APPENDIX
PC-2018

RECORD DRAWINGS

RMTA BRIDGES 63, 64, 65, 66, 67, 68

RMTA System Map

RICHMOND EXPRESSWAY SYSTEM

Scale: 0 1000 2000 3000ft.

63 - Bridge Numbers and RMTA Facilities Shown in Red

RMTA
RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

CITY OWNED GRAVEL LOT

APPROXIMATELY 10,500 S.F. RMTA OWNED STAGING AREA

RMTA OWNED ABANDONED RAMP

RMTA OWNED STAGING AREA

RICHMOND

JOSEPH BRYAN PARK
Toll Booths

BRYAN PARK INTERCHANGE

LABURNUM AVE.

WESTWOOD AVE.

BROOKLAND PARK BLVD.

OVERBROOK RD.

NORTH AVE.

CHAMBERLAYNE AVE.

BROOK RD.

MEADOW

MECHANICSVILLE

Visitor Information Center

The Diamond

Science Museum Of Virginia

VIRGINIA UNION UNIVERSITY

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.

HERMITAGE RD.

RICHMOND PETERSBURG TURNPIKE

HUGUENOT BRIDGE

HUGUENOT ROAD

RIVERSIDE DR.

Williams Island

DOVER RD.

(C & O. RY.)

Section Two Connection To I-195

I-195

Virginia Museum Of Fine Arts

THE BOULEVARD

ROBINSON AVE.

Downtown Expressway Extension

ELWOOD RD

GROVE AVE

FLOYD AVE

MAIN ST

CARY ST

PARKWOOD AVE

IDLEWOOD AVE

MAPLEWOOD AVE

CITY STADIUM

PORTLAND PL.

BOULEVARD INTERCHANGE

Toll Booths

STADIUM INTERCHANGE

GRANT RD.

DOUGLASDALE RD.

WILLIAM BYRD PARK

Water Works

R.F.&P. R.R.

Connection to Downtown Expressway

Section One

Section Three

MAYMONT PARK

WILLOW OAKS COUNTRY CLUB

FOREST HILL AVE.

Toll Booths

POWHITE BRIDGE OVER THE JAMES RIVER

Toll Plaza

Powhite Parkway State Rte 76

Toll Plaza (SB)

Toll Plaza (NB)

FOREST HILL AVE. INTERCHANGE

Powhite Parkway Extension (VDOT Toll Road)

CHIPPENHAM PARKWAY INTERCHANGE

CHIPPENHAM PARKWAY

BLILELY RD.

JAHNKE RD.

SEABOARD COAST LINE CSX RAILWAY

(SOUTHERN RAILWAY)

WESTOVER HILLS BLVD.

BOULEVARD BRIDGE 7500# Limit

CSX RAILWAY

NORFOLK SOUTHERN (SOUTHERN RAILWAY)

FOREST HILL PARK

SEMMES AVE.

HULL ST.

COMMERCE RD.

MAURY ST.

Section Four Downtown Expressway

MT. CALVARY CEMETERY

RIVERVIEW CEMETERY

HOLLYWOOD CEMETERY

COLORADO AVE.

Toll Plaza

Toll Booths

Downtown Expressway State Rte. 195

MEADOW ST.

ALLEN AVE.

LAKEVIEW AVE.

RANDOLPH ST.

HARRISON ST.

CHERRY ST.

LAUREL ST.

BELVIDERE

FRANKLIN ST.

GRAYLAND AVE.

Toll Plaza

Monroe Park

The Mosque

Public Library

COLISEUM

City Hall

Med. Col. Of Va. (VCU)

STATE CAPITOL

Shockoe Slip Historic District

Chamber of Commerce

State Penetentiary

MAIN ST. STATION

Toll Booths

DOWNTOWN I-95 INTERCHANGE

JAMES RIVER BRIDGE

ROBERT E. LEE BRIDGE

MAYOS BRIDGE

MANCHESTER BRIDGE

Virginia Commonwealth University

LEIGH ST.

ADAMS ST.

MAIN ST.

CANAL ST.

BROAD ST.

MARSHALL ST.

CLAY ST.

MOSBY ST.

17th ST.

18th ST.

25TH ST.

CARRINGTON ST.

NINE MILE RD.

FAIRFIELD AVE.

Toll Booths

Chimborazo Park

SOUTHERN RAILWAY

CSX RAILWAY

RMTA

RMTA

RMTA

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

RICHMOND EXPRESSWAY SYSTEM
CONTRACT NO. PC – 2018
PROTECTIVE COATING OF STRUCTURES
****

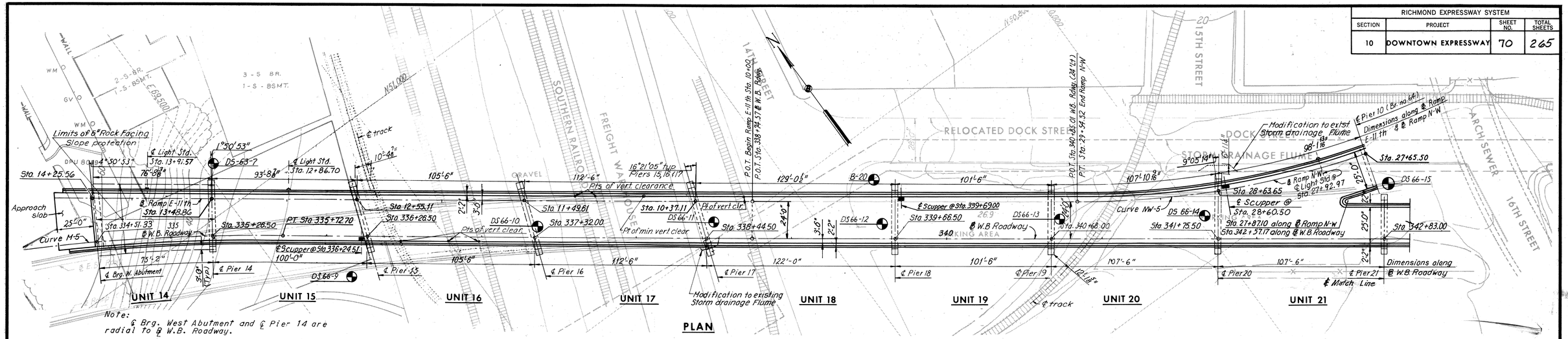
Bridge 63

Downtown Expressway

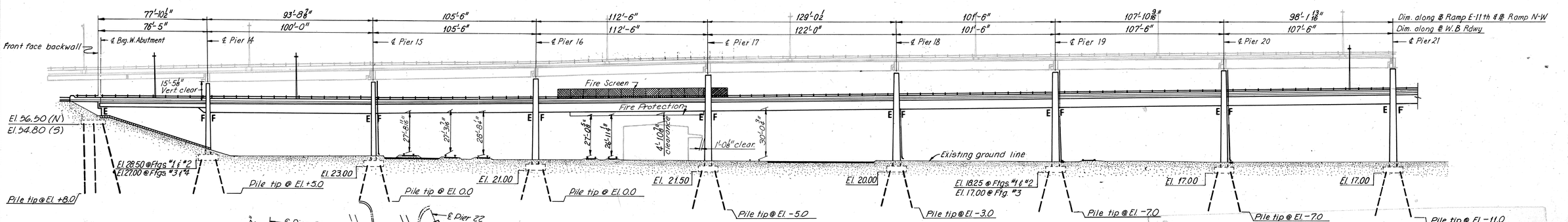
12th St. - R.R. Tracks and 16th St.

RECORD SET PLANS (Next 25)

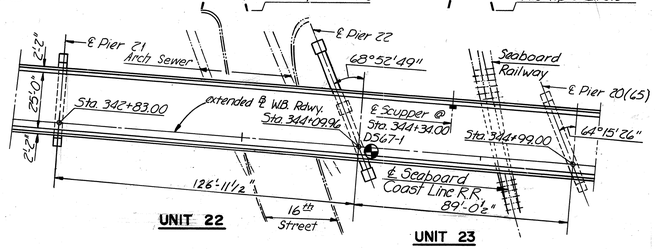
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	70	265



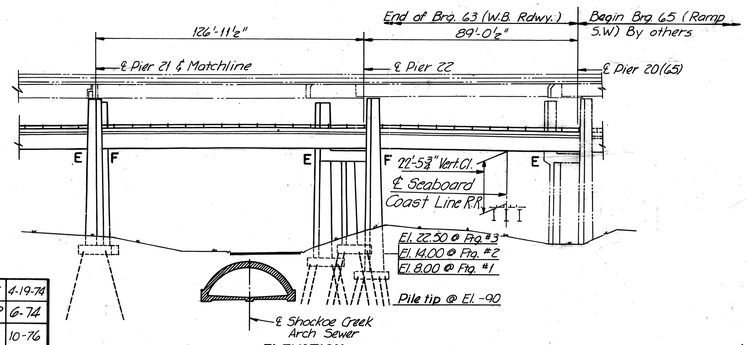
PLAN



ELEVATION



PLAN



ELEVATION

℄ W.B. Roadway	
Curve: M-5	
P.I.	= Sta. 334+26.15
Δ	= 11°45'56"
D	= 4°00'
T	= 147.59'
L	= 294.14'
R	= 1432.40'

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

HORIZONTAL CURVE DATA

Notes:
For Estimated quantities and General Notes see Sheet 2.
For Boring Logs see Sheets 26 thru 29.
For Layout of Pier 10(64) see Bridge No. 64 (Ramp N-W) Sheet 3.
⊕ Indicates boring location.
Footing numbers (1,2, etc.) on each pier go from North to South.
For Profile Grade Data see Sheet 2.

INDEX

	BY	DATE
MADE	Y.C.P	1-9-69
CHECKED	J.D.	3-13-69
IN CHARGE	FKD	

NO.	REVISION	BY	DATE
1	Joint Type & Rail-Road Name Added	PRM℄	4-19-74
2	Seaboard & Coast Line Added To Elev.	K.D.P	6-74
3	As Built	TEM	10-76

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
GENERAL PLAN AND ELEVATION

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

SCALE: 1" = 30'
CONTRACT NO.: 10
SHEET NO. 1 OF 29

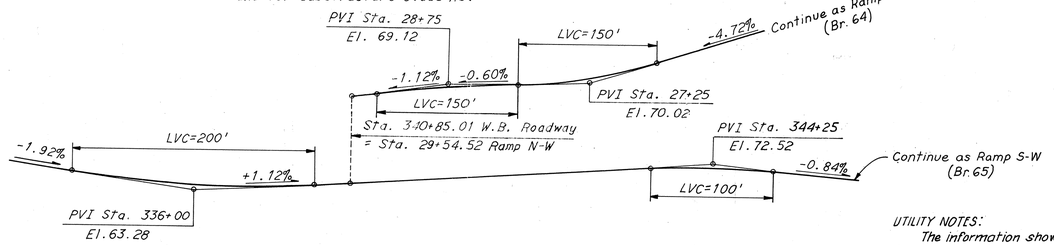
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	71	265

ESTIMATED QUANTITIES

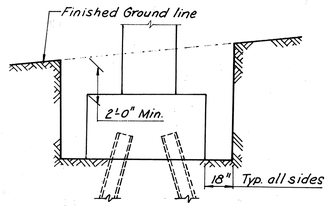
	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (T-Rail) Lin. Ft.	Porous Backfill Cu. Yds.	Underdrain 6" Dia. Pipe Lin. Ft.	Steel Piles 10BP42 Lin. Ft.	Asphalt Damp proofing Sq. Yds.
Superstructure	---	1,246.9	277,890	964,800	349,300	2,157	---	---	--	-
Substructure	2,043	1,881.7	351,080	---	---	---	8	54	9,630	27
Total	2,043	3,128.6‡	628,970	964,800	349,300	2,157	8	54	9,630	27

	Approach Slab Concrete (‡) Cu. Yds.	Fire Protection Insulation Lump Sum	Fire Screen Lin. Ft.	Approach Slab Reinforcing Steel Lbs.	Metal Conduit Lin. Ft.		Bridge Drainage Metal Work Lbs.	Rock Facing Slope Prot. Sq. Yds.	Modifications to Storm Drain. Flume Cu. Yds.
Superstructure	---	1	209	---	464		9,210	---	-
Substructure	51.8	-	---	11,120	--		---	352	123
Total	51.8 ‡	1	209	11,120	464		9,210	352	123

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



℄ W.B. ROADWAY, RAMPS N-W AND S-W
PROFILE GRADE DATA



LIMITS OF STRUCTURE EXCAVATION

GENERAL NOTES:

Roadway: One variable width roadway transitioning from Ramps N-W and S-W (Bridges No. 64 and 65) into W.B. Roadway and Ramp E-11th.

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

Specifications: GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973, modified by Special Design provisions.
WELDING: 1972 Structural Welding Code of the American Welding Society

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

Datum: City of Richmond

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

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

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

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

Concrete Notes: Concrete in superstructure shall be Class A-4. All other concrete shall be Class A-3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and/or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing concrete surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing 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. All reinforcing steel shall be deformed bars conforming to ASTM Designation A615 Grade 40.

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

UTILITY NOTES:
The information shown on these drawings concerning type and location of underground utilities is not guaranteed to be accurate or all inclusive. The Contractor is responsible for making his own determinations as to the type and location of underground utilities as may be necessary to avoid damage thereto.

SUBSURFACE NOTES:
The subsurface information shown on these drawings was obtained solely for use in establishing design controls for the project.
The accuracy of this information is restricted solely to that noted at the actual boring locations.
Any projection of this subsurface data either between borings or beyond the limit of the borings is purely interpretive and should not be construed as that representing the actual conditions to be encountered during construction.

	BY	DATE				
MADE	J.D	2-24-69				
CHECKED	P.T.A	4-29-69	1	As Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

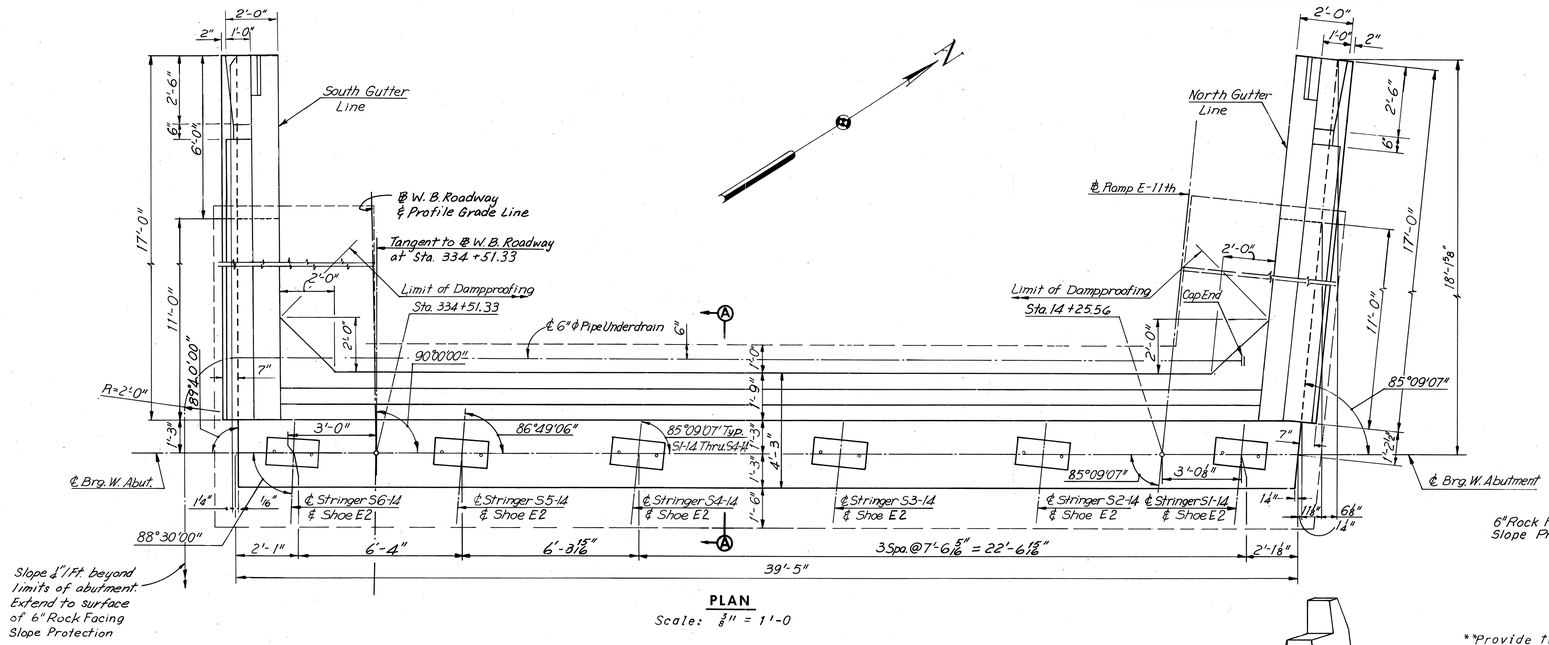
BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

QUANTITIES

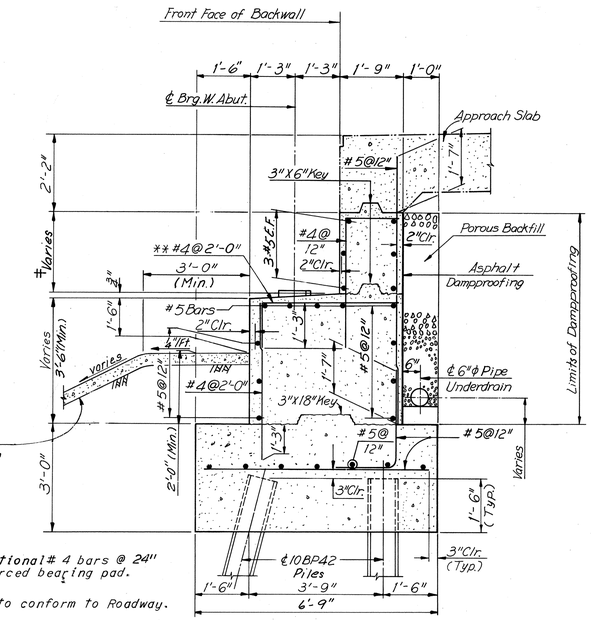
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 2 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	72	265



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

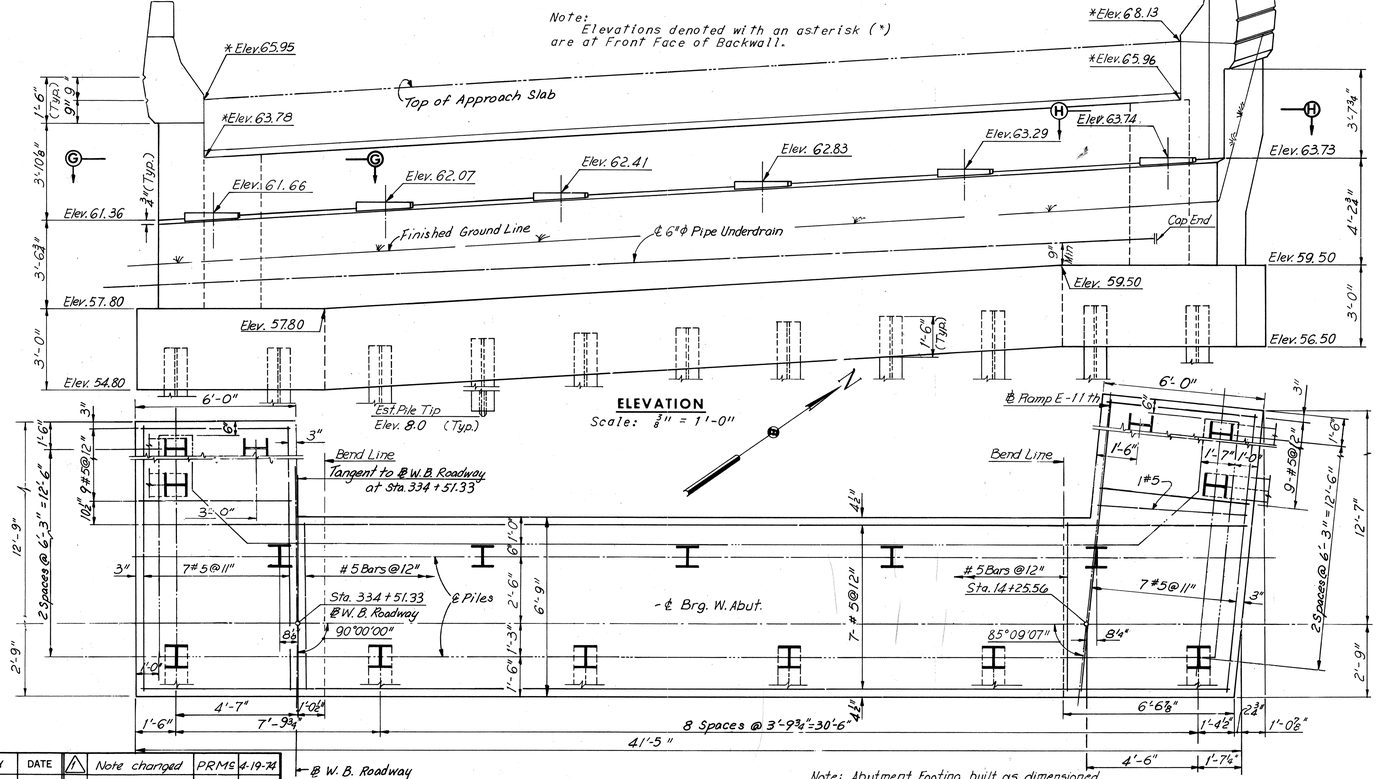


** Provide two additional # 4 bars @ 24" at each unreinforced bearing pad.

‡ Top of backwall to conform to Roadway.

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

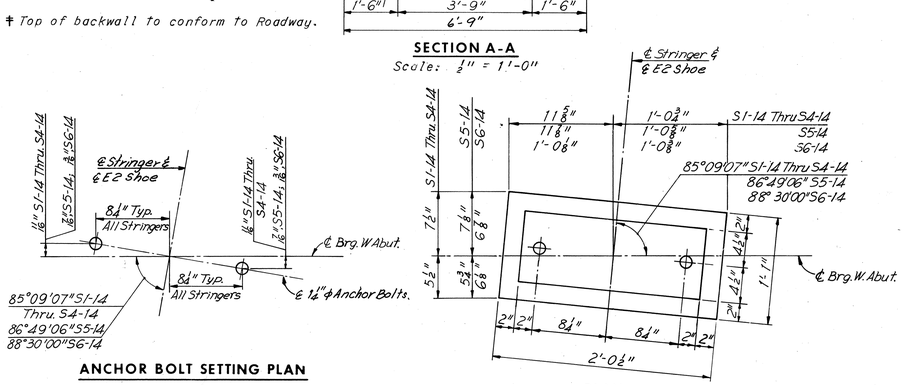
Note:
Elevations denoted with an asterisk (*) are at Front Face of Backwall.



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

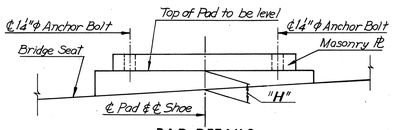
FOOTING
Scale: 3/8" = 1'-0"

Note: Abutment footing built as dimensioned about called ℄ Footing
Abutment built as dimensioned about ℄ Brg.



ANCHOR BOLT SETTING PLAN

PLAN



PAD DETAILS
Scale: 1½" = 1'-0"

Note:
Pads with height "H" of 4" or less shall not be reinforced.

Note:
All piles shall be 10BP42 steel piles. (Design Capacity = 45 Tons)
Batter piles 3" per foot where shown.
For Steel Pile Details, see Sheet 4.
For Wingwall Details, see Sheet 4.
For Section G-G and Section H-H, see Sheet 4.
For Framing Plan, see Sheet 12.
Estimated Pile Tip Elevation = 8.0

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

Note:
For architectural treatment of abutments and wingwalls, see Sheet 57.

	BY	DATE
MADE	A.H.H	6-22-68
CHECKED	G.C.C	8-17-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note changed	PRMS	4-19-71
2	As Built	TEM	10-76

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

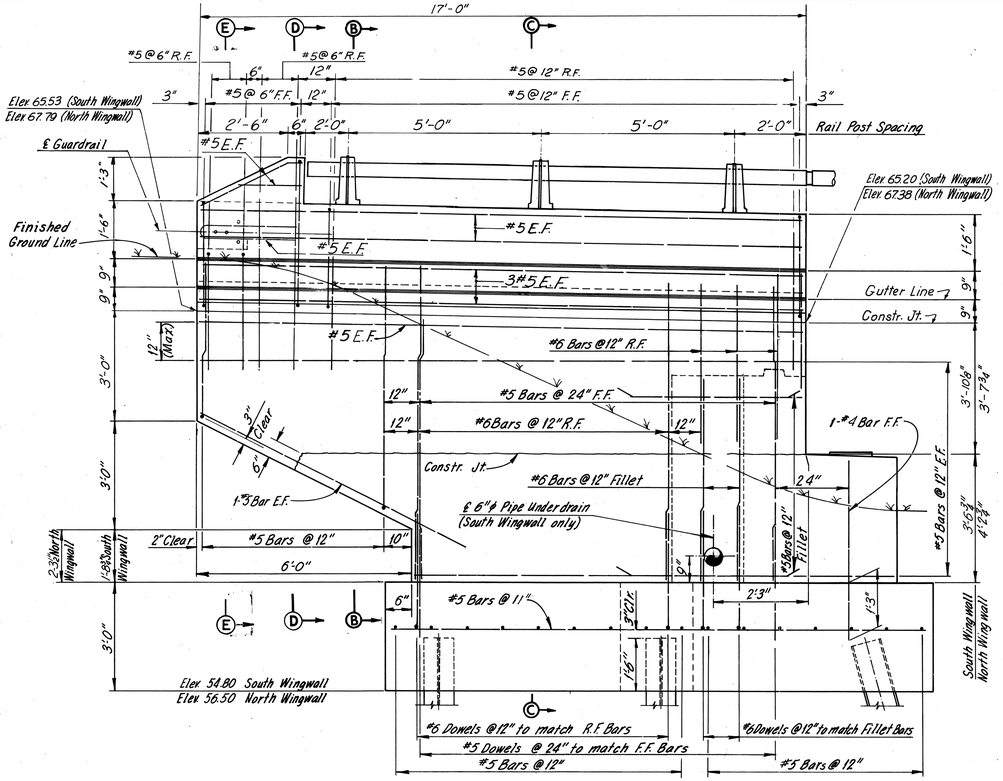
BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

WEST ABUTMENT

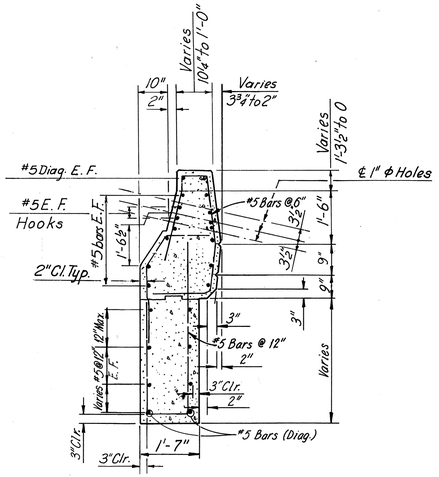
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 3 OF 29

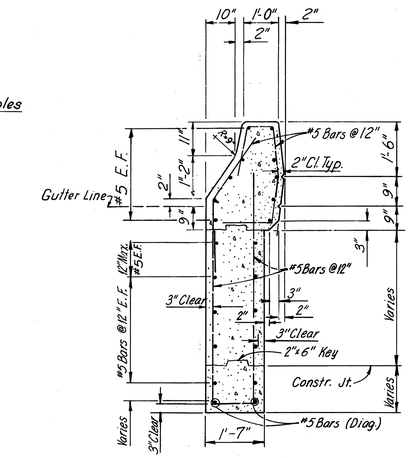
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	73	265



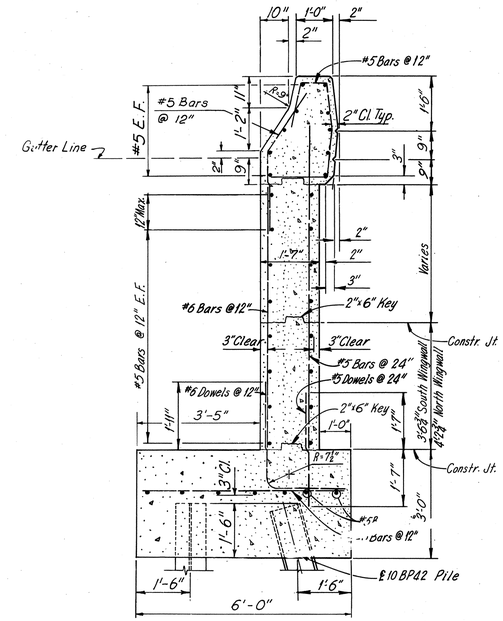
SOUTH WINGWALL ELEVATION
(North Wingwall Similar)
Scale: $\frac{1}{2}$" = 1'-0"



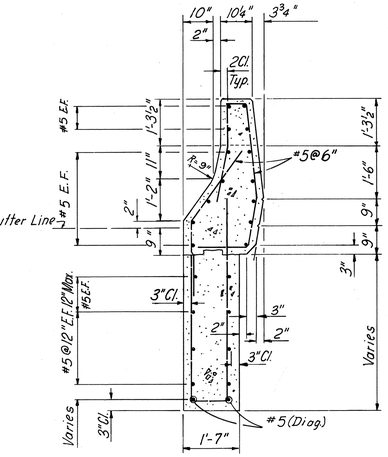
SECTION E-E
Scale: $\frac{1}{2}$" = 1'-0"



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



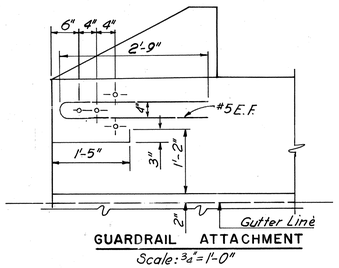
SECTION C-C
Scale: $\frac{1}{2}$" = 1'-0"



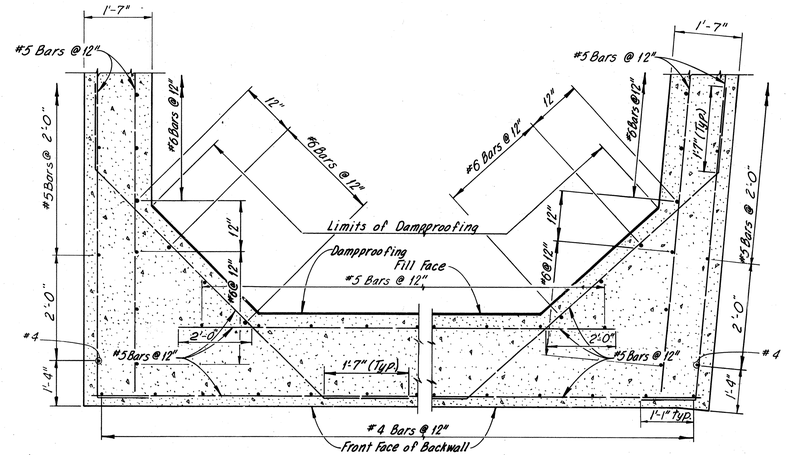
SECTION D-D
Scale: $\frac{1}{2}$"=1'-0"

Fully Butt Weld All Around

PILE SPLICE



GUARDRAIL ATTACHMENT
Scale: $\frac{3}{4}$"=1'-0"



SECTION G-G
Scale: $\frac{3}{4}$" = 1'-0"

SECTION H-H
Scale: $\frac{3}{4}$" = 1'-0"

FILLET DETAILS

Note:
All piles shall be 10BP42 steel piles (Design Capacity =45 Tons).
Batter piles 3" per foot where shown.
Estimated pile tip Elev. 8.
For West Abutment, see Sheet 3 .
For Standard Handrail details, see Sheet S3.
For location of Section G-G and Section H-H, see Sheet 3.
For architectural treatment of Abutments and Wingwalls, see Sheet 57.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.	6-21-68	2	As Built	TEM	10-76
CHECKED	AHH	8-28-68		Note changed	PRMC	4-19-70
IN CHARGE						

AS BUILT

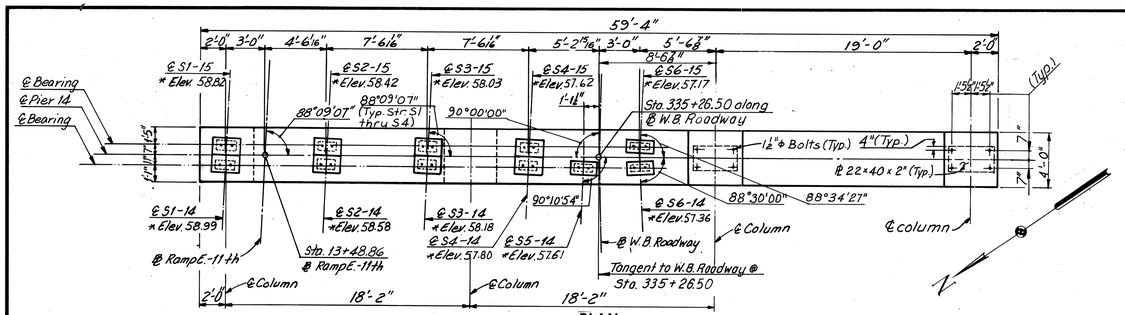
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
WEST ABUTMENT DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 4 OF 29

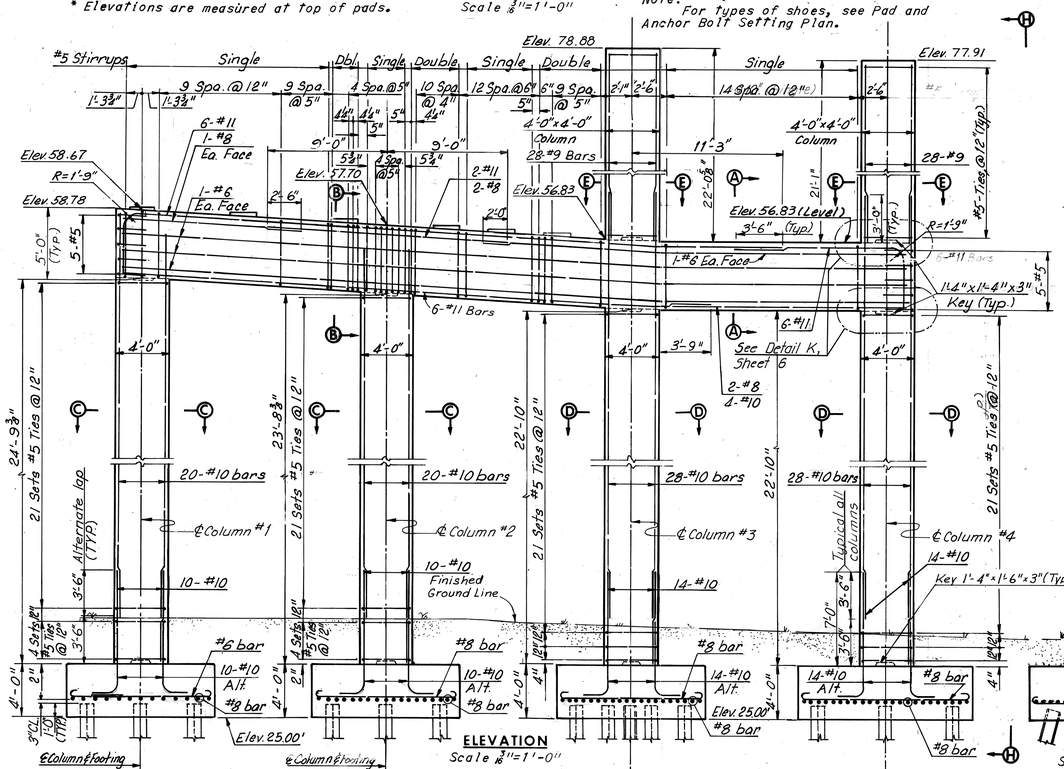
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	74	265



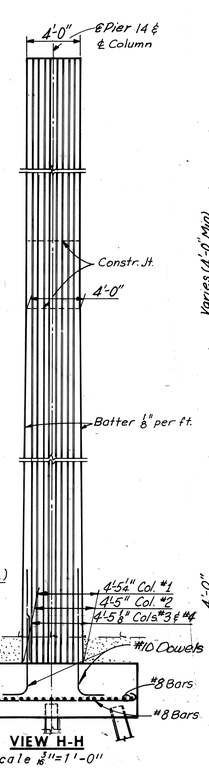
PLAN
Scale 3/8"=1'-0"

* Elevations are measured at top of pads.

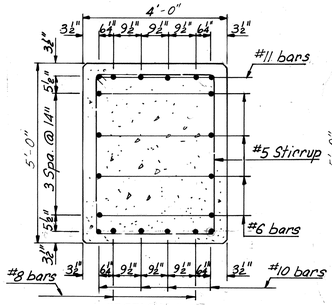
Note: For types of shoes, see Pad and Anchor Bolt Setting Plan.



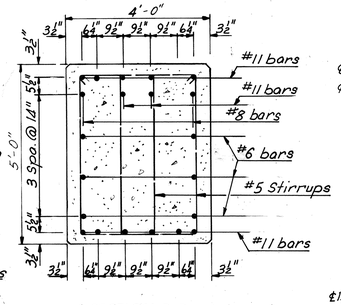
ELEVATION
Scale 3/8"=1'-0"



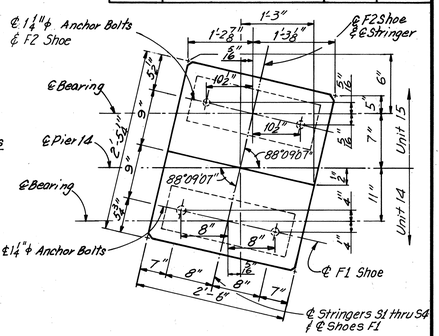
VIEW H-H
Scale 3/8"=1'-0"



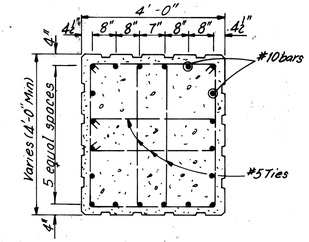
SECTION A-A
Scale 1/2"=1'-0"



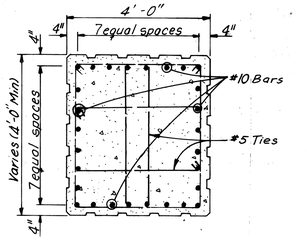
SECTION B-B
Scale 1/2"=1'-0"



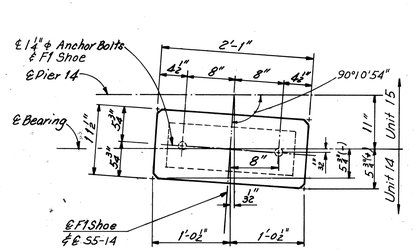
(Stringer S1 Thru S4)



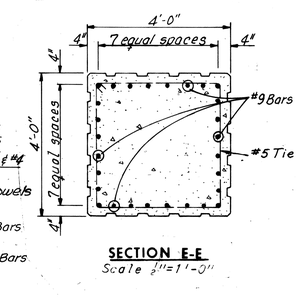
SECTION C-C
Scale 1/2"=1'-0"



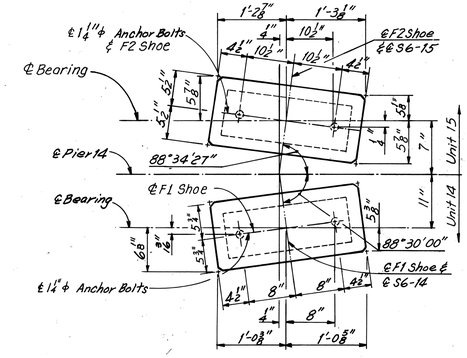
SECTION D-D
Scale 1/2"=1'-0"



(Stringer S5-14 only)

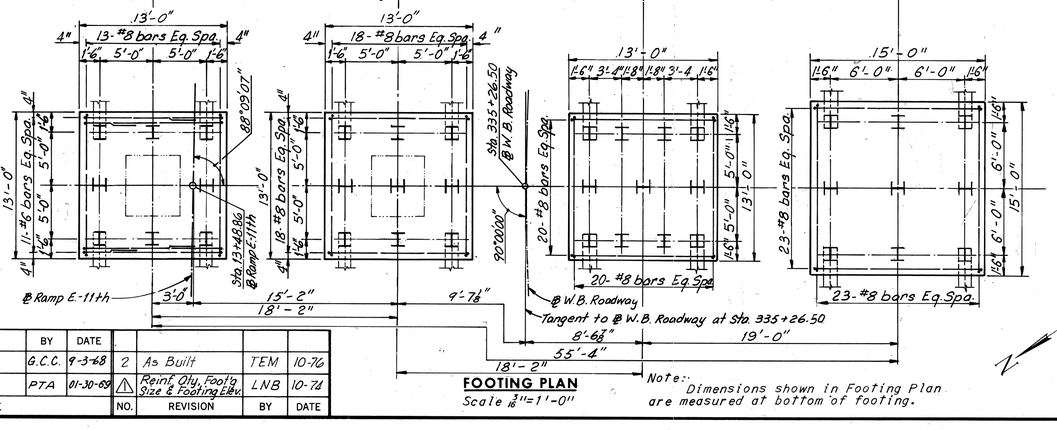


SECTION E-E
Scale 3/4"=1'-0"



(Stringer S6 only)

PAD AND ANCHOR BOLT SETTING PLAN
No Scale



FOOTING PLAN
Scale 3/16"=1'-0"

Note: Dimensions shown in Footing Plan are measured at bottom of footing.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons), for Details see Sheet 6.
Batter all piles 3" per foot where shown.
For Shoe details, see Sheets S1 to S2.
For Framing Plan, see Sheet 12.
Estimated Pile Tip Elevation 5.0

Note:
For architectural treatment of columns, see Standard Architectural Details Sheet S7

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.C.C.	9-3-68	2	As Built	TEM	10-76
CHECKED	PTA	01-30-69	1	Reinf. Qty., Foot'g Size & Footing Elev.	LNB	10-74
IN CHARGE						

AS BUILT

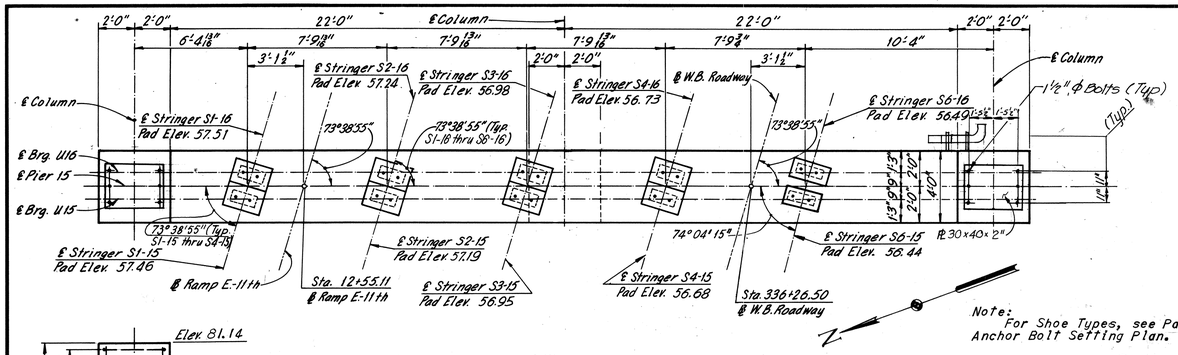
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 14

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

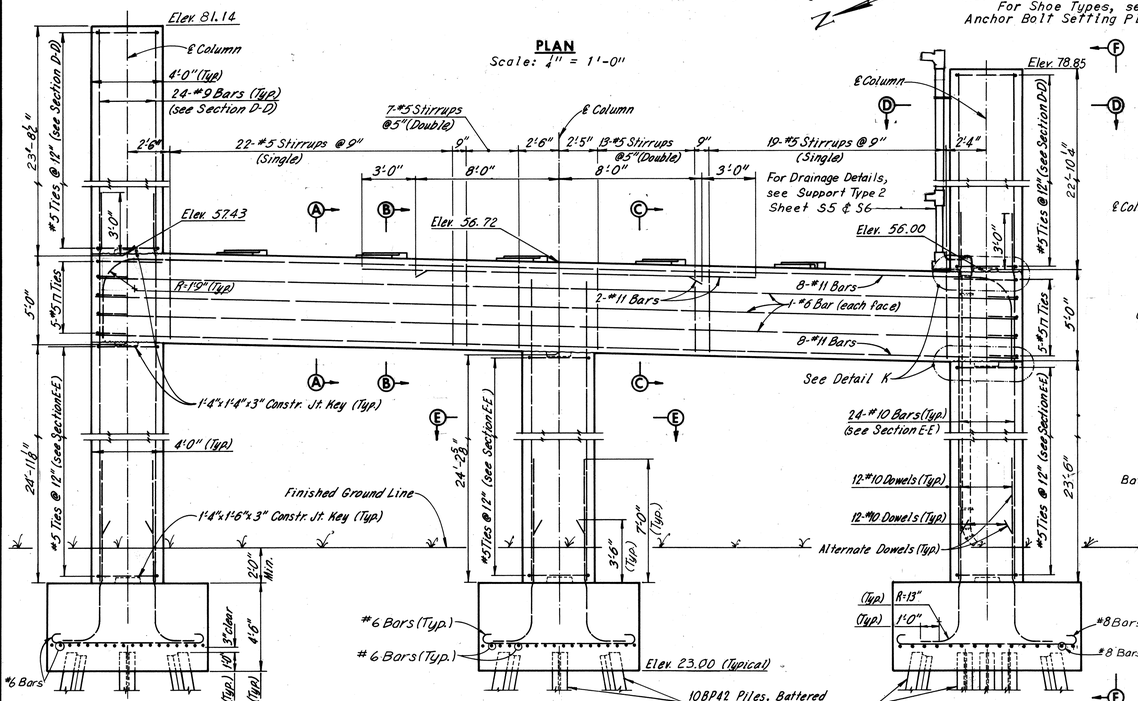
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	75	265

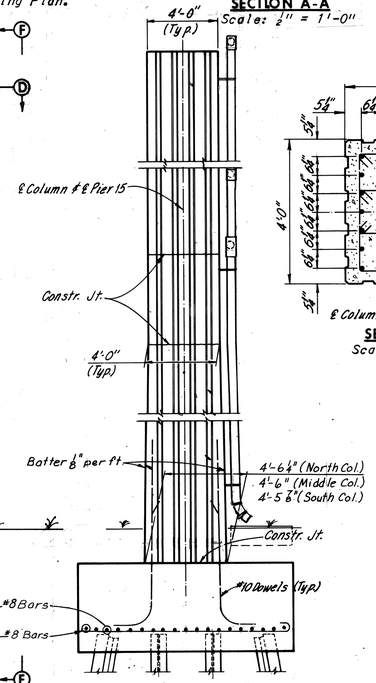


Note: For Shoe Types, see Pad and Anchor Bolt Setting Plan.

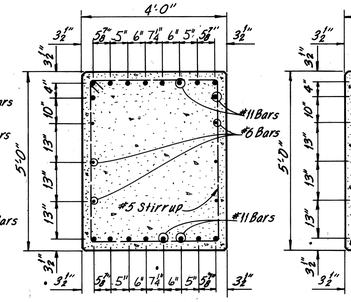
PLAN
Scale: 1/4" = 1'-0"



ELEVATION
Scale: 1" = 1'-0"

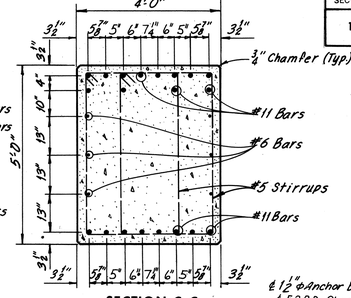


VIEW F-F
Scale: 1" = 1'-0"

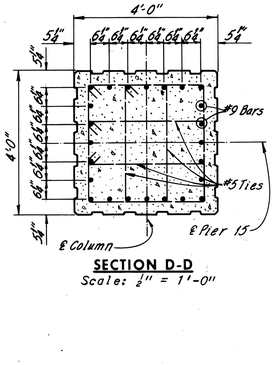


SECTION A-A
Scale: 1" = 1'-0"

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

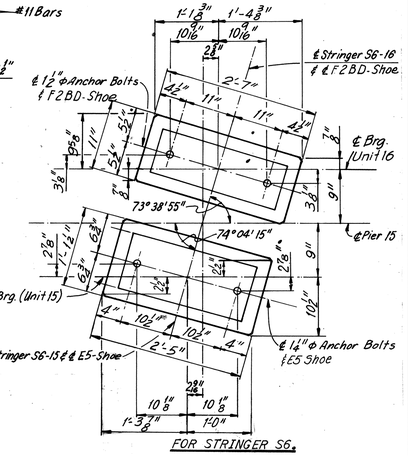


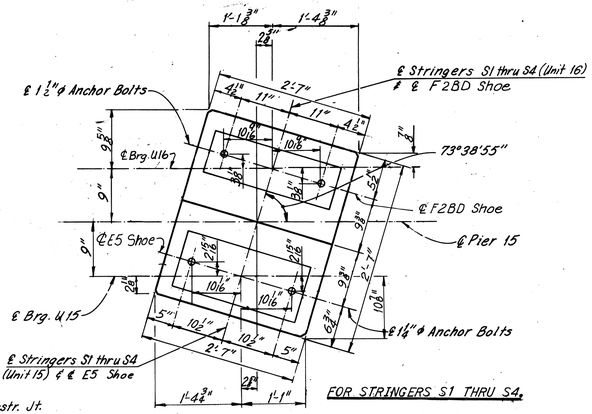
SECTION C-C
Scale: 1" = 1'-0"



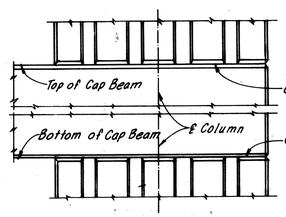
SECTION D-D
Scale: 1" = 1'-0"

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

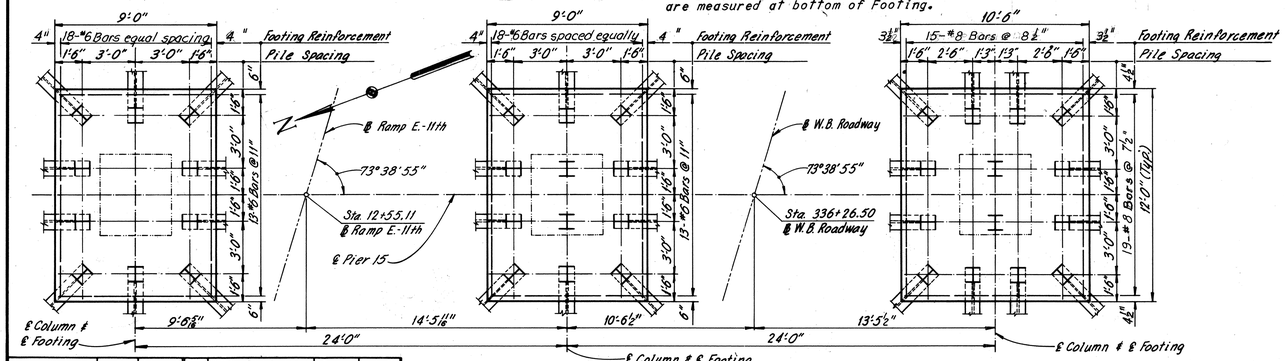




PAD AND ANCHOR BOLT SETTING PLAN
No Scale



DETAIL K
No Scale



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

Note: Dimensions in Footing Plan are measured at bottom of Footing.

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

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Shoe details, see Sheets S1 & S2
For Framing Plan, see Sheet 12.
Estimated Pile Tip Elevation 0.0
For Architectural treatment of Colums, see Sheet S7

AS BUILT

	BY	DATE				
MADE	D.E.S.	11-4-68				
CHECKED	J.D.	1-31-69	1	As Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

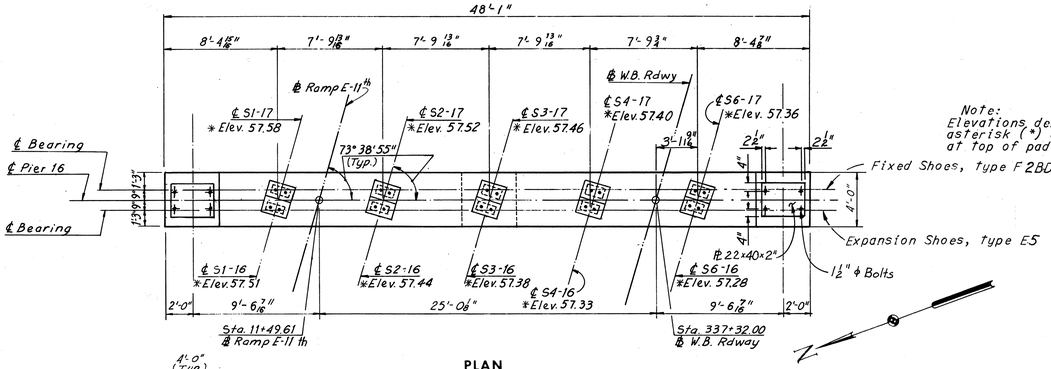
BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 15

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 6 OF 29

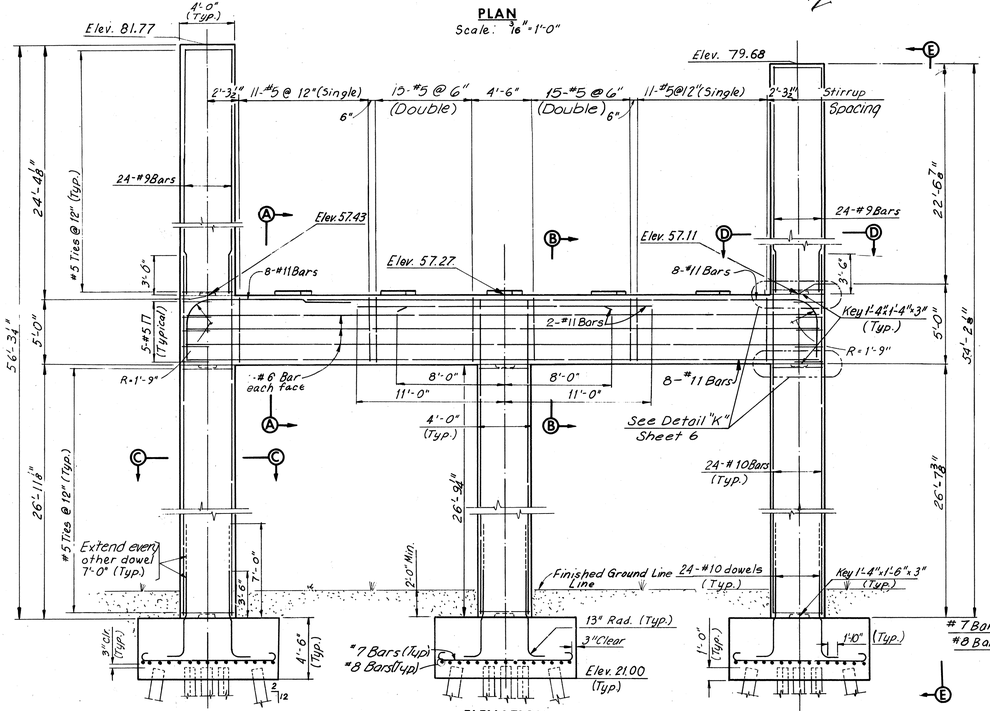
1028-22-10-003-853

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	76	265

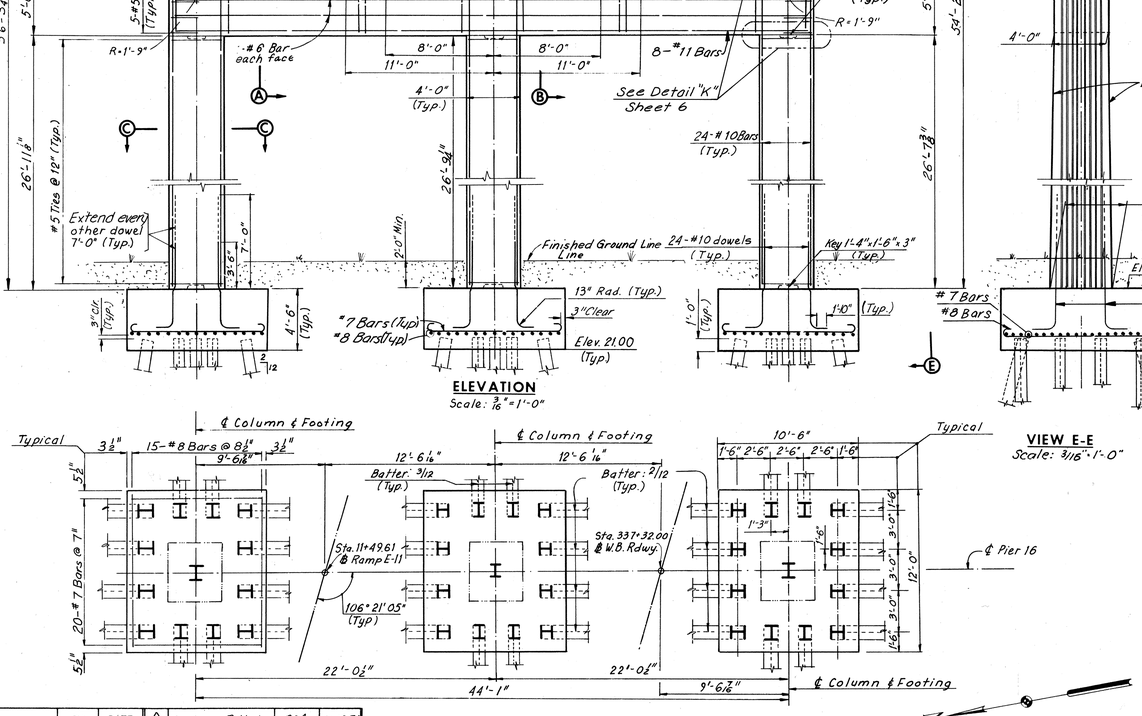


PLAN
Scale: 3/16"=1'-0"

Note:
Elevations denoted with an asterisk (*) are elevations at top of pad and at ℄ Bearing.

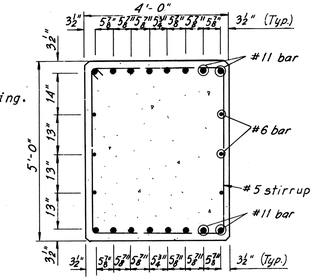


ELEVATION
Scale: 3/16"=1'-0"

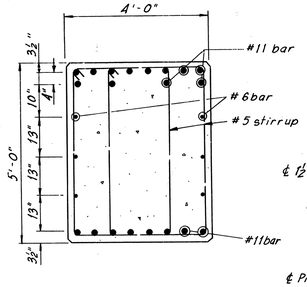


FOOTING PLAN
Scale: 3/16"=1'-0"

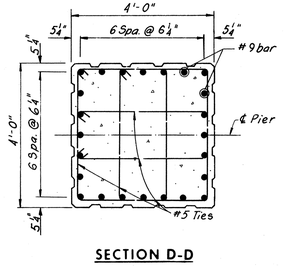
Note:
Dimensions given in Footing Plan are measured at bottom Footing.



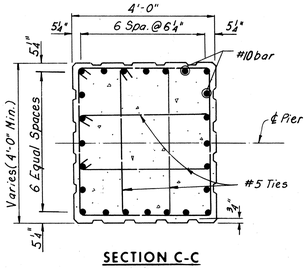
SECTION A-A
Scale: 1/2"=1'-0"



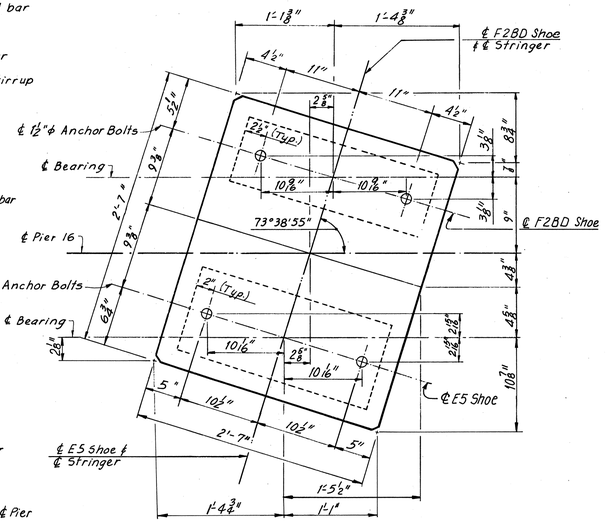
SECTION B-B
Scale: 1/2"=1'-0"



SECTION D-D
No Scale



SECTION C-C
No Scale



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

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

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

Note:
All piles shall be 10BP42 Steel Piles (Design Capacity = 45 tons).
Batter piles 3" or 2" per foot where shown.
For Shoe Details, see Sheets 31 & 32
For Steel Pile Details, see Sheet 11,
For Framing Plan, see Sheets 12 & 13.
Estimated Pile Tip elevation 0.0
For Architectural Treatment of columns, see Sheet 8-7.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.	11-7-68	2	As Built	TEM	10-16
CHECKED	PTA	01-23-69				
IN CHARGE				Anchor Bolt loc.	REB	11-13-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 16

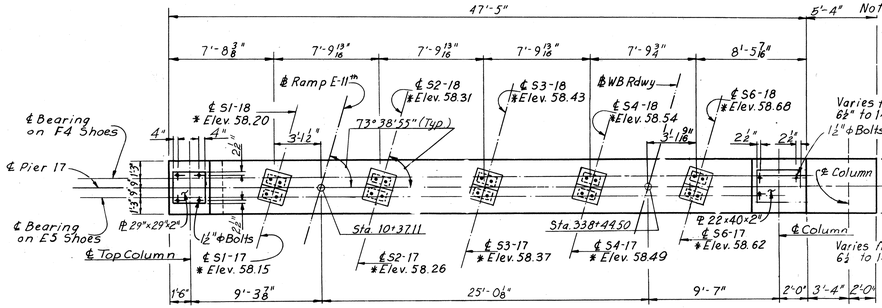
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

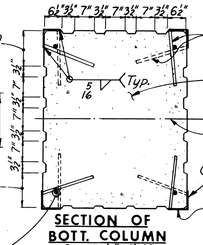
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 7 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	77	265

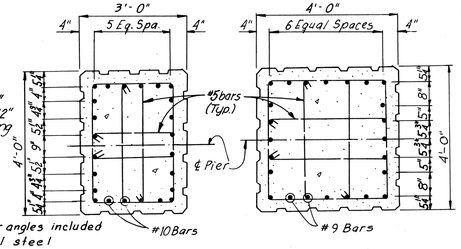
Note: All piles shall be HP12x53 Steel Piles (Design capacity = 58 tons).

For Shoe Details, see Sheets S1 & S2
Pile Tip elevation = -5.0'
For Framing Plan see Sheet 13.
For Steel Pile Details, see Sheet 11.
For architectural treatment of Columns, see Sheet S7.



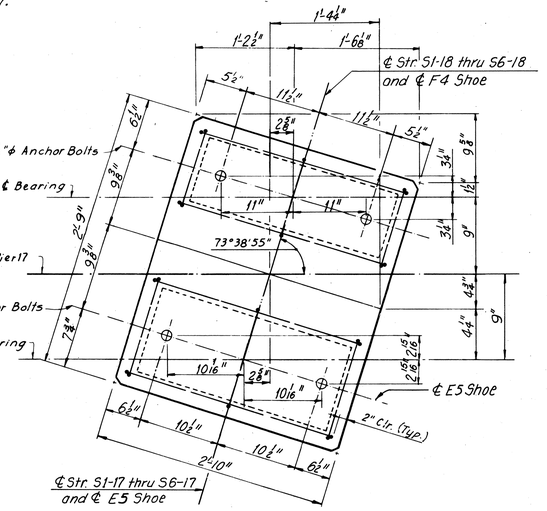


SECTION OF BOTT. COLUMN
Scale: ½"=1'-0"

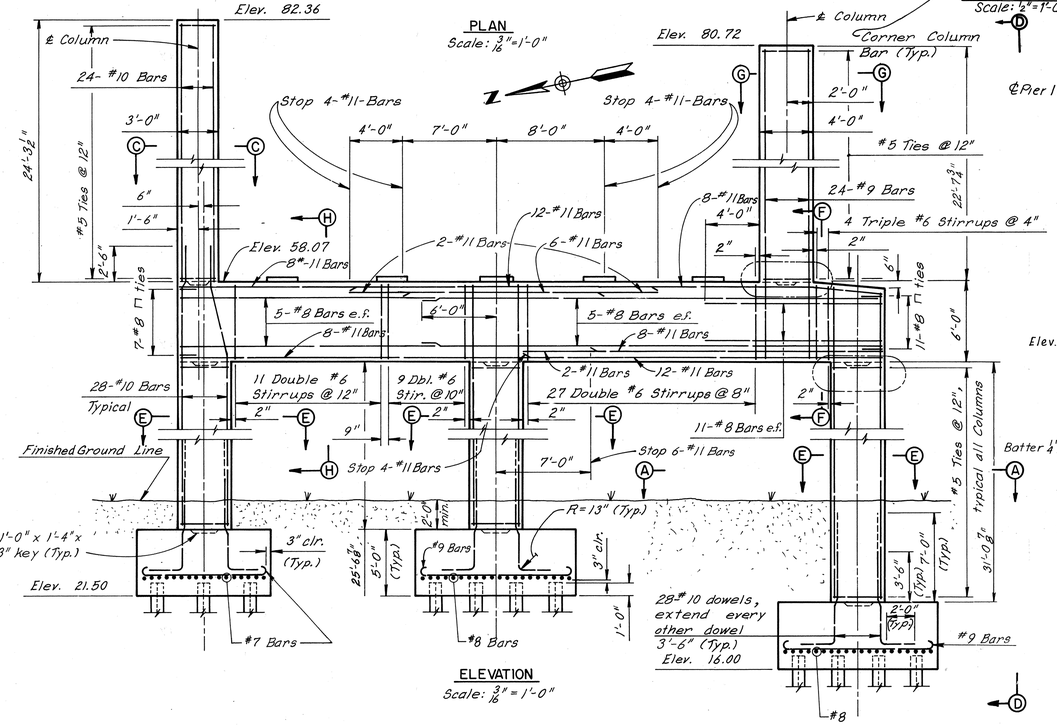


SECTION C-C
Scale: ½" = 1'-0"

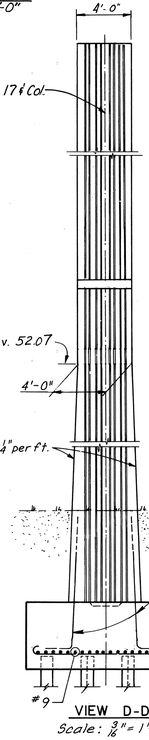
SECTION G-G
Scale: ½"= 1'-0"



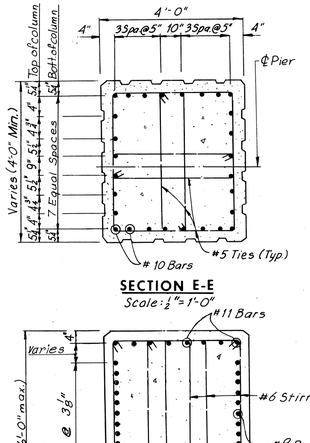
PAD AND ANCHOR BOLT SETTING PLAN
No Scale



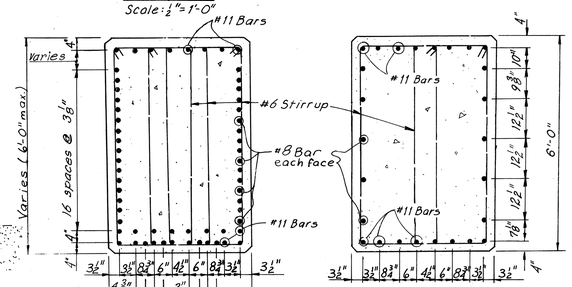
ELEVATION
Scale: 3/16"=1'-0"



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



SECTION E-E
Scale: ½"=1'-0"



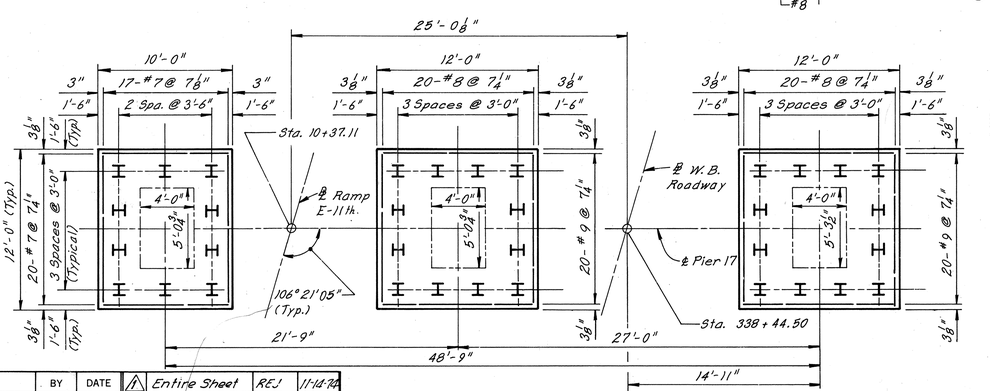
SECTION H-H
Scale: ½"=1'-0"

SECTION F-F
Scale: ½"=1'-0"

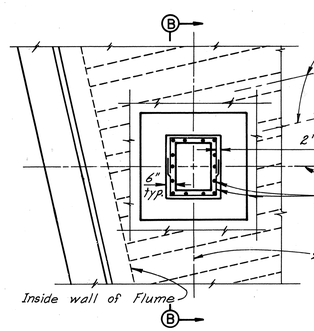
Note: Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical Shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.
Bottom elevation of Flume must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

PAD ELEVATION VIEW
No Scale

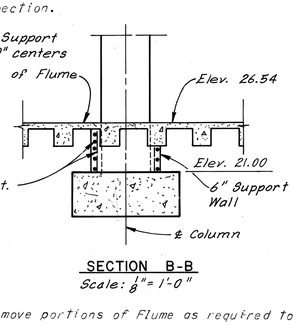
Note: Pads with height "H" of 4" or less shall not be reinforced.



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



VIEW A-A
Scale: ⅜"=1'-0"



SECTION B-B
Scale: ⅜"=1'-0"

Note: Remove portions of Flume as required to build Footing and Column, then replace removed portions of Flume around Column partially supported by 6" support wall as shown in View A-A.

	BY	DATE				
MADE	REJ	11-6-74	2	As Built	TEM	10-76
CHECKED	DMG	11-14-74				
IN CHARGE			NO.	REVISION	BY	DATE
			1	Entire Sheet	REJ	11-14-74

AS BUILT

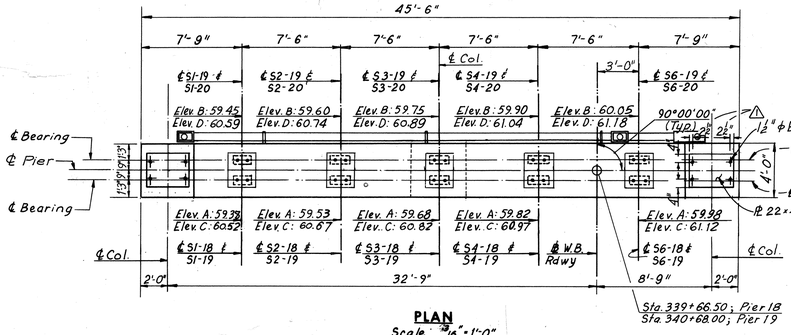
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 17

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

SCALE As Noted
CONTRACT NO. 10
SHEET NO. 8 OF 29

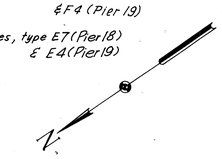
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	78	265

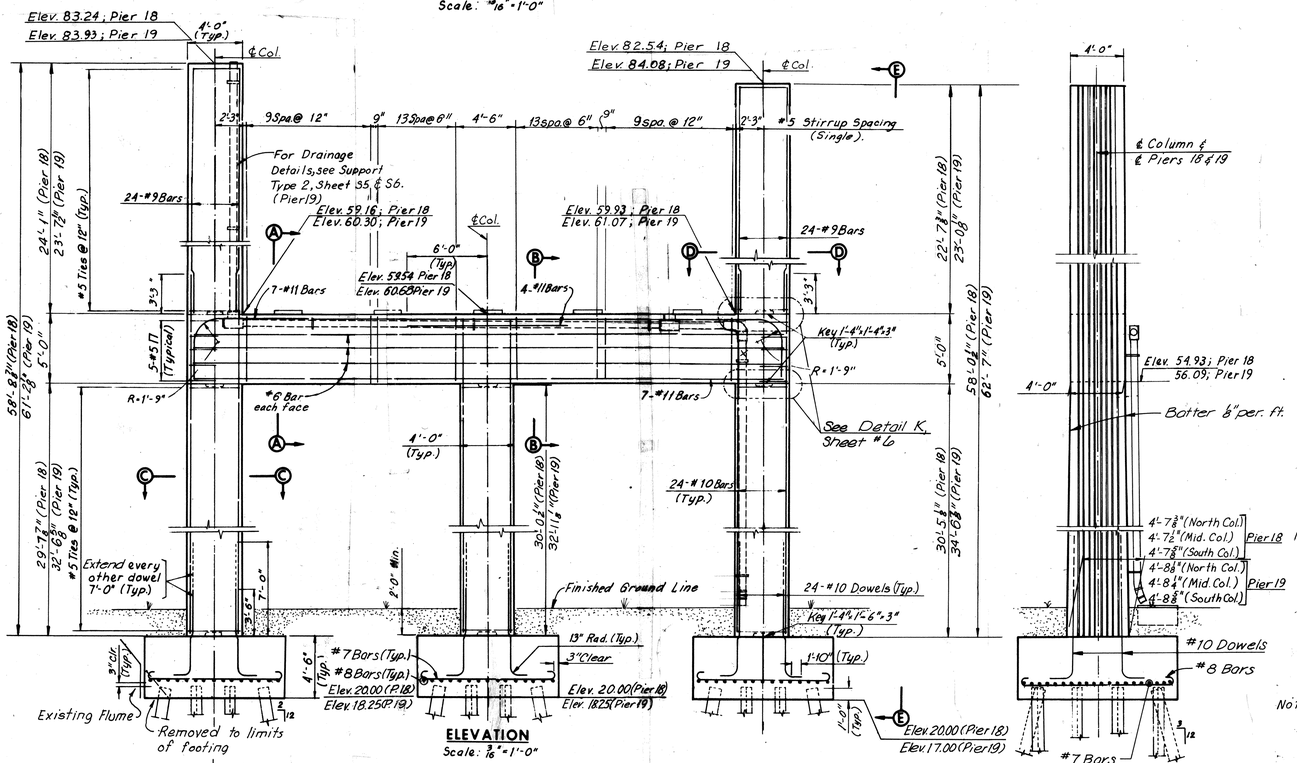


PLAN
Scale: 3/16" = 1'-0"

Note;
Elevations given in plan are elevations at top of Pad and at ℄ Bearing.

Elevation A refers to ℄Brg. Unit 18 @ Pier 18
Elevation B refers to ℄Brg. Unit 19 @ Pier 18
Elevation C refers to ℄Brg. Unit 19 @ Pier 19
Elevation D refers to ℄Brg. Unit 20 @ Pier 19



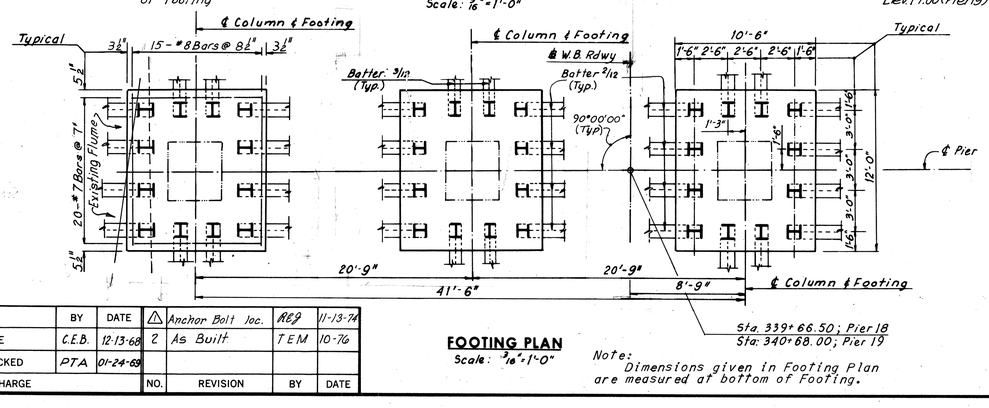


ELEVATION
Scale: 3/16" = 1'-0"

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter piles 3" or 2" per foot where shown.
For Shoe Details, see Sheets S1 and S2.
For Steel Pile Details, see Sheet 11.
Estimated Pile Tip elevations: -3.0 @ Pier 18, -7.0 @ Pier 19.
For architectural treatment of columns, see Sheet 37

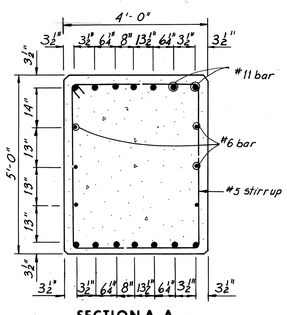
Note:
1) Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.
2) Flume modification at Pier 18 only.

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

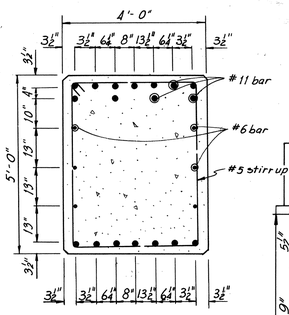


FOOTING PLAN
Scale: 3/16" = 1'-0"

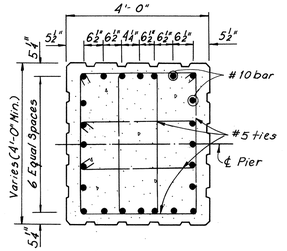
Note:
Dimensions given in Footing Plan are measured at bottom of Footing.



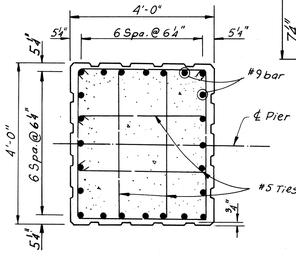
SECTION A-A
Scale 1/2" = 1'-0"



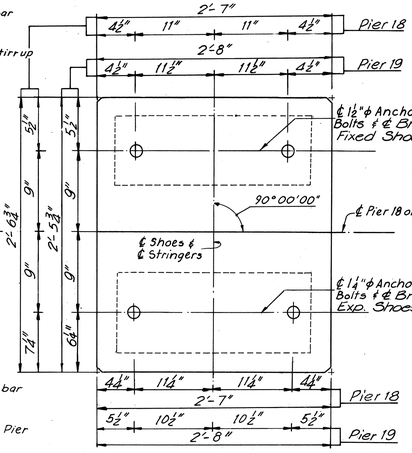
SECTION B-B
Scale 1/2" = 1'-0"



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



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



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.	12-13-68	2	As Built	T.E.M.	10-76
CHECKED	P.T.A.	01-24-69				
IN CHARGE				Anchor Bolt Loc.	R.E.J.	11-13-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 18 AND 19

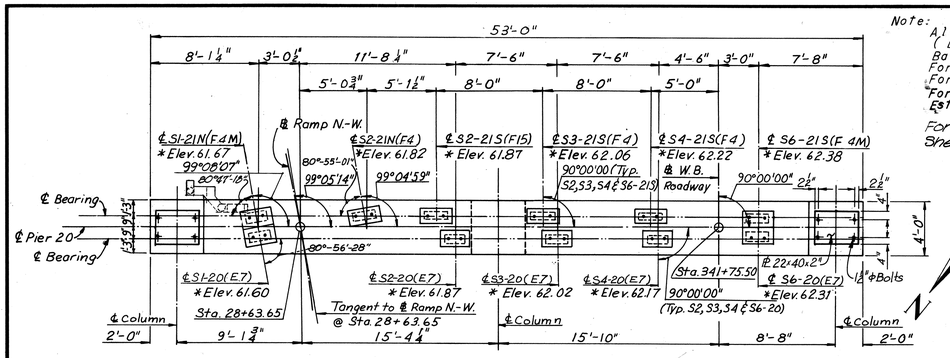
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 9 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	79	265

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter piles 3" or 2" per foot where shown.
For Standard Shoe details, see Sheets S1 & S2.
For Framing Plan see Sheet 14.
For Pile Tip Details, see Sheet 11.
Estimated Pile Tip Elevation -70

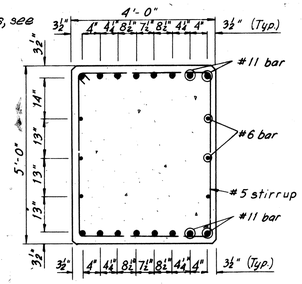
For architectural treatment of columns, see Sheet 57



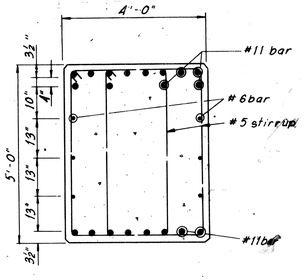
PLAN
Scale: 1/16" = 1'-0"

Note:
Elevations denoted with an asterisk (*) are elevations at top of pad and at ℄ Bearing.

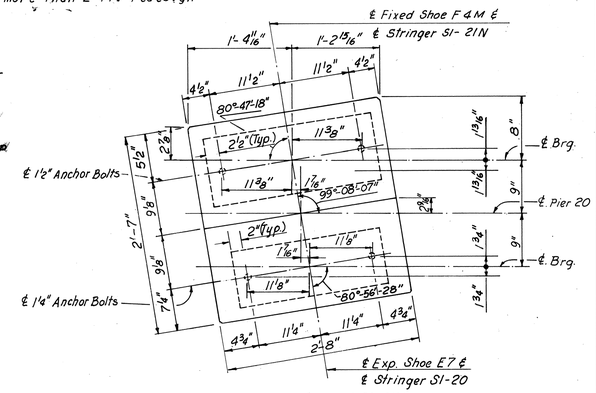
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.



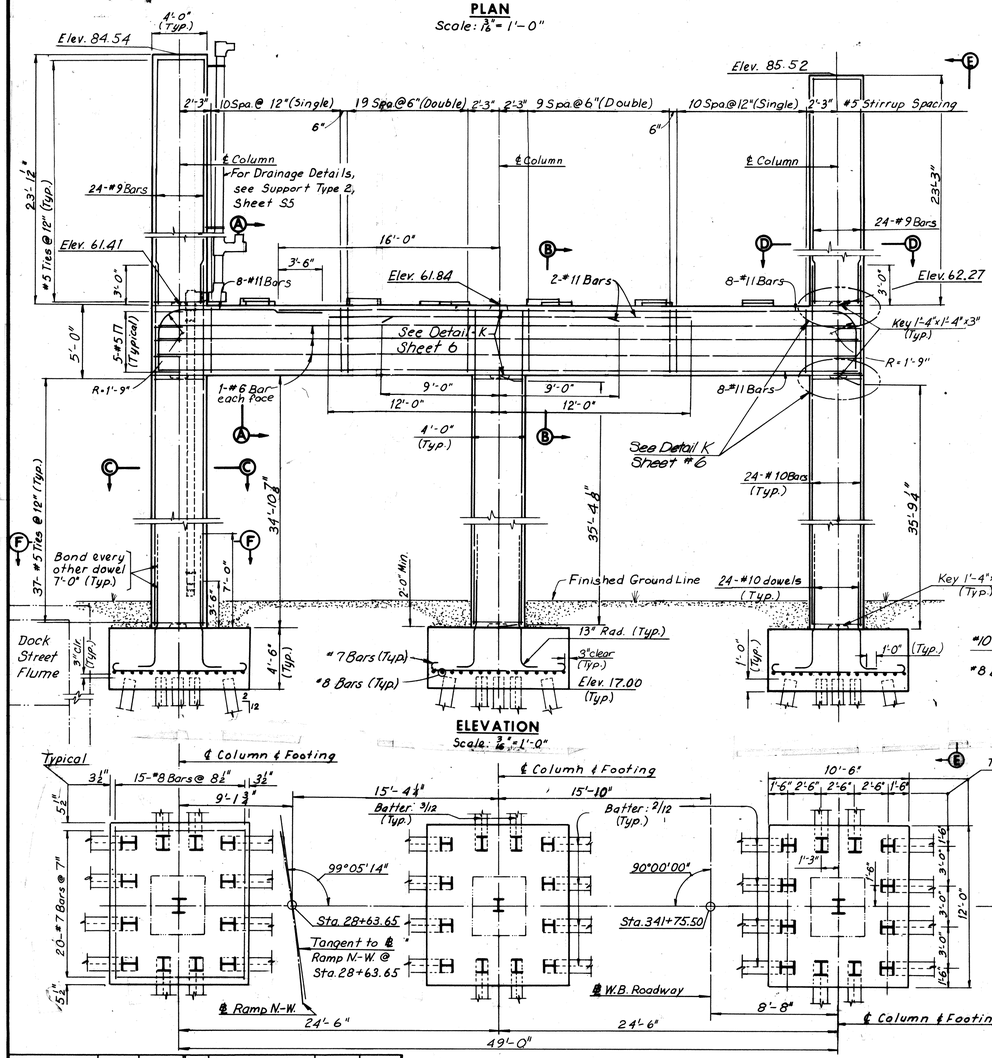
SECTION A-A
Scale: ½" = 1'-0"



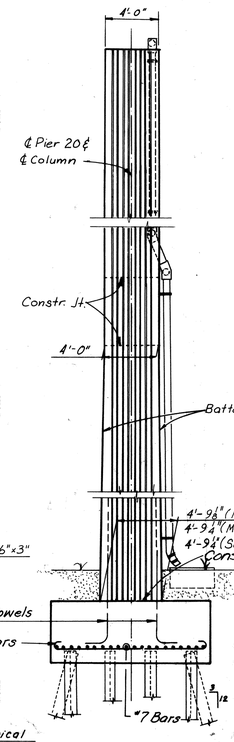
SECTION B-B
Scale: ½" = 1'-0"



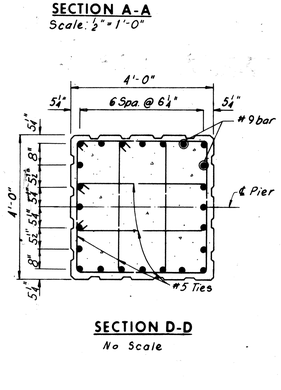
Stringers S1-20 and S1-21N



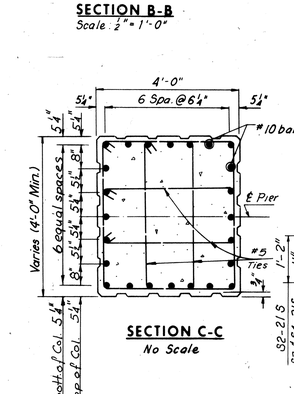
ELEVATION
Scale: 3/16" = 1'-0"



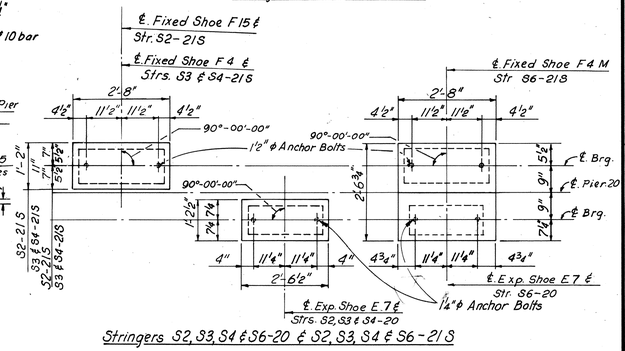
VIEW E-E
Scale: 3/16" = 1'-0"



SECTION D-D
No Scale



SECTION C-C
No Scale



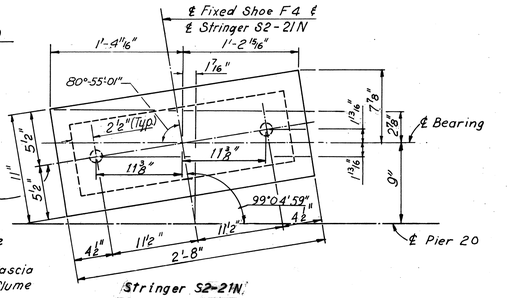
Stringers S2, S3, S4 & S6-20 & S2, S3, S4 & S6-21S

2¾" 2"	11¼"	11¼" 2" 2¾" Exp. Shoe E7(S1 & S6-20)
2" 2"	11¼"	11¼" 2" 2" Exp. Shoe E7(S2,S3,S4-20)
2" 2½"	11½"	11½" 2½" 2" Fixed Shoe F4M (S1-21N & S6-21S)
2" 2½"	11½"	11½" 2½" 2" Fixed Shoe F4 (S2-21N, S3,S4-21S)
2" 2½"	11½"	11½" 2½" 2" Fixed Shoe F15(S2-21S)

Masonry ℄
Top of Cap Beam
℄ Stringer
2½" Typ.
1" Min.

PAD ELEVATION VIEW
No Scale

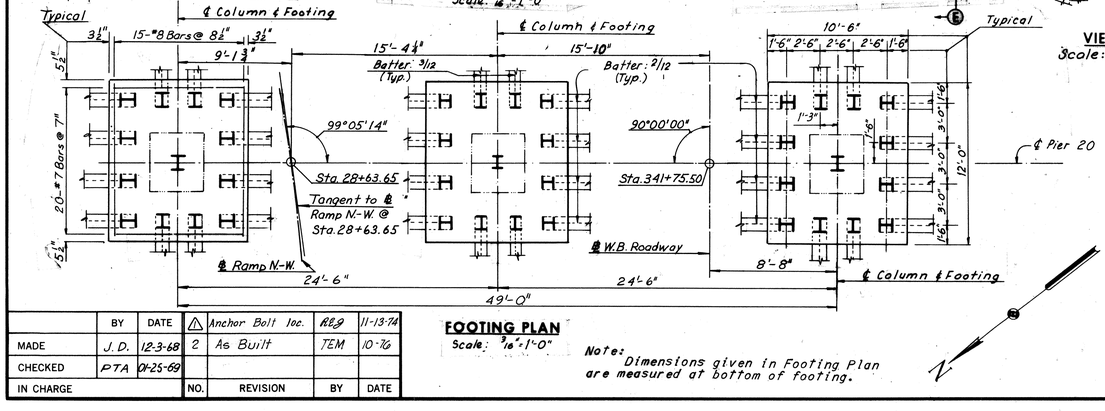
Note:
Pads with height "H" of 4" or less shall not be reinforced.



Stringer S2-21N

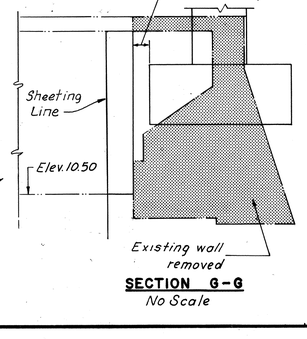
PAD AND ANCHOR BOLT SETTING PLAN
No Scale

Note:
Piles located within 10 ft. (horizontal distance) of Storm Drainage Flume shall be pre-bored to an Elevation 5 ft. below bottom of Flume.

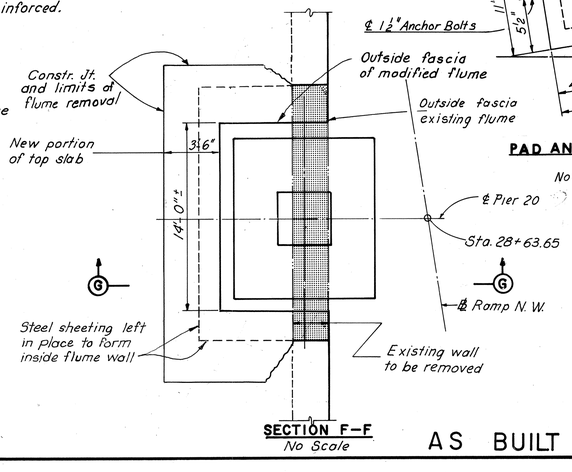


FOOTING PLAN
Scale: 3/16" = 1'-0"

Note:
Dimensions given in Footing Plan are measured at bottom of footing.



SECTION G-G
No Scale



SECTION F-F
No Scale

	BY	DATE				
MADE	J. D.	12-3-68	2	Anchor Bolt loc.	RBG	11-13-74
CHECKED	PTA	01-25-69		As Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

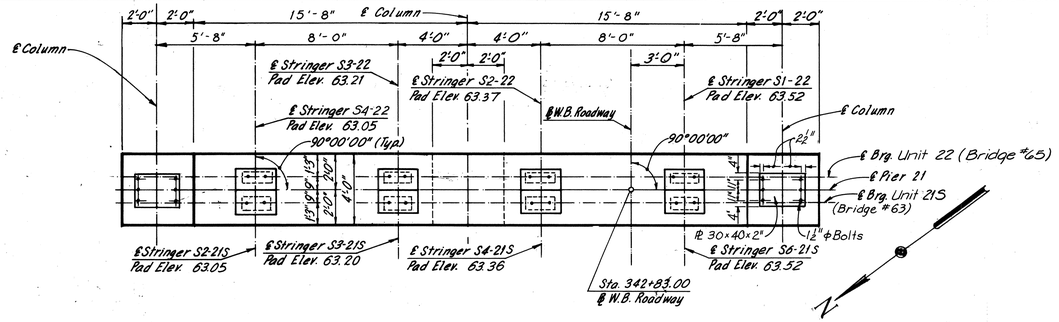
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 20

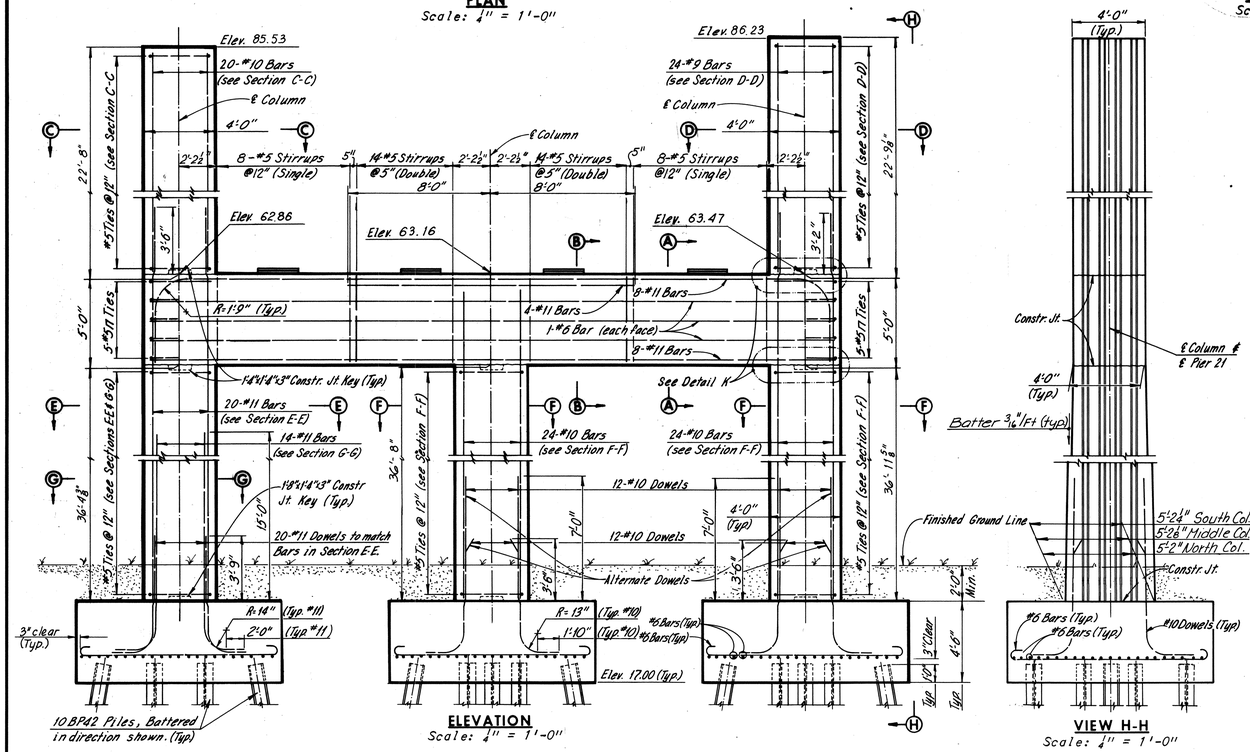
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	80	265

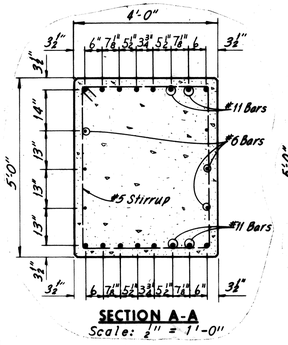


PLAN
Scale: 1/4" = 1'-0"

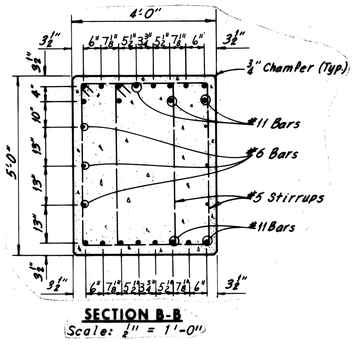


ELEVATION
Scale: 1/4" = 1'-0"

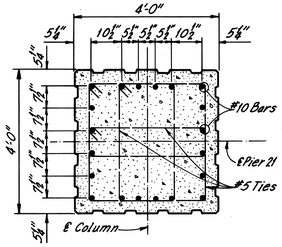
VIEW H-H
Scale: 1/4" = 1'-0"



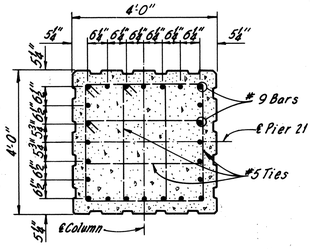
SECTION A-A
Scale: 1/2" = 1'-0"



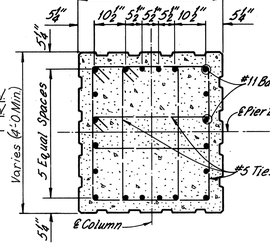
SECTION B-B
Scale: 1/2" = 1'-0"



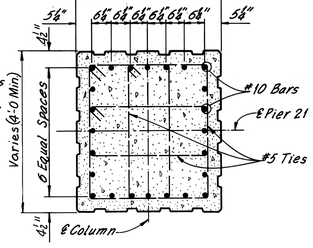
SECTION C-C
Scale: 1/2" = 1'-0"



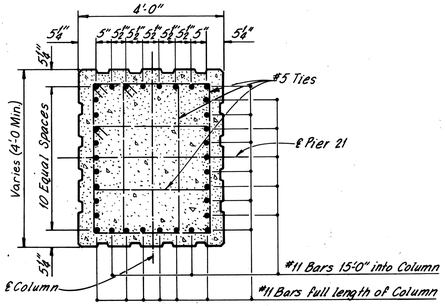
SECTION D-D
Scale: 1/2" = 1'-0"



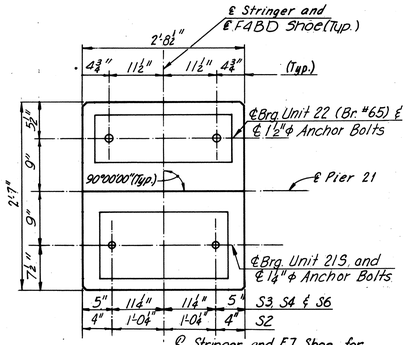
SECTION E-E
Scale: 1/2" = 1'-0"



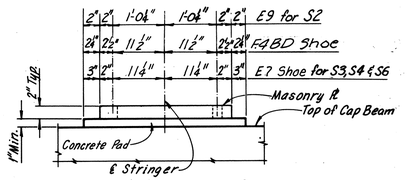
SECTION F-F
Scale: 1/2" = 1'-0"



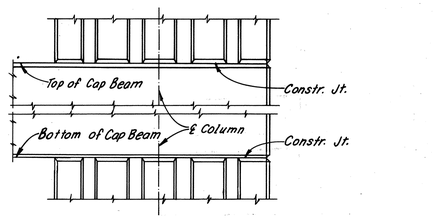
SECTION G-G
Scale: 1/2" = 1'-0"



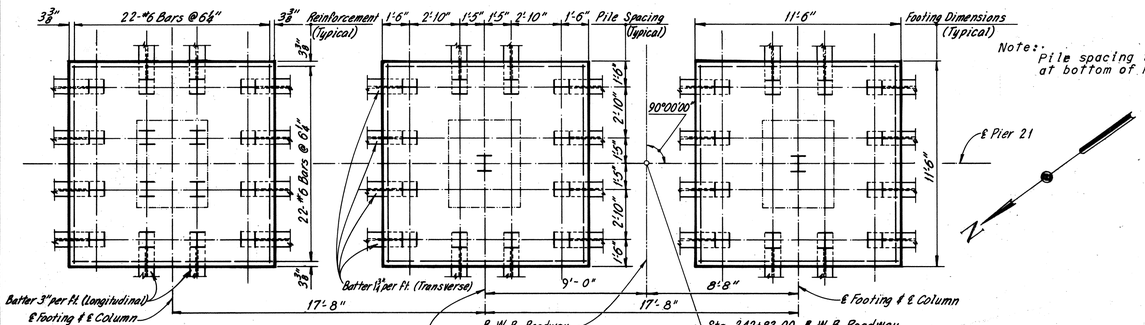
PAD AND ANCHOR BOLT SETTING PLAN
No Scale



PAD ELEVATION
No Scale



DETAIL K
No Scale



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

Note:
Pile spacing is measured at bottom of Footing.

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

Notes:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all transverse piles 1½" per foot.
Batter all longitudinal piles 3" per foot where shown.
For Shoe Details, see Sheets 51 & 52
For Framing Plans, see Sheets 13
Estimated Pile Tip Elevation: -11.0
For architectural treatment of columns, see Sheet 57.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.	11-8-68	2	As Built	TEM	10-76
CHECKED	J.D.	1-30-69				
IN CHARGE				Anchor Bolt loc.	REJ	11-13-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

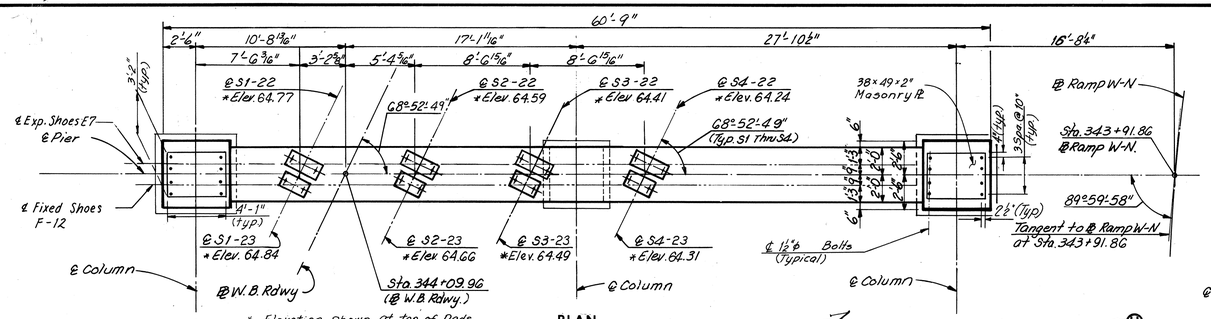
BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 21

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

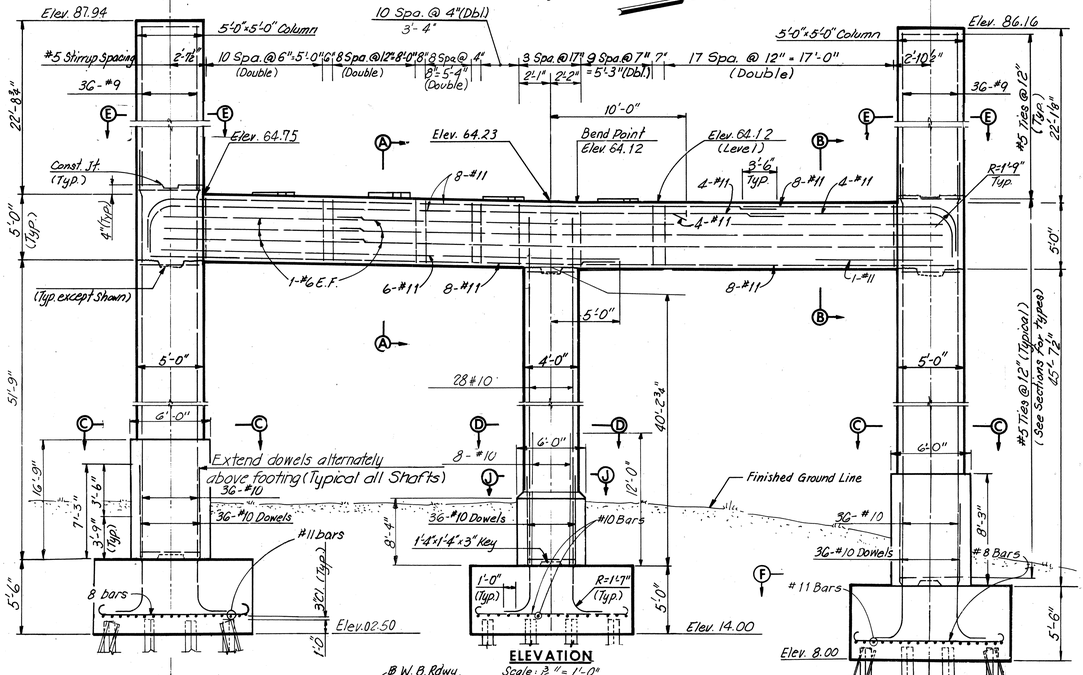
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 11 OF 29

659-69-0-10-12-72-0828

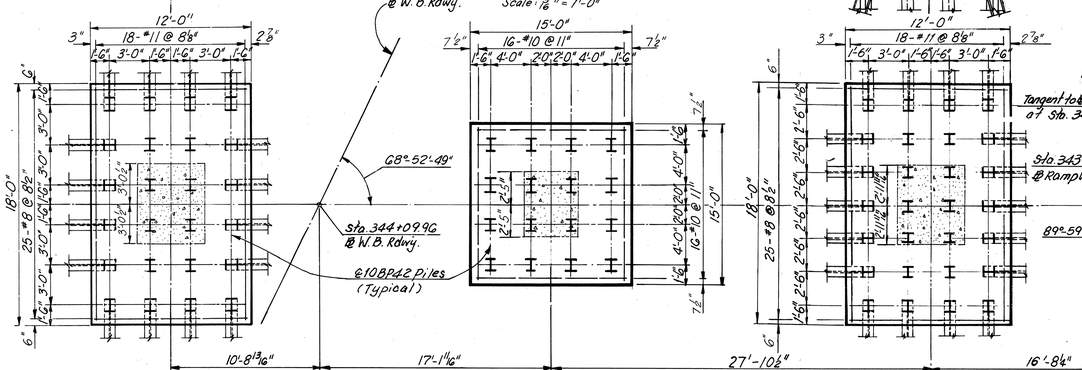
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	81	265



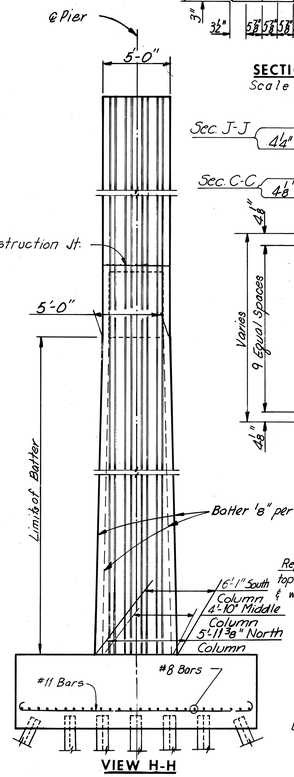
PLAN
Scale: 3/16" = 1'-0"



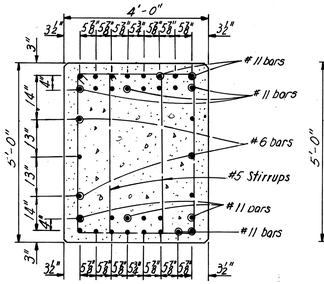
ELEVATION
Scale: 3/16" = 1'-0"



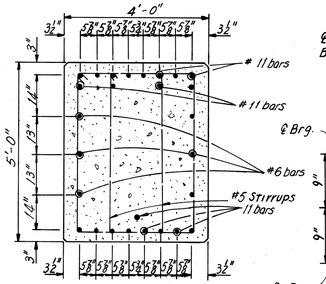
FOOTING PLAN
Scale 3/16" = 1'-0"



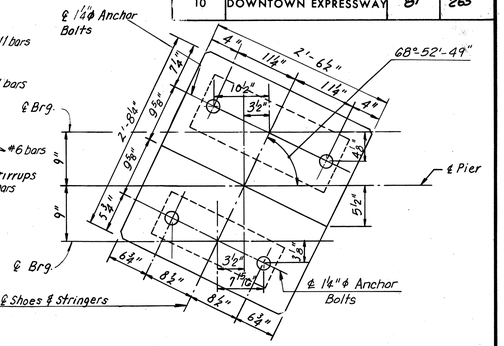
VIEW H-H



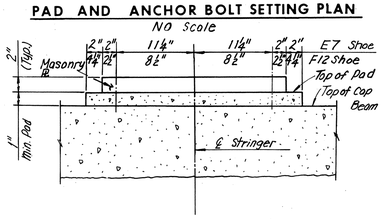
SECTION A-A
Scale 1/2"=1'-0"



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

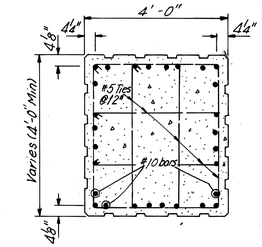


PAD AND ANCHOR BOLT SETTING PLAN
No Scale

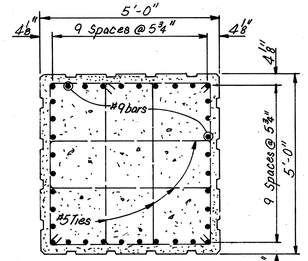


PAD ELEVATION VIEW
No Scale

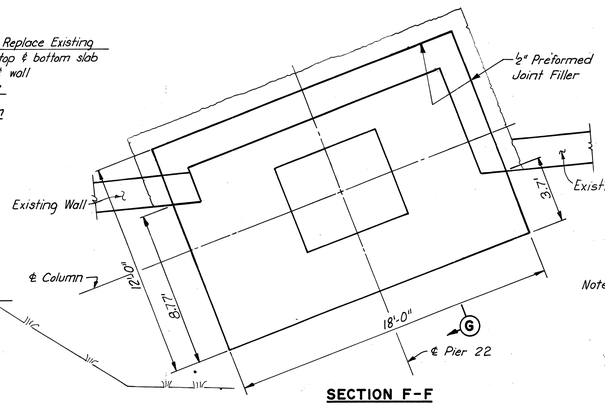
SECTION C-C & J J
Scale: None



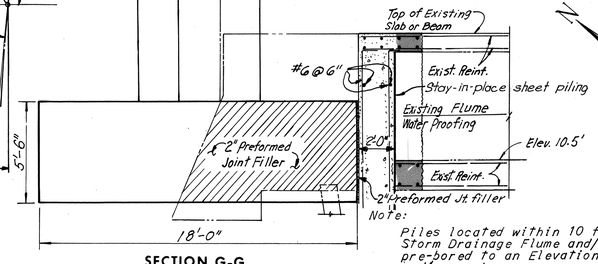
SECTION D-D
Scale 1/2"=1'-0"



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



SECTION F-F



SECTION G-G
Scale 4"=1'-0"

Notes:
All piles shall be 10BP42 steel piles (Design Capacity = 45 Tons)
Batter piles 2 per foot where shown.
For Shoe Details, see Sheet S1 and S2.
For Steel Pile Details, see Sheet 11.
For Framing Plan see Sheet 17.
Estimated Pile Tip Elevation = -9'

Note:
Piles located within 10 ft. (horizontal distance) of Storm Drainage Flume and/or Arch sewer shall be pre-bored to an Elevation 5 ft. below bottom of Flume and/or arch sewer.

AS BUILT

	BY	DATE
MADE	G.C.C. G.S.H.	01-03-69
CHECKED	PTA	01-14-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	10-76
1	Column Dimen. & Shoe Type Changed	PRMS	4-19-74
2	Fig. Elev. Reint. Anch. Bolt, Col. Dim., Sect. J-J	RBH	7-31-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

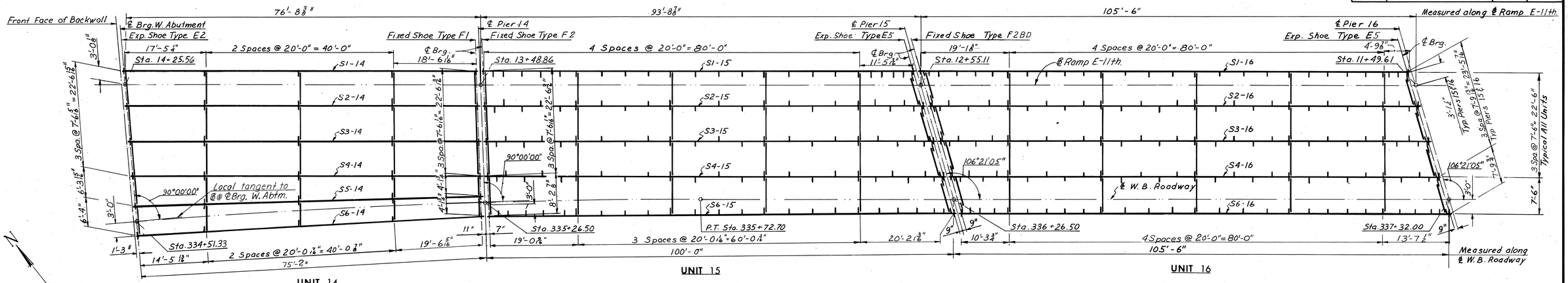
BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST.- R.R. TRACKS AND 16TH ST.

PIER 22

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

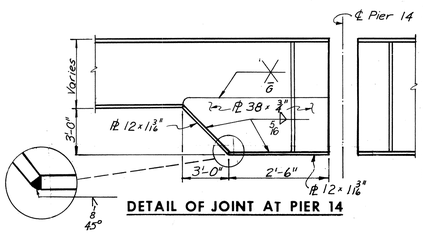
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 12 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	82	265

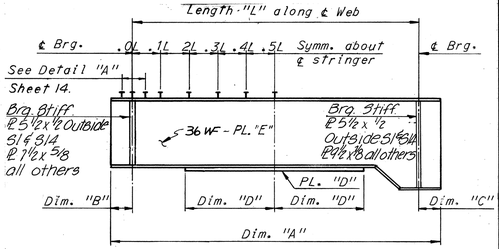


Note:
Girder spacing is measured along ℄ Bearing.

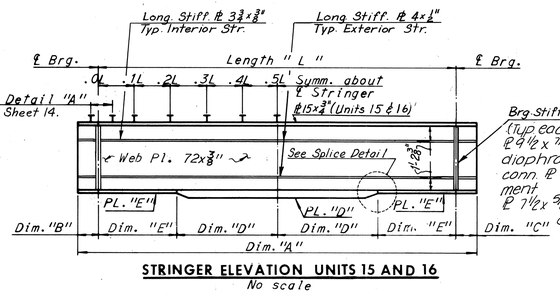
FRAMING PLAN
Scale 1"=10'-0"



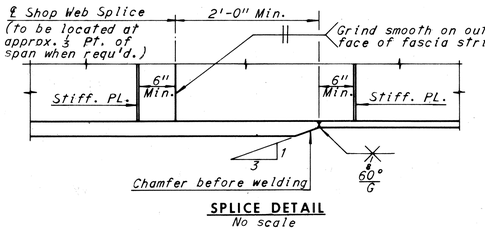
DETAIL OF JOINT AT PIER 14



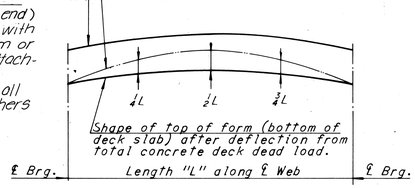
STRINGER ELEVATION - UNIT 14
No Scale



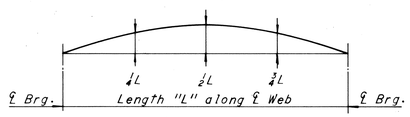
STRINGER ELEVATION UNITS 15 AND 16
No scale



SPLICE DETAIL
No scale



DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM

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

NOTE TO FABRICATOR
The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

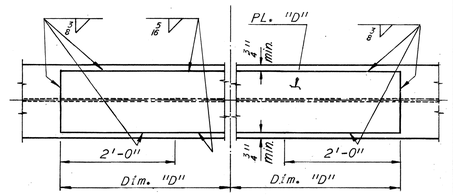
NOTE
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 18.

Note:
All steel shall be A-36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
It may be necessary to increase Bearing Stiffener Size to accommodate erection of end diaphragm

Note:
(-) sign in camber denotes downward camber.

Notes:
For Shoe details see Sheets S1 & S2
For Diaphragm details see Sheet 18.
For Superstructure steel quantities see Sheet 2.
For Joint details see Sheet 24.
For Shear Stud Detail see Sheet 14.

Note:
For web to flange weld sizes and longitudinal stiffener plate details see Sheet 14.



COVER PLATE DETAIL

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E2	6	F1	6
E5	10	F2	5
		F2BD	5

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	PL."D"	PL."E"	MAX. SHEAR STUD SPACING 0.0L-0.1L‡‡	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
14	S1-14	77'-8 3/8"	75'-11 13/16"	1'-1 1/16"	8"	31'-6"	---	10 1/2 x 1 3/16"	36WF182	8"	9"	12"	14 1/2"	18"
	S2-14	77'-2 5/8"	75'-6 3/16"	1'-1 1/16"	7"	30'-6"	---	10 1/2 x 1 3/16"	36WF182	9"	10"	12 1/2"	15"	18"
	S3-14	76'-9 15/16"	75'-1 7/16"	1'-1 1/16"	7"	30'-6"	---	10 1/2 x 1 3/16"	36WF182	9"	10"	12 1/2"	15"	18"
	S4-14	76'-5 3/16"	74'-9 1/16"	1'-1 1/16"	7"	29'-0"	---	10 1/2 x 1"	36WF160	9 1/2"	10 1/16"	13 1/2"	16"	20"
	S5-14	76'-1 1/16"	74'-4 11/16"	1'-1"	7"	30'-0"	---	10 1/2 x 1"	36WF135	10"	11 1/16"	15"	18 1/2"	23 1/16"
	S6-14	75'-10"	74'-1"	1'-1"	8"	30'-0"	---	10 1/2 x 1 1/16"	36WF150	9"	10"	14	17"	23"
15	S1-15	92'-9 1/2"	91'-7 3/16"	7"	7 13/16"	45'-9 5/16"	---	15x1	---	15"	17"	20"	24"	24"
	S2-15	94'-7"	93'-6 1/16"	6"	6 13/16"	46'-9 5/16"	---	15x1	---	16"	18"	20 1/2"	23 1/16"	24"
	S3-15	96'-6 1/2"	95'-6 3/16"	6"	6 13/16"	23'-0"	24'-9 1/16"	15x1 1/16"	15x3/4"	16"	18"	20 1/2"	24"	24"
	S4-15	98'-6"	97'-5 13/16"	6"	6 13/16"	22'-0"	26'-8 15/16"	15x1 1/16"	15x7/8"	15 1/2"	17 1/16"	20"	23"	24"
	S6-15	100'-7 1/16"	99'-4 15/16"	7"	7 13/16"	25'-6"	24'-2 1/16"	15x1 1/16"	15x7/8"	14"	16"	19 1/2"	24"	24"
16	S1-16	105'-3 7/16"	103'-11 1/16"	8 5/16"	8 5/16"	29'-0"	22'-11 5/16"	15x1 3/16"	15x7/8"	14 1/16"	16 1/16"	19 1/16"	24"	24"
	S2-16	105'-1 5/16"	103'-11 1/16"	7 15/16"	7 15/16"	27'-6"	24'-5 3/16"	15x1 3/16"	15x7/8"	16"	18"	21"	24"	24"
	S3-16	105'-1 3/16"	103'-11 1/16"	7 15/16"	7 15/16"	27'-6"	24'-5 3/16"	15x1 3/16"	15x7/8"	16"	18"	21"	24"	24"
	S4-16	105'-1 3/16"	103'-11 1/16"	7 15/16"	7 15/16"	27'-6"	24'-5 3/16"	15x1 3/16"	15x7/8"	16"	18"	21"	24"	24"
	S6-16	105'-3 7/16"	103'-11 1/16"	8 5/16"	8 5/16"	29'-0"	22'-11 5/16"	15x1 3/16"	15x7/8"	14 1/16"	16 1/16"	19 1/16"	24"	24"

‡‡ Spacing begins at termination of 6 spaces @ 4".

DEAD LOAD DEFLECTION SCHEDULE

UNIT	STRINGER	1/4L	1/2L	3/4L
14	S1-14	1"	1 3/8"	1"
	S2-14	1 1/16"	1 1/2"	1 1/16"
	S3-14	1"	1 5/16"	1"
	S4-14	1"	1 3/16"	15/16"
	S5-14	1 1/16"	1 1/16"	1 1/16"
	S6-14	15/16"	1 5/16"	15/16"
15	S1-15	3/4"	1 1/16"	3/4"
	S2-15	13/16"	1 1/16"	13/16"
	S3-15	7/8"	1 13/16"	7/8"
	S4-15	7/8"	1 1/16"	7/8"
	S6-15	7/8"	1 1/16"	7/8"
16	S1-16	1 1/16"	1 3/16"	1 1/16"
	S2-16	1 1/16"	1 1/16"	1 1/16"
	S3-16	1 1/16"	1 1/16"	1 1/16"
	S4-16	1 1/16"	1 1/16"	1 1/16"
	S6-16	1 1/16"	1 1/16"	1 1/16"

CAMBER SCHEDULE

UNIT	STRINGER	1/4L	1/2L	3/4L
14	S1-14	1 3/8"	1 15/16"	1 3/8"
	S2-14	1 3/8"	1 15/16"	1 3/8"
	S3-14	1 5/16"	1 3/4"	1 5/16"
	S4-14	1 5/16"	1 13/16"	1 5/16"
	S5-14	1 5/16"	1 13/16"	1 5/16"
	S6-14	1 3/8"	1 15/16"	1 3/8"
15	S1-15	1/4"	3/4"	1/4"
	S2-15	-1/16"	-3/16"	-1/16"
	S3-15	-1/16"	-3/16"	-1/16"
	S4-15	-5/16"	-5/16"	-5/16"
	S6-15	-1/16"	-3/16"	-1/16"
16	S1-16	-3/16"	-1/4"	-1/16"
	S2-16	-3/16"	-3/16"	0
	S3-16	-1/4"	-1/8"	+1/16"
	S4-16	-1/4"	-1/16"	+1/8"
	S6-16	-1/16"	0	+1/4"

	BY	DATE				
MADE	J.D.	8-8-68				
CHECKED	PTA	10-23-68	1	As-Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

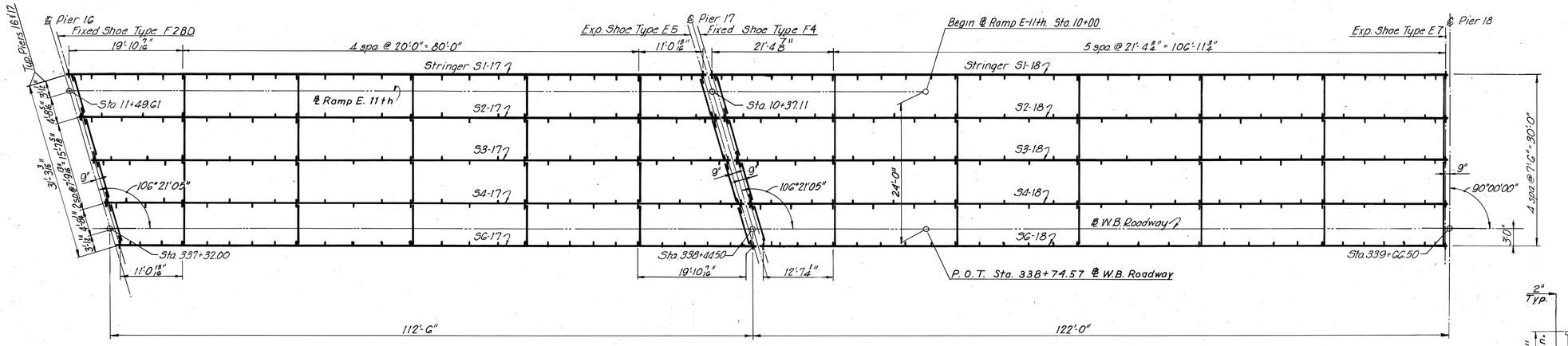
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 14,15 AND 16

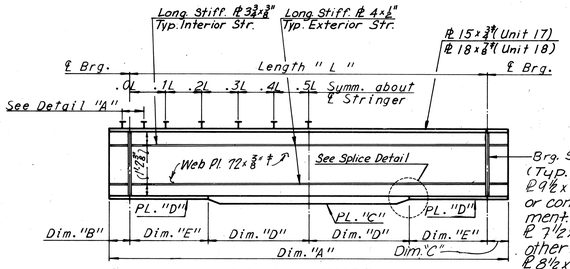
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 13 OF 29

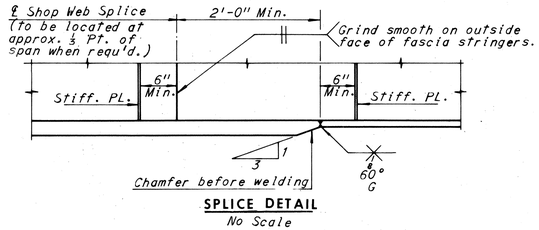
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	83	265



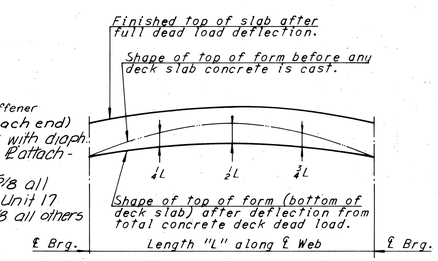
FRAMING PLAN
Scale: 1"=10'-0"



STRINGER ELEVATION
No scale

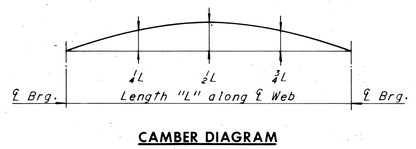


SPLICE DETAIL
No Scale



DEAD LOAD DEFLECTION DIAGRAM

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



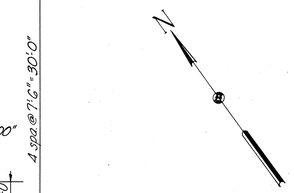
CAMBER DIAGRAM

NOTE TO FABRICATOR
The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

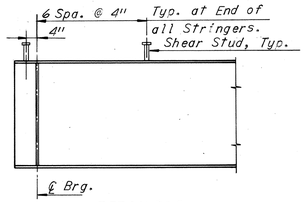
Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	5	F28D	5
E7	5	F4	5



SHEAR STUD DETAIL
No Scale

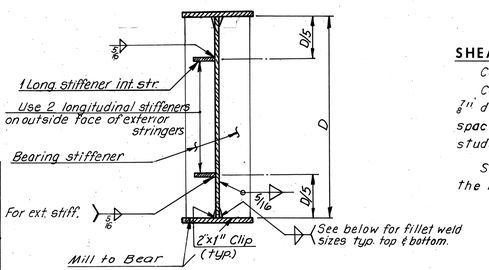


DETAIL "A"
No Scale

SHEAR STUD NOTE
Capacity = 3,400 lbs. per stud.
Contractor may, if he elects, use three 7/8" diameter studs at the same longitudinal spacing in lieu of the four 3/4" diameter studs shown..

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

Notes:
For Superstructure steel quantities see Sheet 2.
For Joint details see Sheet 24.
For Shoe details see Sheets 51 & 52.
For Diaphragm details see Sheet 19.



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS

Note:
Web to flange weld size shall be determined by flange thickness as follows:
To 1": ..... 5/16" weld
over 1" to 2": ..... 3/8" weld

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	PL. "C" ‡	PL. "D" ‡	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
17	S1-17	112'-4"	110'-11 1/4"	8 3/8"	8 3/8"	27'-0"	28'-5 5/8"	15x1 1/4"	15x3/4"	13 1/2"	15 1/2"	18 1/2"	23"	24"	1 5/8"	2 1/4"	1 5/8"	2"	2 11/16"	2"
	S2-17	112'-2"	110'-11 1/4"	7 3/8"	7 3/8"	25'-0"	30'-5 5/8"	15x1"	15x3/4"	15"	17"	19 1/2"	22"	24"	1 5/8"	2 1/4"	1 5/8"	2"	2 5/16"	2"
	S3-17	112'-2"	110'-11 1/4"	7 3/8"	7 3/8"	25'-0"	30'-5 5/8"	15x1"	15x3/4"	15"	17"	19 1/2"	22"	24"	1 5/8"	2 1/4"	1 5/8"	2"	2 5/16"	2 1/16"
	S4-17	112'-2"	110'-11 1/4"	7 3/8"	7 3/8"	25'-0"	30'-5 5/8"	15x1"	15x3/4"	15"	17"	19 1/2"	22"	24"	1 5/8"	2 1/4"	1 5/8"	2 1/16"	2 5/16"	2 1/16"
	S6-17	112'-4"	110'-11 1/4"	8 3/8"	8 3/8"	25'-6"	29'-11 5/8"	15x1 1/8"	15x3/4"	14"	16"	19"	24"	24"	1 3/8"	2 3/8"	1 3/8"	2"	2 3/4"	2"
18	S1-18	129'-9"	128'-4 5/8"	8 3/8"	8"	32'-0"	32'-2 5/8"	18x1 1/4"	18x7/8"	14 1/2"	16 1/2"	19 1/2"	24"	24"	2 1/16"	3 1/4"	2 1/16"	1 11/16"	2 13/16"	2 5/16"
	S2-18	127'-4 5/8"	126'-2 1/4"	7 3/8"	7"	27'-0"	36'-1 1/8"	18x1 1/8"	18x7/8"	16 1/2"	18 1/2"	21 1/2"	24"	24"	2 1/8"	2 5/16"	2 1/8"	1 1/8"	3 1/16"	2 5/16"
	S3-18	125'-2 1/4"	123'-11 7/16"	7 3/8"	7"	24'-6"	37'-5 15/16"	18x1 1/4"	18x3/4"	16 1/2"	18 1/2"	21 1/2"	23 1/2"	24"	2"	2 5/8"	2"	2 1/8"	3 1/16"	2 5/16"
	S4-18	122'-11 3/8"	121'-9 1/2"	7 3/8"	7"	60'-10 3/4"	---	18x1"	---	16 1/2"	18 1/2"	21 1/2"	23 1/2"	24"	1 7/8"	2 5/8"	1 7/8"	2 5/16"	3 1/4"	2 7/16"
	S6-18	120'-11 3/8"	119'-7"	8 3/8"	8"	21'-6"	38'-3 1/2"	18x1 1/4"	18x7/8"	15"	17"	20"	24"	24"	1 3/4"	2 1/2"	1 3/4"	2 7/16"	3 5/16"	2 5/8"

* Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Note:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.

Intermediate stiffener Pls. 4 1/2 x 3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

	BY	DATE
MADE	FKD	07-27-68
CHECKED	SCC	10-18-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	10-76

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

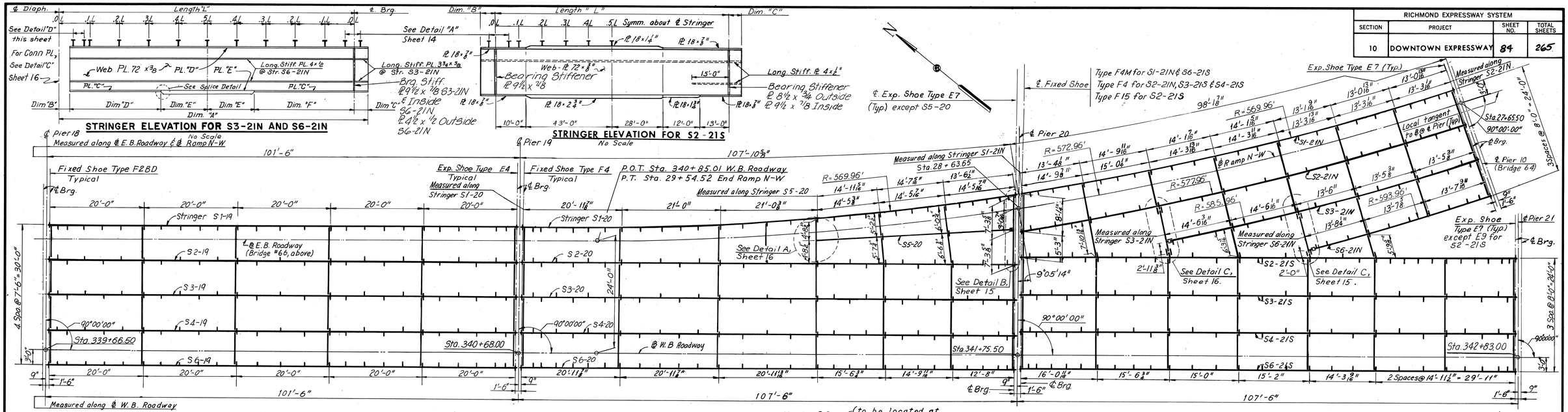
BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

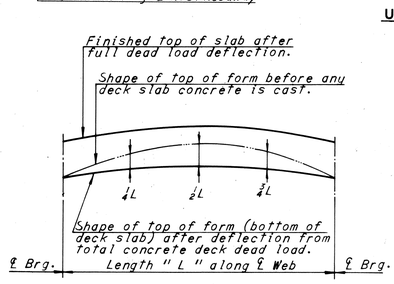
FRAMING PLAN - UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 14 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	84	265



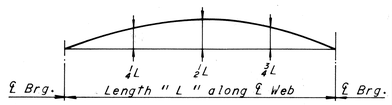


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

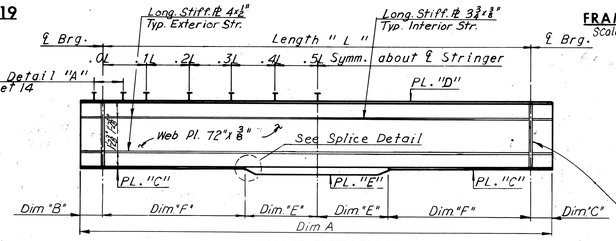
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation comformity with finished grade.

Dimensions are in inches.

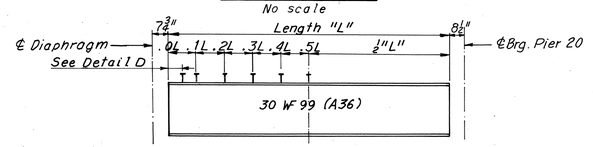
(-)Sign in camber denotes downward camber.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	07-31-68	2	As Built	TEM	10-76
CHECKED	PTA	10-23-68				
IN CHARGE						

UNIT 19



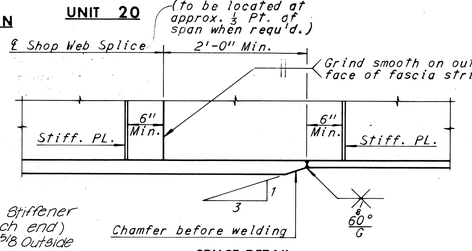
STRINGER ELEVATION
No scale



STRINGER ELEVATION FOR S5-20
No Scale

FRAMING PLAN
Scale 1" = 10'-0"

UNIT 20



SPLICE DETAIL
No scale

UNIT 21

Note:
All Steel shall be A36 unless otherwise shown.

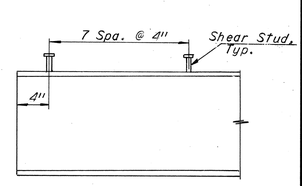
Exterior Stringer Longitudinal Stiffeners shall be located on the exterior face of the stringer.

Intermediate stiffener pls. 4 1/2"x3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

Note:
For web to flange weld sizes and longitudinal stiffener plate details see Sheet 14.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	5	F2BD	5
		F4	8
E7	12	F4M	2
E9	1	F15	1



DETAIL D
No Scale

Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim."D"	Dim. "E"	Dim. "F"	PL."C"	PL."D"	PL."E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
19	S1-19	101'-4"	100'-0"	8"	8"	--	25'-0"	25'-0"	15x7/8"	15x3/4"	15x1 1/4"	14 1/2"	17"	20"	24"	24"
	S2-19	101'-2"	100'-0"	7"	7"	--	24'-0"	26'-0"	15x7/8"	15x3/4"	15x1 1/4"	16"	18"	21"	24"	24"
	S3-19	101'-2"	100'-0"	7"	7"	--	24'-0"	26'-0"	15x7/8"	15x3/4"	15x1 1/4"	16"	18"	21"	24"	24"
	S4-19	101'-2"	100'-0"	7"	7"	--	24'-0"	26'-0"	15x7/8"	15x3/4"	15x1 1/4"	16"	18"	21"	24"	24"
	S6-19	101'-4"	100'-0"	8"	8"	--	25'-0"	25'-0"	15x7/8"	15x3/4"	15x1 1/4"	14 1/2"	17"	20"	24"	24"
20	S1-20	107'-8 3/8"	106'-4 1/2"	8"	8 1/8"	--	34'-0"	19-2 1/4"	18x3/8"	18x3/8"	18x1 3/8"	12"	13 1/2"	17 1/2"	21 1/2"	24"
	S2-20	107'-2"	106'-0"	7"	7"	--	29'-6"	23'-6"	15x7/8"	15x3/4"	15x1 3/8"	15 1/2"	18"	21"	24"	24"
	S3-20	107'-2"	106'-0"	7"	7"	--	29'-6"	23'-6"	15x7/8"	15x3/4"	15x1 3/8"	15 1/2"	18"	21"	24"	24"
	S4-20	107'-2"	106'-0"	7"	7"	--	29'-6"	23'-6"	15x7/8"	15x3/4"	15x1 3/8"	15 1/2"	18"	21"	24"	24"
	S5-20	--	41'-9 1/8"	--	--	--	---	--	Stringer Size 30WF99			9"	10"	11"	13"	15"
	S6-20	107'-4"	106'-0"	8"	8"	--	28'-0"	25'-0"	15x1"	15x3/4"	15x1 1/2"	14 1/2"	17"	20"	24"	24"
21	S1-21N	96'-11 7/16"	95'-7 3/4"	8 1/8"	8"	--	33'-0"	14'-9 7/16"	18x7/8"	18x7/8"	18x1 3/8"	15"	17"	22"	24"	24"
	S2-21N	99'-5 11/16"	98'-3 5/8"	7 1/8"	7"	--	34'-0"	15'-1 13/16"	18x3/8"	18x3/8"	18x1 3/8"	12 1/2"	14"	17 1/2"	24"	24"
	S3-21N	69'-4 1/4"	69'-5"	7 3/4"	7"	10'-0 3/4"	24'-0"	10'-8 1/2"	12x5/8"	12x5/8"	12x1 3/8"	11"	12"	15"	17"	20 1/2"
	S6-21N	40'-11 7/16"	40'-11 7/16"	7 3/4"	8"	19'-10"	---	20'-5 11/16"	10x5/8"	10x5/8"	--	16"	18 1/2"	21"	24"	24"
	S2-21S	107'-4"	106'-0"	8"	8"	--	See Stringer Elevation for S2-21S				--	8"	8 1/2"	11"	16"	18"
	S3-21S	107'-2"	106'-0"	7"	7"	--	28'-6"	24'-6"	15x1"	15x3/4"	15x1 1/2"	15 1/2"	17"	20"	22 1/2"	24"
	S4-21S	107'-2"	106'-0"	7"	7"	--	28'-6"	24'-6"	15x1"	15x3/4"	15x1 1/2"	15 1/2"	17"	20"	22 1/2"	24"
	S6-21S	107'-4"	106'-0"	8"	8"	--	28'-6"	24'-6"	15x1"	15x3/4"	15x1 1/2"	14 1/2"	16 1/2"	19 1/2"	24"	24"

* Spacing begins at termination of 6 spaces @ 4".

DEAD LOAD DEFLECTION SCHEDULE

1/4L	1/2L	3/4L
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1 1/16"	1 7/16"	1 1/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 1/16"	1 7/16"	1 1/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"
1 3/16"	1 3/16"	1 3/16"

CAMBER SCHEDULE

1/4L	1/2L	3/4L
1 1/4"	1 3/16"	1 1/4"
1 1/4"	1 3/16"	1 1/4"
1 1/4"	1 3/16"	1 1/4"
1 1/4"	1 3/16"	1 1/4"
1 1/4"	1 3/16"	1 1/4"
1 1/16"	2 3/8"	1 3/4"
1 5/16"	2 1/16"	1 1/2"
1 1/2"	2 1/16"	1 1/2"
1 1/2"	2 1/16"	1 1/2"
1 1/2"	2 1/16"	1 1/2"
1 1/2"	2 1/16"	1 1/2"
1 5/16"	2 1/16"	1 1/2"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"
1 3/16"	1 15/16"	1 3/16"

Notes:
For Shoe details, see Sheets S1 & S2.
For Diaphragm details, see Sheet 20.
For Superstructure steel quantities, see Sheet 2.
For additional framing details, see Sheet 16.
For Joint details, see Sheet 24.
For Shear stud detail see Sheet 14.

AS BUILT

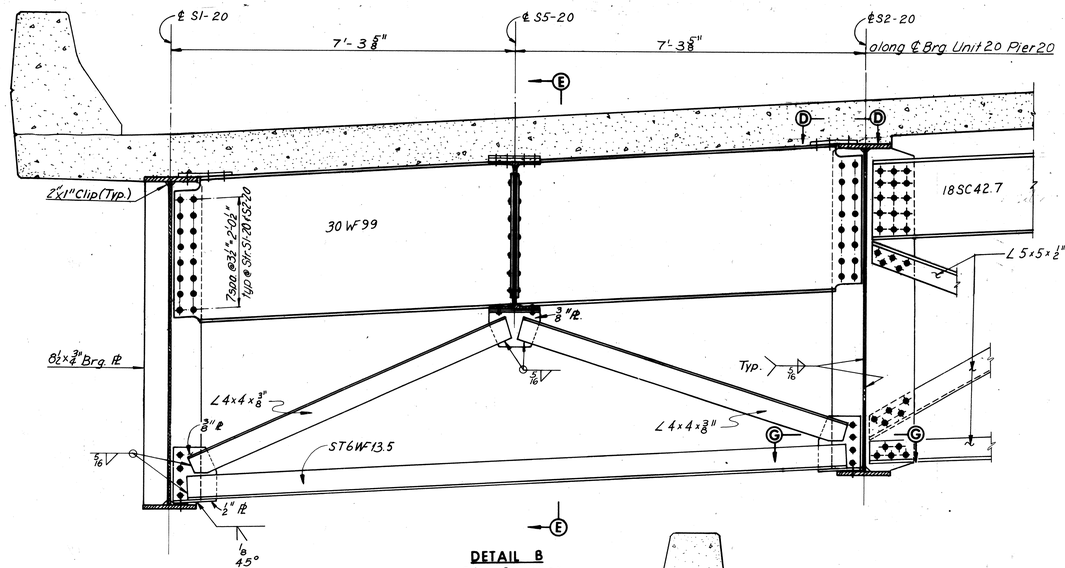
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN—UNITS 19,20 AND 21

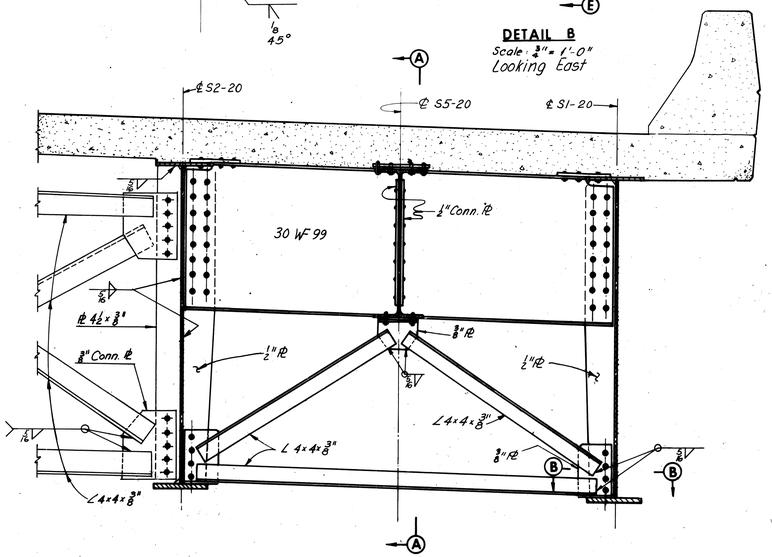
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 15 OF 29

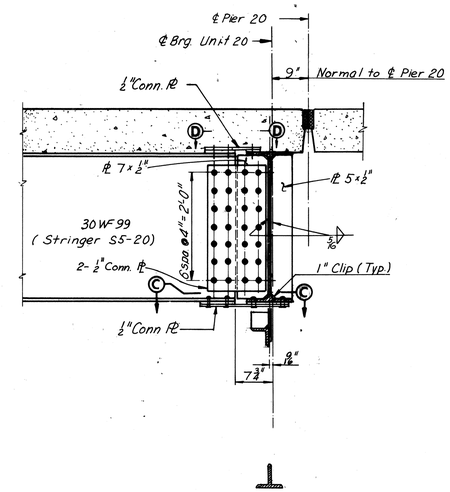
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	85	265



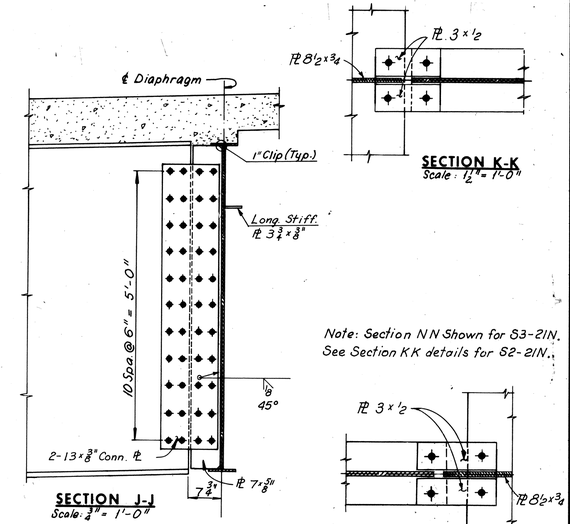
DETAIL B
Scale: ¾" = 1'-0"
Looking East



DETAIL A
Scale: ¾" = 1'-0"
Looking West



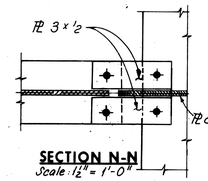
SECTION E-E
Scale: ¾" = 1'-0"



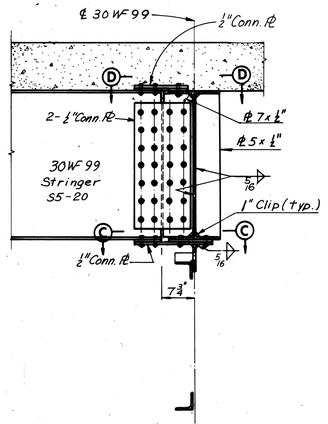
SECTION K-K
Scale: 1½" = 1'-0"

SECTION J-J
Scale: ¾" = 1'-0"

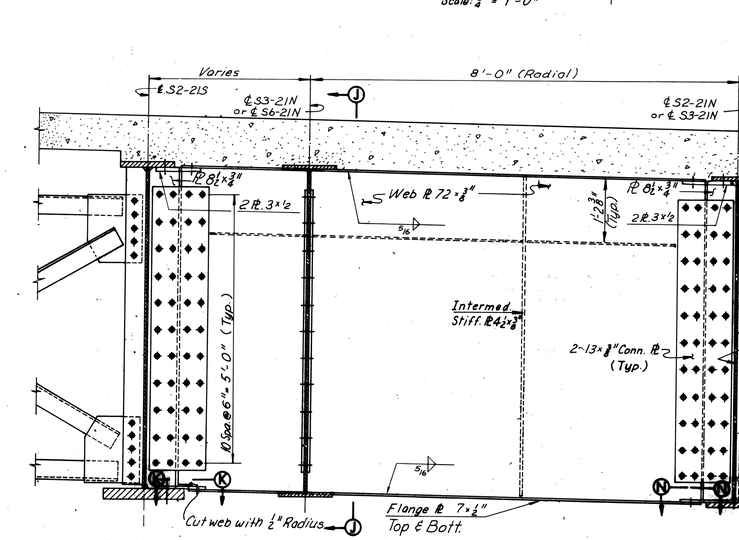
Note: Section N-N Shown for S3-21N.
See Section K-K details for S2-21N.



SECTION N-N
Scale: 1½" = 1'-0"

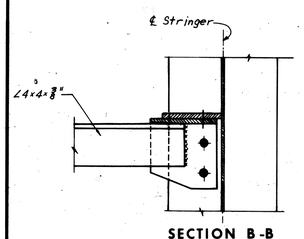


SECTION A-A
Scale: ¾" = 1'-0"

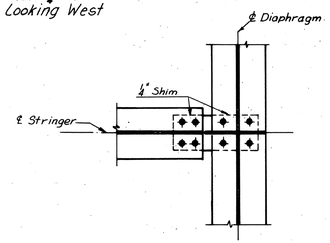


DETAIL C
Scale: ¾" = 1'-0"
Looking West

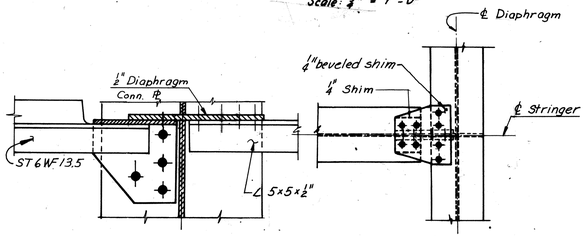
Note:
For location of Details A, B and C, see Framing Plan Units 20 and 21, Sheet 15.
All steel shall be A36 unless otherwise shown.



SECTION B-B
Scale: 1½" = 1'-0"



SECTION C-C
Scale: ¾" = 1'-0"



SECTION G-G
Scale: 1½" = 1'-0"

SECTION D-D
Scale: ¾" = 1'-0"

Section H-H similar

	BY	DATE				
MADE	J.D.	12-18-68				
CHECKED	PTA	4-29-69	1	As Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

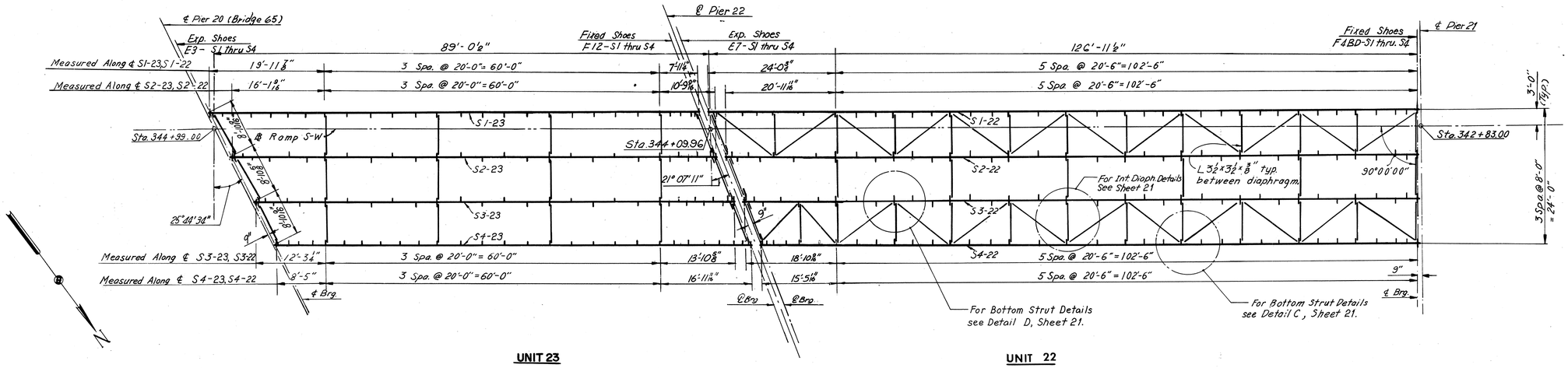
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
UNITS 20 AND 21

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 16 OF 29

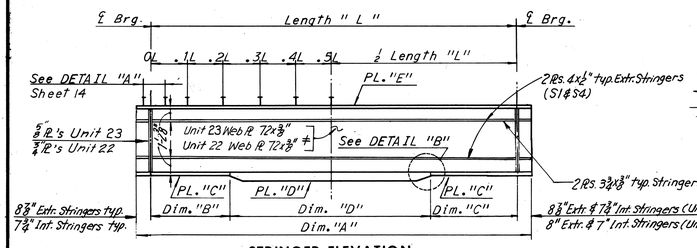
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	86	265



FRAMING PLAN

Scale 1" = 10'-0"

Note:
Units 22 and 23 are shown with stationing from right to left.

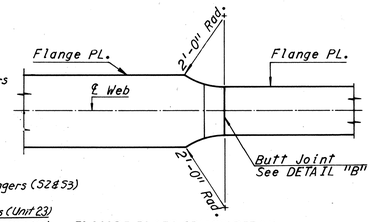


STRINGER ELEVATION

No Scale

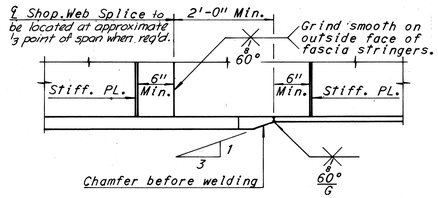
Note: All horizontal dimensions are measured along ℄ Web.

Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of stringers.
Intermediate stiffener plates shall be equally spaced between diaphrams as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of Pl. 4 1/2 x 3/8" except where the width of top flange plate is 20" or over, Pl. 5 x 3/8" shall be used.



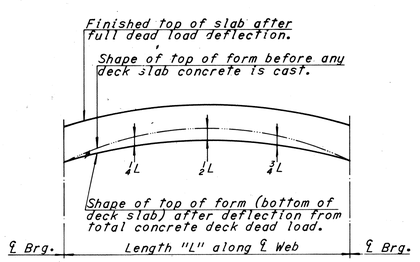
FLANGE PLATE SPLICE DETAIL

No Scale



DETAIL "B"

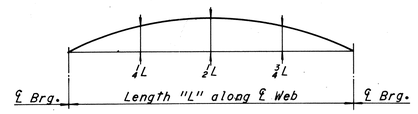
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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



CAMBER DIAGRAM

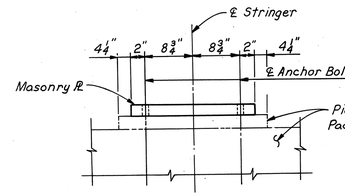
NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 21.

SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E7	4	F12	4
E3	4	F4	4



BEARING PAD ELEVATION AT PIER 20 (BR. 65)

No Scale

Note:
Anchor Bolts for shoes for Unit 23 @ Pier 20(65) and a setting template shall be furnished by the Contractor to the contractor constructing Pier 20(65).

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
23	S1 - 21	89'-2"	87'-8 1/4"	14'-4 1/8"	14'-4 1/8"	59'-0"	12 x 3/4"	16 x 1 1/8"	12 x 3/4"	15"	17"	20"	24"	24"
	S2 - 21	88'-2 9/16"	86'-11 1/16"	13'-11 9/16"	13'-11 9/16"	59'-0"	12 x 3/4"	16 x 1 1/8"	12 x 3/4"	16"	18"	20 1/2"	24"	24"
	S3 - 21	87'-5 3/8"	86'-1 7/8"	13'-7"	13'-6 7/8"	59'-0"	12 x 3/4"	16 x 1 1/8"	12 x 3/4"	16"	18"	20 1/2"	24"	24"
	S4 - 21	86'-10 7/16"	85'-4 11/16"	13'-2 3/8"	13'-2 5/16"	59'-0"	12 x 3/4"	16 x 1 1/8"	12 x 3/4"	15"	17"	20"	24"	24"
22	S1 - 22	127'-11 11/16"	126'-6 13/16"	32'-3 7/16"	32'-3 3/8"	62'-0"	18 x 3/8"#	18 x 1 1/4"#	18 x 3/8"#	14"	16"	19"	24"	24"
	S2 - 22	124'-8 7/16"	123'-5 5/16"	36'-4 5/16"	36'-4 1/2"	51'-0"	18 x 3/8"#	18 X 1 1/4"#	18 x 3/8"#	15 1/2"	17 1/2"	20 1/2"	23"	24"
	S3 - 22	121'-7 3/8"	120'-4 5/8"	35'-2 5/16"	35'-2 5/16"	50'-0"	18 x 3/8"#	18 x 1 1/8"#	18 x 3/8"#	15 1/2"	17 1/2"	20 1/2"	22"	24"
	S4 - 22	118'-8 7/16"	117'-3 9/16"	33'-1 7/16"	33'-1 7/8"	50'-0"	18 x 3/8"#	18 x 1 1/8"#	18 x 3/8"#	14 1/2"	16 1/2"	19 1/2"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
1/2"	1 1/16"	3/4"	2"	3"	2 5/16"
3/4"	1"	5/8"	2 7/16"	3 3/4"	2 3/4"
3/4"	1"	3/4"	2 15/16"	4 1/2"	3 1/8"
11/16"	1"	11/16"	3 7/16"	5 1/4"	3 5/8"
2 7/16"	3 3/8"	2 7/16"	4 3/16"	5 1/16"	3 1/2"
2 5/16"	3 1/16"	2 5/16"	3 3/4"	4 7/16"	3 1/8"
2 1/16"	2 7/8"	2 1/16"	3 1/16"	4 3/16"	2 15/16"
1 7/8"	2 5/8"	1 7/8"	3"	3 3/4"	2 5/8"

*Spacing begins at termination of 7 spaces @ 4".
#Denotes A572- Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Notes:
All Horizontal Dimensions are measured along ℄ Web.
For Diaphragm Details, see Sheet 21.
For Shear Stud Details, see Sheet 14.
For Structural Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 24.
For Shoe Details, see Sheet S1 & S2.
For Horizontal Stiffener Details and Flange to Web Welds, see Sheet 14.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	RC	11.22.68	2	As Built	TEM	10-7C
CHECKED	SCC	1.10.69		Note changed, added	PRMS	4-19-74
IN CHARGE						

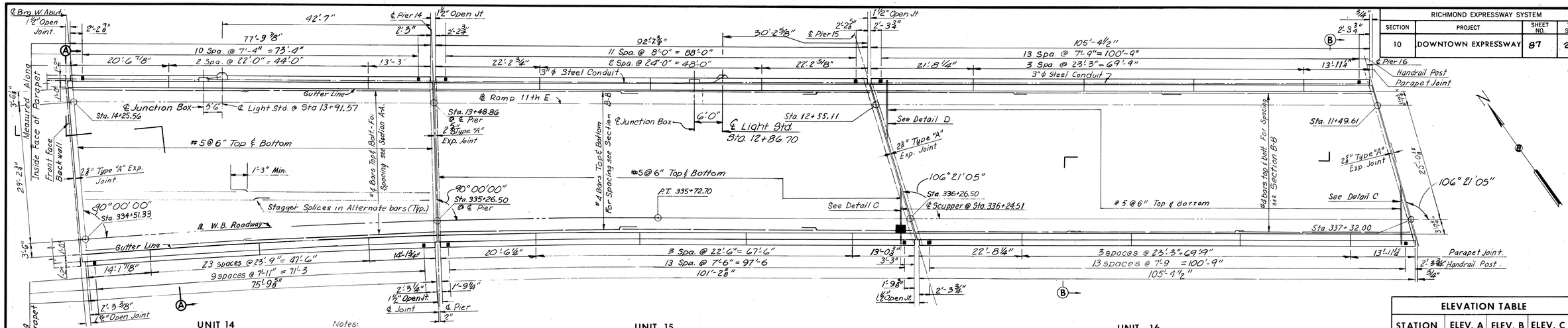
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. — R.R. TRACKS AND 16TH ST.
FRAMING PLAN UNITS 22 AND 23

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

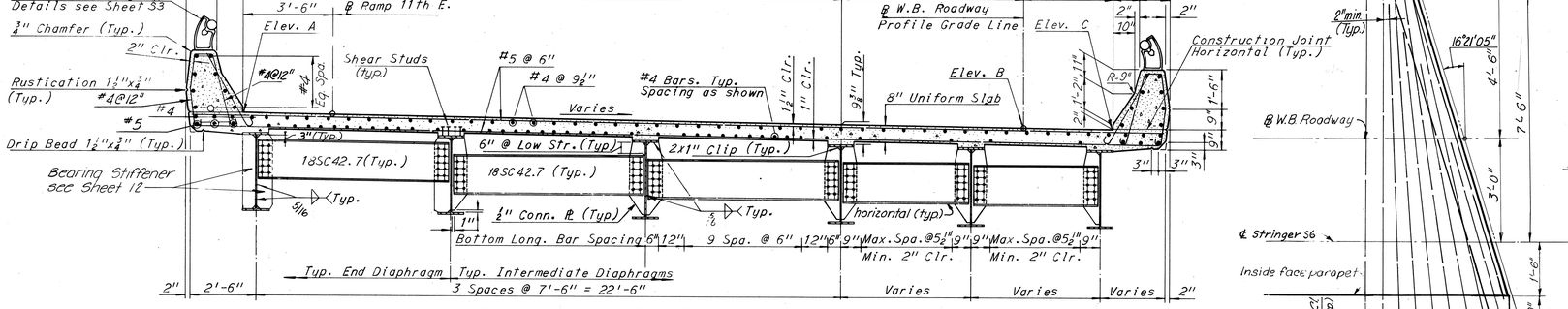
SCALE: As Noted
CONTRACT NO.:
SHEET NO. 17 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	87	265

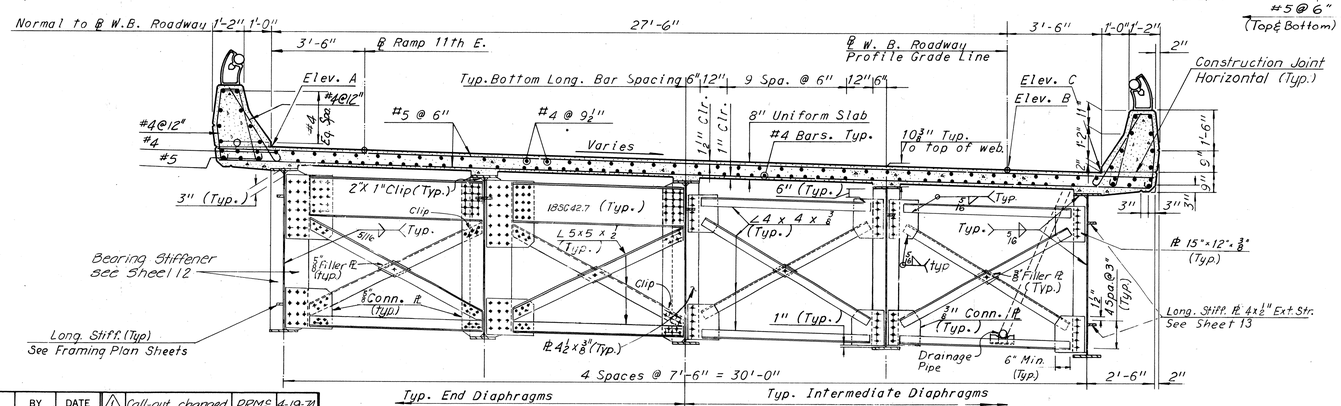


Notes:
For End Diaphragms at Abutment, see Section A-A this Sheet.
For End Diaphragms at Pier 14, Units 14 & 15, see Section A-A Sheet 19.
For End Diaphragms at Pier 15, Units 15 & 16, see Section B-B this Sheet.
For End Diaphragms at Pier 16, Unit 16, see Section B-B this Sheet.

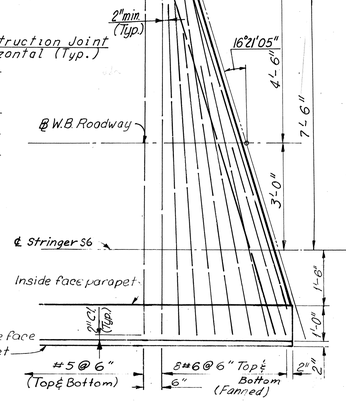
DECK PLAN
Scale: 1" = 10'-0"



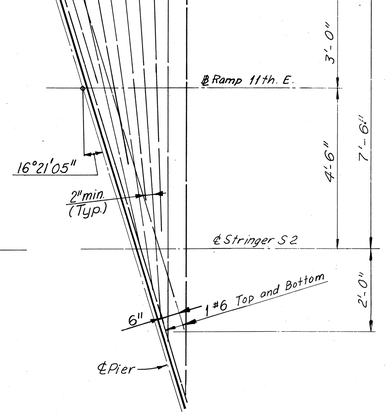
SECTION A-A
Scale: ⅜" = 1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"



DETAIL C
Scale: 1"=2'-0"



DETAIL D
Scale: 1"=2'-0"

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
334+50.00	68.13	66.16	65.95
+51.50	68.10	66.13	65.92
+60.00	67.89	65.97	65.76
+70.00	67.65	65.78	65.57
+80.00	67.42	65.58	65.37
+90.00	67.17	65.39	65.18
335+00.00	66.92	65.20	64.99
+10.00	66.67	65.02	64.81
+20.00	66.43	64.85	64.65
+26.50	66.28	64.74	64.55
+30.00	66.20	64.69	64.50
+40.00	65.99	64.55	64.37
+50.00	65.78	64.43	64.26
+60.00	65.61	64.32	64.16
+70.00	65.46	64.23	64.07
+80.00	65.32	64.15	64.00
+90.00	65.20	64.09	63.95
336+00.00	65.09	64.04	63.91
+10.00	65.00	64.01	63.88
+18.58	64.93	---	---
+20.00	64.92	63.99	63.87
+26.50	---	63.99	---
+27.38	---	---	63.87
+30.00	64.86	63.99	63.87
+40.00	64.81	64.00	63.90
+50.00	64.78	64.03	63.94
+60.00	64.76	64.07	63.99
+70.00	64.76	64.13	64.05
+80.00	64.79	64.21	64.13
+90.00	64.81	64.30	64.23
337+00.00	64.85	64.40	64.34
+10.00	64.91	64.51	64.46
+20.00	64.97	64.62	64.58
+24.08	64.96	---	---
+30.00	65.00	64.74	64.71
+32.00	---	64.76	---
+32.88	---	---	64.74
+40.00	65.05	64.85	64.83

Notes:
For Superstructure quantities, see Sheet 2.
For Framing plan, see Sheet 13.
For Joint details, see Sheet 24.
For Railing details, see Sheet 53.
For Standard Drainage Details, see Support Type 2 Sheet S5 & S6

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SHS	8-2-68	2	As Built	TEM	10-76
CHECKED	R.C.	10-23-68				
IN CHARGE				Call-out changed	PRM &	4-19-72

AS BUILT

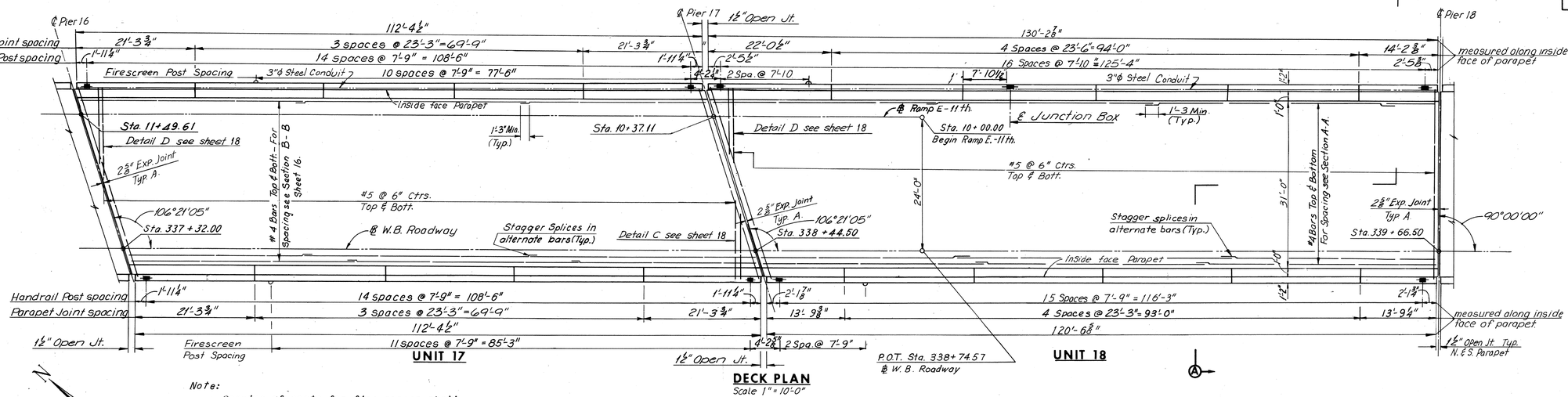
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 14, 15, AND 16

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

SCALE:
CONTRACT NO.: 10
SHEET NO. 18 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	88	265

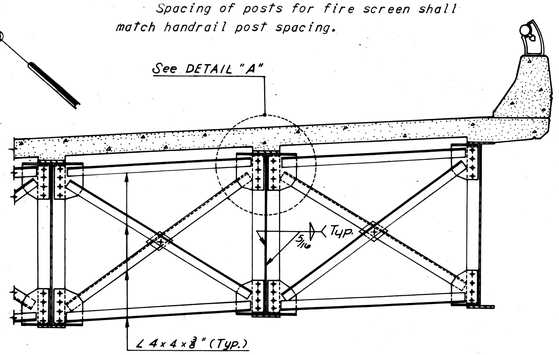


DECK PLAN
Scale 1" = 10'-0"

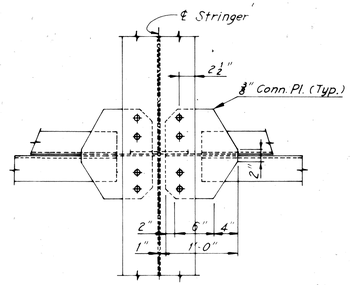
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
337+24.08	64.97	—	—
+30.00	65.01	64.74	64.71
+32.00	—	64.76	—
+32.88	—	—	64.75
+40.00	65.05	64.85	64.83
+50.00	65.11	64.96	64.94
+60.00	65.16	65.07	65.06
+70.00	65.22	65.18	65.18
+80.00	65.27	65.30	65.30
+90.00	65.33	65.41	65.42
338+00.00	65.38	65.52	65.54
+10.00	65.44	65.63	65.65
+20.00	65.49	65.74	65.78
+30.00	65.55	65.86	65.90
+40.00	65.61	65.97	66.02
+44.50	—	66.02	—
+50.00	65.66	66.08	66.13
+60.00	65.73	66.19	66.25
+70.00	65.80	66.30	66.37
+80.00	65.89	66.42	66.49
+90.00	65.98	66.53	66.60
339+00.00	66.09	66.64	66.71
+10.00	66.20	66.75	66.82
+20.00	66.31	66.86	66.93
+30.00	66.43	66.98	67.05
+40.00	66.54	67.09	67.16
+50.00	66.65	67.20	67.27
+60.00	66.76	67.31	67.38
+66.50	—	67.39	—

Notes:
For End Diaphragms at Pier 16, Unit 17, see Section B-B Sheet 18
For End Diaphragms at Pier 17, Units 17 & 18, see Section B-B Sheet 18
For End Diaphragms at Pier 18, Unit 18, see Section A-A, this Sheet.

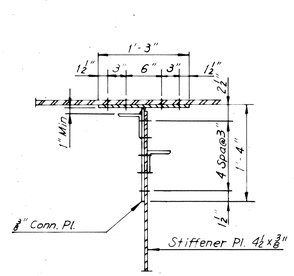
Note:
Spacing of posts for fire screen shall match handrail post spacing.



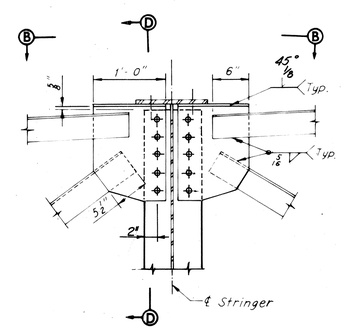
INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"



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

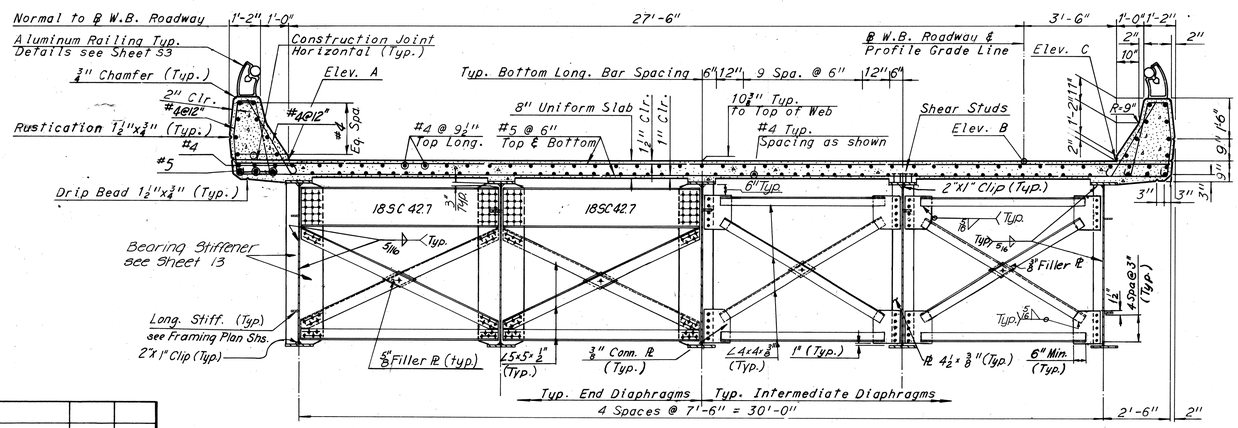


SECTION D-D
Scale: 1"=1'-0"



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

INTERMEDIATE DIAPHRAGM DETAILS



SECTION A-A
Scale: ⅜" = 1'-0"

Note:
Intermediate Diaphragm Details shown, are for Units 22 and 23 and curved stringers only in Units 20 and 21.
Flame Conn. PL as shown above is also to be used in bays where only one of the two stringers is curved.
For Units 20 and 21 see sheet 15 for Framing Plan and sheet 20 for Deck Plan.
For Units 22 and 23 see Sheet 17 for Framing Plan and Sheet 21 for Deck Plan.

Notes:
For Superstructure quantities, see Sheet 2.
For Framing plan, see Sheet 14.
For Joint details, see Sheet 24.
For Railing details, see Sheet 53.

	BY	DATE				
MADE	GSH	08-01-68				
CHECKED	SCC	10-21-68	1	As Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 19 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	89	265

Notes:
For End Diaphragms at Pier 18, Unit 19, see Section A-A, Sheet 19.
For End Diaphragms at Pier 19, Units 19 & 20, see Section A-A, Sheet 19.
For End Diaphragms at Pier 20, Units 20 & 21, see Section A-A, Sheet 19. and for Detail "D" see Sheet 16.
For End Diaphragms at Pier 10, Unit 21N and Pier 21, Unit 21S, see Section C-C this Sheet.

Note: Transverse dotted lines in Units 20 and 21 represent interior diaphragm at left end of stringers S5-20, S3-21N and S6-21N.
For location of diaphragms see Sheet 14.

Along inside face of Parapet
Handrail Post spacing
Parapet Joint spacing

℄ Pier 18 & 2⅝" Type A Jt.
12" Open Jt.
101'-4½"
21'-8¼"
3 Spaces @ 22'-6" = 67'-6"
13 Spaces @ 7'-6" = 97'-6"
1'-1¼"
℄ Scupper @ Sta. 339+69.00
2'-6"
28½" (Typ.)
31'-0"
12"
3"ϕ Steel Conduit
Stagger splices in alternate bars. (Typ.)
#4 Bars Top & Bott. Typ. For Spacing See Section A-A, Sheet 19.
#5 Bars @ 6" Top & Bottom
90°00'00"
Sta. 339+66.50 along ℄ W.B. Roadway
Sta. 340+68.00 along ℄ W.B. Roadway
1'-3" Min. (Typ.)
1'-1¼"
21'-8¼"
13 Spaces @ 7'-6" = 97'-6"
3 Spaces @ 22'-6" = 67'-6"
101'-4½"

UNIT 19

℄ Pier 19 & 2⅝" Type A Jt.
12" open Jt. (Typ.)
21'-10½"
1'-10½"
P.T. Sta. 29+54.52 End ℄ Ramp N.-W.
107'-9⅝"
3 Spaces @ 24'-0" = 72'-0"
13 Spaces @ 8'-0" = 104'-0"
3"ϕ Steel Conduit
9-#4 Bars @ 9½" (Top) 13-#4 Bars @ 6" (Bott.)
15-#6 Bars @ 9½" (Top)
13-#4 Bars @ 9½" (Top) 18-#4 Bars @ 6" (Bott.)
Sta. 28+63.65 ℄ Ramp N.-W.
10'-0" 10'-0"
6"
#5 Bars @ 6" Top & Bottom
℄ W.B. Roadway
27-#4 Bars @ 9½" (Top) for bottom reinf. see Section A-A Sheet 19.
24'-0"
90°00'00"
Sta. 340+68.00 along ℄ W.B. Roadway
inside face Parapet
P.O.T. Sta. 340+85.01 ℄ W.B. Roadway
2'-2¾"
22'-0¼"
13 Spaces @ 7'-11" = 102'-11"
3 Spaces @ 23'-9" = 71'-3"
107'-4½"

UNIT 20

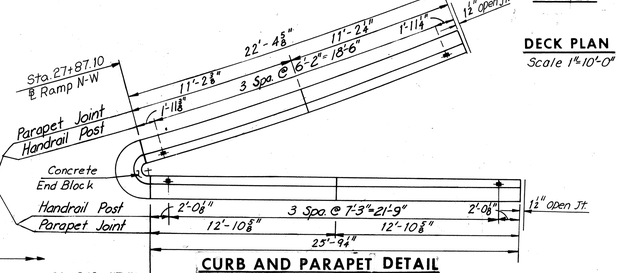
12" Open Jt.
℄ Pier 20 & 2⅝" Type A Jt.
13'-10⅝"
1'-10⅝"
13'-9¼"
2'-3¼"
96'-6½"
3 Spaces @ 23'-0" = 69'-0"
12 Spaces @ 7'-8" = 92'-0"
inside face of parapet
3"ϕ Steel Conduit
℄ Scupper @ Sta. 28+60.50
17-#4 Bars @ 9½" (Top)
23-#4 Bars, Spacing see Section C-C (Bott.)
18-#4 Bars @ 9½" (Top)
18-#4 Bars @ 5½" (Bott.)
13-#4 Bars @ 9½" (Top)
13-#4 Bars @ 5½" (Bott.)
28½"
"4 bars top and bottom as shown in Section C-C
90°00'00"
Sta. 341+75.50 along W.B. Roadway.
24-#5 bars fanned top & bott @ 6" along South ℄
20-#6 bars @ 9½" top
13-#9 Bars @ 9½" top & 16-#4 bars @ 5½" bott
10'-0" 10'-0"
2'-0" (Typ.)
For details of reinforcing in dotted area see Sheet 22.
147-#5 Bars @ 5"
Top & Bott.
6"
37-#5 Bars @ 6"
Top & Bott.
55-#5 Bars @ 6"
Top & Bott.
2'-2¾"
22'-0¼"
13 Spaces @ 7'-11" = 102'-11"
3 Spaces @ 23'-9" = 71'-3"
107'-4½"

UNIT 21

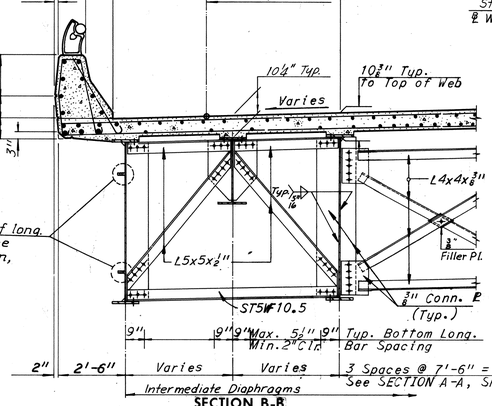
℄ Junction Box
℄ Light Std. @ Sta. 27+92.97
21'-5¾"
5'-9"
12" Open Jt.
℄ Pier 10 (Bridge 64) 2'-8" Type A Jt.
2'-3¼"
℄ Ramp N-W
Sta. 27+65.50 along ℄ Ramp N-W
Radius = 572.96'
℄ Junction Box 90°00'00"
61-#5 Bars @ 6" (Top & Bott.) (measured along South ℄)
3"ϕ Steel Conduit
3"ϕ Steel Conduit
Gutter Line
2'-0"
25'-0"
10'-0"
R=110'-0"
℄ Pier 21 & 2⅝" Type A Jt.
12" open Jt. (Typ.)
Gutter Line
3"ϕ steel Conduit
25'-0"
90°00'00"
Sta. 342+83.00 along ℄ W.B. Roadway

Along inside face of Parapet
Handrail Post spacing
Parapet Joint spacing

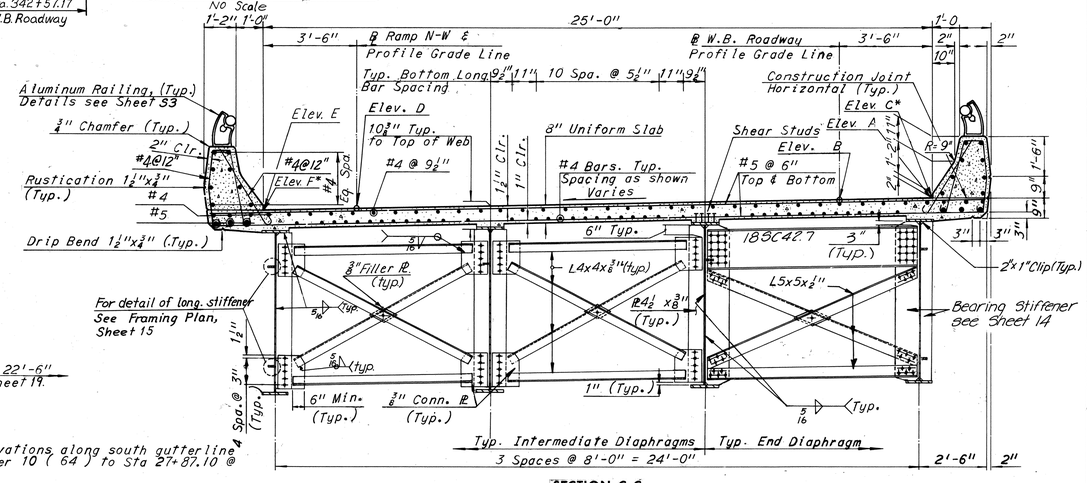
DECK PLAN
Scale 1"=10'-0"



CURB AND PARAPET DETAIL



SECTION B-B
Scale: ⅜" = 1'-0"



SECTION C-C
Scale: ⅜" = 1'-0"

Notes:
For Superstructure quantities, see Sheet 2.
For Framing plan, see Sheet 15
For Joint details, see Sheet 24
For Railing details, see Sheet 53.
For Standard Drainage Details, see Support Type 2 for Units 19 and 21, Sheet S5 & S6.

Note: Intermediate Diaphragms shown in Section C-C can only be used where stringers are straight. For Intermediate Diaphragm Details for curved stringers, see Sheet 19.

Note: Elev. C* are elevations along south gutterline of Ramp N-W from ℄ Pier 10 (64) to Sta 27+87.10 @ ctr. of Nose.
Elev. F* are elevations along north gutterline of W.B. Roadway between Sta. 342+57.17 @ ctr. of Nose and Sta. 342+83.00 @ ℄ Pier 21.

ELEVATION TABLE

STATION ℄ W. B.	ELEV. A	ELEV. B	ELEV. F*	ELEV. D	ELEV. E
339+66.50	67.46	67.39	—	66.91	66.84
+70.00	67.49	67.42	—	66.94	66.87
+80.00	67.61	67.54	—	67.06	66.99
+90.00	67.72	67.65	—	67.17	67.10
340+00.00	67.83	67.76	—	67.28	67.21
+10.00	67.94	67.87	—	67.39	67.32
+20.00	68.05	67.98	—	67.50	67.43
+30.00	68.17	68.10	—	67.62	67.55
+40.00	68.28	68.21	—	67.73	67.66
+50.00	68.39	68.32	—	67.84	67.77
+60.00	68.50	68.43	—	67.95	67.88
+68.00	68.59	68.52	—	68.04	67.97
+70.00	68.61	68.54	—	68.06	67.99
+80.00	68.73	68.66	—	68.18	68.11
+85.01	68.78	68.71	—	68.23	68.16
+90.00	68.84	68.77	—	—	—
341+00.00	68.95	68.88	—	—	—
+10.00	69.06	68.99	—	—	—
+20.00	69.18	69.11	—	—	—
+30.00	69.29	69.22	—	—	—
+40.00	69.40	69.33	—	—	—
+50.00	69.51	69.44	—	—	—
+60.00	69.62	69.55	—	—	—
+70.00	69.73	69.66	—	—	—
+75.50	69.80	69.73	—		
+80.00	69.85	69.78	—		
+90.00	69.96	69.89	—		
342+00.00	70.07	70.00	—		
+10.00	70.18	70.11	—		
+20.00	70.29	70.22	—		
+30.00	70.41	70.34	—		
+40.00	70.52	70.45	—		
+50.00	70.63	70.56	—		
+57.17	70.71	70.64	70.21		
+60.00	70.74	70.67	70.24		
+70.00	70.85	70.78	70.35		
+80.00	70.97	70.90	70.47		
342+83.00	71.00	70.93	70.50		

ELEVATION TABLE

STATION ℄ Ramp N-W	ELEV. D	ELEV. E	ELEV. C
29+54.52	68.23	—	—
+50.00	68.28	68.21	—
+40.00	68.39	68.32	—
+30.00	68.50	68.43	—
+20.00	68.60	68.53	—
+10.00	68.70	68.63	—
29+00.00	68.80	68.73	—
28+90.00	68.89	68.82	—
+80.00	68.98	68.91	—
+70.00	69.07	69.00	—
+63.65	69.12	—	—
+63.17	—	69.05	—
+60.00	69.15	69.08	—
+50.00	69.23	69.16	—
+40.00	69.30	69.23	—
+30.00	69.37	69.30	—
+20.00	69.44	69.37	—
+10.00	69.51	69.44	—
28+00.00	69.57	69.50	—
27+90.00	69.64	69.56	—
27+87.10	69.67	69.58	70.21
+80.00	69.74	69.64	70.34
+70.00	69.87	69.76	70.56
27+65.50	69.94	69.82	70.66

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	7-29-68				
CHECKED	KCT	10-18-68	1	As Built	TEM	10-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

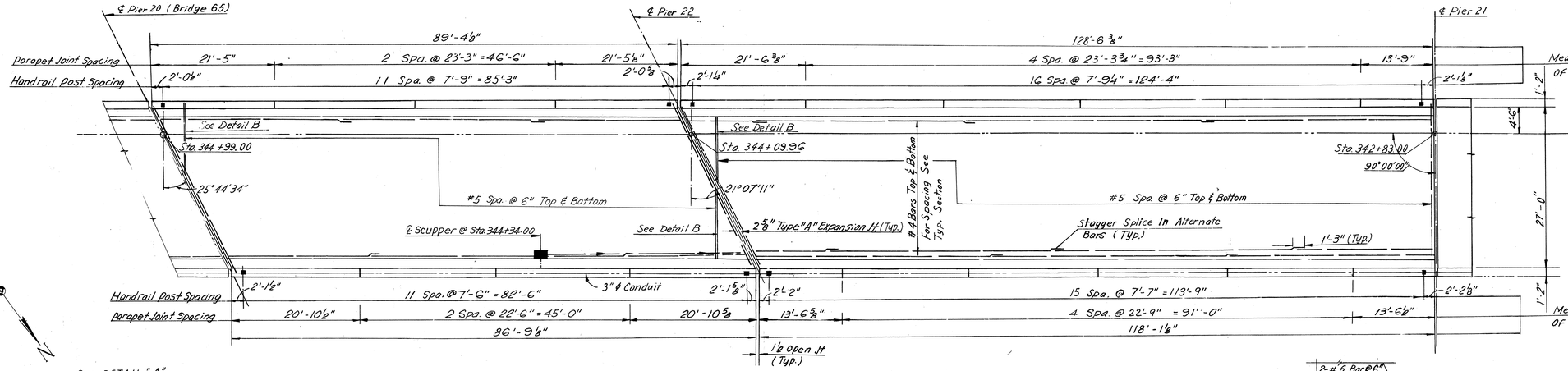
BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

DECK PLAN — UNITS 19, 20 AND 21

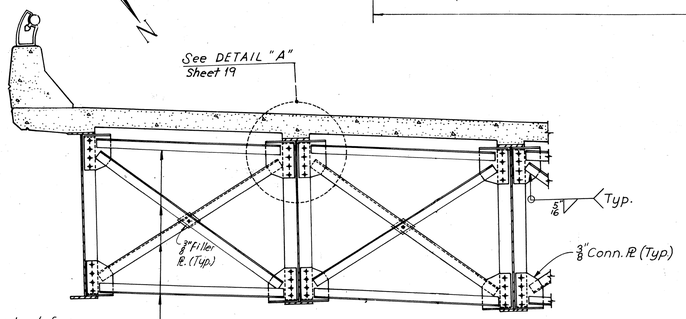
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 20 OF 29

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	90	265



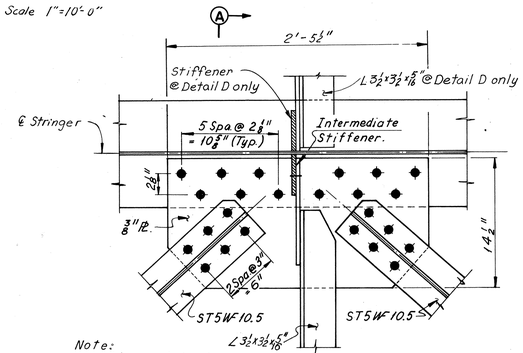
Note:
Units 22 and 23 are shown with stationing from right to left.



UNIT 23

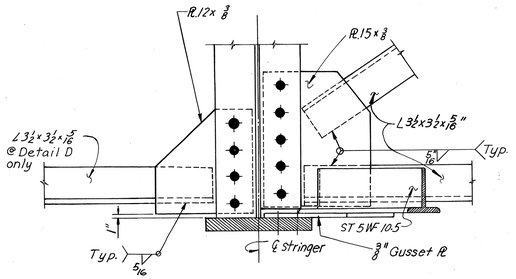
INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"

DECK PLAN
Scale 1"=10'-0"



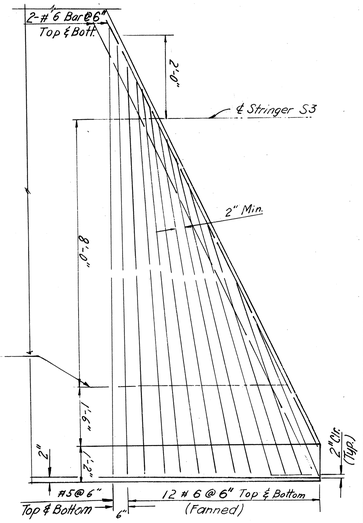
Note:
Diagonal Angle in Intermediate Diapragm is not shown.

DETAIL C
Scale: 1½" = 1'-0"
Ⓐ → Detail D similar except as shown above.



SECTION A-A

UNIT 22

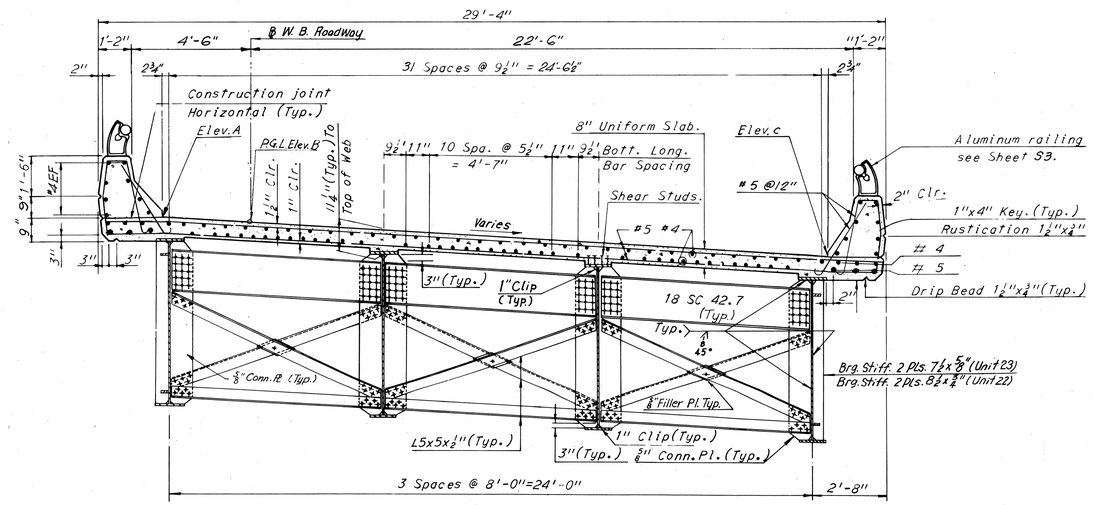


DETAIL B
No Scale

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
345+00.69	72.02	—	—
345+00.00	72.02	71.89	71.07
344+99.00	—	71.90	—
344+90.00	72.10	72.97	71.23
344+88.63	—	—	71.25
344+80.00	72.16	72.06	71.40
344+70.00	72.23	72.14	71.55
344+60.00	72.29	72.20	71.68
344+50.00	72.33	72.25	71.81
344+40.00	72.35	72.27	71.83
344+30.00	72.35	72.28	71.85
344+20.00	72.34	72.27	71.84
344+11.31	72.31	—	—
344+10.00	72.30	72.23	71.80
344+09.96	—	72.23	—
344+00.00	72.25	72.18	71.75
344+01.66	—	—	71.76
343+90.00	72.18	72.11	71.68
343+80.00	72.08	72.01	71.58
343+70.00	71.97	71.90	71.47
343+60.00	71.86	71.79	71.36
343+50.00	71.75	71.68	71.25
343+40.00	71.64	71.57	71.14
343+30.00	71.53	71.46	71.03
343+20.00	71.41	71.34	70.91
343+10.00	71.30	71.23	70.80
343+00.00	71.19	71.12	70.69
342+90.00	71.08	71.01	70.58
342+83.00	71.00	70.93	70.50

Note:
For Standard Drainage Details for Unit 21 see Support Type 2 Sheet 55 & 56.

Notes:
For Framing Plan see Sheet 17.
For Joint Details, see Sheet 24.
For Quantities see Sheet 2.
For Handrail Details, see Sheet 53.



TYPICAL SECTION
Scale: ⅜"=1'-0"

END DIAPHRAGM

	BY	DATE				
MADE	R C	11-21-68				
CHECKED	Y.C.P	1-15-69	1	As Built	TEM	10-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

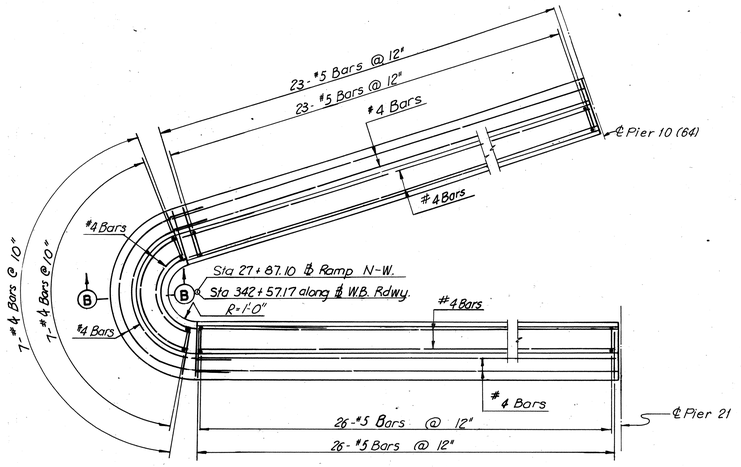
BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST.-R.R. TRACKS AND 16TH ST.

DECK PLAN UNITS 22 AND 23

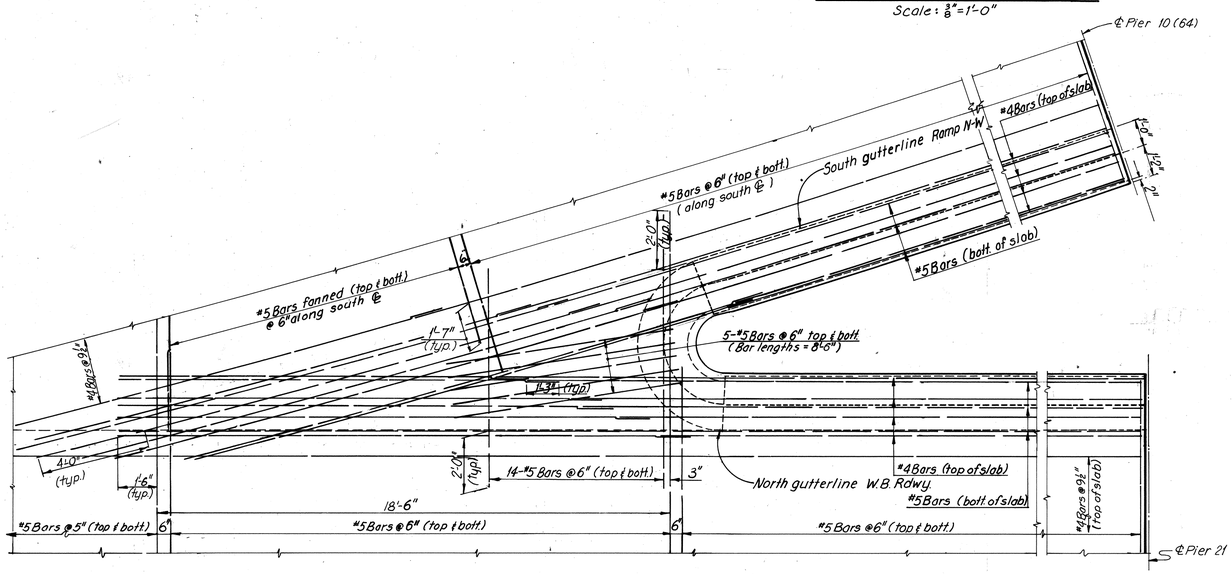
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET 21 OF 29

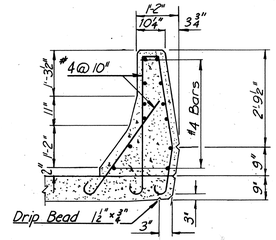
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	91	265



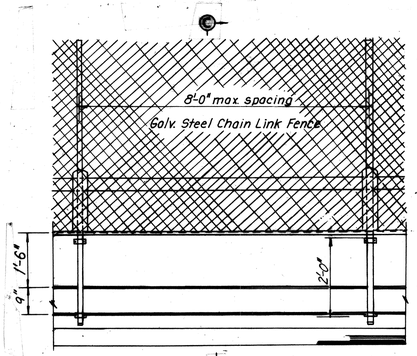
PARAPET REINFORCING STEEL DETAIL
Scale: $\frac{3}{8}$"=1'-0"



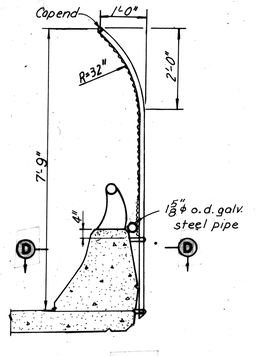
SLAB REINFORCING STEEL DETAIL
Scale: $\frac{3}{8}$"=1'-0"



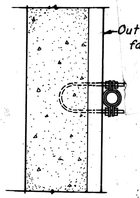
SECTION B-B
Scale: $\frac{3}{8}$"=1'-0"



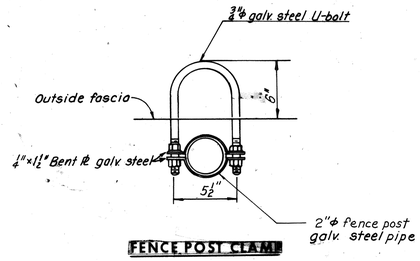
Note: Post spacing of galvanized Steel Chain Link Fence shall match handrail post spacing.



SECTION C-C



SECTION D-D



FENCE POST CLAMP

FIRE SCREEN DETAILS
No Scale

	BY	DATE
MADE	GSH/JD	12-12-68
CHECKED	PTA	2-19-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	10-76

AS BUILT

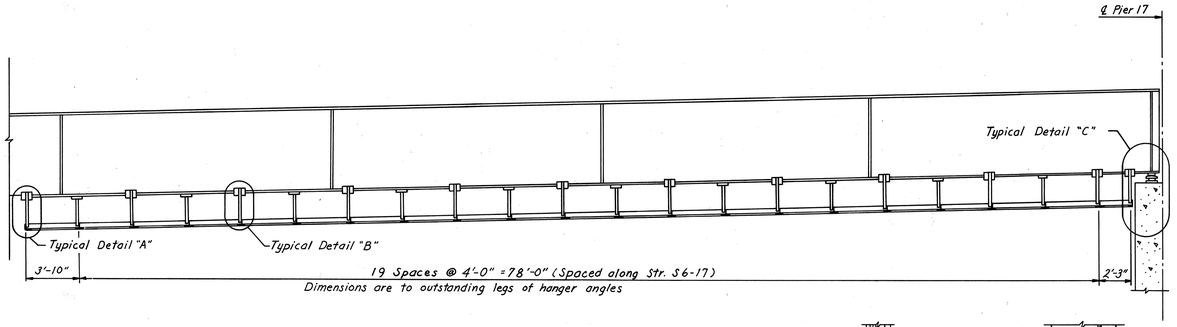
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
SUPERSTRUCTURE DETAILS

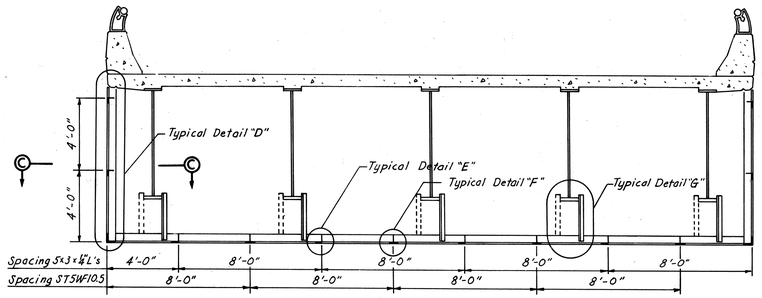
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 22 OF 29

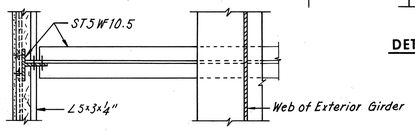
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	92	265



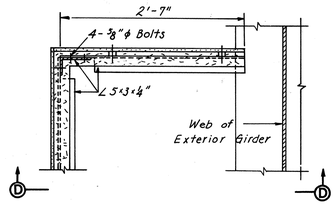
TYPICAL LONGITUDINAL SECTION OF SUPPORT FRAMING FOR FIRE PROTECTION



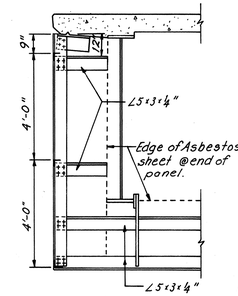
TYPICAL TRANSVERSE SECTION OF SUPPORT FRAMING



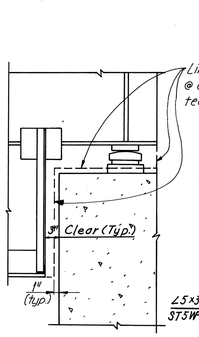
SECTION C-C
(At Typical Side Panel)



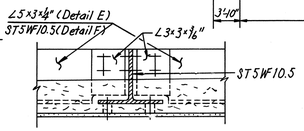
SECTION C-C
(At end of Side Panel)



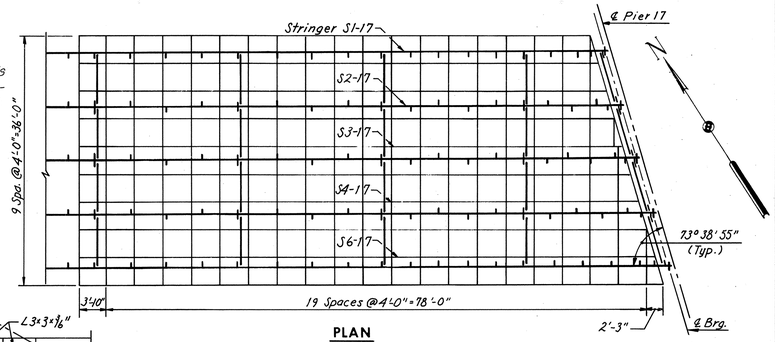
SECTION D-D



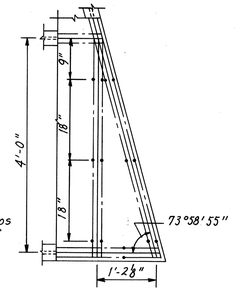
DETAIL C



SECTION A-A

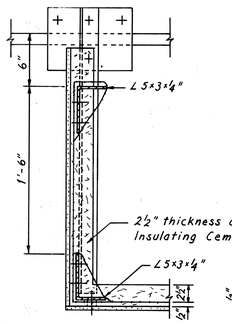


PLAN



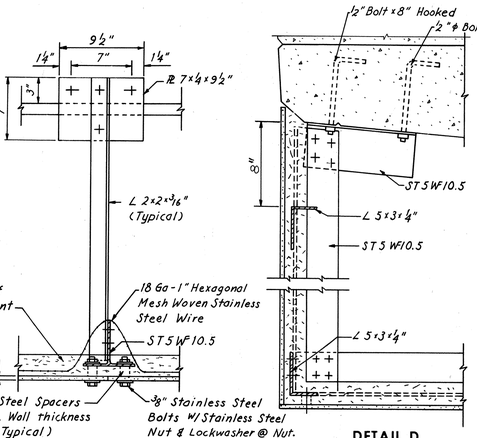
Bottom Panels

NOTE: Stainless steel bolts, washers & Spacers are indicated thus:

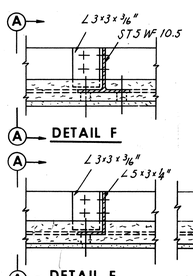


DETAIL A

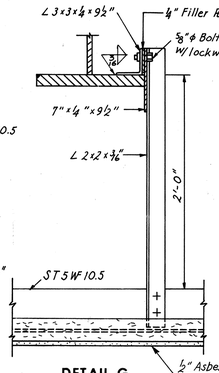
DETAIL B



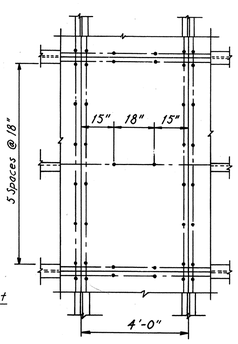
DETAIL D



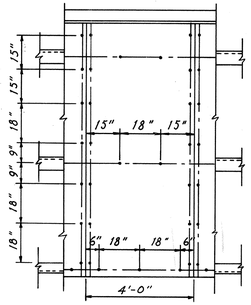
DETAIL E



DETAIL G



4'x8' Bottom Panels



4'x9'7" Side Panels

TYPICAL BOLT LAYOUTS FOR ATTACHING ASBESTOS SHEETS

NOTES FOR SUPPORT FRAMING

1. All materials shall conform to Virginia Std. Specs. - 1970
2. All connections shall be made using 8 7/8"ϕ High strength bolts.
3. All hanger connections to be field connections.
4. A minumum of two bolts shall be used at all connections.
5. Payment for connections shall be based on weight of bolts.
6. Painting:
   A. Angles welded to girders shall be painted in same manner as girders.
   B. All other support framing shall receive one shop coat of red lead paint and one field coat of red lead paint.
7. All support framing shall be paid for by weight as Structural Steel.

NOTES FOR INSULATION

1. All exterior surfaces of support framing shall be covered by asbestos - cement sheets to the extent and in the manner indicated by the details.
2. Asbestos - cement sheets shall be 1/4" thick 48" in width. Sheets shall be simlar or equal to Corey Industrial A-C Board and meet the requirements of Federal Spec SS-B-755. All sheets shall join with tight butt joint
3. 18 Ga. 1" Hexagonal Mesh Woven Stainless Steel Wire shall be placed in a continuous manner over the transverse framing members and 3/4" above the asbestos sheets. All ends shall be securely wired around framing members and splices at ends of rolls shall be lapped 2'-0" and be securely wired together.
4. Insulating Cement shall be placed to a thickness of 2 1/2" on the inside surfaces of the asbestos sheeting as indicated by the details.
5. Insulating Cement shall be similar to and equal the quality and characteristics of "Simco #55" Insulating Cement as Mfg'd. by Standard Asbestos Mfg. & Insulating Co. and shall meet requirements of Federal Spec. HH-I-523 Class 3.
6. Insulating Cement shall be placed in accordance with the recommendations of the Mfg. and shall be applied to a uniform density and thickness to all surfaces of asbestos sheets.
7. Basis of Payment;
   All cost of materials and labor for insulation including the woven wire and all stainless steel bolts, spacers, washers, etc., insulating cement and asbestos sheets, shall be included in the price bid per Lump Sum for Fire Protection Insulation.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	11-25-68				
CHECKED	JD	4-18-69	1	As Built	TEM	10-76
IN CHARGE						

AS BUILT

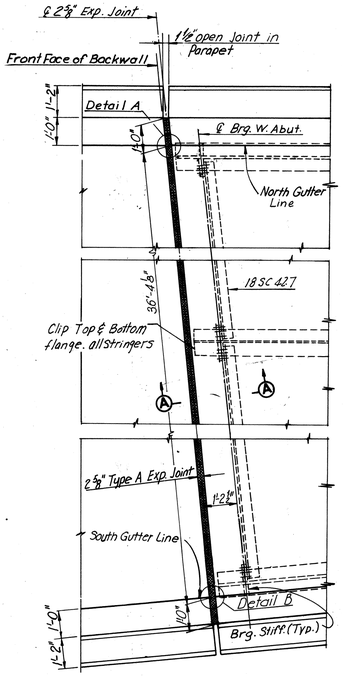
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

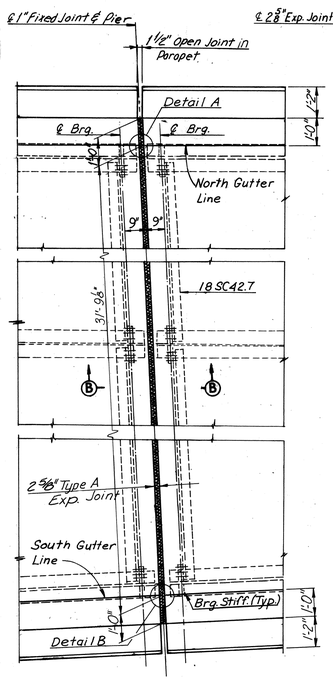
BRIDGE NO. 63
WESTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FIRE PROTECTION DETAILS

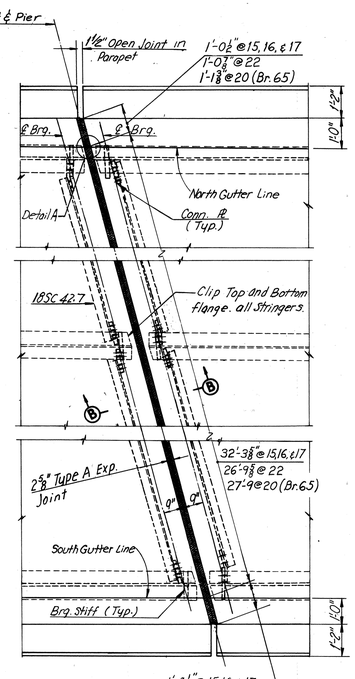
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

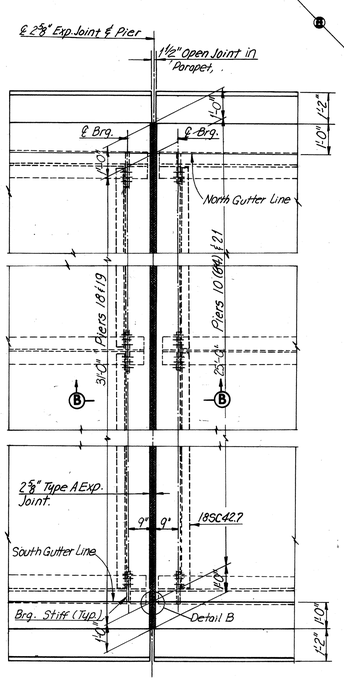
SCALE: No Scale
CONTRACT NO.: 10
SHEET NO. 23 OF 29

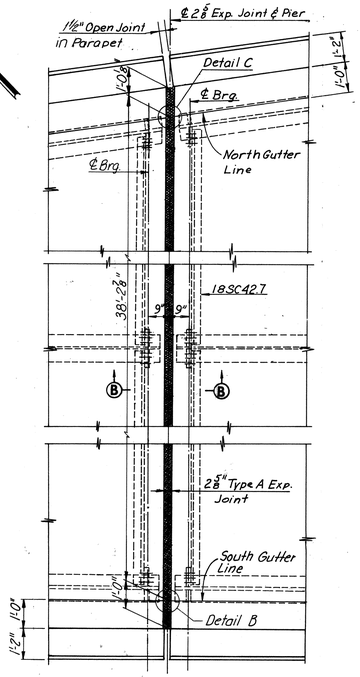
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	93	265

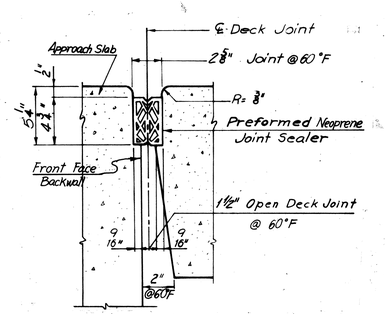












2⅝" TYPE "A" JOINT @ WEST ABUTMENT

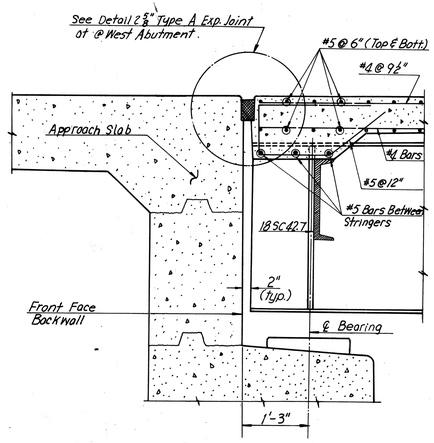
PLAN — JOINT AT WEST ABUTMENT
Scale : ⅜" = 1'-0"

PLAN — JOINT AT PIER 14
Scale : ⅜" = 1'-0"

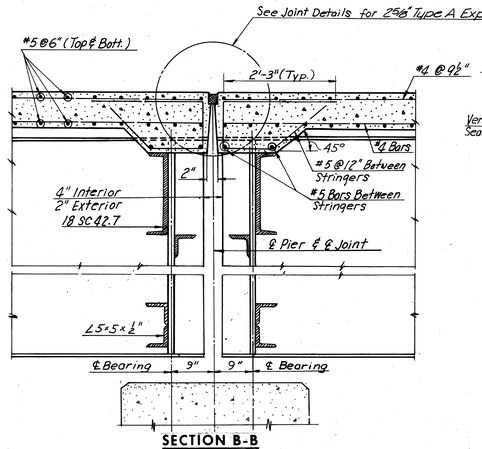
PLAN — JOINT AT PIERS 15, 16, 17, 22 AND 20 (BR. 65)

PLAN — JOINT AT PIERS 18, 19, 21 AND 10 (BR. 64)
Scale : ⅜" = 1'-0"

PLAN — JOINT AT PIER 20
Scale: ⅜" = 1'-0"



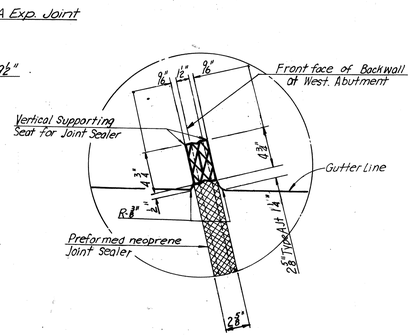
SECTION A-A
Scale : ¾" = 1'-0"



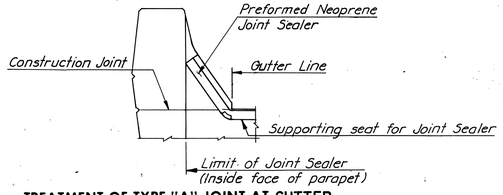
SECTION B-B
Scale: ¾" = 1'-0"

Note:
All horizontal dimensions of Sections shown above are normal to ℄ joint.

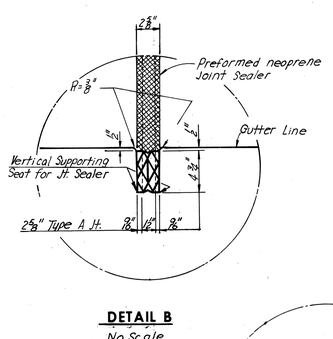
Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the Temperature at the time of construction.



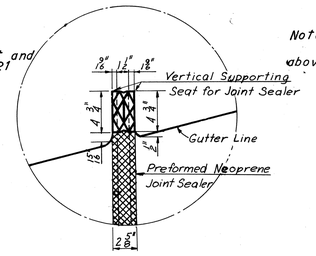
DETAIL A
No Scale
Typical for W. Abutment and Piers 14, 15, 16, 17 22, and 20 (Br. 65)



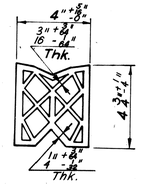
TREATMENT OF TYPE "A" JOINT AT GUTTER
No Scale



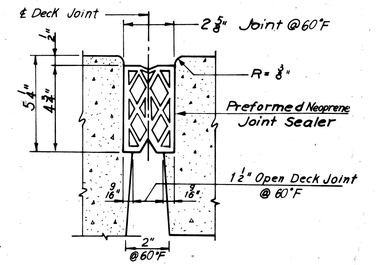
DETAIL B
No Scale
Typical for W. Abutment and Piers 14, 18, 19, 20, 21 and 10 (bridge 64).



DETAIL C
No Scale
Typical for Pier 20.



PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT



2⅝" TYPE "A" JOINT EXPANSION JOINTS
No Scale

Note:
All horizontal dimensions shown above are normal to ℄ Joint.

	BY	DATE
MADE	GSH	10-1-68
CHECKED	J.D.	11-1968
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	10-76

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

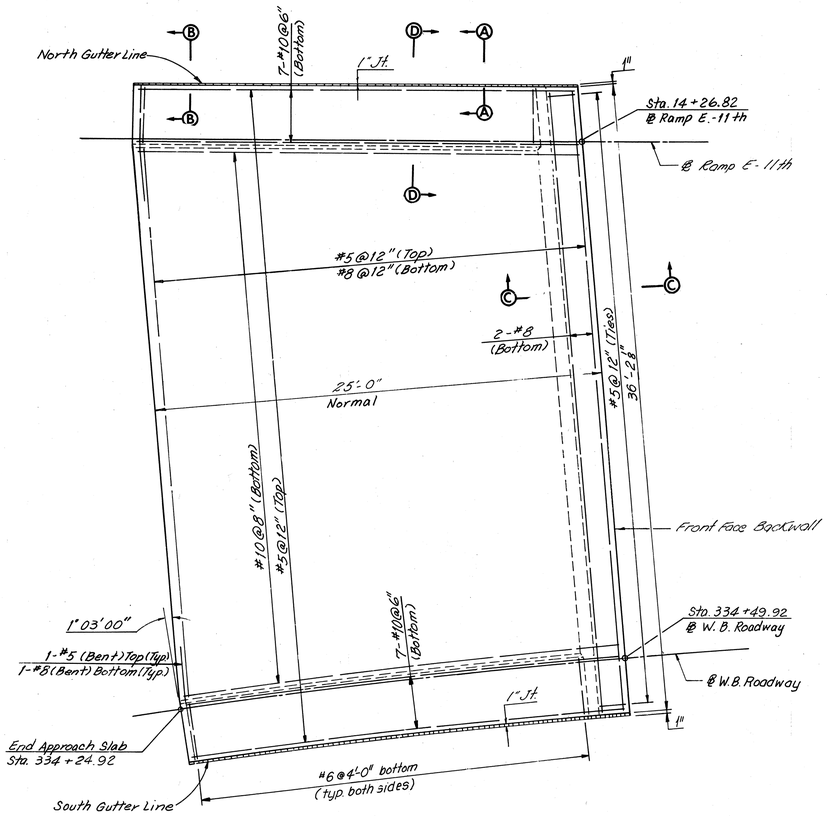
BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
JOINT DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 29

AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	94	265

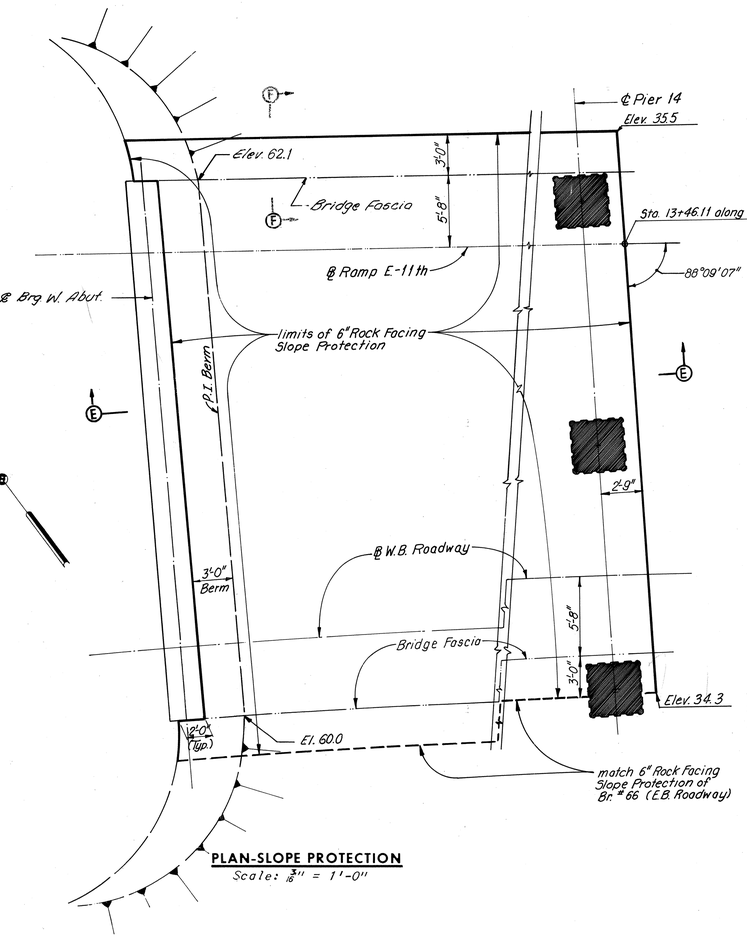


WEST ABUTMENT APPROACH SLAB
Scale: $\frac{1}{4}$" = 1'-0"

Note:
All reinforcing bars shall be minimum 2" clear of exposed face of concrete.

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

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

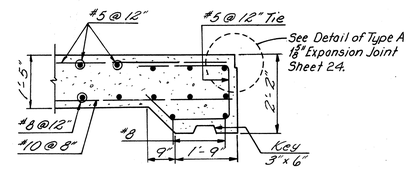


PLAN-SLOPE PROTECTION
Scale: $\frac{3}{16}$" = 1'-0"

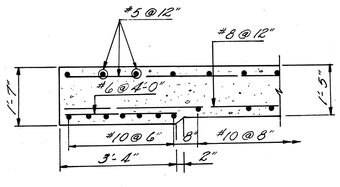
Note:
For limits of Slope Protection, see General Plan, Sheet 1.
For West Abutment, see Sheet 3.
For Abutment Details, see Sheet 4.

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

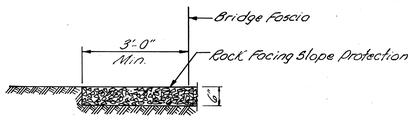
Note:
The item "Rock Facing Slope Protection" shall include the excavation of or the placing and compaction of any embankment material necessary to bring the surface of protected slopes to the finished elevations shown.



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



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



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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	H.J.C.	7-8-68				
CHECKED	G.C.C.	8-22-68	1	As Built	T.E.M.	10-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 63
WESTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
APPROACH SLAB AND SLOPE PROTECTION DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 25 OF 29

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

RICHMOND EXPRESSWAY SYSTEM
CONTRACT NO. PC – 2018
PROTECTIVE COATING OF STRUCTURES
****

Bridge 64

Downtown Expressway

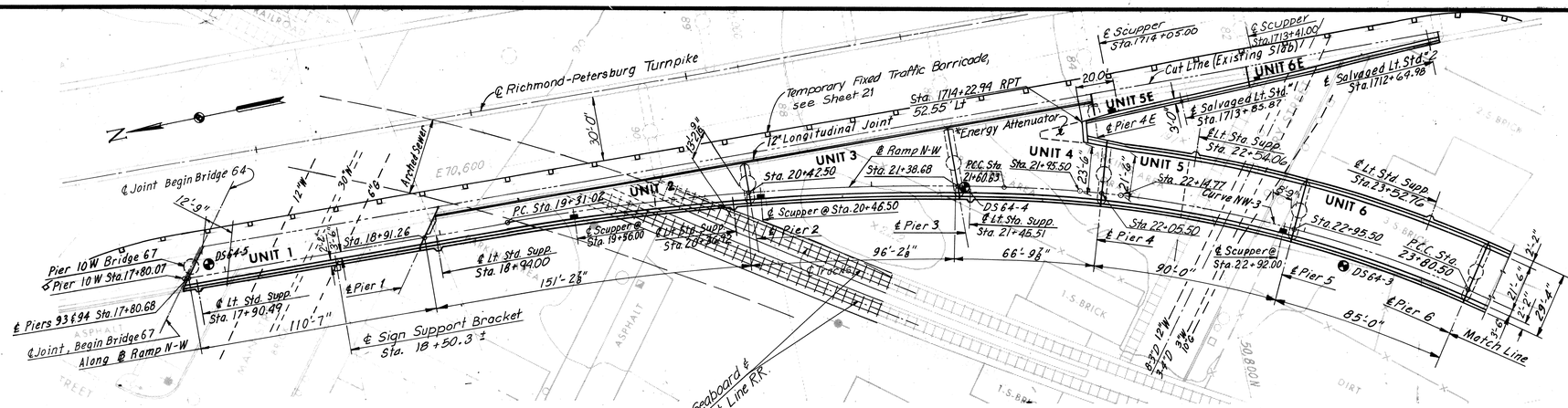
Ramp N-W Connection from
Richmond-Petersburg Turnpike

RECORD SET PLANS (Next 28)

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

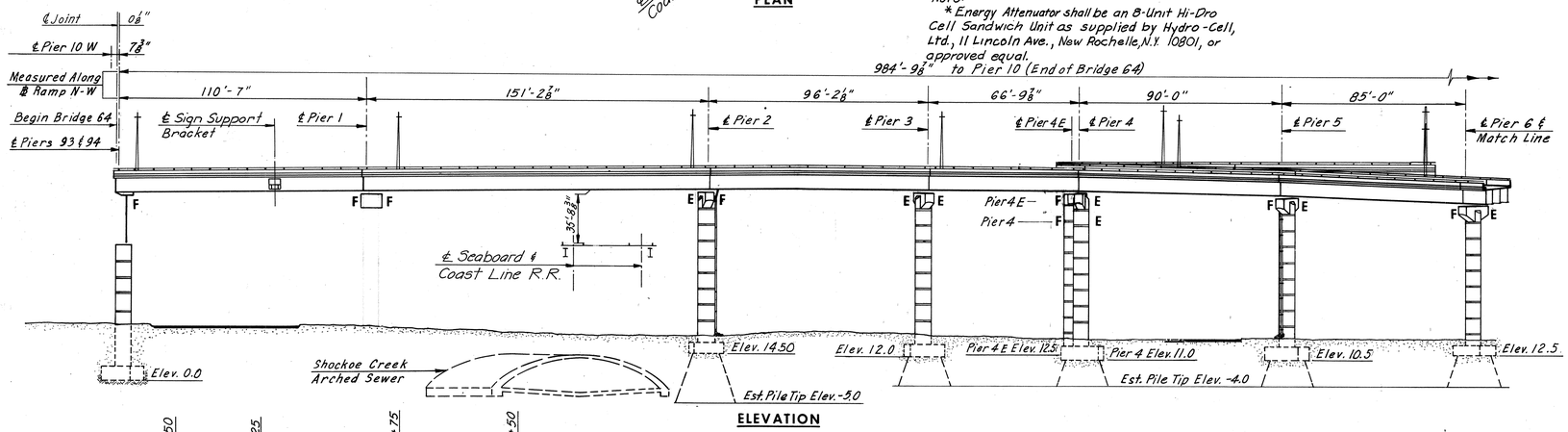
INDEX

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

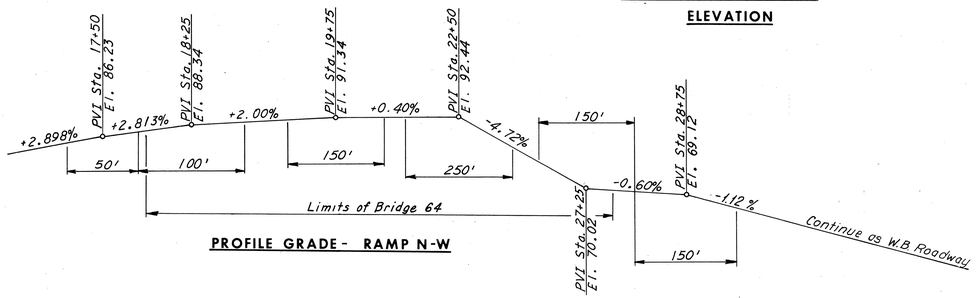


PLAN

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



ELEVATION



PROFILE GRADE - RAMP N-W

HORIZONTAL CURVE DATA

℄ R. P. Turnpike

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

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

℄ Ramp N-W

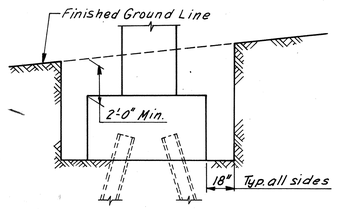
Curve: NW-1
P.I. = Sta. 13+42.50
Δ = 32° 01' 34"
D = 3° 51' 35.6"
T = 426.01'
L = 829.72'
R = 1,484.39

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

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

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

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



LIMITS OF STRUCTURE EXCAVATION
No Scale

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

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

AS BUILT

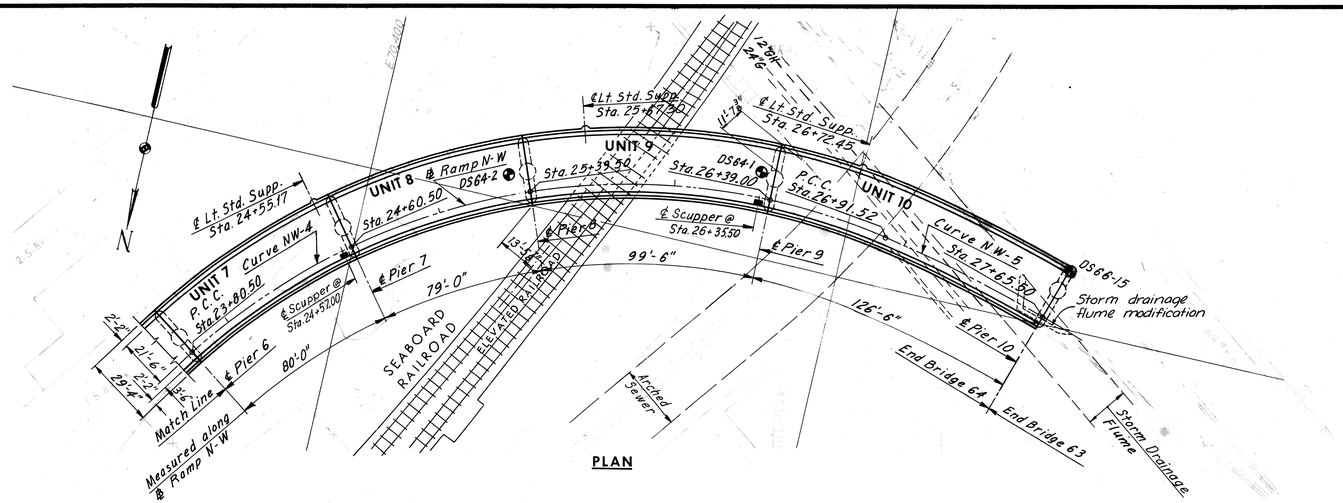
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

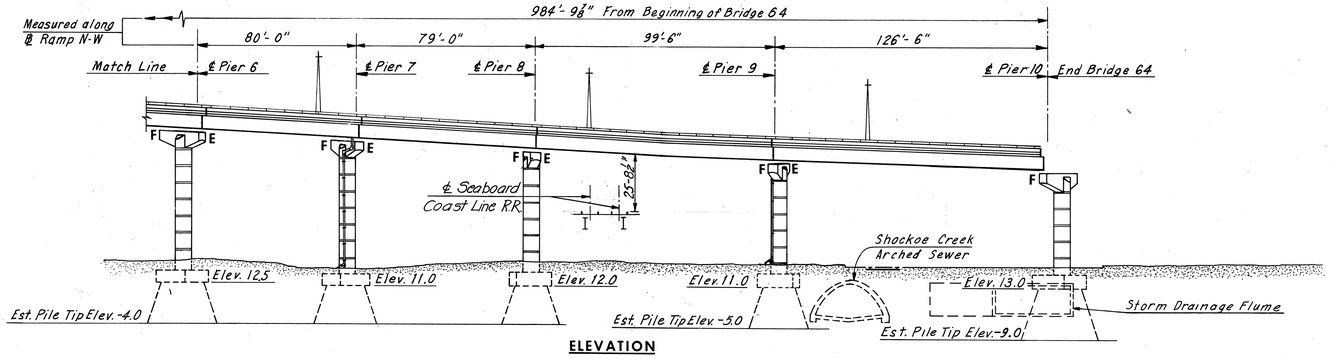
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

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

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





ESTIMATED QUANTITIES

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

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

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

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

GENERAL NOTES:

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

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

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

DATUM: City of Richmond

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

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

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

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

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

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designations A36, A572 - Grade 50 and A588 as noted. See Special Provisions.
All field connections shall be made with high strength bolts. High strength bolts shall be ¾" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

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

AS BUILT

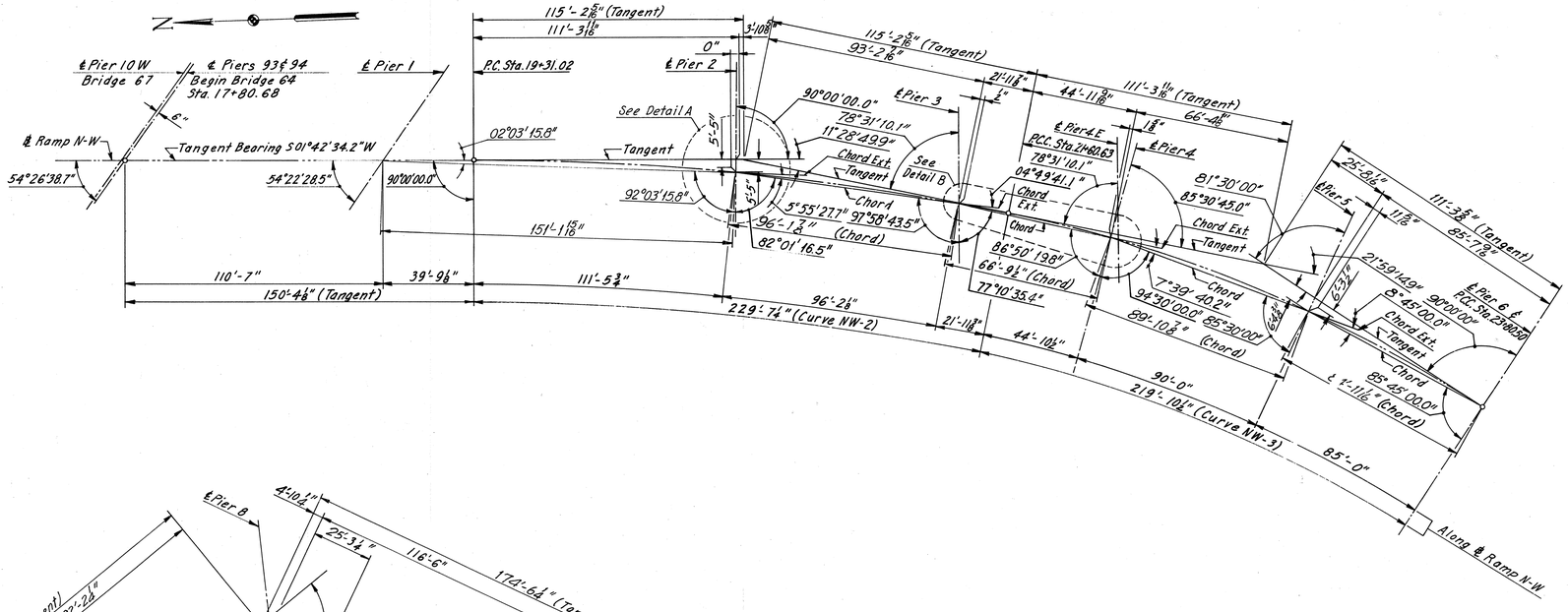
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

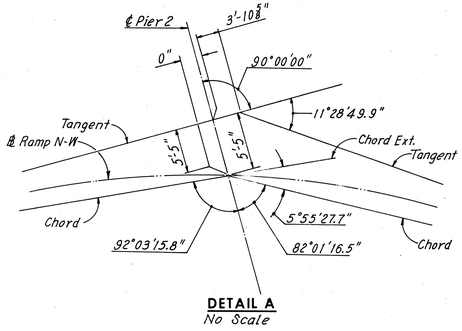
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

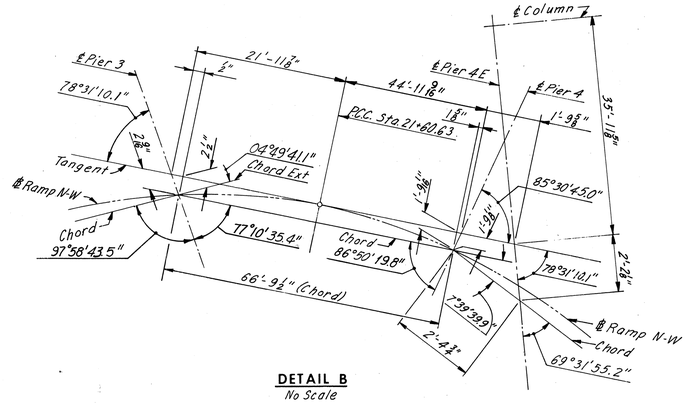
SCALE: 1" = 30'-0"
CONTRACT NO. 10
SHEET NO. 2 OF 28

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





DETAIL A
No Scale



DETAIL B
No Scale

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

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

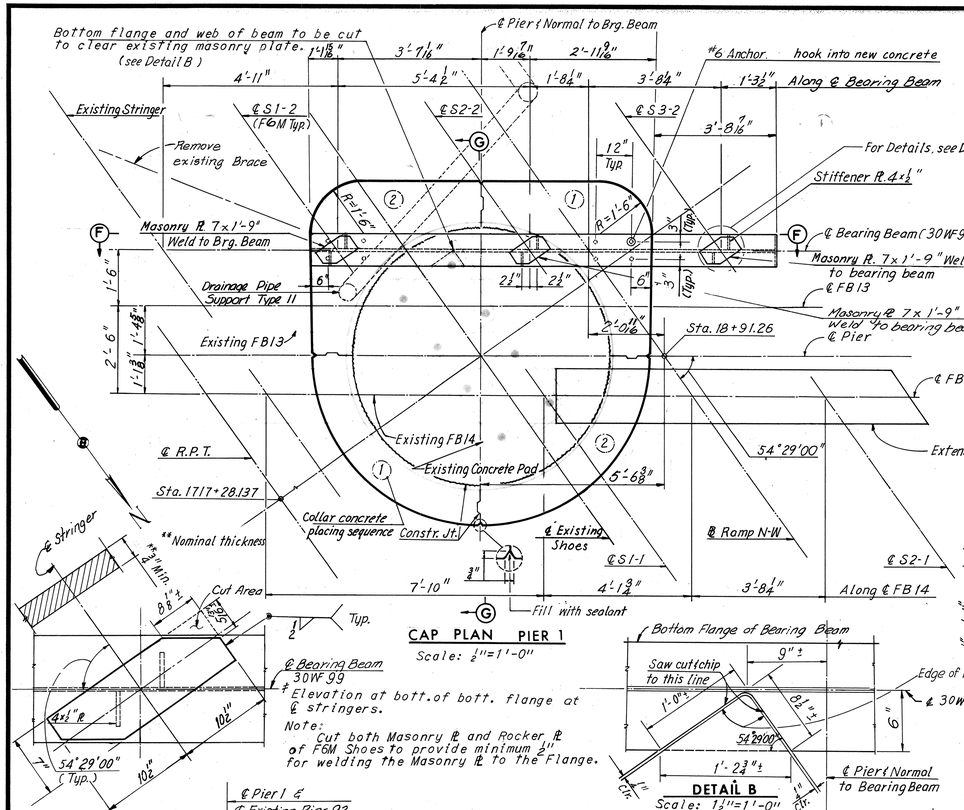
BRIDGE NO. 64
RAMP N-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
LAYOUT PLAN

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

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

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

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



CAP PLAN PIER 1

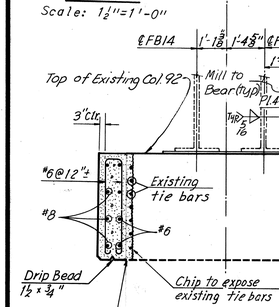
Scale: ½"=1'-0"

DETAIL A

Scale: 1½"=1'-0"

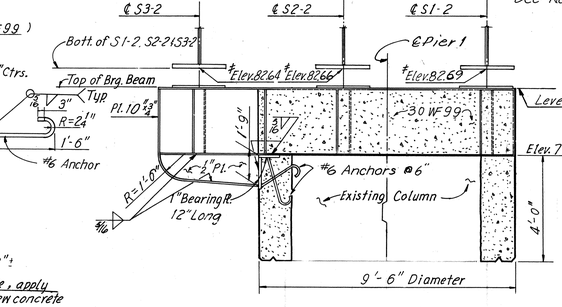
DETAIL B

Scale: 1½"=1'-0"



SECTION G-G

Scale: ⅜"=1'-0"



VIEW F-F

Scale: ⅜"=1'-0"

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

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

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

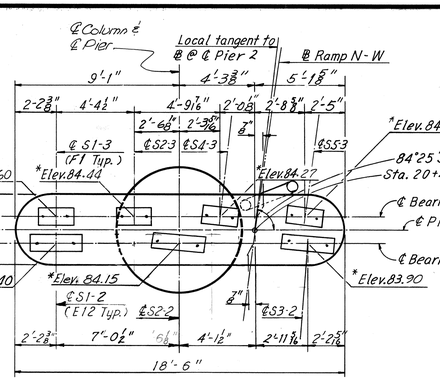
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

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

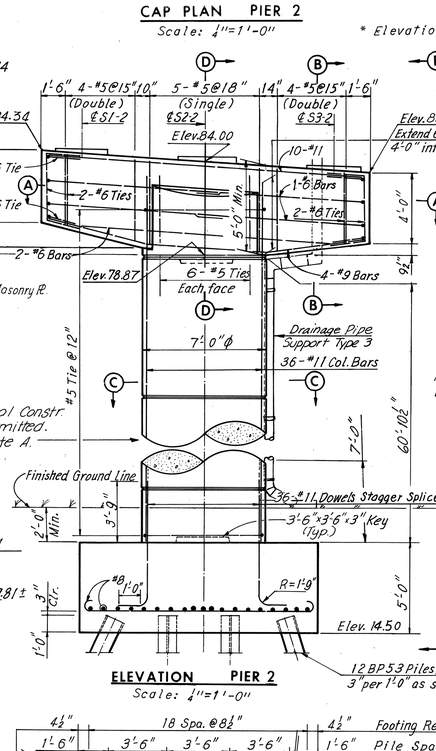
	BY	DATE				
			4	As Built	TEM	6-77
MADE	K.C.T.	3-16-69	3	Angle of Beam	REF	1-6-75
CHECKED	Y.C.P	4-24-69	2	Number of Girders	REF	12-30-74
IN CHARGE			1	Note Change	T.E.M	5-74
			NO.	REVISION	BY	DATE

CAP PLAN PIER 2

Scale: ¼"=1'-0"

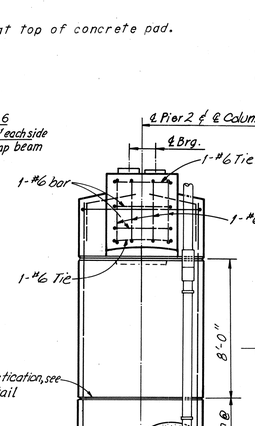


* Elevation at top of concrete pad.



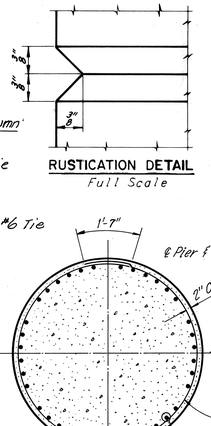
ELEVATION PIER 2

Scale: ¼"=1'-0"



VIEW E-E

Scale: ¼"=1'-0"



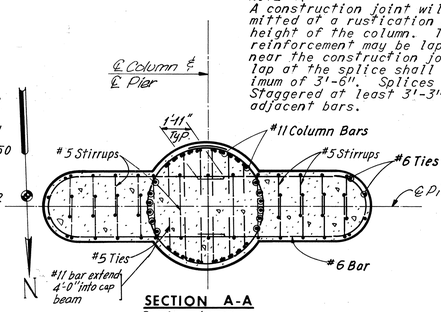
RUSTICATION DETAIL

Full Size

SECTION C-C

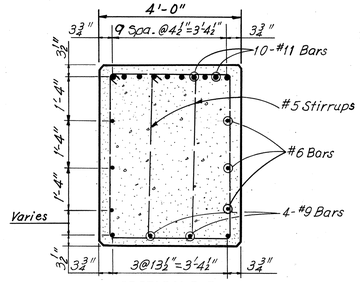
Scale: ⅜"=1'-0"

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



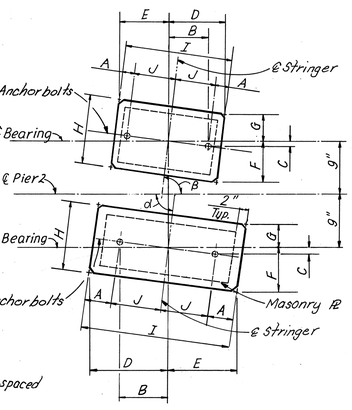
SECTION A-A

Scale: ¼"=1'-0"



SECTION B-B

Scale: ½"=1'-0"

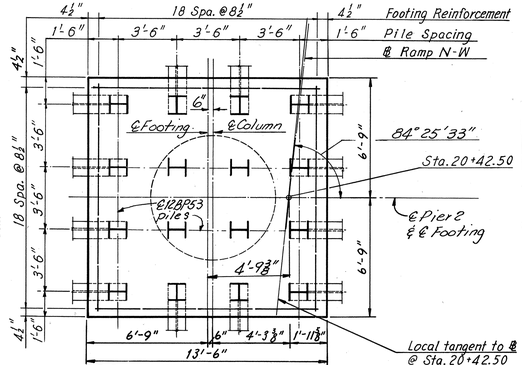


PAD AND ANCHOR BOLT SETTING PLAN

No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN												
Pier	Stringer	d	B	A	B	C	D	E	F	G	H	I	J
2	S1-3	—	90°00'00"	4½"	8"	0	12½"	12½"	5¾"	5¾"	11½"	25"	8"
	S2-3	—	90°00'00"	4½"	8"	0	12½"	12½"	5¾"	5¾"	11½"	25"	8"
	S4-3	—	83°42'49"	4½"	7⅞"	⅞"	13⅛"	11¼"	7"	4⅝"	11½"	25"	8"
	S5-3	—	82°00'00"	4½"	7⅝"	1½"	13⅛"	11⅝"	7⅜"	4"	11½"	25"	8"
	S1-2	90°00'00"	—	4"	14½"	0	18½"	18½"	6⅜"	6⅜"	13½"	36½"	14½"
	S2-2	87°14'17"	—	4"	14⅛"	0	18½"	17⅞"	6⅛"	6"	13⅛"	36½"	14½"
	S3-2	84°26'56"	—	4"	14⅜"	1½"	18¾"	17⅝"	8⅛"	5¼"	13½"	36½"	14¼"

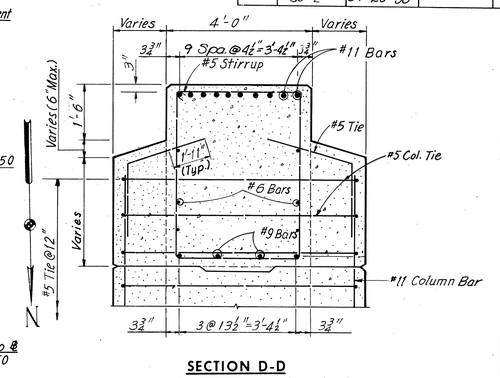
Note:
For Standard Shoe Details, see Sheets S1 & S2.
For Framing Plan, see Sheets 12 & 13.
For Steel and Concrete Quantities, see Sheet 2.
All piles shall be 12BP53 Steel Pile. (Design Capacity = 57 Tons.)
Estimated pile tip elevation. Pier 2 = -5.0
For Pile Details, see Sheet 7.
For Details of Extension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



FOOTING PLAN PIER 2

Scale: ¼"=1'-0"

FOOTING FOR PIER 2 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



SECTION D-D

Scale: ½"=1'-0"

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

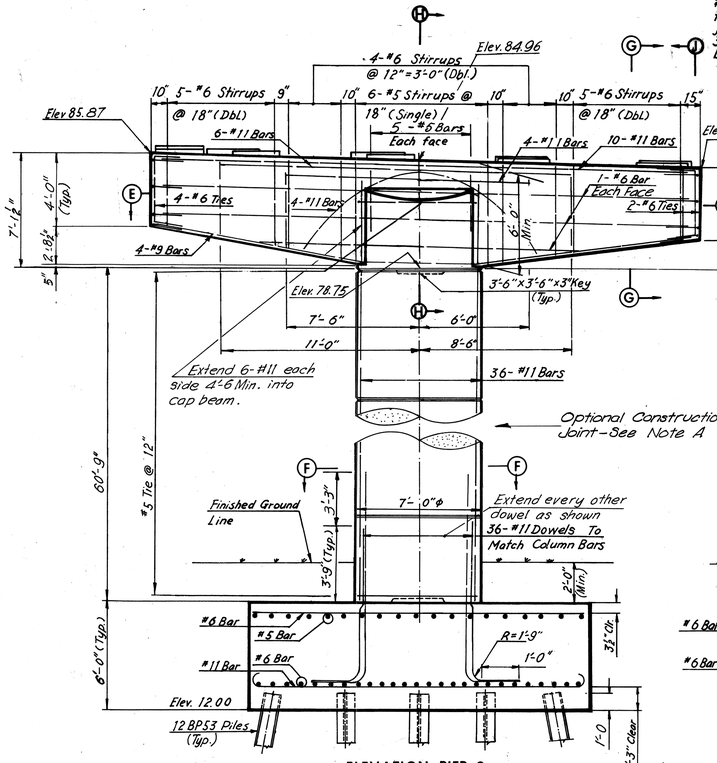
PIERS 1 AND 2

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

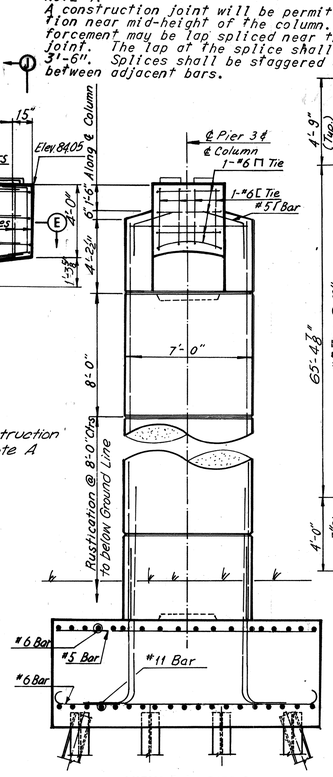
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 4 OF 28

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

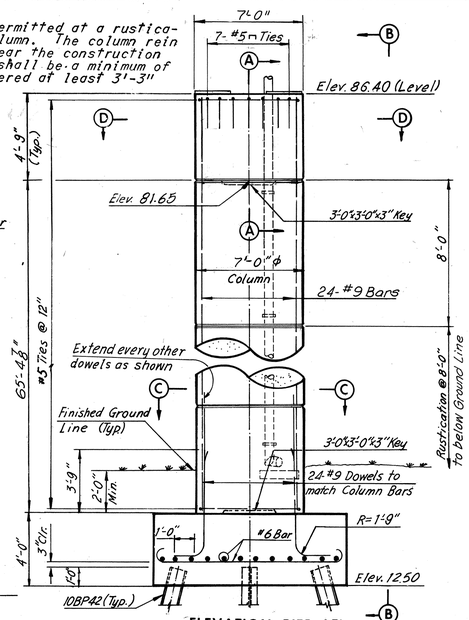
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap of the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



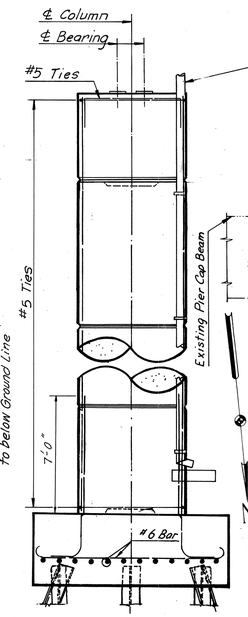
ELEVATION—PIER 3
Scale: 1/4" = 1'-0"



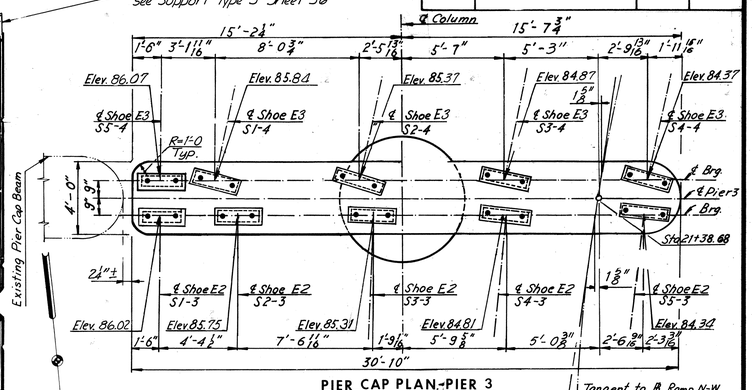
VIEW J-J—PIER 3
Scale: 1/4" = 1'-0"



ELEVATION—PIER 4E
Scale: 1/4" = 1'-0"

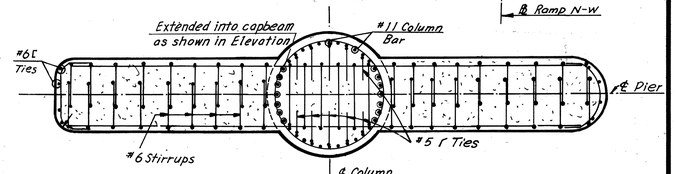


VIEW B-B—PIER 4E
Scale: 1/4" = 1'-0"



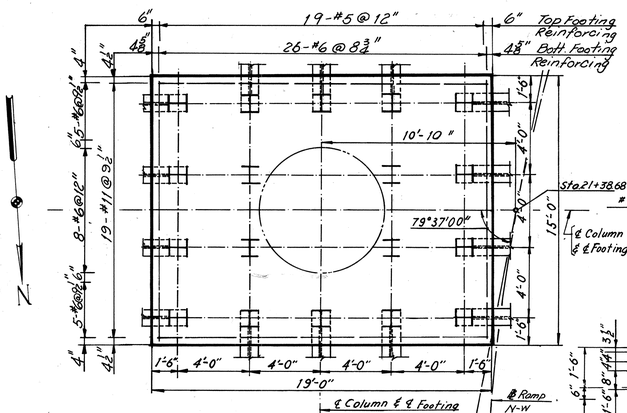
PIER CAP PLAN—PIER 3
Scale: 1/4" = 1'-0"

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

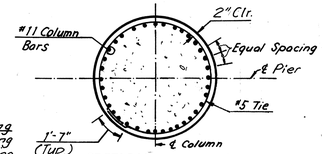


SECTION E-E—PIER 3
Scale: 1/4" = 1'-0"

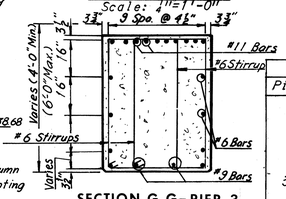
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.



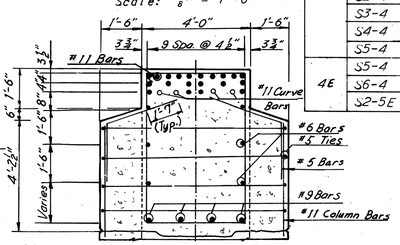
FOOTING PLAN—PIER 3
Scale: 1/4" = 1'-0"



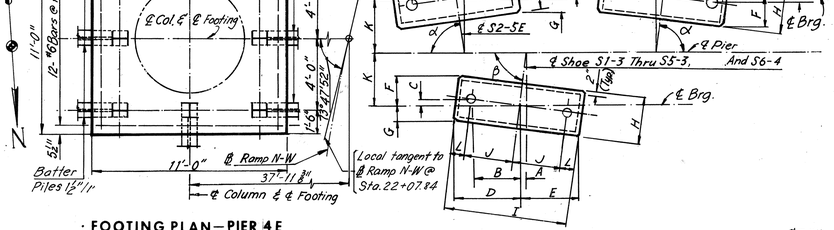
SECTION F-F—PIER 3
Scale: 1/4"=1'-0"



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

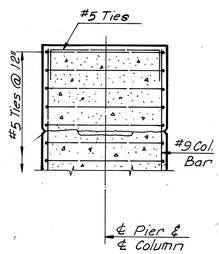


SECTION H-H—PIER 3
Scale: 3/8" = 1'-0"

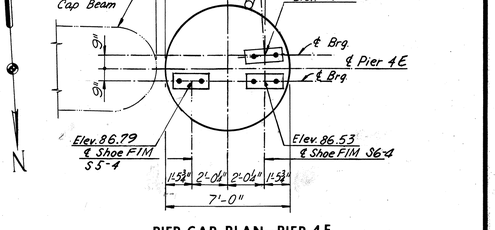


FOOTING PLAN—PIER 4E
Scale: 1/4" = 1'-0"

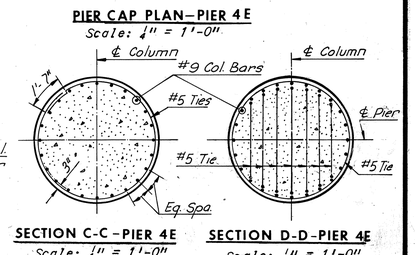
ANCHOR BOLT SETTING PLAN
No Scale



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



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



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

SECTION D-D—PIER 4E
Scale: 1/4" = 1'-0"

DIMENSIONS OF ANCHOR BOLT SETTING PLAN

Pier	Stringer	α	B	A	B	C	D	E	F	G	H	I	J	K	L
3	S1-3	--	90°00'00"	--	8¼"	--	12¼"	12¼"	6½"	6½"	13"	24½"	8¼"	9"	4"
	S2-3	--	90°00'00"	--	8¼"	--	12¼"	12¼"	6½"	6½"	13"	24½"	8¼"	9"	4"
	S3-3	--	86°50'50"	1/2"	8¼"	7/16"	12 9/16"	11 15/16"	7⅛"	5⅞"	13"	24½"	8¼"	9"	4"
	S4-3	--	83°42'49"	1"	8⅛"	⅜"	12⅞"	11⅛"	7⅞"	5⅛"	13"	24½"	8¼"	9"	4"
	S5-3	--	82°00'00"	1¼"	8⅛"	1⅛"	13"	11¼"	8¼"	4⅜"	13"	24½"	8¼"	9"	4"
	S1-4	77°09'40"	--	6½"	8½"	1 15/16"	14"	11"	9 7/16"	3⅜"	13½"	25½"	8¾"	9"	4"
	S2-4	77°09'40"	--	6½"	8½"	1 15/16"	14"	11"	9 7/16"	3⅜"	13½"	25½"	8¾"	9"	4"
	S3-4	77°09'40"	--	6½"	8½"	1 15/16"	14"	11"	9 7/16"	3⅜"	13½"	25½"	8¾"	9"	4"
	S4-4	77°09'40"	--	6½"	8½"	1 15/16"	14"	11"	9 7/16"	3⅜"	13½"	25½"	8¾"	9"	4"
	S5-4	90°00'00"	--	--	8¾"	--	12¾"	12¾"	6¾"	6¾"	13½"	25½"	8¾"	9"	4"
4E	S5-4	--	90°00'00"	--	8"	--	12½"	12½"	5¾"	5¾"	11½"	25"	8"	9"	4½"
	S6-4	--	90°00'00"	--	8"	--	12½"	12½"	5¾"	5¾"	11½"	25"	8"	9"	4½"
	S2-5E	87°05'14"	--	7/16"	10 2/16"	9/16"	14 15/16"	14 3/16"	7"	5½"	12½"	29"	10 2/16"	9"	4"

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

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

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

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

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

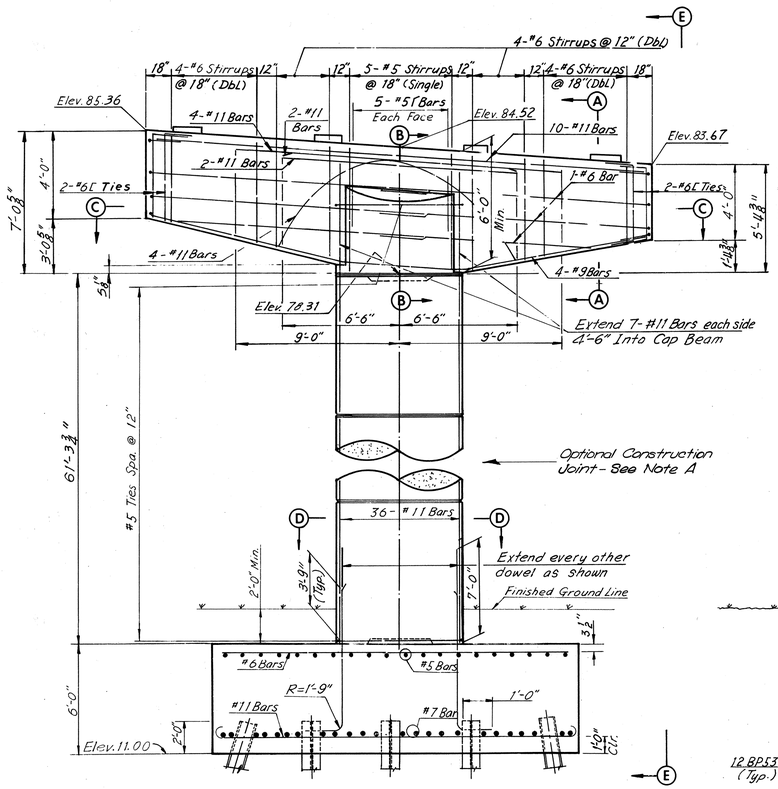
PIERS 3 AND 4E

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

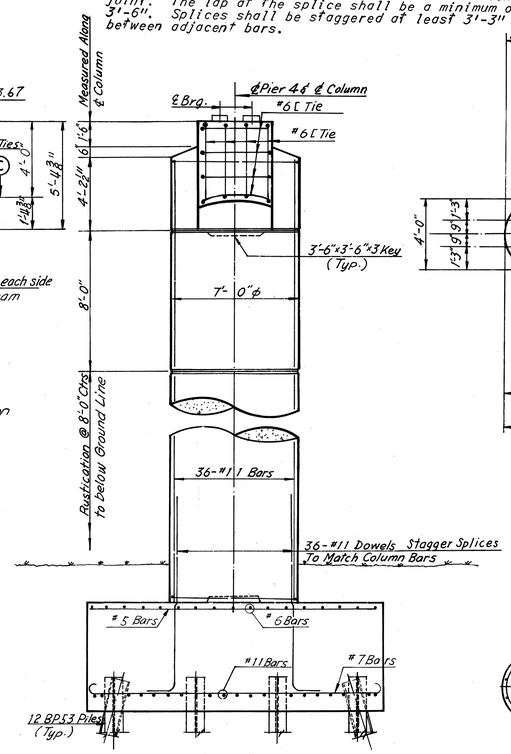
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 28

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

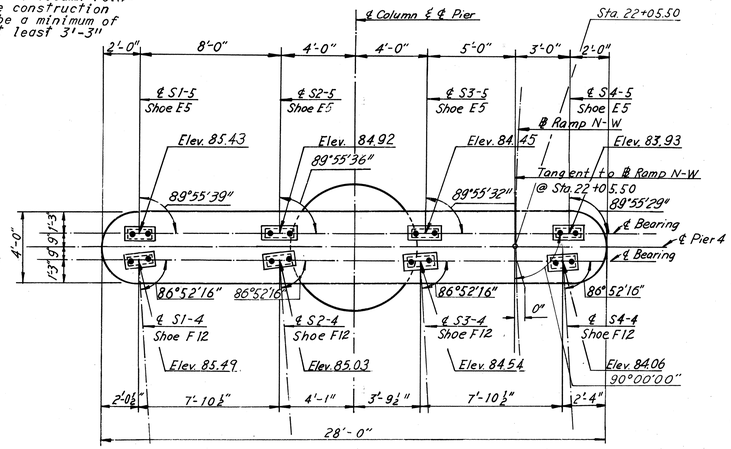
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



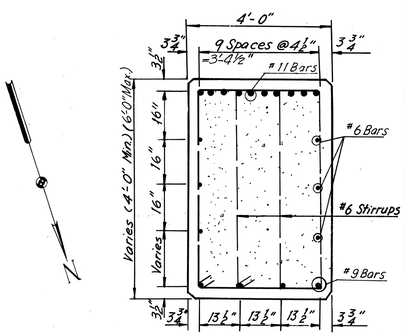
ELEVATION
Scale: 1/4" = 1'-0"



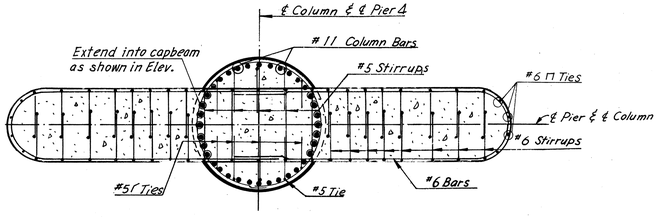
VIEW E-E
Scale: 1/4" = 1'-0"



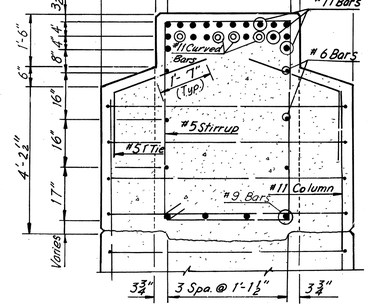
CAP PLAN
Scale: 1/4" = 1'-0"



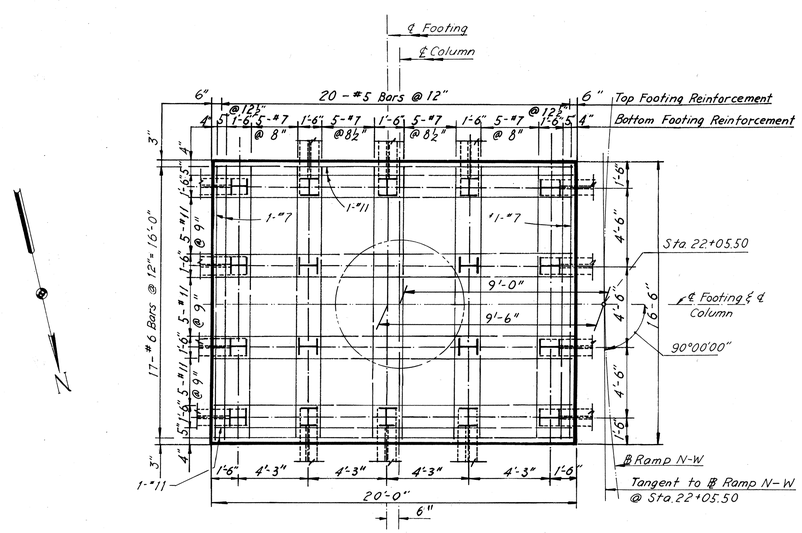
SECTION A-A
Scale: 1/4" = 1'-0"



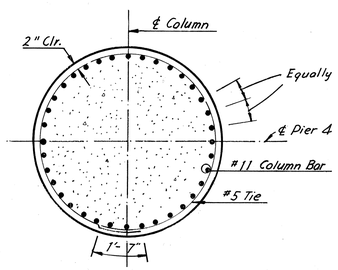
SECTION C-C
Scale: 1/4" = 1'-0"



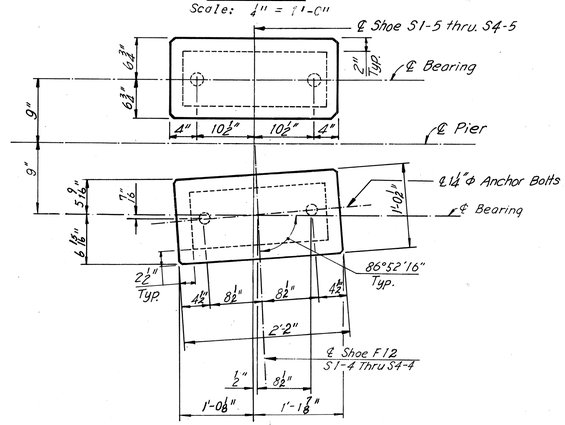
SECTION B-B
Scale: 1/2" = 1'-0"



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



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



ANCHOR BOLT SETTING PLAN
No Scale

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

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

FOOTING FOR PIER 4 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

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

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

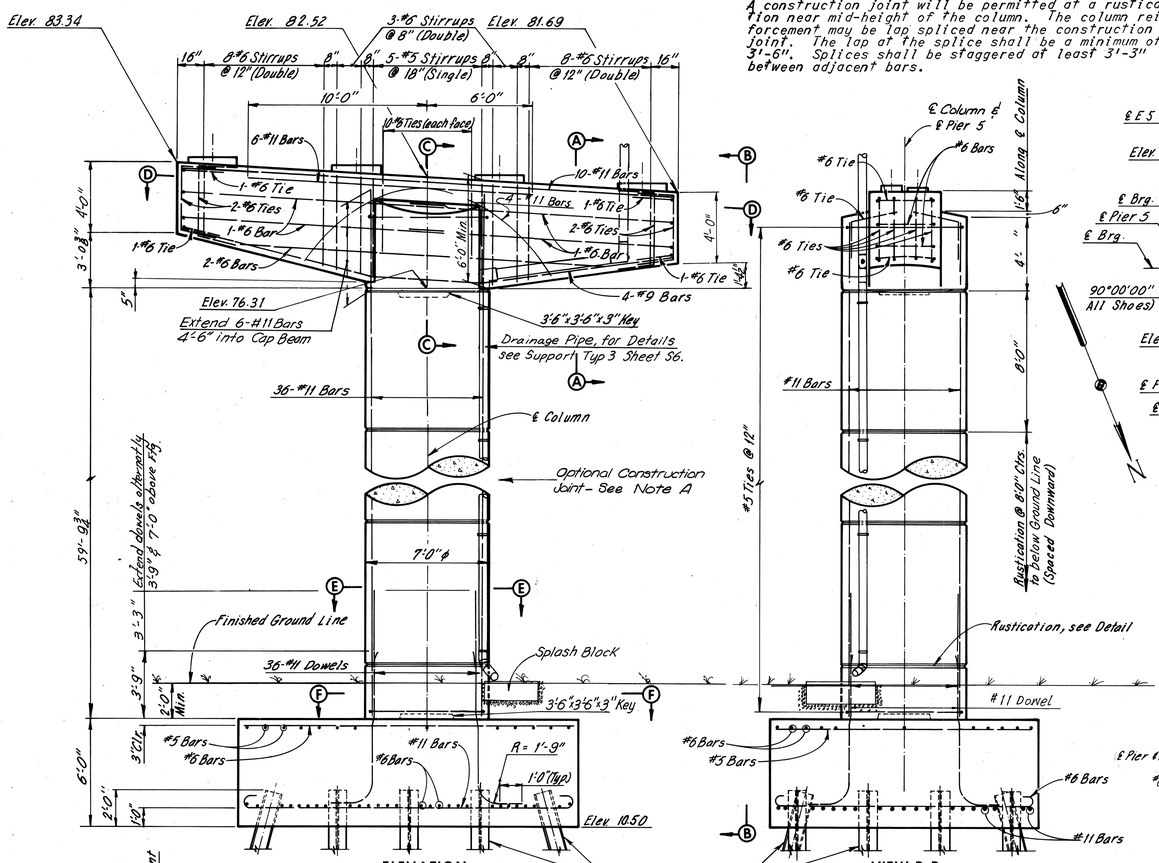
PIER 4

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

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

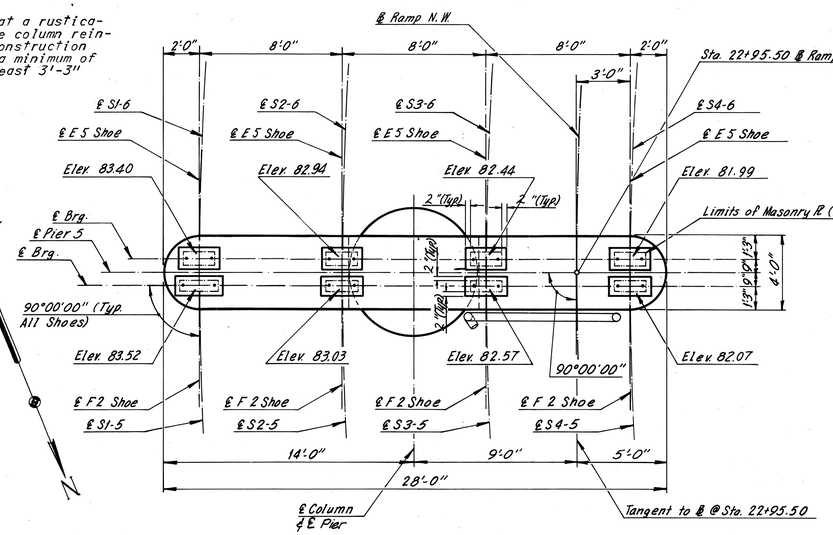
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	105	205

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

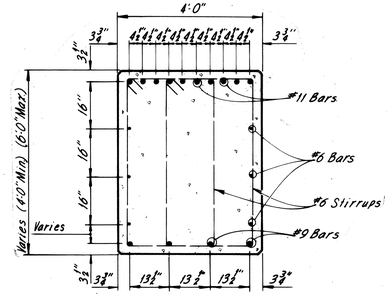


ELEVATION
Scale: ¼" = 1'-0"

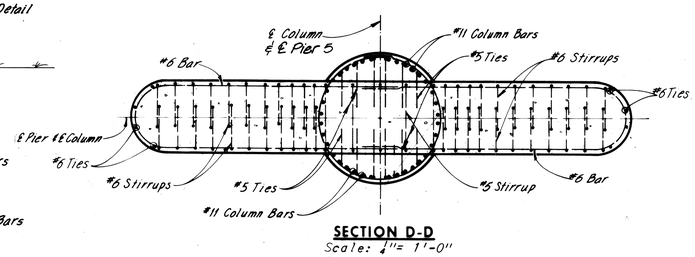
VIEW B-B
Scale: ¼" = 1'-0"



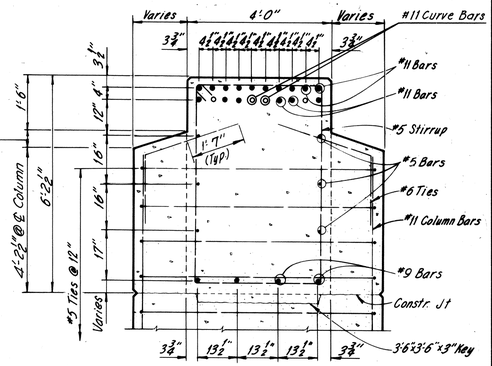
PIER CAP PLAN
Scale: ¼" = 1'-0"



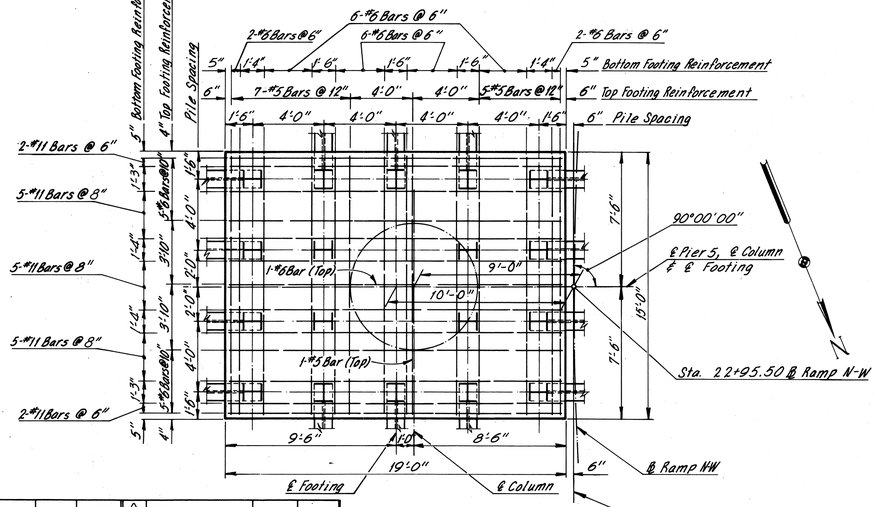
SECTION A-A
Scale: ½" = 1'-0"



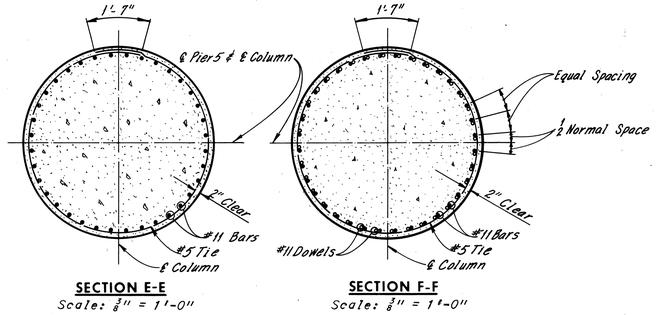
SECTION D-D
Scale: ¼" = 1'-0"



SECTION C-C
Scale: ½" = 1'-0"

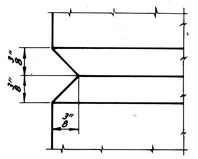


FOOTING PLAN
Scale: ¼" = 1'-0"



SECTION E-E
Scale: ⅜" = 1'-0"

SECTION F-F
Scale: ⅜" = 1'-0"

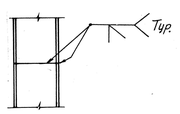


RUSTICATION DETAIL
Full Scale

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S1 & S2.
For Framing Plan, see Sheet 15.
Estimated Pile Tip Elevation -4.0

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

FOOTING FOR PIER 5 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



PILE SPLICE DETAILS
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.	9-20-68	2	As Built	TEM	6-77
CHECKED	SCC.	4-16-69		Pile Splice Weld Change	PRMS	4-19-74
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

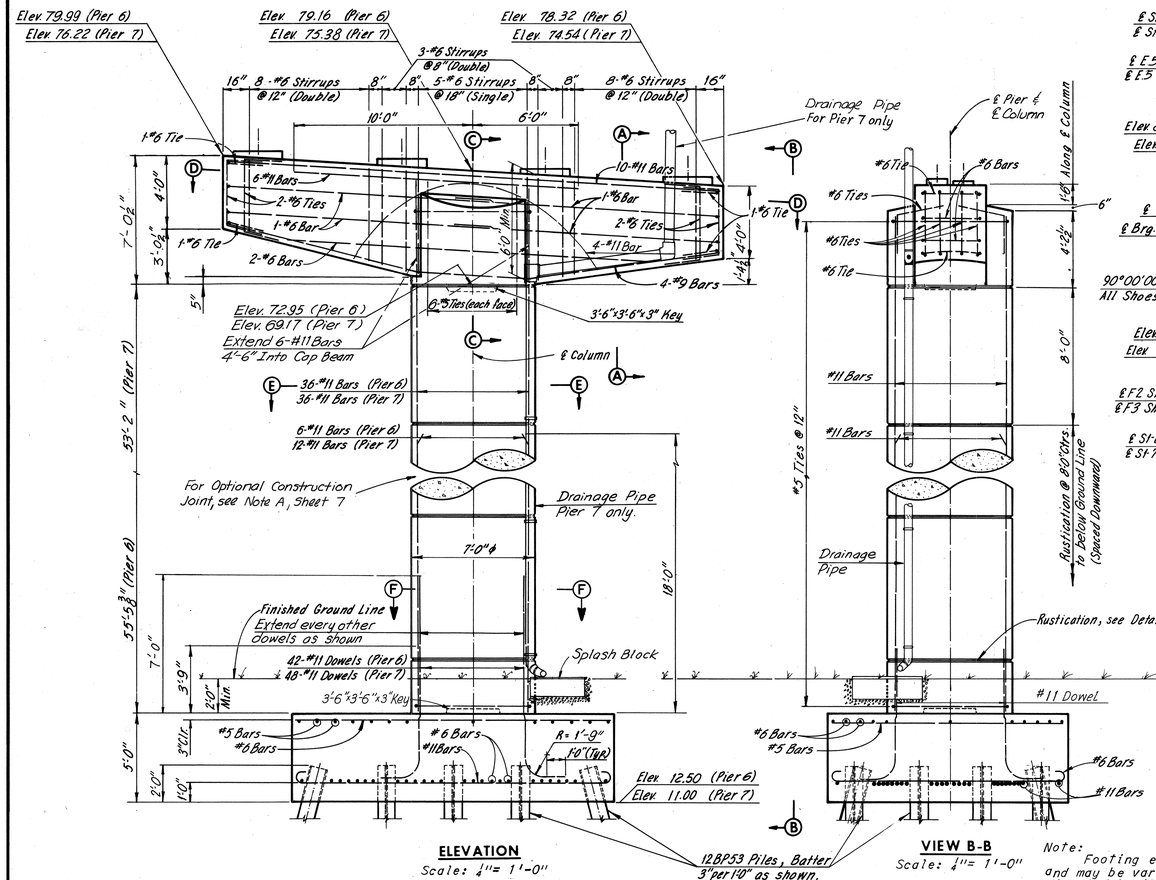
PIER 5

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

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

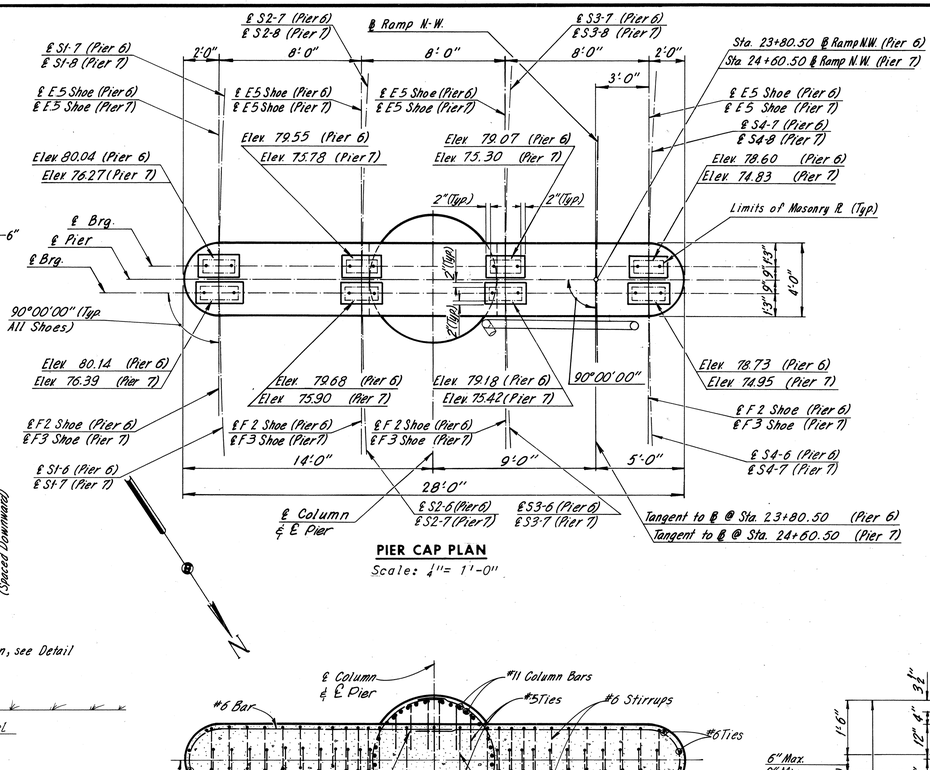
1028-22-10-004-B53

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

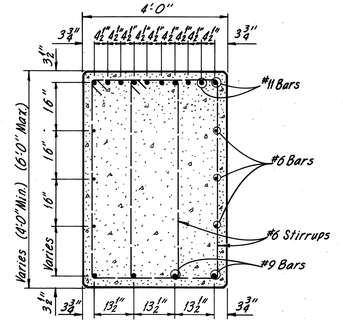


ELEVATION
Scale: $\frac{1}{4}$"= 1'-0"

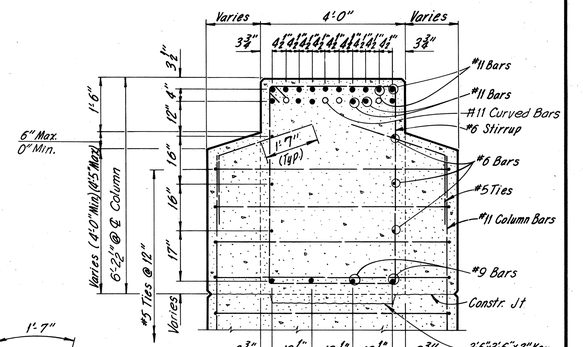
VIEW B-B
Scale: $\frac{1}{4}$"= 1'-0"



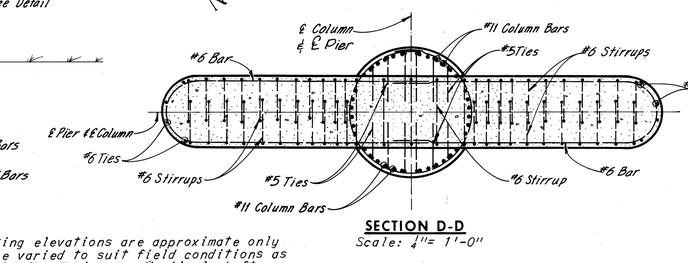
PIER CAP PLAN
Scale: $\frac{1}{4}$"= 1'-0"



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

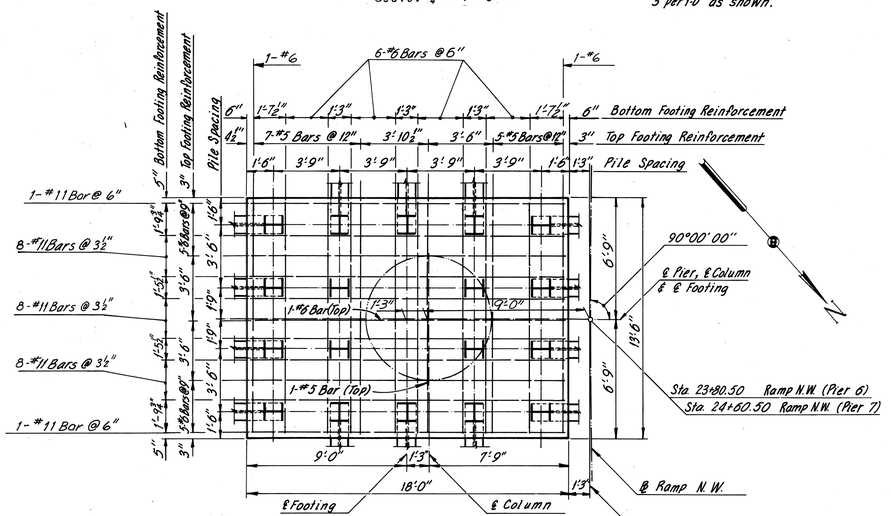


SECTION C-C
Scale: $\frac{1}{2}$"= 1'-0"



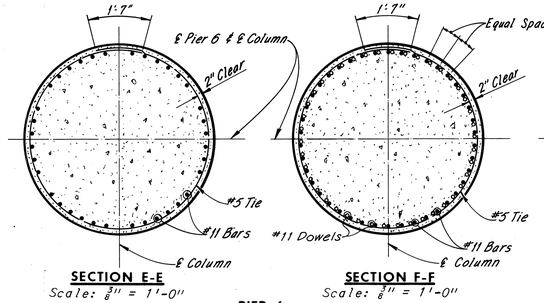
SECTION D-D
Scale: $\frac{1}{4}$"= 1'-0"

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



FOOTING PLAN
Scale: $\frac{1}{4}$" = 1'-0"

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



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

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

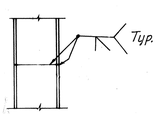
PIER 6

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

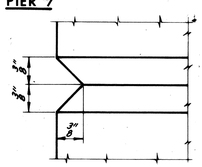
SECTION F-F
Scale: $\frac{3}{8}$"= 1'-0"

PIER 7

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



PILE SPLICE DETAILS
No Scale



RUSTICATION DETAIL
Full Scale

AS BUILT

	BY	DATE
MADE	D.E.S.	9-12-68
CHECKED	K.C.T.	9-17-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Pile Splice Weld Chngd & Note Added	PRMS	6-19-74
	As Built	TEM	6-77

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

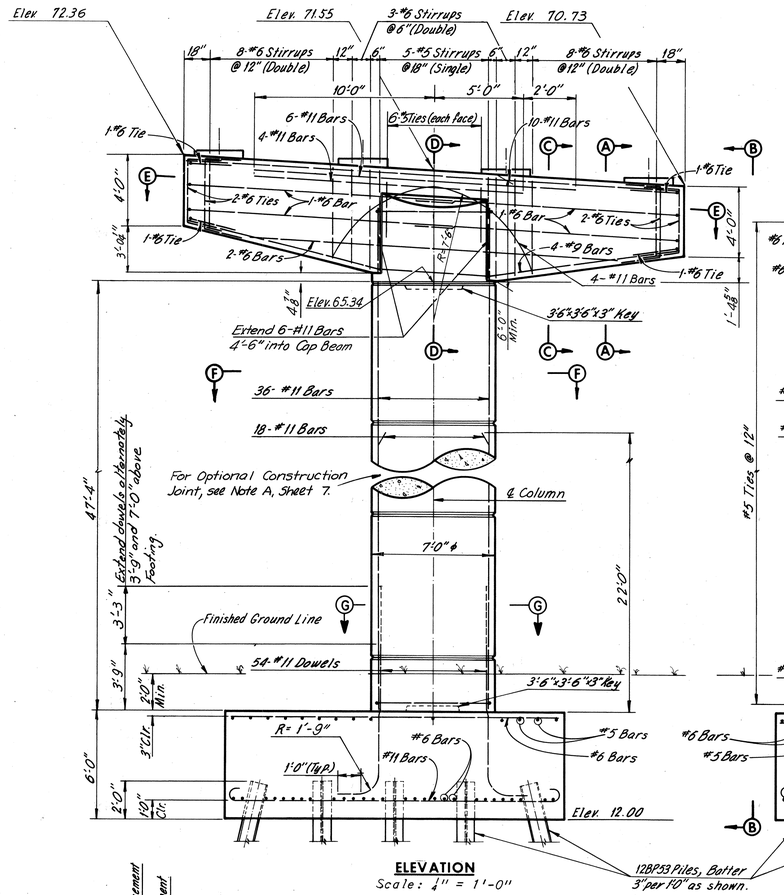
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

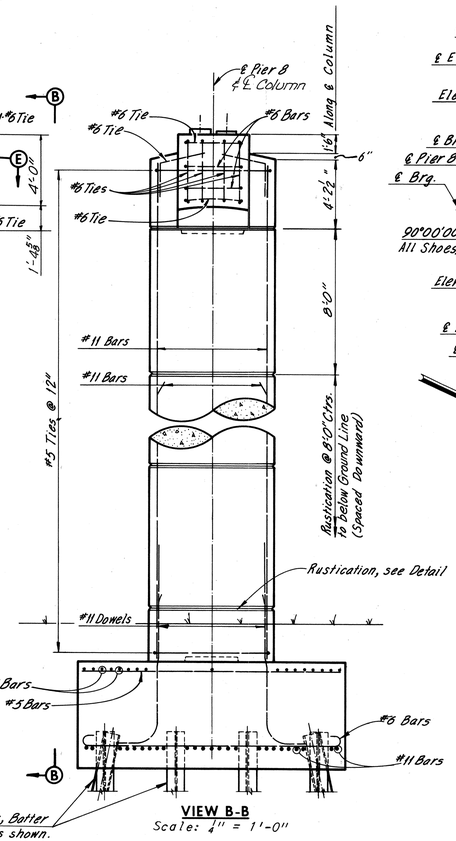
PIERS 6 AND 7

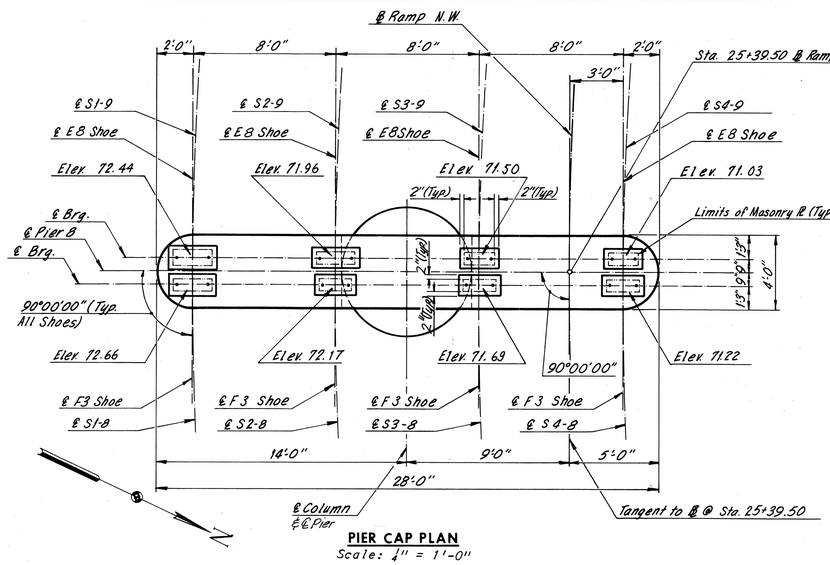
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

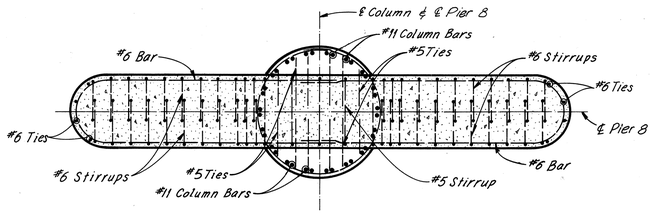
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	107	265



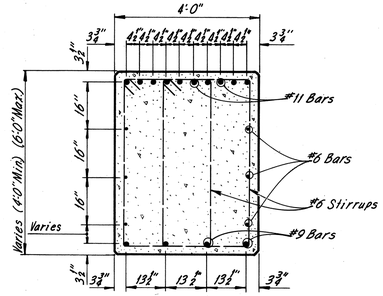




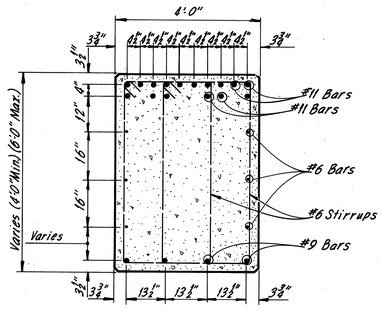
PIER CAP PLAN
Scale: 1/4" = 1'-0"



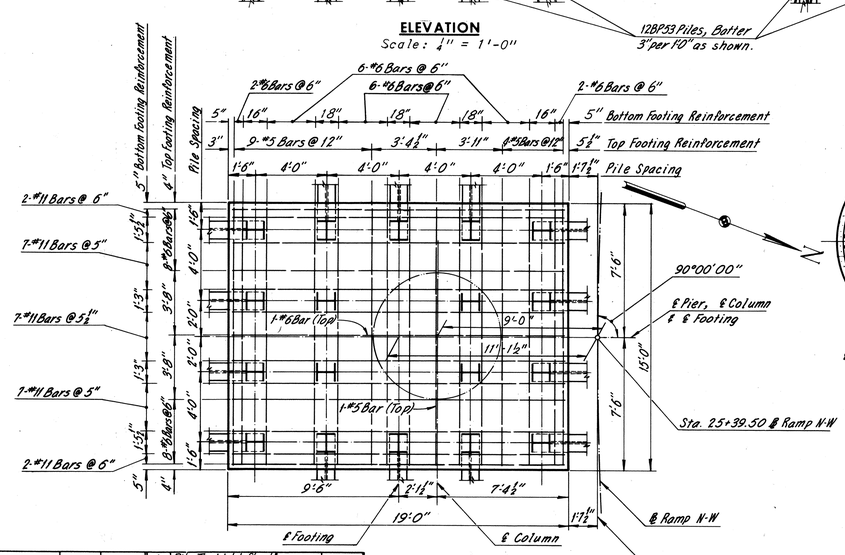
SECTION E-E
Scale: 1/4" = 1'-0"



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

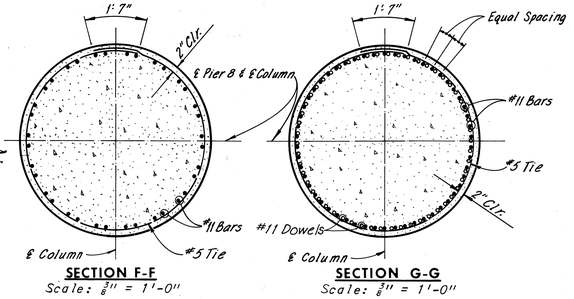


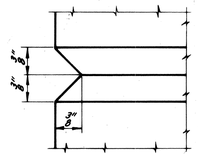
SECTION C-C
Scale: 1/2" = 1'-0"



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

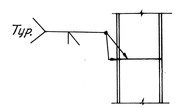
FOOTING FOR PIER 8 IS ECCENTRIC AS SHOWN ON FOOTING PLAN





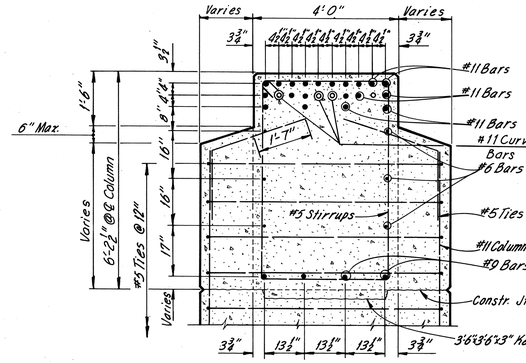
RUSTICATION DETAIL
Full Scale

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



PILE SPLICE
No Scale

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheet S1
For Framing Plan, see Sheets 16 & 17
Estimated Pile Tip Elevation -40



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

	BY	DATE		Pile Tip Weld Change & Note Added	PRMS	4-19-70
MADE	DES	9-1868	2	As Built	TEM	6-77
CHECKED	SCC.	4-15-69				
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

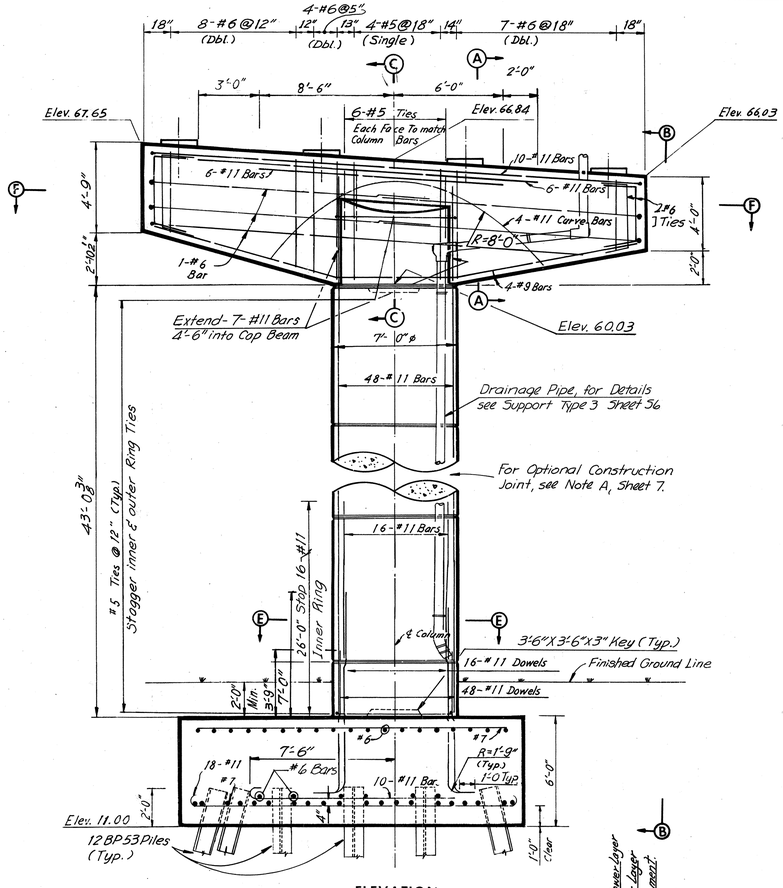
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 8

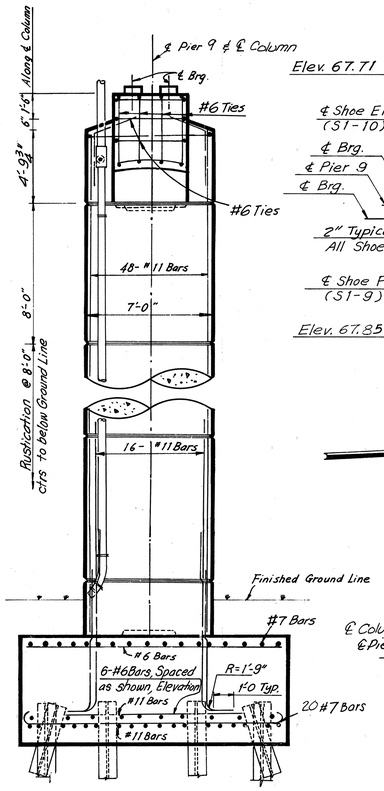
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Shown
CONTRACT NO. 10
SHEET NO. 9 OF 28

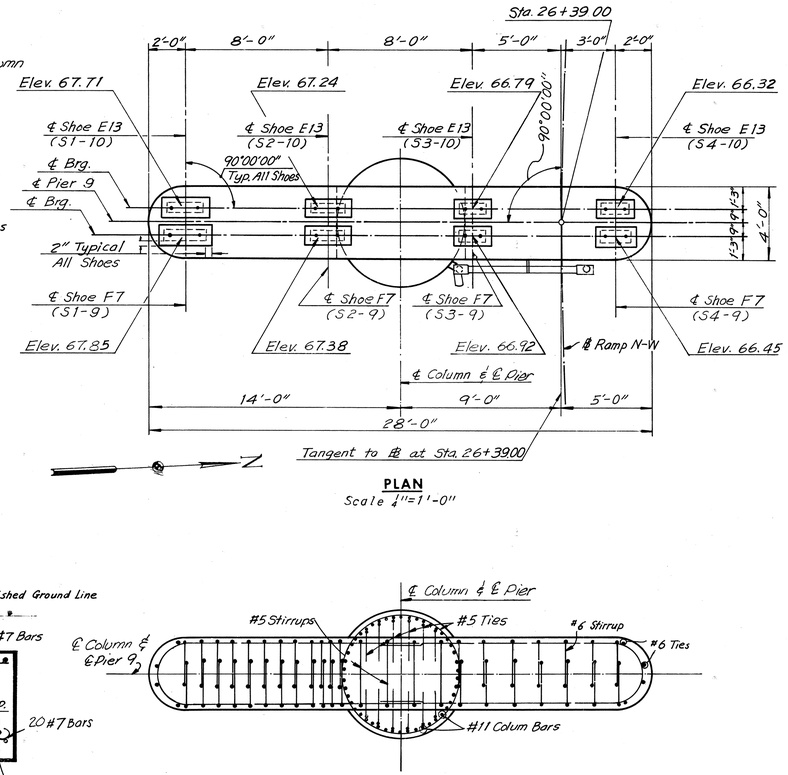
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	108	265



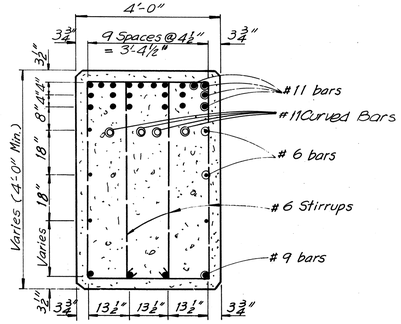
ELEVATION
Scale: 1/4"=1'-0"



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

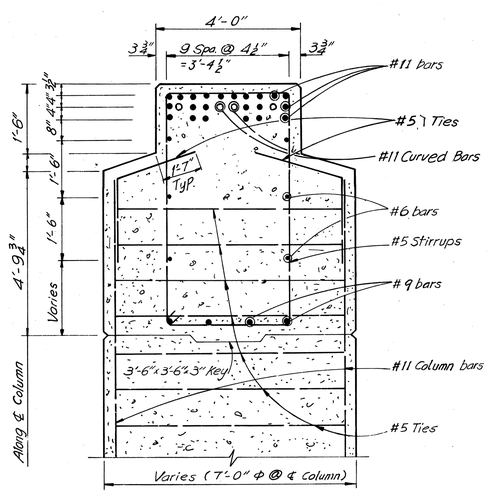


PLAN
Scale 1"=1'-0"

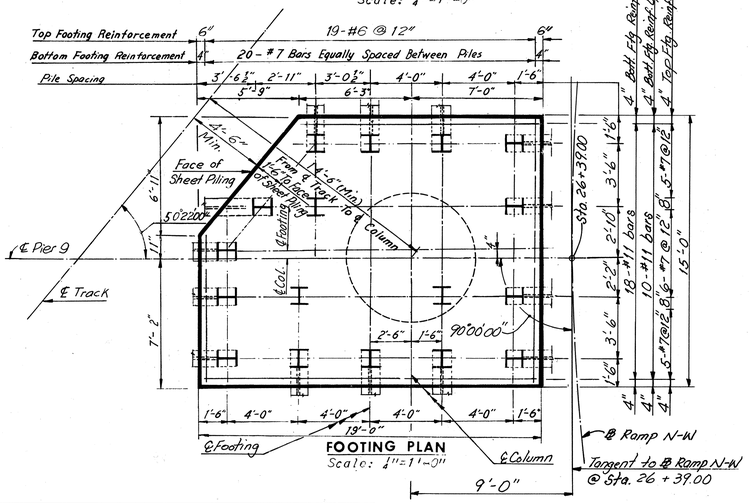


SECTION A-A
Scale 1"=1'-0"

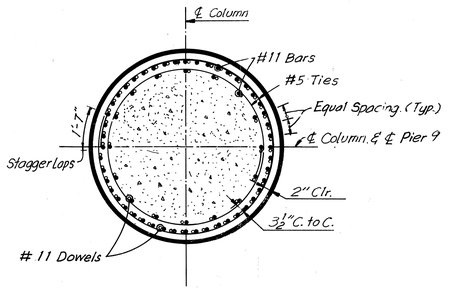
SECTION F-F
Scale: 1/4"=1'-0"



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



FOOTING FOR PIER 9 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



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

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

Notes:
All piles shall be 12BP53 steel piles (Design Capacity = 57 ton)
Batter all piles 3" per foot where shown.
For Standard Shoe Detail, see Sheet 51.
For Framing Plan, see Sheet 17.
Estimated Pile Tip Elevation is -50
For Rustication Detail, see Sheet 9.
For 12BP53 Steel Pile Details, see Sheet 9.
For Standard Drainage Details, see Support Type 3, Sheet 36.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	R.C.	2.5.69	2	As Built	TEM	6-77
CHECKED	Y.C.D	4-17-69	1	Note Added	PRMS	4-19-74
IN CHARGE						

AS BUILT

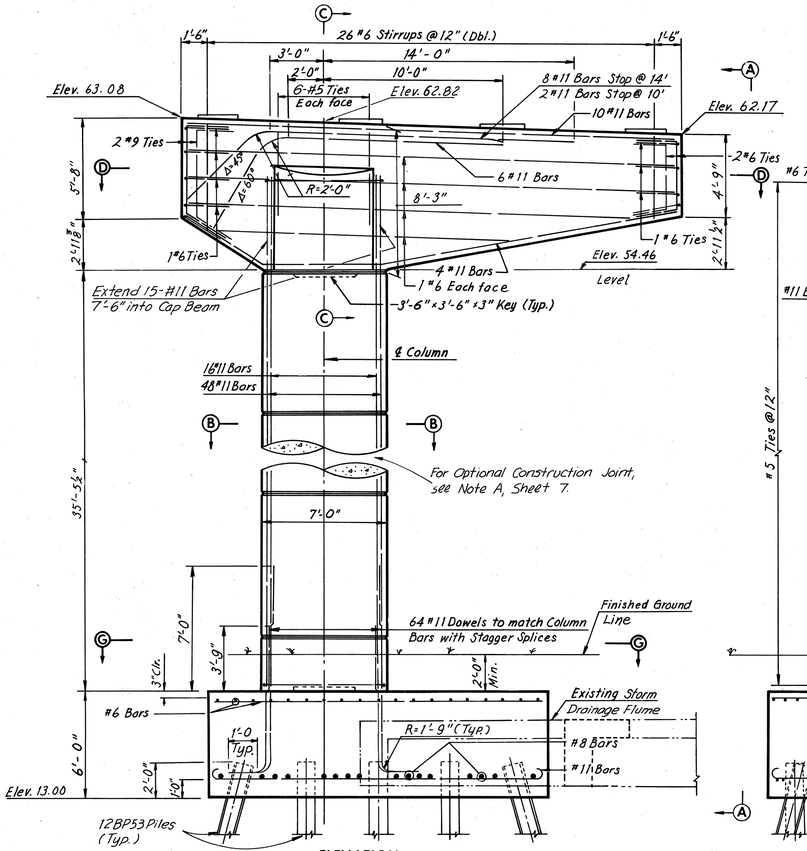
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 9

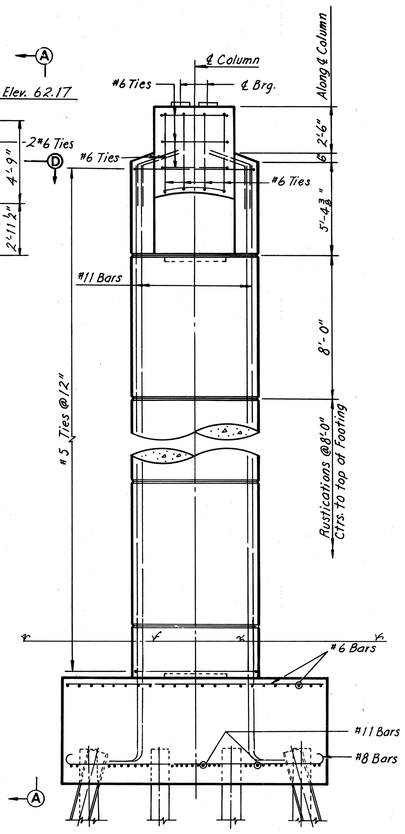
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

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

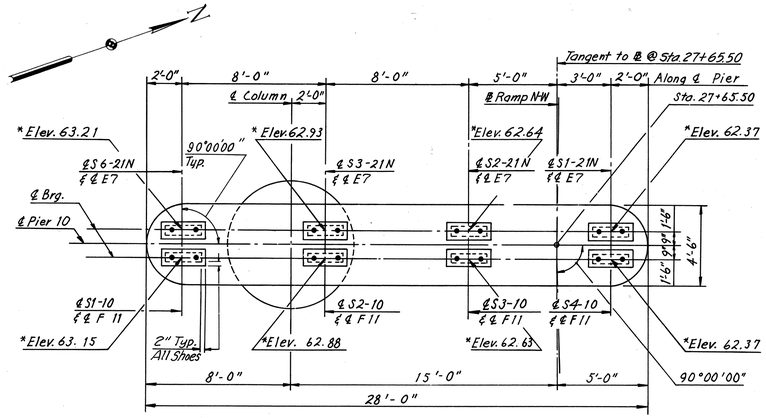
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	109	265



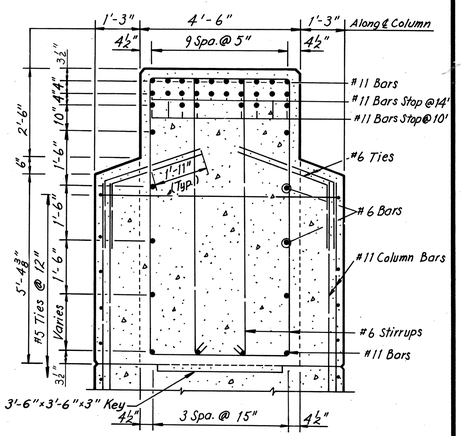
ELEVATION
Scale: 1/4" = 1'-0"



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



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



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

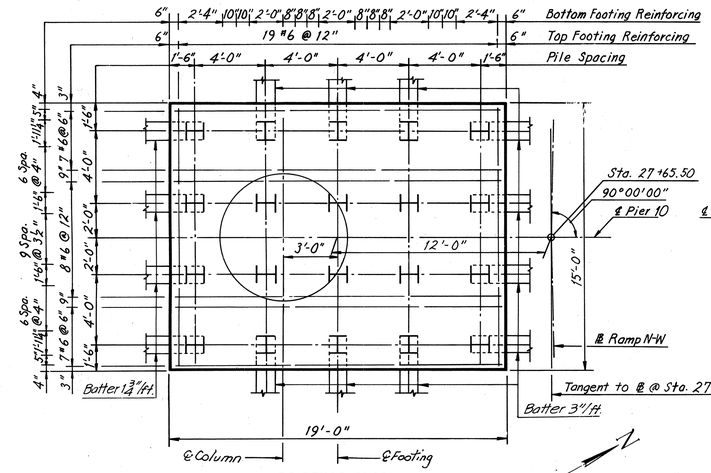
SECTION D-D
Scale: 1/4" = 1'-0"

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

Notes:
All piles shall be 12BP53 Steel Piles (Design Capacity= 57 tons)

For Standard Shoe Details, see Sheet 31.
For Framing Plan, see Sheet 17.
Estimated Pile Tip Elevation is - 9.0 feet.
For Rustication Details, see Sheet 9.
For 12BP53 Steel Pile Details, see Sheet 9.

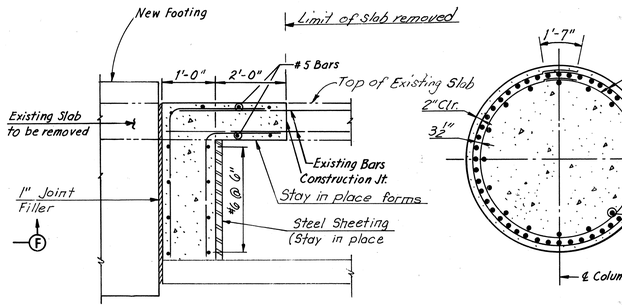
Note:
Piles located within 10 ft. (horizontal distance) of Storm Drinage Flume shall be pre-bored to an Elevation 5 ft. below bottom of sewer.



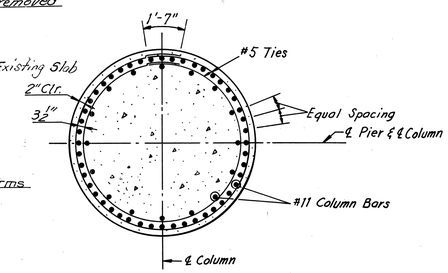
FOOTING PLAN
Scale: 1/4" = 1'-0"

FOOTING FOR PIER 10 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

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



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



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

	BY	DATE		Note Added	PRMc	4-19-74
MADE	Y.C.P	3-10-69	2	As Built	TEM	G-77
CHECKED	K.C.T.	4-17-69				
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

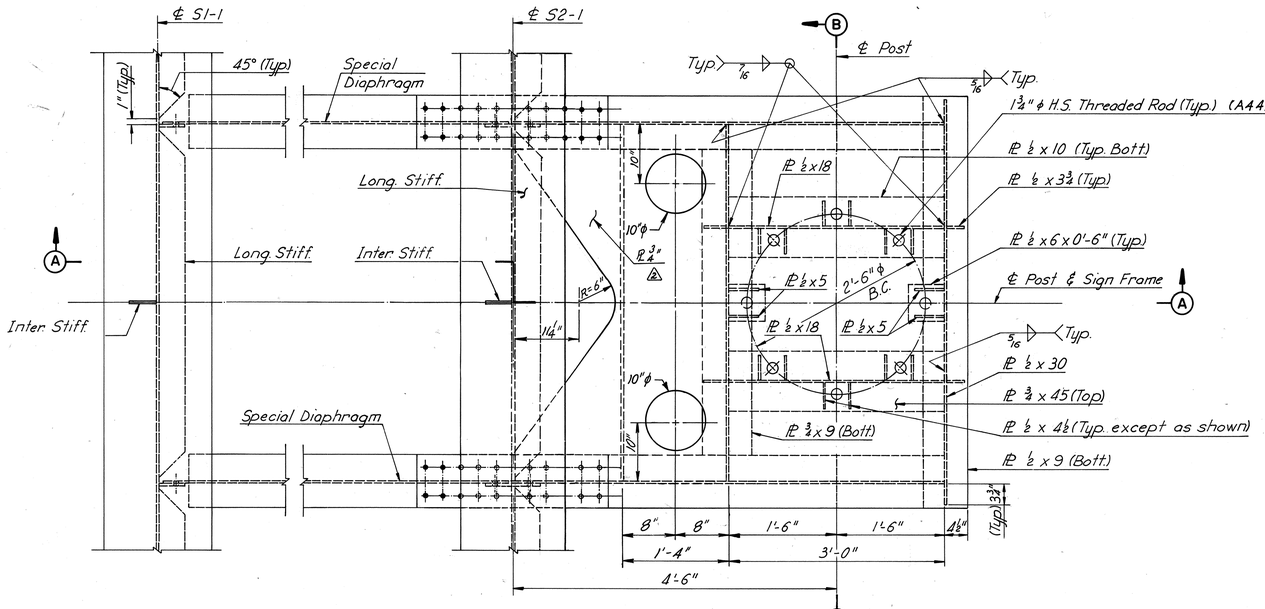
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 10

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

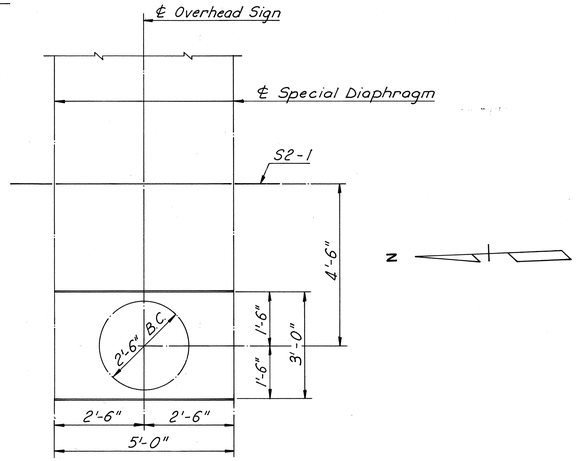
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 11 OF 28

AS BUILT

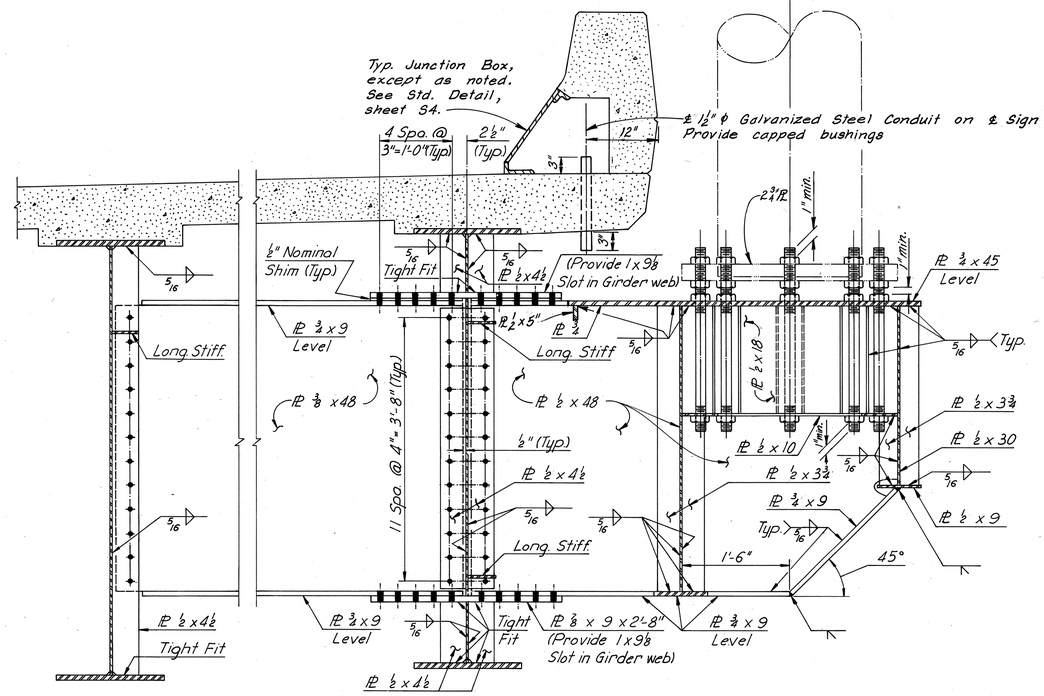
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	110a	265



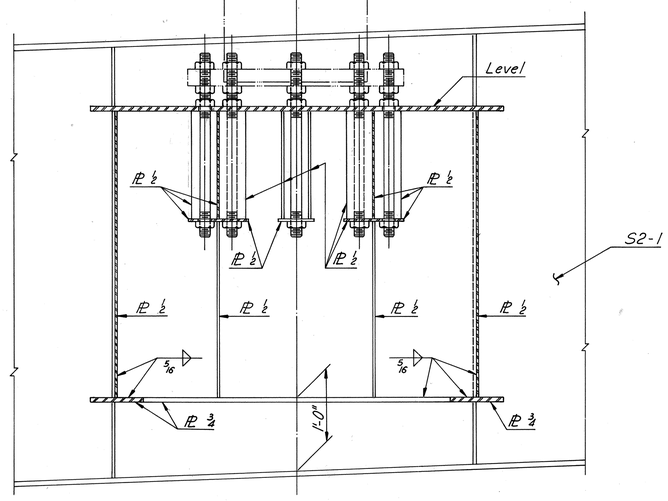
PLAN
Scale: 1" = 1'-0"



LAYOUT PLAN
Scale: ½" = 1'-0"



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



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

NOTES:

1. See Framing Plan Sheet 12 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the end frame. Any vertical misalignment shall be taken up in the leveling nuts.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞" ϕ H.S. unless noted otherwise.
6. B.C. indicates Bolt Circle.

			NO.	REVISION	BY	DATE
DESIGNED			3	As Built	TEM	6-77
DRAWN	N.L.B.	8-74	2	Replaced 4x4 L with 6x4 PL	REV	1-16-75
CHECKED	R.B.H.	9-74	1	New Sheet Added	R.B.H.	9-74
IN CHARGE	P.R.Y.					

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

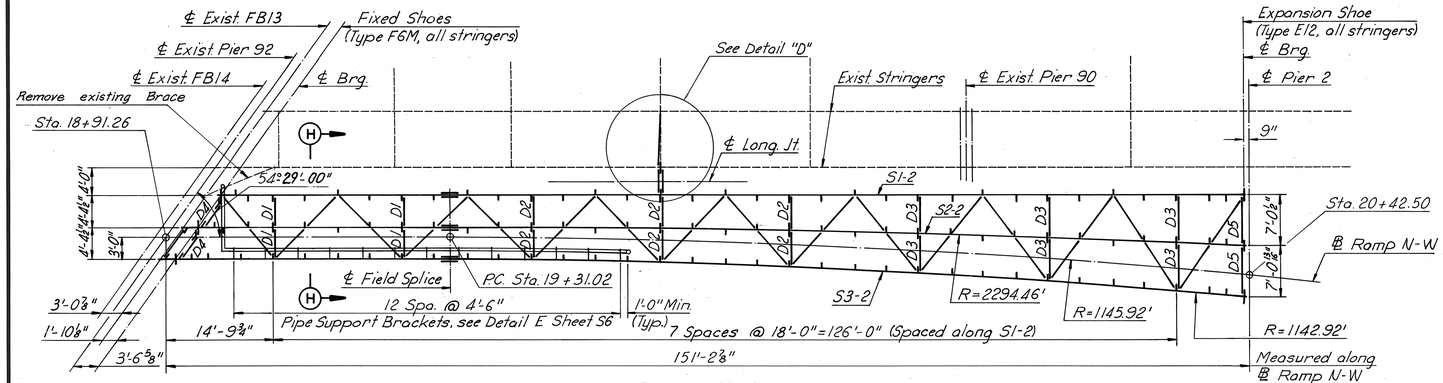
SIGN SUPPORT BRACKET DETAILS-UNIT I

SCALE AS SHOWN
DATE

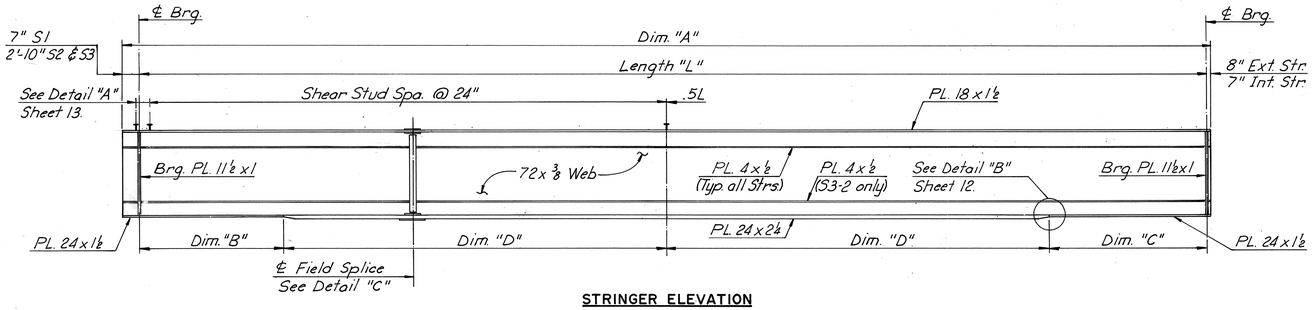
SHEET 12a OF 28

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	110b	265

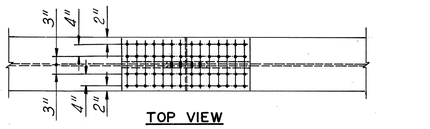


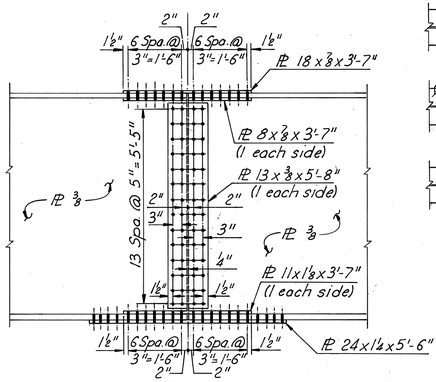
FRAMING PLAN
Scale: 1"=10'-0"



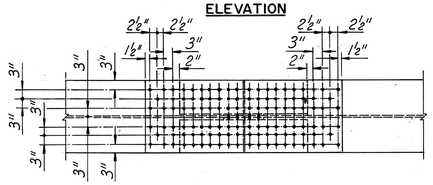
STRINGER ELEVATION
Scale: None

STRINGER SCHEDULE						DEAD LOAD DEFLECTION SCHEDULE						CAMBER SCHEDULE		
						DUE TO CONCRETE			DUE TO STEEL					
STRINGER	LENGTH "L"	DIM. "A"	DIM. "B"	DIM. "C"	DIM. "D"	¼L	½L	¾L	¼L	½L	¾L	¼L	½L	¾L
S1-2	142'-7 11/16"	143'-9 13/16"	19'-0"	19'-7 11/16"	52'-0"	1 5/16"	1 15/16"	1 3/8"	3/4"	1 1/16"	3/4"	3 3/8"	4 5/8"	3 3/16"
S2-2	145'-9 3/8"	149'-2 3/8"	20'-0"	20'-9 3/8"	52'-6"	1 9/16"	2 1/4"	1 5/8"	7/8"	1 3/16"	7/8"	4 1/2"	6 1/4"	4 5/8"
S3-2	149'-1"	152'-6 15/16"	20'-0"	22'-1"	53'-6"	1 3/4"	2 1/2"	1 3/4"	15/16"	1 1/4"	15/16"	5 1/16"	7 1/2"	5 1/2"

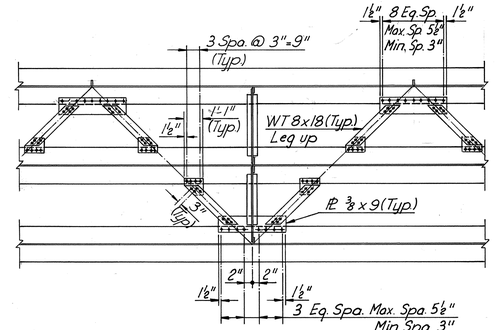




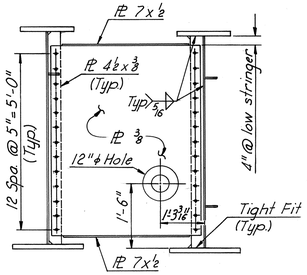
ELEVATION



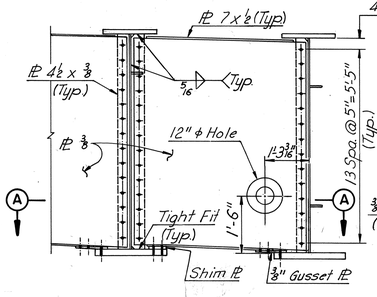
BOTTOM VIEW



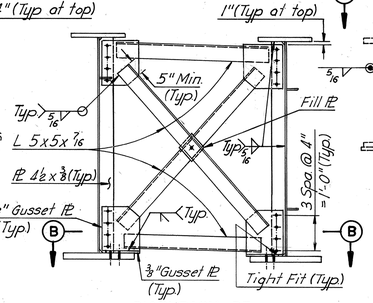
TYPICAL LATERAL BRACING
Scale: ¼"=1'-0"



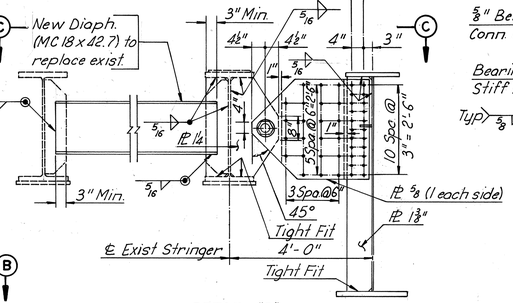
DIAPHRAGM D1
Scale: ½"=1'-0"



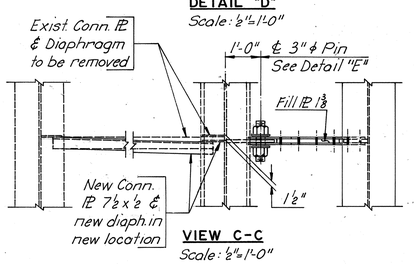
DIAPHRAGM D2
Scale: ½"=1'-0"



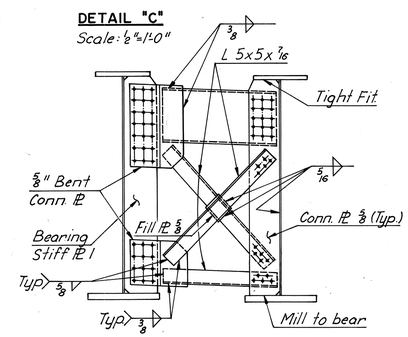
DIAPHRAGM D3
Scale: ½"=1'-0"



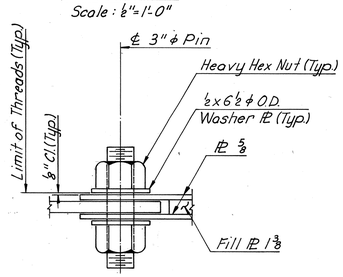
DETAIL "D"
Scale: ½"=1'-0"



VIEW C-C
Scale: ½"=1'-0"



DIAPHRAGM D4
Scale: ½"=1'-0"



DETAIL "E"
Scale: 1½"=1'-0"

NOTE: Spot weld nut to pin upon completion of assembly.

NOTE:
1. For Diaphragm D5 use type shown as end diaphragm section B-B, Sheet 20.
2. For notes not shown, see Sheet 12.
3. For Section H-H see Sheet 19.

AS BUILT

DESIGNED			3	As Built	TEM	6-77
DRAWN	N.L.B.	10-7-74	2	Remove Brace & change angle	NLB	12-30-74
CHECKED	R.B.H.	11-4-74	1	New Sheet Added	NLB	10-7-74
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

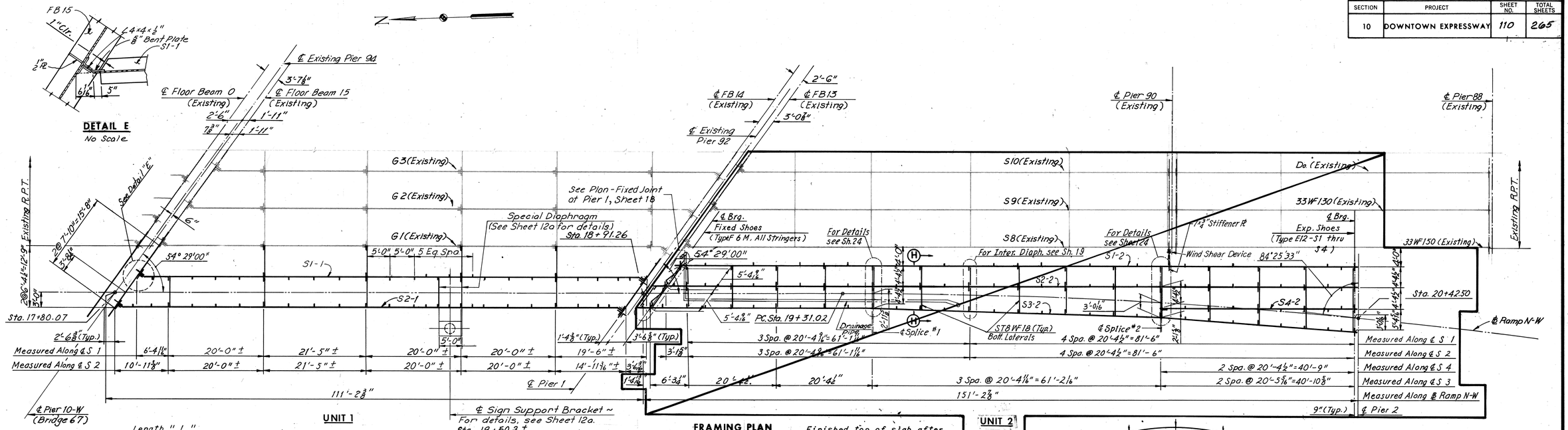
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

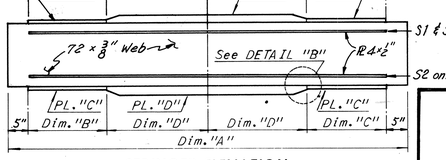
FRAMING PLAN - UNIT 2

SCALE AS NOTED
DATE
SHEET 12b OF 28

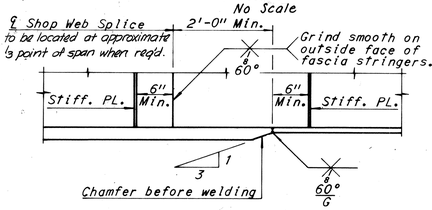
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	110	265

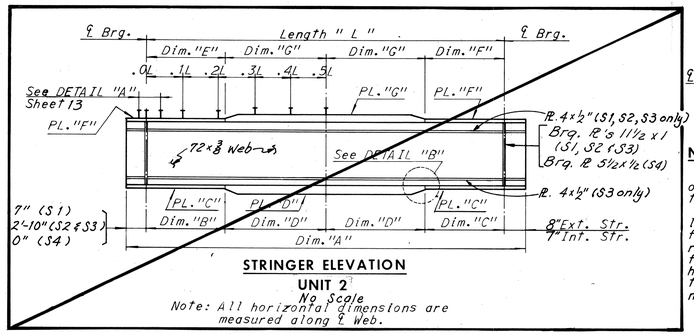




STRINGER ELEVATION
UNIT 1
No Scale



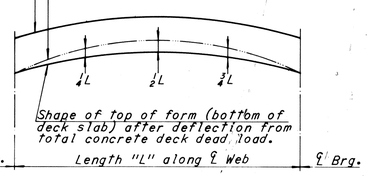
DETAIL "B"
No Scale



STRINGER ELEVATION
UNIT 2
No Scale
Note: All horizontal dimensions are measured along ℄ Web.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.
New Diaphragms are to match Existing Diaphragms in Unit 1.

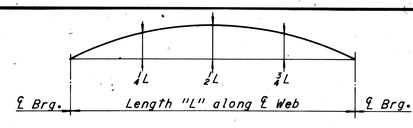
FRAMING PLAN
Scale: 1"=10'-0"



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value.
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 19

⊕ Except as shown otherwise.

Note:
Intermediate stiffener R.s 4½x⅜" shall be equally spaced between diaphragms ~~@ as shown~~. The first two stiffener spaced at the ends of stringers shall be one-half normal spacing within the panel.
It may be necessory to increase Bearing Stiffener size to accommodate erection of end diaphragm.

Note:
For Deck Plan, see Sheet 19.
For Joint Details, see Sheets 18 & 25
For Joint Details of Pier 10W, see Sheet 42, Bridge 67.
For Standard Shoe Details, see Sheet 51.
For Details of FB 14 and FB 15, see Sheet 18.

See Sheet 4 for special modifications of masonry plate, FBM @ Pier 1.

For Section H-H, see Sheet 19.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

SHOE SCHEDULE			
EXPANSION SHOE		FIXED SHOE	
TYPE	NO. REQD.	TYPE	NO. REQD.
E 12	4	F 6 M	3

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL. "D"	PL."F"	PL. "G"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
1	S1-1	106'-3⅜"	105'-5⅞"	23'-0 1/16"	23'-0"	29'-8⅜"	23'-0 1/16"	23'-0"	29'-8⅜"	18x⅝"	18x1⅛"	18x⅞"	18x1⅛"	—	—	—	—	—
	S2-1	106'-3⅜"	105'-5⅞"	23'-0 1/16"	23'-0"	29'-8⅜"	23'-0 1/16"	23'-0"	29'-8 11/16"	18x⅝"	18x1¼"	18x⅞"	18x1¼"	—	—	—	—	—
2	S1-2	149'-2⅜"	148'-7 11/16"	19'-0"	19'-7⅛"	52'-0"	—	—	71'-3⅞"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S2-2	149'-2⅜"	148'-7 11/16"	19'-0"	19'-7⅛"	52'-0"	—	—	71'-3⅞"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S3-2	152'-6 11/16"	149'-0 13/16"	20'-0"	20'-9⅞"	52'-6"	—	—	72'-10 11/16"	24x1½"	24x2½"	—	18x1"	24"	24"	24"	24"	24"
	S4-2	152'-6 11/16"	149'-0 13/16"	20'-0"	22'-0 13/16"	53'-6"	—	—	74'-0½"	24x1½"	24x2½"	—	18x⅝"	24"	24"	24"	24"	24"
	Sdle-2	41'-9"	40'-9"	—	—	20'-4½"	—	—	20'-4½"	—	12x⅜"	—	12x5/16"	24"	24"	24"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE		
¼L	½L	¾L
7/8"	1 1/4"	7/8"
7/8"	1¼"	7/8"
13/16"	2"	1 3/16"
1 13/16"	2 9/16"	1 13/16"
2 1/4"	3 1/8"	2 1/4"

CAMBER SCHEDULE		
¼L	½L	¾L
2 3/16"	2 15/16"	2 1/8"
2 31/16"	3"	2 31/16"
3 9/16"	5"	3 11/16"
4 3/4"	6 11/16"	4 1/4"
6 1/8"	8 7/16"	6 1/8"

Note : * Spacing begins at termination of 6 spaces @ 4".
All steel shall be A36 unless otherwise shown.

Note: For revisions to Unit 2, see Sheet 12a.

	BY	DATE
MADE	Y.C.P	2-11-69
CHECKED	S.C.C.	4-24-69
IN CHARGE		

NO.	REVISION	BY	DATE
5	As Built	TEM	6-77
4	Pier Angle Chg.	R&J	1-13-75
3	Note changed, added	PRM's	4-19-74
2	Sign Support Bracket & Intern. Diaph. Spa. added	L.N.B.	9-9-74
1	Unit 2 Deleted	L.N.B.	10-1-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

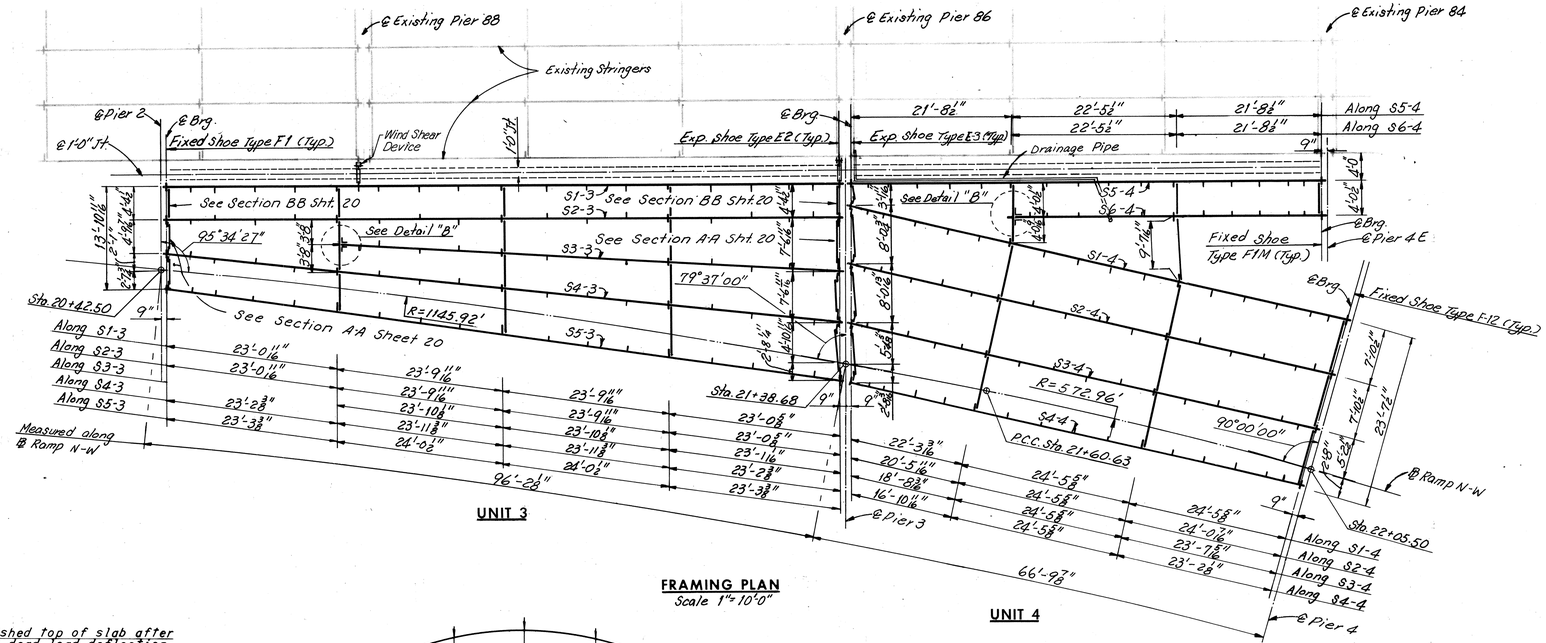
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN - UNITS 1

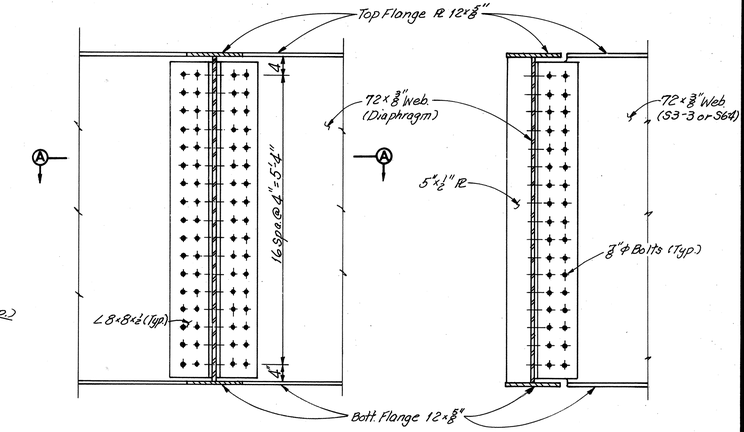
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 12 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	111	265

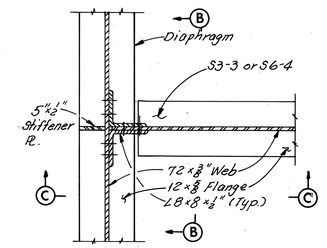


FRAMING PLAN
Scale 1"=10'-0"

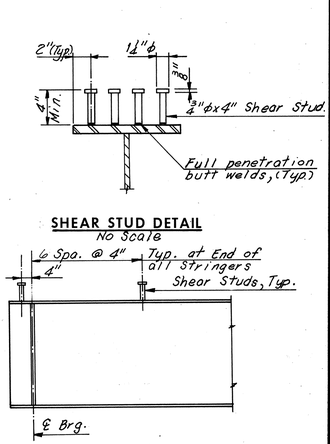


VIEW B-B
Scale 3/4"=1'-0"

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

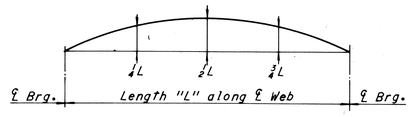


DETAIL B
SECTION A-A
Scale 3/4"=1'-0"



SHEAR STUD DETAIL
No Scale

DETAIL A
No Scale

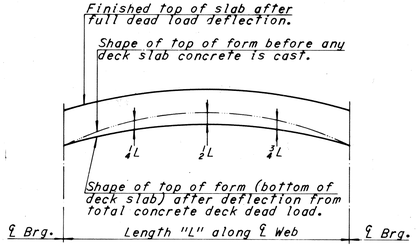


CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

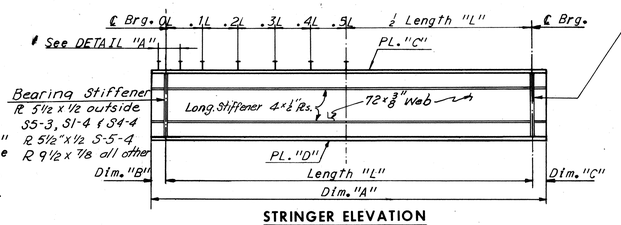
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 20



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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



STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.

Note:
All Steel shall be A-36 unless denoted otherwise.

Note:
Intermediate stiffener Pls. 4x3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

Brg. Stiffener
PL 5 1/2 x 1/2 outside
S5-3, S1-4, S4-4
S5-4 & S6-4
PL 9 1/2 x 7/8 All others

Note:
For Shoe Details, see Sheet S1.
For Deck Plan, see Sheet 20.
For Joint Details, see Sheet 25 & 26
For Diaphragm Details, see Sheet 20.
It may be necessary to increase Bearing Stiffener size to accomodate erection of end diaphragms.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.

SHEAR STUD NOTE

Capacity = 3,400 lbs. per stud.
Contractor may, if he elects, use three 7/8" diameter studs at the same longitudinal spacing in lieu of the four 3/4" diameter studs shown.
Stud rows shall be placed parallel to the main deck reinforcement.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E2	5	F1	4
E3	5	F1M	2
		F12	4

	BY	DATE			PRMS	4-19-74
MADE	G.C.C.	2-1969	2	Revised DL. Defl. & Camber Schedule.	EJM	10-11-74
CHECKED	S.C.C.	2-2869	3	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	PL. "C"	PL "D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE DUE TO TOTAL CONCRETE 1/4 L	1/2 L	3/4 L	DUE TO STEEL 1/4 L	1/2 L	3/4 L	CAMBER SCHEDULE 1/4 L	1/2 L	3/4 L
3	S1-3	94'-10 11/16"	93'-8 11/16"	7"	7"	12x8/8"	12x1"	19"	22"	24"	24"	24"	1/2"	11/16"	1/2"	1/4"	3/8"	1/4"	1"	1 3/8"	1"
	S2-3	94'-10 11/16"	93'-8 11/16"	7"	7"	12x8/8"	12x1"	19"	22"	24"	24"	24"	3/4"	1"	3/4"	1/4"	3/8"	1/4"	1"	1 3/8"	1"
	S3-3	71'- 4 5/16"	70'-3 3/16"	0	7"	12x8/8"	12x8/8"	19"	22"	24"	24"	24"	1/4"	3/8"	1/4"	1/16"	1/8"	1/16"	5/16"	1/2"	5/16"
	S4-3	95'- 5 5/16"	94'-3 1/16"	7 1/16"	7 1/16"	12x8/8"	12x1"	19"	22"	24"	24"	24"	15/16"	1 5/16"	15/16"	1/16"	3/16"	1/16"	1 3/16"	1 5/8"	1 3/16"
	S5-3	95'-11 7/16"	94'-7 3/4"	8 1/16"	8 1/16"	12x8/8"	12x1"	19"	22"	24"	24"	24"	13/16"	1 1/8"	13/16"	3/16"	5/16"	3/16"	1"	1 7/16"	1"
4	S1-4	72'- 4 11/16"	71'-2 5/8"	7 1/4"	7"	12x8/8"	12x1 1/4"	12"	13"	15"	16"	24"	3/8"	1/2"	3/8"	1/16"	1/16"	1/16"	1 1/16"	1 1/4"	1 1/16"
	S2-4	70'- 2"	68'-11 3/4"	7 1/4"	7"	12x8/8"	12x8/8"	13"	15"	17"	20"	24"	5/16"	7/16"	5/16"	1/16"	1/16"	1/16"	1 1/16"	1 1/16"	1"
	S3-4	67'-11 3/4"	66'-9 5/8"	7 1/4"	7"	12x8/8"	12x8/8"	13"	15"	17"	20"	24"	5/16"	7/16"	5/16"	1/16"	1/16"	1/16"	1"	1 1/4"	15/16"
	S4-4 —	65'-10 11/16"	64'-6 7/8"	8 1/4"	8"	12x8/8"	12x8/8"	13"	15"	17"	20"	24"	1/4"	3/16"	1/4"	1/16"	1/16"	1/16"	3/4"	1"	3/4"
	S5-4	67'- 0 1/2"	65'-10 1/2"	7"	7"	12x8/8"	12x8/8"	13"	15"	17"	20"	24"	5/16"	3/8"	1/4"	1/16"	1/16"	1/16"	3/4"	1"	7/16"
	S6-4	44'- 9"	44'-2"	0	7"	12x8/8"	12x8/8"	24"	24"	24"	24"	24"	1/16"	1/16"	1/16"	—	—	—	3/16"	3/16"	1/16"

* Spacing begins at termination of 6 spaces @ 4".

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

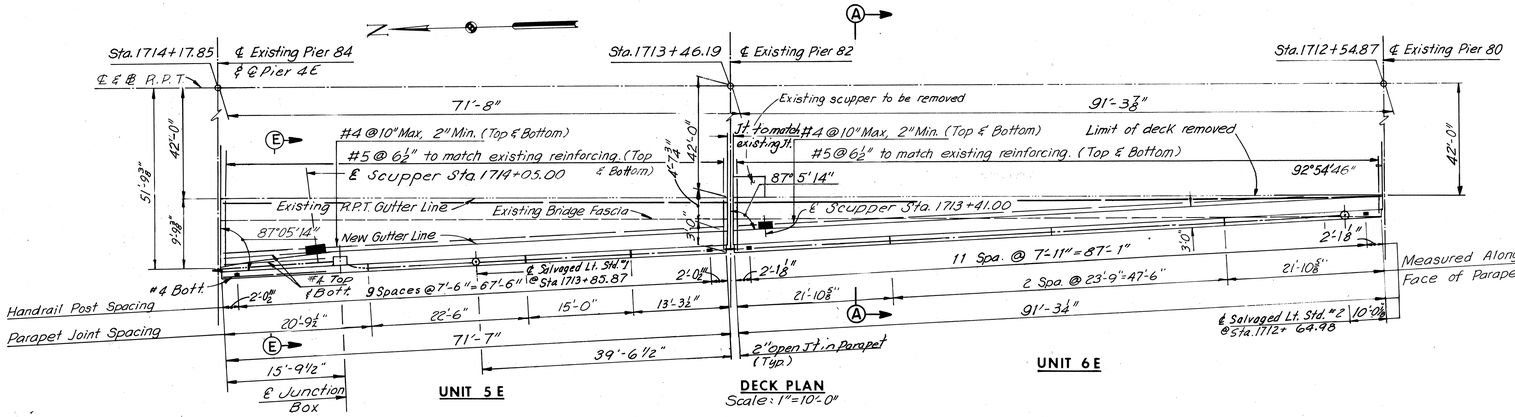
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN — UNITS 3 AND 4

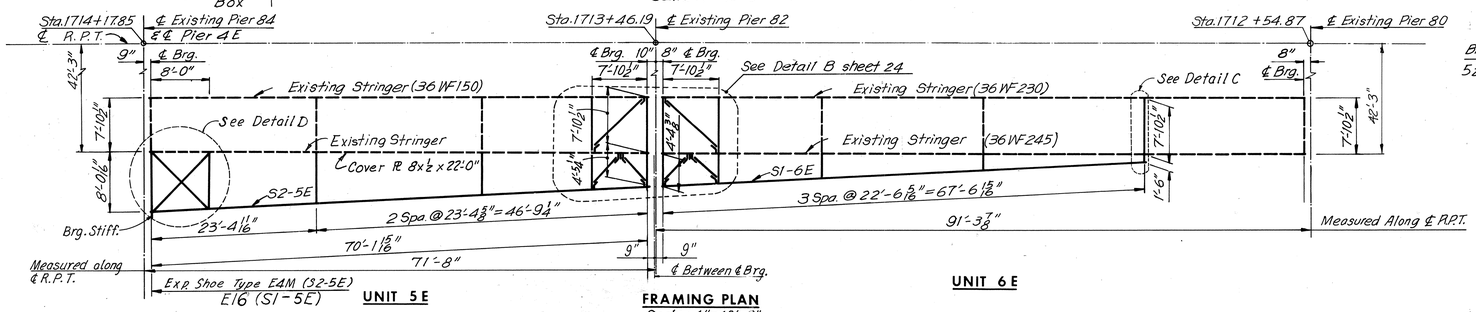
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 13 OF 28

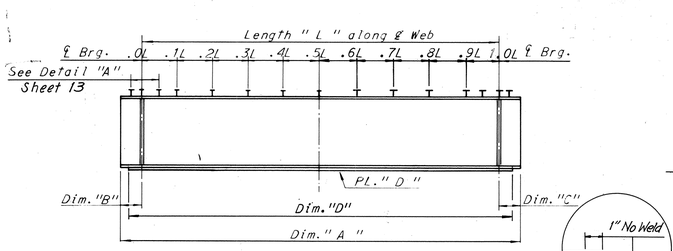
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	112	265



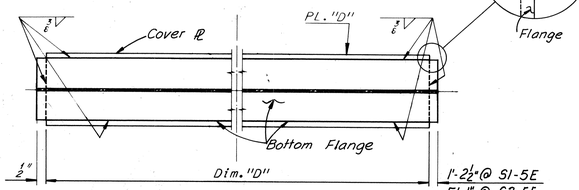
DECK PLAN
Scale: 1"=10'-0"



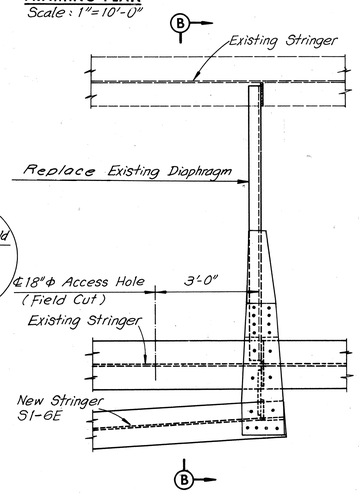
FRAMING PLAN
Scale: 1"=10'-0"



STRINGER ELEVATION
No Scale

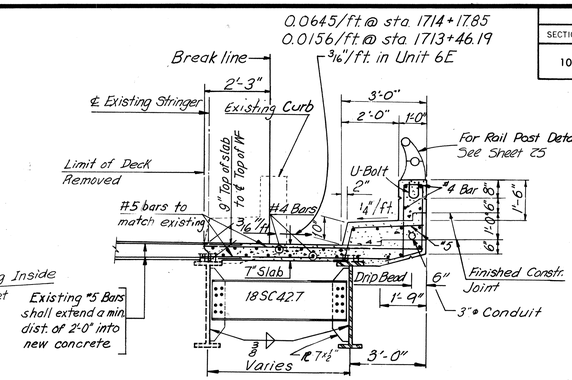


COVER PLATE DETAIL
No Scale

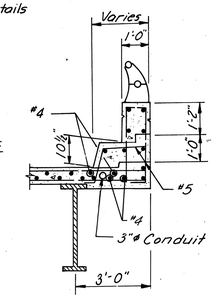


DETAIL C
Scale: 1/2"=1'-0"

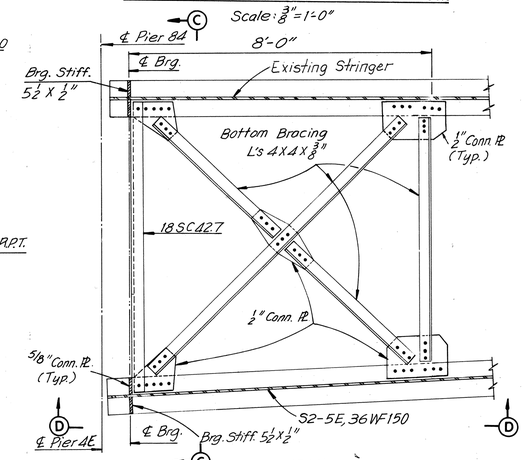
NOTE:
Contractor shall remove the minimum amount of deck necessary to perform the work shown on this sheet.



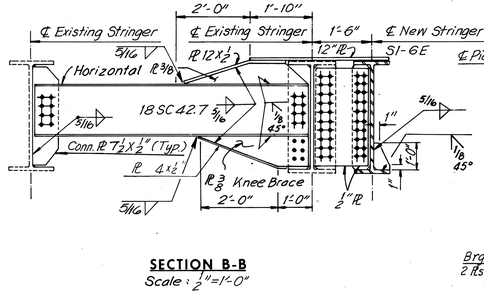
SECTION A-A—INTERMEDIATE DIAPHRAGM



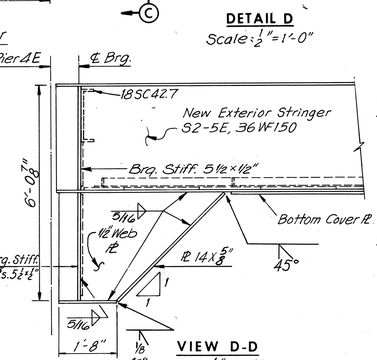
SECTION E-E
Scale: 3/8"=1'-0"



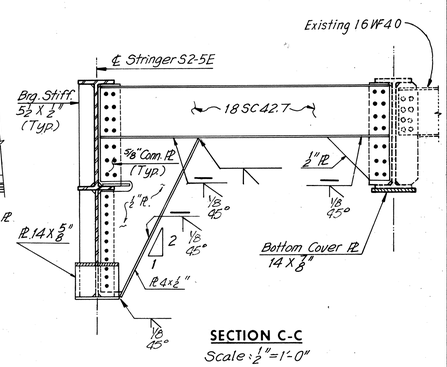
DETAIL D
Scale: 1/2"=1'-0"



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



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



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

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.
New Diaphragms are to match Existing Diaphragms.

SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4M	1		
E16	1		

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	0.5L-0.6L	0.6L-0.7L	0.7L-0.8L	0.8L-0.9L	0.9L-1.0L*
5E	S2-5E	36W 150	71'-5 11/16"	70'-1 15/16"	8"	8"	6'-4"	14 X 5/8"	9 1/4"	10 1/2"	12"	15"	18 1/2"	19"	17"	14 1/2"	6"	6"
6E	S1-6E	36W 150	68'-9"	67'-6 15/16"	7"	7/8"	--	--	24"	24"	24"	24"	24"	24"	24"	24"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE						CAMBER SCHEDULE		
DUE TO TOTAL CONC.			DUE TO STEEL					
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
7/8"	1 3/16"	7/8"	1/4"	5/16"	1/4"	1/8"	2 1/16"	1 3/4"
3/4"	1 1/16"	3/4"	3/16"	5/16"	1/4"	1/16"	1/16"	15/16"

* Spacing begins at termination of 6 spaces @ 4".

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SCC	3.12.69	2	As Built	TEM	6-77
CHECKED	GCC	4.28.69	1	Deck Plan & Section A-A	TEM	10-74
IN CHARGE						

AS BUILT

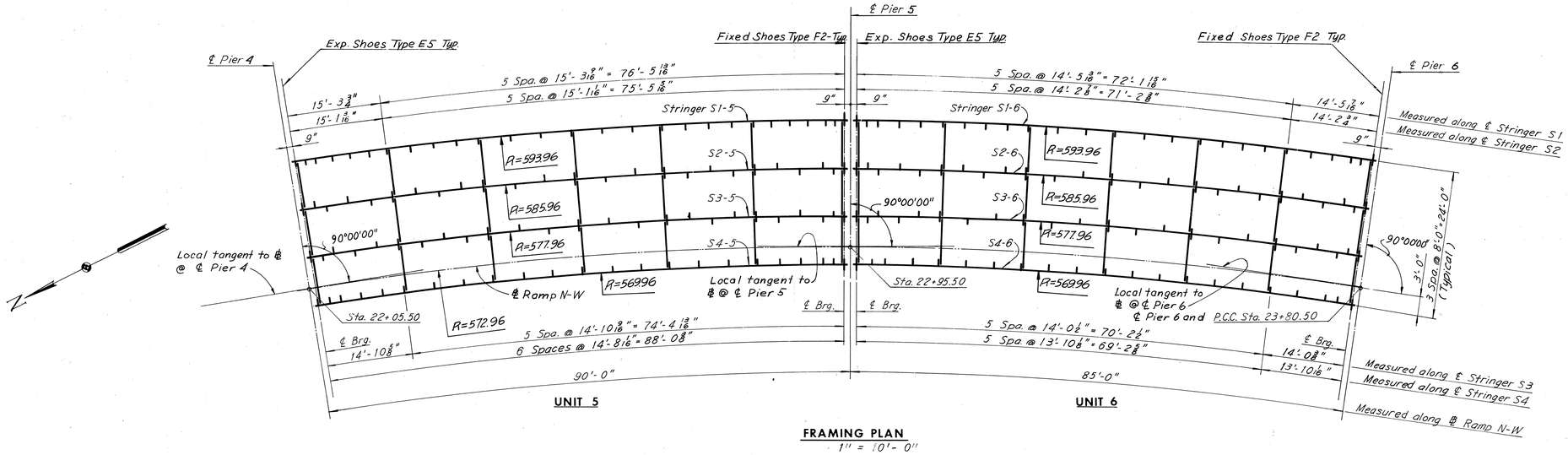
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN AND DECK PLAN
UNITS 5E AND 6E

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

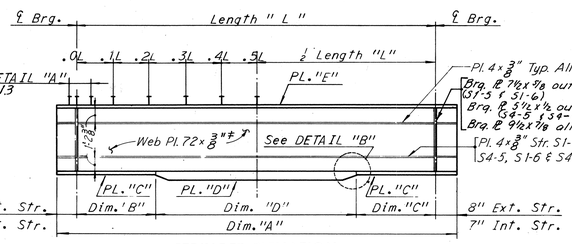
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 14 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	113	265



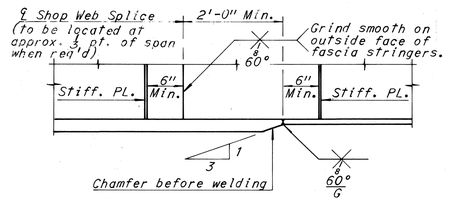
FRAMING PLAN
1" = 10'-0"

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



STRINGER ELEVATION
No Scale

FLANGE PLATE SPLICE DETAIL
No Scale



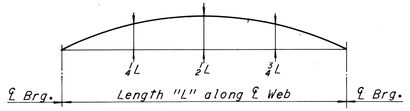
DETAIL "B"
No Scale

DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 21 .

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	8	F2	8

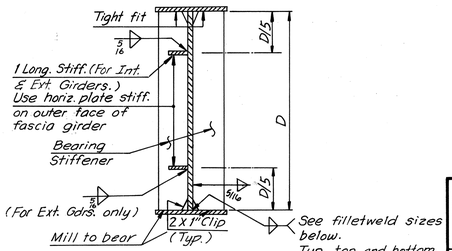
Notes:
For Joint details see Sheet 26.
For Superstructure steel quantities see Sheet 2
For Diaphragm details see Sheet 21.
For Shoe details see Sheet 51
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"#	PL. "D"#	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
5	S1-5	93'- 1 3/8"	91'-9 5/8"	17'-11 11/16"	17'-11 3/8"	55'-10"	16x 7/8"	16x 1 3/8"	12x 3/4" ±	10 1/2"	12 1/2"	15 1/2"	20"	24"
	S2-5	91'- 8 1/2"	90'-6 1/2"	18'- 0 1/4"	18'- 0 1/4"	54'- 6"	12x 1"	12x 1 1/8"	12x 1/4" ±	13"	14 1/2"	17"	21 1/4"	24"
	S3-5	90'- 5 5/8"	89'-3 3/8"	17'- 4 3/4"	17'- 4 3/4"	54'-6"	12x 3/4"	12x 1 1/8"	12x 3/4" ±	14 1/2"	16 1/2"	19"	23 3/8"	24"
	S4-5	89'- 4 3/8"	88'-0 5/8"	44'- 0 3/8"	44'- 0 3/8"	-	12x 1"	-	12x 3/4"	15 1/2"	18"	21 1/4"	24"	24"
6	S1-6	87'-11 3/8"	86'-7 3/8"	43'- 3 11/16"	43'- 3 11/16"	-	16x 7/8"	-	12x 3/4" ±	11"	13"	15 1/2"	20"	24"
	S2-6	86'- 7 1/8"	85'-5 1/8"	16'-11 13/16"	16'-11 13/16"	51'-6"	12x 7/8"	12x 1 3/8"	12x 3/4" ±	13"	14 1/2"	17"	21 1/4"	24"
	S3-6	85'- 4 3/8"	84'-2 3/8"	42'- 1 7/8"	42'- 1 7/8"	-	12x 3/4"	-	12x 3/4" ±	15"	16 1/2"	19"	23"	24"
	S4-6	84'- 4 11/16"	83'-0 11/16"	41'- 6 11/16"	41'- 6 3/4"	-	12x 3/4"	-	12x 3/4"	15 1/2"	18"	21 1/4"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE						
DUE TO TOTAL CONC.			DUE TO STEEL		
¼L	½L	¾L	¼L	½L	¾L
15/16"	1 5/16"	1 15/16"	1/4"	5/16"	1/4"
13/16"	1 1/8"	1 13/16"	3/16"	1/4"	3/16"
3/4"	1"	1 1/2"	3/16"	1/4"	3/16"
5/8"	7/8"	1 5/8"	1/8"	3/16"	1/8"
3/4"	1 1/16"	1 1/2"	3/16"	1/4"	3/16"
11/16"	1"	1 1/16"	3/16"	1/4"	3/16"
5/8"	7/8"	1 5/8"	1/8"	3/16"	1/8"
9/16"	13/16"	1 7/16"	1/8"	3/16"	1/8"

* Spacing begins at termination of 6 spaces @ 4".
# Denotes A572-Grade 50 steel for thickness of ¾" and under, and A588 steel for thickness over ¾".



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS
No Scale

Note:
Web to flange weld size to be determined by flange thickness as follows:
To 12"..... 5/16" weld
Over 12" to 24"..... 3/8" weld
Over 24"..... ½" weld

	BY	DATE				
MADE	MHH	8-29-68	1	Detail Changed	PRMS	4-19-74
CHECKED			2	Revised D.L. Defl. & Camber Schedule	EJM	10-11-74
IN CHARGE			3	As Built	TEM	6-77
			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

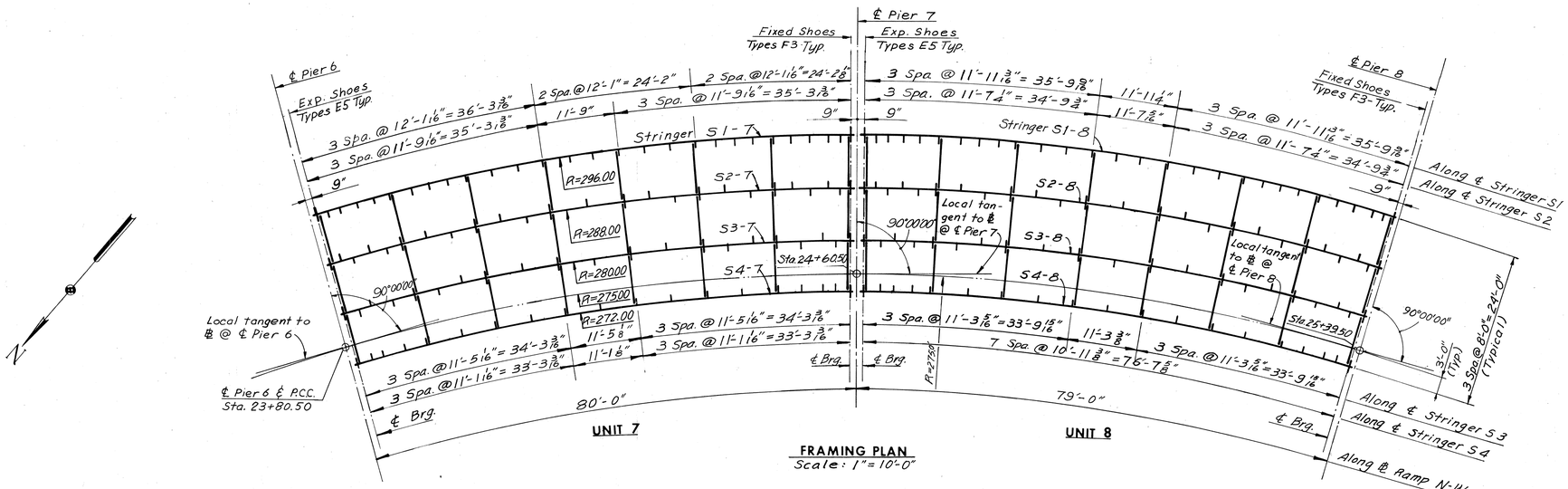
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN - UNITS 5 AND 6

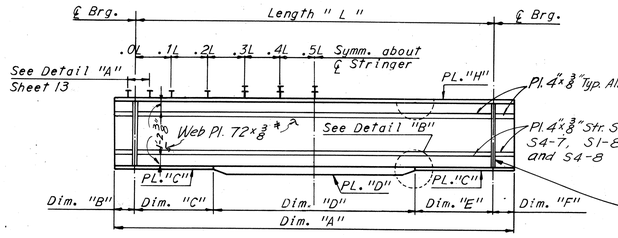
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 15 OF 28

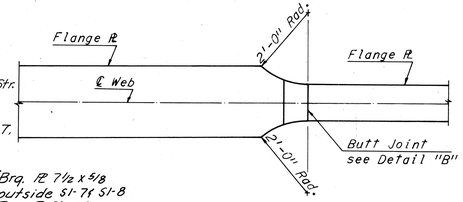
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	114	265



FRAMING PLAN
Scale: 1"=10'-0"

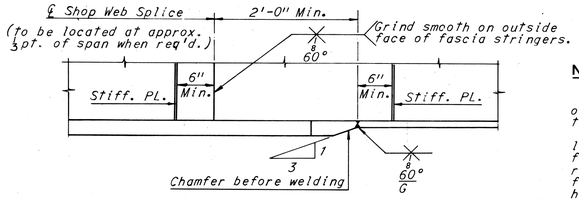


STRINGER ELEVATION
No Scale
Note: For Web Pl. S4-7 and S4-8 use A36.

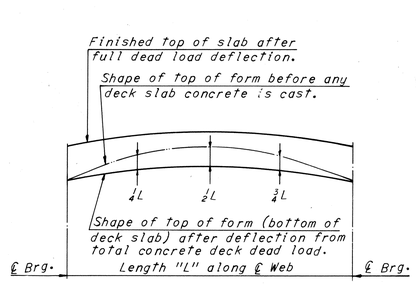


Brg. PL 7½ x 5/8 outside S1-7 & S1-8
Brg. PL 5½ x ½ outside S4-7 & S4-8
Brg. PL 9½ x ⅞ other locations

FLANGE PLATE SPLICE DETAIL
No Scale



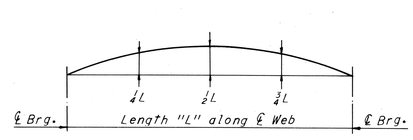
DETAIL "B"
No scale



DEAD LOAD DEFLECTION DIAGRAM
No Scale

NOTE TO CONTRACTOR

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



CAMBER DIAGRAM
No Scale

NOTE TO FABRICATOR

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

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with a minimum distance as shown in cross-section on Sheet 22.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	8	F3	8

Notes:
For Joint details see Sheet 26.
For Superstructure steel quantities see Sheet 2
For Diaphragm details see Sheet 22
For Shoe details see Sheet 51
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragm.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	PL. "C"	PL. "D"	PL. "H"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
7	S1-7	85'-11 31/16"	84'-7 5/16"	8"	15'-6 11/16"	53'-6"	15'-6 3/8"	8"	16"x⅞" *	16"x1 1/2" *	12"x⅜" *	10"	12"	14½"	19"	24"
	S2-7	83'-5 3/8"	82'-3 3/8"	7"	15'-10 11/16"	50'-6"	15'-10 11/16"	7"	12"x1" *	16"x1⅛" *	12"x⅜" *	12"	13"	16½"	21"	24"
	S3-7	81'-1 2"	79'-11 3/4"	7"	39'-11 3/4"	-	39'-11 3/4"	7"	12"x1" *	-	12"x⅜" *	15½"	17"	20"	24"	24"
	S4-7	78'-11½"	77'-7½"	8"	38'-9 3/4"	-	38'-9 3/4"	8"	12"x⅞"	-	12"x⅜"	17"	19"	23"	24"	24"
8	S1-8	84'-10 3/8"	83'-6 3/8"	8"	15'-0 3/8"	53'-6"	15'-0 3/8"	8"	16"x⅞" *	16"x1 1/2" *	12"x⅜" *	10"	12"	14½"	19"	24"
	S2-8	82'-4 15/16"	81'-2 15/16"	7"	15'-4 7/16"	50'-6"	15'-4 7/16"	7"	12"x1" *	16"x1⅛" *	12"x⅜" *	12"	13"	16½"	21"	24"
	S3-8	80'-1 7/16"	78'-11 7/16"	7"	39'-5 7/8"	-	39'-5 7/8"	7"	12"x1" *	-	12"x⅜" *	15½"	17"	20"	24"	24"
	S4-8	77'-11 7/8"	76'-7 5/16"	8"	38'-3 15/16"	-	38'-3 15/16"	8"	12"x⅞"	-	12"x⅜"	17"	19"	23"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

DUE TO TOTAL CONCRETE ¼L	½L	¾L	DUE TO STEEL ¼L	½L	¾L
¾"	1"	¾"	3/16"	¼"	3/16"
5/8"	⅞"	5/8"	⅛"	3/16"	⅛"
7/16"	11/16"	7/16"	⅛"	⅛"	⅛"
5/16"	⅜"	5/16"	1/16"	⅛"	1/16"
11/16"	1"	11/16"	3/16"	¼"	3/16"
5/8"	⅞"	5/8"	⅛"	⅛"	⅛"
7/16"	11/16"	7/16"	⅛"	⅛"	⅛"

CAMBER SCHEDULE

¼ L	½ L	¾ L
15/16"	1¼"	15/16"
3/4"	1⅛"	3/4"
9/16"	13/16"	9/16"
⅜"	½"	⅜"
⅞"	1¼"	⅞"
3/4"	1⅛"	3/4"
9/16"	13/16"	9/16"

* Spacing begins at termination of 6 spaces @ 4".
# Denotes A572-Grade 50 Steel for thicknesses of ¾" and under and A588 steel for thicknesses over ¾"

Notes:
All steel shall be A36 unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.

Intermediate stiffener Pls. 4½x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

	BY	DATE
MADE	SCC	8-23-66
CHECKED		
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note Added	PRMc	4-19-74
2	Revised D.L. Defl. Sch. & Camber Sch.	E.J.M.	10-11-74
3	As Built	TEM	6-77

AS BUILT

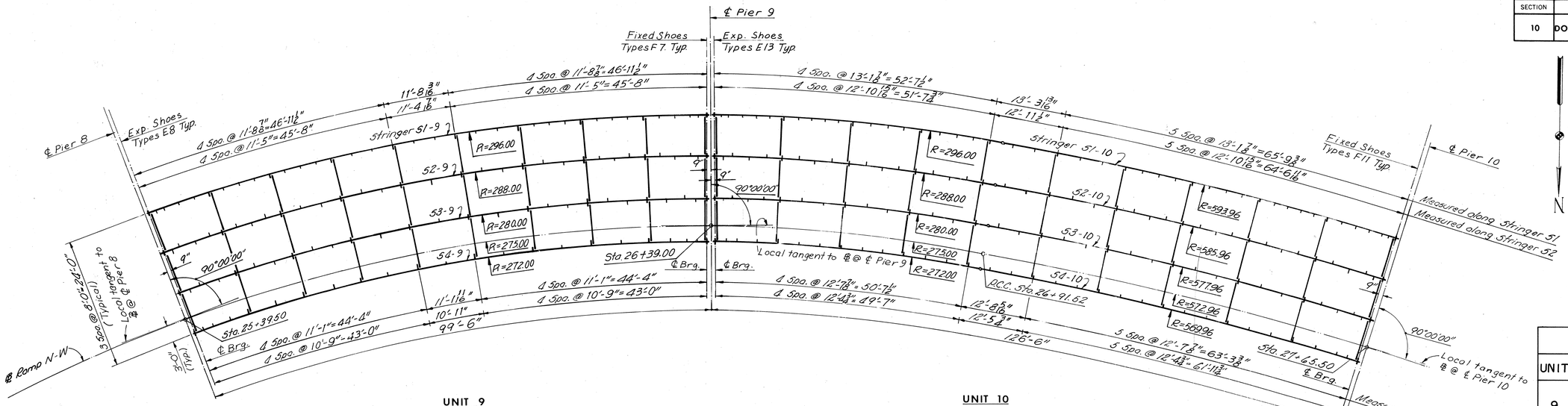
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 7 AND 8

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

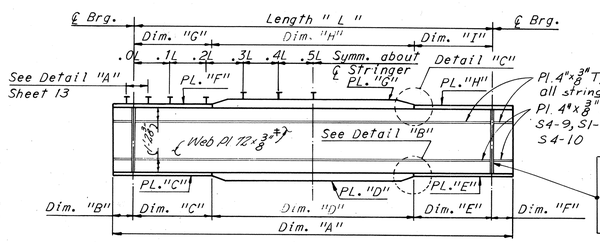
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 16 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	115	265



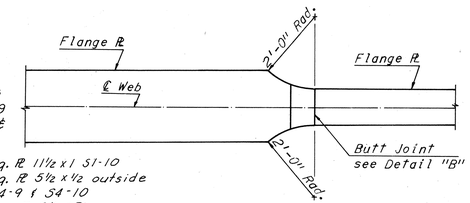
FRAMING PLAN
Scale 1" = 10'-0"

CAMBER SCHEDULE				
UNIT	STRINGER	¼L	½L	¾L
9	S1-9	1 9/16"	2 1/8"	1 9/16"
	S2-9	1 5/16"	1 13/16"	1 5/16"
	S3-9	1 1/8"	1 9/16"	1 1/8"
	S4-9	7/16"	5/8"	7/16"
10	S1-10	-1/8"	-3/16"	-1/16"
	S2-10	-1/4"	-1/8"	-1/2"
	S3-10	-2 3/16"	-2 11/16"	-2 5/16"
	S4-10	-3 3/8"	-5 1/4"	-3 3/8"

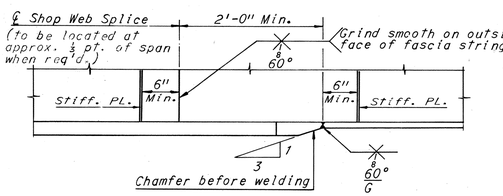


STRINGER ELEVATION
No Scale

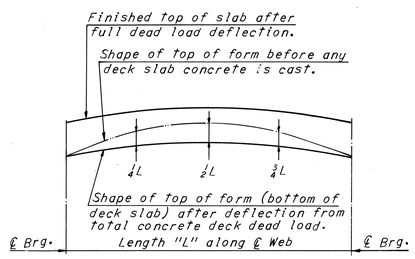
Note :
Web Plate for Stringer S4-9 use A-36.



FLANGE PLATE SPLICE DETAIL
No Scale



DETAIL "B"
No scale
(Detail "C" similar)

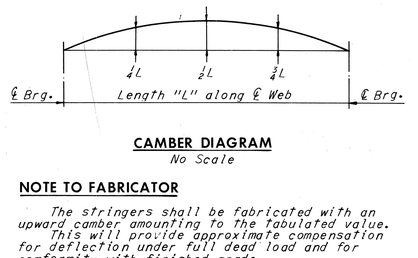


DEAD LOAD DEFLECTION DIAGRAM
No Scale

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM
No Scale

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

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

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with a minimum distance as shown in cross-section on Sheet 23.

Note:
Minus (-) sign in camber denotes a downward camber.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD	TYPE	NO. REQD.
E8	4	F7	4
E13	4	F11	4

Notes:
For Diaphragm and Connection Details see Sheet 23.
For Shoe details see Sheet 51
For Joint details see Sheet 26
For Superstructure Steel quantities see Sheet 2
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragm.
For Horizontal Stiffener Detail and Flange to Web Welds, see Sheet 15.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	Dim. "H"	Dim. "I"	PL. "C"	PL. "D"	PL. "E"	PL. "F"	PL. "G"	PL. "H"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
9	S1-9	106'-11 13/16"	105'-7 7/16"	8"	20'-2 5/16"	65'-2 9/16"	20'-2 5/16"	8"	20'-2 5/16"	65'-2 9/16"	20'-2 5/16"	20"x 2 3/16"±	20"x 2"±	20"x 1 5/16"±	16"x 2 7/16"±	16"x 1 3/16"±	16"x 2 7/16"±	7½"	10½"	14"	18½"	24"
	S2-9	103'-10 9/16"	102'-8 3/16"	7"	19'-3"	64'-2 7/16"	19'-3"	7"	19'-3"	64'-2 7/16"	19'-3"	16"x 1 1/4"±	16"x 1 3/16"±	16"x 1 1/4"±	12"x 3 1/16"±	12"x 1 3/16"±	12"x 3 1/16"±	11½"	12½"	17"	22"	24"
	S3-9	100'-11 1/16"	99'-9 11/16"	7"	19'-0 15/16"	61'-4 1/16"	19'-0 15/16"	7"	49'-10 5/16"	---	49'-10 15/16"	12"x 1"±	12"x 1 2 7/16"±	12"x 1"±	12"x 3 1/16"±	---	12"x 3 1/16"±	15½"	17½"	20½"	24"	24"
	S4-9	98'-3"	96'-11"	8"	48'-5½"	---	48'-5½"	8"	48'-5½"	---	48'-5½"	12"x 3/8"	---	12"x 3/8"	12"x 3/16"	---	12"x 3/16"	18½"	21"	24"	24"	24"
10	S1-10	133'-0 1/16"	131'-8 9/16"	8"	25'-0"	82'-8 1/16"	24'-0"	8"	25'-0"	82'-8 1/16"	24'-0"	24"x 1 5/16"±	24"x 2 1/16"±	24"x 1 8 3/16"±	20"x 1 1/16"±	20"x 1 3/16"±	20"x 1 1/16"±	8½"	10½"	14½"	19½"	24"
	S2-10	130'-3 15/16"	129'-1 7/16"	7"	24'-6"	80'-1 13/16"	24'-6"	7"	24'-6"	80'-1 13/16"	24'-6"	20"x 2"±	20"x 1 2 1/16"±	20"x 1 1/16"±	12"x 1 1/16"±	16"x 1 1/16"±	11"	12½"	17"	22"	24"
	S3-10	127'-9 3/16"	126'-7 5/16"	7"	23'-0"	78'-7 1/16"	25'-0"	7"	24'-0"	70'-7 1/16"	32'-0"	16"x 1 1/16"±	16"x 1 5/16"±	16"x 1"±	12"x 3/16"±	12"x 1 1/16"±	12"x 3/16"±	15"	17"	20½"	24"	24"
	S4-10	125'-4 1/16"	124'-0 1/16"	8"	22'-0"	78'-0 7/16"	24'-0"	8"	62'-0 1/16"	---	62'-0 1/16"	12"x 1"±	12"x 1 5/16"±	12"x 3/16"±	12"x 3/16"±	---	12"x 3/16"±	14½"	16½"	21"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE					
DUE TO TOTAL CONC.			DUE TO STEEL		
¼L	½L	¾L	¼L	½L	¾L
1 3/16"	1 11/16"	1 3/16"	3/8"	7/16"	3/8"
1"	1 3/8"	1"	5/16"	7/16"	5/16"
7/8"	1¼"	7/8"	¼"	5/16"	¼"
3/8"	½"	3/8"	1/16"	1/16"	1/16"
1 5/16"	2 1/16"	1 5/16"	5/8"	7/8"	5/8"
1 1/8"	2 5/16"	1 1/16"	9/16"	3/4"	9/16"
1 5/8"	2 1/4"	1 5/8"	7/16"	5/8"	7/16"
13/16"	1 1/16"	13/16"	3/16"	1/4"	3/16"

Note:
All steel shall be A36 unless denoted otherwise.
Exterior stringer longitudinal stifferers shall be located on the exterior face of the stringer.

Intermediate stiffener Pls. 4½x 3/8" for top flange width of 12" and 16" and Pls. 5x 5/16" for top flange width of 20", shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

* Spacing begins at termination of 6 space.

# Denotes A572-Grade 50 steel for thicknesses of ¾" and under, and A588 for thicknesse over ¾".

	BY	DATE				
MADE	HJC	8-20-68	1	Note Added	PRMS	4-19-74
CHECKED	RC	10-21-68	2	Dim 'D' S4-10 Revised DL Defl. & Camber Sch.	E.J.M.	10-11-74
IN CHARGE			3	As Built	TEM	6-77
			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

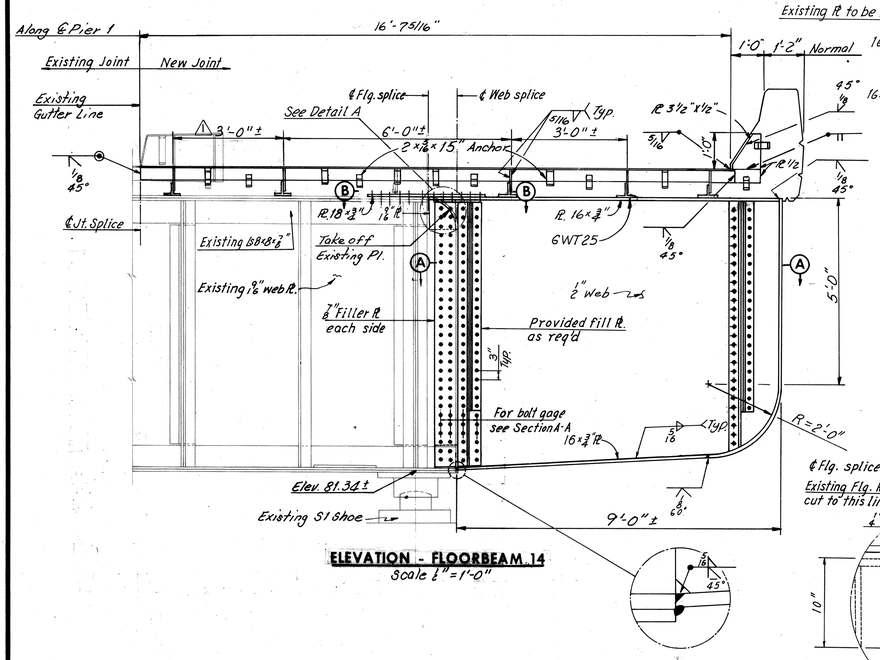
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

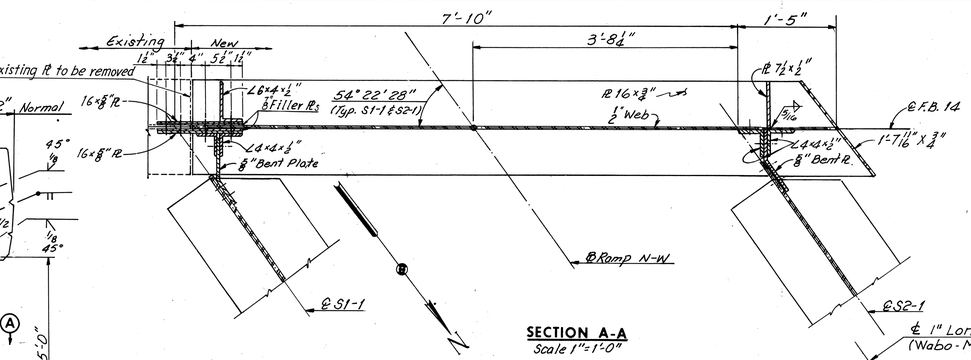
FRAMING PLAN — UNITS 9 AND 10

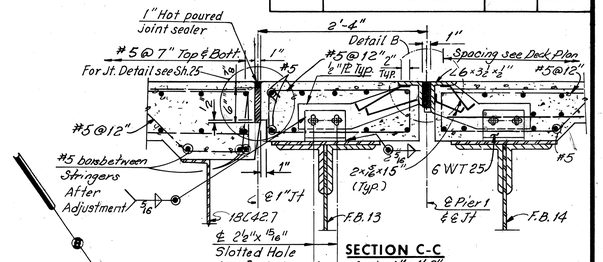
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

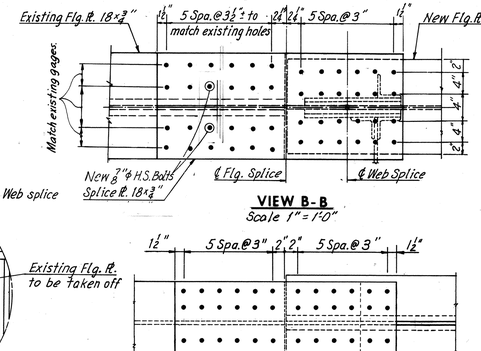
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 17 OF 28

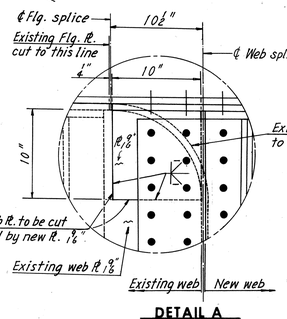
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10.	DOWNTOWN EXPRESSWAY	116	265

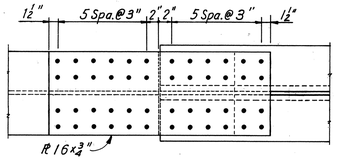


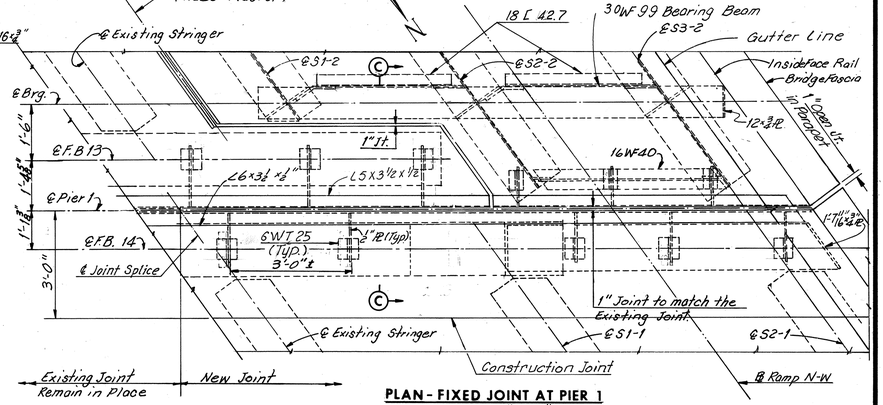




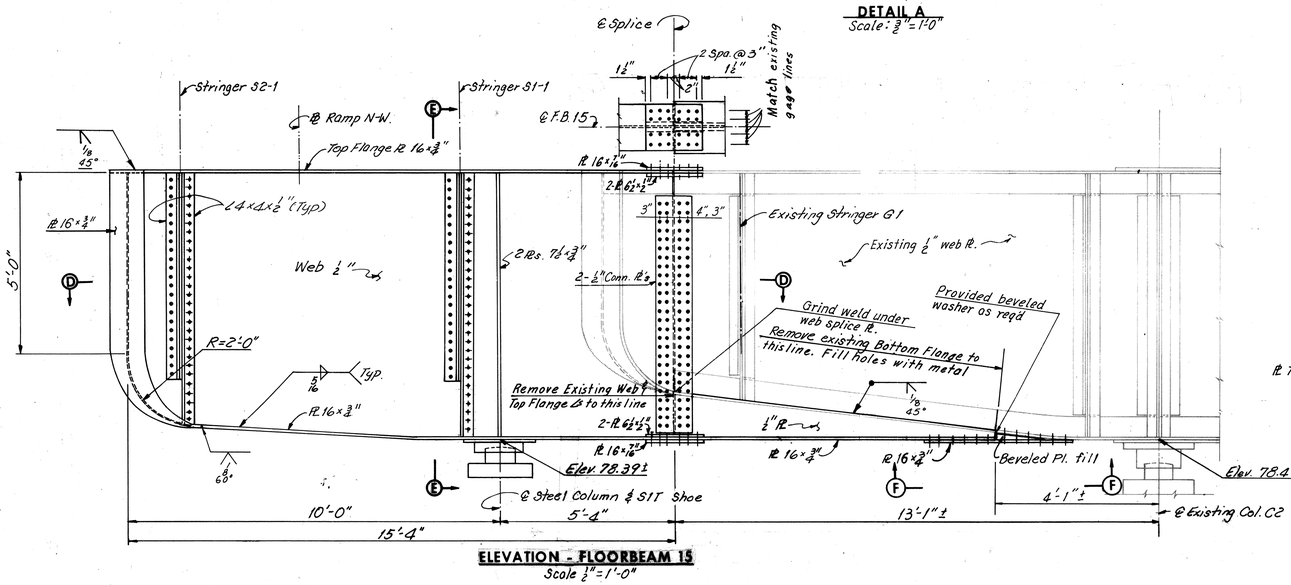


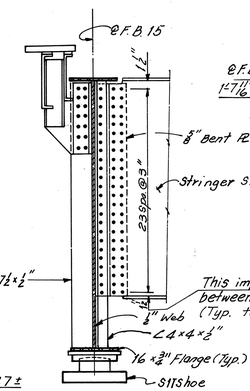


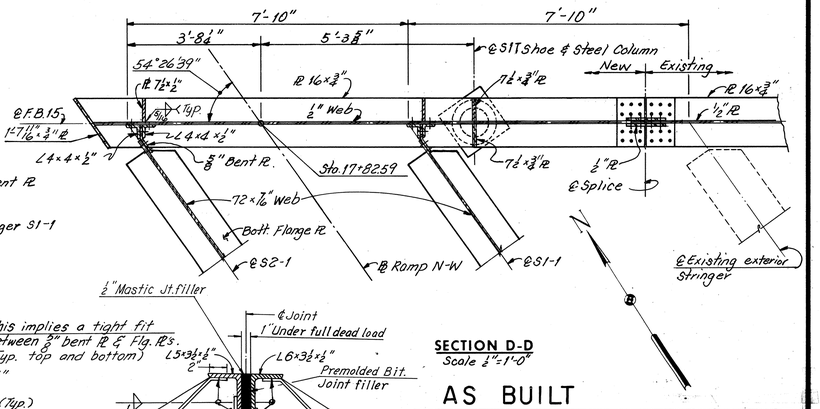




Note:
1" Joint at pier 1 is to match the existing Joint. The Contractor shall verify the location of Joint.







AS BUILT

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.

Note:
For Joint Details at F.B. 15, see Sheet 42 Bridge 67.
For Framing plan, see Sheet 12.
For Steel Column Details, see Sheet 28 Bridge 67.
For S1T Shoe Details, see Sheet 47 Bridge 67.
All Elevations are to be verified by the Contractor.

	BY	DATE
MADE	G.C.C.	3-13-69
CHECKED	Y.C.P.	4-25-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	T.E.M	6-77
1	Unit 2 End Diaph. @ Pier 1 revised L 3 1/2"x 3 1/2"x 1/2" Support Changed to GUT25	LBP	10-31-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

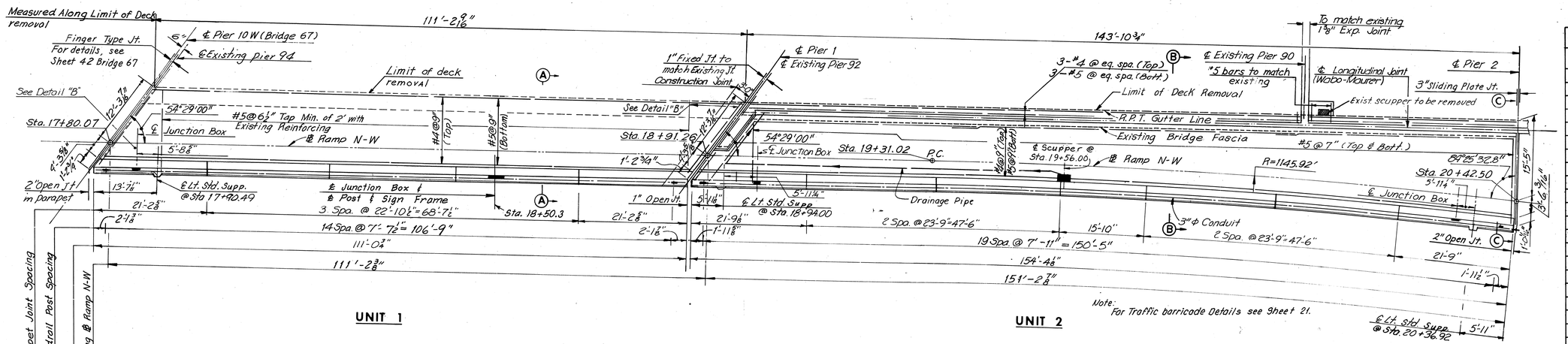
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING DETAILS

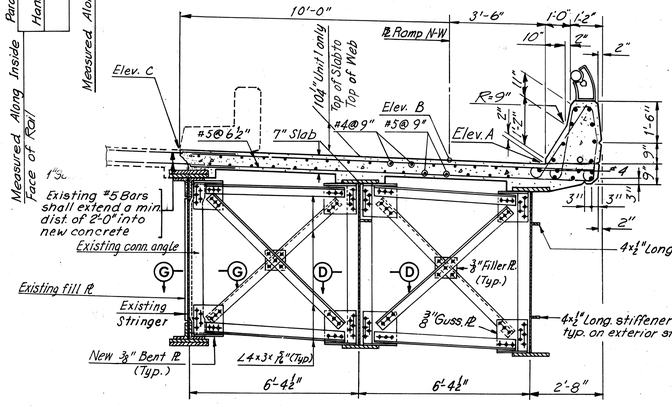
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 18 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	117	265

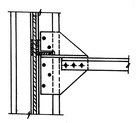


DECK PLAN
Scale: 1" = 10'-0"

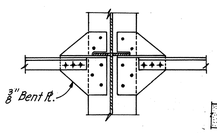


(Showing Intermediate Diaphragm)

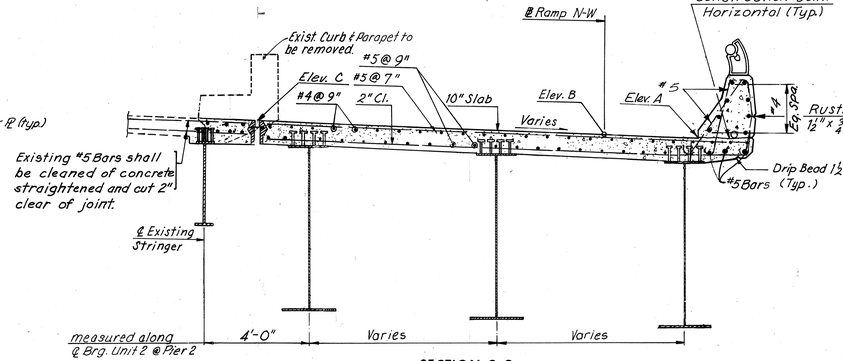
SECTION A-A
Scale: ⅜" = 1'-0"



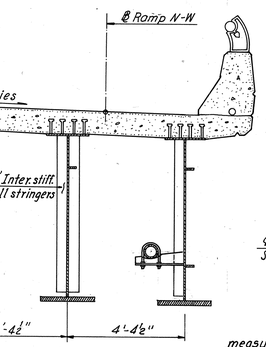
SECTION G-G
Scale: ½" = 1'-0"



SECTION D-D
Scale: ½" = 1'-0

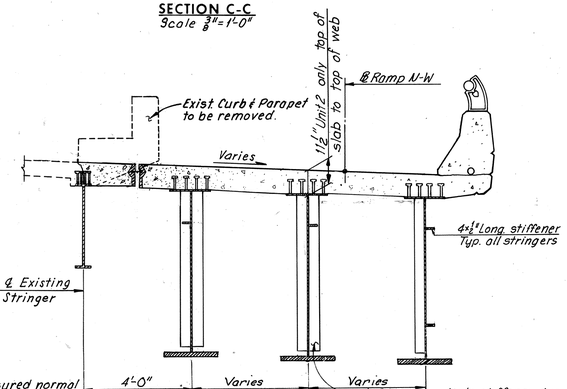


SECTION C-C
Scale ⅜" = 1'-0"

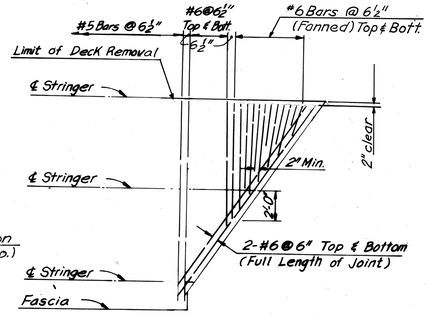


SECTION H-H
Scale: ⅜" = 1'-0"

For location of Section H-H, see Sheet 12b.



SECTION B-B
Scale: ⅜" = 1'-0"



DETAIL B
Pier 1 shown Pier 10W similar.

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
17+77.57	87.11	"	"
17+80	87.17	87.07	86.73
17+80.07	"	87.07	"
17+87.21	"	"	87.00
17+90	87.44	87.35	87.07
18+00	87.70	87.61	87.35
18+10	87.95	87.87	87.63
18+20	88.19	88.12	87.90
18+30	88.43	88.36	88.15
18+40	88.66	88.59	88.40
18+50	88.88	88.81	88.64
18+60	89.09	89.03	88.87
18+70	89.29	89.24	89.10
18+80	89.49	89.44	89.32
18+88.75	89.65	"	"
18+90	89.67	89.64	89.57
18+91.26	"	89.66	"
18+98.42	"	"	89.72
19+00	89.87	89.84	89.78
19+10	90.06	90.03	89.98
19+20	90.23	90.22	90.18
19+30	90.40	90.39	90.37
19+40	90.56	90.55	90.54
19+50	90.71	90.71	90.71
19+60	90.84	90.85	90.88
19+70	90.95	90.98	91.04
19+80	91.05	91.10	91.20
19+90	91.15	91.21	91.35
20+00	91.24	91.31	91.49
20+10	91.31	91.39	91.64
20+20	91.38	91.47	91.77
20+30	91.43	91.54	91.91
20+40	91.47	91.59	92.04
20+41.28	-	-	92.06
20+42.50	-	91.60	-
20+42.84	91.49	" -	-

Elevations given in the Elevation Table may require adjustment in the field.

Notes:
For Joint Details, see Sheet 18, 25 and Sheet 42 Bridge 67.
Elevation C is to be confirmed by by contractor.
For Framing Plan, see Sheet 12.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet 53.
For Lighting Details, see Sheet 54.
For Standard Drainage Details, see Support Type 11 Sheet 56.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	2-12-69	4	As Built	TEM	6-77
CHECKED	SCC.	4-24-69	3	Note for Table of Elevations	DWB	1-28-75
IN CHARGE			2	Chg. of Pier Angle Added Jun. Box	AEJ	1-13-75
			1	Deck Plan Sect A-A B.B.C-C H-H, Det B	TEM	10-31-74

AS BUILT

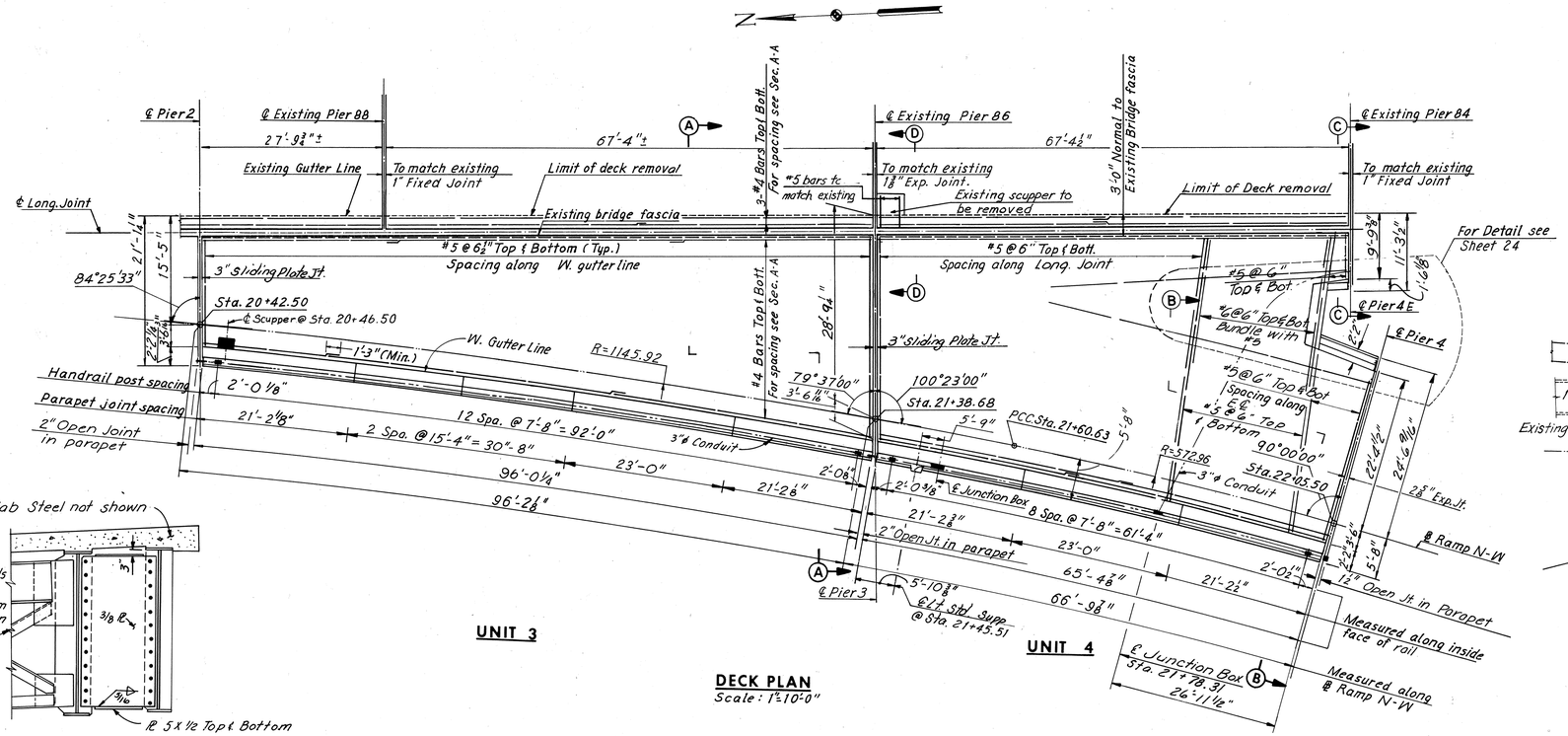
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

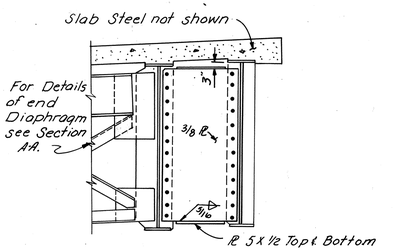
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 1 AND 2

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

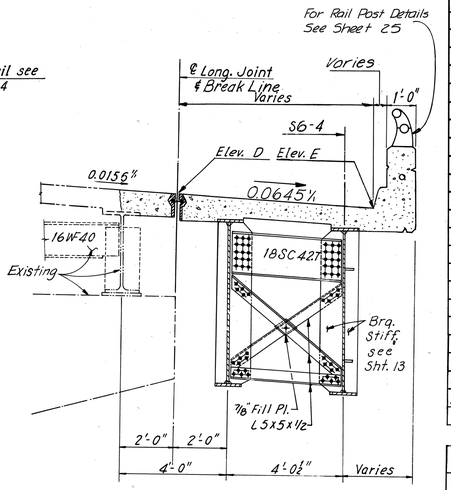
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 19 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	118	265





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



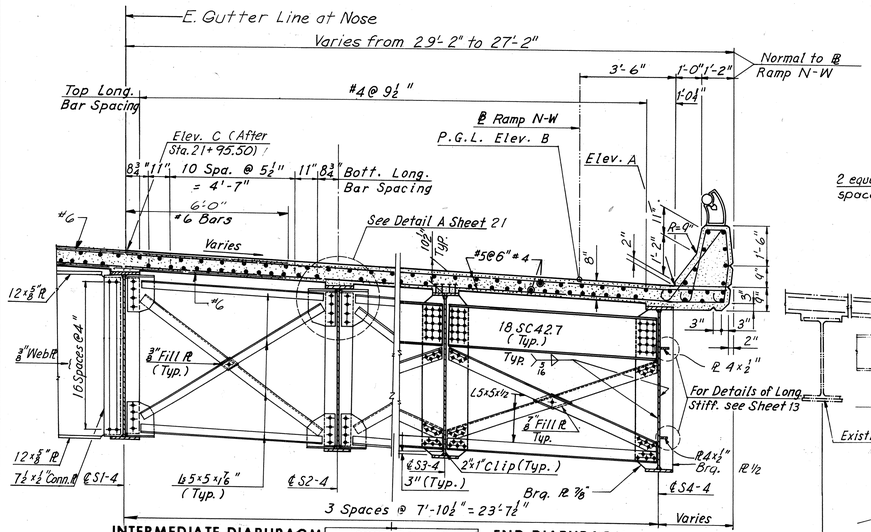
SECTION C-C
Scale: ⅜"=1'-0"

(For Reinforcing Steel see Section A-A Sheet 24)

Elevations given in the Elevation Table may require adjustment in the field.

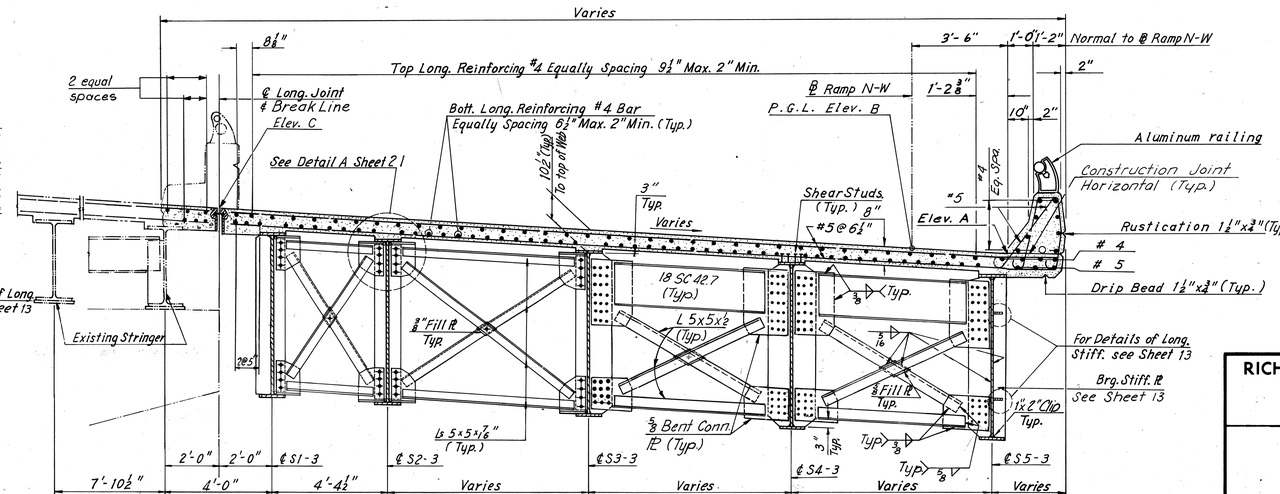
ELEVATION TABLE			
*STATION	ELEV. A	ELEV. B	ELEV. C
20+41.28	---	---	92.06
+42.50	---	91.61	---
+42.49	91.49	---	---
+50.00	91.49	91.64	92.21
+60.00	91.52	91.68	92.34
+70.00	91.54	91.72	92.52
+80.00	91.58	91.76	92.65
+90.00	91.61	91.80	92.80
21+00.00	91.64	91.84	93.00
+10.00	91.66	91.88	93.22
+20.00	91.70	91.92	93.38
+30.00	91.74	91.96	93.53
21+34.10	---	---	93.59
21+38.68	---	91.98	---
21+39.33	91.76	---	---
+40.00	91.76	91.98	93.67
+50.00	91.76	91.98	93.80
+60.00	91.73	91.95	93.92
+70.00	91.69	91.91	94.01
+80.00	91.63	91.85	94.09
+90.00	91.55	91.77	94.14
21+95.50	———	———	93.18
22+00.00	91.44	91.66	93.05
+05.50	91.39	91.60	92.91

GUTTER LINE ELEVATION			
STATION	ELEV. D	ELEV. E	———
1714+22.95	94.22	93.73	———
1714+17.85	94.27	93.85	———



INTERMEDIATE DIAPHRAGM — SECTION B-B — END DIAPHRAGM
Scale: ⅜"=1'-0"

Note:
For Standard Drainage Details for Unit 3 see Support Type 3, and for Nose see Support Type 9 (connect to existing Pier 86) Sheet S6.



INTERMEDIATE DIAPHRAGM — SECTION A-A — END DIAPHRAGM
Scale: ⅜"=1'-0"

Notes;
Elevation C is along W. edge of longitudinal joint before Sta. 21+60.00 and along W. Nose Gutter line after Sta. 21+60.00.
For elevation D and elevation E, see Section C-C.
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 13.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Superstructure details, see Sheet 24.
For Traffic Barricade Detail, see sheet 21.

* Station along ℄ Ramp N-W.

** Station along ℄ R.P.T..

	BY	DATE	NO.	REVISION	BY	DATE
MADE	K.C.T.	2-19-69	3	As Built	TEM	6-77
CHECKED	G.C.C.	4-17-69	1	Deck Elev. Table, Gutt. Line Elev. Table, Sect. A-A, Sect. B-B & Sect. D-D	EJM	10-11-74
IN CHARGE			2	Note for Table of Elevations	DWB	1-28-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

DECK PLAN - UNITS 3 AND 4

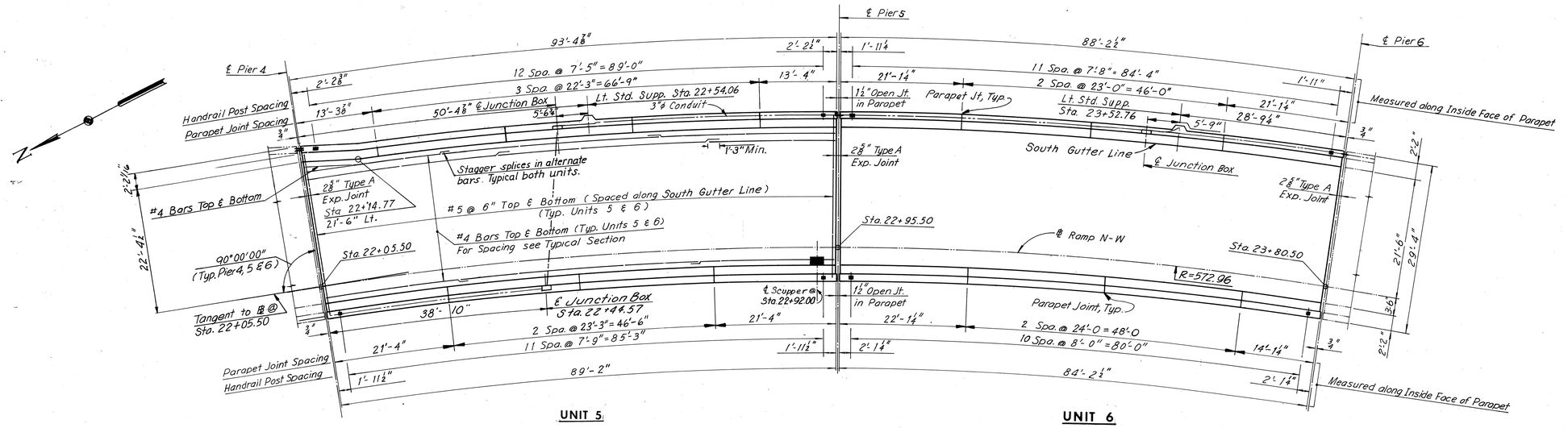
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 10
SHEET NO. 20 OF 28

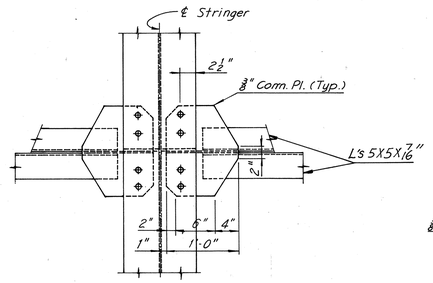
AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	119	265

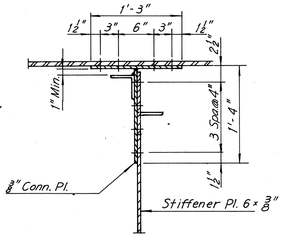
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
22+00.00	91.47	91.66	92.97
05.50	91.41	91.60	92.90
10.00	91.36	91.54	92.83
20.00	91.22	91.40	92.67
30.00	91.02	91.23	92.52
40.00	90.84	91.05	92.34
50.00	90.63	90.84	92.13
60.00	90.40	90.61	91.90
70.00	90.16	90.37	91.66
80.00	89.89	90.10	91.39
90.00	89.60	89.81	91.10
95.50	89.43	89.64	90.93
23+00.00	89.29	89.50	90.79
10.00	88.97	89.18	90.47
20.00	88.62	88.83	90.12
30.00	88.25	88.46	89.75
40.00	87.86	88.07	89.36
50.00	87.45	87.66	88.95
60.00	87.01	87.22	88.51
70.00	86.56	86.77	88.06
80.00	86.09	86.30	87.59
80.50	86.07	86.28	87.47
90.00	85.62	85.83	87.12



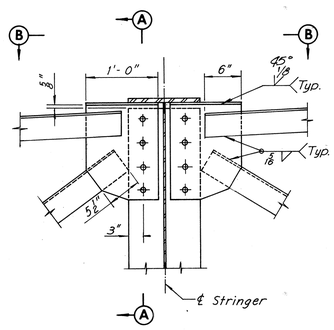
DECK PLAN
Scale: 1" = 10'-0"



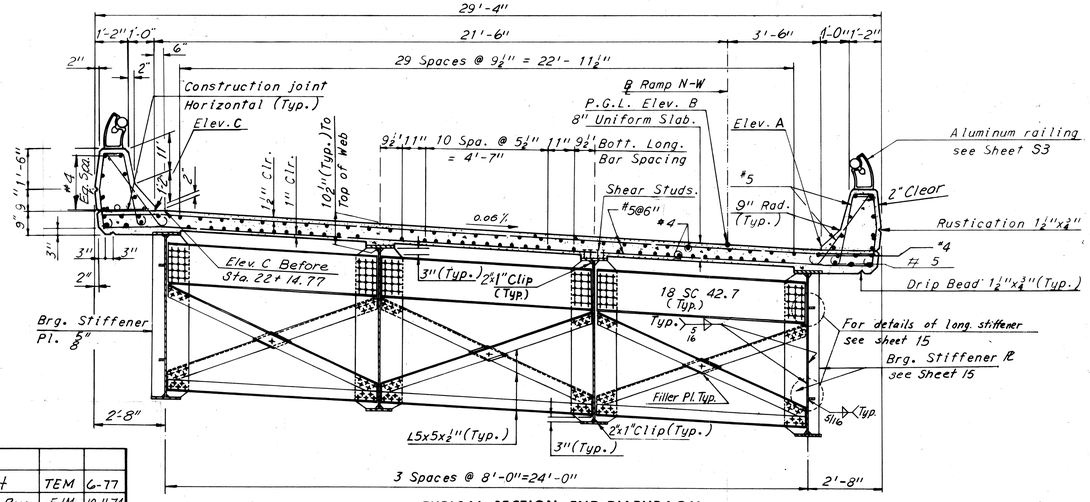
VIEW B-B
Scale: 1"=1'-0"



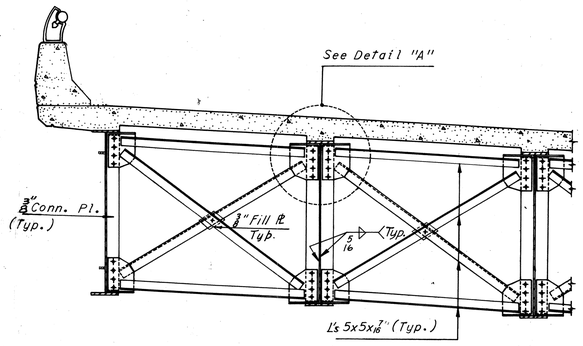
SECTION A-A
Scale: 1"=1'-0"



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



TYPICAL SECTION-END DIAPHRAGM
Scale: ⅜"=1'-0"



INTERMEDIATE DIAPHRAGM
Scale: ⅜" = 1'-0"

Notes:
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 15.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 3 Sheet S6.

	BY	DATE				
MADE	MHH	9-4-68	2	As Built	TEM	6-77
CHECKED	R. C.	10-17-68	1	Deck Elev. Rev.	EJM	10-11-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

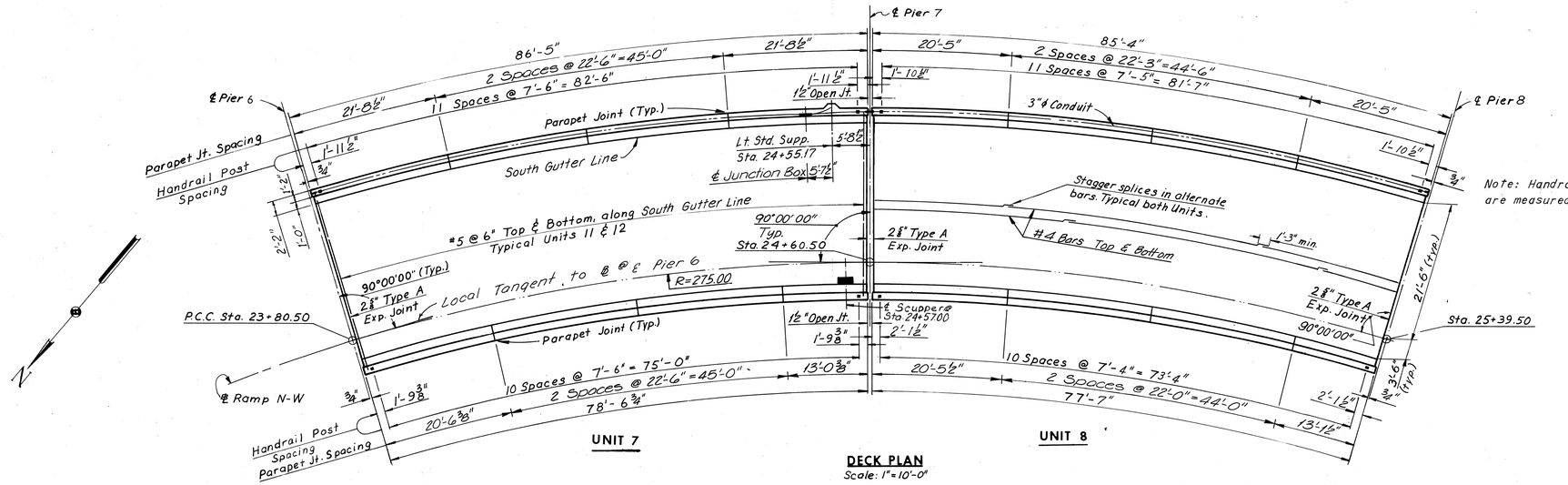
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN-UNITS 5 AND 6

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

SCALE: As shown
CONTRACT NO.: 10
SHEET NO. 21 OF 28

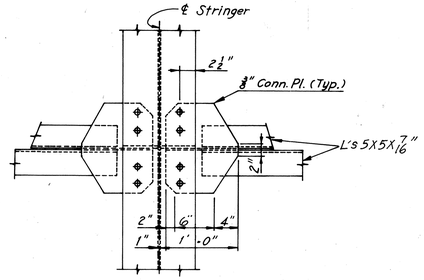
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	120	265



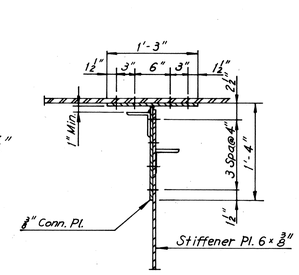
DECK PLAN
Scale: 1"=10'-0"

Note: Handrail and Parapet Joint Spacings are measured along inside face of parapet.

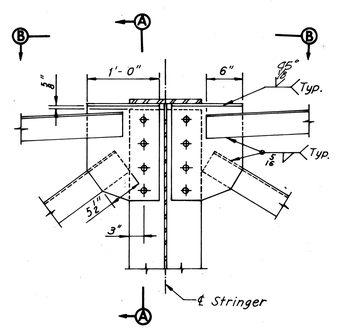
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
23+80.00	86.09	86.30	87.59
+80.50	86.07	86.28	87.57
+90.00	85.62	85.83	87.12
24+00.00	85.15	85.36	86.65
+10.00	84.68	84.89	86.18
+20.00	84.21	84.42	85.71
+30.00	83.73	83.94	85.23
+40.00	83.26	83.47	84.76
+50.00	82.79	83.00	84.29
+60.00	82.32	82.53	83.82
+60.50	82.29	82.50	83.79
+70.00	81.85	82.06	83.35
+80.00	81.37	81.58	82.87
+90.00	80.90	81.11	82.40
25+00.00	80.43	80.64	81.93
+10.00	79.96	80.17	81.46
+20.00	79.49	79.70	80.99
+30.00	79.01	79.22	80.51
+39.50	78.57	78.78	80.07
+40.00	78.54	78.75	80.04



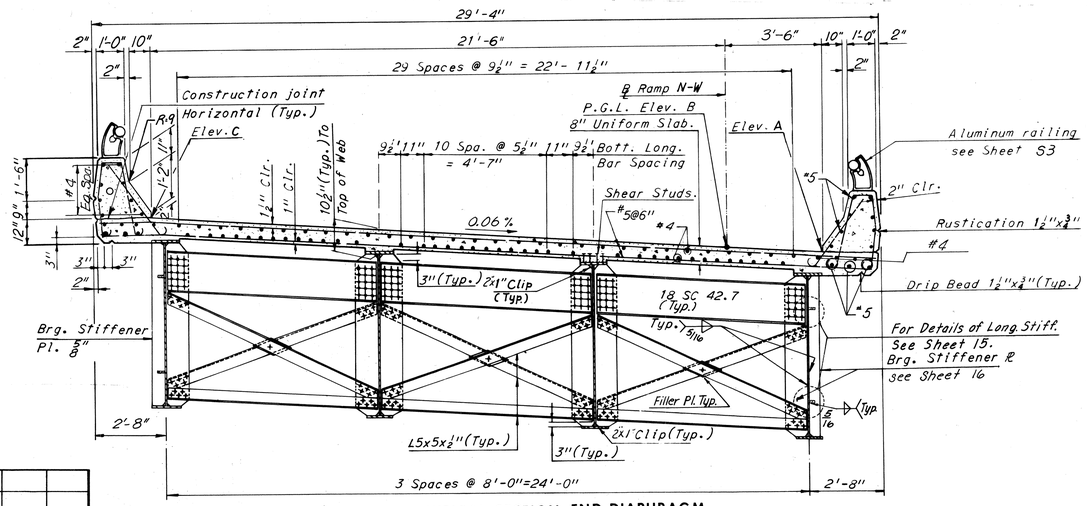
VIEW B-B
Scale: 1"=1'-0"



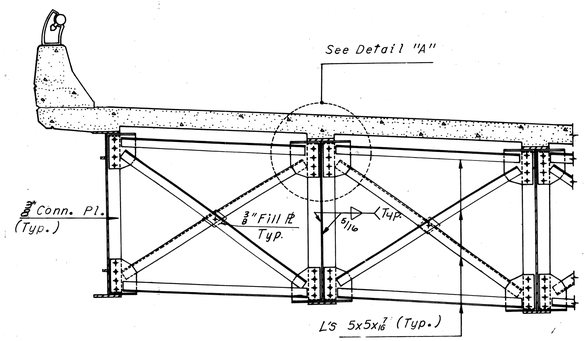
SECTION A-A
Scale: 1"=1'-0"



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



TYPICAL SECTION-END DIAPHRAGM
Scale: ⅜"=1'-0"



INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"

Notes:
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 16.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 3 Sheet S6.

	BY	DATE				
MADE	J.D.	8-20-68				
CHECKED	R.C.	10-17-68	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

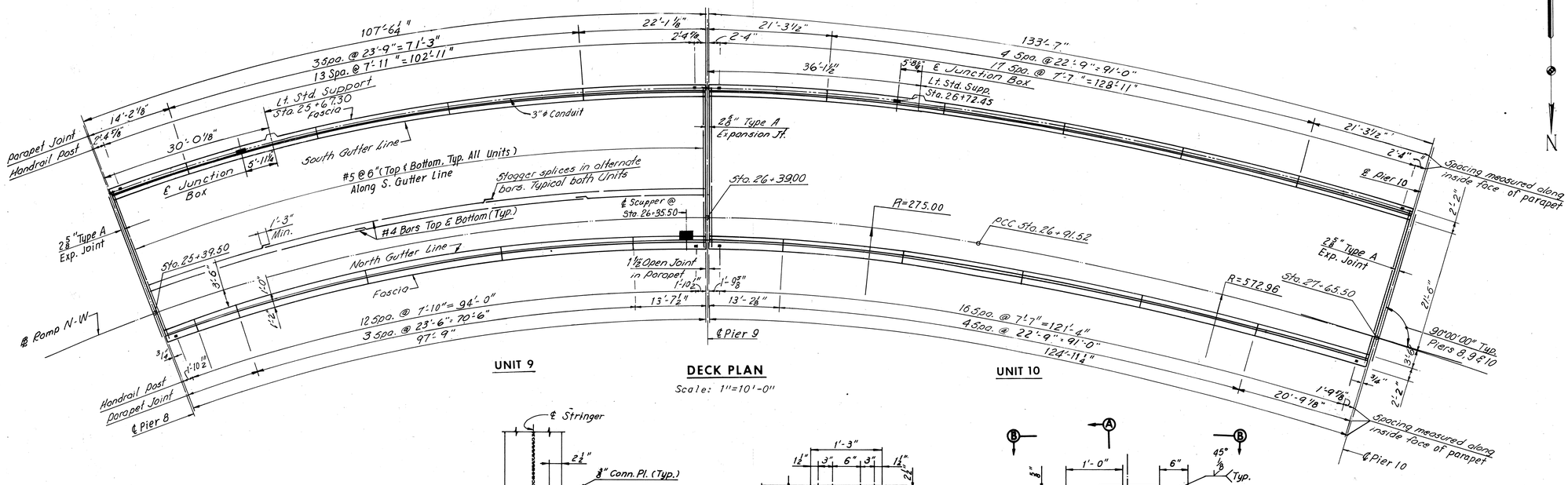
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 7 AND 8

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

SCALE: As shown
CONTRACT NO. 10
SHEET NO. 22 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	121	265



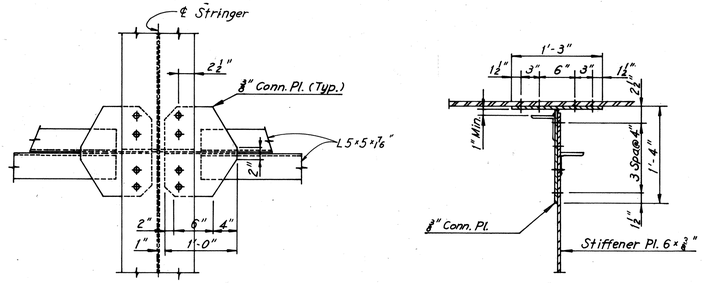
UNIT 9

DECK PLAN

Scale: 1"=10'-0"

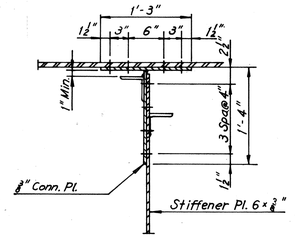
UNIT 10

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
25+30.00	79.01	79.22	80.51
25+39.50	78.57	78.78	80.07
25+40.00	78.54	78.75	80.04
25+50.00	78.07	78.28	79.57
25+60.00	77.60	77.81	79.10
25+70.00	77.13	77.34	78.63
25+80.00	76.65	76.86	78.15
25+90.00	76.18	76.39	77.68
26+00.00	75.71	75.92	77.21
26+10.00	75.24	75.45	76.74
26+20.00	74.77	74.98	76.27
26+30.00	74.29	74.50	75.79
26+39.00	73.87	**74.08**	**75.37**
26+40.00	**73.82**	**74.03**	**75.32**
26+50.00	73.35	73.56	74.85
26+60.00	72.89	73.10	74.39
26+70.00	72.46	72.67	73.96
26+80.00	72.06	72.27	73.56
26+90.00	71.68	71.89	73.18
27+00.00	71.33'	71.54	72.83
27+10.00	71.02'	71.22	72.43
27+20.00	70.75	70.93	72.05
27+30.00	70.49	70.66	71.69
27+40.00	70.27	70.42	71.37
27+50.00	70.07	70.21	71.07
27+60.00	69.90	70.03	70.40
27+65.50	69.82	69.94	70.67
27+70.00	69.76	69.87	70.56



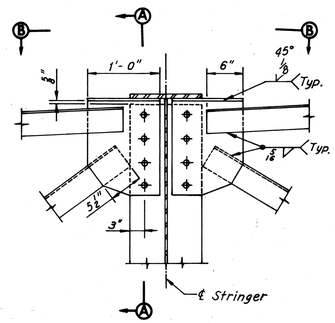
VIEW B-B

Scale: 1"=1'-0"



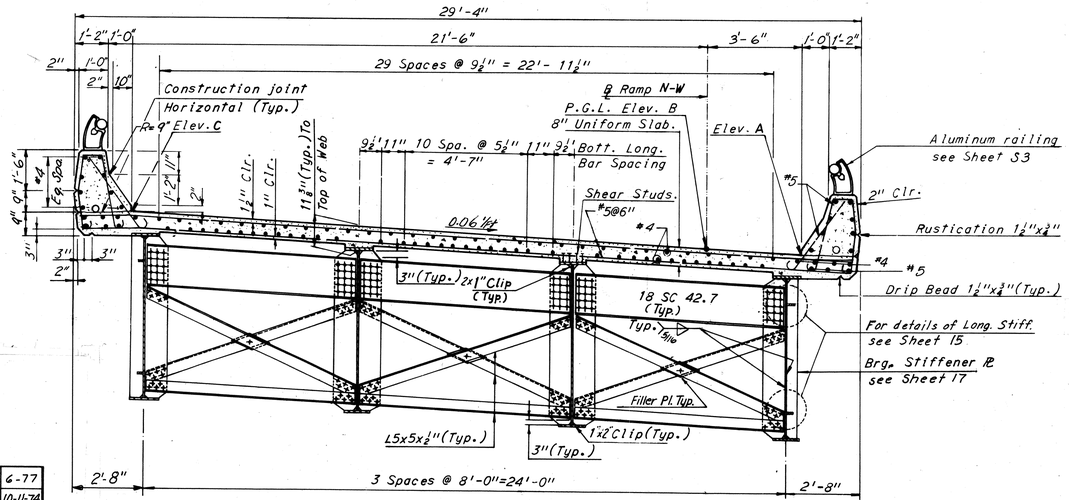
SECTION A-A

Scale: 1"=1'-0"



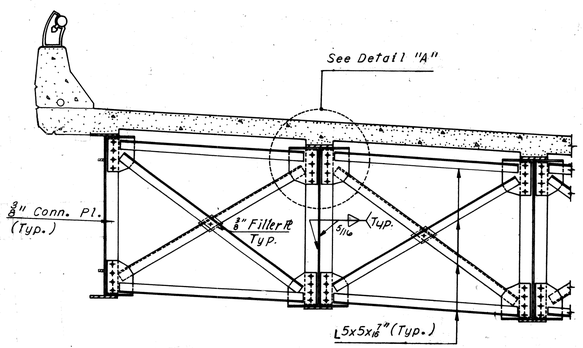
DETAIL A

Scale: 1"=1'-0"



TYPICAL SECTION—END DIAPHRAGM

Scale: ⅜"=1'-0"



INTERMEDIATE DIAPHRAGM

Scale: ⅜"=1'-0"

Notes:
For Joint Details, see Sheet 26.
For Framing Plan, see Sheet 17.
For Steel and Concrete Quantities, see Sheet 2.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 3 Sheet S6.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	MJC	8-13-68	2	As Built	TEM	6-77
CHECKED	G.C.C.	4-18-69	1	Changed Deck Elev.	EJM	10-11-74
IN CHARGE			1	Revised Fascia to Stringer Dimension	TEM	10-11-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

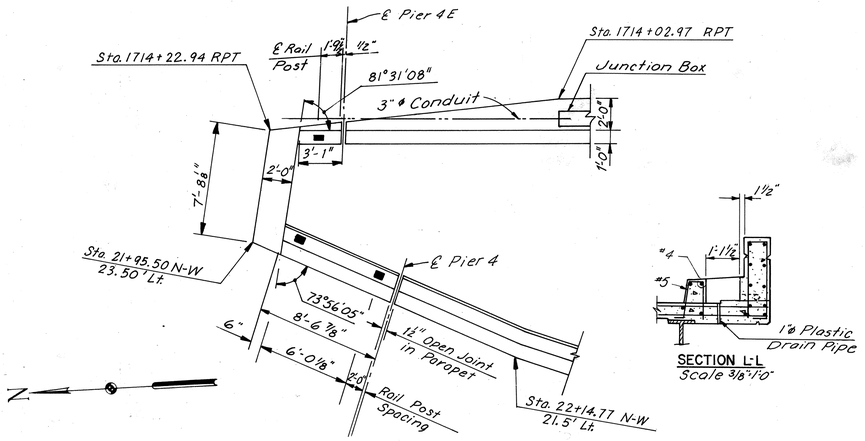
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

DECK PLAN - UNITS 9 AND 10

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

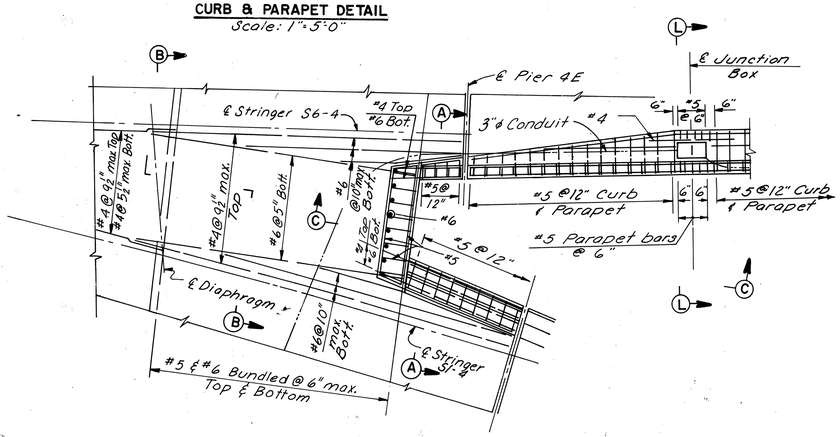
SCALE: As shown
CONTRACT NO.: 10
SHEET NO. 23 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	122	265

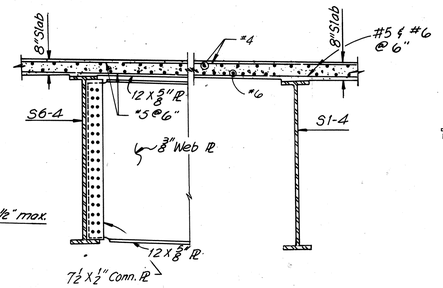


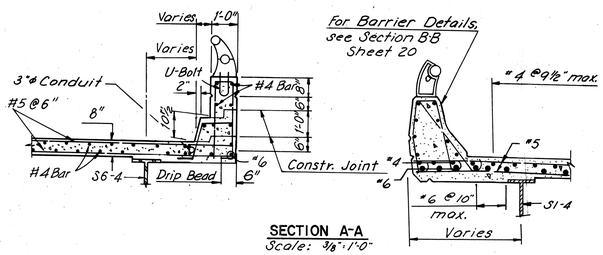
SECTION L-L
Scale 3/8"=1'-0"

CURB & PARAPET DETAIL
Scale: 1"=5'-0"



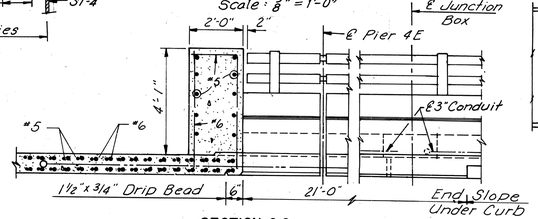
NOSE AND SLAB DETAIL
Scale: 1"=5'-0"



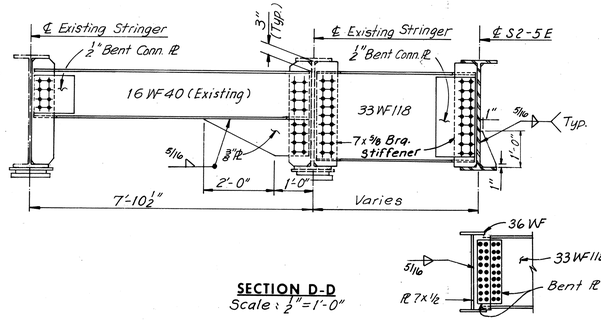


SECTION A-A
Scale: 3/8"=1'-0"

SECTION B-B
Scale: ⅜"=1'-0"

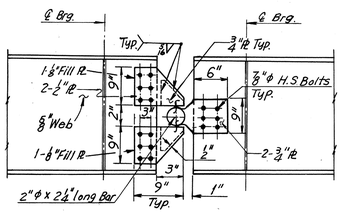


SECTION C-C
Scale 3/8"=1'-0"

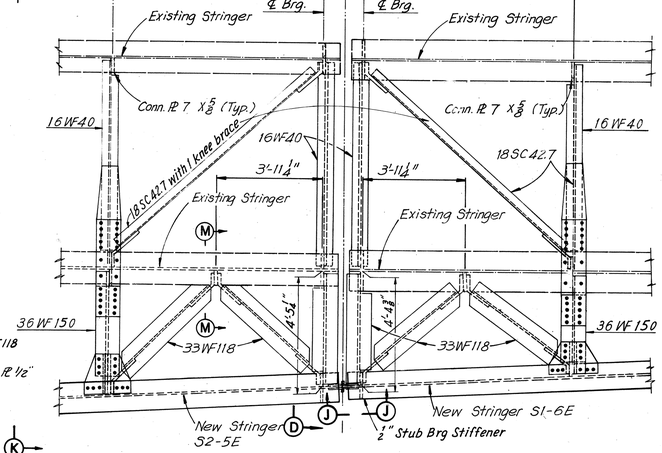


SECTION D-D
Scale: ½"=1'-0"

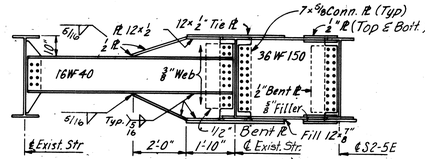
SECTION M-M
Scale: 3/8"=1'-0"



VIEW J-J
No Scale



DETAIL B
Scale: ⅜"=1'-0"



SECTION K-K
Scale: ⅜"=1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SCC K.C.T.	2.28.69 3.24.69	2	As Built	TEM	6-77
CHECKED	G.C.C.	4-2169	⚠	Unit 2 Details Deleted	TEM	10-74
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

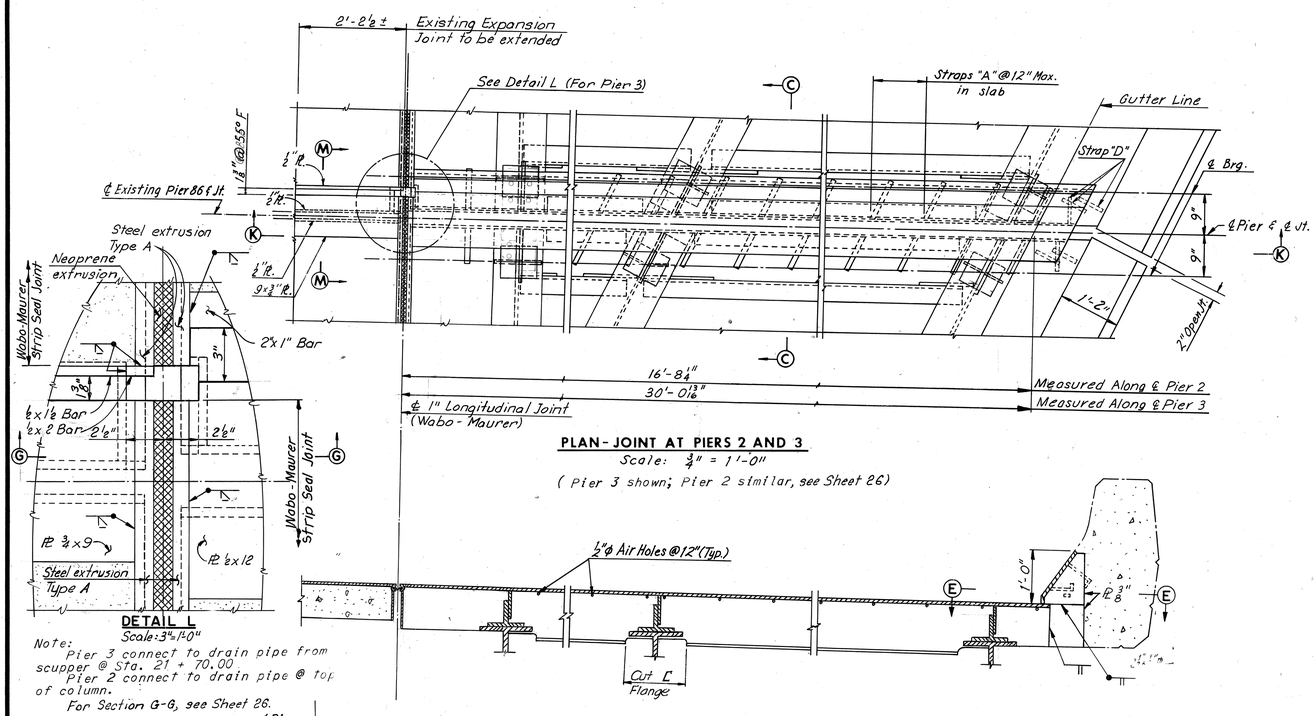
BRIDGE NO. 64
RAMP N-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

SUPERSTRUCTURE DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	123	265



PLAN - JOINT AT PIERS 2 AND 3
Scale: ¾" = 1'-0"
(Pier 3 shown; Pier 2 similar, see Sheet 26)

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

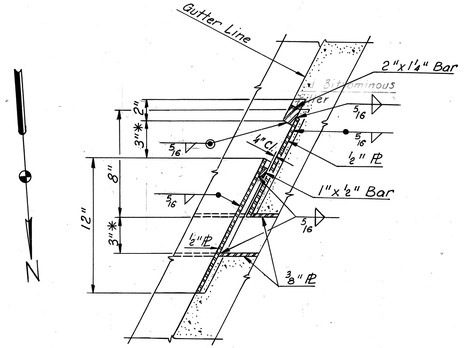
Note:
Pier 3 connect to drain pipe from scupper @ Sta. 21 + 70.00
Pier 2 connect to drain pipe @ top of column.
For Section G-G, see Sheet 26.

SECTION K-K
Scale: ¾" = 1'-0"

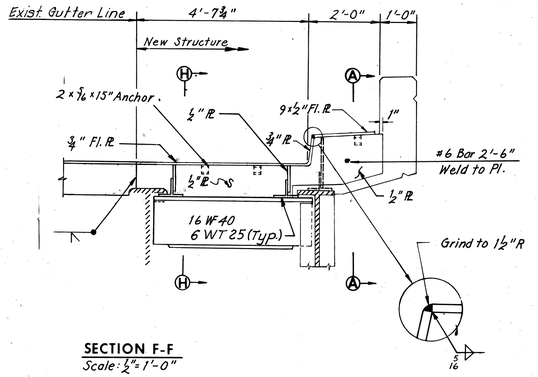
SECTION C-C
Scale: 1½"=1'-0"

Section above is shown for Pier 3. Section thru Joint @ Pier 2 is similar except for End Diaphragm in Unit #2, which consists of a ⅜"web Pl and a 4½"x⅝" Fl. Pl instead of 18SC42.7 as shown above

LEGEND
- ● Denotes transverse #5 Bar spaced as shown on Sheets 19 and 20.
- ○ Denotes transverse #6 Bar between stringers.
- ✱ Denotes dimension shown @ 60°F.

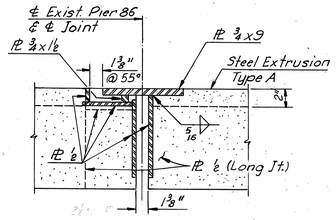


SECTION E-E
Scale: ½"=1'-0"

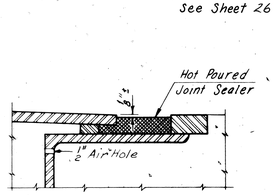


SECTION F-F
Scale: ½"=1'-0"

(For Location of Section F-F, See Sheet 26)

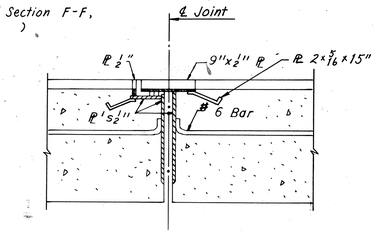


SECTION M-M
Scale: 1½"=1'-0"

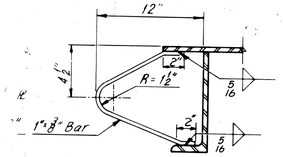


JOINT SEALER DETAIL
Scale: 3" = 1'-0"

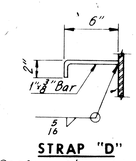
Note:
Throughly clean joint and fill with Hot Poured Joint Sealer. Trowel into curb joint.



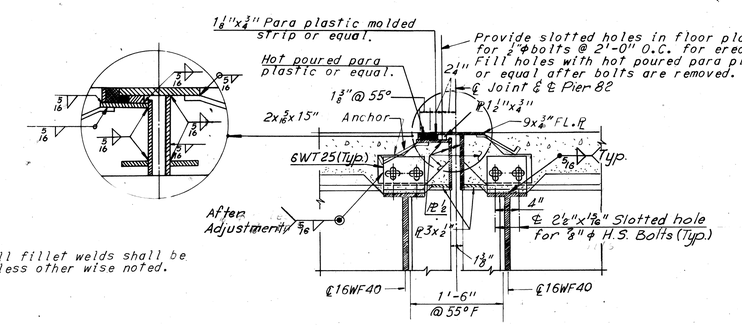
SECTION A-A
Scale: 1"=1'-0"



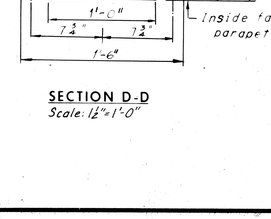
STRAP "A"
Scale: 1½" = 1'-0"



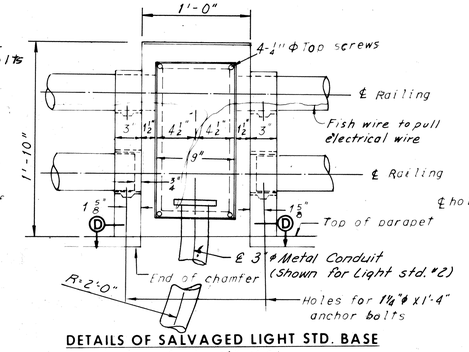
STRAP "D"
Scale: 1½" = 1'-0"



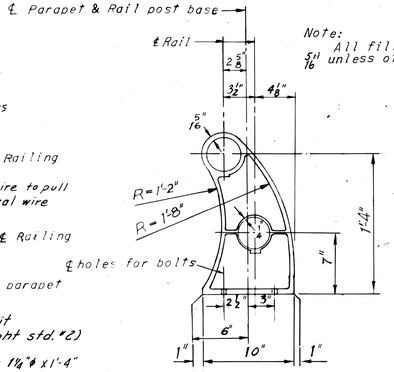
SECTION H-H
Scale: 1"=1'-0"



SECTION D-D
Scale: 1½"=1'-0"

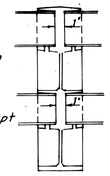


DETAILS OF SALVAGED LIGHT STD. BASE
Scale: 1½"=1'-0"



SALVAGED RAIL POST
Scale: 1½"=1'-0"

Note:
All fillet welds shall be 5/16 unless other wise noted.



Hand tighten north set screws at joint

Provide joint at every other post except end post.

TYPICAL JOINT
No Scale

Note
All metal work in joints is to be included in Superstr. A36 Str. Steel.

	BY	DATE
MADE	Y.C.P.	3-20-69
CHECKED	G.C.C.	4-21-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built TEM G-77		
1	Sect. G-G & Det. A moved to Sh. 26. Long. Jt. changed to Wabo-Maurer. Std'g Pl. Jt. Supports changed to 6 WT 25.	NLB	10-31-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

JOINT DETAILS

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

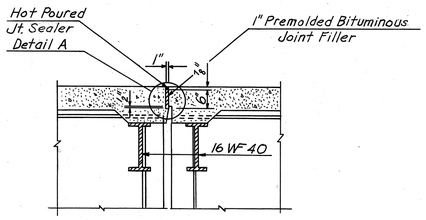
SCALE: As Noted
CONTRACT NO: 10
SHEET NO. 25 OF 28

AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	124	265

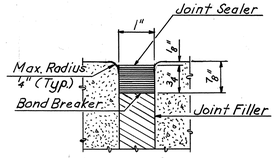
NOTES FOR FILLED JOINTS:

Joints shall be free of cracked and spalled areas and their faces shall be free of all foreign matter, curing compound, oils, greases and dirt. All faces must be sandblasted or brushed with a mechanical rotary wire brush, just prior to sealing, the joint shall be blown out with oil-free and water-free compressed air.

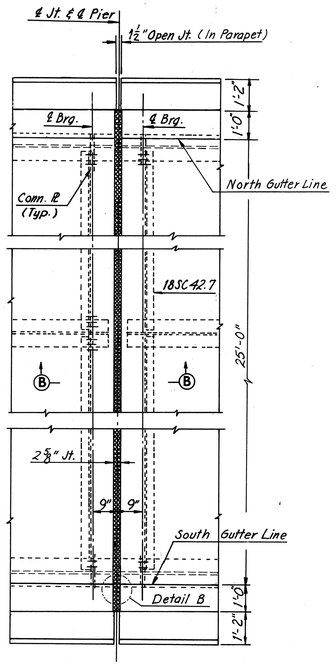


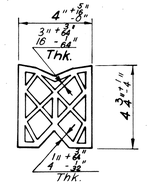
TYPICAL SECTION THRU 1" FIXED JOINT
Scale: 1½"=1'-0"

Note:
Joint filler material and copper flashing to be included in price bid for Superstr. Concrete

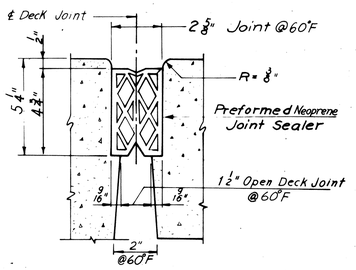


DETAIL A
No Scale



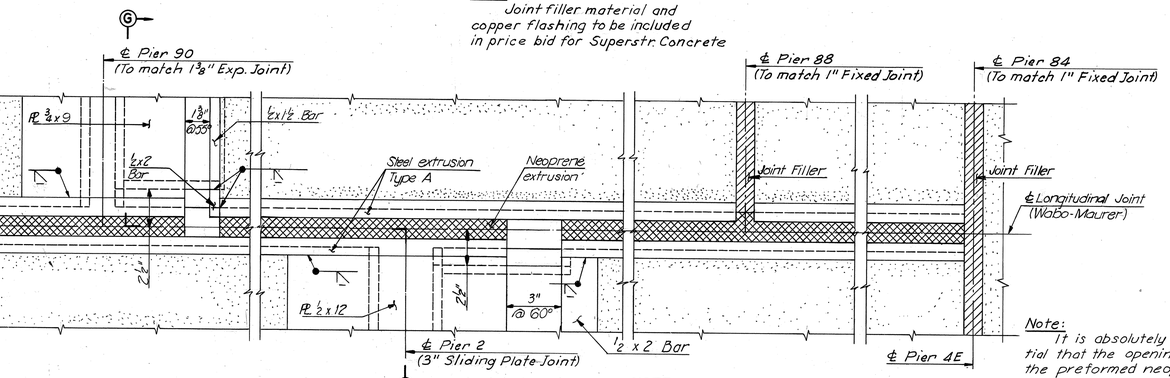


PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT



2⅝" TYPE "A" JOINT

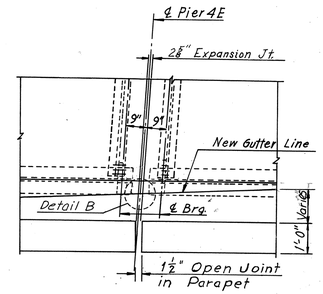
EXPANSION JOINT DETAILS

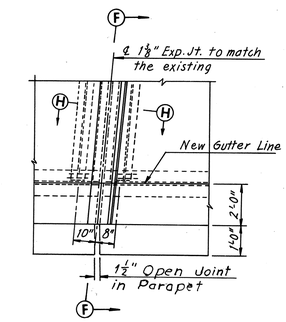


PLAN - LONGITUDINAL JOINT
Scale: 3"=1'-0"

NOTE:
For Plan of Pier 3 & existing Pier 86, see Sheet 25.

Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.





PLAN - JOINT AT PIERS 4,5,6,7,8 AND 9
Scale: ⅜" = 1'-0"

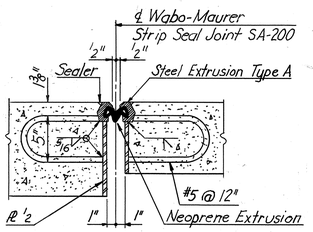
PLAN - JOINT AT PIER 4E
Scale: ⅜" = 1'-0"

PLAN - JOINT AT EXISTING PIER 82
Scale: ⅜" = 1'-0"
(For Section F-F & Section H-H, See Sheet 25)

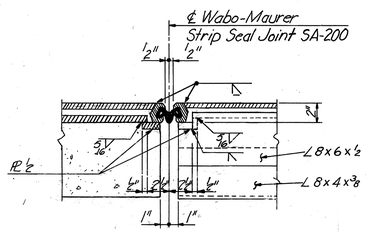
NOTES FOR WABO-MAURER JOINT:

Do not use steel extrusions as screed support.
Steel extrusion shall conform to ASTM A 36.
Structural steel shall conform to ASTM A 588.
Steel assembly shall be shop welded to convenient lengths and butt welded in the field to desired length. Joint shall conform to grade of deck slab.
Steel assembly shall be sandblasted in the shop prior to painting.
Steel assembly shall receive one shop coat of epoxy zinc paint.

Neoprene extrusion shall be roughened with a wire brush before bonding to steel extrusion with Bon Lastic Adhesive. Groove in steel extrusion to be blown out with oil-free and water-free compressed air prior to installation of Neoprene extrusion.
The Wabo-Maurer joint assembly shall be installed in accordance with manufacturer's recommended construction methods.

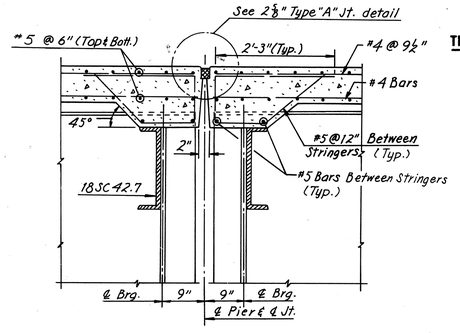


TYPICAL SECTION THRU WABO-MAURER JOINT
Scale: 1½"=1'-0"

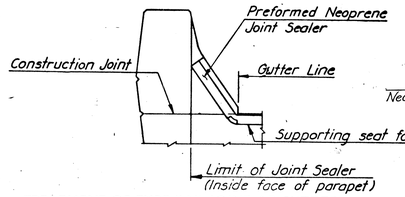


SECTION G-G
Scale: 1½"=1'-0"

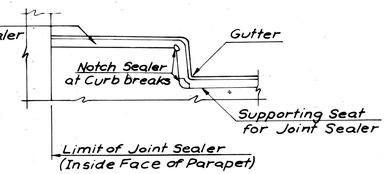
NOTE: Steel extrusion of Wabo-Maurer Joint to rest & Slide on Pℓ ½.
For location of Sect. G-G, see Plan-Long. Joint above & Detail L. Sheet 25.



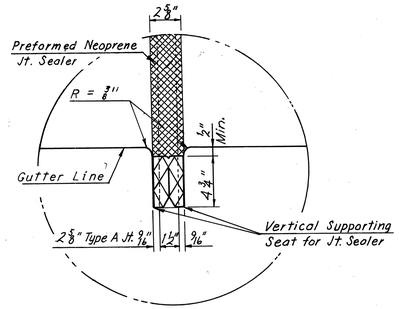
SECTION B-B
Scale: ¾"=1'-0"



TREATMENT OF TYPE "A" JOINT AT GUTTER
PIERS 4,5,6,7,8 AND 9
No Scale



TREATMENT OF TYPE "A" JOINT AT CURB
PIER 4E
No Scale



DETAIL B
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P.	3-18-69	2	As Built	TEM	6-77
CHECKED	G.C.C.	4-21-69	1	Notes, Typ. Sect thru Joint, Det. A, Typ. Sect. thru Wabo-Maurer joint, Sect. G-G add.	E.J.M.	10-31-74
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

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

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

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 26 OF 28

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

RICHMOND EXPRESSWAY SYSTEM
CONTRACT NO. PC – 2018
PROTECTIVE COATING OF STRUCTURES
****

Bridge 65

Downtown Expressway

Ramp S-W Connection from
Richmond - Petersburg Turnpike

RECORD SET PLANS (Next 38)

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	26	97

SOUTHBOUND ROADWAY

NORTHBOUND ROADWAY

RICHMOND PETERSBURG TURNPIKE

JAMES RIVER

SOUTHERN RAILROAD

PC Curve SW-1 @ Sta 6+86.04

Begin ℄ Ramp S-W Br. No. 65 @ Sta 6+86.04

Sta. 7+73.89

Sta 8+61.18

PC Curves SW-1 SW-2 @ Sta. 8+61.10

Sta 9+48.26

Sta. 10+02.63

Sta 10+71.80

℄ Sign Support Sta. 10+89.71

PC Curves SW-2 SW-3 @ Sta 10+99.24

Sta 11+80.50

Sta 12+69.70 ℄ Ramp S-W

Sta 1703+62.86 ℄ R.P.T.

℄ Scupper @ Sta. 1703+75.00

Energy Attenuator 8-Unit

Limit of Pavement removal

℄ Salvaged Lt Std #1 Sta 1703+76.03

℄ Light Std. Salvaged #2 Sta 1704+71.57

Temporary Inkid Traffic Barricade

℄ Light Std Sta 8+09.89

℄ Light Std @ Sta 9+34.77

℄ Light Std Sta. 10+57.03

℄ Light Std @ Sta 11+51.84

℄ Light Std @ Sta 12+39.32

℄ Light Std @ Sta 13+38.30

℄ Light Std @ Sta 14+08.00

℄ Light Std @ Sta 14+81.50

℄ Light Std @ Sta 15+30.00

Curve SW-1

Curve SW-2

Curve SW-3

℄ Ramp S-W

℄ Joint Sta. 11+80.50

East ℄ R.P.T.

Sta 12+42.33

Sta 12+89.60

Sta 13+23.00

Sta 13+65.91

PC Curve SW-3 @ Sta 13+65.91

Sta 14+50.00 @ Shift 18' R.P.T.

Sta 14+61.50 @ Ramp S-W

Sta 14+89.50

PC Curve SW-4 @ Sta 15+89.15

Sta 15+58.50

Sta 15+80.00

match line see Sheet 2

87'-7 7/8"

87'-5 5/8"

87'-0 3/8"

54'-4 1/2"

68'-10 7/8"

109'-0"

61'-10"

80'-8"

85'-0"

87'-0"

86'-6"

81'-6"

60'-6"

96" Combined Sewer

8"W

2" Oxygen

2" Acetylene

3 S METAL

OVERHANGING CRANE

PARKING AREA

WALL

Spline Grade

PVI Sta 16+25 El.=92.87

LVC=100'

+3.72%

-6.40%

+0.56%

LVC=350'

LVC=200'

PVI Sta 13+00 El.=80.78

PVI Sta 24+34.80 El.=72.52

+0.84%

-1.12%

PVI Sta 20+00 El.=68.87

LVC=100'

P.T. Sta. 23+43.20 Ramp S-W (Br. 65)

P.O.T. Sta. 345+16.60 Ramp W-S (Br. 68)

UNIT 1 UNIT 2 UNIT 3 UNIT 4 UNIT 5 UNIT 6 UNIT 7 UNIT 8 UNIT 9 UNIT 10 UNIT 11

INDEX

PLAN

PROFILE GRADE DATA

Total length along ℄ Ramp S-W = 1,890'-9"

Along ℄ Ramp S-W

℄ Existing Pier 41 Sta 6+86.09 (Ramp S-W)

Begin ℄ Ramp S-W @ Sta 6+86.04 (Ramp S-W) = 1697+68.33 (R.P.T)

℄ Pier 1 ℄ Pier 2 ℄ Pier 3 ℄ Pier 4 ℄ Pier 5 ℄ Pier 6 ℄ Pier 7 ℄ Pier 8 ℄ Pier 9 ℄ Pier 10 ℄ Pier 11

Approximate Mud line

Approximate Rock line

El - 8.0 El - 15.12

El -9.00 El -15.84

El -9.00 El -16.53

El. 3.50

Pile Tip @ El. -20.00

El. 16.00

Pile Tip @ El. -22.00

El. 13.50

El. 13.00

El. 12.50

El. 12.50

Pile Tip @ El. -20.00 Typ. Piers 6 thru 15

El. 7.00

El. -0.50

Approximate Mud line

El. 4.50

El. -5.00

ELEVATION

Notes:
For General Plan and Elevation Units 12 thru 20 see Sheet 2.
For Layout of Ramp S-W, see Sheets 3 and 4.
For Estimated Quantities, see Sheet 4.
For Boring Logs, see Sheets 36 thru 38.
For General Notes, see Sheet 4.

Substructure Note: Footings for Piers 1, 2 and 3 shall be founded on concrete seals socketed 1'-0" into solid rock.

Finished Ground line

2'-0" Min.

18" Typ all sides

LIMITS OF STRUCTURE EXCAVATION

no scale

NO.	REVISION	BY	DATE
20a	Sheet 20a Added	TEM	9-9-75
	Profile Ramp W-S	TEM	9-8-75
	Limit of pavement removal & Sheet 17A added	G.B.P.	8-25-75

	BY	DATE
MADE	J.V. JLK	4-28-69 6-25-75
CHECKED	V.C.P. D.W.B.	5-28-69 7-7-75
IN CHARGE		

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

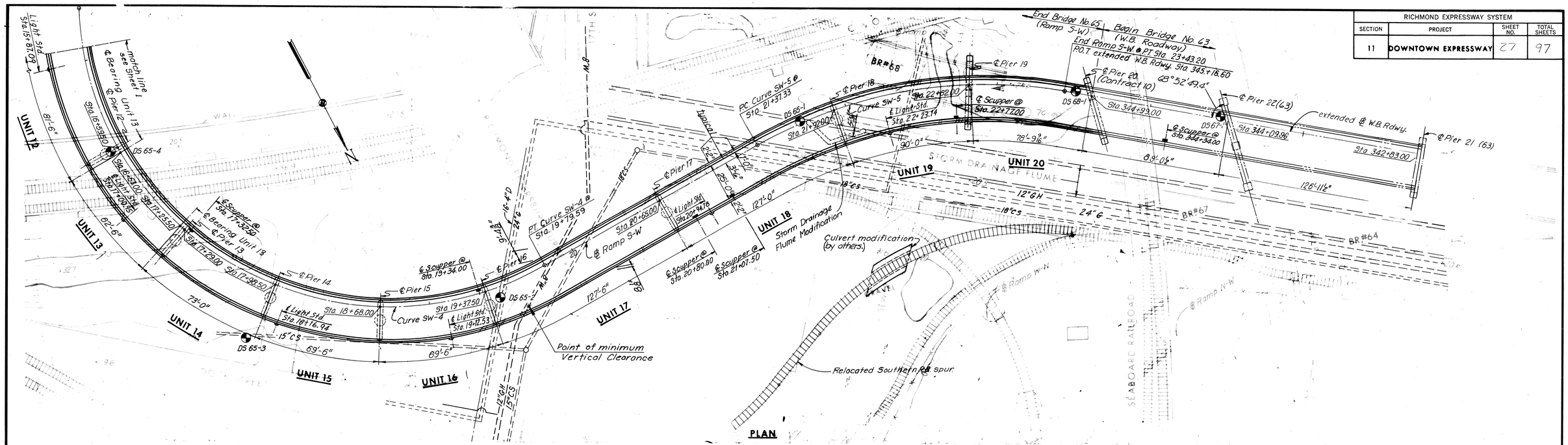
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

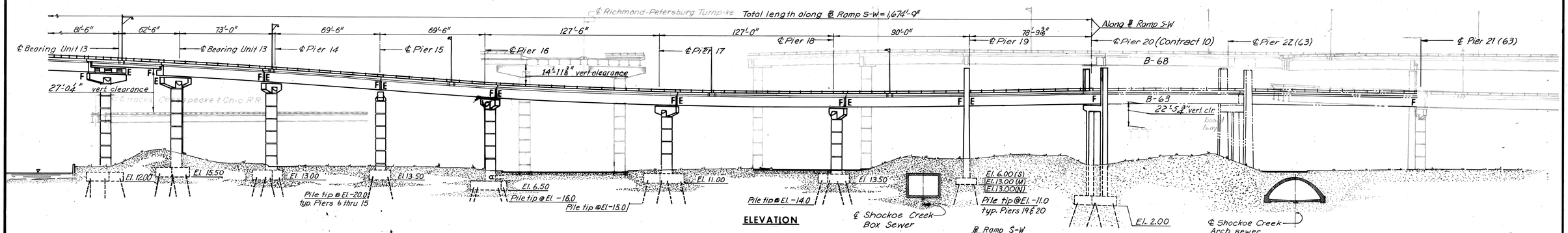
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=30'-0"
CONTRACT NO. 11
SHEET NO. 1 OF 38

26

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	27	97





ELEVATION

℄ Ramp S-W

Curve: SW-1

P.I.	= Sta. 7+73.58
Δ	= 1°45'02"
D	= 1°00'
T	= 87.53'
L	= 175.05'
R	= 5,729.58'

Curve: SW-2

P.I.	= Sta. 9+80.19
Δ	= 2°24'12"
D	= 1°00'33"
T	= 119.09'
L	= 238.14'
R	= 5,677.58'

Curve: SW-3

P.I.	= Sta. 12+36.15
Δ	= 32°00'00"
D	= 12°00'
T	= 136'91'
L	= 266.67'
R	= 477.47'

Curve: SW-4

P.I.	= Sta. 18+95.05
Δ	= 116°25'03"
D	= 28°27'51"
T	= 325.90'
L	= 410.44'
R	= 202.00'

Curve: SW-5

P.I.	= Sta. 22+44.51
Δ	= 39°19'04"
D	= 19°05'55"
T	= 107.17'
L	= 205.87'
R	= 300.00'

℄ Richmond-Petersburg Turnpike

Curve: R.P.T.-1

P.I.	= Sta. 1704+68.83
Δ	= 15°03'56"
D	= 1°00'
T	= 757.65'
L	= 1,506.56'
R	= 5,729.58

Curve: R.P.T.-2

P.I.	= Sta. 1723+07.01
Δ	= 33°27'07"
D	= 4°00'
T	= 430.45'
L	= 836.30'
R	= 1,432.39'

HORIZONTAL CURVE DATA

Notes:
For General Plan and Elevation Units 1 thru 11, see Sheet 1.
For Layout of Ramp S-W, see Sheets 3 and 4.
For Estimated Quantities, see Sheet 4.
For Boring Logs, see Sheets 34 thru 38.
For General Notes, see Sheet 4.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.V.	4-2-69				
CHECKED	Y.C.P.	5-28-69				
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

GENERAL PLAN AND ELEVATION

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

SCALE: 1"=30'-0"
CONTRACT NO. 11
SHEET NO. 2 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	28	97

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H. / J.L.K.	3-28-69 / 6-25-75				
CHECKED	K.C.T. / D.W.B.	5-7-69 / 7-7-75				
IN CHARGE						

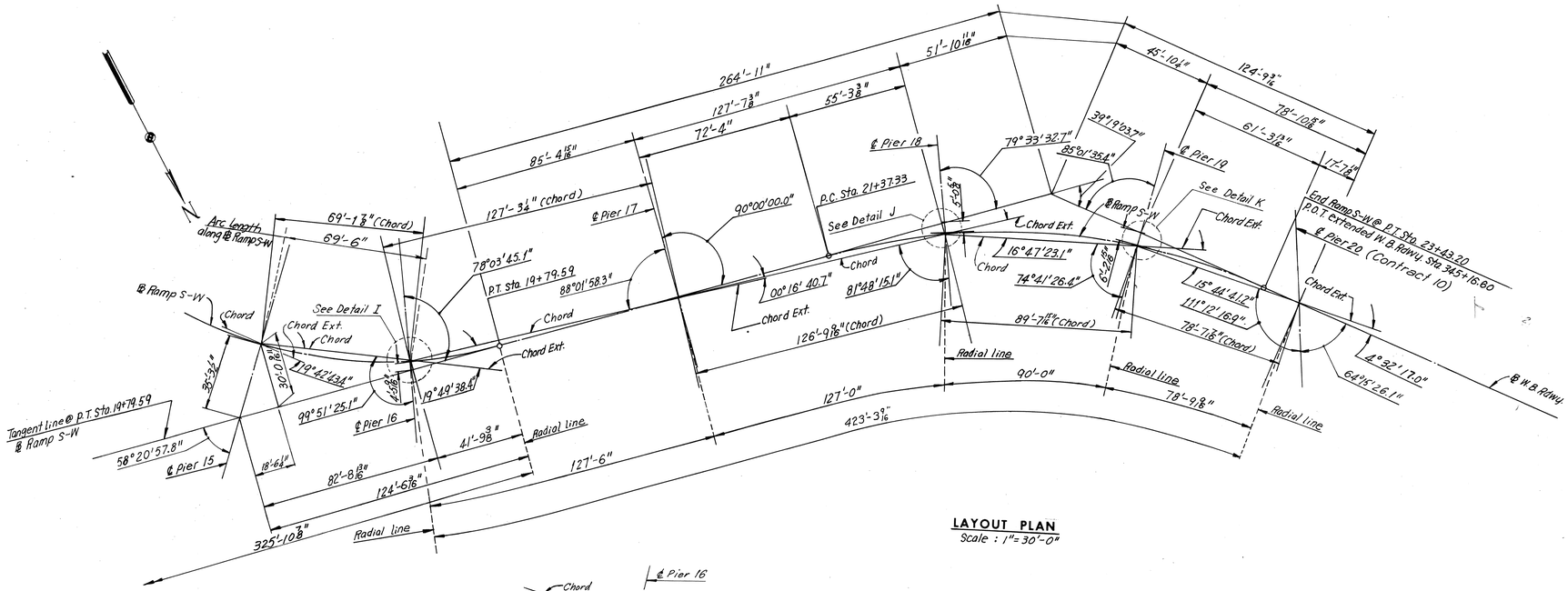
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
LAYOUT

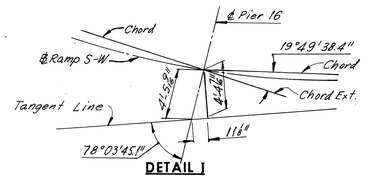
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 3 OF 38

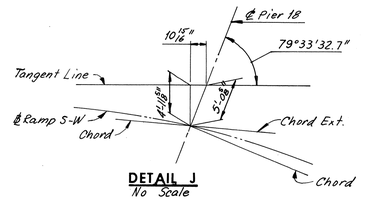
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	29	97



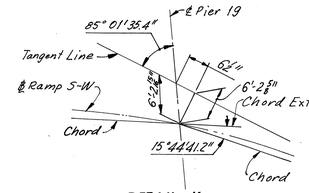
LAYOUT PLAN
Scale : 1"=30'-0"



DETAIL I



DETAIL J
No Scale



DETAIL K
No Scale

ESTIMATED QUANTITIES

	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (1-Rail) Lin. Ft.	Steel Piles 10BP42 Lin. Ft.	Steel Piles 12BP53 Lin. Ft.
Superstructure	---	1454.8	340,730	1,074,600	476,400	2,820	---	---
Substructure	2,741 *	2,702.8	386,910	15,100	12,000	---	1,152	7,497
Total	2,741 *	4157.6 ‡	727,640	1,089,700	488,400	2,820	1,152	7,497

	Temporary Barricade Lin. Ft.	Tremie Concrete Class T3 Cu. Yds.	Metal Conduit Lin. Ft.	Energy Attenuator 8-Unit Each	Modifications to R.P. Turnpike Bridge Lump Sum	Bridge Drainage Metal Work Lbs.	Modifications to Storm Drain. Flume Cu. Yds.	Pipe Support @ Pier 16 Lump Sum
Superstructure		---	1800	1	1	19,960	---	---
Substructure		472.6	---	---	---	---	48	1
Total	840	472.6	1800	1	1	19,960	48	1

* Including 757 Cu. Yds. of "Underwater" Excavation for Piers 1, 2, 3, 10 and 11.

‡ All Concrete for Superstructure shall be Class A4 and for Substructure Class A3. Concrete for footing seals shall be Tremie Concrete Class T3 and is listed separately.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H	3-28-69	3	Conc. & Reinf. Quant.	TEM	9-7-76
CHECKED	K.C.T.	5-7-69	2	Layout Dim. and ℄ at Pier 16	TEM	7-76
IN CHARGE			1	Concrete & Strug. Steel Quan.	TEM	8-75

GENERAL NOTES :

ROADWAY : One 25'-0" clear roadway transitioning into a 13'-6" widening of existing Richmond-Petersburg Turnpike.

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

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

DATUM : City of Richmond

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

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

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

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

Concrete: Concrete in superstructure shall be Class A4. All other concrete shall be Class A3 except that footing seals shall be Tremie Concrete Class T3 as indicated on the detailed drawings. All exposed edges and corners shall have a 2" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces : See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing steel shall be deformed bars conforming to ASTM A615 Grade 40. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face of concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted.

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

AS BUILT

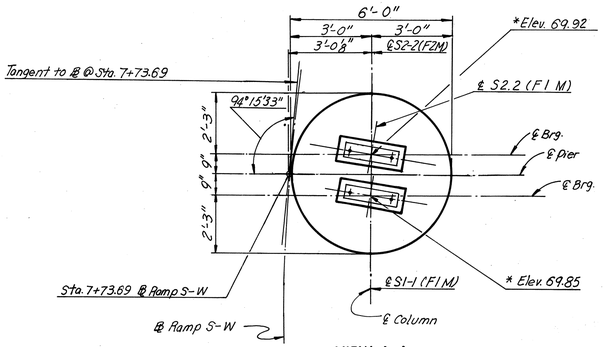
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
LAYOUT

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

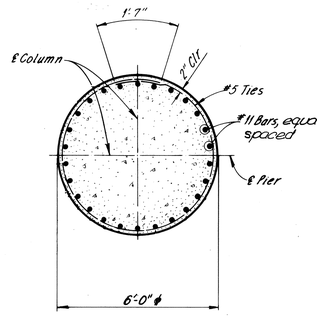
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 4 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	30	97

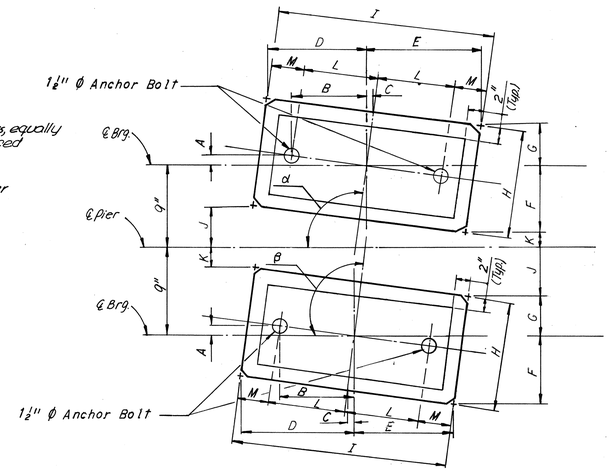


VIEW A-A
Scale : ⅜" = 1'-0"

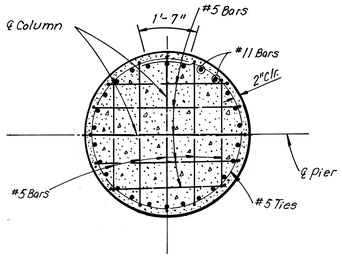
* Denotes top elevations of pad.



SECTION C-C
Scale: ⅜" = 1'-0"

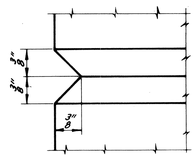


PAD AND ANCHOR BOLT SETTING PLAN
No Scale

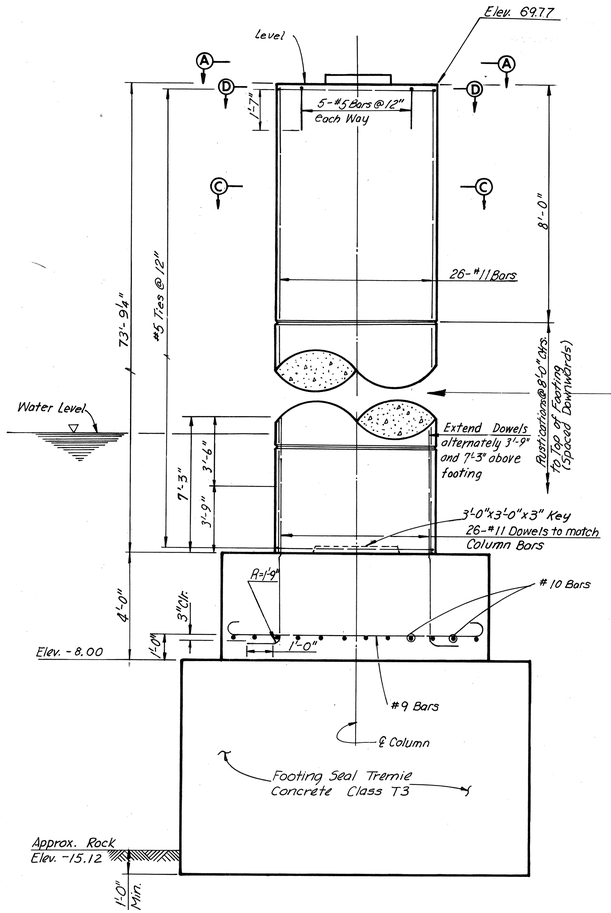


SECTION D-D
Scale : ⅜" = 1'-0"

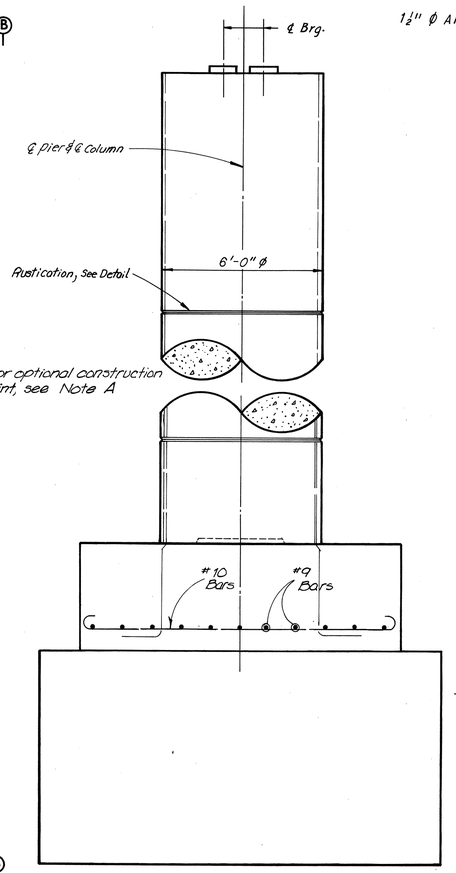
DIMENSIONS FOR PAD ANCHOR BOLT SETTING PLAN														
Stringer	d	B	A	B	C	D	E	F	G	H	I	J	K	L	M
S1-1	—	92°00'58"	5/16"	8"	3/16"	12 11/16"	12 5/16"	6 3/16"	5 5/16"	11½"	2'-1"	3 11/16"	2 13/16"	8"	4½"
S2-2	94°41'20"	—	5/8"	8"	½"	12"	12 15/16"	6 3/4"	4 11/16"	11½"	2'-1"	4 5/16"	2¼"	8"	4½"



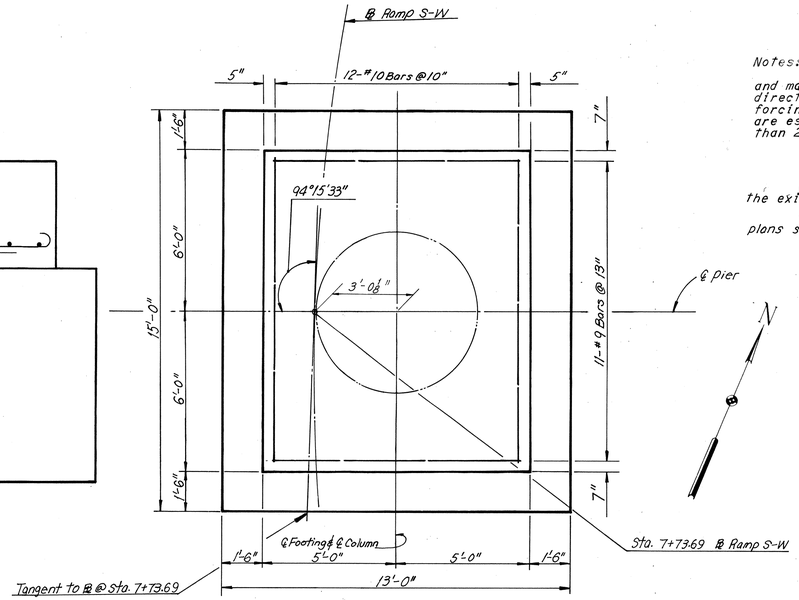
RUSTICATION DETAIL
Full Scale



ELEVATION PLAN
Scale : ⅜" = 1'-0"



VIEW B-B
Scale : ⅜" = 1'-0"



FOOTING PLAN
Scale : ⅜" = 1'-0"

Notes:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.
For Standard Shoe Details, see Sheet S1 & S2.
For Framing Plan, see Framing Plan Sheets 18.
For Quantities of Steel and Concrete, see Sheet 4.
Overexcavation will not be permitted between the existing pier and new pier.
Pier 1 is to match existing Pier 43. Station shown on plans shall be verified by the Contractor in the field.

	BY	DATE				
MADE	G.S.H. / J.L.K.	2-10-69 / 6-25-75	2	Pad Elev Shoe Type & Anchor Bolt set. Dim.	T.E.M.	4-76
CHECKED	K.C.F.	2-18-69	1	Pad Elev., Str. no. & column height	T.E.M.	9-5-75
IN CHARGE			NO.	REVISION	BY	DATE

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 31'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

AS BUILT

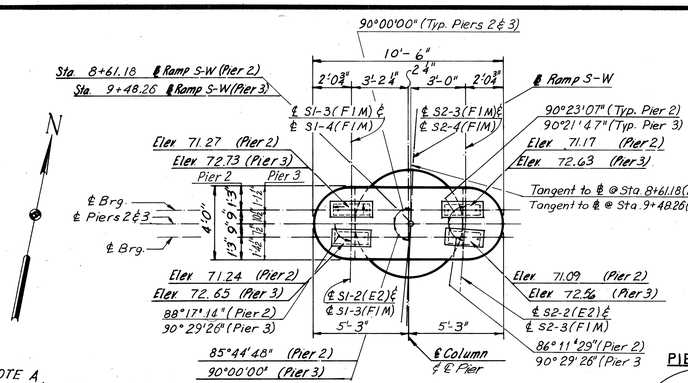
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 1

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

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 5 OF 38

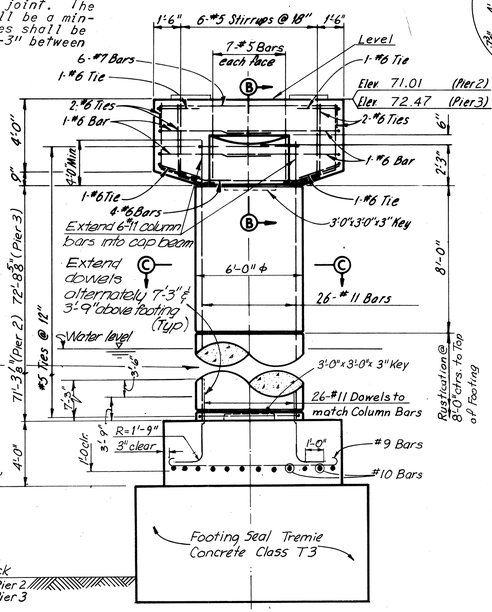
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	31	97



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

PIER CAP PLAN-PIERS 2 AND 3

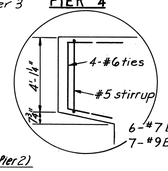
Scale: 1/4"= 1'-0"



ELEVATION- PIERS 2 AND 3

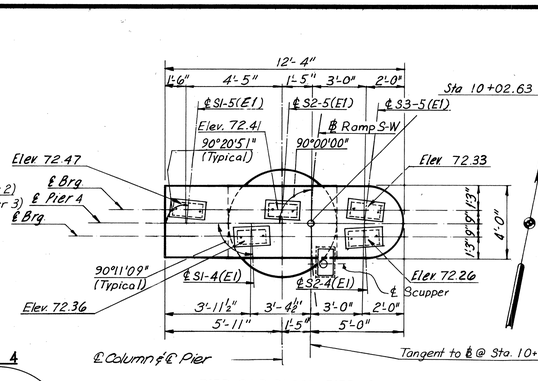
Scale: 1/4"= 1'-0"

PIER 4



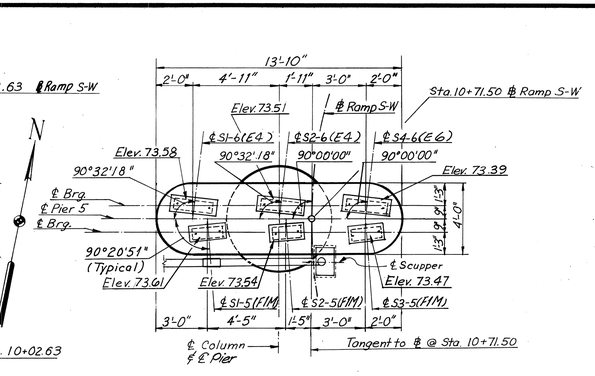
PIER CAP PLAN- PIER 4

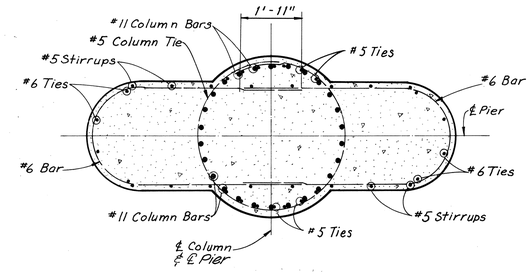
Scale: 1/4"=1'-0"



PIER CAP PLAN - PIER 5

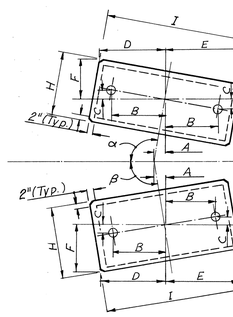
Scale: 1/4"=1'-0"





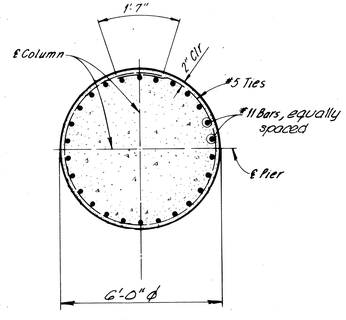
TYPICAL SECTION THRU CAP BEAM

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



VIEW E-E

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



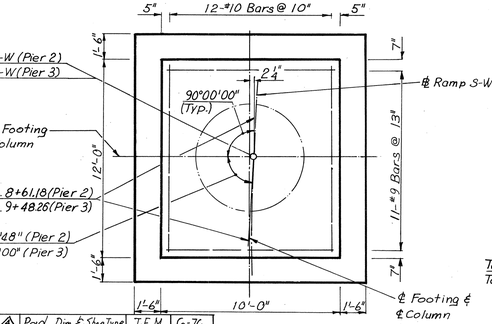
SECTION C-C

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

PAD AND ANCHOR BOLT SETTING PLAN

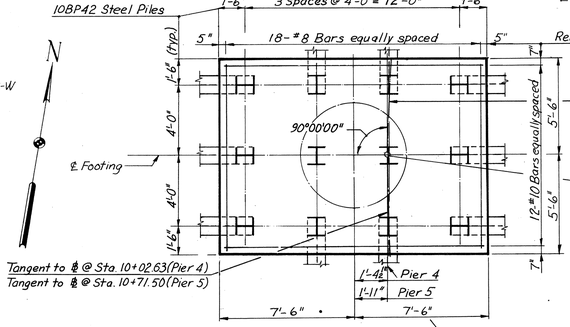
No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN												
Pier	Stringer	α	β	A	B	C	D	E	F	G	H	I
2	S1 & S2-3	90°29'26"	-	1/16"	8"	1/16"	12 7/16"	12 9/16"	5 3/8"	5 3/8"	11 1/2"	2'-1"
2	S1-2	-	88°17'14"	1/4"	8 1/4"	1/4"	12 7/16"	12 9/16"	6 3/8"	6 3/8"	1'-1"	2'-0 1/2"
2	S2-2	-	86°11'29"	5/16"	8 1/4"	9/16"	12 5/8"	11 13/16"	5 11/16"	7 1/16"	1'-1"	2'-0 1/2"
3	S1 & S2-4	90°21'47"	-	1/16"	8"	1/16"	12 1/16"	12 1/16"	5 1/16"	5 1/16"	11 1/2"	2'-1"
3	S1 & S2-3	-	90°29'26"	1/4"	8"	1/16"	12 1/16"	12 3/16"	5 3/8"	5 3/8"	11 1/2"	2'-1"
4	S1, S2 & S3-5	90°20'51"	-	1/16"	8 1/4"	1/16"	12 3/16"	12 5/16"	6 1/16"	5 13/16"	1'-0"	2'-0 1/2"
4	S1 & S2-4	-	90°11'09"	1/16"	8 1/4"	1/16"	12 1/4"	12 1/4"	6 1/16"	5 11/16"	1'-0"	2'-0 1/2"
5	S1 & S2-6	90°32'18"	-	1/16"	10 1/2"	0"	14 1/16"	14 3/16"	6 3/8"	6 3/8"	1'-0 1/2"	2'-5"
5	S4-6	90°00'00"	-	0"	11 1/4"	0"	15 1/4"	15 1/4"	6 1/4"	6 1/4"	1'-0 1/2"	2'-6 1/2"
5	S1, S2 & S3-5	-	90°20'51"	1/16"	8"	1/16"	12 1/16"	12 1/16"	5 1/16"	5 1/16"	11 1/2"	2'-1"



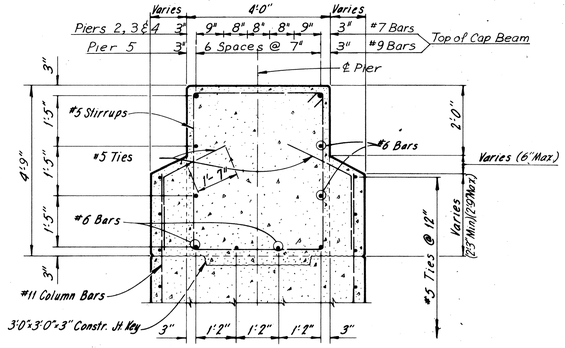
FOOTING PLAN- PIERS 2 AND 3

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



FOOTING PLAN- PIERS 4 AND 5

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



SECTION B-B

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

Col. Reinf. Impediment	TEM	9-30-76
	BY	DATE
MADE	J.D. J.L.K.	2-6-89 6-25-75
CHECKED	G.S.H.	2-20-89
IN CHARGE		

NO.	REVISION	BY	DATE
3	Pad Dim. & Shoe Type	T.E.M.	6-76
2	Pad Elev.	TEM	5-76
1	Pad Elev. Shoe Type & Anchor Bolt set. Plan	TEM	4-76
1	Pad Elev. & Col. Dim.	TEM.	9-8-75

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

AS BUILT

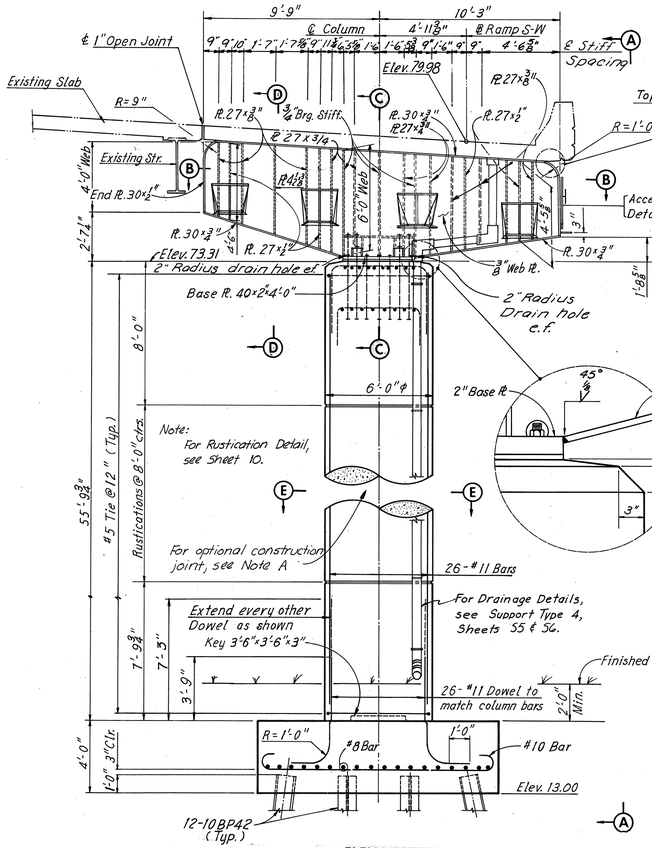
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 2, 3, 4 AND 5

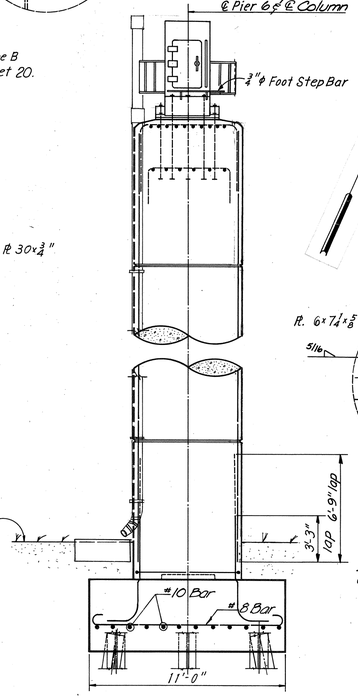
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 6 OF 38

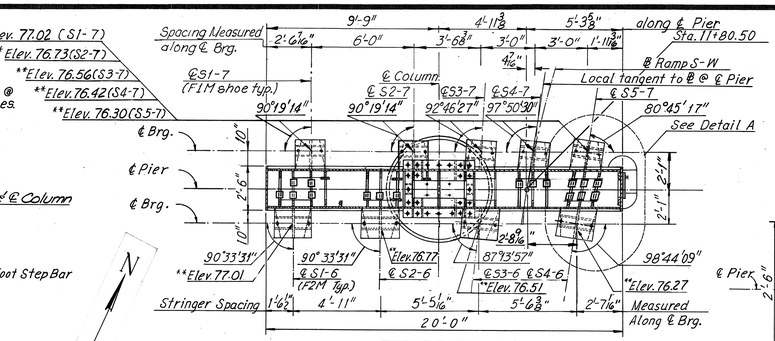
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	32	97



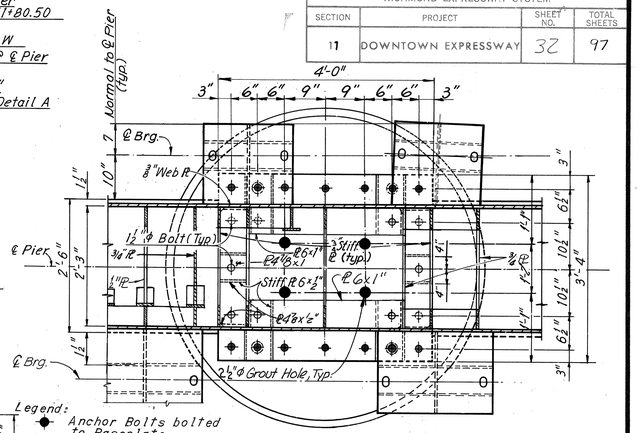
ELEVATION
Scale: ¼"=1'-0"



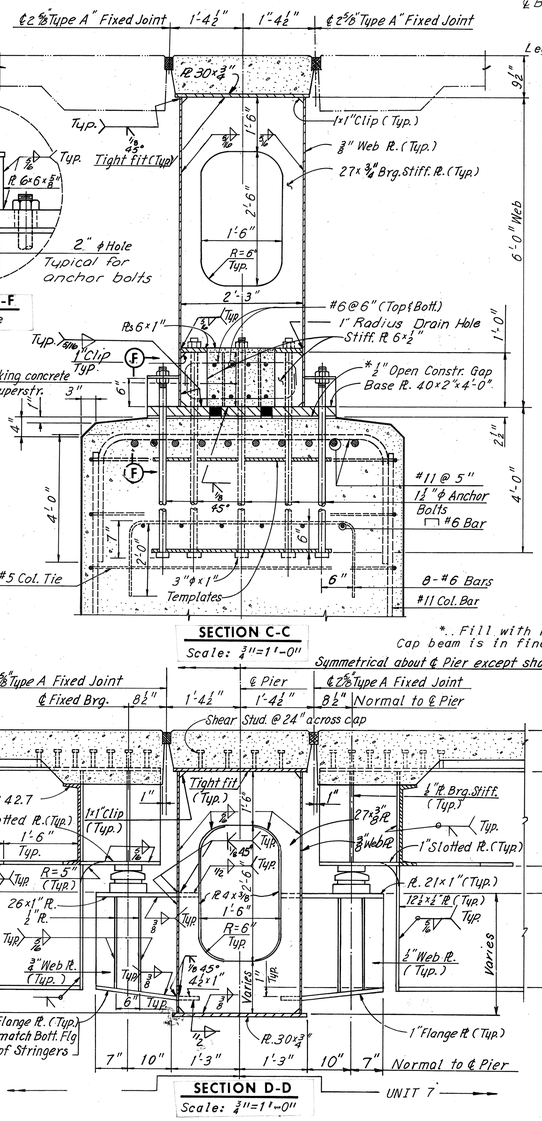
VIEW A-A
Scale: ¼"=1'-0"



SECTION B-B
Scale: ¼"=1'-0"

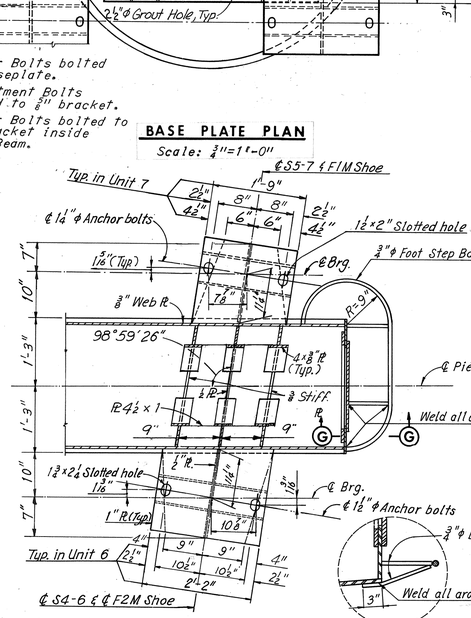


Legend:
- Anchor Bolts bolted to Baseplate.
- Adjustment Bolts bolted to ⅜" bracket.
- Anchor Bolts bolted to 1" bracket inside Cap Beam.



SECTION F-F
No Scale

SECTION C-C
Scale: ¾"=1'-0"



DETAIL A
Scale: ¾"=1'-0"

SECTION G-G
No Scale

BASE PLATE PLAN
Scale: ¾"=1'-0"

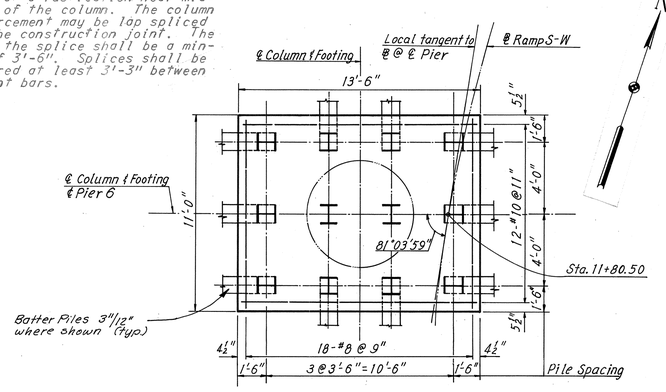
*. Fill with nonshrinking Grout after Cap beam is in final position.

Notes:
For Joint Details see Sheet 34 and 35.
For Shear Stud Details see Sheet 20.
For Shoe Details see Sheet S1 and S2.
For Bearing Pile Details see Sheet 9.

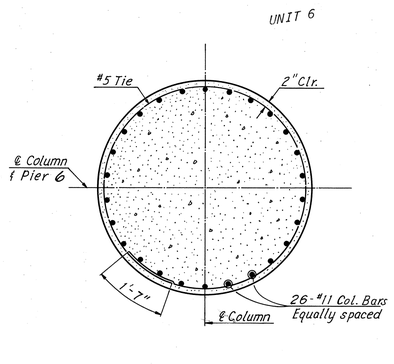
Estimated Pile tip Elevation =-20.0
All piles shall be 10BP42 (Design capacity = 45 tons).

Note:
All anchor bolts connecting cap beam to column shall be 1½" in Dia. and each nut shall have washer (not shown on details)

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



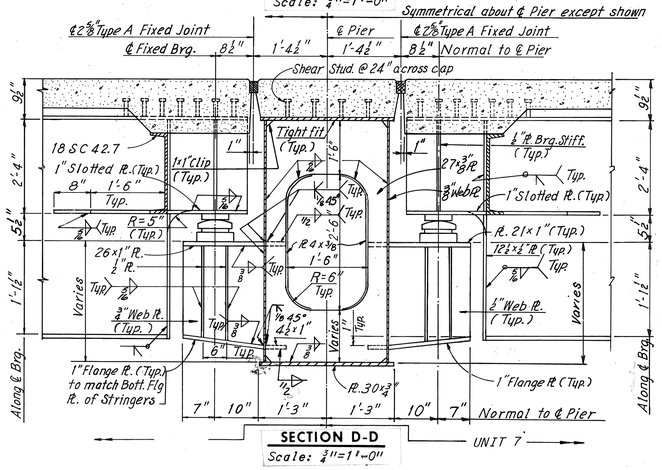
FOOTING PLAN
Scale: ¼"=1'-0"



SECTION E-E
Scale: ½"=1'-0"

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

Note:
All Structural Steel for Pier 6 shall be A36.
Top of cap beam, Pier 6, need not be cambered.



SECTION D-D
Scale: ¾"=1'-0"

	BY	DATE
MADE	K.C.T. J.L.K.	8-13-69 6-25-75
CHECKED	S.C.C.	5-27-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	Shoe Plate Dim. in Detail A	T.E.M.	8-76
2	Pier Cap Dim.	T.E.M.	3-76
1	Pad Elev. & Col. Dim.	T.E.M	9-8-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 6

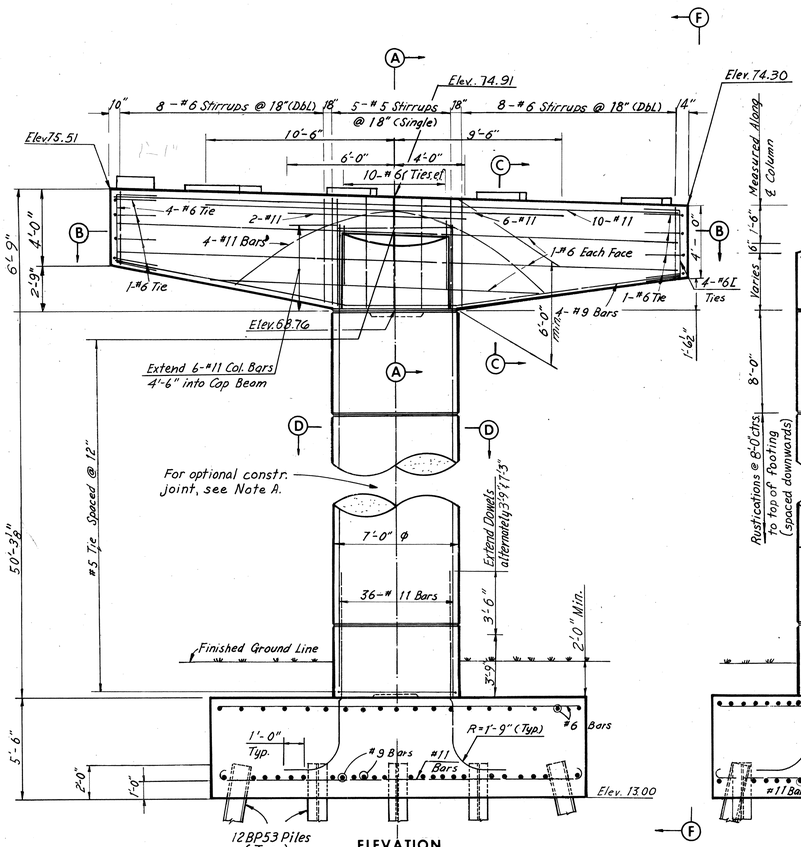
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 7 OF 38

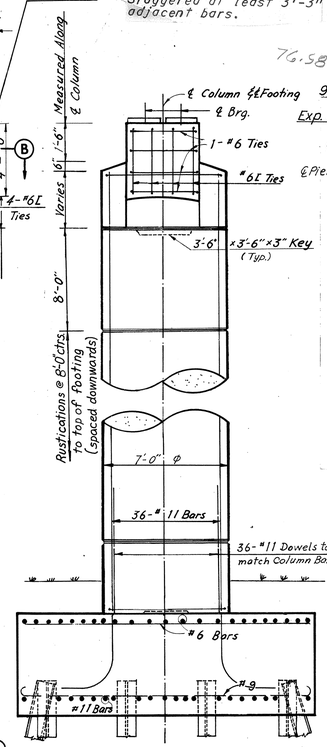
32

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	33	97

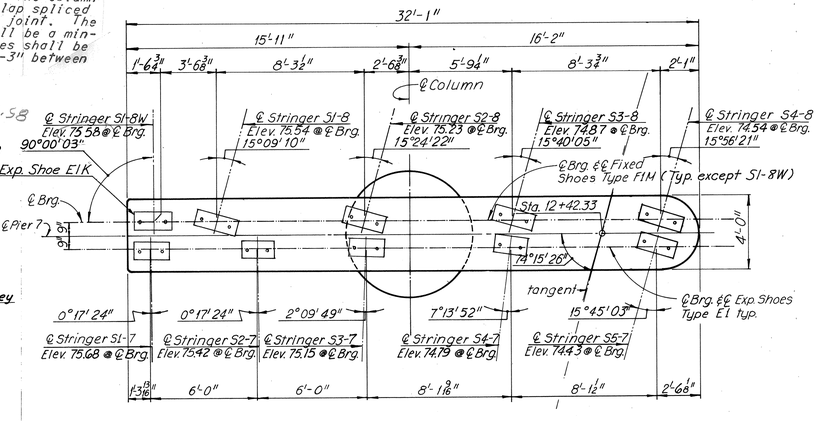
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



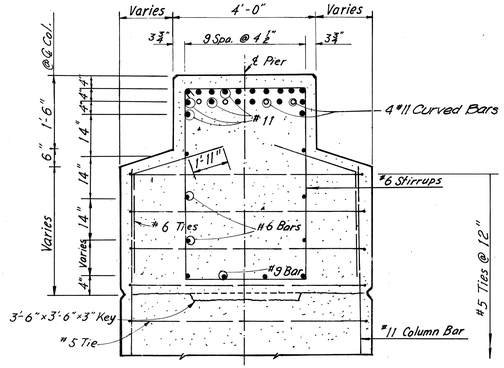
ELEVATION
Scale: 1/4"=1'-0"



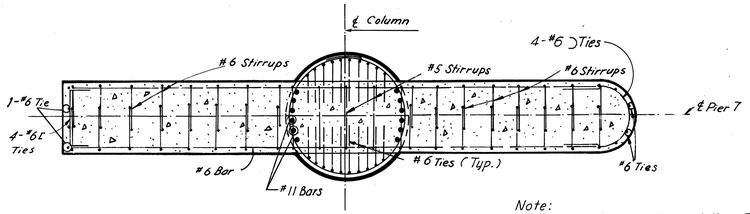
VIEW F-F
Scale: 1/4"=1'-0"



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

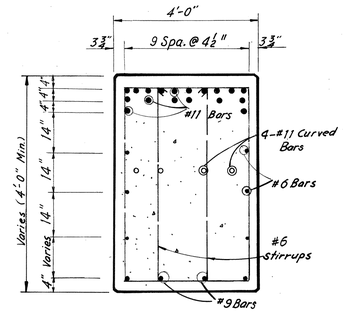


SECTION A-A
Scale: 1/2"=1'-0"

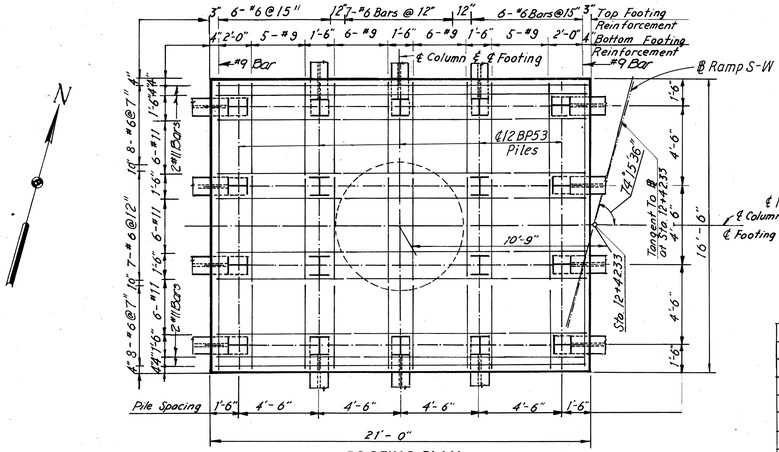


SECTION B-B
Scale: 1/4"=1'-0"

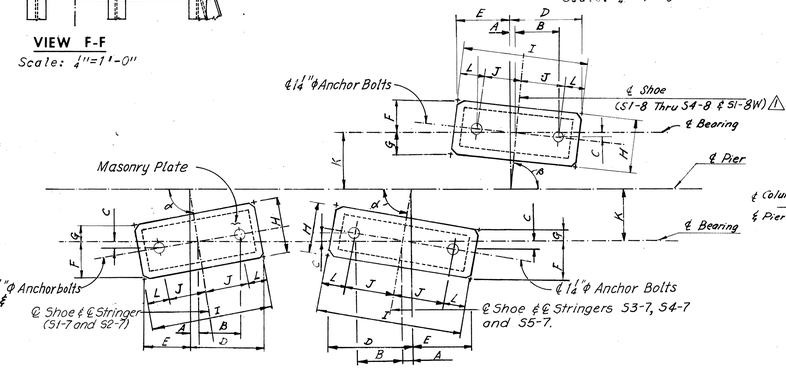
Note:
Pier 7 is to match existing Pier 55. Station shown shall be verified by the Contractor in the field.



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



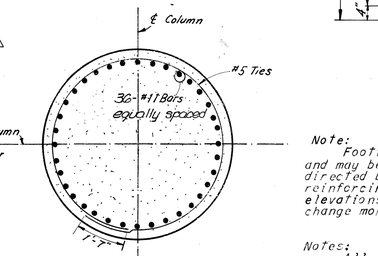
FOOTING PLAN
Scale: 1/4"=1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS OF ANCHOR BOLT SETTING PLAN

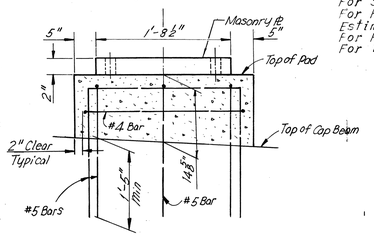
Stringer	α	β	A	B	C	D	E	F	G	H	I	J	K	L
S1-7	90°17'24"	--	1 1/16"	8 1/4"	1 1/16"	1'-0 5/16"	1'-0 3/16"	6 1/16"	5 5/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S2-7	90°17'24"	--	1 1/16"	8 1/4"	1 1/16"	1'-0 5/16"	1'0 3/16"	6 1/16"	5 5/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S3-7	87°50'11"	--	1 5/16"	8 1/4"	1 5/16"	1'-0 13/16"	11 11/16"	6 1/16"	5 7/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S4-7	82°46'08"	--	1 1/16"	8 3/16"	1 1/16"	1'-2 1/16"	10 1/16"	7 1/16"	6 1/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S5-7	74°14'57"	--	2 3/16"	7 15/16"	2 1/16"	1'-3 13/16"	7 5/8"	9 1/16"	2 5/16"	1'-0"	2'-0 1/2"	8 1/4"	9"	4"
S1-8	--	74°50'50"	2 1/16"	10 1/16"	2 3/16"	1'-6 3/16"	10 5/16"	9 1/16"	1 3/16"	11"	2'-6"	10 1/2"	9"	4 1/2"
S2-8	--	74°35'38"	2 1/16"	10 1/16"	2 3/16"	1'-6 3/16"	10 1/16"	9 5/16"	1 3/16"	11"	2'-6"	10 1/2"	9"	4 1/2"
S3-8	--	74°19'55"	2 1/16"	10 1/16"	2 5/16"	1'-6 7/16"	10 5/16"	9 3/16"	1 1/4"	11"	2'-6"	10 1/2"	9"	4 1/2"
S4-8	--	74°03'39"	2 1/16"	10 1/16"	2 5/16"	1'-6 7/16"	10 5/16"	9 3/16"	1 5/16"	11"	2'-6"	10 1/2"	9"	4 1/2"
S1-8W		89°59'57"	--	8 1/4"	--	1'-0 1/4"	1'-0 1/4"	6"	6"	1'-0"	2'-0 1/2"	8 1/4	9"	4"



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

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

Notes:
All piles shall be 12BP53 steel piles (Design Capacity = 57 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheet S1 & S2.
For Framing Plan, see Sheet 19 & 20.
Estimated Pile Tip Elevation is -210.0
For Rustication Details, see Sheet 10.
For 12BP53 Steel Pile Details, see Sheet 9.



REINFORCING PAD DETAIL OF S1-8W
No Scale

	BY	DATE
MADE	R.C. JLK	2-17-69 6-26-75
CHECKED	Y.C.P.	3-3-69
IN CHARGE		

NO.	REVISION	BY	DATE
⚠3	Cap Dimensions	PRY	10-76
⚠2	Pad Elev. Col. Dim.	T.E.M	9-8-75
⚠1	S1-8W Angle & Pad. Dim.	T.E.M.	9-2-75

AS BUILT

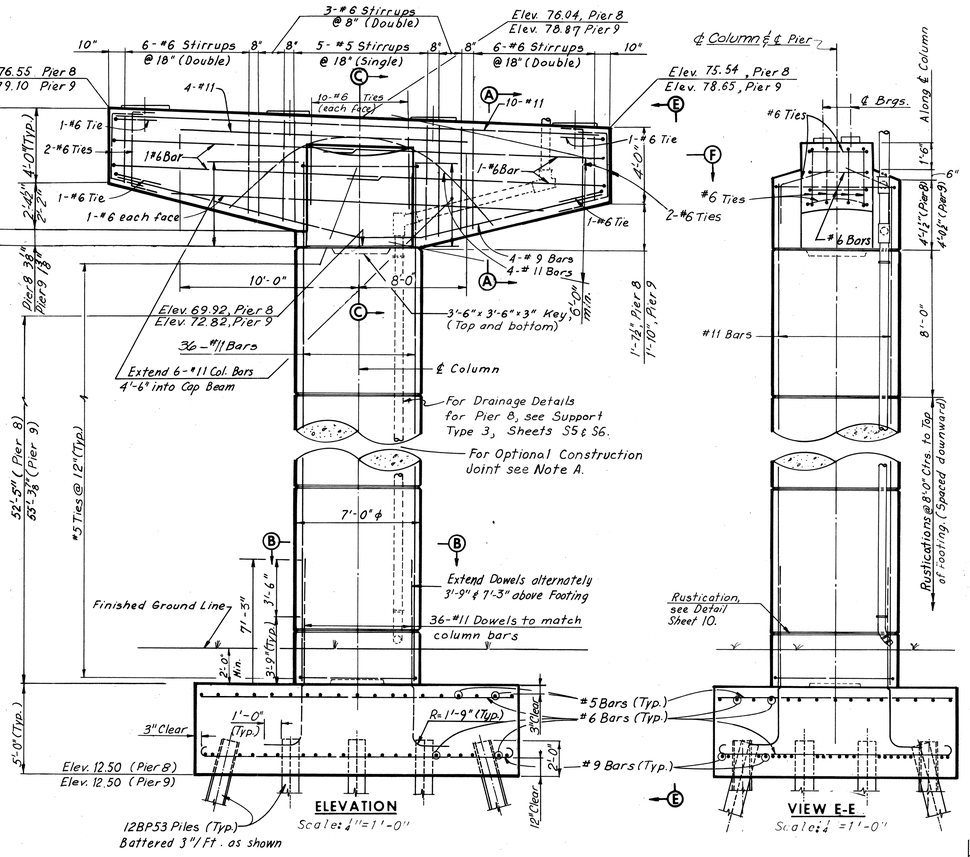
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 7

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

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 8 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	34	97

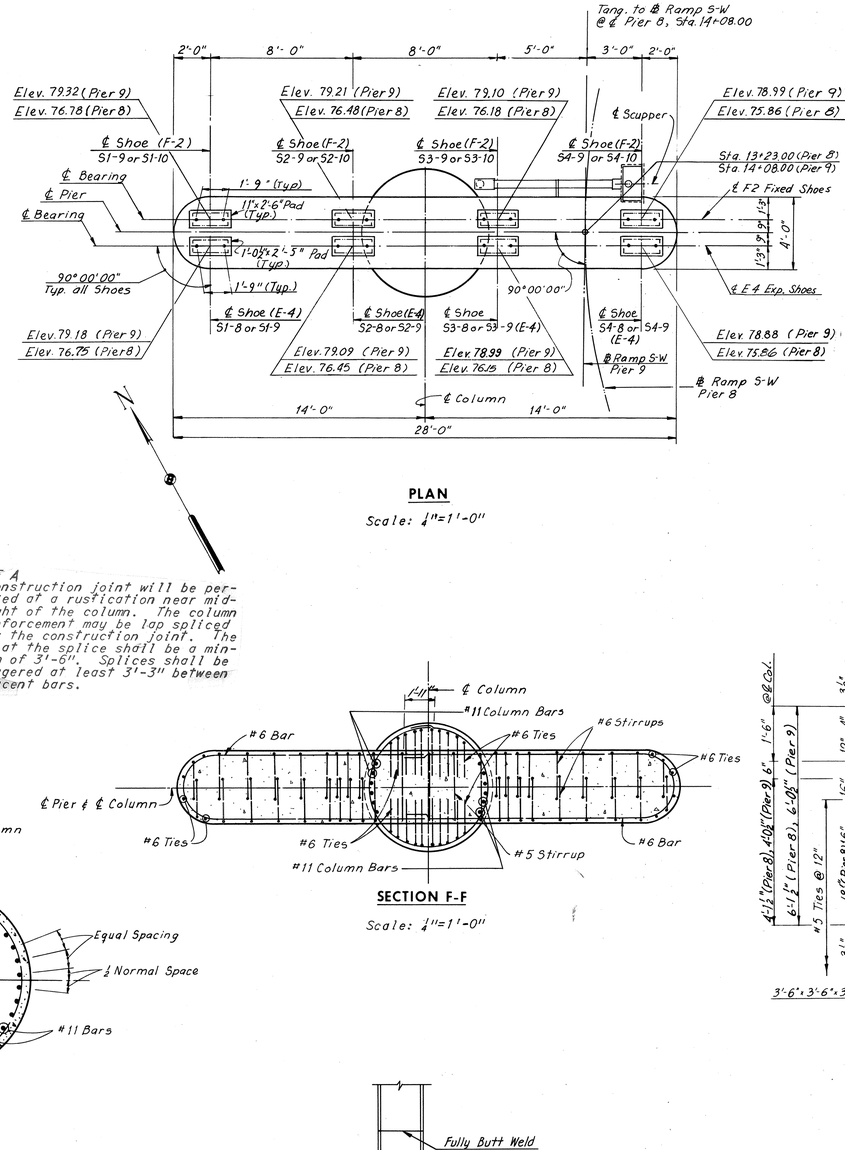


ELEVATION

Scale: 1"=1'-0"

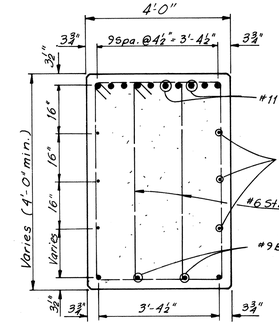
VIEW E-E

Scale: 1"=1'-0"



PLAN

Scale: 1"=1'-0"



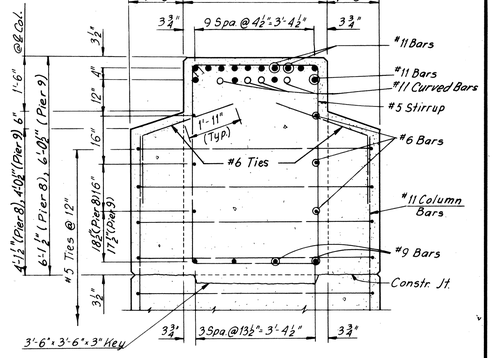
SECTION A-A

Scale: ½"=1'-0"

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

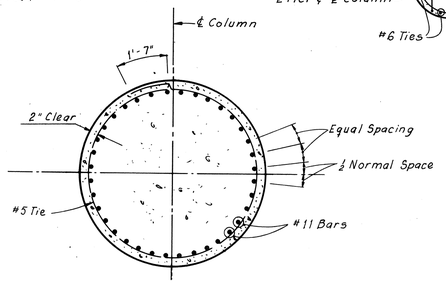
SECTION F-F

Scale: 1"=1'-0"



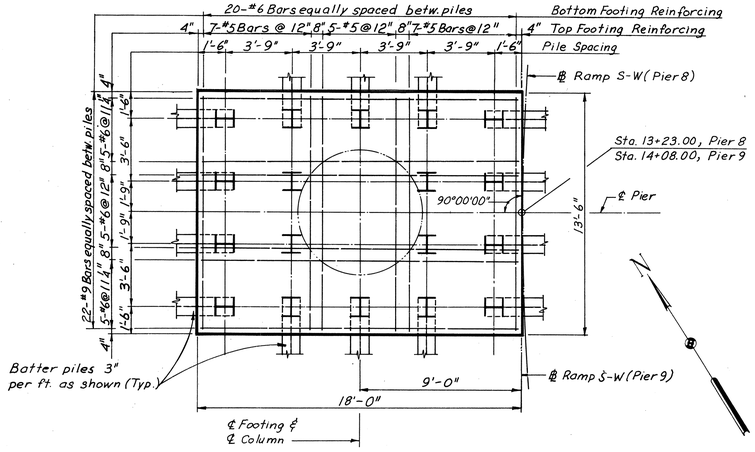
SECTION C-C

Scale: 1" = 1'- 0"



SECTION B-B

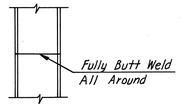
Scale: 3"=1'-0"



FOOTING PLAN

Scale: ¼"=1'-0"

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



STEEL PILE SPLICE DETAIL

No Scale

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity= 57 Tons).
Batter piles 3" per ft. as shown.
For Standard Shoe Details see Sheet S1 & S2.
For Framing Plans see Sheet 20.
Estimated Pile Tip elevation -20.0

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	CEB/JD	12-17-68				
CHECKED	PTA	01-07-69				
IN CHARGE						

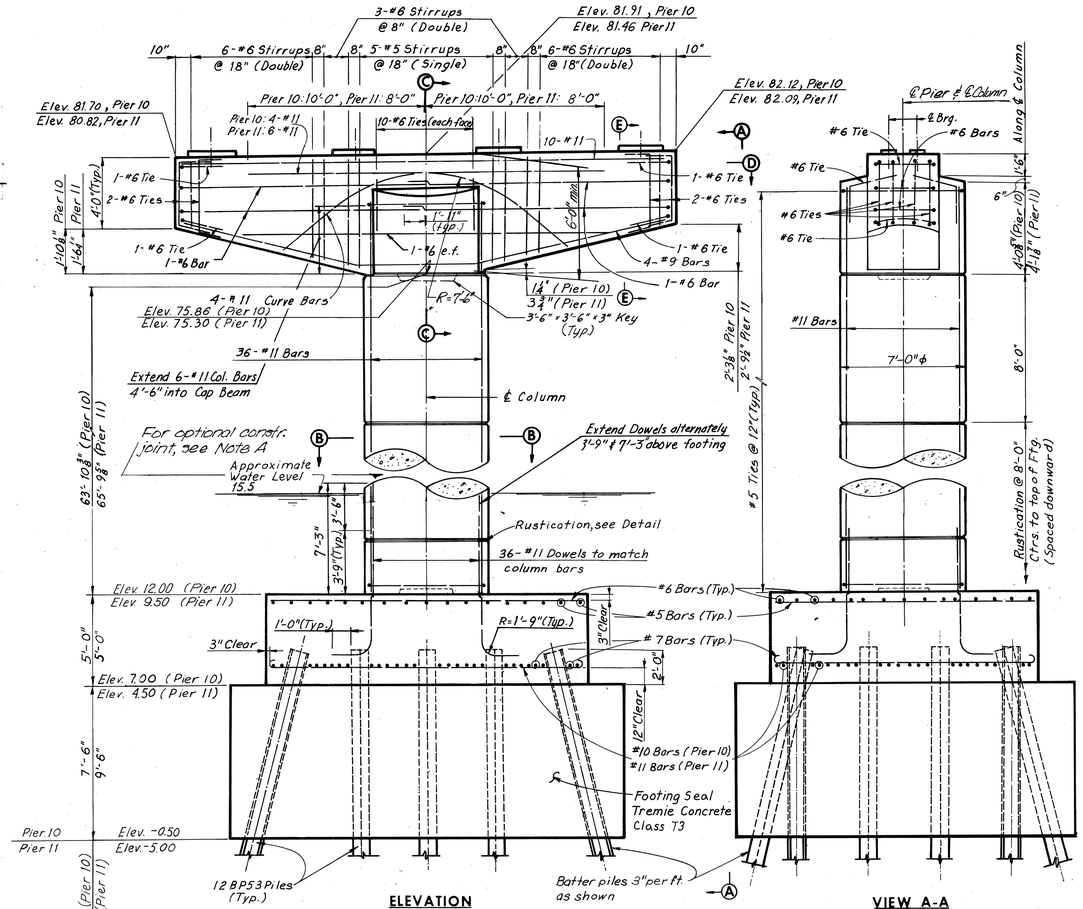
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 8 AND 9

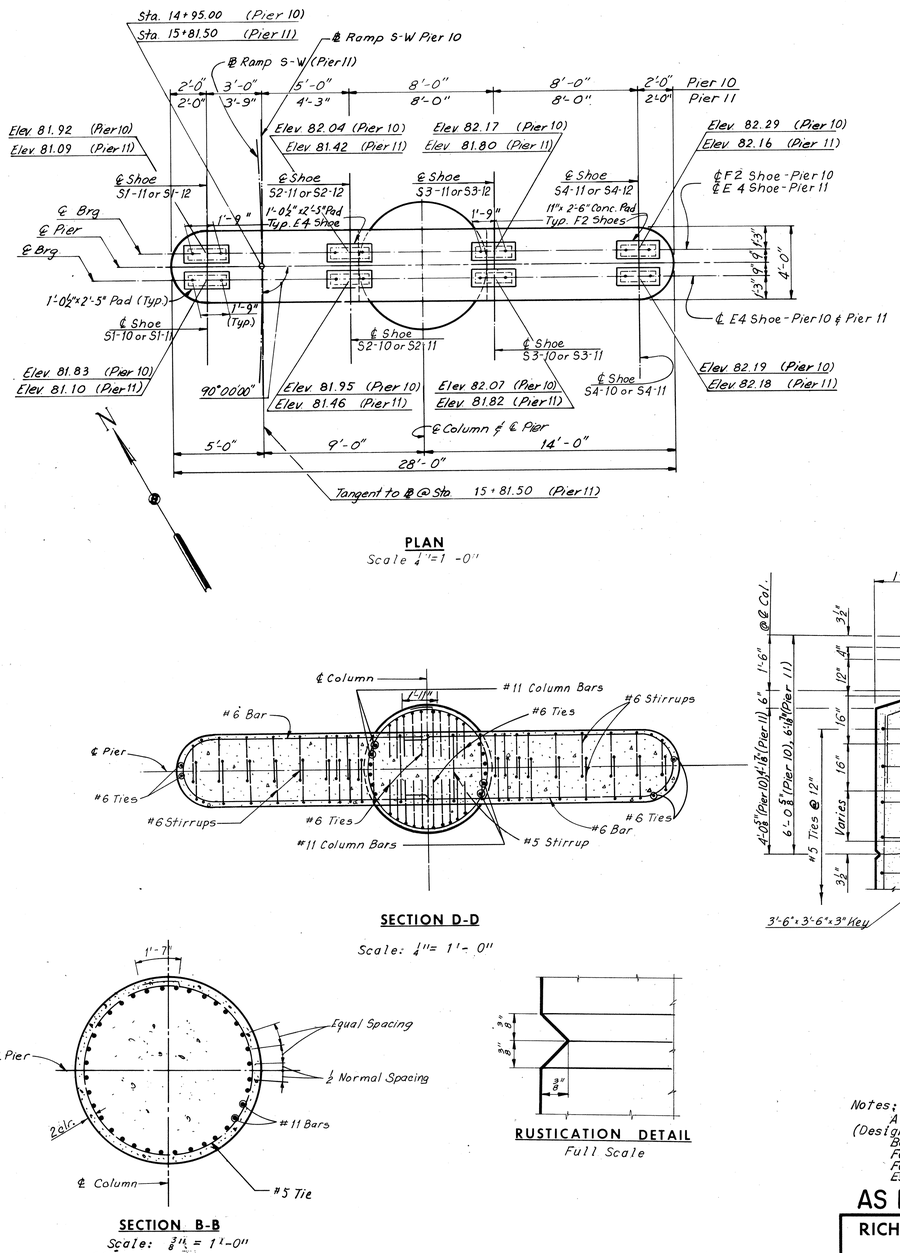
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 9 OF 38

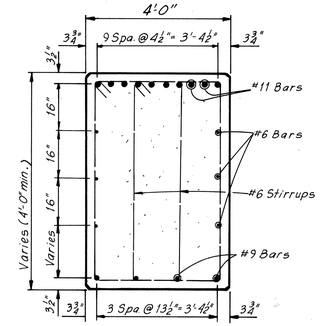
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	35	97



ELEVATION
Scale: ¼" = 1'-0"

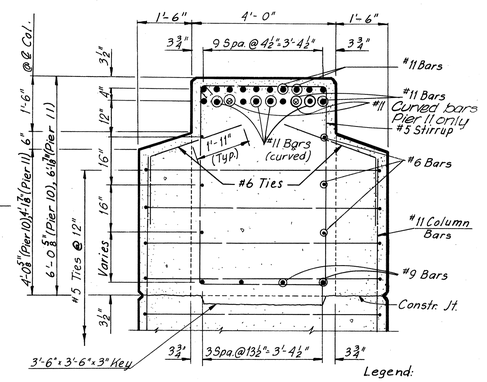


PLAN
Scale ¼"=1'-0"



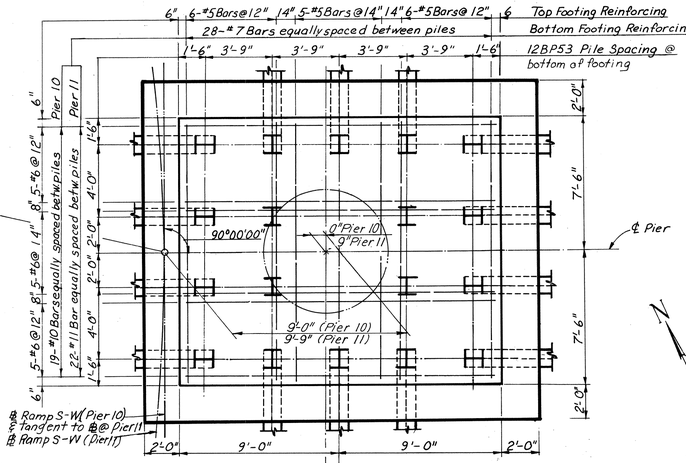
SECTION E-E
Scale ½"=1'-0"

SECTION D-D
Scale: ¼"= 1'- 0"



SECTION C-C
Scale: ½" = 1'- 0"

Legend:
- Piers 10 & 11
- Pier 11 only



FOOTING PLAN
Scale: ¼" = 1'-0"

FOOTING FOR PIER 11 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

SECTION B-B
Scale: ¾" = 1'-0"

RUSTICATION DETAIL
Full Scale

Note:
Bottom reinforcement shown in View A-A is for pier 11 only. Bottom reinforcement for pier 10 is similar except in size & number.

Note:
For layout of piers 10 and 11 See Sheet 3.
Pile dimensions given on Footing Plan are measured at bottom of Footing (Elev. 7.00 Pier 10 and Elev. 4.50 Pier 11).

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

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

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter piles 3" per ft. as shown.
For Standard Shoe Details see Sheet S1 & S2.
For Framing Plans see Sheet 20 & 21
Estimated Pile Tip elevation -20.0

AS BUILT

	BY	DATE
MADE	CEB/JD	12-18-68
CHECKED	GSH	1-24-69
IN CHARGE		

NO.	REVISION	BY	DATE

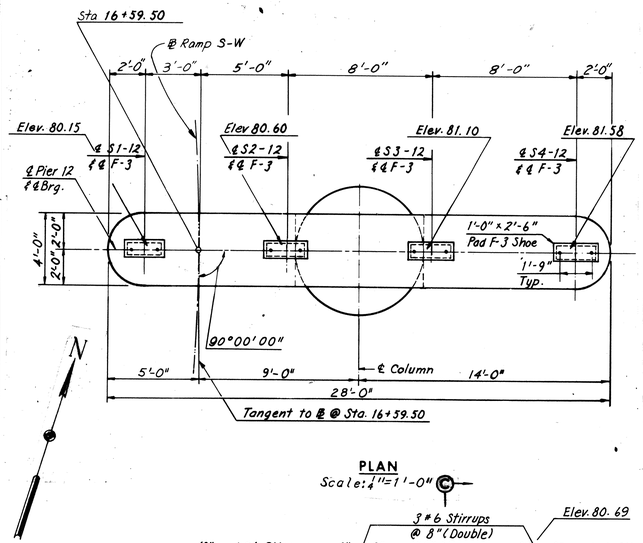
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 10 AND 11

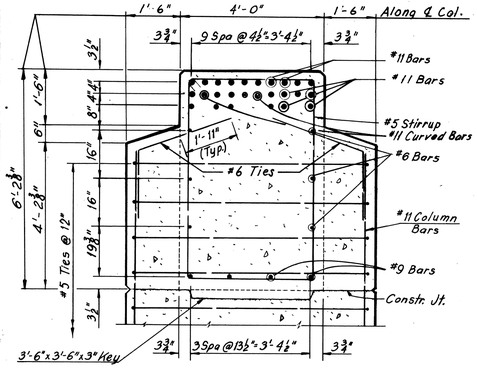
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 10 OF 38

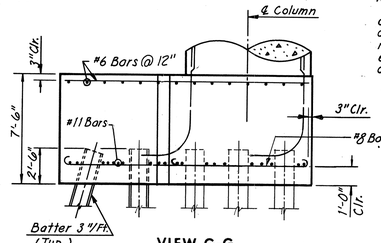
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	36	97



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



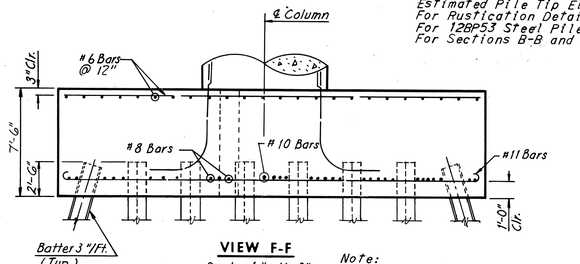
SECTION C-C
Scale: 1" = 1'-0"



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

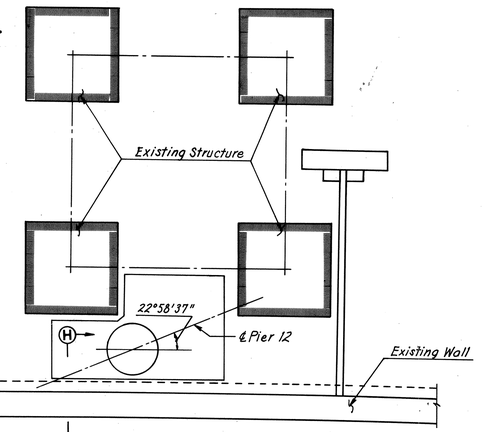
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes:
All piles shall be 12BP53 steel piles (Design Capacity= 57 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S1 & S2
For Framing Plan, see Sheet 21.
Estimated Pile Tip Elevation is -20.0.
For Rustication Details, see Sheet 5.
For 12BP53 Steel Pile Details, see Sheet 9.
For Sections B-B and D-D, see Sheet 12.

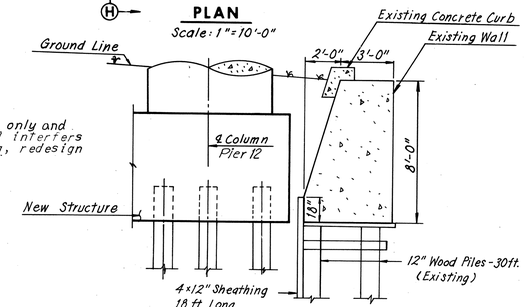


VIEW F-F
Scale: 1/4"=1'-0"

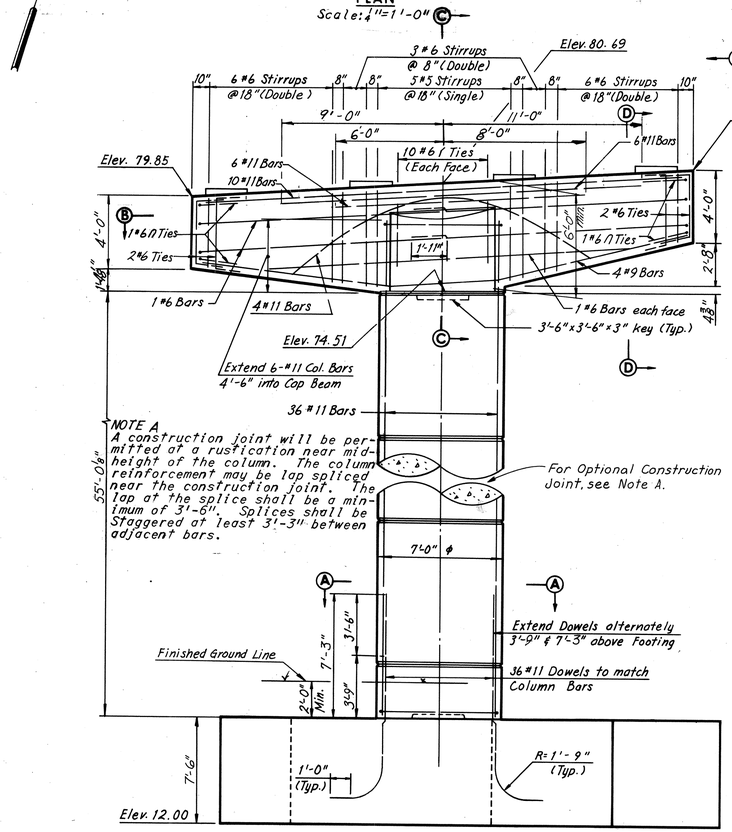
Note:
Wall location as shown on Plan is approximate only and shall be verified in field. If existing wall interfers with the piling or parts of the new footing, redesign of footing will be required



PLAN
Scale: 1"=10'-0"

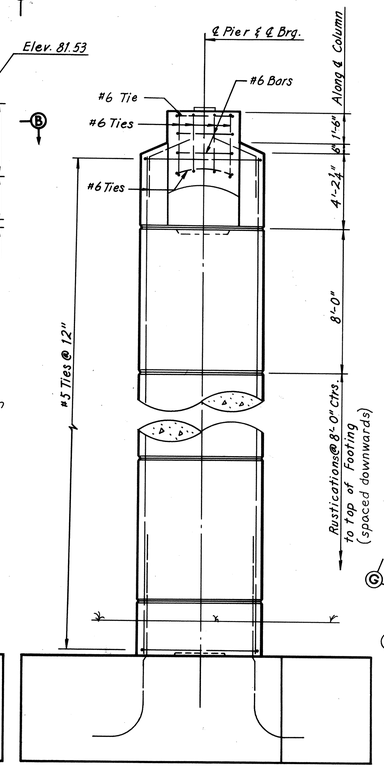


SECTION H-H
Scale: 1/4"=1'-0"



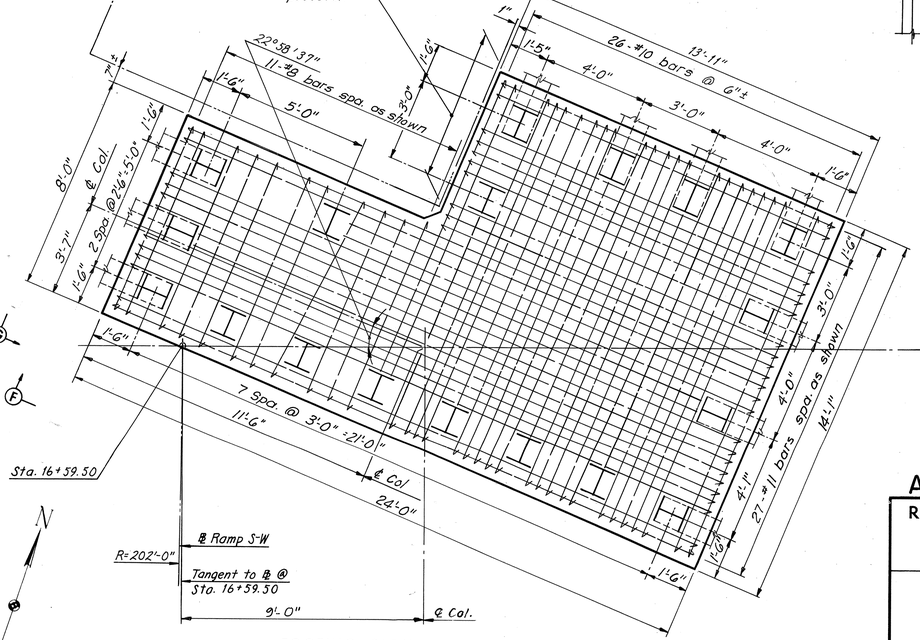
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

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



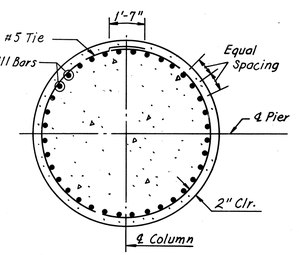
VIEW E-E
Scale: 1/4"=1'-0"

Note:
12 BP 53 Bearing Piles and Footing Reinforcing Steel in "ELEVATION" or "VIEW E-E" are not shown.



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

FOOTING FOR PIER 12 IS ECCENTRIC AS SHOWN ON FOOTING PLAN (Showing Bottom Reinforcing)



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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	3-29-69				
CHECKED	K C T	5-6-69				
IN CHARGE						

AS BUILT

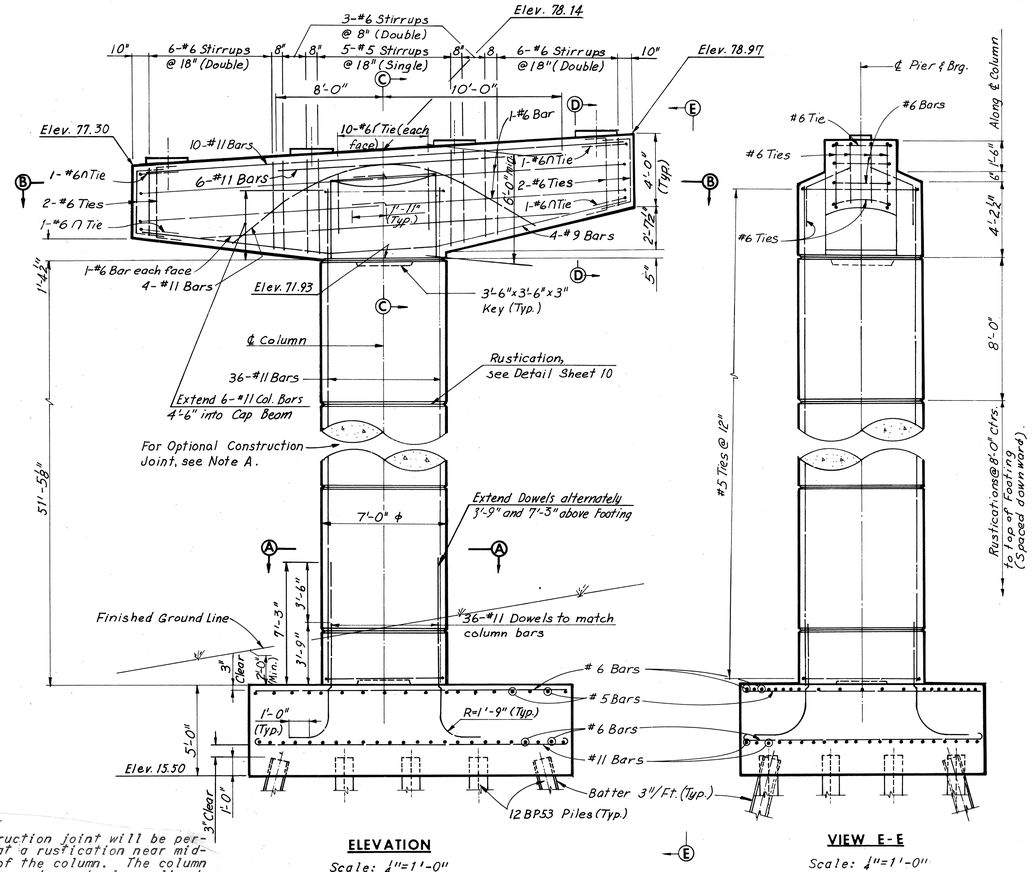
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 12

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

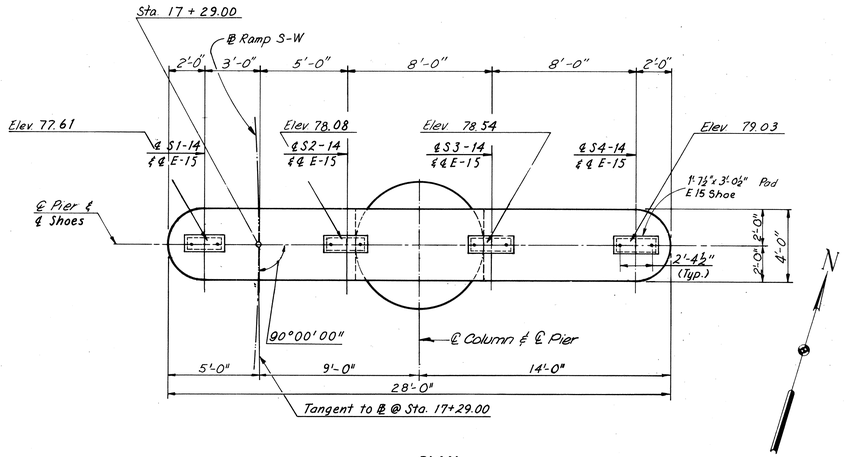
SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 11 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	37	97

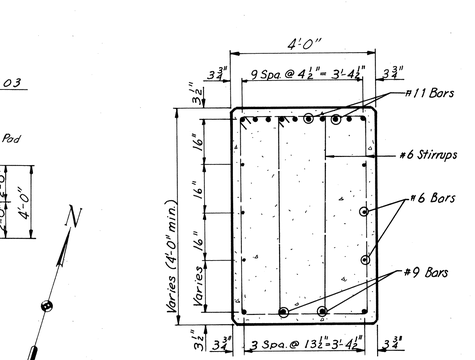


ELEVATION
Scale: ¼"=1'-0"

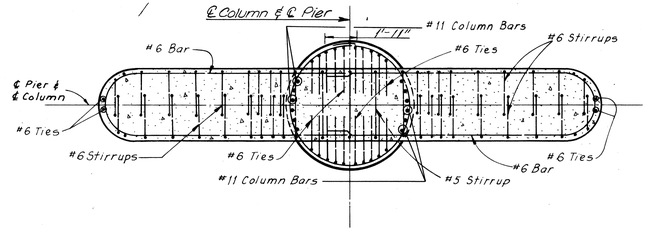
VIEW E-E
Scale: ¼"=1'-0"



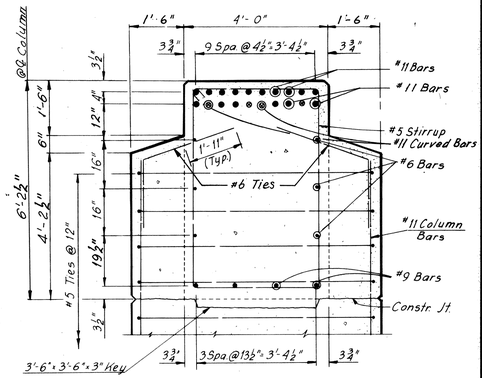
PLAN
Scale ¼"=1'-0"



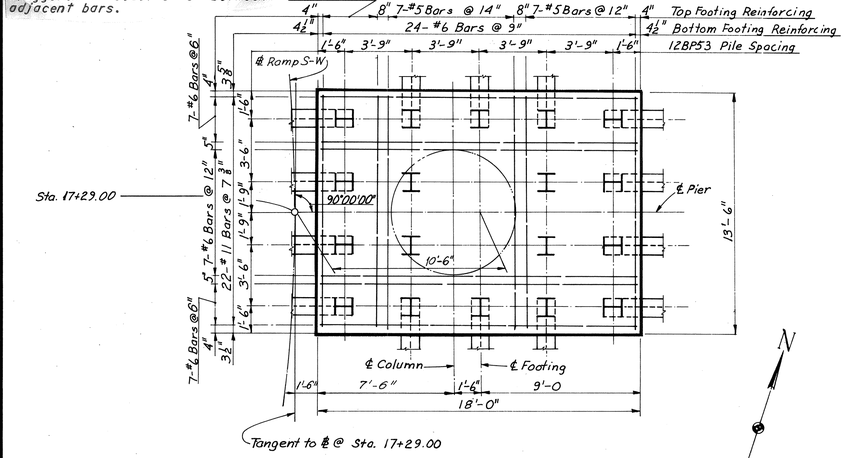
SECTION D-D
Scale ½"=1'-0"



SECTION B-B
Scale: ¼"= 1'- 0"



SECTION C-C
Scale: ½" = 1'- 0"



FOOTING PLAN
Scale: ¼"=1'-0"

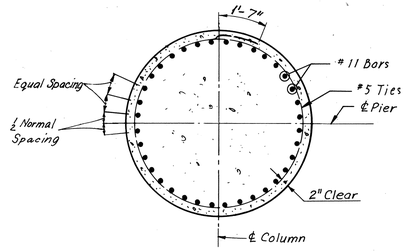
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.

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

Notes:
All piles shall be 12BP53 steel piles (Design Capacity= 57 ton)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets 51 & 52.
For Framing Plan, see Sheet 22
Estimated Pile Tip Elevation is - 20.0.
For Rustication Details, see Sheet 10.
For 12BP53 Steel Pile Details, see Sheet 9.

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

FOOTING FOR PIER 13 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



SECTION A-A
Scale: ¾"=1'-0"

	BY	DATE
MADE	JD/PTA	1-6-69
CHECKED	GSH	1-20-69
IN CHARGE		

NO.	REVISION	BY	DATE

AS BUILT

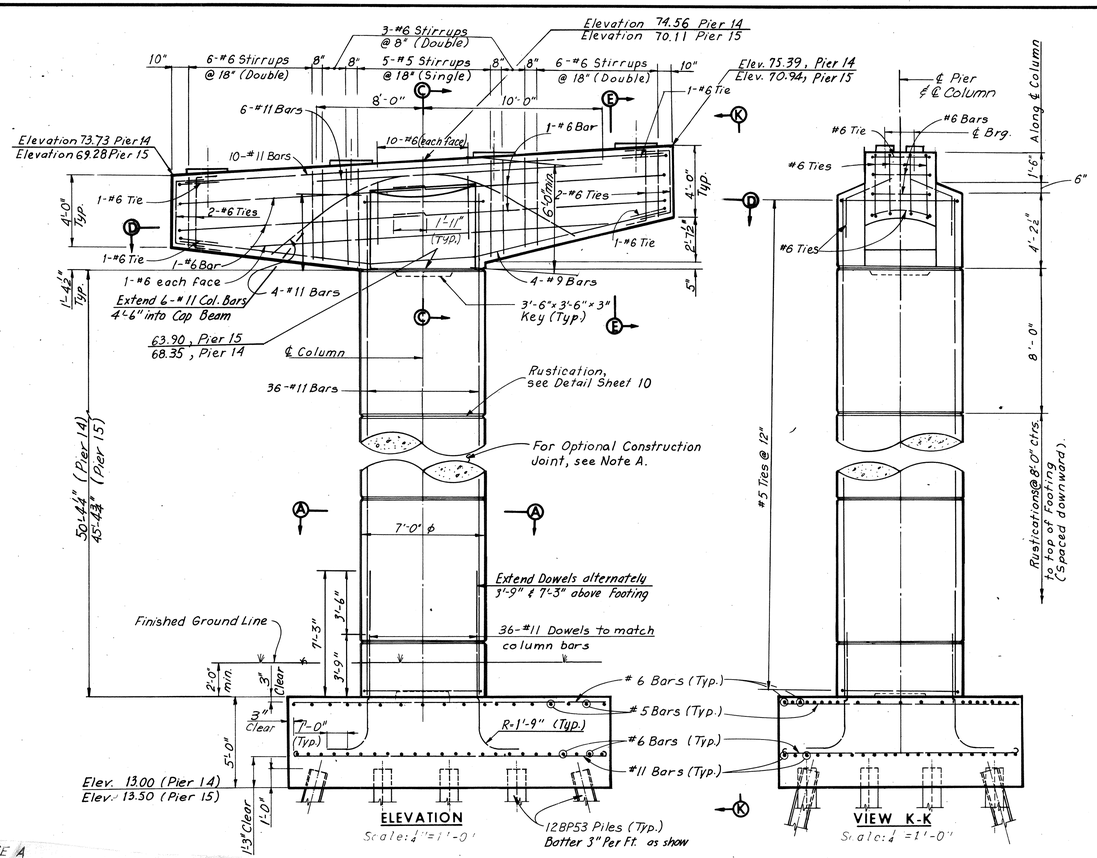
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 13

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 12 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	38	97

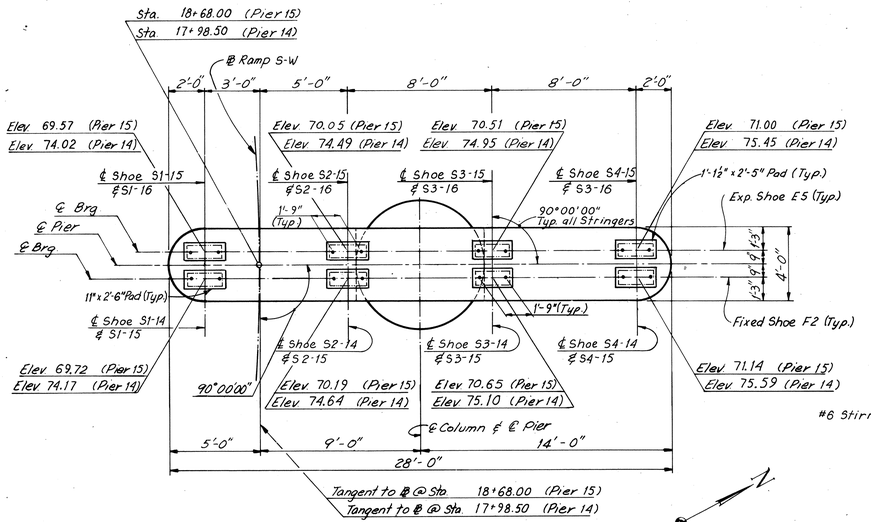


ELEVATION

Scale: ¼"=1'-0"

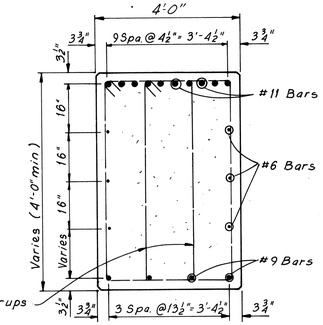
VIEW K-K

Scale: ¼"=1'-0"



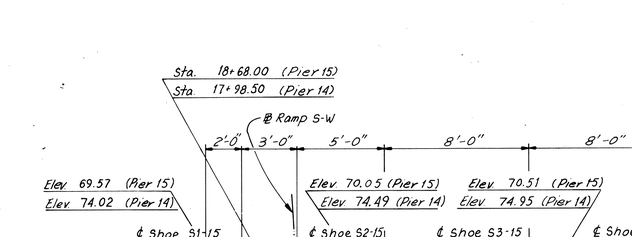
PLAN

Scale: ¼"=1'-0"



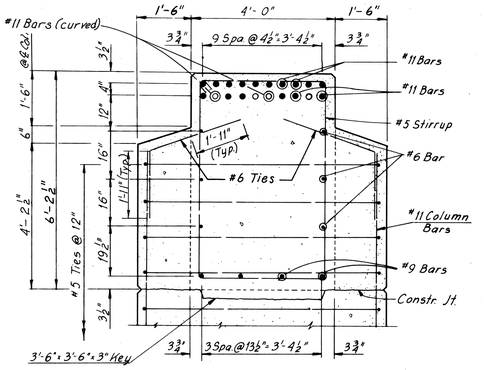
SECTION E-E

Scale: ½"=1'-0"



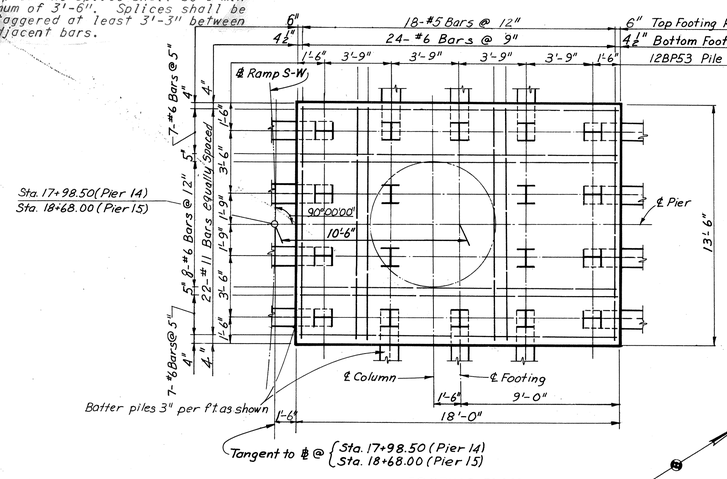
SECTION D-D

Scale: ¼"= 1'-0"



SECTION C-C

Scale: ½" = 1'-0"



FOOTING PLAN

Scale: ¼" = 1'-0"

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

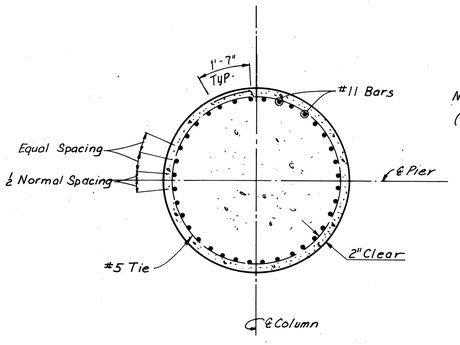
Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

Note:
For layout of Piers 14 and 15 See Sheet 3.

FOOTINGS FOR PIERS 14 AND 15 ARE ECCENTRIC AS SHOWN ON FOOTING PLAN

Note:
Dimensions given in Footing Plan are measured at bottom of Footing.

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



SECTION A-A

Scale: ½" =1'-0"

Notes:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter piles 3" per ft. as shown.
For Shoe Details see Sheet S1 & S2.

For Steel Pile Details see Sheet 9.
For Framing Plans see Sheet 22.
Estimated Pile Tip elevations -20.0.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	CEB/JD	12-19-68				
CHECKED	R C	1.20.69				
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

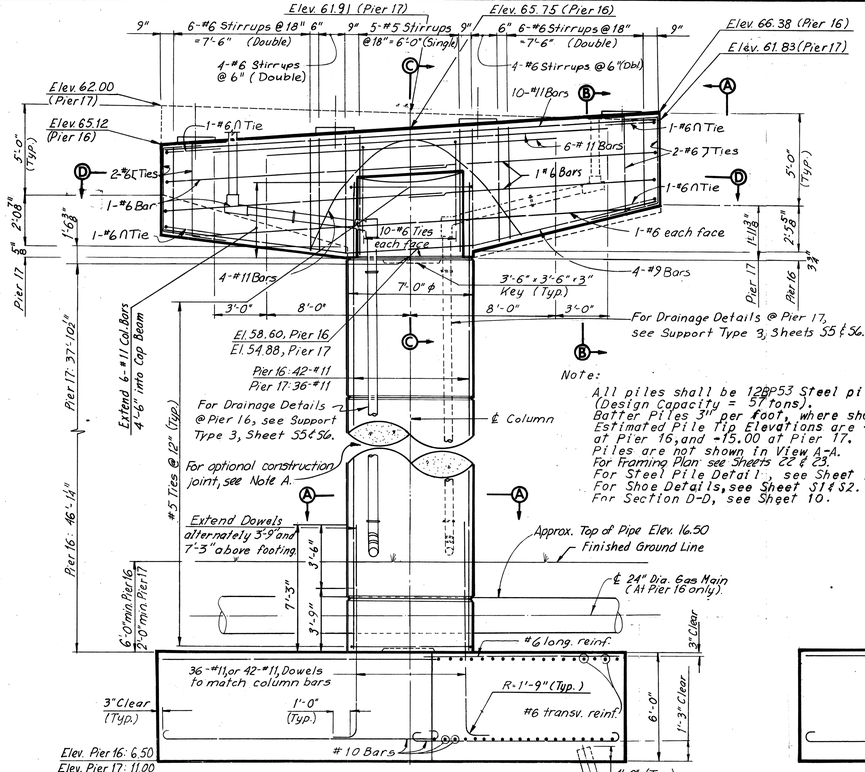
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 14 AND 15

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 13 OF 38

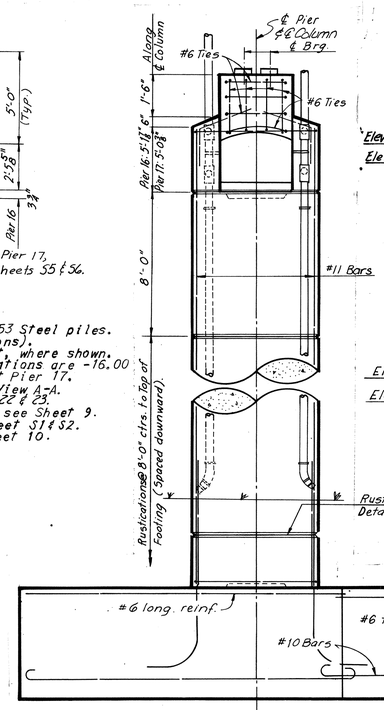
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	39	97

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



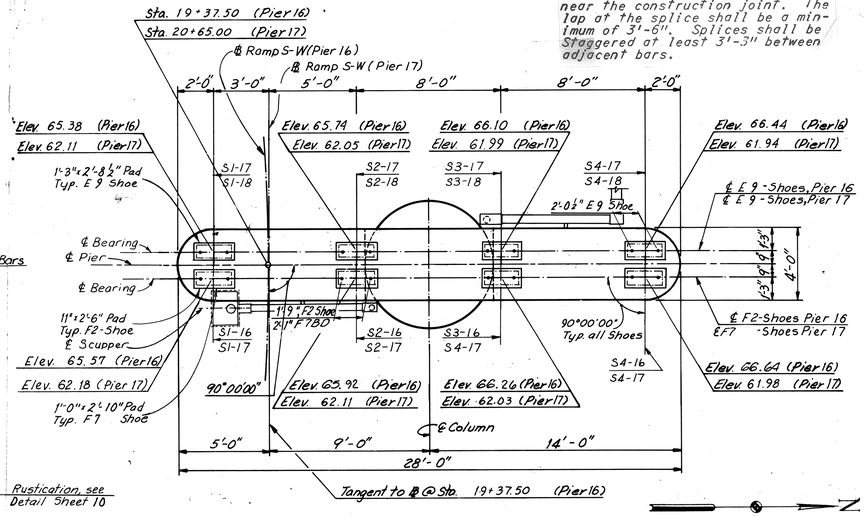
ELEVATION (Footing Pier 16)

Note:
All piles shall be 12BP53 Steel piles. (Design Capacity = 51 tons). Batter Piles 3" per foot, where shown. Estimated Pile Tip Elevations are -16.00 at Pier 16, and -15.00 at Pier 17. Piles are not shown in View A-A. For Framing Plan see Sheets 22 & 23. For Steel Pile Detail, see Sheet 9. For Shoe Details, see Sheet 51 & 52. For Section D-D, see Sheet 10.

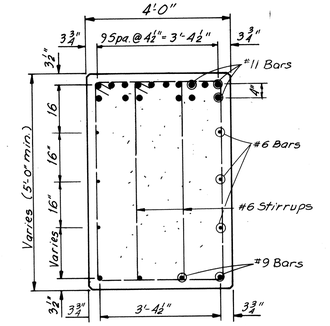


VIEW A-A
Scale: ¼" = 1'-0"

Note:
Piles to be battered 3:12 Pier 17 Footing.

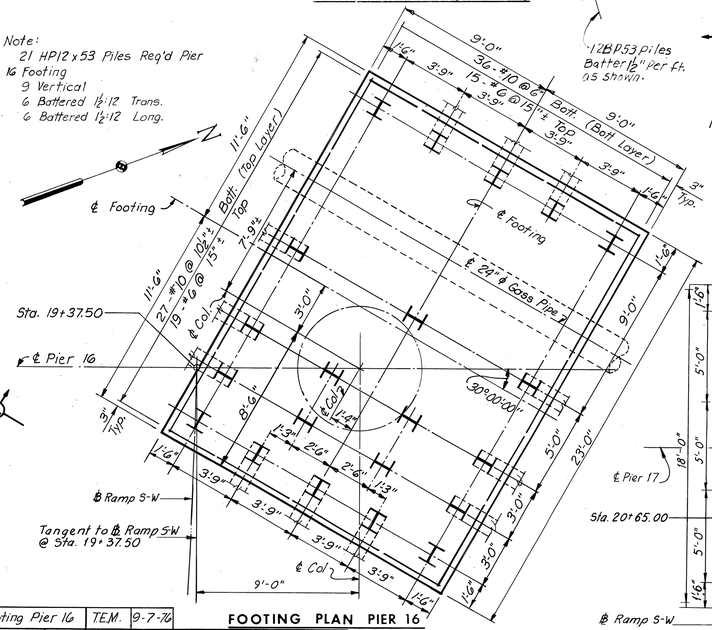


PLAN
Scale ¼" = 1'-0"



SECTION B-B
Scale ½" = 1'-0"

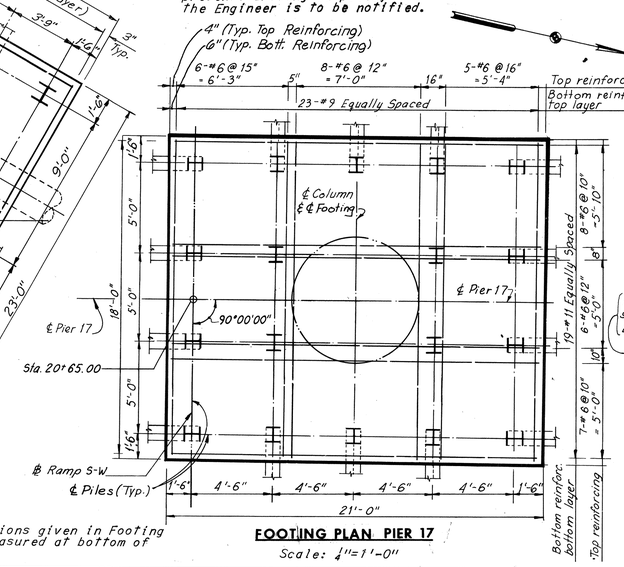
Note:
21 HP12 x 53 Piles Req'd Pier 16 Footing
9 Vertical
6 Battered ½:12 Trans.
6 Battered ½:12 Long.



FOOTING PLAN PIER 16

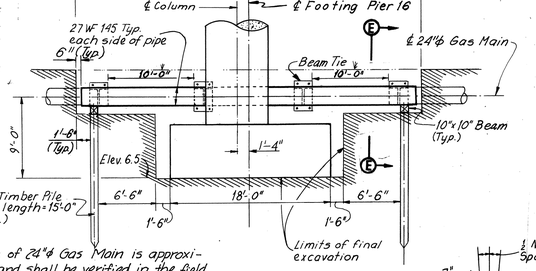
Note:
Dimensions given in Footing Plan are measured at bottom of footing.

Note:
If location of Gas Line prevents driving of piles, the Engineer is to be notified.



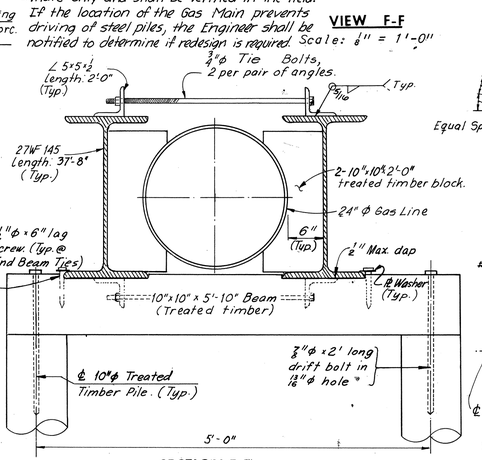
FOOTING PLAN PIER 17
Scale: ¼" = 1'-0"

FOOTING FOR PIER 16 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

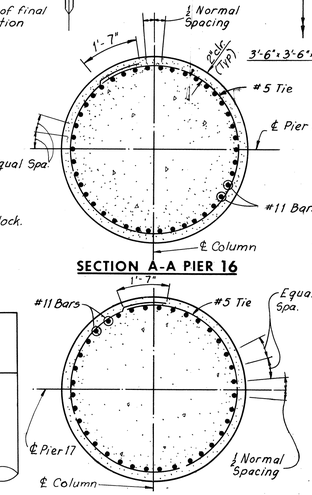


Note:
Location of 24" ϕ Gas Main is approximate only and shall be verified in the field. If the location of the Gas Main prevents driving of steel piles, the Engineer shall be notified to determine if redesign is required.

VIEW F-F
Scale: ½" = 1'-0"

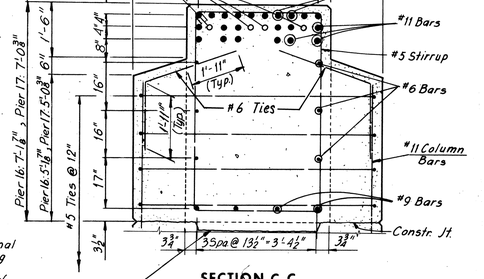


SECTION E-E
Scale: 1" = 1'-0"



SECTION A-A PIER 16

SECTION A-A PIER 17
Scale: ⅜" = 1'-0"



SECTION C-C
Scale: ½" = 1'-0"

Sequence of placing the supports of the 24" ϕ Gas Line:

1) Make a local excavation at each end of the support to below the pipe invert elevation. Drive timber piles and install timber beams.
2) Complete excavation for pipe support. Adequate temporary support of the pipe shall be maintained by earth, blocking or other means as approved by the Engineer until installation of the pipe support is completed.
3) Install W beams, timber blocks and beam ties.
4) The pipe support shall remain in place.
5) Payment will be made at the Lump Sum Bid price for "Pipe Support at Pier 16".

NO.	REVISION	BY	DATE
4	footing Pier 16	T.E.M.	9-7-76
3	Pier Dim Pier 17	T.E.M.	8-26-76
2	Pad Elev. Pier 16	T.E.M.	5-76
1	Shoe Type revised	J.B.P.	9-25-75

	BY	DATE
MADE	C.E.B.	1-16-69
CHECKED	J.D.	1-23-69
IN CHARGE		

AS BUILT

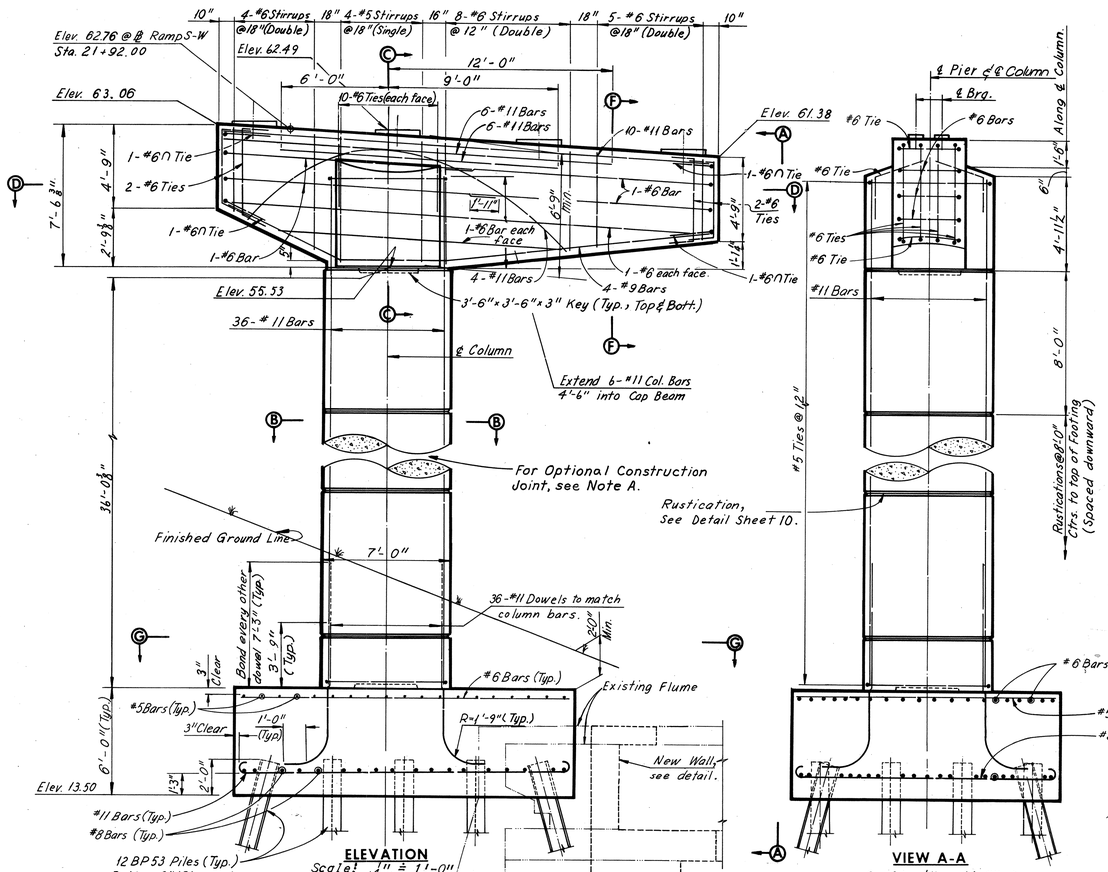
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIERS 16 AND 17

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

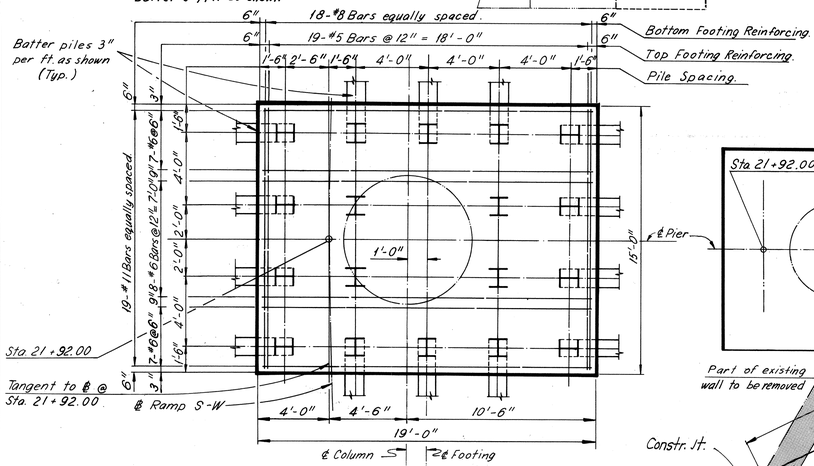
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 14 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	40	97

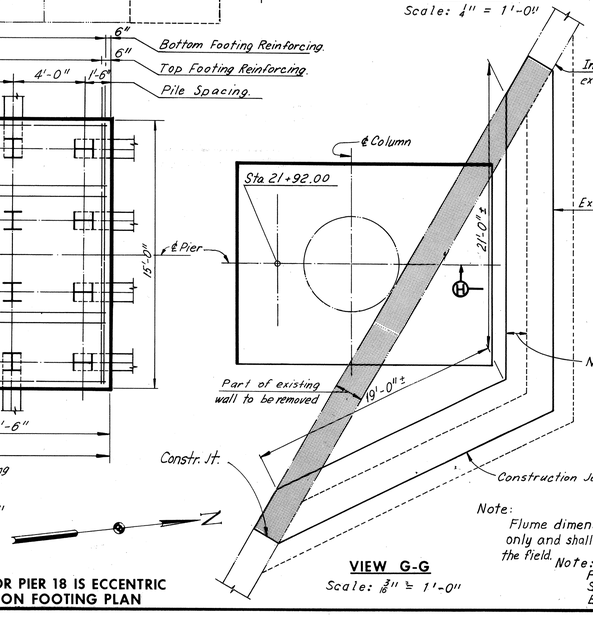


ELEVATION
Scale: 1/4" = 1'-0"

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



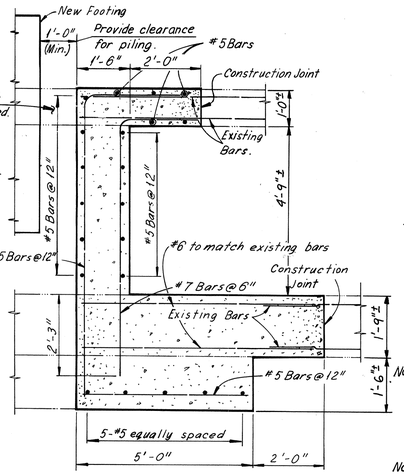
FOOTING PLAN
Scale: 1/4" = 1'-0"



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

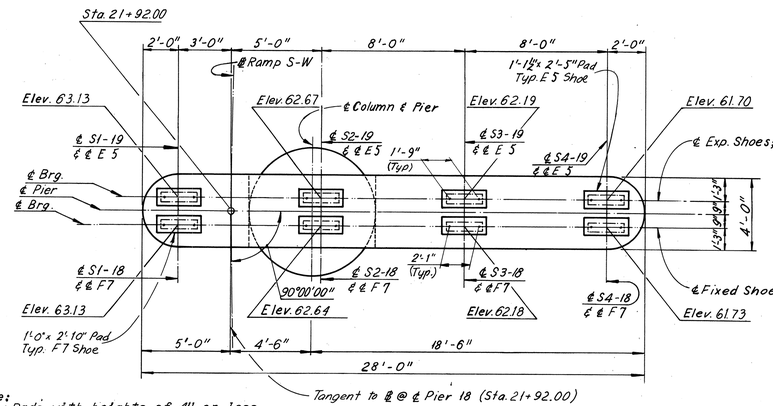
Note:
Flume dimensions shown are approximate only and shall be verified by the Contractor in the field.

Note:
Piles located within 10 ft. (horizontal distance) of Storm Drainage Flume shall be pre-bored to an Elevation 5 ft. below bottom of Flume.



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

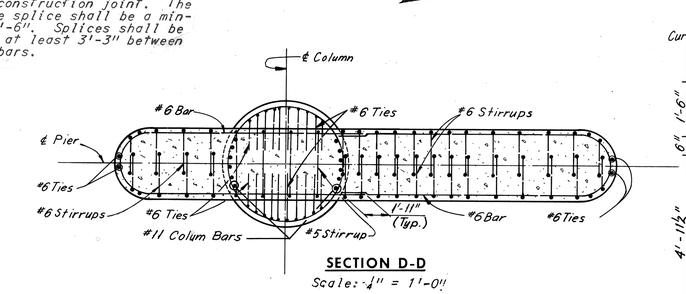
Note:
Piles located within 10 ft. (horizontal distance) of Storm Drainage Flume shall be pre-bored to an Elevation 5 ft. below bottom of Flume.



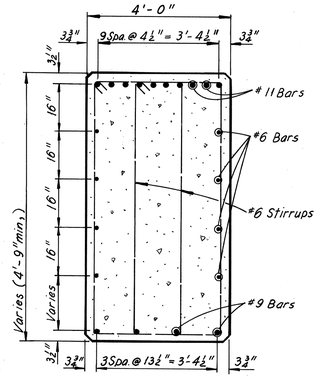
Note:
Pads with heights of 4" or less shall not be reinforced.

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

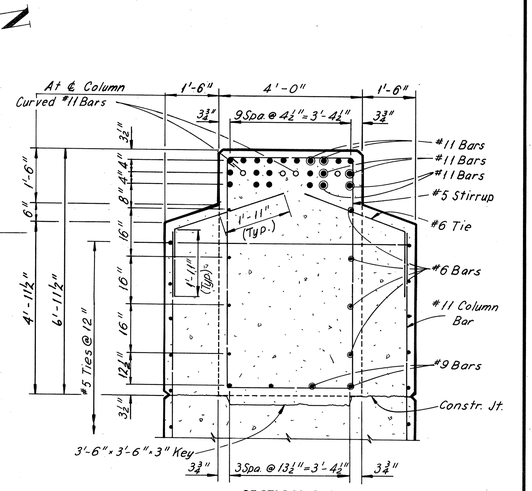
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



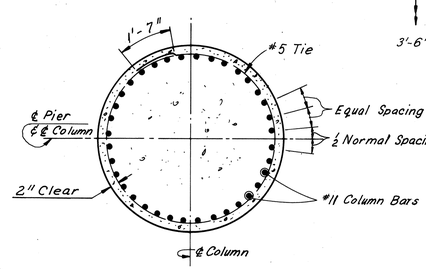
SECTION D-D
Scale: 1/4" = 1'-0"



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



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



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

Note:
All piles shall be 12 BP 53 Steel Piles (Design Capacity = 57 tons) Batter piles 3" per foot where shown.

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

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

Notes:
For Steel Pile Details, see Sheet 9.
For Shoe Details, see Sheet S1 & S2.
Estimated Pile Tip elevation -14.0.

	BY	DATE
MADE	PTA	12-20-68
CHECKED	J.D.	1-15-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Rev. Footing Reinf.	TEM	9-8-75

FOOTING FOR PIER 18 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

AS BUILT

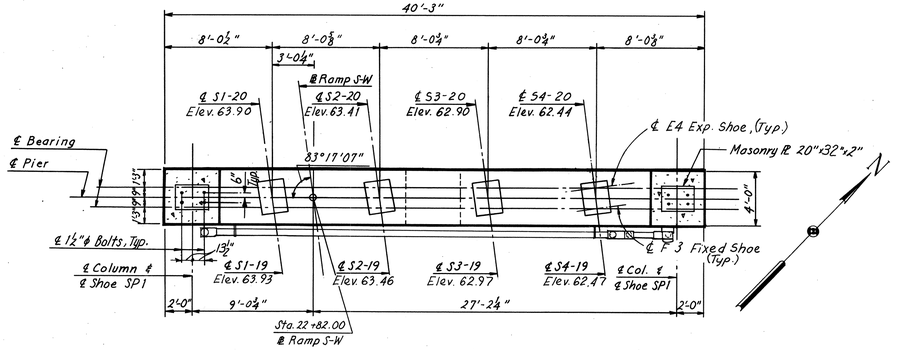
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 18

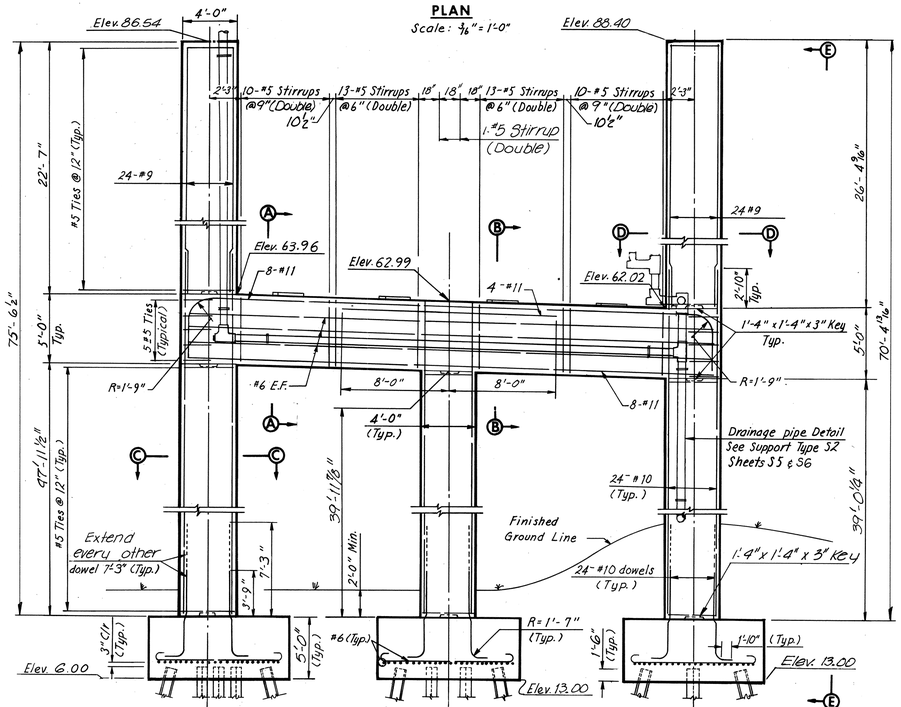
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 15 OF 38

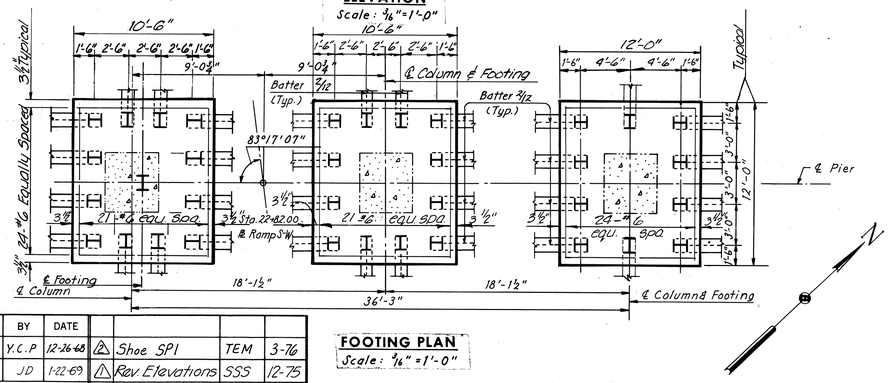
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11.	DOWNTOWN EXPRESSWAY	41	97



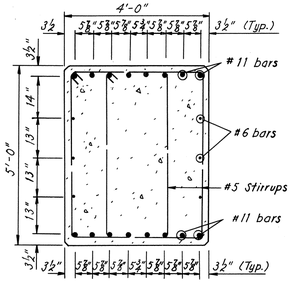
PLAN
Scale: 3/16" = 1'-0"



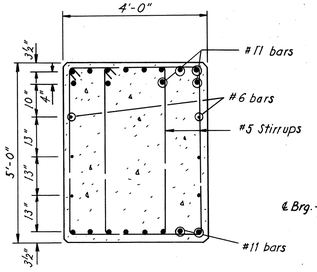
ELEVATION
Scale: 3/16" = 1'-0"



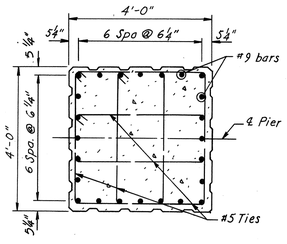
FOOTING PLAN
Scale: 3/16" = 1'-0"



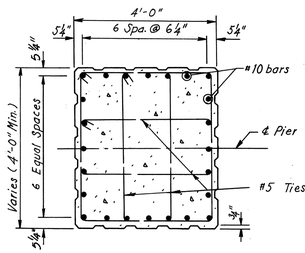
SECTION A-A
Scale: ½" = 1'-0"



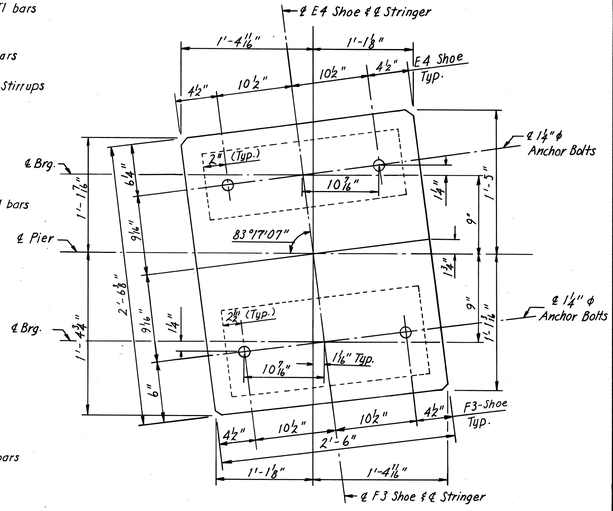
SECTION B-B
Scale: ½" = 1'-0"



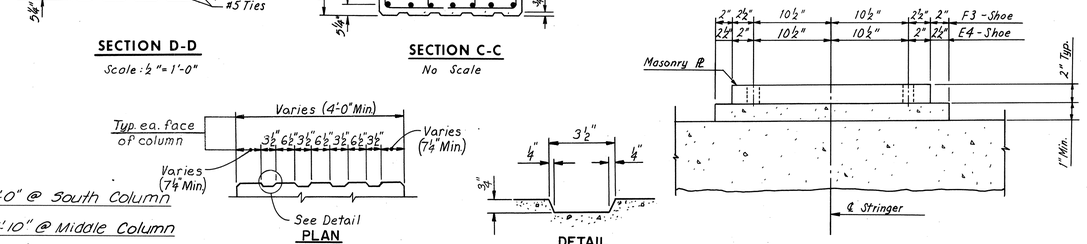
SECTION D-D
Scale: ½" = 1'-0"



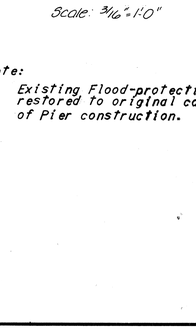
SECTION C-C
No Scale



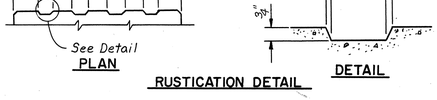
PAD AND ANCHOR BOLT SETTING PLAN
No Scale



PAD ELEVATION VIEW
No Scale



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



RUSTICATION DETAIL

DETAIL

Note:
Rustications on pier shaft shall extend a minimum of 2'-0" below the finished ground line except that when the top of footing is within 5'-0" of the finished ground line the rustications shall extend to the top of footing.

Notes:
For Shoe Details, see Sheet S1 and S2.
Batter Piles 2"/ft where shown.
For Steel Pile Details, See Sheet 9.
For Framing Plan see Sheet 24.
Estimated Pile Tip Elevation = -11.0
All piles shall be 12BP53 steel piles (Design capacity=57 tons)

Note:
Existing Flood-protection dike is to be restored to original contour upon completion of Pier construction.

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	12-26-68	2	Shoe SP1	TEM	3-76
CHECKED	JD	1-22-69	1	Rev. Elevations	SSS	12-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

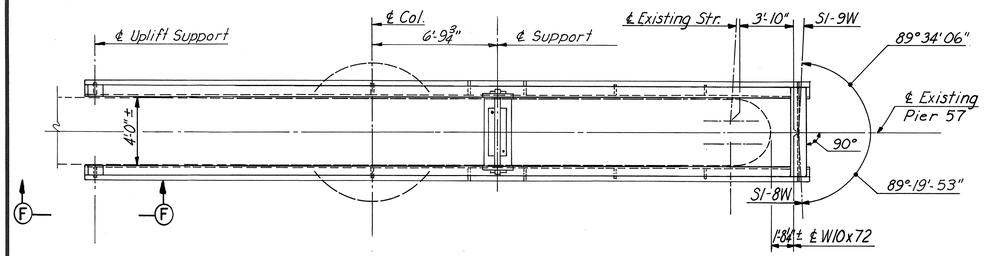
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

PIER 19

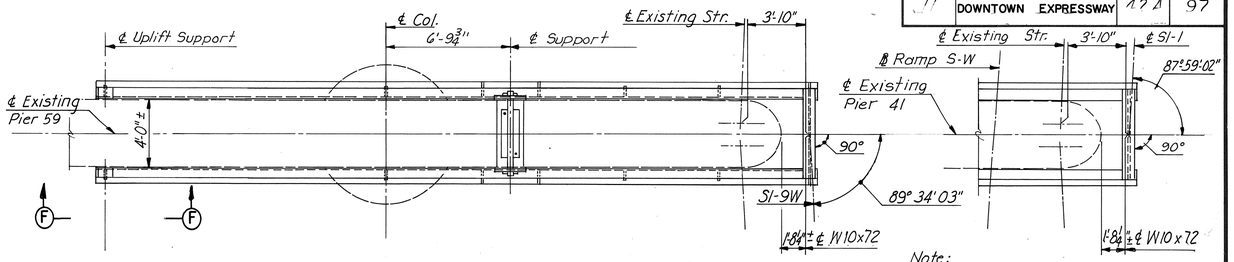
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 16 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
II	DOWNTOWN EXPRESSWAY	17A	97



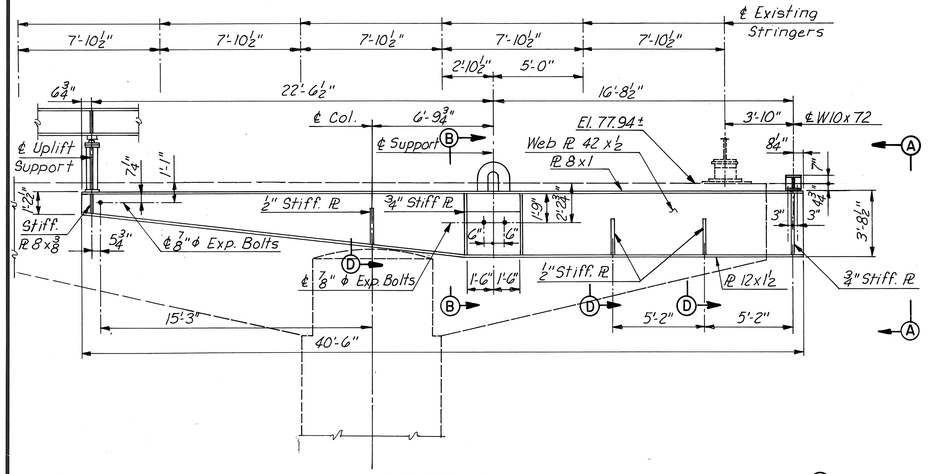
PLAN OF EXISTING PIER 57
Scale: ¼"=1'-0"



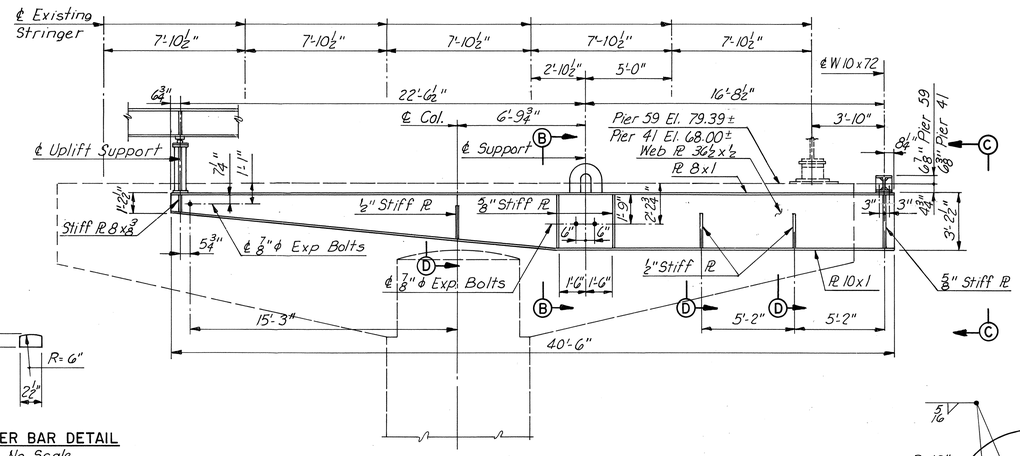
Note:
For dimensions not shown, see Plan of Pier 59.

PLAN OF EXISTING PIER 59
Scale: ¼"=1'-0"

PARTIAL PLAN OF EXISTING PIER 41
Scale: ¼"=1'-0"



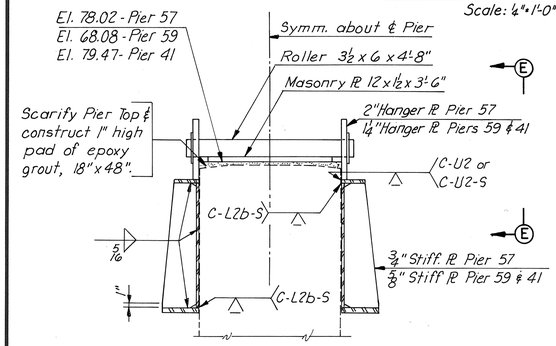
ELEVATION OF EXISTING PIER 57
Scale: ¼"=1'-0"



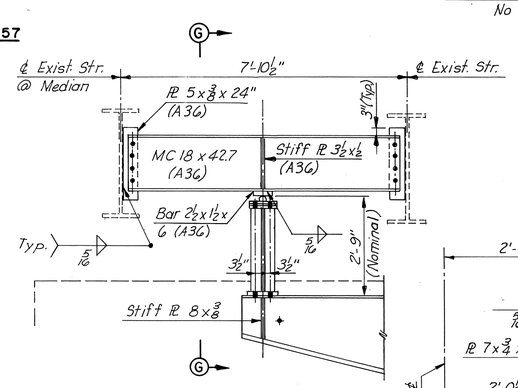
ELEVATION OF EXISTING PIERS 59 & 41
Scale: ¼"=1'-0"

SECTION D
Scale ½"=1'-0"

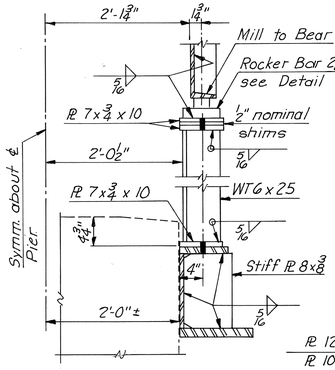
ROCKER BAR DETAIL
No Scale



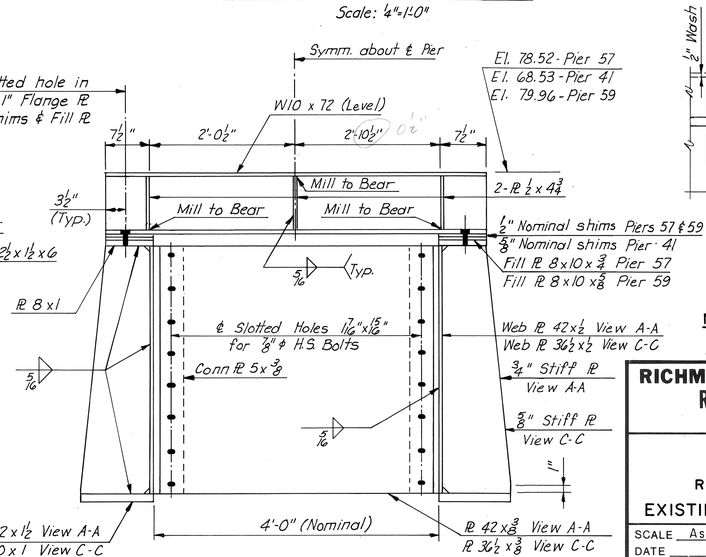
SECTION B-B
Scale ½"=1'-0"



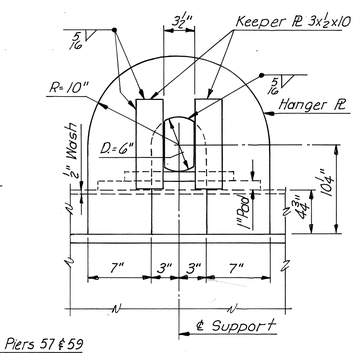
VIEW F-F
Scale ½"=1'-0"



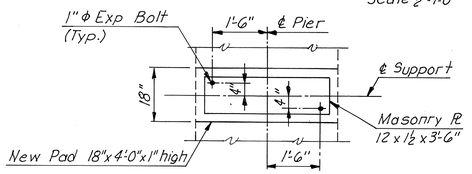
SECTION G-G
Scale 1"=1'-0"



VIEW A-A & C-C
Scale 1"=1'-0"



VIEW E-E
Scale ½"=1'-0"



PAD PLAN
Scale ½"=1'-0"

NOTE: Structural steel shall be A588 except as noted.

AS BUILT

DESIGNED			3	Entire Sheet	TEM	10-76
DRAWN	EJM/dBP	8-11-75	2	Elev. and Dim.	TEM	9-8-75
CHECKED	PRY	10-14-76	1	New Sheet added	d.B.P.	8-25-75
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE

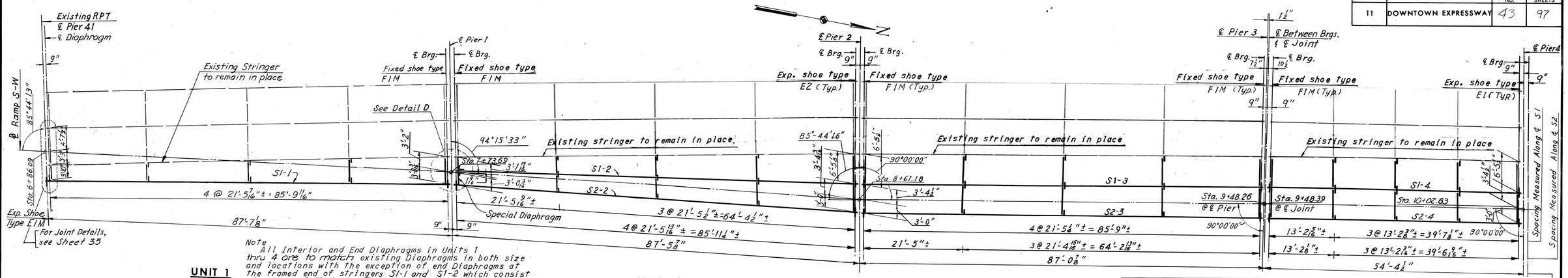
EXISTING PIERS 41, 57 & 59 MODIFICATIONS

SCALE As Noted
DATE
SHEET 17A OF 38

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

42A

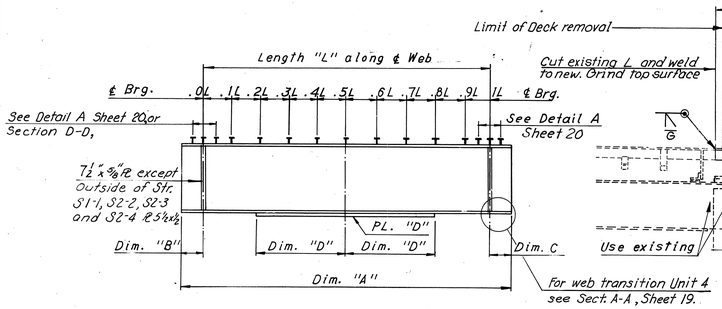
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	43	97

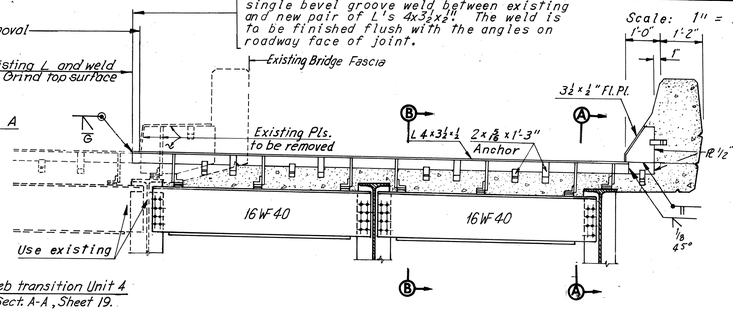


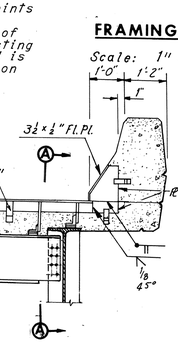
UNIT 1

UNIT 2

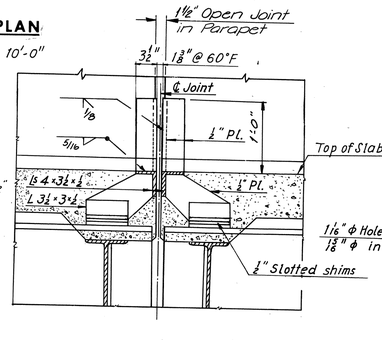
Curb portion of existing expansion joints is to be removed beyond the curbline an amount sufficient for performance of single bevel groove weld between existing and new pair of L's 4x3½x½". The weld is to be finished flush with the angles on roadway face of joint.







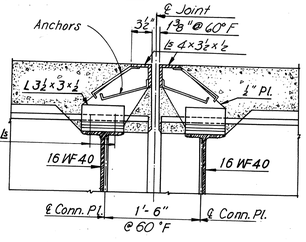
UNIT 3

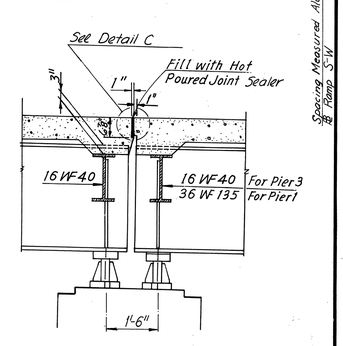


SHOE SCHEDULE

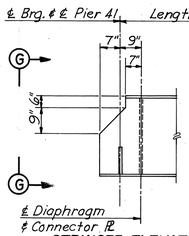
EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQRD.	TYPE	NO. REQRD.
E1	2	F1M	8
E2	2		
E1M	1		

UNIT 4

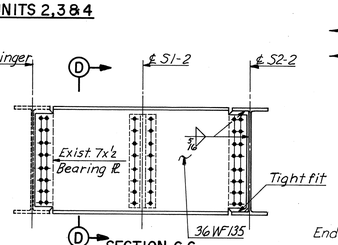




STRINGER ELEVATION UNITS 2,3&4



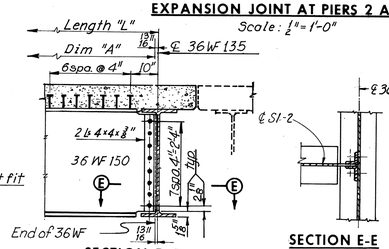
Note:
For details not shown see Stringer Elevation Unit 2,3 & 4. For Section G-G, see Sheet 32.



SECTION C-C
Scale: ½"=1'-0"

EXPANSION JOINT AT PIERS 2 AND 4

Scale: ½"=1'-0"

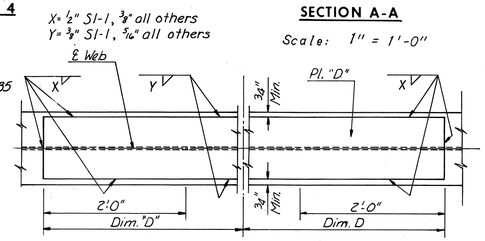


SECTION D-D
No Scale

SECTION E-E
No Scale

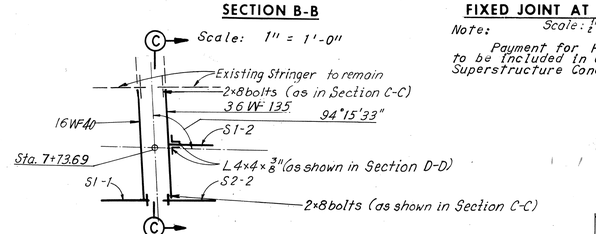
X = ½" S1-1, ⅜" all others
Y = ⅜" S1-1, 5/16" all others

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



COVER PLATE DETAIL
No Scale

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

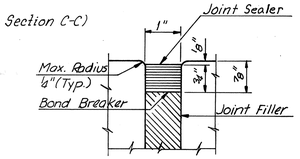


DETAIL D
No Scale

FIXED JOINT AT PIERS 1 AND 3

Scale: 1"=1'-0"

Note: Payment for Hot Poured Joint Sealer to be included in Unit Price bid for Superstructure Concrete.



DETAIL C
No Scale

STRINGER ELEVATION UNIT 1

No Scale

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	DIM "A"	LENGTH "L"	DIM "B"	DIM "C"	DIM "D"	PL. "D"	MAX SHEAR STUD SPACING ** 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	0.5L-0.6L	0.6L-0.7L	0.7L-0.8L	0.8L-0.9L	0.9L-1.0L*
1	S1-1	36WF182	87'-8 11/16"	86'-6 11/16"	——	7"	29'-9"	10½"x1⅝"	18"	19"	24"	24"	24"	24"	24"	24"	19"	18"
2	S1-2	36WF150	‡86 -3 11/16"	‡85'-9½"	——	7"	32'-6"	10½"x¾"	18"	20½"	24"	24"	24"	22"	20"	17"	13½"	12"
	S2-2	36WF194	87'-2 3/4"	85'-11¼"	7½"	8"	42'-0"	10½"x1⅛"	15½"	18"	22"	22"	22"	22"	19½"	16"	13½"	11½"
3	S1-3	36WF194	86'-11"	85'-9"	7"	7"	32'-0"	10½"x1⅛"	12"	13½"	17½"	20½"	22"	22"	17½"	17½"	13½"	12"
	S2-3	36WF194	86'-11 13/16"	85'-7 13/16"	8"	7½"	42'-0"	10½"x⅝"	10½"	12"	14½"	17½"	20"	20"	17½"	14½"	12"	10½"
4	S1-4	36WF150	53'-11 7/16"	52'-9 7/16"	7"	7"	——	——	12½"	14"	16"	18½"	22½"	22½"	18½"	16"	14"	12½"
	S2-4	36WF150	54'-0 7/16"	52'-8 11/16"	7½"	8"	——	——	11"	12½"	14½"	17"	21½"	21½"	17"	14½"	12½"	11"

**Use 2-⅞" ø Shear Stud all Stringers this sheet.

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1 3/8	1 15/16	1 7/16
1 5/8	2 1/4	1 3/8
1 3/16	1 11/16	1 1/4
1 3/8	1 15/16	1 3/8
1 3/8	2	1 3/8
1 3/8	2	1 3/8
5/16	1/2	5/16
7/16	9/16	7/16
7/16	5/8	7/16

CAMBER SCHEDULE

¼L	½L	¾L
1 3/8	2 1/8	1 15/16
2 1/4	3 1/16	2 5/16
1 11/16	2 1/16	1 3/4
1 15/16	2 7/16	1 3/4
2	2 7/8	2 1/16
1 13/16	2 7/16	2 1/16
7/16	9/16	7/16
7/16	5/8	7/16

* Spacing begins at termination of 7 spaces @ 4" as shown in Detail A Sheet 20. This Detail is typical for all stringer ends except framed ends of stringers S1-1 and S1-2 which are shown in Section D-D.

Note
For Dead Load Deflection Diagram and Detail A, see Sheet 20.

Notes:
All structural steel shall be A36 unless denoted otherwise.
For Superstructure Steel Quantities see Sheet 4.
For Shoe Details see Sheets S1 and S2.
For additional Diaphragm Details see Sheet 25.
For Shear Stud Details see Sheet 20.
All transverse dimensions shown on Joint Details are normal to ℄ Joint.
All structural steel for expansion Joints shall be of A588 steel.

Note
Dimensions shown on the plans for existing structural metal work are in accordance with drawings prepared for the original construction.
The Contractor shall verify all necessary dimensions of existing structural metal work prior to preparing shop drawings for new metalwork.

‡.....Length "L" is measured from ℄ Diaphragm to ℄ Brg and dimension "A" is out to out of stringer.

NO.	REVISION	BY	DATE
4	Camber S2-2	TEM.	8-76
4	Shear Stud spa.	TEM.	6-7-76
3	R D & Shoe Type	TEM	3-76
2	Str. Size in Section D-D	TEM	3-76
1	Framing Unit / Str. Elev. Unit /	TEM	8-2575
1	Section C-C Shoe E1M		

	BY	DATE
MADE	KCT JLH	11-8-68 6-26-75
CHECKED	PTA	01-20-69
IN CHARGE		

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

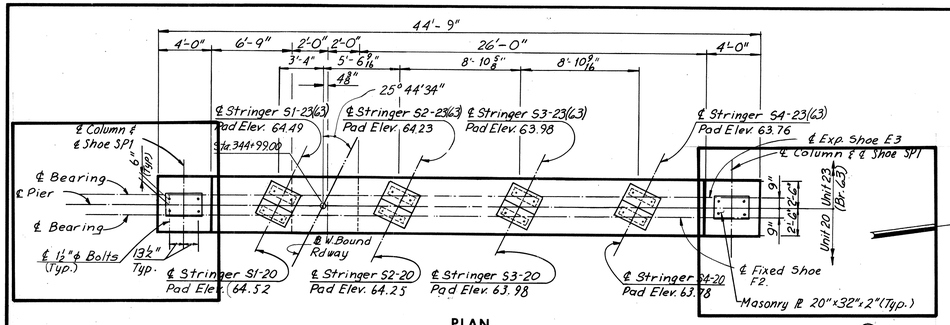
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN — UNITS 1, 2, 3 AND 4

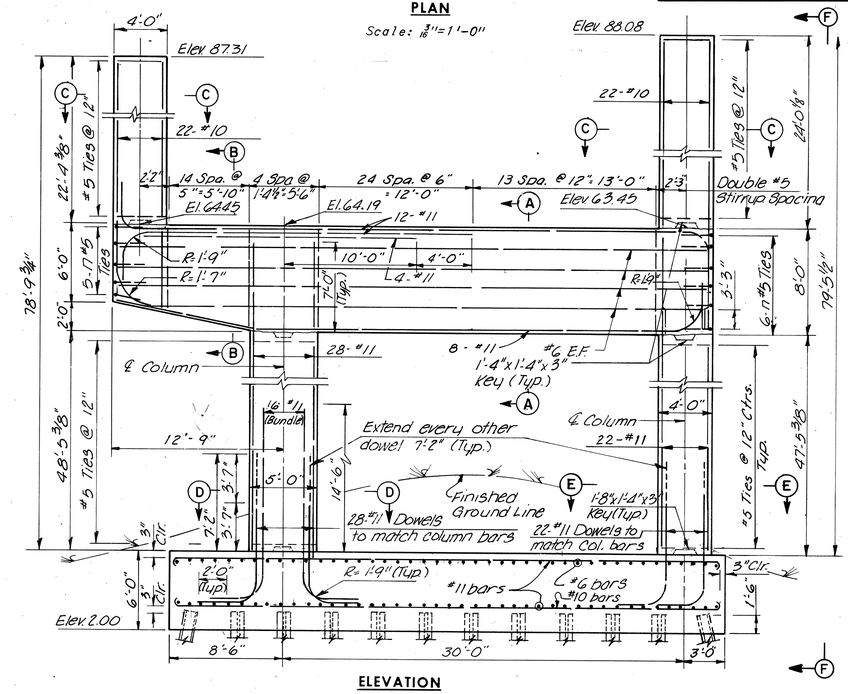
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 18 OF 38

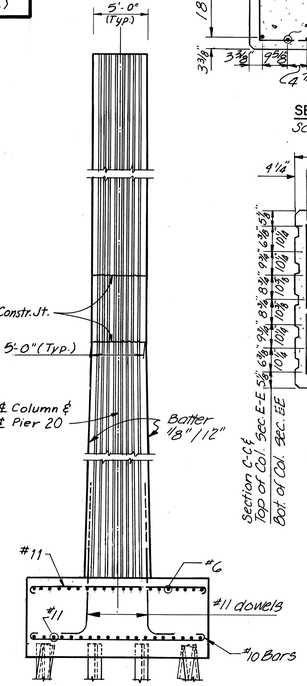
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	42	97



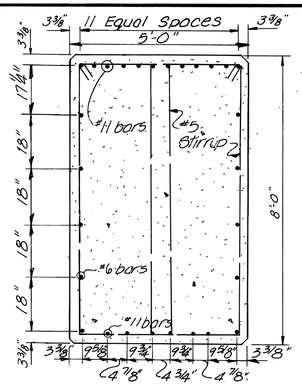
PLAN
Scale: 3/16"=1'-0"



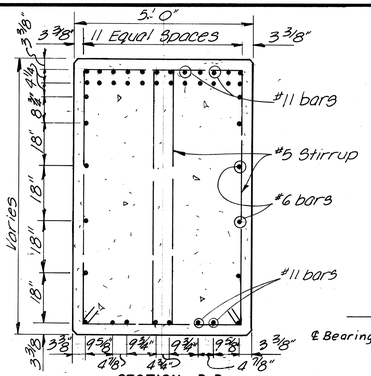
ELEVATION
Scale: 3/16"=1'-0"



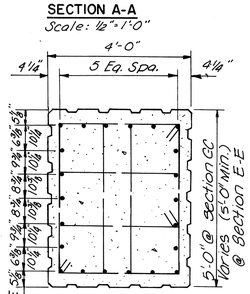
VIEW F-F
No Scale



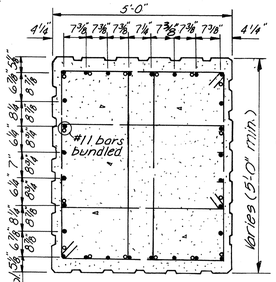
SECTION A-A
Scale: ½"=1'-0"



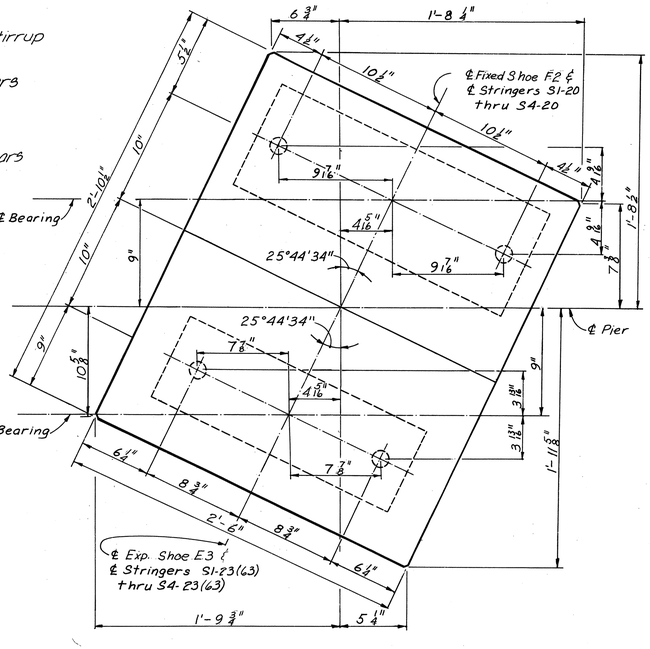
SECTION B-B
Scale: ½"=1'-0"



SECTION C-C
Scale: ½"=1'-0"
(Section E-E similar except as shown)

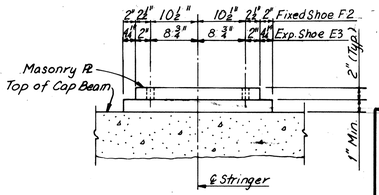


SECTION D-D
Scale: ½"=1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

Note:
Anchor Bolts and Setting Template for the shoes at Unit 23(63) shall be furnished by others for setting in the pier cap by the Contractor.

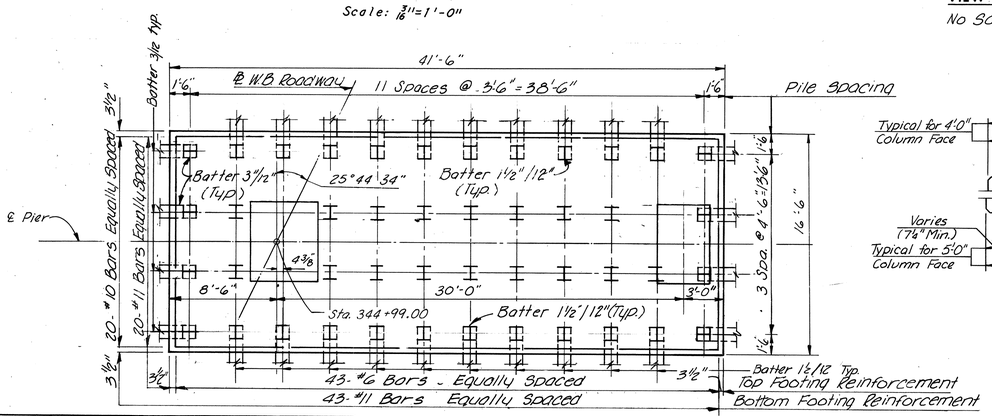


PAD ELEVATION VIEW
No Scale.

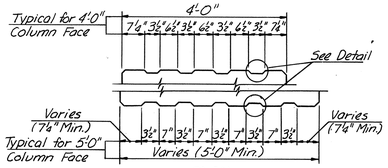
NOTE:
Pier 20 was constructed as part of Contract 10 with the Exception of the anchor bolts for the upper steel capbeam (SP1 Shoes). These shall be supplied and drilled in place as part of Contract 11.

Note:
All piles shall be 12BP53 Steel Piles (Design Capacity = 57 tons).
Batter all transverse piles 3" per foot where shown.
Batter all longitudinal piles 1½" per foot where shown.
For Standard Shoe details, see Sheet S1 & S2.
For Framing Plan, see Sheet 24.
Estimated Pile Tip Elevation -11.0.

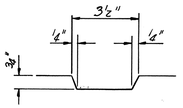
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2ft. redesign will be required.



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



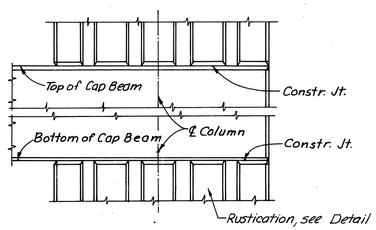
PLAN



DETAIL

RUSTICATION DETAIL
No Scale

Note:
Rustications on pier shafts shall extend a minimum of 2'-0" below the finished ground line except that when the top of footing is within 5'-0" of the finished ground line the rustications shall extend to the top of footing.



DETAIL K
No Scale

	BY	DATE
MADE	J.D.	12-13-68
CHECKED	C.E.B.	1-17-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	Shoe SP1	T.E.M.	3-76
2	Right Col. Elev.	T.E.M.	3-76
1	Rev. Elevations	S.S.S.	12-75

AS BUILT

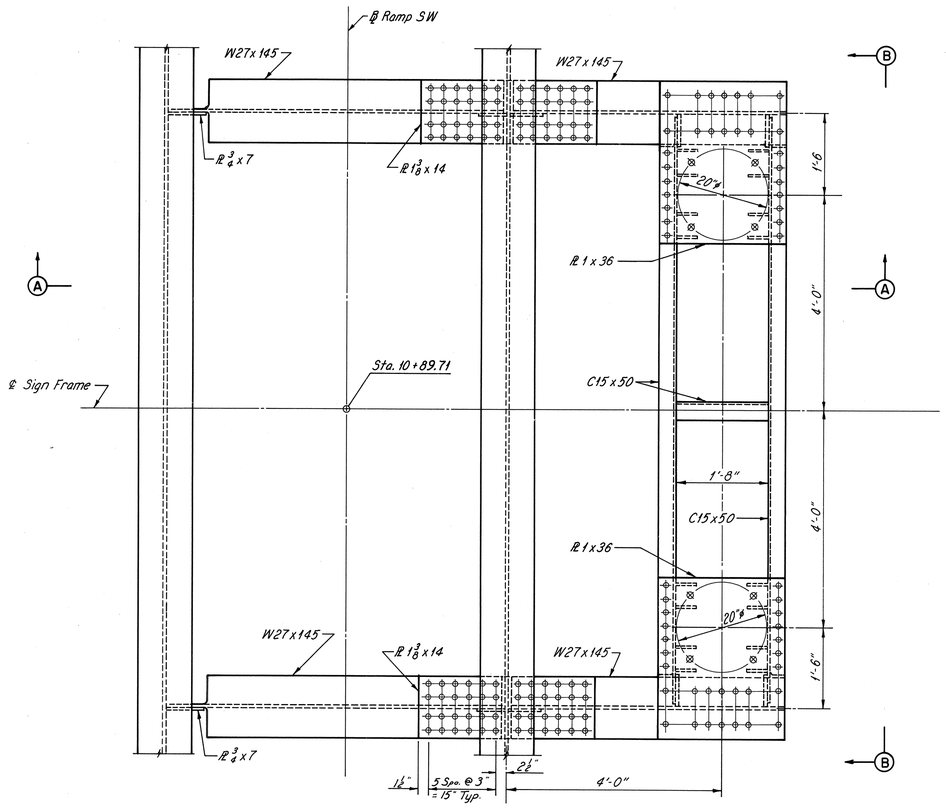
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
PIER 20

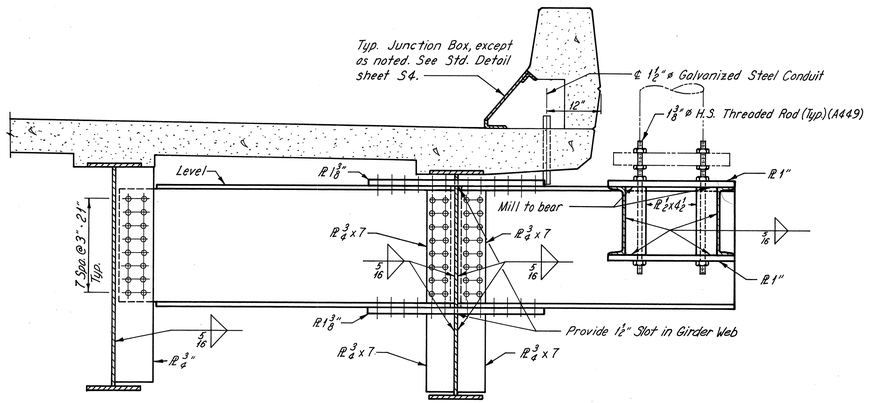
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 17 OF 38

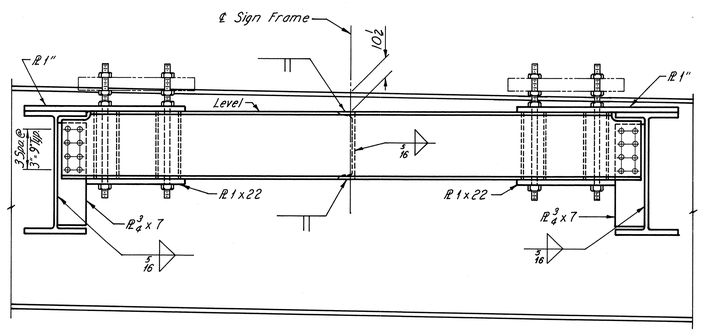
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	44A	97



PLAN



SECTION A-A



VIEW B-B

Notes:
1. See Framing Plan Sheet 16 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the end frame. Any vertical misalignment shall be taken up in the leveling nuts.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞"ø H.S. unless noted otherwise.

	BY	DATE				
MADE	JLK	7-23-75				
CHECKED	DWB	7-23-75	1	Dim ℄ Sign Frame to ℄ Lane/Channel	TEM.	4-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

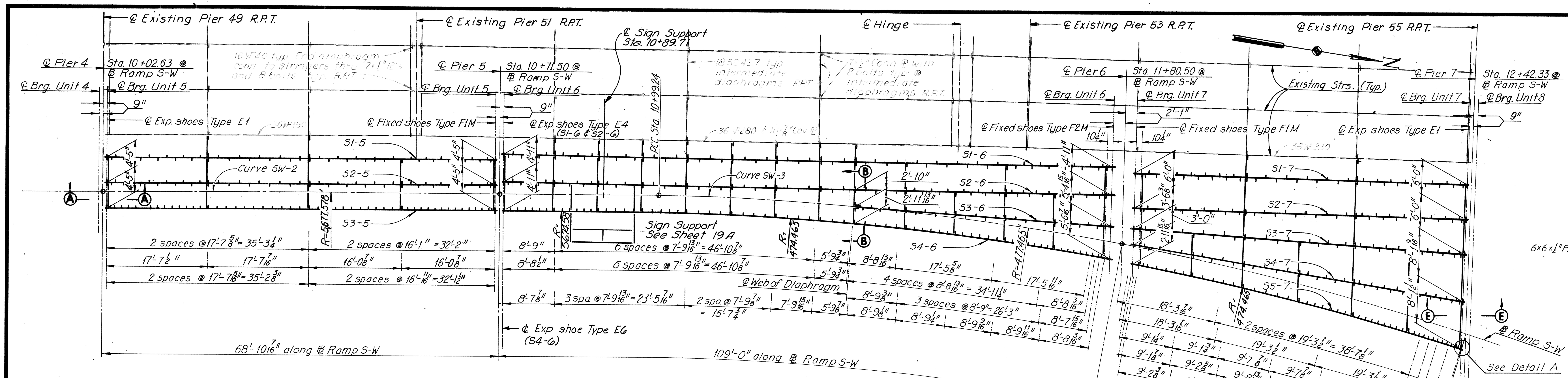
BRIDGE NO. 65
RAMP W-S CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
SIGN SUPPORT BRACKET DETAILS UNIT 6

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

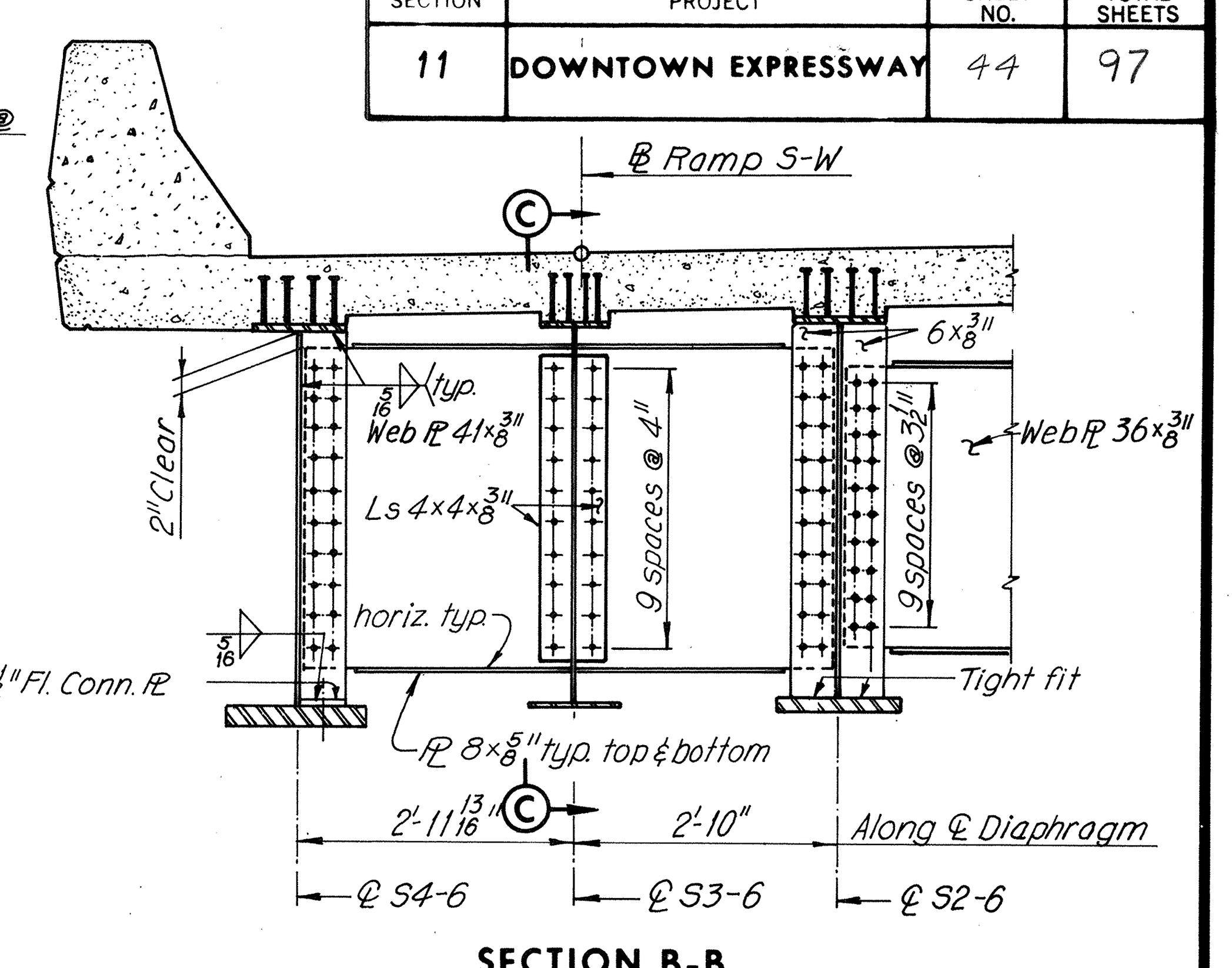
SCALE: As Shown
CONTRACT NO.: 11
SHEET NO. 19A OF 38

44A

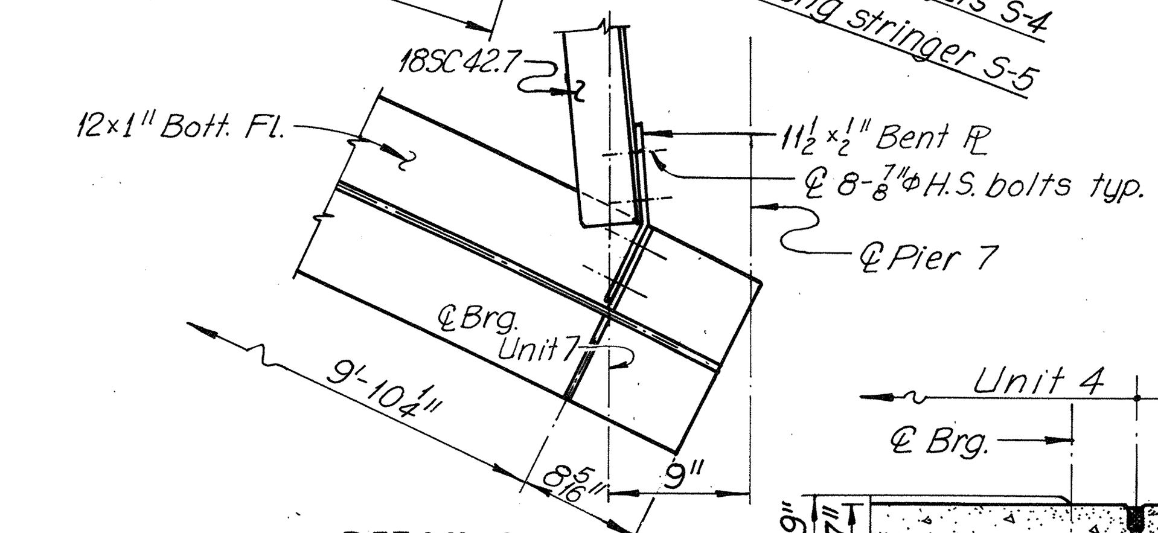
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	44	97



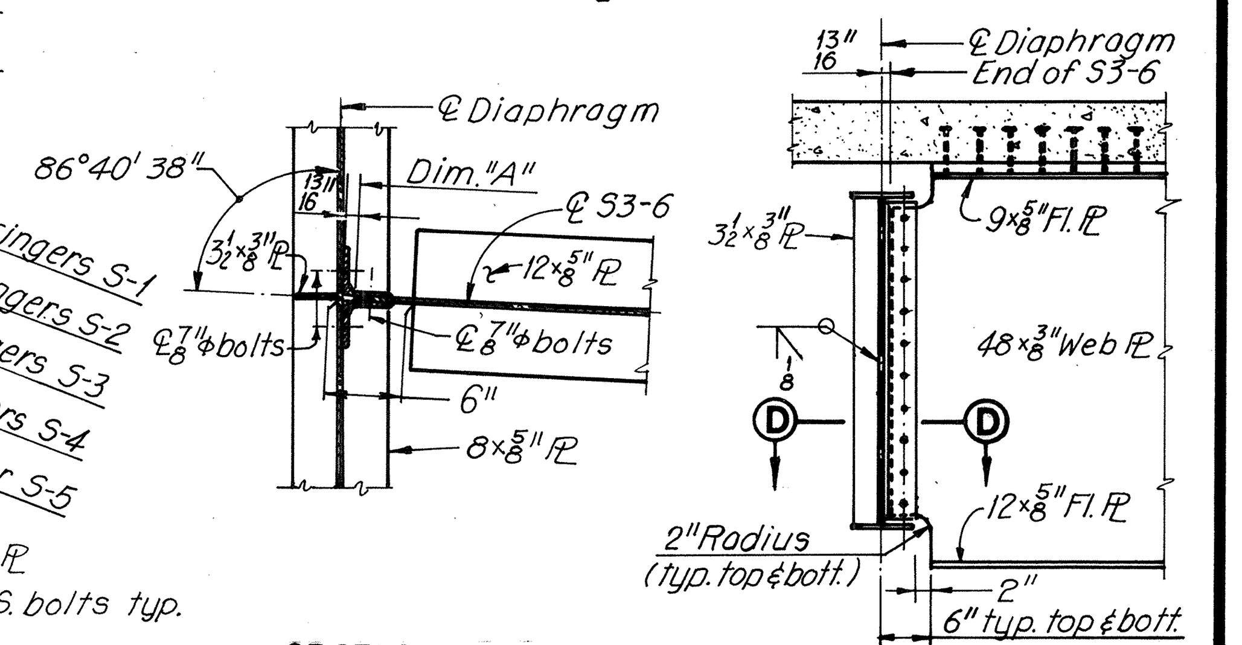
FRAMING PLAN
Scale 1"=10'-0"



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



DETAIL A
Scale 1"=1'-0"



SECTION D-D **SECTION C-C**
DETAILS OF FRAMED END STRINGER S3-6
Scale 1/2"=1'-0"

NOTES:

Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction.

The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

New Diaphragms are to match existing Diaphragms as shown in "Framing Plan".

Connection bolts in Diaphragms between existing exterior stringer and new stringer S1, shall not be fully tightened until new concrete deck slab has been poured.

Intermediate stiffener ℞s 4 1/2"x3/8" shall be equally spaced between Diaphragms as shown.

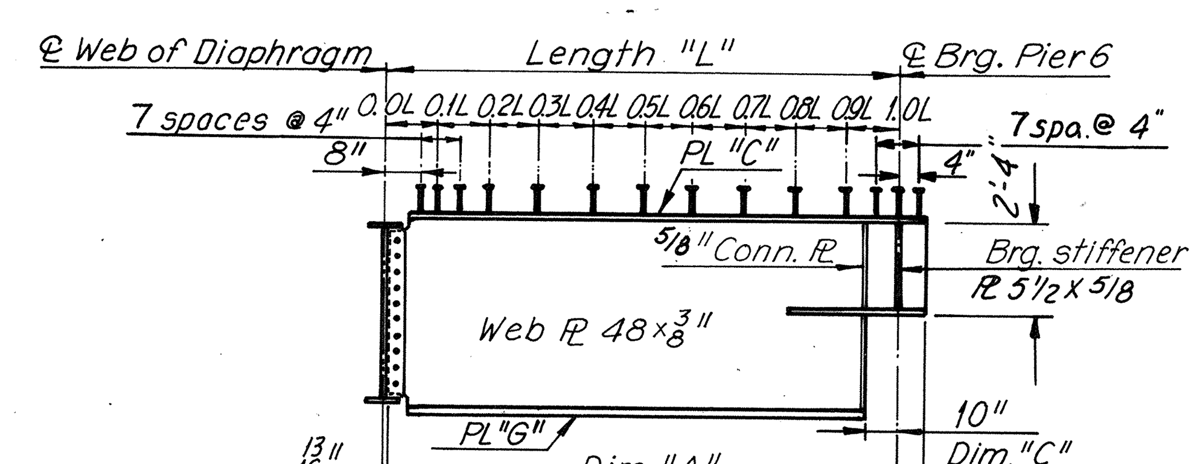
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

All horizontal dimensions in "Stringer Elevations" are measured along ℄ Web.

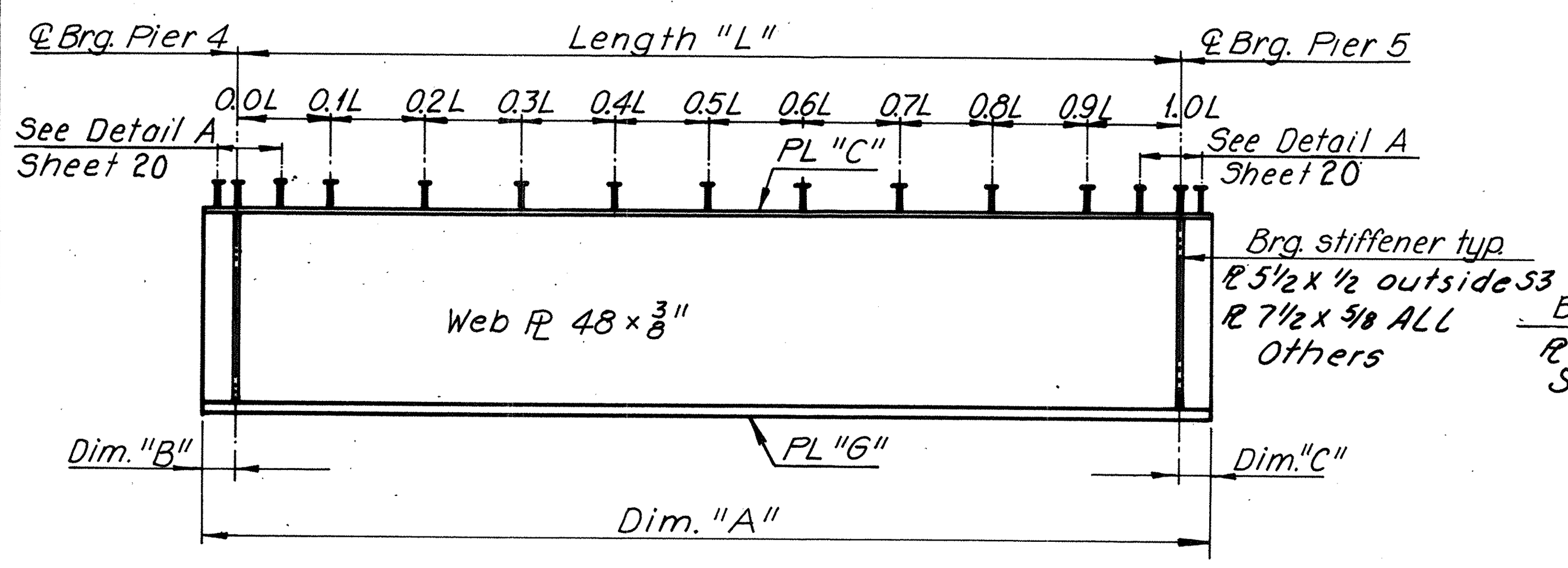
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

SHOE SCHEDULE

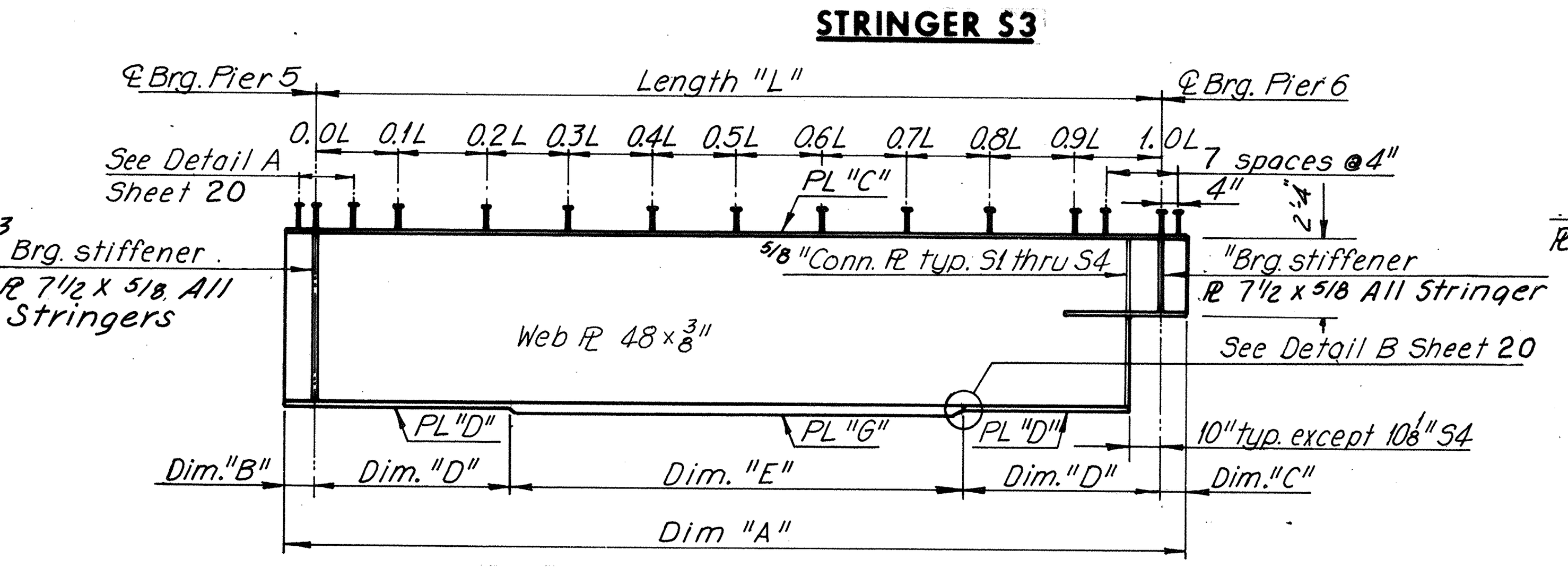
FIXED SHOES		EXPANSION SHOES	
TYPE	NO.REQD.	TYPE	NO.REQD.
F1M	8	E1	8
F2M	4	E4	2
		E6	1



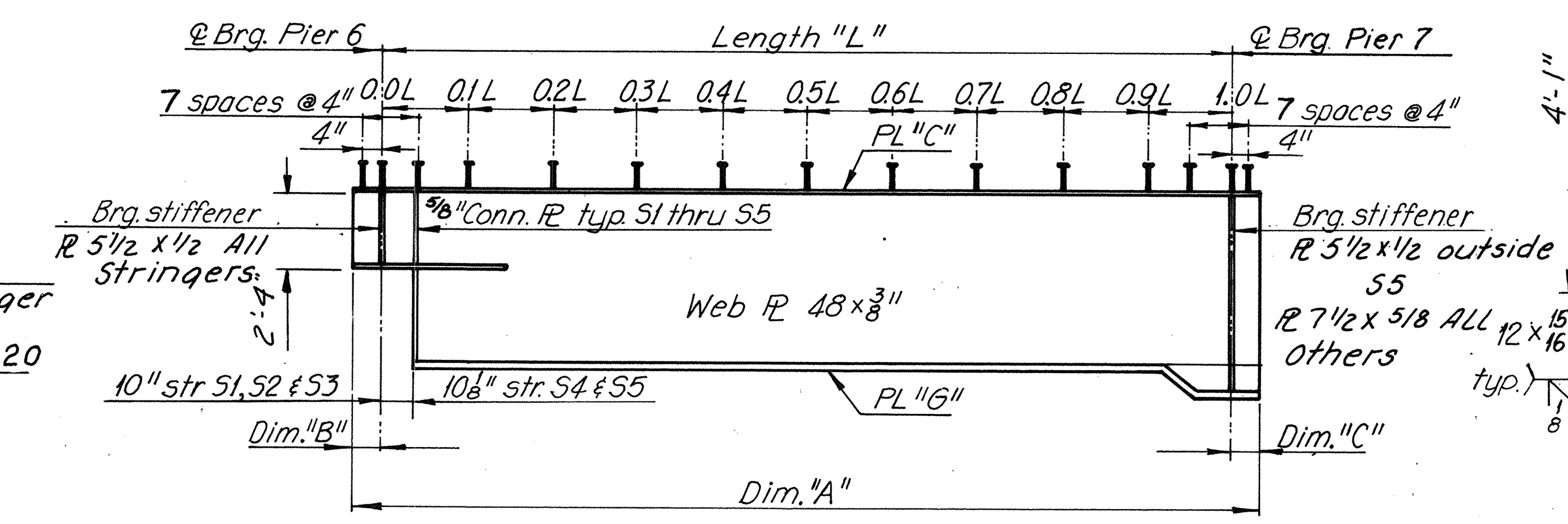
STRINGER S3



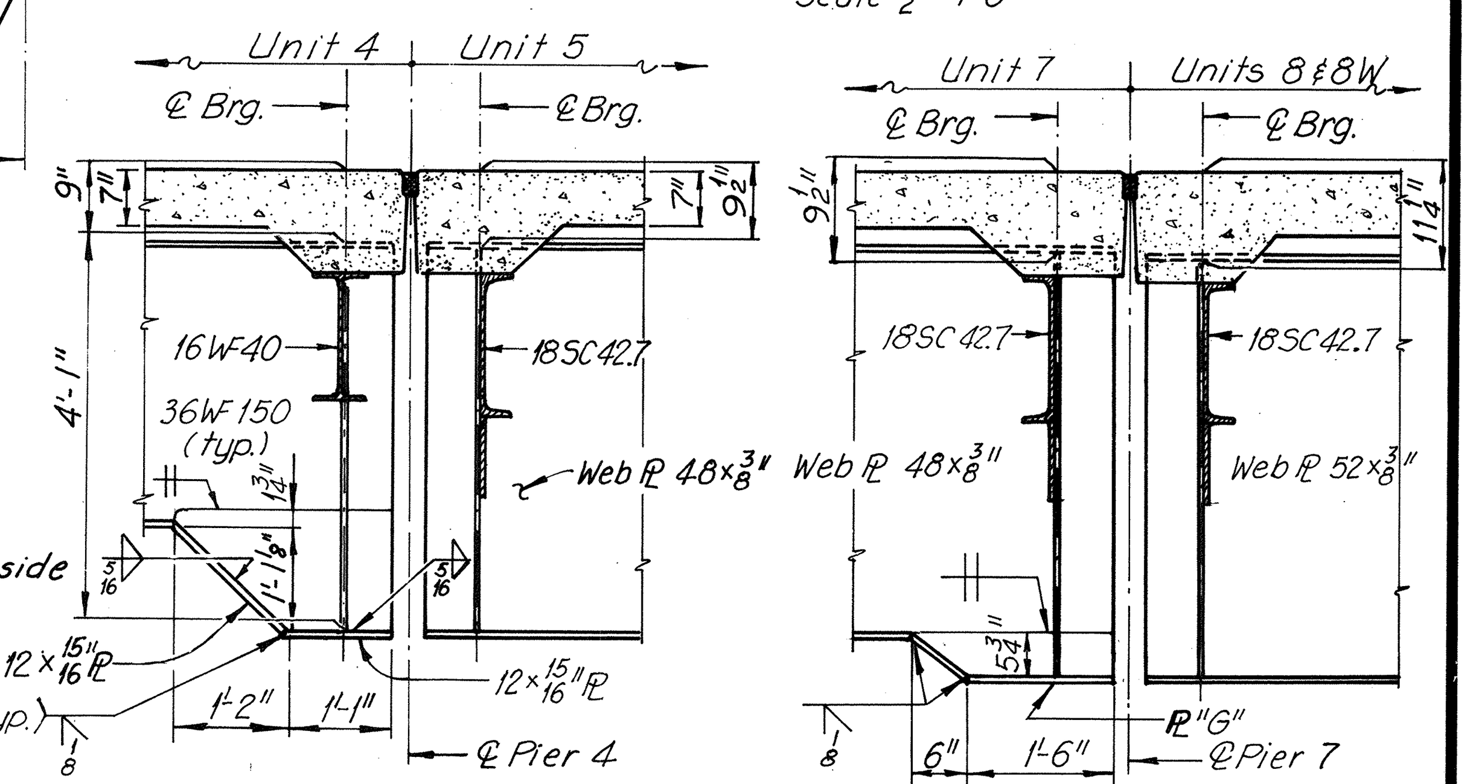
STRINGER ELEVATION UNIT 5



STRINGERS S1, S2 AND S4
STRINGER ELEVATIONS UNIT 6



STRINGER ELEVATION UNIT 7



SECTION A-A **SECTION E-E**

Note:
Web transition @ Pier 7 is shown for stringers S1-7 through S5-7.

DETAILS OF WEB TRANSITION AT PIERS 4 AND 7
Scale 1/2"=1'-0"

STRINGER SCHEDULE

UNIT	STRINGER	DIM. "A"	LENGTH "L"	DIM. "B"	DIM "C"	DIM "D"	DIM. "E"	PL. "C"	PL. "D"	PL. "G"	MAX. SHEAR STUD SPACING ** 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	0.5L-0.6L	0.6L-0.7L	0.7L-0.8L	0.8L-0.9L	0.9L-1.0L*	DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
5	S1-5	68'-7 1/4"	67'-5 1/4"	7"	7"	--	--	9 x 5/8"	--	12"x3/4"	18"	20"	23"	24"	24"	24"	24"	23"	20"	18"	3/8"	9/16"	3/8"	11/16"	1"	3/4"
	S2-5	68'-6 11/16"	67'-4 11/16"	7"	7"	--	--	9"x5/8"	--	12"x3/4"	18"	20"	23"	24"	24"	24"	24"	23"	20"	18"	1/2"	11/16"	1/2"	13/16"	1 1/8"	7/8"
	S3-5	68'-8 1/8"	67'-4 1/8"	8"	8"	--	--	9"x5/8"	--	12"x7/8"	15"	17"	20"	24"	24"	24"	24"	20"	17"	15"	5/8"	7/8"	5/8"	15/16"	1 5/16"	1"
6	S1-6	107'-1 1/2"	106'-0"	7"	6 1/2"	16'-0"	74'-0"	16"x1"	16"x1"	16"x1 1/2"	18"	20"	24"	24"	24"	24"	24"	24"	20"	18"	1 1/4"	1 11/16"	1 1/4"	1 11/16"	2 3/8"	1 11/16"
	S2-6	107'-0 5/16"	105'-10 13/16"	7"	6 1/2"	12'-11 3/4"	80'-0"	16"x1"	16"x1"	16"x1 3/4"	17"	20"	24"	24"	24"	24"	21"	18"	14"	13"	1 7/16"	2 1/16"	1 1/2"	1 15/16"	2 3/4"	2"
	S3-6	45'-0 1/4" ‡	44'-6 9/16" ‡	--	6 1/2"	--	--	9"x5/8"	--	12"x5/8"	17" ‡‡	17"	17"	17"	17"	17"	17"	17"	17"	17"	1/16"	1/8"	1/16"	1/8"	1/8"	1/8"
	S4-6	107'-3 5/8"	106'-1 1/16"	8"	6 9/16"	16'-0"	74'-1 1/16"	16"x1 1/8"	18"x1 1/2"	18"x2 1/4"	15"	17"	21"	24"	24"	24"	24"	19"	15"	13"	2"	2 13/16"	2"	2 7/16"	3 1/2"	2 1/2"
7	S1-7	58'-10 1/4"	57'-8 3/4"	6 1/2"	7"	--	--	9"x5/8"	--	12"x5/8"	15"	17"	19"	22"	24"	24"	22"	19"	17"	15"	1/4"	3/8"	1/4"	5/16"	7/16"	5/16"
	S2-7	58'-9 1/2"	57'-8"	6 1/2"	7"	--	--	9"x5/8"	--	12"x5/8"	15"	17"	19"	22"	24"	24"	22"	19"	17"	15"	1/4"	3/8"	1/4"	5/16"	1/2"	5/16"
	S3-7	58'-9 1/2"	57'-8"	6 1/2"	7"	--	--	9"x5/8"	--	12"x3/4"	18"	18"	24"	24"	24"	22"	17"	16"	14"	12"	1/4"	3/8"	1/4"	5/16"	1/2	5/16
	S4-7	59'-2 1/4"	58'-0 5/8"	6 9/16"	7 1/16"	--	--	9"x5/8"	--	12"x3/4"	18"	18"	24"	24"	24"	22"	17"	16"	14"	12"	5/16"	7/16"	5/16"	3/8"	1/2"	3/8"
	S5-7	60'-2"	58'-11 1/8"	6 9/16"	8 5/16"	--	--	9"x5/8"	--	12"x1"	16"	16"	22"	22"	22"	22"	18"	15"	13"	11"	3/8"	1/2"	3/8"	11/16"	15/16"	5/8"

** Use 2-7/8"φ Shear Studs on stringers S3-6 and S1-7 through S5-7
** Use 2-7/8"φ Shear Studs on stringers S1-5, S2-5 and S3-5

*.....Spacing begins at termination of 7 spaces @ 4"
‡.....See Stringer Elevation of stringer S3-6
‡‡.....For Shear Stud spacing at framed end of stringer S3-6 see Stringer Elevation above.

NOTE:
ALL STRUCTURAL STEEL SHALL BE A-36

Notes:
For Superstructure Steel Quantities see Sheet 4.
For additional Diaphragm Details see Sheet 26.
For Deck Plan see Sheet 26.
For Dead Load Deflection and Camber Diagram see Sheet 20
For Joint Details see Sheets 34 and 35.
For Detail "A" see Sheet 20
For Standard Shoe Details see Sheets S1 and S2.
For Flange to Web welds see Sheet 24.

	BY	DATE	NO.	REVISION	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.V. / J.L.K	1-16-69 / 6-27-75	3	Camber S1-6	T.E.M.	3-76	6	Shoes @ Pier 5	TEM	7-76
CHECKED	AMH	1-30-69	2	Dimension Changes	TEM	9-8-75	5	Shear Studs	TEM	6-76
IN CHARGE			1	Diaphs. removed & Note revised	L.B.P.	8-25-75	4	Shear Stud Spacing	TEM	6-7-76

AS BUILT

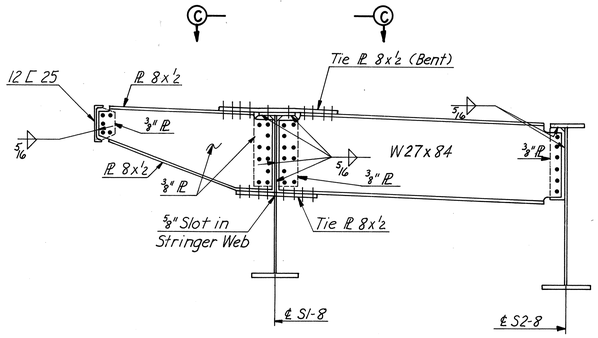
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN-UNITS 5,6 AND 7

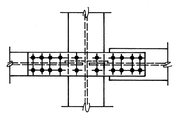
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As shown
CONTRACT NO.: 11
SHEET NO. 19 OF 38

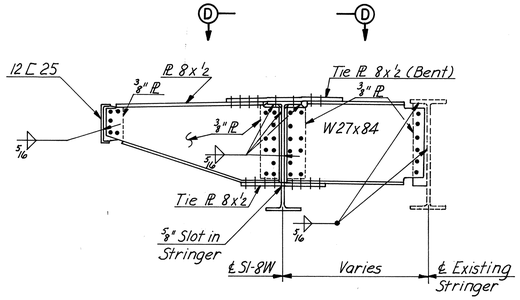
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	Downtown Exp	45A	97



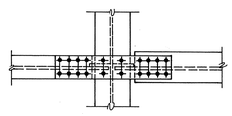
SECTION A-A



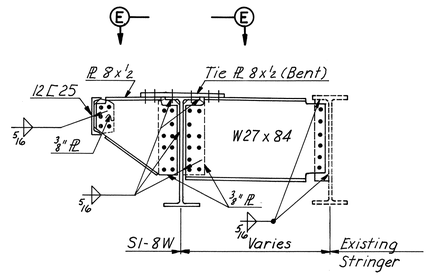
SECTION C-C



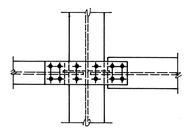
SECTION M-M



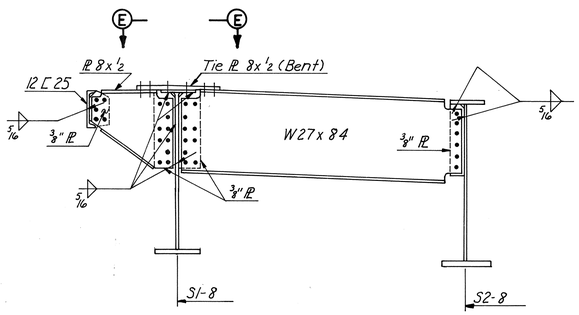
SECTION D-D



SECTION N-N



SECTION E-E



SECTION B-B

NOTE:
For location of Sections A-A & B-B, see Sheet 20.
For location of Sections M-M & N-N, see Sheet 32.

DESIGNED						
DRAWN	E.J.M	9-75				
CHECKED			⚠	New Sheet	T.E.M.	9-9-75
IN CHARGE	P.R.Y.		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

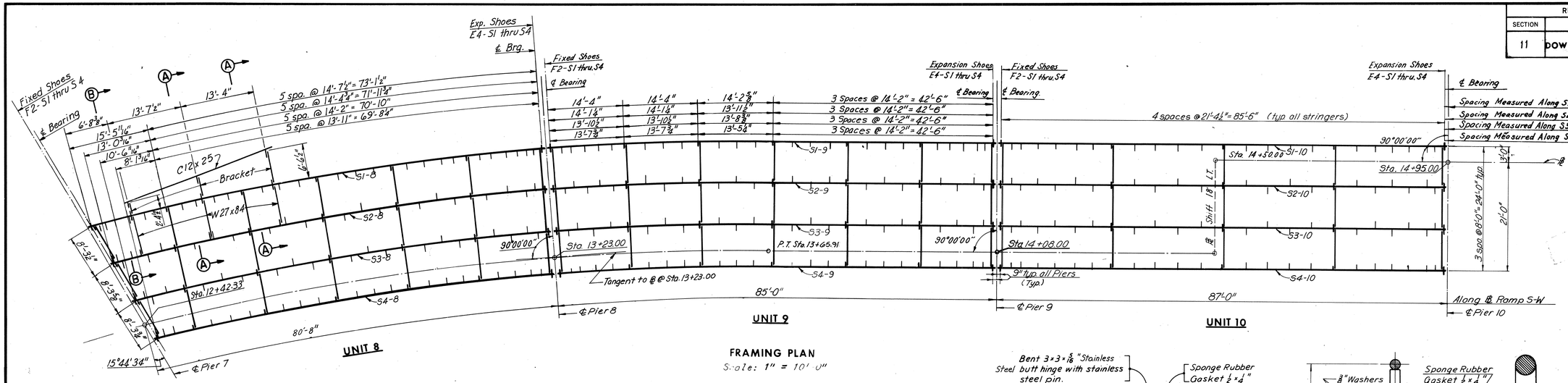
BRIDGE NO. 65
RAMP S W CONNECTION FROM
RICHMOND PETERSBURG TURNPIKE
FRAMING DETAILS UNIT 8 & 8W

SCALE As Noted
DATE

SHEET 20a OF 38

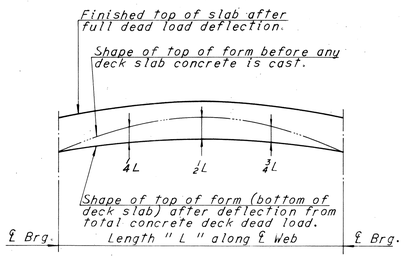
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	45	97



FRAMING PLAN

Scale: 1" = 10'-0"

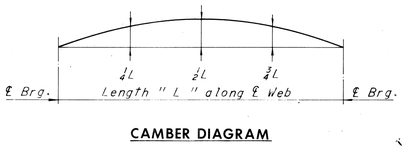


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

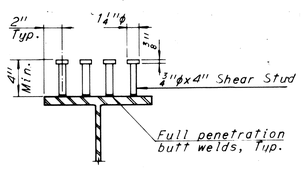
The stringers shall be fabricated with a total camber amounting to the tabulated value. A positive number indicates an upward camber and negative number indicates a downward camber. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

Notes:

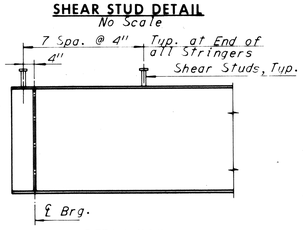
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance from top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross section on sheet 27.



SHEAR STUD DETAIL

No Scale



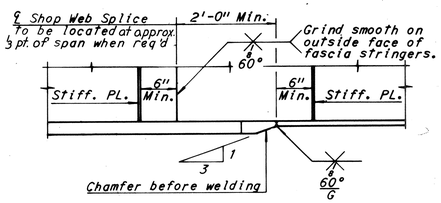
DETAIL "A"

No Scale

SHEAR STUD NOTE

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

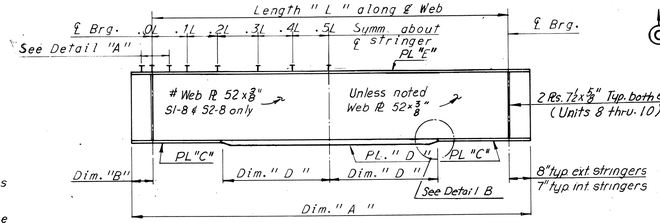
Stud rows shall be placed parallel to the main deck reinforcement.



DETAIL "B"

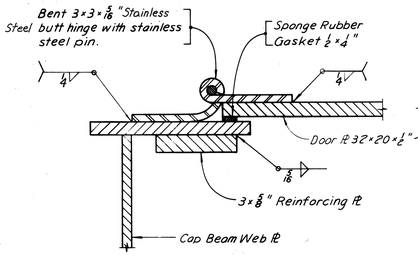
No Scale

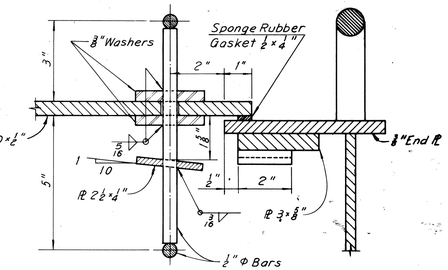
\# Denotes A572-Grade 50 Steel for thickness of ¾" and under and A588 Steel for thickness over ¾".



STRINGER ELEVATION

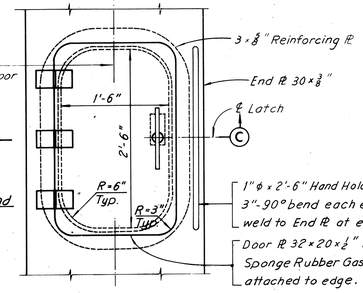
No Scale





SECTION C-C

No Scale



ACCESS DOOR - TYPE B

Scale: 1" = 1'-0"

For the location of Access Door Type-B, see sheet 7.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	12	F2	12

Notes:

All steel shall be A36 steel unless denoted otherwise.

Intermediate stiffener plates shall be equally spaced between diaphragms as shown.

The first two plates at the ends of stringers shall be one half the normal spacing within the panel.

All intermediate stiffeners shall be Pl. 4½x⅜".

For framing and connecting detail, see sheet 27.

For shoe detail, see sheet S1 & S2.

All Horizontal Dimensions are measured along ℄ Web.

For Web to Flange Welds and Longitudinal Stiffener Details, see Sheet 24.

For Diaphragm Details, see Sheet 27.

For Structural Steel Quantities, see Sheet 4.

For Joint Details, see Sheets 34 and 35.

It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

For Sections A-A and B-B see Sheet 20a.

AS BUILT

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "D"	PL."C"	PL."D"	PL."E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
8	S1-8	89'-11⅞"	88'-7⅛"	8"	26'-6"	#16x½"	#16x2"	#12x1"	9"	10"	12"	16½"	20"
	S2-8	86'-1⅝"	84'-11⅝"	7"	30'-0"	#16x1"	#16x1½"	#12x3"	11½"	12½"	15"	18"	21½"
	S3-8	82'-6⅛"	81'-4⅛"	7"	24'-0"	16x 1"	16x1¾"	12x1"	12"	13"	16"	19"	23"
	S4-8	79'-1⅛"	77'-9⅛"	8"	26'-0"	16x ⅝"	16x1⅞"	12x2¾"	12"	13½"	16"	19"	24"
9	S1-9	86'-8⅝"	85'-4⅝"	8"	27'-6"	16x1¼"	16x2⅝"	12x2¾"	10"	11"	14"	16½"	21"
	S2-9	85'-10"	84'-8"	7"	28'-0"	16x 1"	16x 2"	12x2¾"	11"	12½"	15½"	18"	22"
	S3-9	85'-1⅛"	83'-11⅛"	7"	30'-0"	16x ¾"	16x1⅝"	12x2¾"	11½"	13"	16"	19"	23"
	S4-9	84'-6¾"	83'-2¾"	8"	28'-0"	16x ¾"	16x1⅞"	12x2¾"	11½"	13½"	17"	20½"	24"
10	S1-10	86'-1 10"	85'-6"	8"	29'-0"	16x ¾"	16x1½"	12x2¾"	10½"	11½"	15"	18"	23"
	S2-10	86'-1 8"	85'-6"	7"	29'-0"	16x ¾"	16x1½"	12x2¾"	11½"	12½"	15½"	18½"	22"
	S3-10	86'-1 8"	85'-6"	7"	29'-0"	16x ¾"	16x1½"	12x2¾"	11½"	12½"	15½"	18½"	22"
	S4-10	86'-1-10"	85'-6"	8"	29'-0"	16x ¾"	16x1½"	12x2¾"	10½"	11½"	15"	18"	23"

* Spacing begins at termination of 7 spaces @ 4".

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1⅛"	1 3/4"	1 1/4"
1 3/16"	1 1/16"	1 3/16"
7/8	1 1/4"	7/8"
3/4"	1 1/16"	3/4"
1⅛"	1 3/4"	1 1/4"
1 1/16"	1 3/16"	1 1/16"
1⅛"	1 3/8"	1"
1"	1 3/8"	1"
15/16"	1 5/16"	15/16"
1 1/8"	1 9/16"	1 1/8"
1 5/16"	1 9/16"	1 1/8"
1 1/16"	1 1/2"	1 1/16"
1 1/16"	1 1/2"	1 1/16"
1 1/8"	1 9/16"	1 1/8"

CAMBER SCHEDULE

¼L	½L	¾L
-3/4"	-1"	-11/16"
-3/8"	-1 1/16"	-3/8"
-1 1/8"	-1 1/2"	-1 1/8"
-1 1/4"	-1 5/8	-1 1/4"
1 1/2"	2 1/8"	1 1/2"
1 1/4"	1 11/16"	1 1/4"
1 3/16"	1 5/8"	1 3/16"
1 1/8"	1 9/16"	1 1/8"
1 5/16"	3 9/16"	3"
1 9/16"	3 1/2"	2 15/16"
1 5/16"	3 3/16"	2 15/16"
2 5/16"	3 1/2"	2 15/16"

NO.	REVISION	BY	DATE
3	St length S2-8	TEM	3-16
2	Dimensions Added	TEM	9-9-75
1	Bracket Unit 8	TEM	8-25-75
	Re-design S1-8 & S2-8	TEM	
	Pl. Stes.	TEM	5-76

	BY	DATE
MADE	R.C. J.L.K.	1-16-69 6-26-75
CHECKED	AMH	1-24-69
IN CHARGE		

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN UNITS 8,9 AND 10

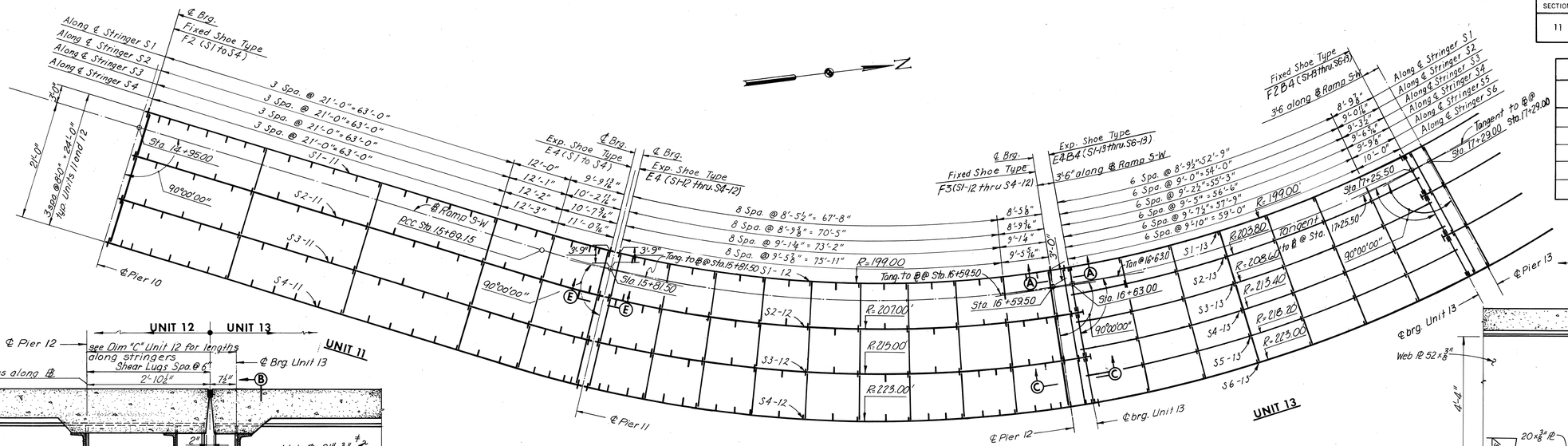
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

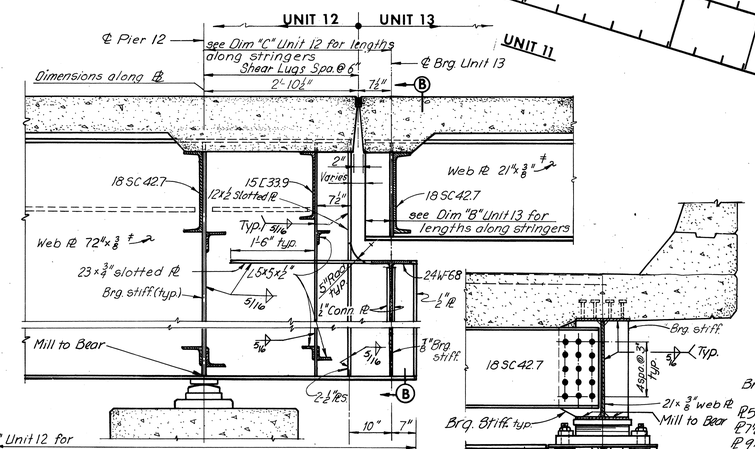
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 20 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	46	97

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	8	F2	4
E4B4	6	F3	4
		F2B4	6



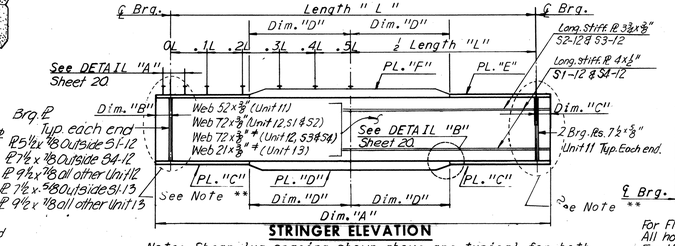


Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

UNIT 12

** Note: For stringers in Unit 11, see Section E-E
For stringers in Units 12 and 13, see Section A-A

FRAMING PLAN
Scale: 1"=10'-0"

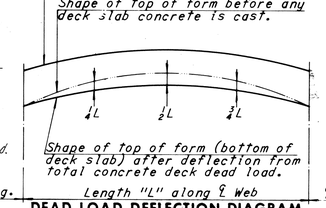


STRINGER ELEVATION

Note: Shear lug spacing shown above are typical for both halves of the stringer.

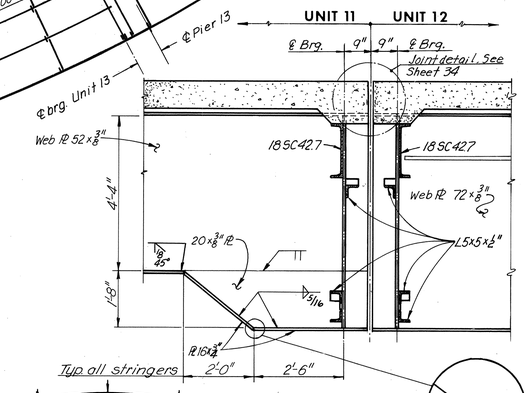
Finished top of slab after full dead load deflection.

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

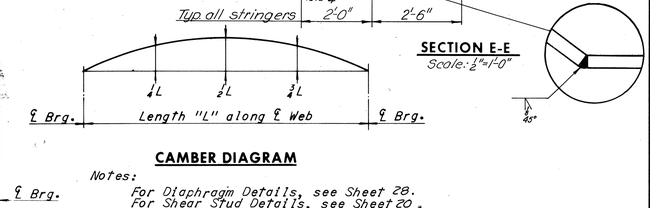


DEAD LOAD DEFLECTION DIAGRAM

For Flange Splice Detail, see Sheet 23
All horizontal dimensions are measured along ℄ Web.
For Horizontal Stiffener Detail and Web to Flange Welds, see Sheet 24.



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



CAMBER DIAGRAM

Notes:
For Diaphragm Details, see Sheet 28.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35.
For Shoe Details, see Sheet S1 & S2.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "C"	Dim. "D"	Dim. "B"	PL. "C"	PL. "D"	PL. "E"	PL. "F"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
11	S1-11	86'-1 1/8"	84'-9 1/16"	8"	29'-0"	8"	16x3/4"	16x1 1/2"	12x3/4"	—	10 1/2"	12"	15"	18"	23"
	S2-11	86'-5 11/16"	85'-3 11/16"	7"	29'-2"	7"	16x3/4"	16x1 1/2"	12x3/4"	—	11 1/2"	12 1/2"	15 1/2"	18 1/2"	22"
	S3-11	86'-11 3/16"	85'-9 3/16"	7"	29'-6"	7"	16x3/4"	16x1 1/2"	12x3/4"	—	11 1/2"	12 1/2"	15 1/2"	18 1/2"	22"
	S4-11	87'-7 7/16"	86'-3 7/16"	8"	29'-8"	8"	16x3/4"	16x1 1/2"	12x3/4"	—	10 1/2"	12"	15"	18"	23"
12	S1-12	80'-9 1/4"	76'-1 1/4"	31'-5 3/8"	—	8"	12x5/8"	—	12x3/4"	—	16 1/2"	19 1/2"	22 1/2"	24"	24"
	S2-12	83'-11 3/16"	79'-2 3/16"	31'-7"	—	7"	16x1/4"	—	12x3/4"	—	14"	16 1/2"	19 1/2"	24"	24"
	S3-12	87'-1 5/16"	82'-3 1/16"	31'-8 11/16"	25'-0"	7"	12x1 11/16"	16x1 3/16"	12x3/4"	—	13 1/2"	14 1/2"	17"	21 1/2"	24"
	S4-12	90'-5 5/16"	85'-4 5/16"	31'-10 3/16"	24'-6"	8"	16x1 11/16"	16x1 3/16"	12x1 1/16"	—	12 1/2"	13"	16"	21"	24"
13	S1-13	62'-6 7/16"	61'-6 7/16"	6"	—	6"	16x1 1/4"	—	12x3/4"	—	8 1/2"	9 1/2"	12"	15 1/2"	20 1/2"
	S2-13	64'-0 1/16"	63'-0 1/16"	6"	—	6"	16x5/8"	—	12x3/4"	—	8 1/2"	10"	13"	16 1/2"	21"
	S3-13	65'-6 1/16"	64'-6 1/16"	6"	18'-6"	6	16x1 1/16"	20x1 1/16"	12x1 1/16"	—	8"	9"	12"	16"	20"
	S4-13	67'-1 3/16"	66'-0 3/16"	6"	18'-6"	6	16x5/8"	20x1 3/16"	16x3/4"	—	8"	9"	11 1/2"	14 1/2"	18 1/2"
	S5-13	68'-6 1/16"	67'-6 1/16"	6"	19'-6"	6	16x1 5/16"	20x1 5/16"	16x1 5/16"	—	7 1/2"	8 1/2"	11 1/2"	14 1/2"	19 1/2"
	S6-13	70'-0"	69'-0"	6"	19'-6"	6	20x1 1/16"	24x1 1/16"	16x1 1/4"	20x1 1/8"	6 1/2"	7 1/2"	10"	13 1/2"	19"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L
1 1/8"	1 9/16"	1 1/8"	3 5/8"	5"	3 5/8"
1 1/16"	1 1/2"	1 1/16"	3 5/8"	5"	3 7/8"
1 1/8"	1 9/16"	1 1/8"	3 3/4"	5 1/16"	3 3/4"
1 3/16"	1 5/8"	1 3/16"	3 7/8"	5 1/4"	3 7/8"
1/4"	3/8"	1/4"	2 3/16"	2 7/8"	2 3/16"
3/8"	1/2"	3/8"	2 9/16"	3 1/2"	2 5/8"
5/8"	13/16"	5/8"	3 1/8"	4 1/4"	3 3/16"
7/8"	1 1/4"	7/8"	3 1/16"	5 1/8"	3 13/16"
7/8"	1 1/4"	7/8"	2 7/16"	3 3/8"	2 7/16"
7/8"	1 1/4"	7/8"	2 1/2"	3 7/16"	2 1/2"
1 3/16"	1 5/8"	1 3/16"	2 13/16"	3 13/16"	2 13/16"
1 3/8"	1 15/16"	1 3/8"	3"	4 1/8"	3"
1 1/2"	2 1/16"	1 1/2"	3 1/8"	4 1/4"	3 1/8"
2 3/16"	3"	2 3/16"	3 13/16"	5 1/4"	3 13/16"

* Spacing begins at termination of 7 spaces @ 4".

Note: Dim. "D" is measured out from the halfway line (.5L) between ℄ Brgs. of stringer.

Note: See Section A-A for limits of Dims. A, B and C as shown in the Stringer Schedule above.
Dimension F equals 39'-0", S6-13 only.

: Denotes A572 Grade 50 Steel for thickness of 1" and under and A588 Steel for thickness over 4".

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

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

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 29.

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

AS BUILT

	BY	DATE
MADE	J.V.	1-21-69
CHECKED	A.M.H.	1-27-69
IN CHARGE		

NO.	REVISION	BY	DATE

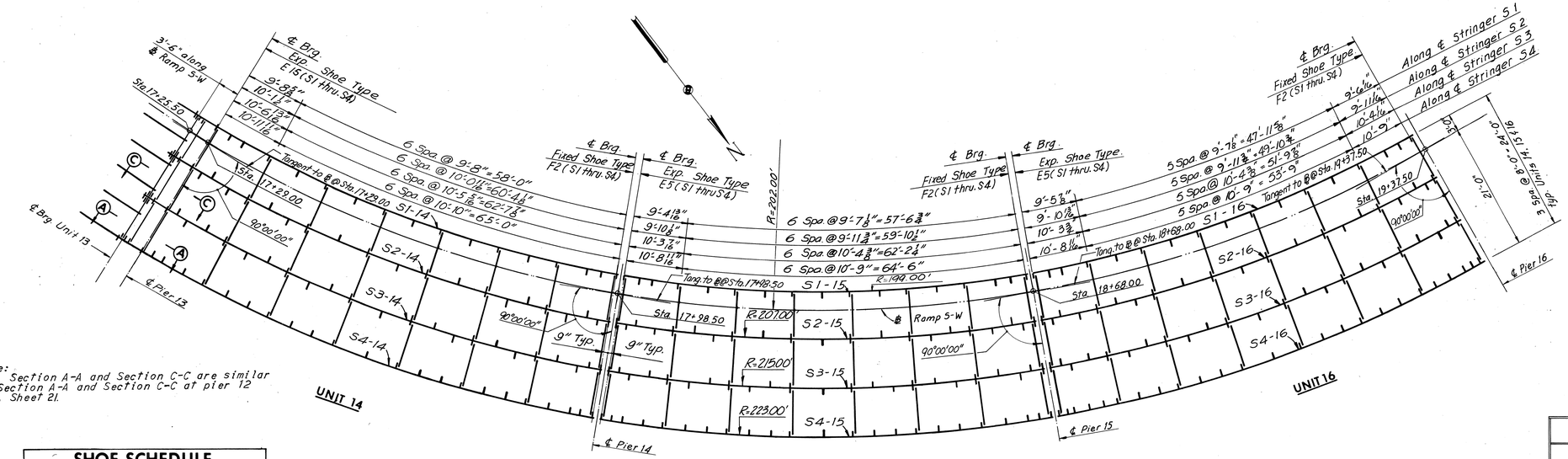
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN UNITS 11, 12 AND 13

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 21 38

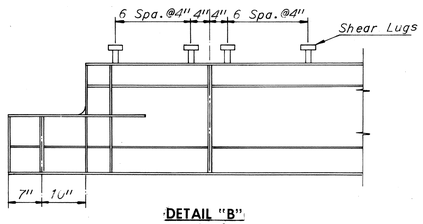
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	47	97



Note: Section A-A and Section C-C are similar to Section A-A and Section C-C at pier 12 see, Sheet 21.

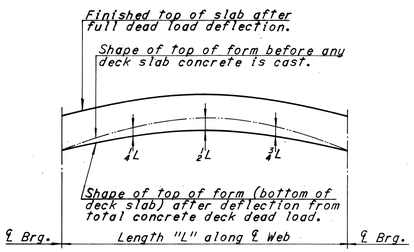
SHOE SCHEDULE

EXPANSION SHOE		FIXED SHOES	
TYPE	NO.REQD.	TYPE	NO. REQD.
E5	8	F2	12
E15	4		



DETAIL "B"
No Scale

FRAMING PLAN
Scale 1" = 10'-0"



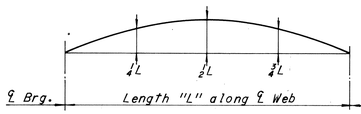
DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer witout altering the slab thickness.

Notes:
All steel shall be A36 unless otherwise shown.
Exterior Stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be 4½ x ⅜".



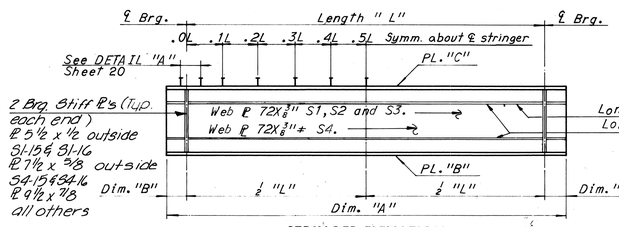
CAMBER DIAGRAM

NOTE TO FABRICATOR

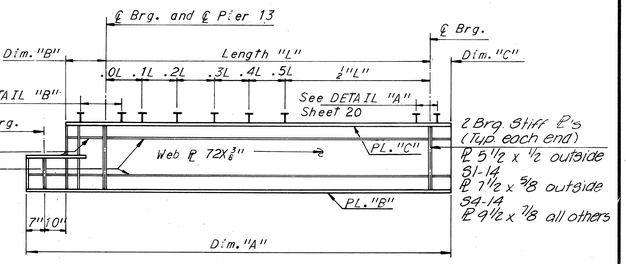
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 29.



STRINGER ELEVATION
UNITS 15 AND 16
No Scale



STRINGER ELEVATION
UNIT 14
No Scale

STRINGER SCHEDULE

UNIT	STRINGER	Dim "A"	LENGTH "L"	Dim. "B"	Dim. "C"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
14	S1 - 14	72'-5 "	67'-8⅝"	2'-7⅝"	8"	12 x ¾"	12 x ¾"	20"	23"	24"	24"	24"
	S2 - 14	75'-2⅛"	70'-5⅝"	2'-9⅛"	7"	16 x ⅞"	12 x ¾"	17"	19"	22"	24"	24"
	S3 - 14	78'-1⅜"	73'-2⅛"	2'-10⅛"	7"	16 x1⅛"	12 x ¾"	14½"	16"	18½"	21½"	24"
	S4 - 14	81'-1⅛"	75'-11⅛"	3'-0⅜"	8"	‡16 x 1"	12 x ¾"	11½"	13½"	15½"	19"	23½"
15	S1 - 15	68'-3⅜"	66'-11⅛"	8"	8"	12 x ¾"	12 x ¾"	20"	23"	24"	24"	24"
	S2 - 15	70'-10⅜"	69'-8⅝"	7"	7"	16 x ⅞"	12 x ¾"	17"	19"	22"	24"	24"
	S3 - 15	73'-7⅛"	72'-5⅛"	7"	7"	16 x1⅛"	12 x ¾"	14½"	16"	18½"	21½"	24"
	S4 - 15	76'-6⅛"	75'-2⅛"	8"	8"	‡16 x 1"	‡12 x ¾"	11½"	13½"	15½"	19"	23½"
16	S1 - 16	68'-3⅜"	66'-11⅛"	8"	8"	12 x ¾"	12 x ¾"	20"	23"	24"	24"	24"
	S2 - 16	70'-10⅜"	69'-8⅝"	7"	7"	16 x ⅞"	12 x ¾"	17"	19"	22"	24"	24"
	S3 - 16	73'-7⅛"	72'-5⅛"	7"	7"	16 x1⅛"	12 x ¾"	14½"	16"	18½"	21½"	24"
	S4 - 16	76'-6⅛"	75'-2⅛"	8"	8"	‡16 x 1"	‡12 x ¾"	11½"	13½"	15½"	19"	23½"

*. . . Spacing begins @ termination of 7 spaces @ 4"

‡ . . . Denotes A572 Grade 50 steel for thicknesses of ¾" and under and A588 for thicknesses over ¾"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1/8"	3/16"	1/8"
1/4"	5/16"	1/4"
3/8"	1/2"	3/8"
9/16"	13/16"	9/16"
1/8"	3/16"	1/8"
1/4"	5/16"	1/4"
3/8"	1/2"	3/8"
9/16"	13/16"	9/16"

CAMBER SCHEDULE

¼L	½L	¾L
1 11/16"	2 5/16"	1 11/16"
1 7/8"	2 1/2"	1 7/8"
2"	2 11/16"	2"
2 3/16"	3"	2 3/16"
3/16"	1/4"	3/16"
5/16"	7/16"	5/16"
7/16"	5/8"	7/16"
11/16"	15/16"	11/16"
9/16"	1 1/4"	1 3/16"
7/16"	1 1/16"	1 1/16"
5/16"	7/8"	15/16"
11/16"	1/2"	11/16"

Notes:
All Horizontal Dimensions are measured along ℄ Web.
For Web to Flange Welds and Longitudinal Stiffener Details, see Sheet 24.
For Diaphragm Details, see Sheet 29.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35.
For Shoe Details, see Sheet S1 & S2.
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

AS BUILT

	BY	DATE				
MADE	J.V.	1-21-69				
CHECKED	A.M.H	1-27-69	1	Diaph. Spacing Unit 16	T.E.M	5-7-6
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

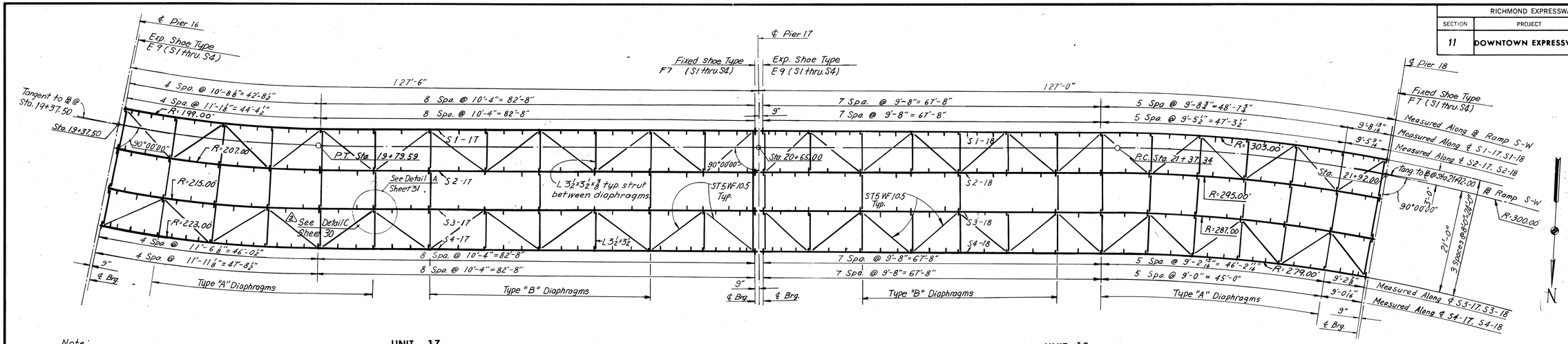
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN UNITS 14,15 AND 16

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

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 22 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	48	97



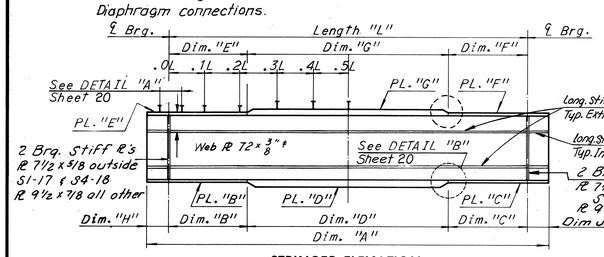
UNIT 17

UNIT 18

FRAMING PLAN
Scale: 1"=10'-0"

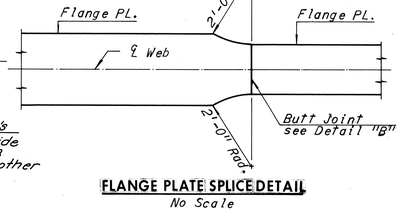
Note:
Detail A Sheet 31 to be used at top flange of all Type "A" Diaphragms.
Detail A Sheet 31 to be used at bottom flange of all Type "A" Diaphragms without Lateral Bracing.
Detail C Sheet 30 to be used at bottom flange of all Type "A" and "B" Diaphragms with Lateral Bracing
Section C-C Sheet 30 portion marked "Without Lateral Bracing" to be used at all other Type "B" Diaphragm connections.

Note:
For Details of Intermediate diaphragms Types " A " and " B " see, Sheet 30.

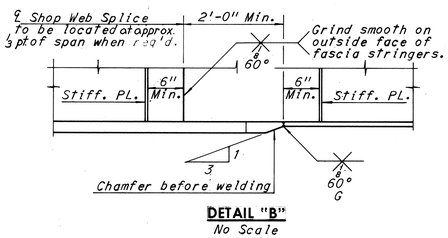


STRINGER ELEVATION
No Scale

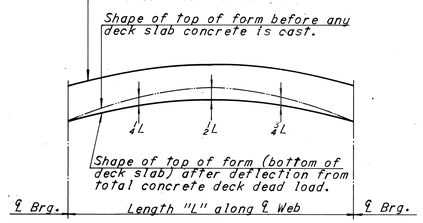
Note:
All horizontal dimensions are measured along ℄ Web.



FLANGE PLATE SPLICE DETAIL
No Scale

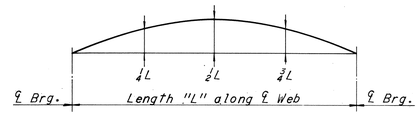


DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

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



CAMBER DIAGRAM

NOTE TO FABRICATOR
The stringers shall be fabricated with a total camber amounting to the tabulated value.
A positive number indicates an upward camber and a negative number indicates a downward camber. This will provide approximate compensation for deflection under full load and for conformity with finished grade.

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 30.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E9	8		
		F7	8

Notes:
All Horizontal Dimensions are measured along ℄ Web.
For Web to Flange Welds and Longitudinal Stiffener Details, see Sheet 24.
For Diaphragm Details, see Sheet 30.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35
For Shoe Details, see Sheet S1 & S2.
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	Dim. "H"	Dim. "J"	PL. "B"#	PL. "C"#	PL. "D"#	PL. "E"#	PL. "F"#	PL. "G"#	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
17	S1 - 17	126'-8¼"	125'-4½"	23'-8½"	23'-8½"	78'-0"	23'-8¼"	23'-8¼"	78'-0"	8"	8"	16 x 1 3/8"	16 x 1"	20 x 1 3/8"	12 x 1"	12 x ¾"	16 x 1"	12"	14½"	18½"	23½"	24"
	S2 - 17	128'-2¼"	127'-0½"	25'-0"	25'-0"	77'-0½"	——	26'-6½"	100'-6"	7"	7"	16 x 1 3/8"	16 x 1 1/8"	16 x 1 ¼"	——	12 x ¾"	12 x 1 ¼"	12½"	15"	19"	24"	24"
	S3 - 17	129'-10½"	128'-8½"	25'-0"	25'-0"	78'-8½"	25'-10¼"	25'-10¼"	77'-0"	7"	7"	20 x 1 ⅜"	16 x 1 ½"	20 x 1 ¼"	16 x 1 ⅛"	12 x 1 ⅛"	16 x 1 ¼"	11"	13"	17½"	23"	24"
	S4 - 17	131'-8½"	130'-4½"	25'-6"	25'-6"	79'-4½"	25'-6"	25'-6"	79'-4½"	8"	8"	20 x 1 3/8"	20 x 1 ⅜"	20 x 2 ¼"	16 x 1 3/8"	16 x 1"	16 x 1 ⅛"	10½"	13"	15½"	20½"	24"
18	S1 - 18	127'-4 9/16"	126'-0 9/16"	25'-3¼"	27'-3 5/16"	73'-6"	25'-3¼"	27'-3 5/16"	73'-6"	8"	8"	20 x 1 ⅛"	20 x 1 ½"	24 x 1 ⅝"	16 x ⅝"	16 x 1 1/16"	20 x 1 ¼"	10"	12"	17"	23½"	24"
	S2 - 18	125'-9 9/16"	124'-7 13/16"	24'-6"	24'-6"	75'-7 13/16"	24'-6"	24'-6"	75'-7 13/16"	7"	7"	16 x 1 ⅛"	16 x 1 3/8"	20 x 1 3/8"	12 x 1"	12 x 1 ⅛"	16 x 1 ¼"	11½"	14"	18"	23½"	24"
	S3 - 18	124'-3 3/8"	123'-1 7/8"	24'-0"	24'-0"	75'-1 7/8"	24'-0"	24'-0"	75'-1 7/8"	7"	7"	16 x 1 ⅛"	16 x 1 3/8"	16 x 2"	12 x 1 3/16"	12 x 1"	12 x 1 ¼"	12½"	15"	19"	24"	24"
	S4 - 18	123'-0 1/8"	121'-8 5/8"	30'-0"	24'-0"	67'-8 5/8"	——	——	121'-8 5/8"	8"	8"	16 x 1"	16 x 1"	20 x 1 ⅛"	——	——	12 x ¾"	10"	12"	15"	20"	24"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1 1/4"	1 15/16"	1 1/2"
1 9/16"	2 1/4"	1 7/16"
1 7/8"	2 9/16"	1 13/16"
2"	2 3/4"	1 15/16"
2 1/8"	3"	2 3/16"
1 11/16"	2 5/16"	1 1/16"
1 7/16"	1 15/16"	1 3/8"
1 3/8"	1 3/4"	1 1/8"

CAMBER SCHEDULE

¼L	½L	¾L
- 4 13/16"	- 6 1/8"	- 4 9/16"
- 4 1/8"	- 5 3/8"	- 4 1/8"
- 3 5/16"	- 4 11/16"	- 3 3/4"
- 2 3/4"	- 4 1/8"	- 3 1/2"
3/4"	2 1/2"	2 3/16"
1/8"	1 7/16"	1 1/8"
- 3/8"	5/8"	3/16"
- 1/2"	1/4"	- 3/8"

Note:
Shear stud spacing as shown is typical for both halves of the stringers.
*Spacing begins at termination of 7 spaces @ 4".
# Denotes A572 Grade 50 Steel for thickness of ¾" and under and A588 Steel for thickness over ¾".

	BY	DATE				
MADE	R.C.	11.21.68	2	Note added	TEM	3-76
CHECKED	S.C.C.	12.1.68	1	Delete F7 BD Shoes & Sheet No. rev.	J.B.P.	8-2575
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

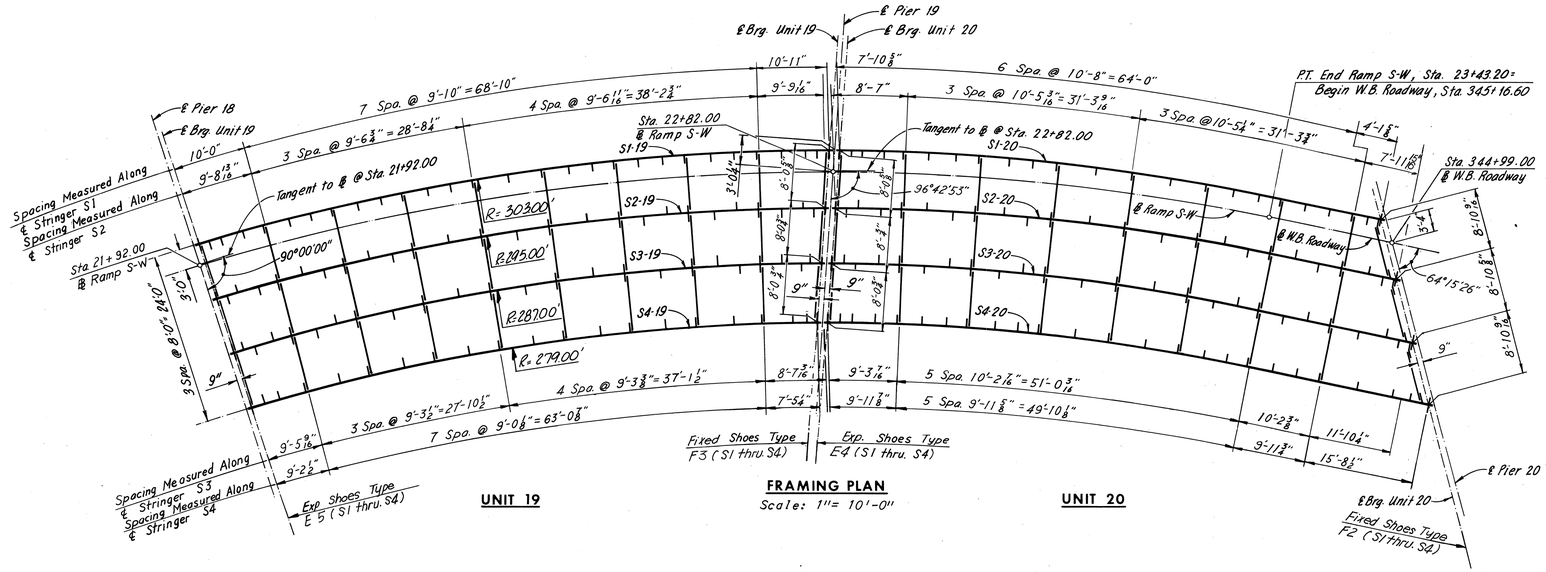
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 23 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	49	97

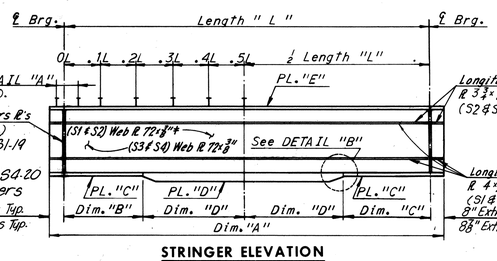


FRAMING PLAN

Scale: 1" = 10'-0"

SHOE SCHEDULE

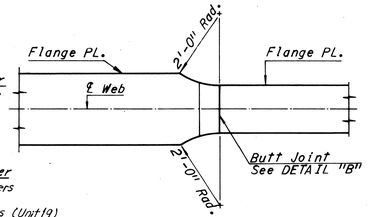
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	4	F2	4
E5	4	F3	4



STRINGER ELEVATION

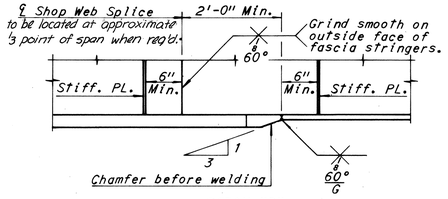
No Scale

Note: All horizontal dimensions are measured along ℄ Web.



FLANGE PLATE SPLICE DETAIL

No Scale



DETAIL "B"

No Scale

Finished top of slab after full dead load deflection.

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

Shape of top of form (bottom of deck slab) after deflection from total concrete deck dead load.

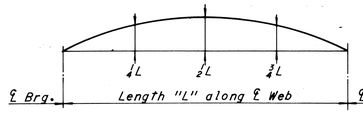
℄ Brg. Length "L" along ℄ Web ℄ Brg.

DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

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

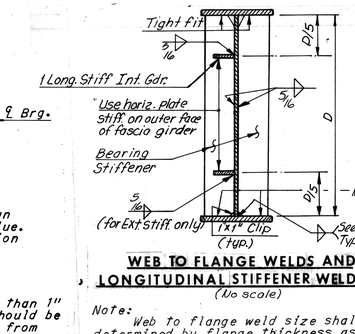
If stringers are not cambered distance, top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 33

Note: All steel shall be A36 unless otherwise shown. Exterior Stringer Longitudinal Stiffeners shall be located on the exterior face of the stringer. Intermediate stiffener Pls. 4½"x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

Legend:

‡ Denotes A572-Grade 50 steel for thicknesses of ¾" and under, and A588 steel for thicknesses over ¾".

* Spacing begins at termination of 17 spaces @ 4".



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS

(No scale)

Note: Web to flange weld size shall be determined by flange thickness as follows:

To 1½".....5/16" weld
over 1½" to 2¼".....⅜" weld
over 2¼".....½" weld

Notes: All Horizontal Dimensions are measured along ℄ Web.

For Diaphragm Details, see Sheet 31.
For Shear Stud Details, see Sheet 20.
For Structural Steel Quantities, see Sheet 4.
For Joint Details, see Sheets 34 and 35.
For Shoe Details, see Sheet S1 & S2
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
19	S1-19	91'-1"	89'-9"	13'-10¼"	13'-10¼"	31'-0"	12 x 1"‡	16 x 1⅛"‡	12 x 1"‡	11"	12½"	16"	19"	24"
	S2-19	87'-6 7/16"	86'-4 7/16"	12'-2 7/16"	12'-2 7/16"	31'-0"	12 x ¾"‡	16 x 1⅛"‡	12 x ¾"‡	11½"	13"	17½"	20½"	24"
	S3-19	84'-2 3/4"	83'-0 3/4"	12'-0 3/8"	12'-0 3/8"	29'-6"	12 x ¾"	16 x 1⅛"	12 x ¾"	14"	16"	21½"	24"	24"
	S4-19	81'-0 5/16"	79'-8 5/16"	39'-10 5/16"	39'-10 5/16"	———	16 x ⅜"	———	12 x ⅜"	20½"	23½"	24"	24"	24"
20	S1-20	77'-5⅛"	76'-0¼"	38'-0⅛"	38'-0⅛"	———	16 x ⅜"‡	———	12 x ⅜"	13"	14½"	17½"	21"	24"
	S2-20	80'-5"	79'-2¼"	39'-7⅛"	39'-7⅛"	———	16 x ⅜"‡	———	12 x ⅜"	14"	16"	18½"	22"	24"
	S3-20	83'-7"	82'-4¼"	41'-2⅛"	41'-2⅛"	———	16 x 1⅛"	———	12 x ⅜"	16½"	19"	21½"	24"	24"
	S4-20	86'-11⅛"	85'-6¼"	42'-9⅛"	42'-9⅛"	———	16 x ⅜"	———	12 x ⅜"	17⅛"	20"	23½"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L
1"	1 3/8"	1"	1 1/16"	1 9/16"	1 1/16"
¾"	1"	¾"	7/8"	1 1/4"	7/8"
7/16"	5/8	7/16"	9/16"	¾"	9/16"
1/4"	5/16"	1/4"	5/16"	1/2"	5/16"
5/8"	7/8"	5/8"	7/8"	1 1/8"	¾"
9/16"	13/16"	9/16"	5/8"	15/16"	5/8"
7/16"	9/16"	7/16"	1/2"	¾"	1/2"
5/16"	7/16"	5/16"	7/16"	5/8"	7/16"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.	12-3-68				
CHECKED	A.M.H.	1-27-69	1	Diaph. layout at Pier 19	T.E.M.	8-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

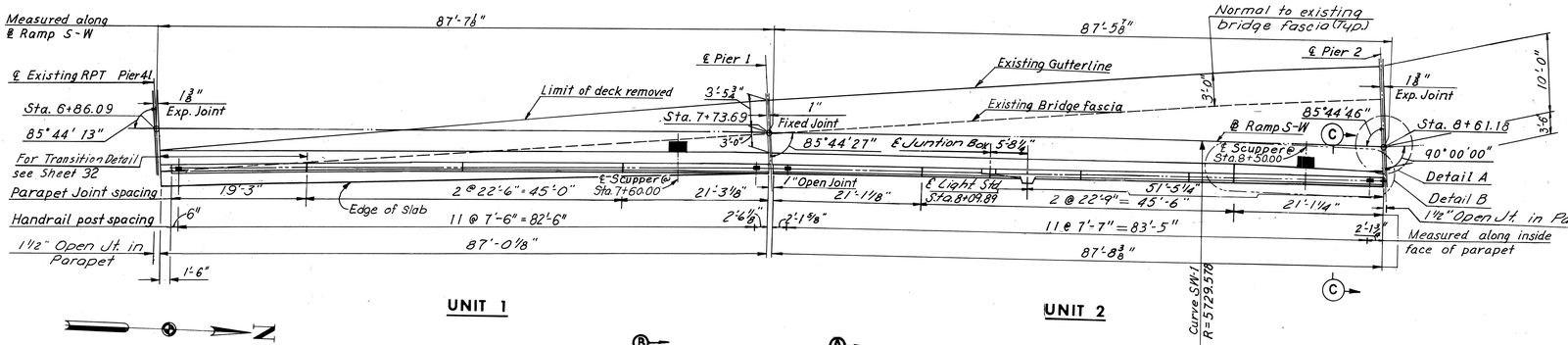
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

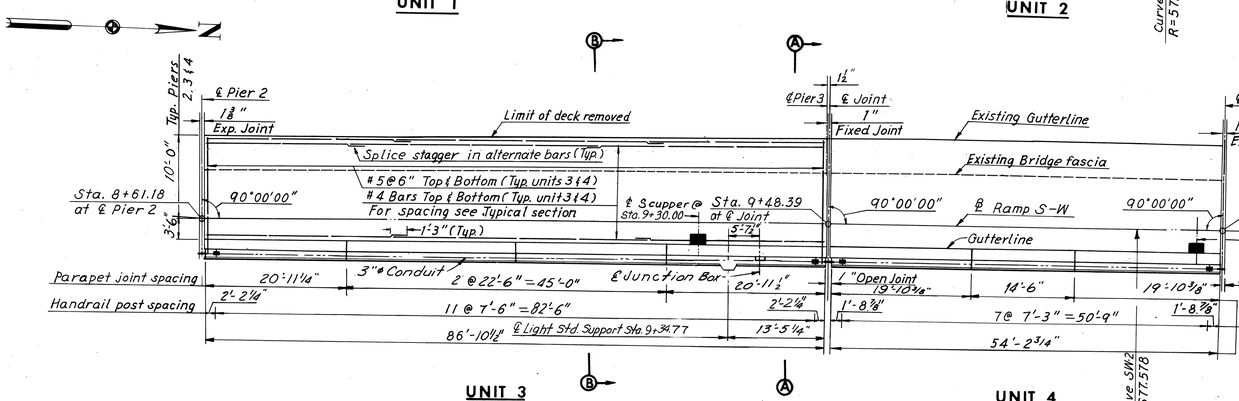
FRAMING PLAN - UNITS 19 AND 20

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

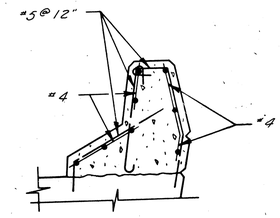
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 24 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	50	97





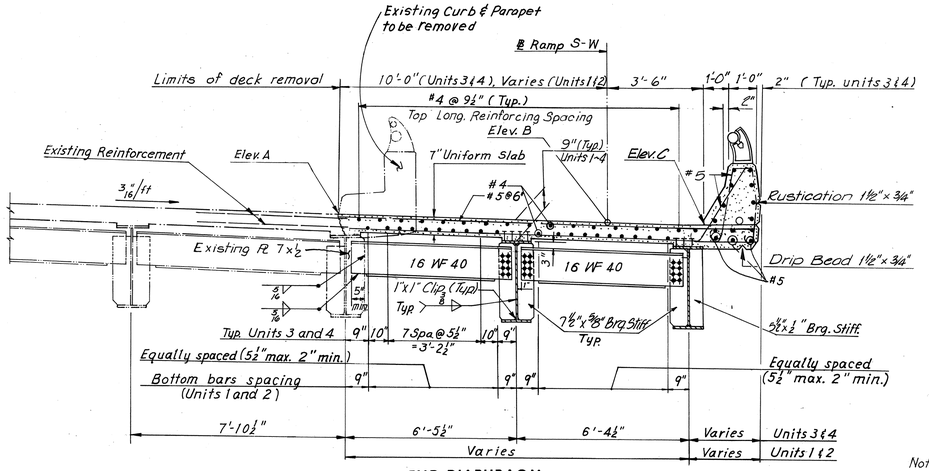
DETAIL B
No Scale



SECTION C-C
No Scale

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
6+86.09	——	72.84	——
+90.00	——	72.90	72.85
7+00.00	——	73.05	73.00
+10.00	——	73.19	73.15
+20.00	——	73.35	73.30
+30.00	73.50	73.49	73.45
+40.00	73.66	73.64	73.60
+50.00	73.82	73.79	73.75
+60.00	73.98	73.94	73.89
+70.00	74.14	74.09	74.04
+73.69	74.20	74.15	74.10
+80.00	74.30	74.24	74.19
+90.00	74.46	74.39	74.34
8+00.00	74.62	74.54	74.49
+10.00	74.79	74.69	74.64
+20.00	74.95	74.84	74.79
+30.00	75.11	74.99	74.94
+40.00	75.27	75.15	75.09
+50.00	75.43	75.29	75.23
+60.00	75.59	75.44	75.39
+61.18	75.61	75.45	75.40
+70.00	75.75	75.60	75.54
+80.00	75.91	75.76	75.70
+90.00	76.08	75.92	75.86
9+00.00	76.24	76.08	76.02
+10.00	76.40	76.24	76.19
+20.00	76.56	76.40	76.35
+30.00	76.72	76.56	76.51
+40.00	76.88	76.73	76.67
+48.39	77.02	76.86	76.81
+50.00	77.04	76.89	76.83
+60.00	77.20	77.05	76.99
+70.00	77.37	77.21	77.15
+80.00	77.53	77.37	77.32
+90.00	77.69	77.53	77.48
10+00.00	77.85	77.69	77.64
+02.63	77.89	77.74	77.68

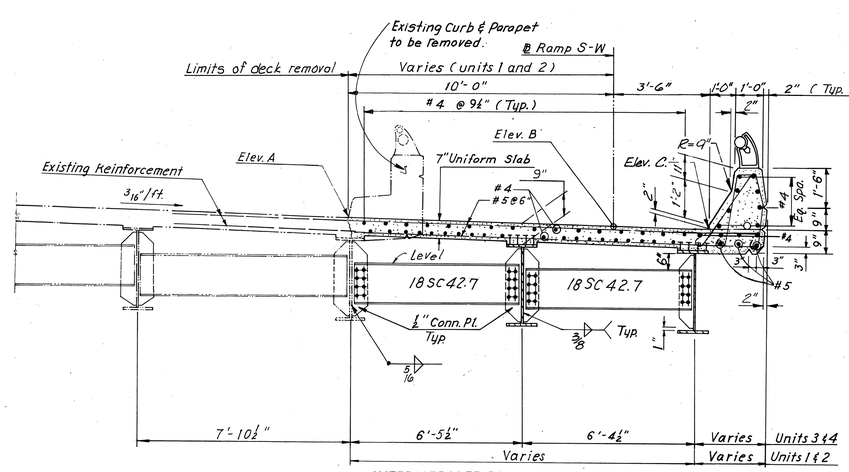
Note A:
Elev A from Sta 6+86.09 to 10+02.63 is given along the existing Gutter Line R.P.T. and is radial to the existing Base Line R.P.T. at the respective stations as given along the Base Line Ramp S-W. Cross Slope is radial to the Base Line R.P.T.
Elev A is to be field verified. Minor adjustments may be required.



END DIAPHRAGM

SECTION A-A
Scale: ⅜" = 1'-0"

Note:
Existing No. 5 transverse steel top and bottom to remain in place and be cleaned of concrete. Existing steel shall extend a minimum of 2'-0" into new concrete. Bottom reinforcing shall be straightened.



INTERMEDIATE DIAPHRAGM

SECTION B-B
Scale: ⅜" = 1'-0"

Note:
For Framing plan, see Sheet 18.
For Joint Details, see Sheet 18.
For Quantities, see Sheet 4
For Handrail Detail, see Sheet S3
Elev. A is to be confirmed by contractor.
Cross Slope in Units 1 and 2 should be normal to ℄ R.P.T.
For Drainage Details see Support Type 6 for Units 1, 2 and 3, and Support Type 5 for Unit 4, see Sheets S5 & S6

AS BUILT

	BY	DATE
MADE	KCT	11-2-68
	JLK	6-27-75
CHECKED	YCP	1-17-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Deck Elev.	T.E.M.	9-8-75
1	limits of deck removal Sect A & B	T.E.M.	8-25-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

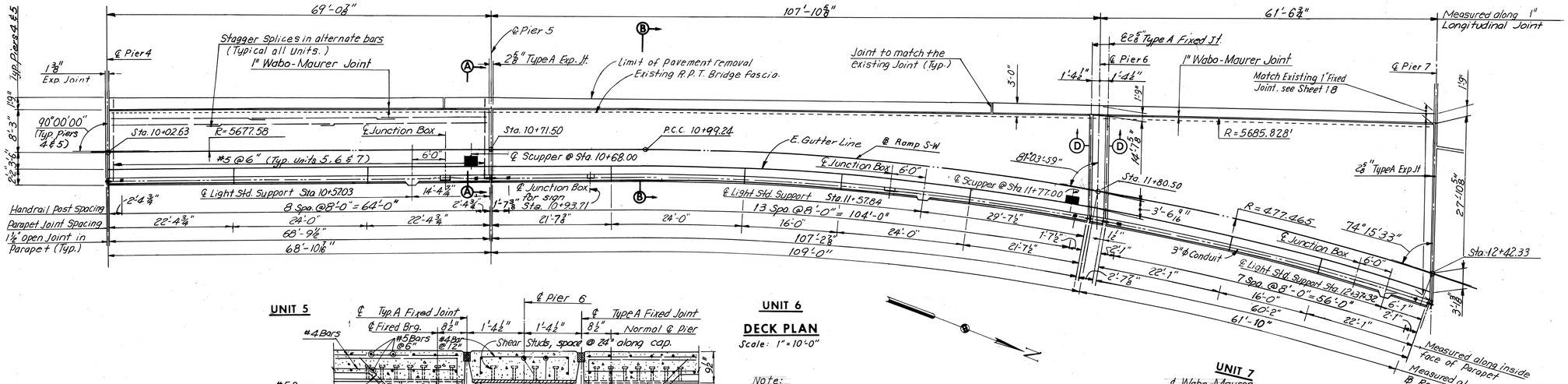
DECK PLAN UNITS 1,2,3 AND 4

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

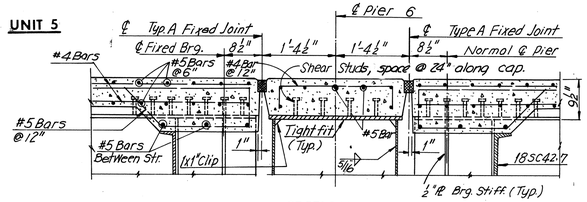
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 25 OF 38

50

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	51	97



UNIT 5



SECTION D-D

Scale: ½" = 1'-0"

UNIT 6

DECK PLAN

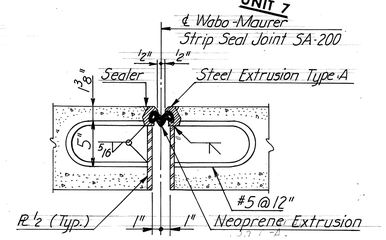
Scale: 1" = 10'-0"

Note:
For Drainage Details, see Support Type 9 for Unit 5, and Support Type 5 for Unit 6, see Sheets 55 & 56.
Elevations given in the Elevation Table may require adjustment in the field.

Note:
For Framing Plan, See Sheet 19.
For Joint Details, See Sheet 34 & 35.
For Quantities, See Sheet 4.
For Handrail Details, See Sheet 33.
Elev. A is to be confirmed by contractor.

Note:
Reinforcement in Curb and Parapet is same as shown in Section A-A.
Extend Handrail of Units 6 and 7 to within 1" of ℄ Pier 6.

UNIT 7



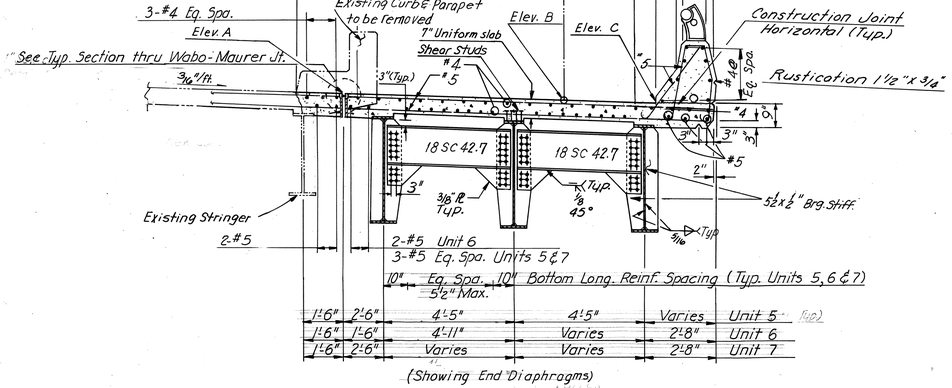
TYPICAL SECTION THRU WABO-MAURER JOINT

Scale: 1½" = 1'-0"

Note A:
Elev. A from Sta. 10+02.63 to 12+42.33 is given along ℄ longitudinal joint and is radial to the existing Base Line R.P.T. at the respective stations as given along the Base Line Ramp S-W. Cross Slope is radial to the Base Line R.P.T.
Elev. A is to be field verified. Minor adjustments may be required.

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
10+02.63	77.83	77.74	77.68
+10	77.95	77.86	77.80
+20	78.12	78.02	77.96
+30	78.27	78.18	78.12
+40	78.44	78.34	78.29
+50	78.60	78.50	78.45
+60	78.76	78.66	78.61
+70	78.92	78.82	78.77
+71.50	78.94	78.85	78.80
+80	79.08	78.97	78.91
+90	79.24	79.11	79.04
11+00	79.40	79.24	79.16
+10	79.57	79.36	79.27
+20	79.73	79.47	79.36
+30	79.89	79.57	79.45
+40	80.05	79.66	79.53
+50	80.21	79.74	79.60
+60	80.37	79.82	79.68
+70	80.53	79.90	79.76
+79.11	80.67	79.97	79.83
+80	80.69	79.98	79.84
+80.50	80.70	79.98	79.84
+81.89	80.72	80.00	79.86
+90	80.86	80.06	79.92
12+00	81.01	80.14	80.00
+10	81.17	80.22	80.08
+20	81.33	80.29	80.15
+30	81.48	80.36	80.22
+40	81.64	80.43	80.29
+42.33	81.68	80.45	80.31

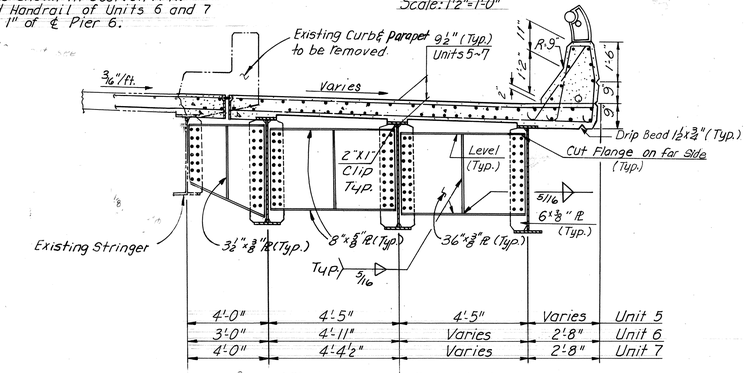
Notes for Wabo-Maurer Joint:
Do not use steel extrusions as screed support.
Steel extrusion shall conform to ASTM A36.
Structural steel shall conform to ASTM A588.
Steel assembly shall be shop welded to convenient lengths and butt welded in the field to desired length. Joint shall conform to grade of deck slab.
Steel assembly shall be sandblasted in the shop prior to painting.
Steel assembly shall receive one shop coat of epoxy zinc paint.
Neoprene extrusion shall be roughened with a wire brush before bonding to steel extrusion with Bon Lastic Adhesive. Groove in steel extrusion to be blown out with oil-free and water-free compressed air prior to installation of Neoprene extrusion.
The Wabo-Maurer joint assembly shall be installed in accordance with manufacturers recommended construction methods.



SECTION A-A

Scale: ⅜" = 1'-0"

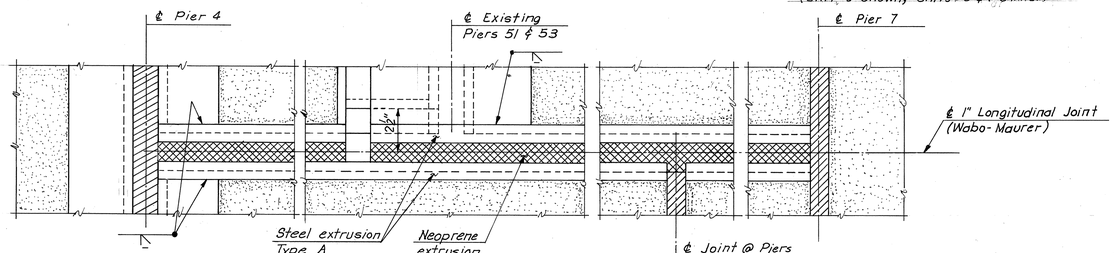
(Unit 5 shown, Units 6 & 7 similar)



SECTION B-B

Scale: ⅜" = 1'-0"

(Unit 6 Shown, Units 5 & 7 similar)



PLAN 1" LONGITUDINAL JOINT

	BY	DATE
MADE	G.C.C. J.L.K.	11-3-68 6-27-73
CHECKED	Y.C.P.	1-20-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Deck Elev.	T.E.M.	5-76
2	Deck Elev. & Dim.	T.E.M.	9-8-75
1	Limit of pavement removal & 1" longit. joint revised, Det. A removed, & Wabo-Maurer Jt. added	S.B.P.	8-25-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

DECK PLAN UNITS 5, 6 AND 7

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

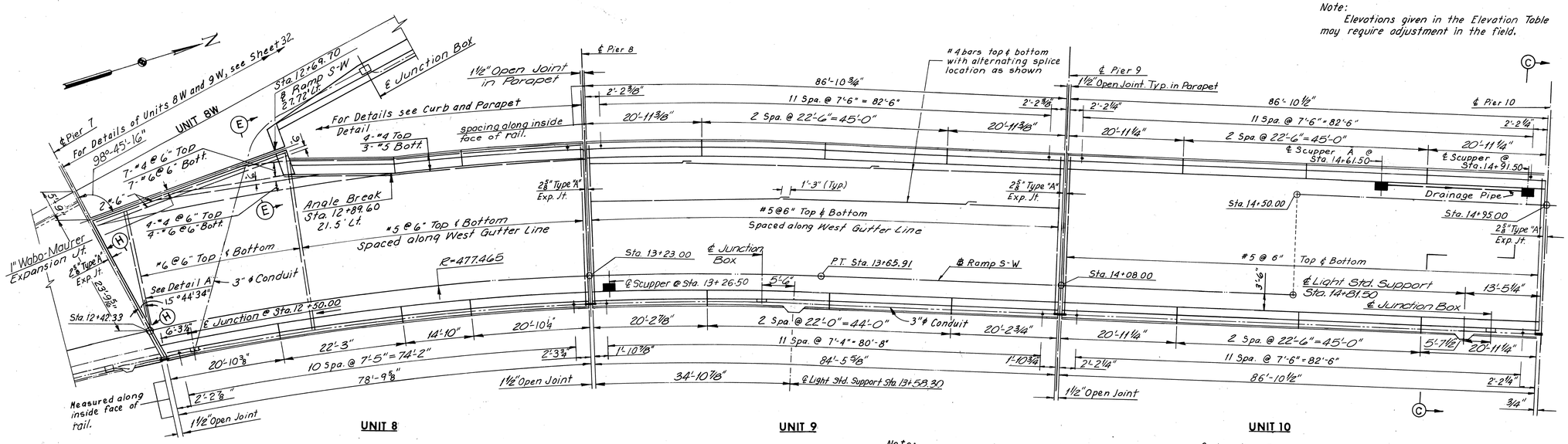
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 26 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	52	97

Note:
Elevations given in the Elevation Table may require adjustment in the field.

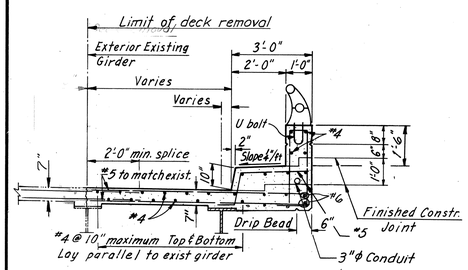
* Elev. given along ℄ of joint along lines radial to ℄ Ramp S-W

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
12+42.33	81.38	80.45	80.31
12+40	*81.53	—	—
12+50	*81.62	80.50	80.36
12+60	*81.72	80.57	80.43
12+70	*81.82	80.68	80.54
12+80	81.72	80.81	80.66
12+90	81.83	80.98	80.83
13+00	82.03	81.17	81.03
13+10	82.26	81.40	81.26
13+20	82.53	81.67	81.52
13+23	82.62	81.75	81.61
13+30	82.80	81.96	81.82
13+40	83.07	82.28	82.15
13+50	83.37	82.64	82.52
13+60	83.67	83.01	82.90
13+70	83.96	83.38	83.29
13+80	84.26	83.76	83.68
13+90	84.56	84.13	84.06
14+00	84.86	84.50	84.44
14+08	85.10	84.80	84.75
14+10	85.16	84.87	84.82
14+20	85.47	85.24	85.20
14+30	85.76	85.62	85.60
14+40	86.06	85.99	85.98
14+50	86.36	86.36	86.36
14+60	86.71	86.72	86.79
14+70	87.03	87.05	87.19
14+80	87.32	87.35	87.57
14+90	87.57	87.62	87.91
14+95	87.69	87.74	88.08

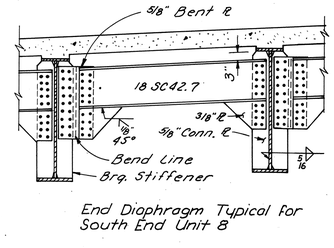


Note:
Piers 8, 9 and 10 are not skewed.

DECK PLAN
Scale: 1"=10'-0"

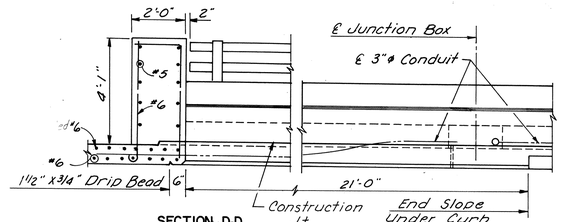


SECTION B-B
Scale: ⅜"=1'-0"

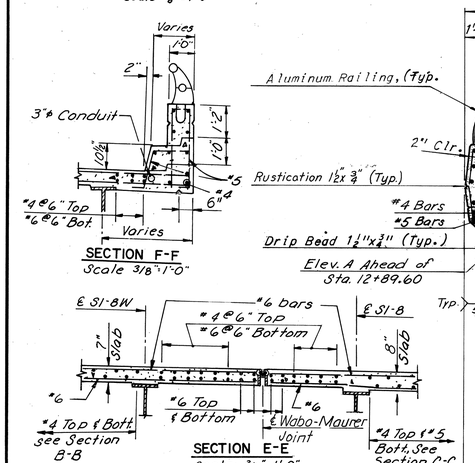


End Diophragm Typical for South End Unit 8

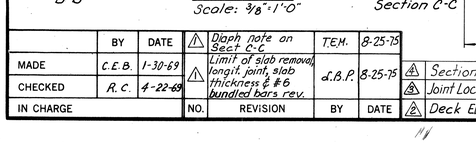
SECTION H-H
Scale: ⅜"=1'-0"



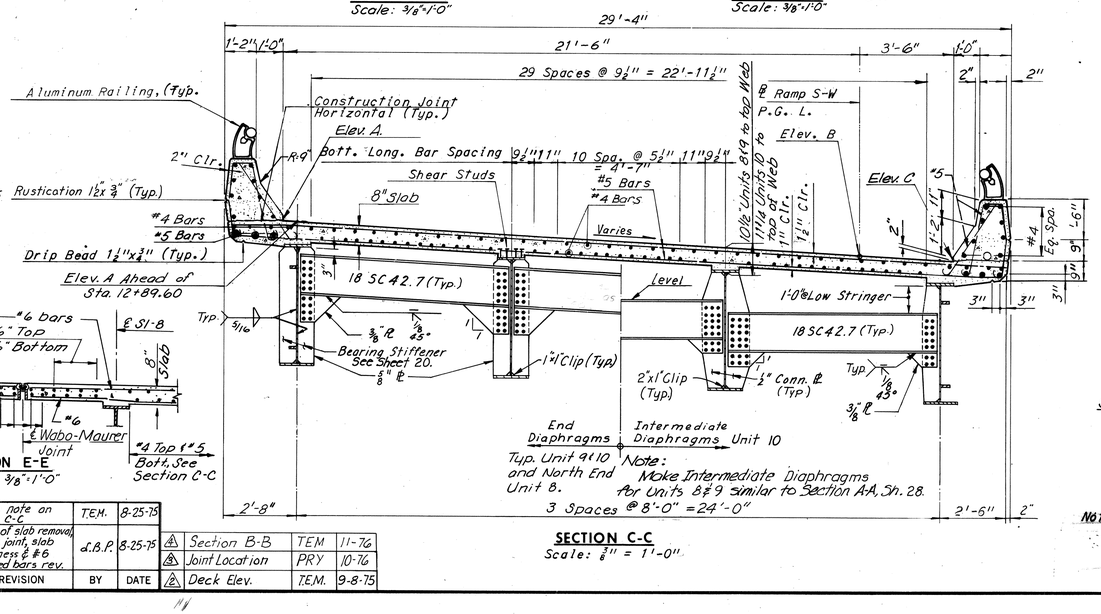
SECTION D-D
Scale: ⅜"=1'-0"



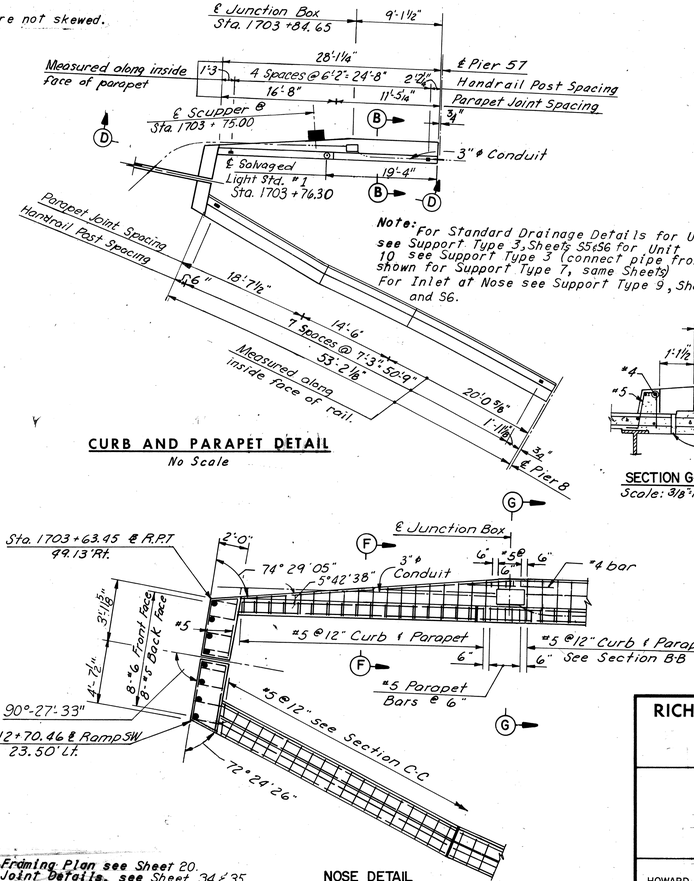
SECTION F-F
Scale ⅜"=1'-0"



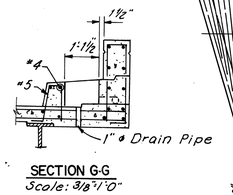
SECTION E-E
Scale: ⅜"=1'-0"



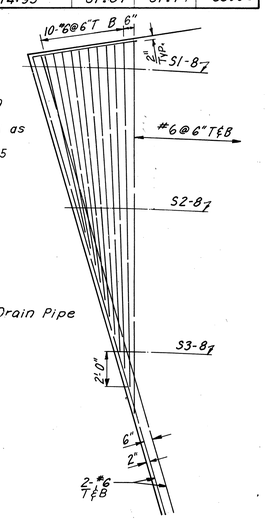
SECTION C-C
Scale: ⅜" = 1'-0"



CURB AND PARAPET DETAIL
No Scale



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



DETAIL A
Scale ¼"=1'-0"

Notes:
For Framing Plan see Sheet 20.
For Joint Details, see Sheet 34 & 35.
For Quantities see Sheet 4.
For Handrail Details, see Sheet 53.

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

Note: For Standard Drainage Details for Unit 9 see Support Type 3, Sheets 55 & 56 for Unit 10 see Support Type 3 (connect pipe from A as shown for Support Type 7, same Sheets) For Inlet at Nose see Support Type 9, Sheets 55 and 56.

AS BUILT

	BY	DATE
MADE	C.E.B.	1-30-69
CHECKED	R.C.	4-22-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Diaph note on Sect C-C	T.E.M.	8-25-75
2	Limit of slab removal, longit. joint, slab thickness & #6 bundled bars rev.	J.B.P.	8-25-75
4	Section B-B	TEM	11-76
5	Joint Location	PRY	10-76
6	Deck Elev.	T.E.M.	9-8-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

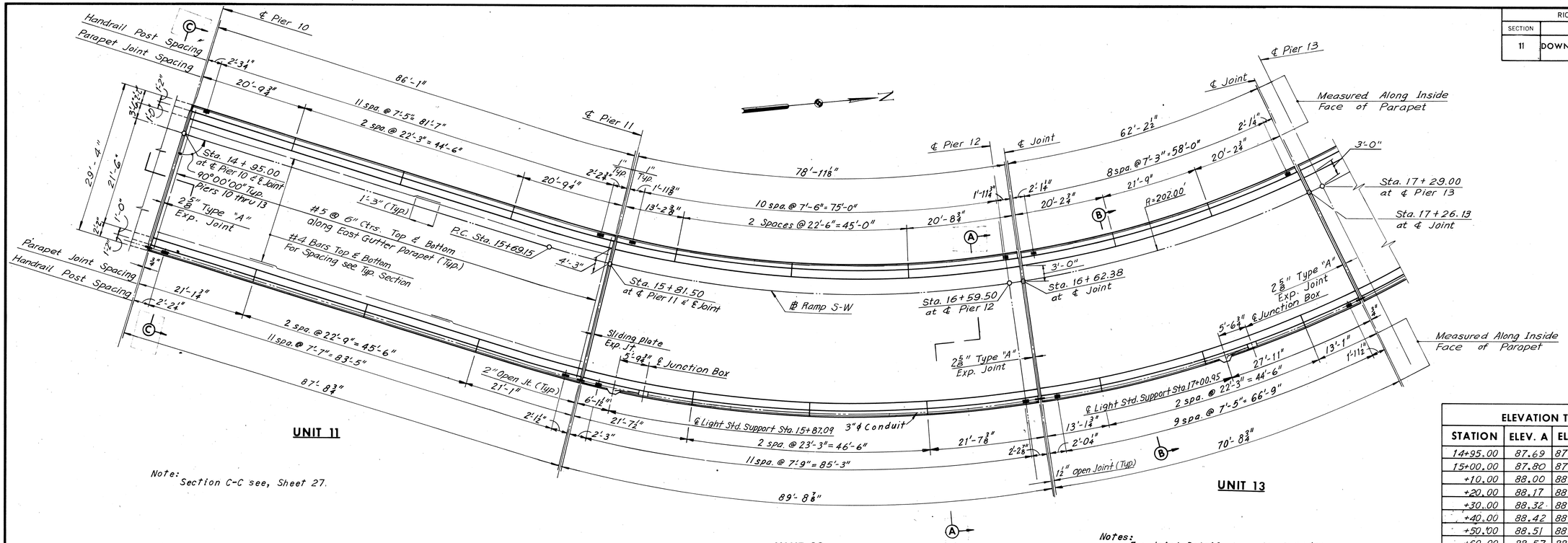
DECK PLAN UNITS 8, 9 AND 10

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

SCALE: As Noted
CONTRACT NO 11
SHEET NO 27 OF 38

52

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	53	97



UNIT 11

Note: Section C-C see, Sheet 27.

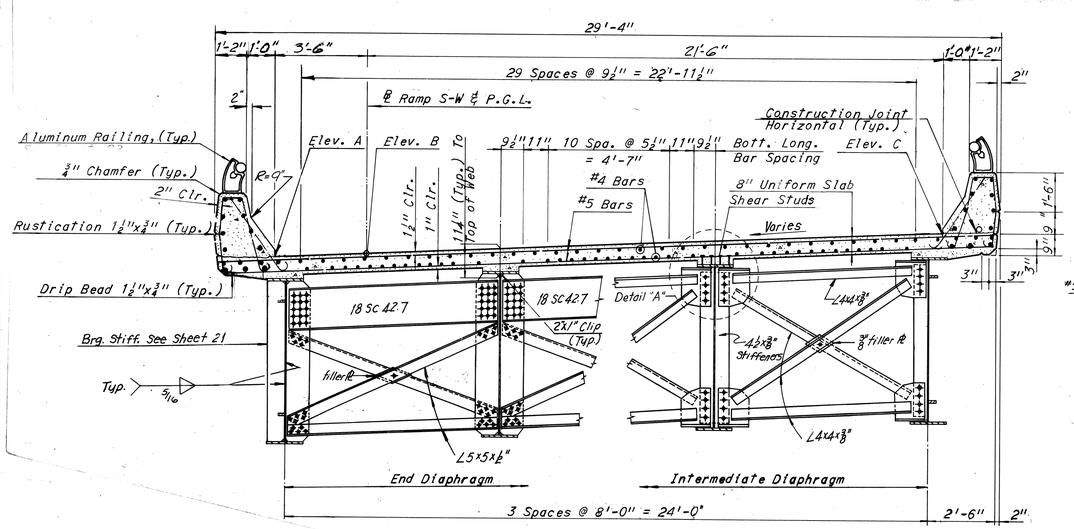
UNIT 12

UNIT 13

DECK PLAN
Scale : 1"=10'-0"

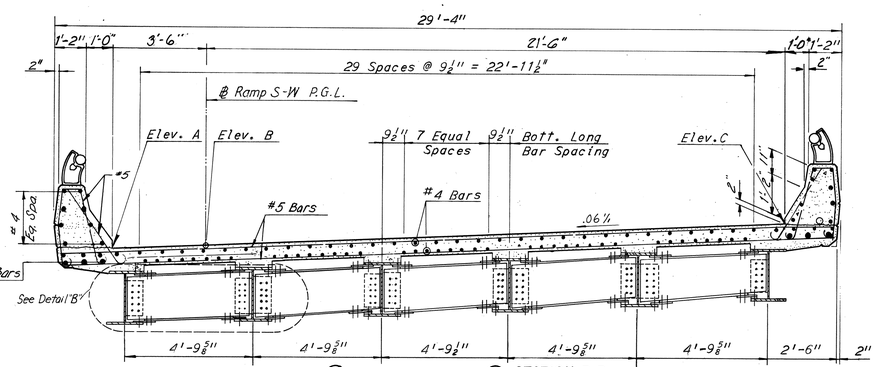
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
14+95.00	87.69	87.74	88.07
15+00.00	87.80	87.86	88.23
+10.00	88.00	88.07	88.51
+20.00	88.17	88.26	88.77
+30.00	88.32	88.41	89.00
+40.00	88.42	88.54	89.20
+50.00	88.51	88.63	89.37
+60.00	88.57	88.70	89.51
+70.00	88.60	88.74	89.63
+80.00	88.60	88.75	89.71
+81.50	88.60	88.75	89.72
+90.00	88.57	88.73	89.76
16+00.00	88.50	88.69	89.80
+10.00	88.42	88.61	89.79
+20.00	88.31	88.51	89.73
+30.00	88.17	88.37	89.63
+40.00	88.00	88.21	89.49
+50.00	87.81	88.02	89.31
+59.50		87.81	
+60.00	87.59	87.80	89.09
+62.38	87.53	87.74	89.03
+70.00	87.34	87.55	88.84
+80.00	87.06	87.27	88.56
+90.00	86.75	86.96	88.25
17+00.00	86.41	86.62	87.91
+10.00	86.05	86.26	87.55
+20.00	85.65	85.86	87.15
+26.12	85.40	85.61	86.90
+29.00		85.49	

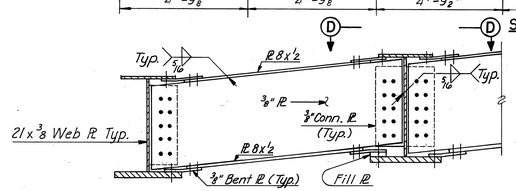
Notes:
For Joint Details, see Sheet 34 & 35.
For Framing Plan, see Sheet 21.
For Steel and Concrete Quantities, see Sheet 4.
For Handrail Details, see Sheet S3.
For Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 6, Sheets 55 & 56.
For Superstructure details, see Sheet 32.



SECTION A-A
Scale: ⅜" = 1'-0"

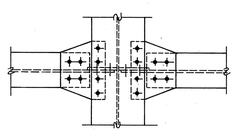
Note: For Detail A, See Sheet 31.





DETAIL B
Scale: ¾"=1'-0"

SECTION B-B
Scale: ⅜"=1'-0"



VIEW D-D
Scale: ¾"=1'-0"

	BY	DATE
MADE	SCC	10-31-68
CHECKED	G.S.H.	1-14-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Detail 'B' & View D-D revised	A.B.P.	8-25-75

AS BUILT

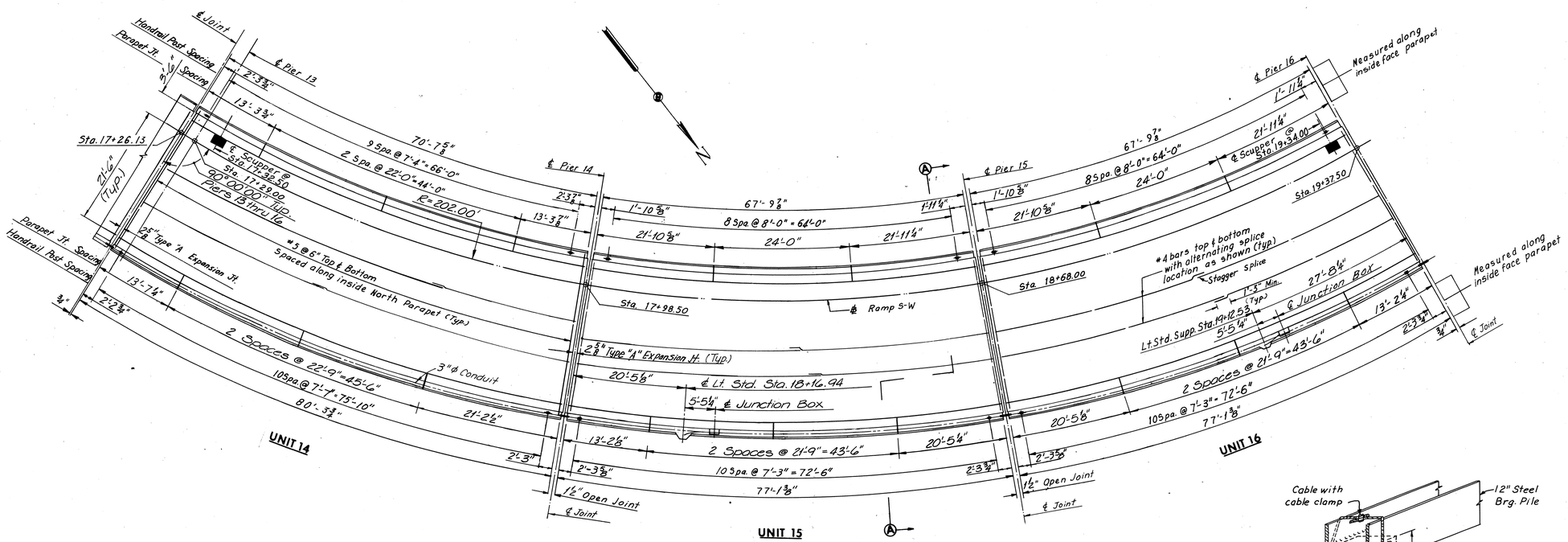
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 11 12 AND 13

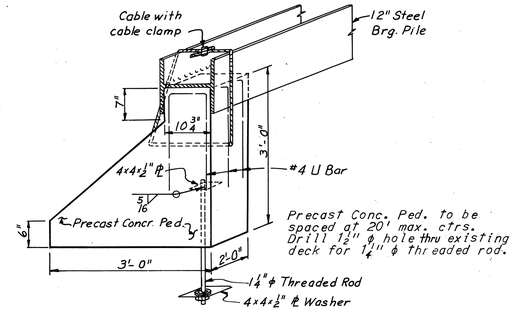
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE:
CONTRACT NO. 11
SHEET NO. 28 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	54	97

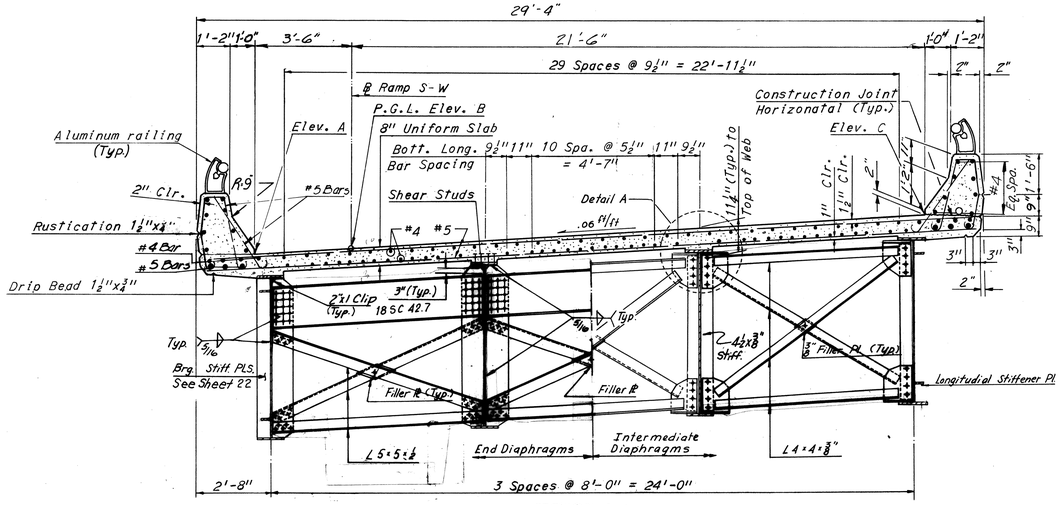


DECK PLAN
Scale: 1" = 10'-0"



PROPOSED TEMPORARY FIXED TRAFFIC BARRICADE

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
17+29.00	85.28	85.49	86.78
+30.00	85.23	85.44	86.73
+40.00	84.78	84.99	86.28
+50.00	84.30	84.51	85.80
+60.00	83.74	84.00	85.29
+70.00	83.25	83.46	84.75
+80.00	82.68	82.89	84.18
+90.00	82.09	82.30	83.59
+98.50	81.56	81.77	83.06
18+00.00	81.46	81.67	82.96
+10.00	80.82	81.03	82.82
+20.00	80.18	80.39	81.68
+30.00	79.54	79.75	81.04
+40.00	78.90	79.11	80.40
+50.00	78.26	78.47	79.74
+60.00	77.62	77.83	79.12
+68.00	77.11	77.32	78.61
+70.00	76.98	77.19	78.48
+80.00	76.36	76.57	77.86
+90.00	75.75	75.96	77.25
19+00.00	75.12	75.33	76.62
19+10.00	74.52	74.72	75.93
19+20.00	73.93	74.12	75.24
19+30.00	73.37	73.54	74.57
19+37.50	72.98	73.13	74.09



SECTION A-A
Scale: ⅜" = 1'-0"

Note:
For Detail A, see Sheet 31.

Notes:
For Framing Plan see Sheet 22
For Joint Details, see Sheet 34 & 35
For Quantities see Sheet 4
For Handrail Details, see Sheet S3.

Note: For Standard Drainage Details for Units 14 and 16, see Support Type 3 Sheets S5 & S6.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.	12-10-68				
CHECKED	Y.C.P	1-15-69				
IN CHARGE						

AS BUILT

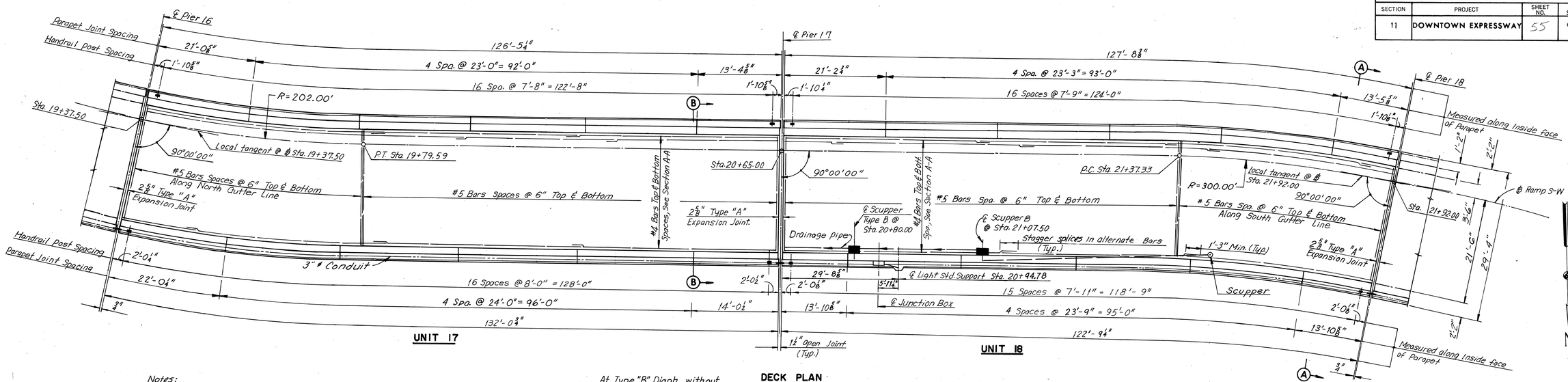
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 14,15 AND 16

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

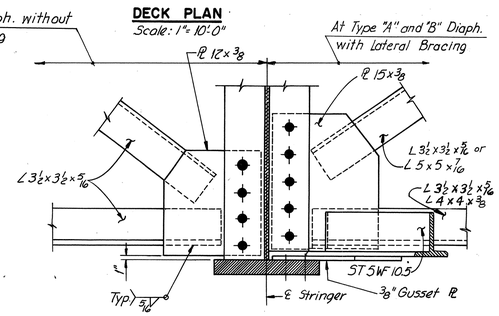
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 29 of 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	55	97

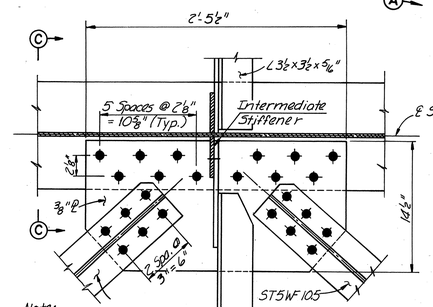


Notes:
For Framing Plan see Sheet 23.
For Joint Details, see Sheet 35.
For Quantities, see Sheet 4.
For Handrail Details see Sheet 53.
For Standard Drainage Details for Unit 18, see Support Type 3, Sheets 55 & 56 (connect pipe from A to pipe from B as shown for Support Type 7).

DECK PLAN
Scale: 1"= 10'-0"



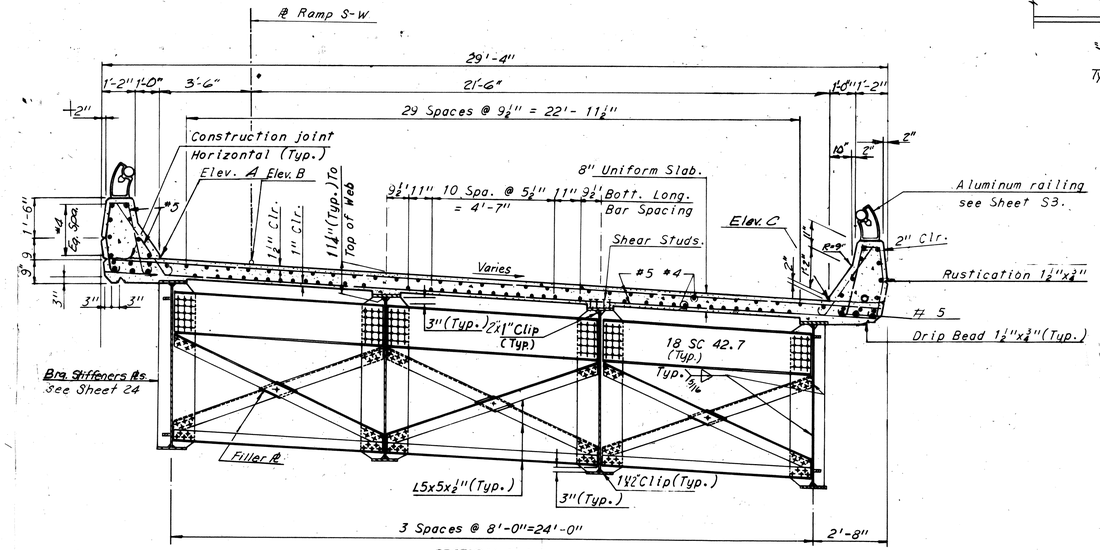
SECTION C-C
Scale: 1½"= 1'-0"



Note:
Diagonal Angle in Intermediate Diaphragm is not shown.

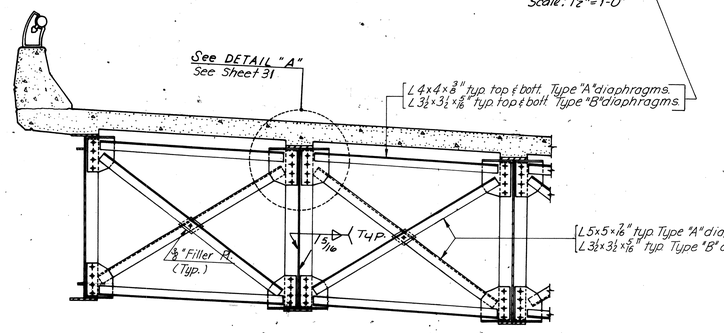
DETAIL C
Scale: 1½"= 1'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
19+37.50	72.98	73.13	74.09
+40.00	72.85	73.00	73.94
+50.00	72.38	72.52	73.38
+60.00	71.95	72.08	72.86
+70.00	71.56	71.68	72.37
+80.00	71.21	71.31	71.97
+90.00	70.89	70.98	71.49
20+00.00	70.61	70.68	71.11
+10.00	70.36	70.42	70.77
+20.00	70.15	70.20	70.46
+30.00	69.98	70.01	70.18
+40.00	69.85	69.86	69.94
+50.00	69.74	69.74	69.74
+60.00	69.68	69.66	69.56
+65.00	69.66	69.64	69.48
+70.00	69.65	69.62	69.42
+80.00	69.67	69.61	69.30
+90.00	69.71	69.64	69.23
21+00.00	69.79	69.71	69.20
+10.00	69.89	69.79	69.18
+20.00	70.00	69.88	69.15
+30.00	70.10	69.96	69.13
+40.00	70.19	70.05	69.12
+50.00	70.29	70.13	69.10
+60.00	70.40	70.21	69.07
+70.00	70.50	70.30	69.06
+80.00	70.59	70.38	69.09
+90.00	70.68	70.47	69.18
+92.00	70.70	70.49	69.20



SECTION A-A
Scale: ⅜"=1'-0"
END DIAPHRAGM

Note:
For location of End diaphragms see Sheet 23.



SECTION B-B

INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"

Note:
For location of Intermediate diaphragms Types "A" and "B" see Sheet 23.

	BY	DATE
MADE	R.C.	11.18.68
CHECKED	Y.C.P.	1-14-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Diaph.	TEM	3-76

AS BUILT

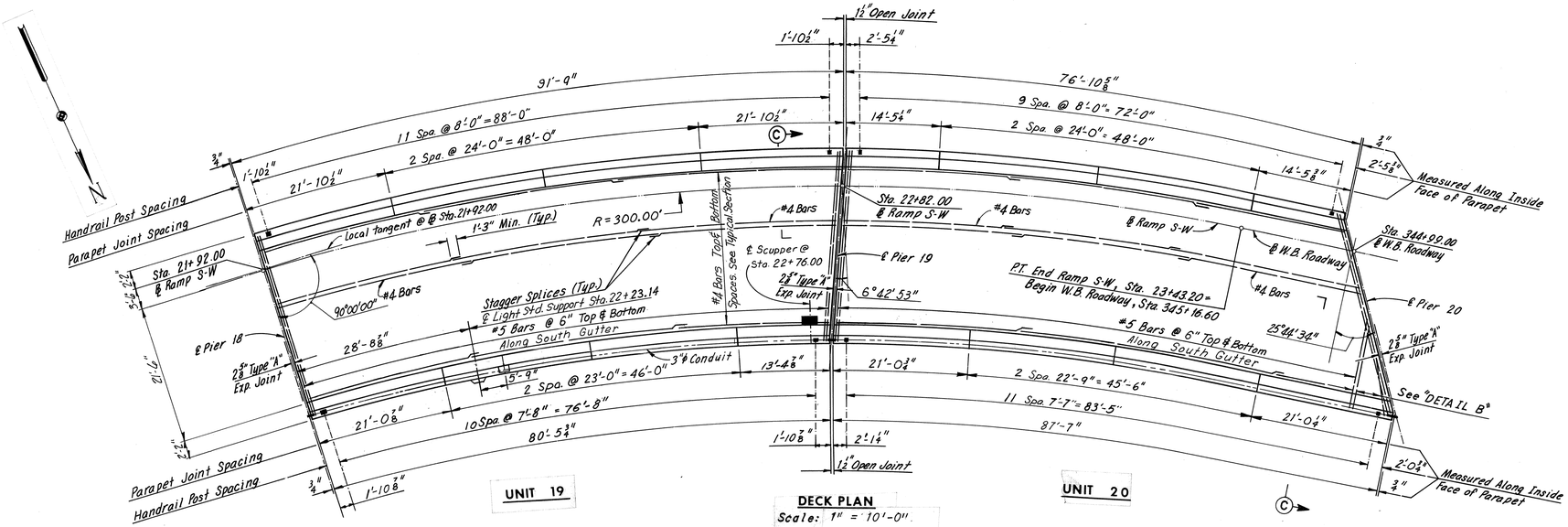
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 17 AND 18

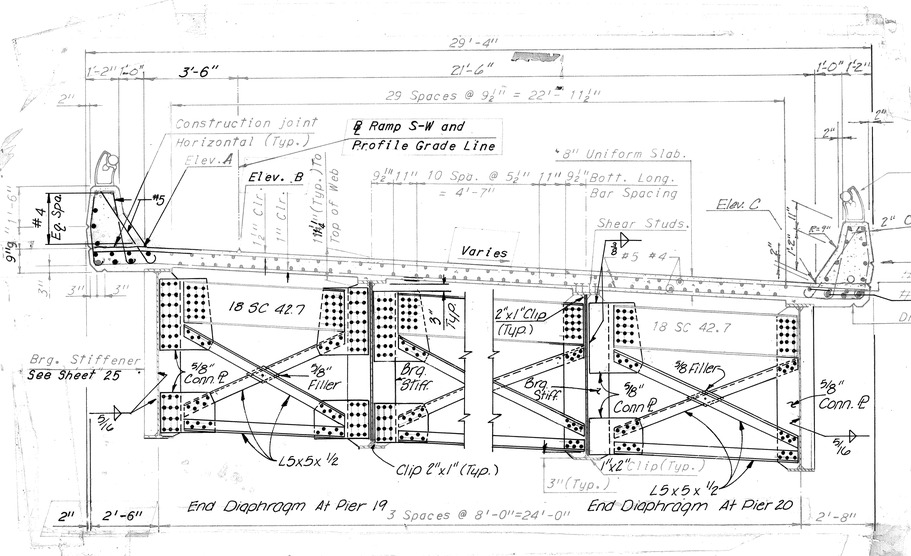
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 30 OF 38

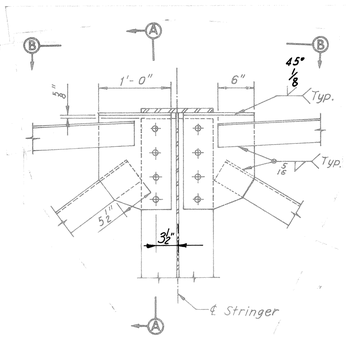
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	56	97



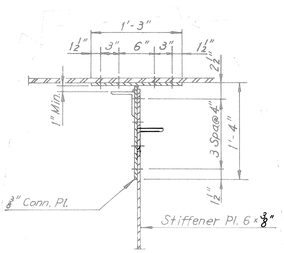
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
21+92.00	70.70	70.49	69.26
22+00.00	70.76	70.55	69.32
+10.00	70.84	70.63	69.40
+20.00	70.93	70.72	69.49
+30.00	71.01	70.80	69.57
+40.00	71.09	70.88	69.65
+50.00	71.18	70.97	69.74
+60.00	71.26	71.05	69.82
+70.00	71.35	71.14	69.91
22+79.34	——	——	69.99
+80.00	71.43	71.22	69.99
+82.00	——	71.24	——
22+82.35	71.45	——	——
+90.00	71.51	71.30	70.07
23+00.00	71.60	71.39	70.14
+10.00	71.67	71.47	70.32
+20.00	71.74	71.56	70.48
+30.00	71.81	71.64	70.59
+40.00	71.88	71.72	70.75
23+43.20	71.90	71.75	70.80
345+16.60	71.90	71.75	70.80
345+10.00	71.95	71.81	70.91
345+00.45	72.02	——	——
345+00.00	72.03	71.89	71.07
344+99.00	——	71.90	——
344+88.87	——	——	71.25



Note:
For details of end diaphragm at Pier 18 see Section A-A, Sheet 32.



DETAIL A
No Scale

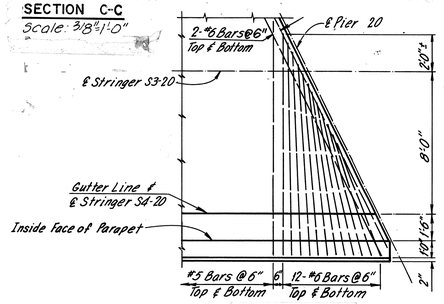


SECTION A-A
No Scale

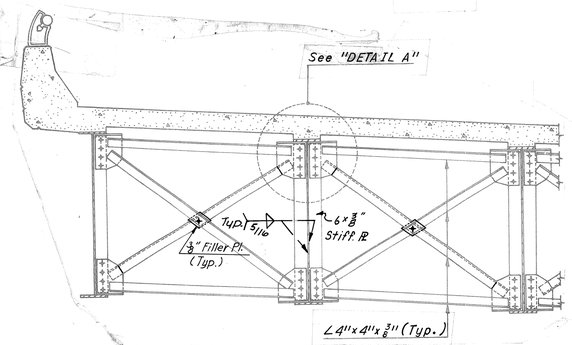
Notes:
For Framing Plan see Sheet 24
For Joint Details, see Sheet 37 & 38
For Quantities see Sheet 44
For Handrail Details, see Sheet S3.

Note:
For Standard Drainage Details for Unit 20 see Support Type 2 Sheet S5.

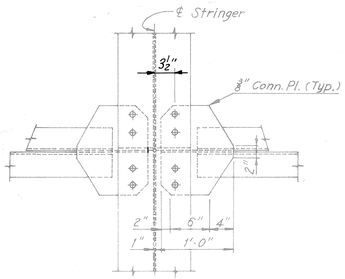
SECTION C-C
Scale: 3/8"=1'-0"



DETAIL B
Scale: ¼"= 1'-0"



INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"



VIEW B-B
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S.					
CHECKED	Y.C.P	1-14-69	1	Dim. Det. A View B-B Diaph. Conn. Pier 20	T.E.M	8-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

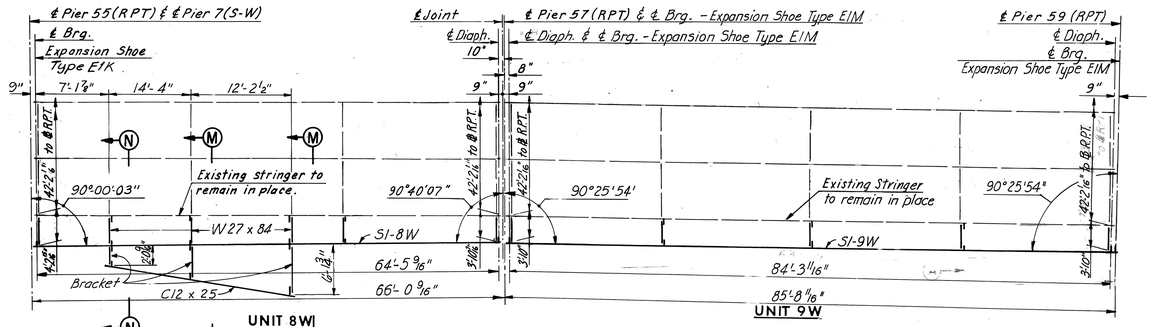
BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE

DECK PLAN - UNITS 19 AND 20

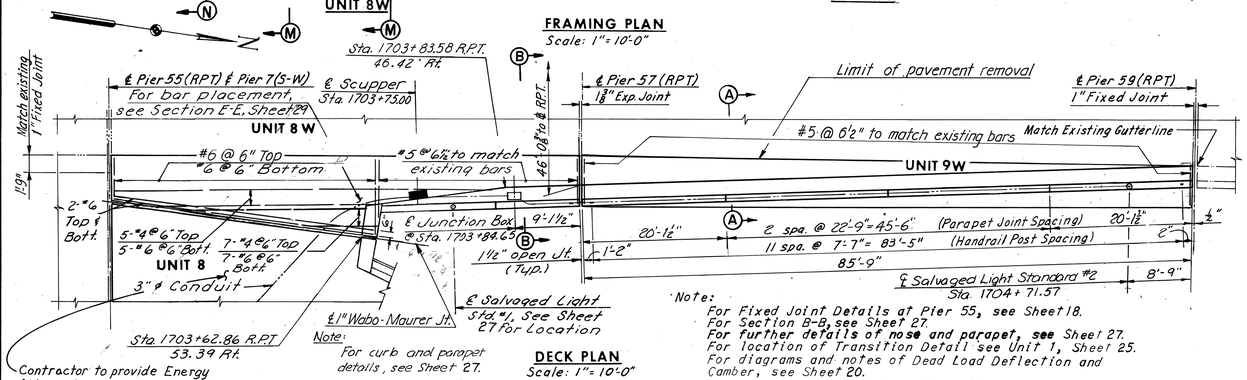
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 31 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION NO.	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	57	97



FRAMING PLAN
Scale: 1"=10'-0"

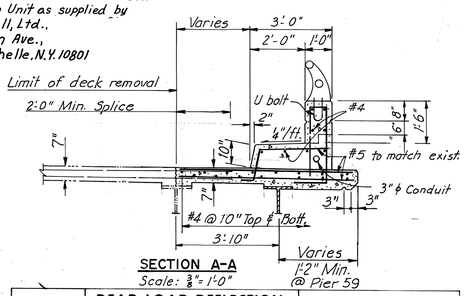


Contractor to provide Energy Attenuator - 8 Unit Hi-Dro Cell Sandwich Unit as supplied by Hydro-Cell, Ltd., 11 Lincoln Ave., New Rochelle, N.Y. 10801

Note: For curb and parapet details, see Sheet 27.

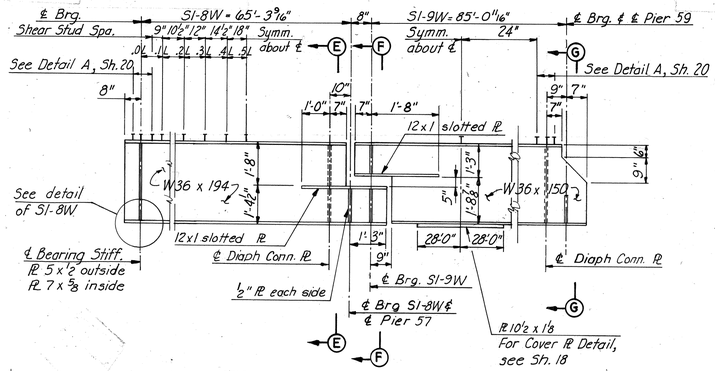
DECK PLAN
Scale: 1"=10'-0"

Note:
For Fixed Joint Details at Pier 55, see Sheet 18.
For Section B-B, see Sheet 27.
For Further details of nose and parapet, see Sheet 27.
For location of Transition Detail see Unit 1, Sheet 25.
For diagrams and notes of Dead Load Deflection and Camber, see Sheet 20.
For Sections M-M & N-N see Sheet 20a.

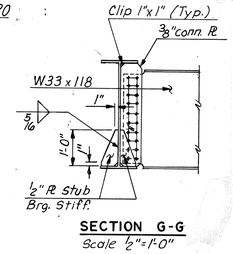


SECTION A-A
Scale: ¾"=1'-0"

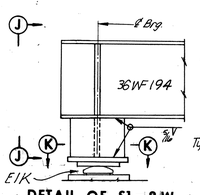
	DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
STRINGER	¼L	½L	¾L	¼L	½L	¾L
SI-8W	1 3/16"	1 7/16"	1 3/16"	1⅛"	1 7/16"	1"
SI-9W	1½"	1¾"	1½"	2"	2¼"	2"



STRINGER ELEVATION SI-8W & SI-9W
No Scale

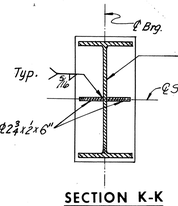


SECTION G-G
Scale ½"=1'-0"

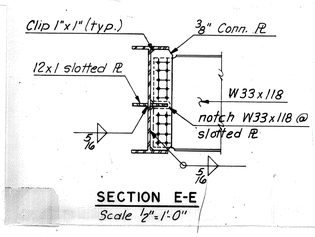


DETAIL OF SI-8W
No Scale

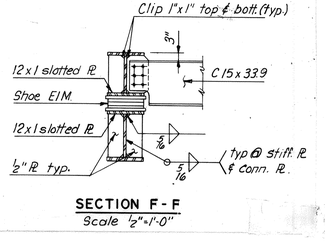
VIEW J-J
No Scale



SECTION K-K
No Scale



SECTION E-E
Scale ½"=1'-0"

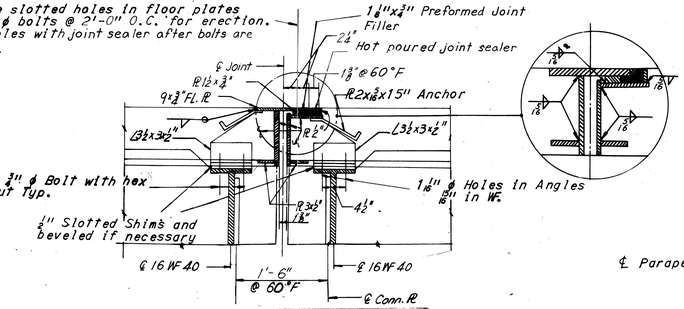


SECTION F-F
Scale ½"=1'-0"

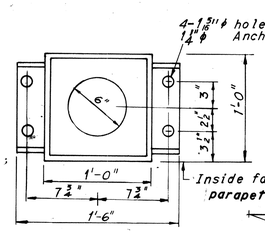
	BY	DATE
MADE	AMH	2-19-69
CHECKED	RCT	5-8-69
IN CHARGE		

NO.	REVISION	BY	DATE
4	Bracket Dimensions	P.R.Y.	10-76
3	Dimensions Added	T.E.M.	9-9-75
2	Angle @ Pier 7	T.E.M.	9-5-75
1	Major revisions	A.B.P.	8-25-75

Provide slotted holes in floor plates for ½" ϕ bolts @ 2'-0" O.C. for erection. Fill holes with joint sealer after bolts are removed.

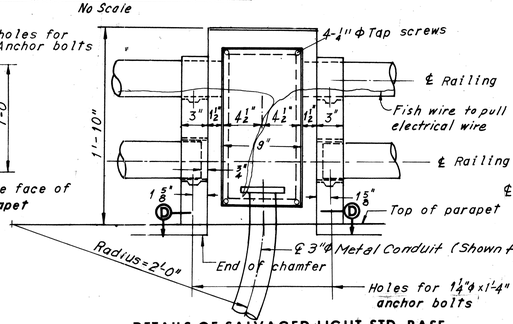


EXPANSION JOINT DETAIL - PIER 57
No Scale



SECTION D-D
Scale: 1½"=1'-0"

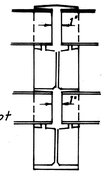
SHOE SCHEDULE EXPANSION SHOES	
TYPE	NO. REQD.
EIM	3
EIK	1



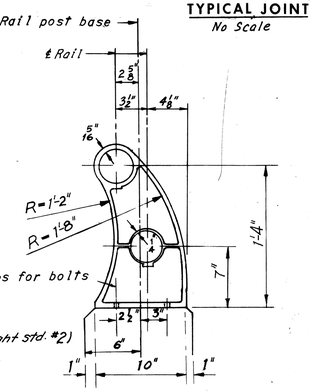
DETAILS OF SALVAGED LIGHT STD. BASE
Scale: 1½"=1'-0"

Hand tighten north set screws at joint

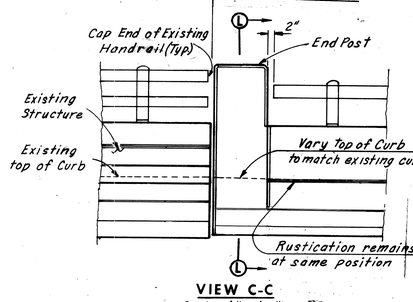
Provide joint at every other post except end post.



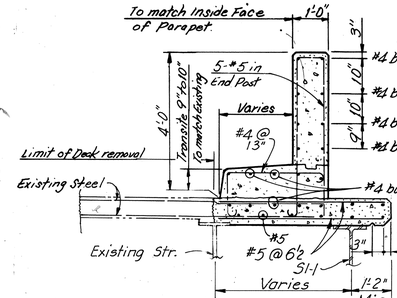
TYPICAL JOINT
No Scale



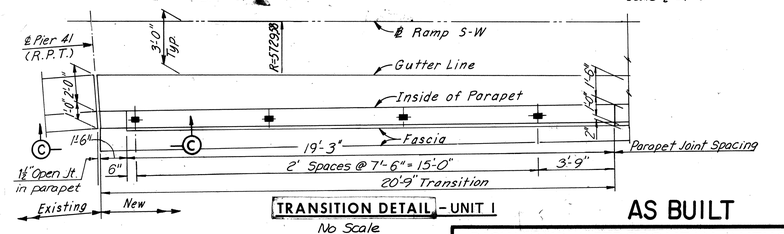
SALVAGED RAIL POST
Scale: 1½"=1'-0"



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



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



TRANSITION DETAIL - UNIT 1
No Scale

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparation of shop drawings for new metalwork.
New Diaphragms are to match Existing Diaphragms unless otherwise shown.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
SUPERSTRUCTURE DETAILS

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 32 OF 38

57

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
		59A	

NOTES

*Dimension shown is at 60° F. For Dim. "W", "X" and "Y" adjustment due to temparture change, see Adjustment Schedule.

Reinforced Elastomeric Expansion Dam, Transflex type 200A or Onflex type 25, to be installed in accordance with the manufacturer's specifications. The manufacturer's representative shall be present during installation.

Shop drawings, showing complete details and dimensions of the dam and other pertinent information for installation of a practical leakproof joint, shall be prepared in accordance with these specifications. Review of shop drawings by the Engineer shall be required prior to installation of the expansion dam.

TRANSFLE 200A

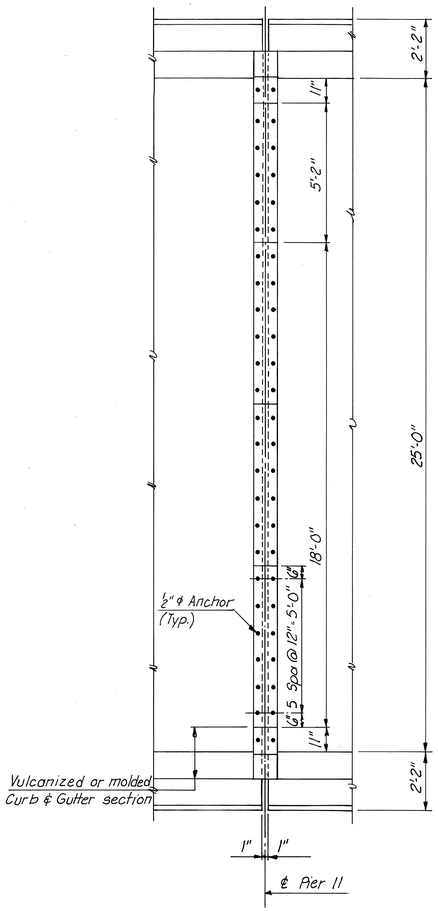
Curb and gutter sections shall be a one piece molded section or shall be pre-assembled by the manufacturer and all joints therein vulcanized.

Units of the dam shall have tongue and groove joints at the ends of all units to provide for a positive leakproof connection between adjacent units.

ONFLEX 25

Elastomeric membrane shall be one piece premolded unit extending full length of the aluminum extrusion.

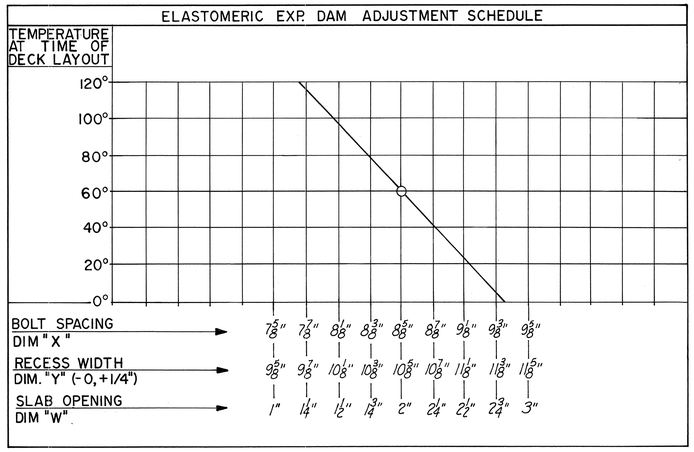
Aluminum extrusions to be continuous with mitered and welded joints at the gutter lines.

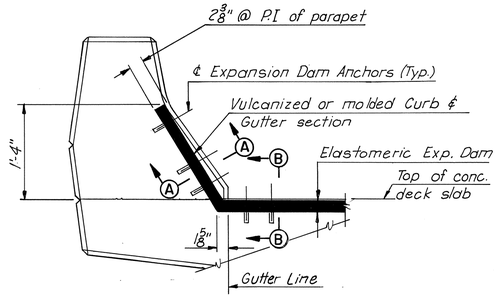


PLAN

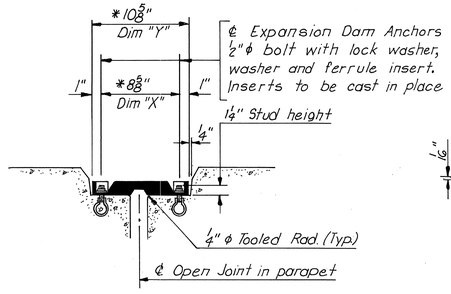
NOTE

Plan is shown for Transflex 200A. Onflex 25 is similar except as noted under Notes Onflex 25.

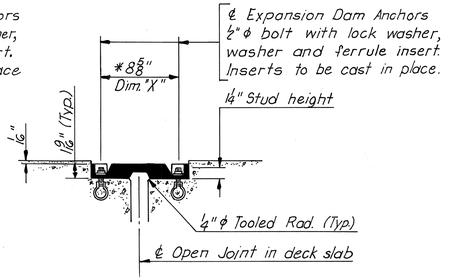




TYPICAL SECTION ALONG ℄ JOINT

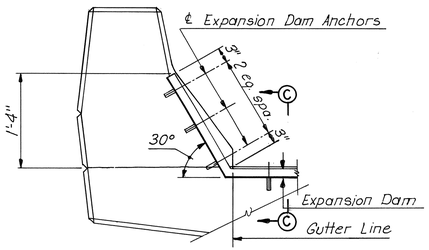


SECTION A-A

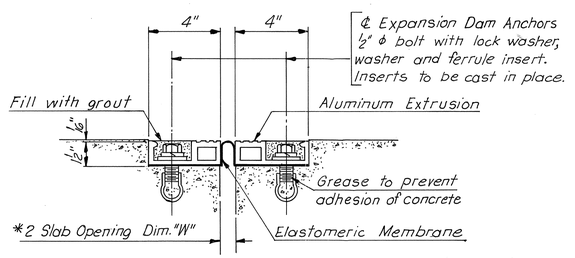


SECTION B-B

TRANSFLEX 200A JOINT DETAILS



TYPICAL SECTION ALONG ℄ JOINT



SECTION C-C

ONFLEX 25 JOINT DETAILS

DESIGNED						
DRAWN	TEM	9-30-76				
CHECKED			1	New Sheet '	TEM	9-30-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

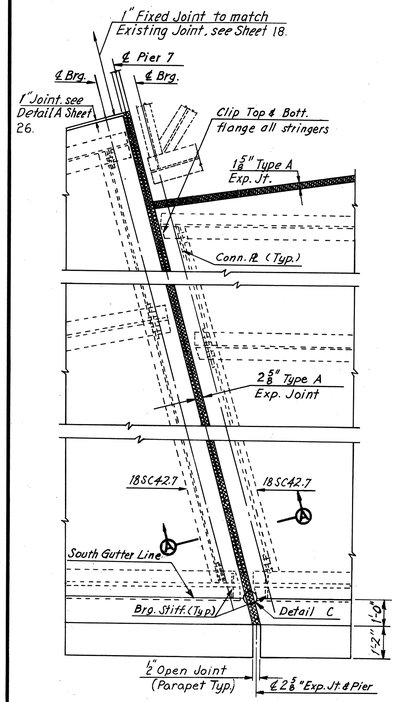
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS - PIER 11

SCALE _____
DATE _____
SHEET 34A OF ____

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

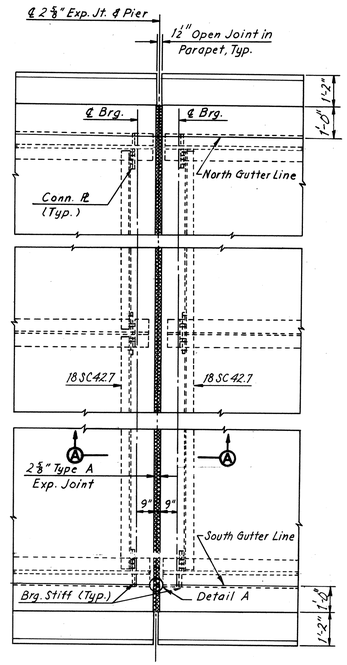
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	59	97



PLAN — JOINT AT PIER 7

Scale : ⅜"= 1'-0"

Note :
For Detail C, See Sheet 35.

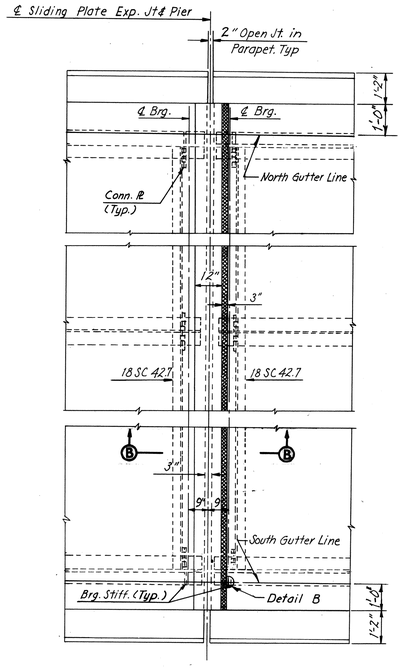


PLAN — JOINT AT PIERS 8, 9, 10, 17 AND 18

Scale : ⅜"= 1'-0"

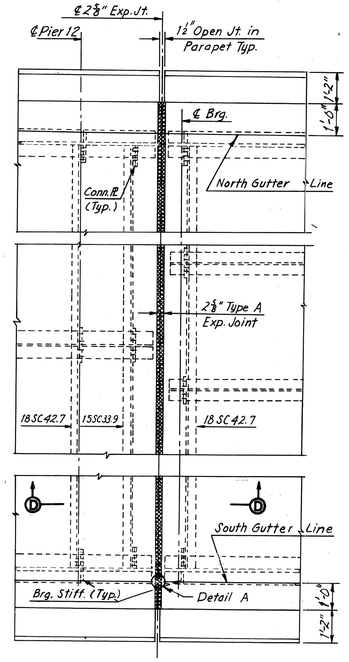
(Piers 4 and 5 similar)

For Piers 17 and 18 see Section C-C, Sheet 35.



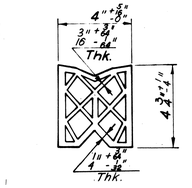
PLAN — JOINT AT PIER 11

Scale : ⅜"= 1'-0"

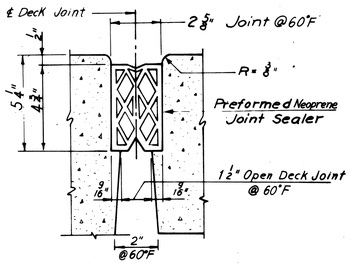


PLAN — JOINT AT PIER 12

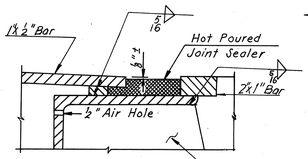
Scale : ⅜"= 1'-0"



PREFORMED NEOPRENE JOINT SEALER FOR 2 5/8" TYPE "A" JOINT

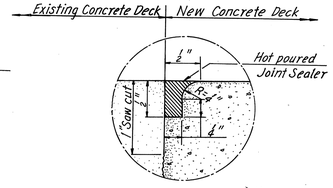


2 5/8" TYPE "A" JOINT



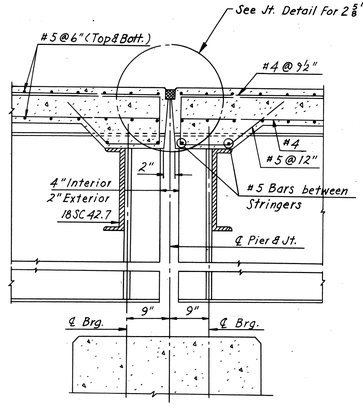
DETAIL B

Scale : 3"=1'-0"



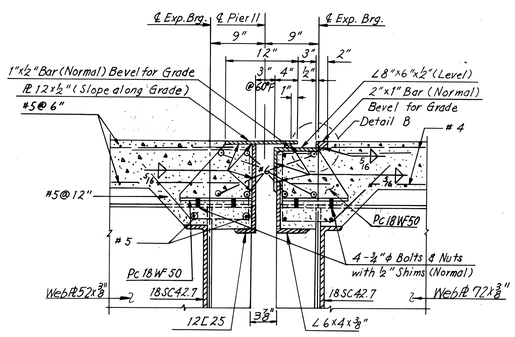
DETAIL D

Full Scale



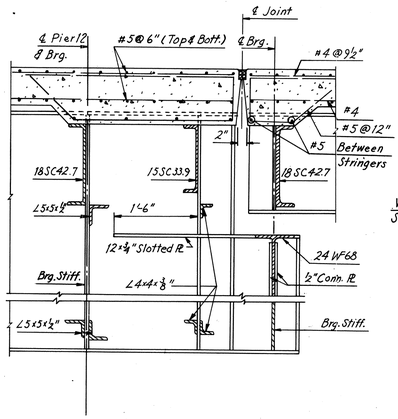
SECTION A-A

Scale : ¼"=1'-0"



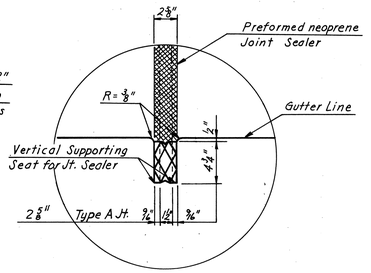
SECTION B-B

Scale : 1"= 1'-0"



SECTION D-D

Scale : ¼"= 1'-0"



DETAIL A

No Scale

Note:
All horizontal dimensions shown above are normal to ℄ Joint.

Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	12-18-68				
CHECKED	G.S.H.	1-29-69				
IN CHARGE						

AS BUILT

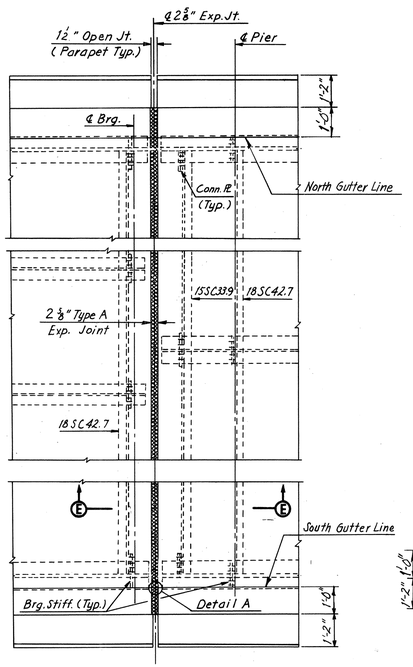
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS

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

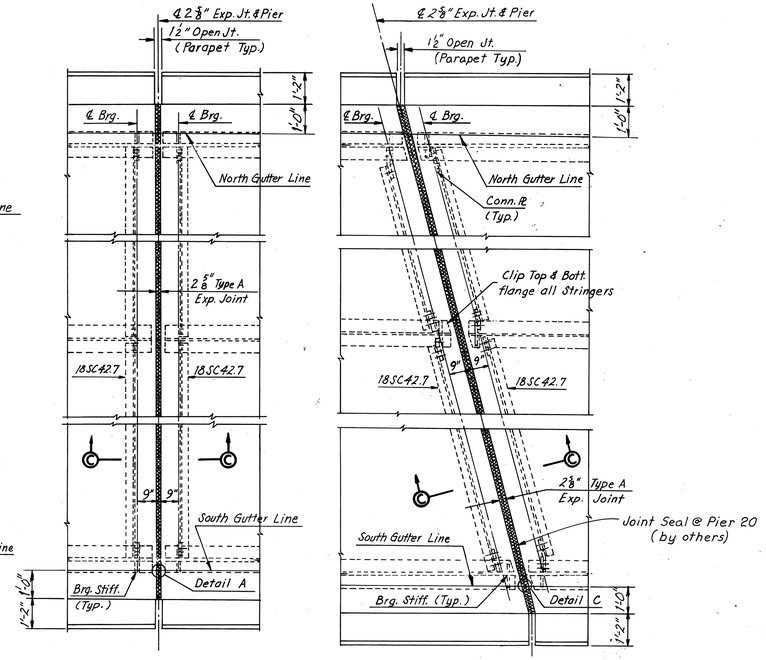
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 34 OF 38

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	60	97



PLAN — JOINT AT PIER 13

Scale: ⅜" = 1'-0"



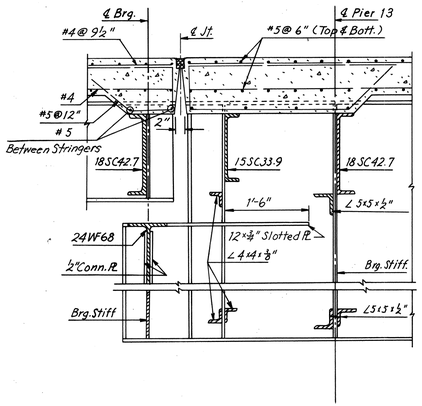
PLAN — JOINT AT PIERS 14, 15 AND 16

Scale: ⅜" = 1'-0"

PLAN — JOINT AT PIERS 19 AND 20

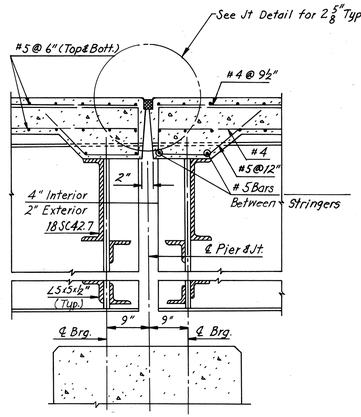
Scale: ⅜" = 1'-0"

Note: For Detail A, See Sheet 34



SECTION E-E

Scale ⅜" = 1'-0"

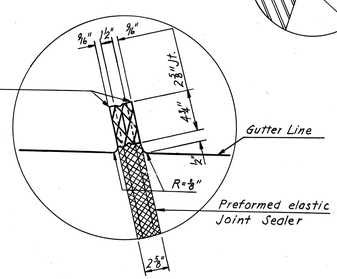


SECTION C-C

Scale ¾" = 1'-0"

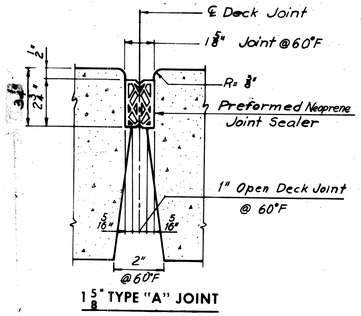
Note: All horizontal dimension of sections shown above are normal to ℄ joint and pier.

Notes: For Details of bearing stiffeners and connection plates, see Framing Plan Sheets.
For End Diaphragms, See Cross Sections-Deck Plan Sheets.

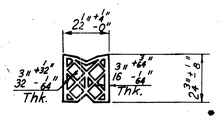


DETAIL C

No Scale

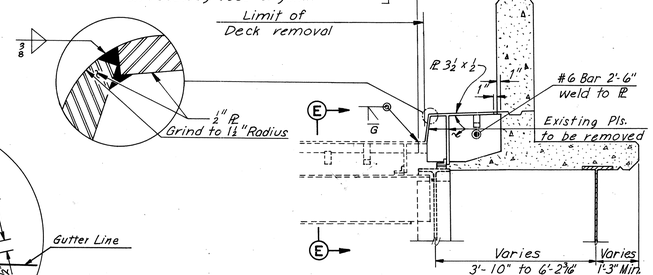


1⅝" TYPE "A" JOINT



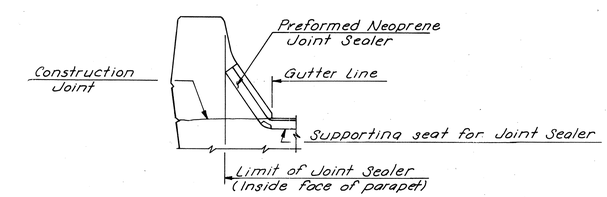
PREFORMED NEOPRENE JOINT SEALER FOR 1⅝" TYPE "A" JOINT

Curb portion of existing expansion joints is to be removed beyond the curbline an amount sufficient for performance of single bevel groove weld between existing and new pair of L's 4 x 3½ x ½". The weld is to be finished flush with the angles on roadway face of joint.



EXPANSION JOINT AT EXISTING PIER 41

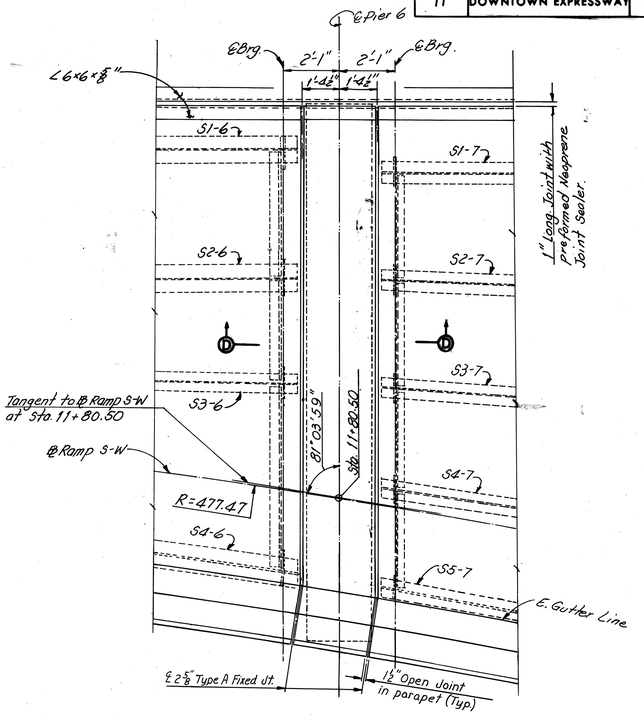
Scale: ½" = 1'-0"



TREATMENT OF TYPE "A" JOINT AT GUTTER

No Scale

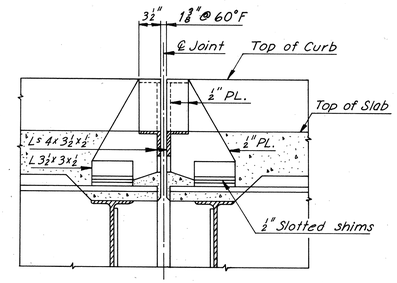
Note: All horizontal dimensions shown above are normal to ℄ Joint.



PLAN - JOINT AT PIER 6

Scale ⅜" = 1'-0"

Note: For Section D-D, see Sheet 7 & 26.



SECTION E-E

Scale: 1" = 1'-0"

AS BUILT

	BY	DATE
MADE	Y. C. P	12-18-68
CHECKED	G.S.H.	1-28-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Revised Exp. Jt. at Pier 41	TEM	9-9-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 65
RAMP S-W CONNECTION FROM RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS

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

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 35 OF 38

60

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

RICHMOND EXPRESSWAY SYSTEM
CONTRACT NO. PC – 2018
PROTECTIVE COATING OF STRUCTURES
****

Bridge 66

Downtown Expressway

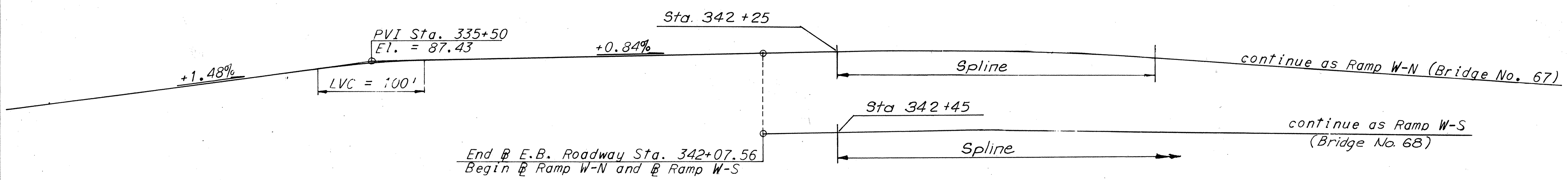
Eastbound Roadway Over
12th St. - R.R. Tracks and 16th St.

RECORD SET PLANS (Next 43)

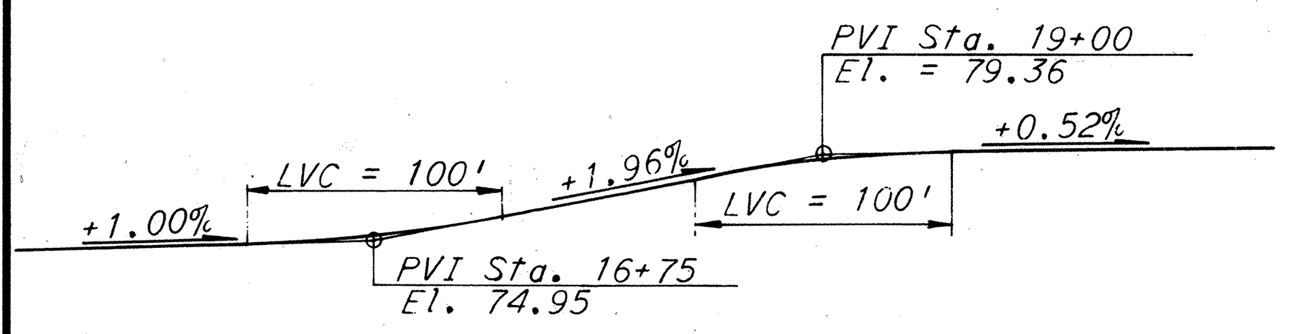
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	127	265

Note:
For Layout of Units 14 thru 21 refer to Bridge No. 63 (W.B. Roadway)
For Boring Logs, see Sheets 37 thru 42.
For Quantities, see Sheet 2.
For General Notes, see Sheet 2.
N, M and S denote North, Middle and South footing.

ELEVATION



℄ E.B. ROADWAY, RAMP W-N AND RAMP W-S



℄ RAMP 10TH-E.

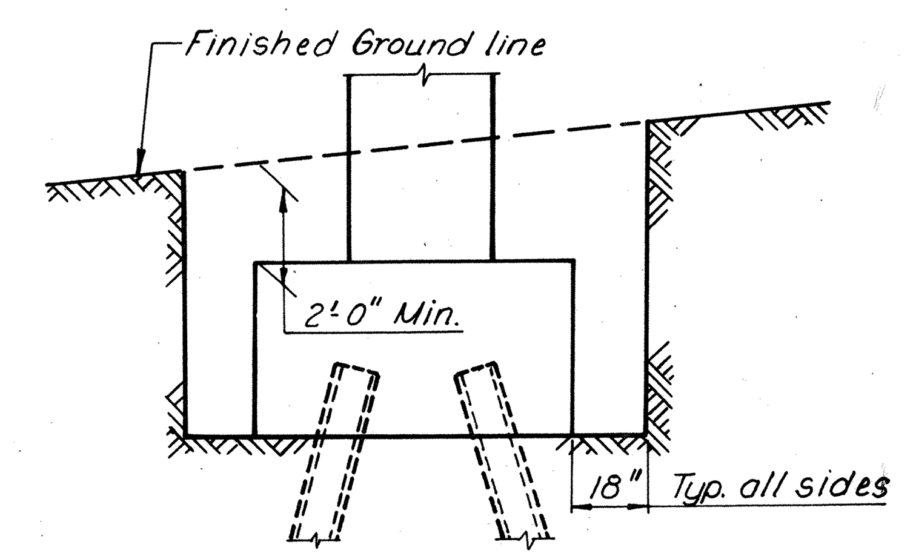
PROFILE GRADE DATA

℄ Downtown Expressway Curve: M-4	℄ E.B. Roadway Curve: M-6	℄ Ramp W-N Curve: WN-1
P.I. = 326+57.21	P.I. = 336+40.09	P.I. = 345+25.47
Δ = 12°25'03"	Δ = 11°45'56"	Δ = 64°53'49"
D = 4°00'	D = 2°30'	D = 11°27'33"
T = 155.83'	T = 236.14'	T = 317.90'
L = 310.44'	L = 470.62'	L = 566.33'
R = 1,432.40'	R = 2,291.83'	R = 500.00'

Curve: 10E-2	℄ Ramp 10th-E. Curve: 10E-3	Curve: 10E-4
P.I. = 17+36.87	P.I. = 24+11.27	P.I. = 26+80.64
Δ = 6°29'42"	Δ = 1°11'57"	Δ = 12°30'55"
D = 6°00'	D = 1°00'	D = 3°00'
T = 54.18'	T = 59.97'	T = 209.42'
L = 108.25	L = 119.93'	L = 417.18'
R = 954.93'	R = 5,729.58'	R = 1,909.86'

HORIZONTAL CURVE DATA

INDEX



LIMITS OF STRUCTURE EXCAVATION

no scale

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
			3	As Built	TEM	8-76
			2	Sign Support Bracket & Sh. 16A & 20A added	R.B.H.	9-74
MADE	J.V.	9-12-68	1	Footing elev. & piles, Piers 8, 9, 10, 11, 12 & 13	R.B.H.	8-74
CHECKED	G.C.C.	5-26-69				
IN CHARGE						

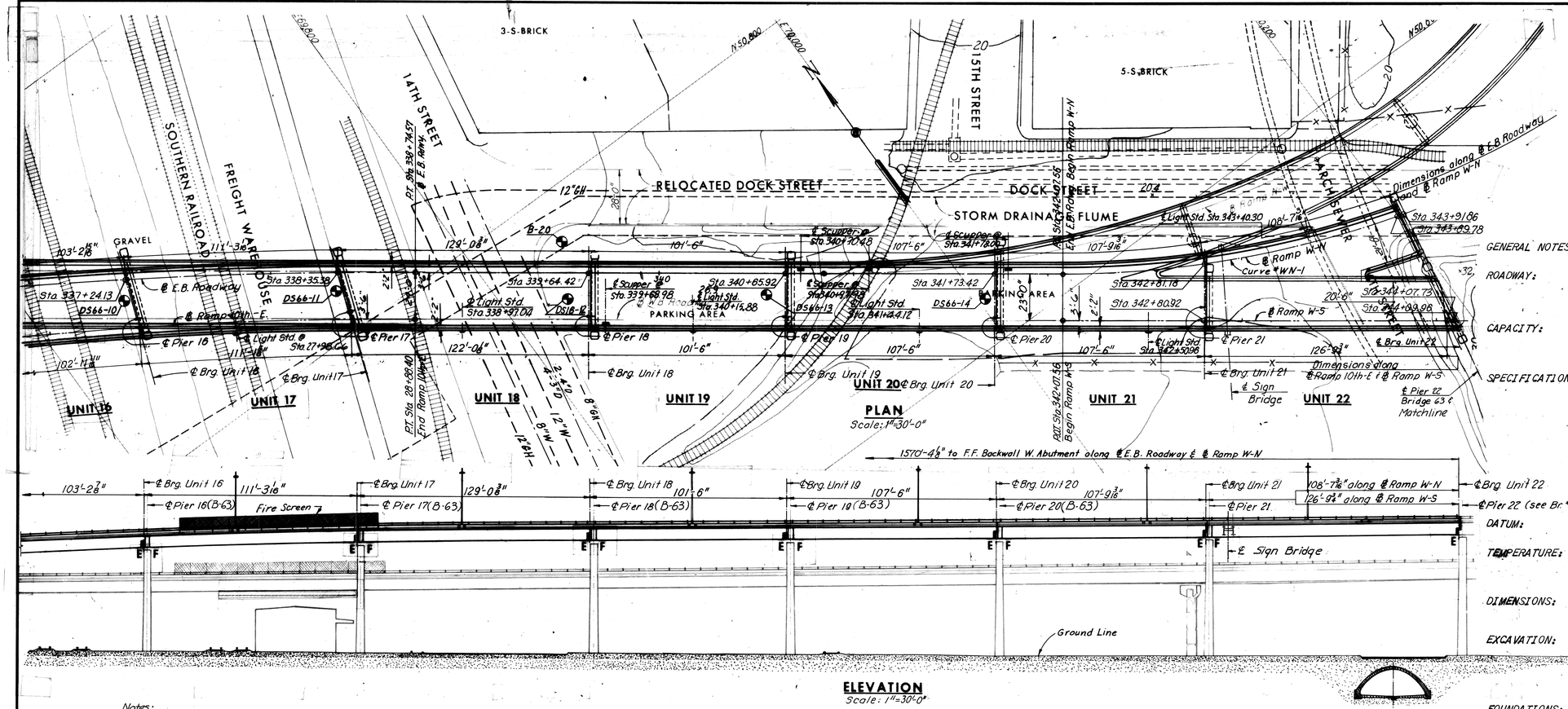
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
GENERAL PLAN AND ELEVATION

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

SCALE: 1"=30'
CONTRACT NO.: 10
SHEET NO. 1 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	128	265



Notes:
For Vertical and Horizontal Curve Data see Sheet 1.
For Layout of Units 14 thru 22 refer to Bridge No. 63 (Westbound Roadway).

ESTIMATED QUANTITIES

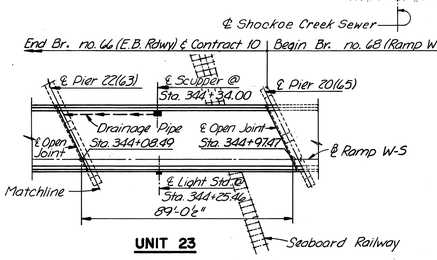
	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (1-Rail) Lin. Ft.	Porous Backfill Cu. Yds.	Underdrain 6"Dia. Pipe Lin. Ft.	Steel Piles 10BP42 Lin. Ft.
Superstructure	--	2,237.6	530,860	1,564,700	567,800	3,241	--	--	---
Substructure	1,835	1,256.6	155,030	---	----	84	34	150	9,410
Total	1,835	3,494.2 ‡	685,890	1,564,700	567,800	3,325	34	150	9,410

	Asphalt Damp-proofing Sq. Yds.	Approach Slab Concrete (‡) Cu. Yds.	Fire Screen Lin. Ft.	Approach Slab Reinforcing Steel (Lbs.)	Metal Conduit Lin. Ft.	Concrete Slope Protection Sq. Yds.	Bridge Drainage Metal Work Lbs.	Rock Facing Slope Prot. Sq. Yds.	Energy Attenuator 8-Unit Each
Superstructure	--	--	210	---	2,214	--	11,870	--	1
Substructure	105	91.5	---	23,870	92	559	--	3,320	---
Total	105	91.5 ‡	210	23,870	2,306	559	11,870	3,320	1

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

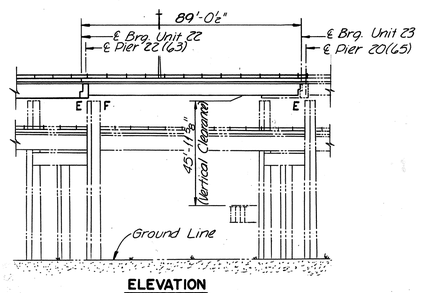
	BY	DATE
MADE	J.V.	1-9-69
CHECKED	G.C.C.	5-26-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Span Fixities & R.E. reamt added	PRMS	4-19-74
2	Sign Bridge added & Struct. Stl. Qty.	R.B.H.	9-74
3	As Built	TEM	8-76



UNIT 23

PLAN



ELEVATION

GENERAL NOTES:

ROADWAY: One variable width roadway transitioning from E.B. Roadway Downtown Expressway and Ramp 10th-E into Ramps W-N and W-S (Bridges No. 67 and 68)

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

SPECIFICATIONS:
GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973 modified by Special Design provisions.
WELDING: 1972 Structural Welding Code of the American Welding Society.

CONTRACT SPECIAL PROVISIONS
Specifications and Contract Special Provisions referred to above are necessary to make these plans complete

DATUM: City of Richmond

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

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

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

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

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

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

AS BUILT

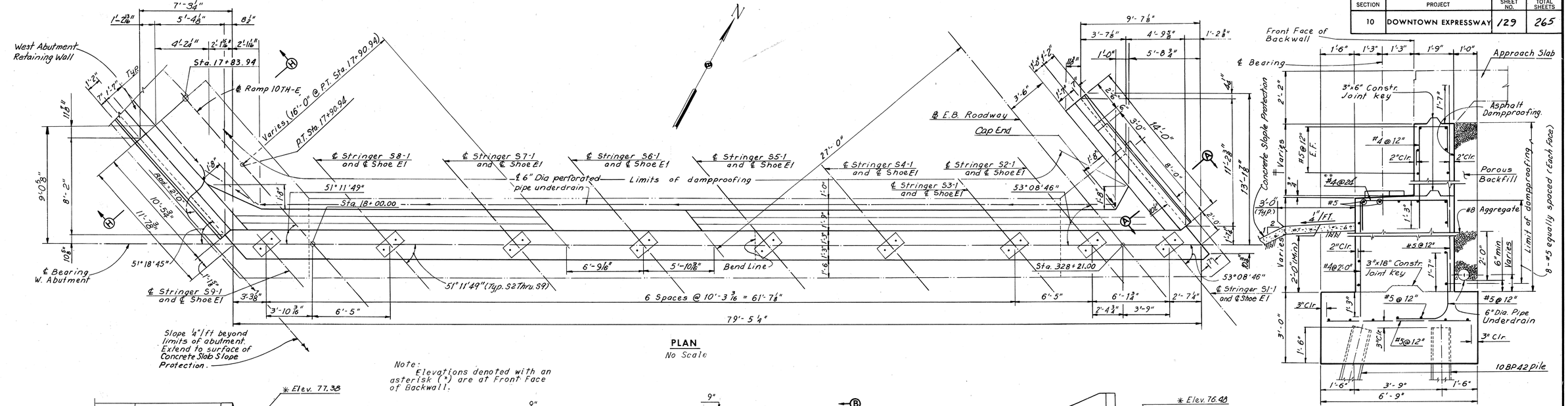
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
GENERAL PLAN AND ELEVATION

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 2 OF 46

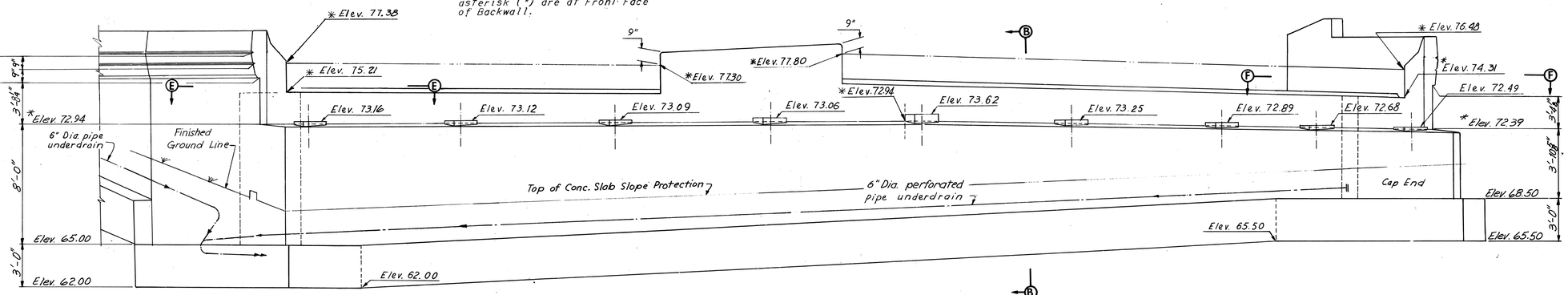
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	129	265



PLAN
No Scale

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

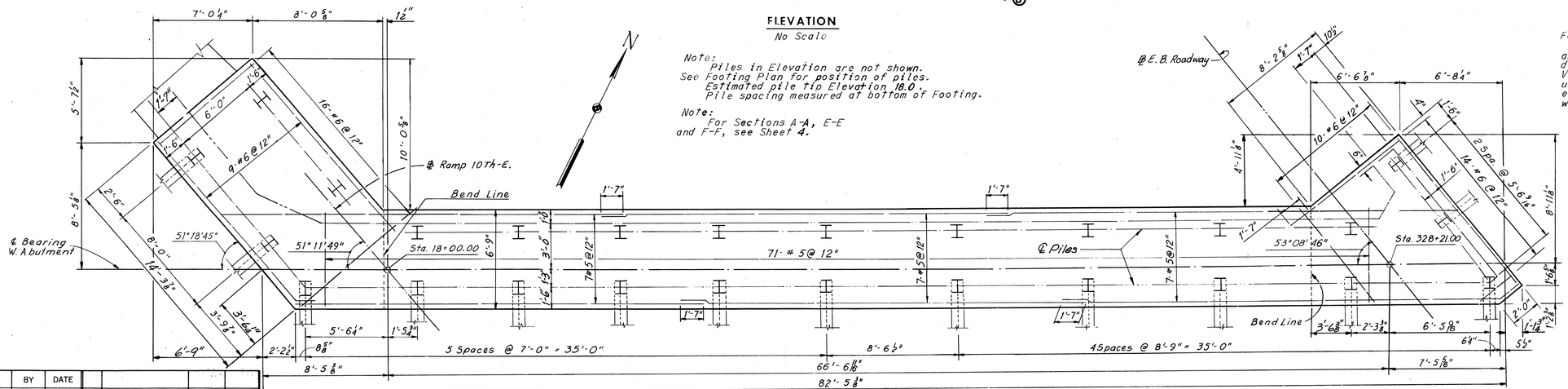
Note:
Elevations denoted with an asterisk (*) are at Front Face of Backwall.



ELEVATION
No Scale

Note:
Piles in Elevation are not shown. See Footing Plan for position of piles. Estimated pile tip Elevation 18.0'. Pile spacing measured at bottom of Footing.

Note:
For Sections A-A, E-E and F-F, see Sheet 4.



FOOTING PLAN
No Scale

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

Note:
For Architectural treatment of Abutments and Wingwalls, see Sheet S7.

** Provide two additional #4 bars @ 24" at each unreinforced bearing pad.

Note:
All piles shall be 10BP42 Steel Piles (Design Capacity = 45 tons)
Batter piles 3" per foot where shown.
For Steel pile details, see Sheet 4.
For North Wingwall elevation and details, see Sheet 4.
For South Wingwall and Retaining wall elevation and details, see Sheet 5.
For Rail Post Spacing, see Sheet 5.
For Anchor Bolt setting plan and reinforcing pad details, see Sheet 4.
For Framing Plan, see Sheet 14.

‡ Top of backwall to conform to Roadway.

	BY	DATE
MADE	C.E.B	7-26-68
CHECKED	G.C.C.	8-15-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	As Built	TEM	8-76

AS BUILT

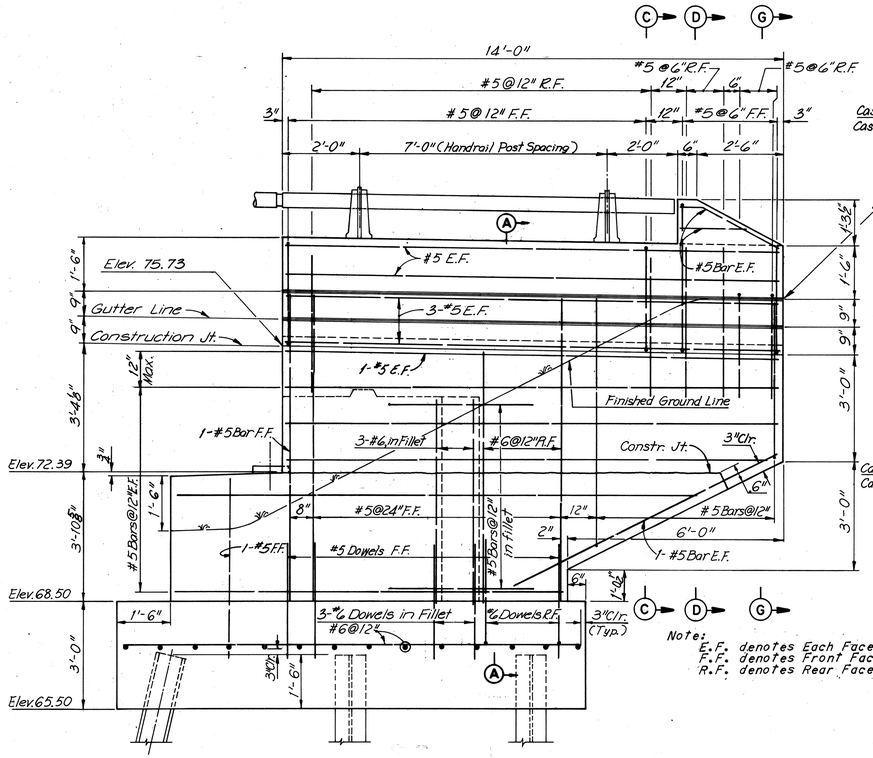
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
WEST ABUTMENT

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

SCALE: As Noted
CONTRACT NO.: 10
NO. 3 OF 46

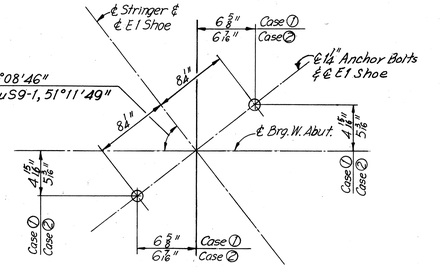
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	130	265



Note:
E.F. denotes Each Face.
F.F. denotes Front Face.
R.F. denotes Rear Face.

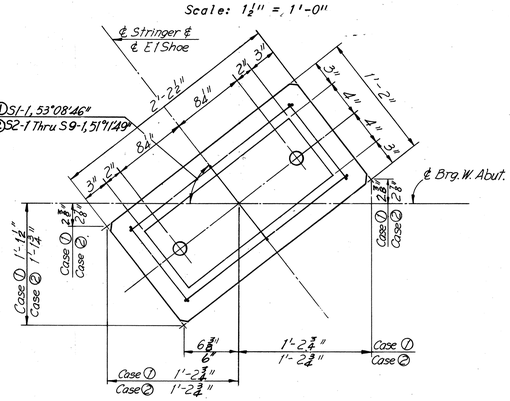
NORTH WINGWALL ELEVATION

Scale: ½" = 1'-0"



ANCHOR BOLT SETTING PLAN

Scale: 1½" = 1'-0"

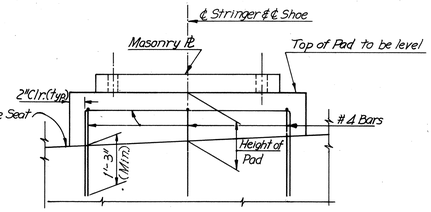


PAD PLAN

Scale: 1½" = 1'-0"

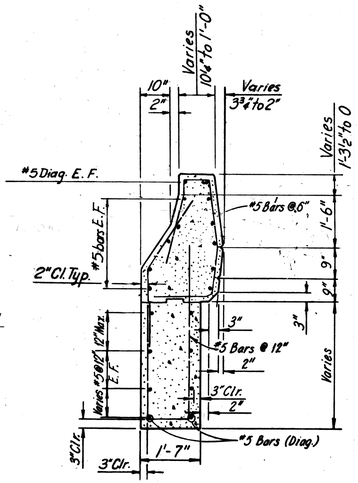
Note:
No reinforcing steel required for pad height less than 4".

Note:
All piles shall be 10BP42 steel piles (Design Capacity = 45 Tons).
Batter piles 3" per foot where shown.
Estimated pile tip Elev. 18.0.
For Abutment, see Sheet 3.
For Standard Handrail details, see Sheet S3.
For Standard Shoe details, see Sheets S1 & S2.
For Framing Plan, see Sheet 14.
For architectural treatment of Abutments and Wingwalls, see Sheet 5



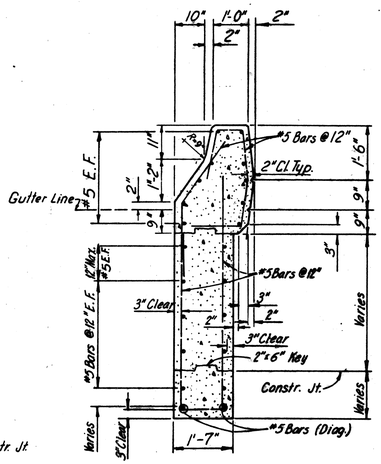
PAD ELEVATION

Scale: ½" = 1'-0"



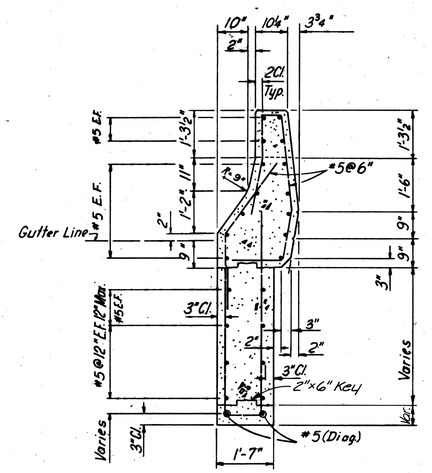
SECTION G-G

Scale: ½" = 1'-0"



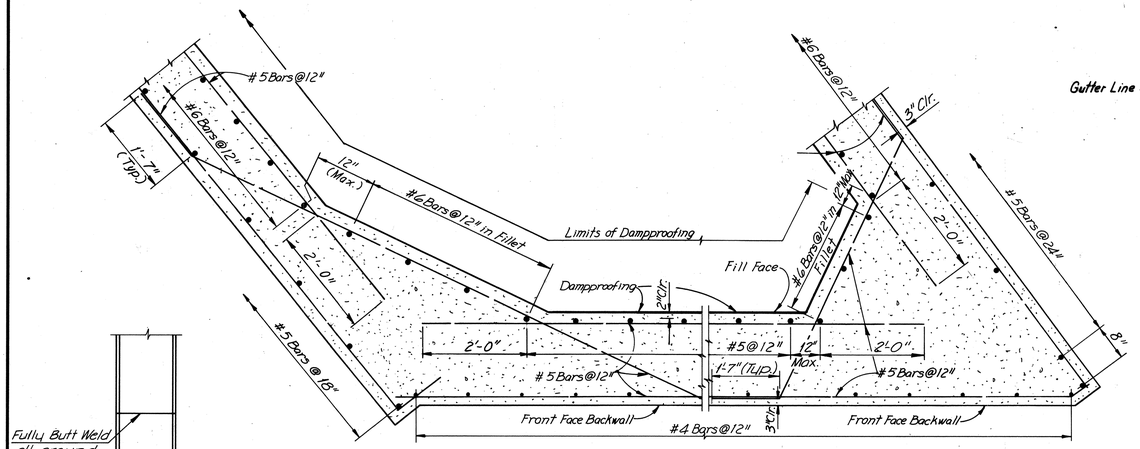
SECTION C-C

Scale: ½" = 1'-0"



SECTION D-D

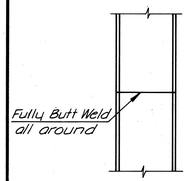
Scale: ½" = 1'-0"



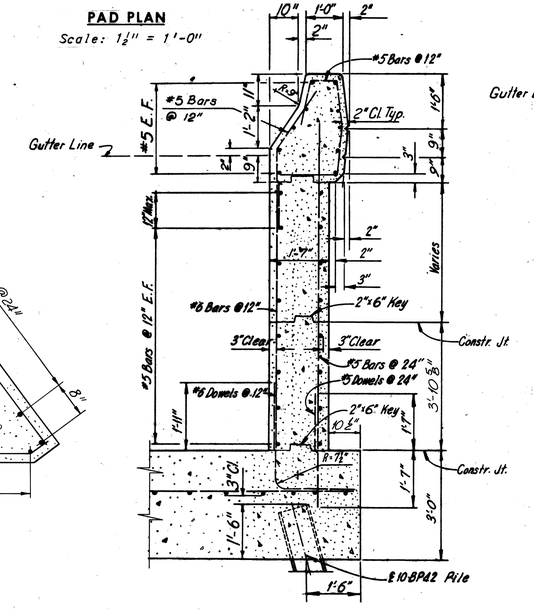
SECTION E-E **SECTION F-F**

FILLET DETAILS

Scale: ¾" = 1'-0"



DETAIL OF STEEL PILE SPLICE



SECTION A-A

Scale: ½" = 1'-0"

	BY	DATE				
MADE	AHH	7-23-68				
CHECKED	GC.C.	8-21-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

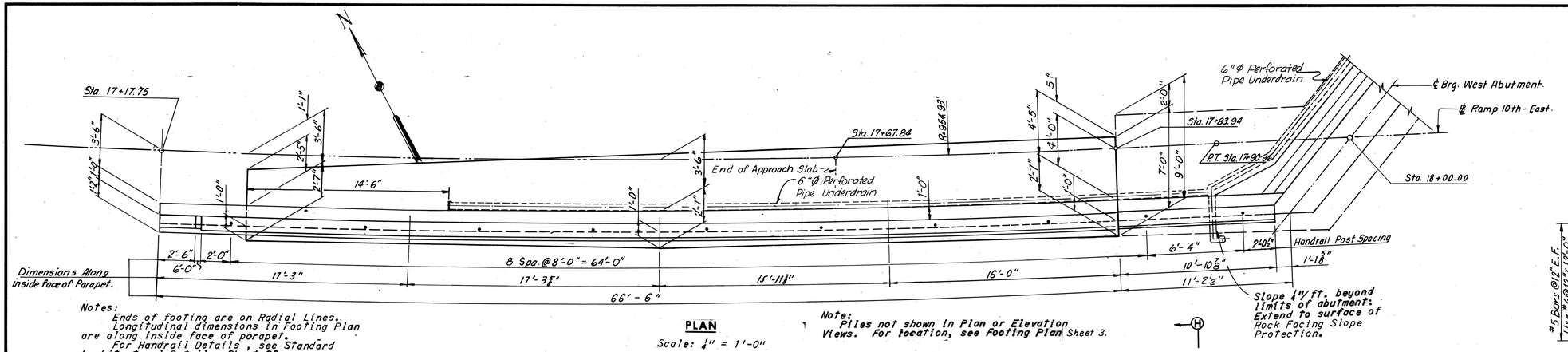
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

WEST ABUTMENT DETAILS

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 4 OF 46

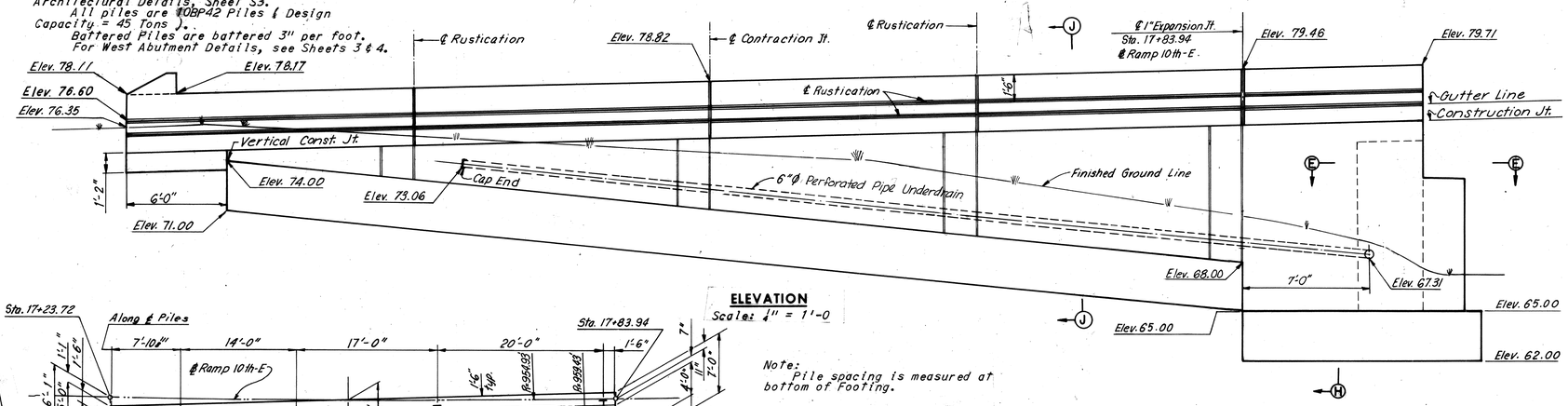
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	131	265



Notes:
Ends of footing are on Radial Lines.
Longitudinal dimensions in Footing Plan are along inside face of parapet.
For Handrail Details, see Standard Architectural Details, Sheet S3.
All piles are 10BP42 Piles (Design Capacity = 45 Tons).
Battered Piles are battered 3" per foot.
For West Abutment Details, see Sheets 3 & 4.

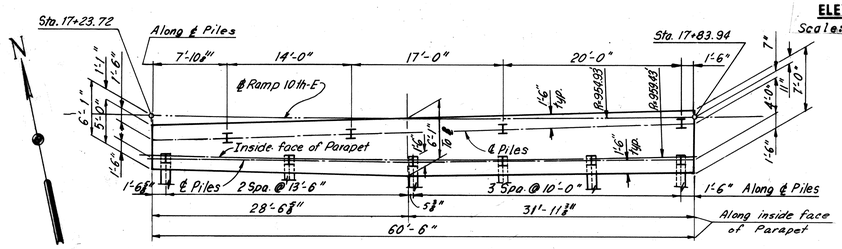
PLAN
Scale: ¼" = 1'-0"

Note:
Piles not shown in Plan or Elevation Views. For location, see Footing Plan Sheet 3.

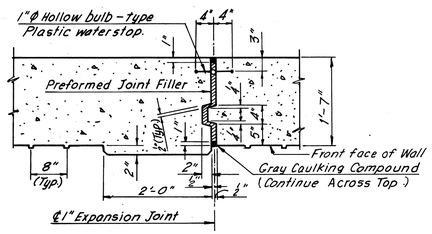


ELEVATION
Scale: ¼" = 1'-0

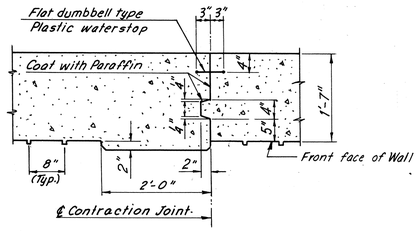
Note:
Pile spacing is measured at bottom of Footing.



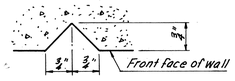
FOOTING PLAN
Scale: ⅛" = 1'-0"



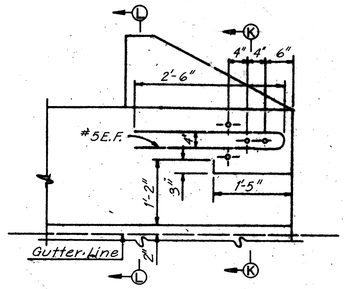
EXPANSION JOINT DETAIL
Scale: ¾" = 1'-0"



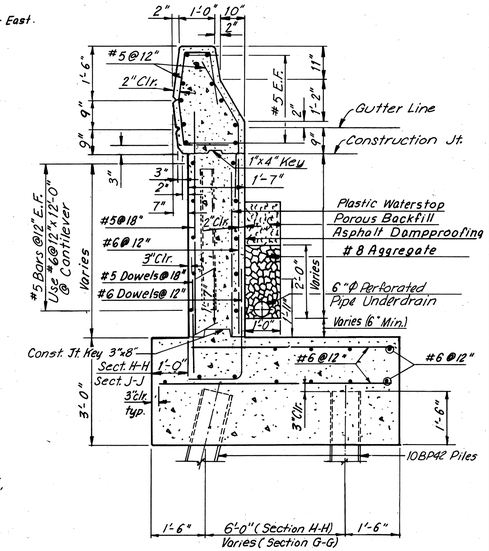
CONTRACTION JOINT DETAIL
Scale: ¾" = 1'-0"



RUSTICATION DETAIL
No Scale



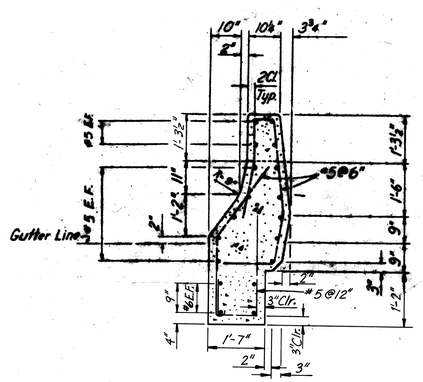
GUARDRAIL ATTACHMENT
Scale: ¾" = 1'-0"



SECTION H-H
Scale: ½" = 1'-0"

Note:
For Section E-E, see sheet 4.

Note:
Section J-J is similar.



SECTION K-K
Scale: ½" = 1'-0"

SECTION L-L
Scale: ½" = 1'-0"

	BY	DATE
MADE	M.A.R.	7-23-68
CHECKED	RLM	8-14-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Underdrain change Add Guard Rl. Attach. As Built	PRMS TEM	4-19-71 8-76

1828-22-10-066

AS BUILT

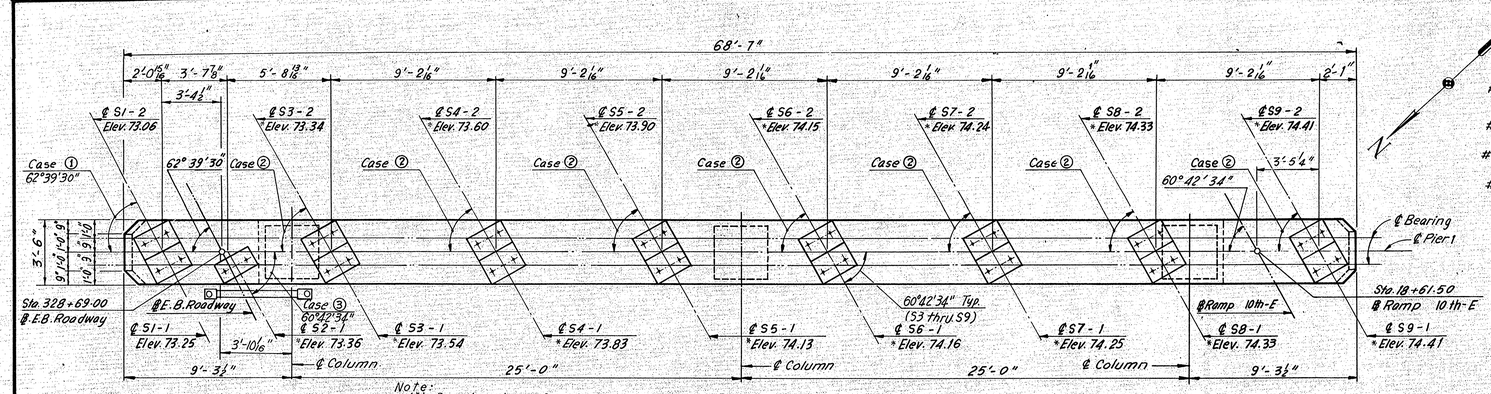
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
WEST ABUTMENT RETAINING WALL

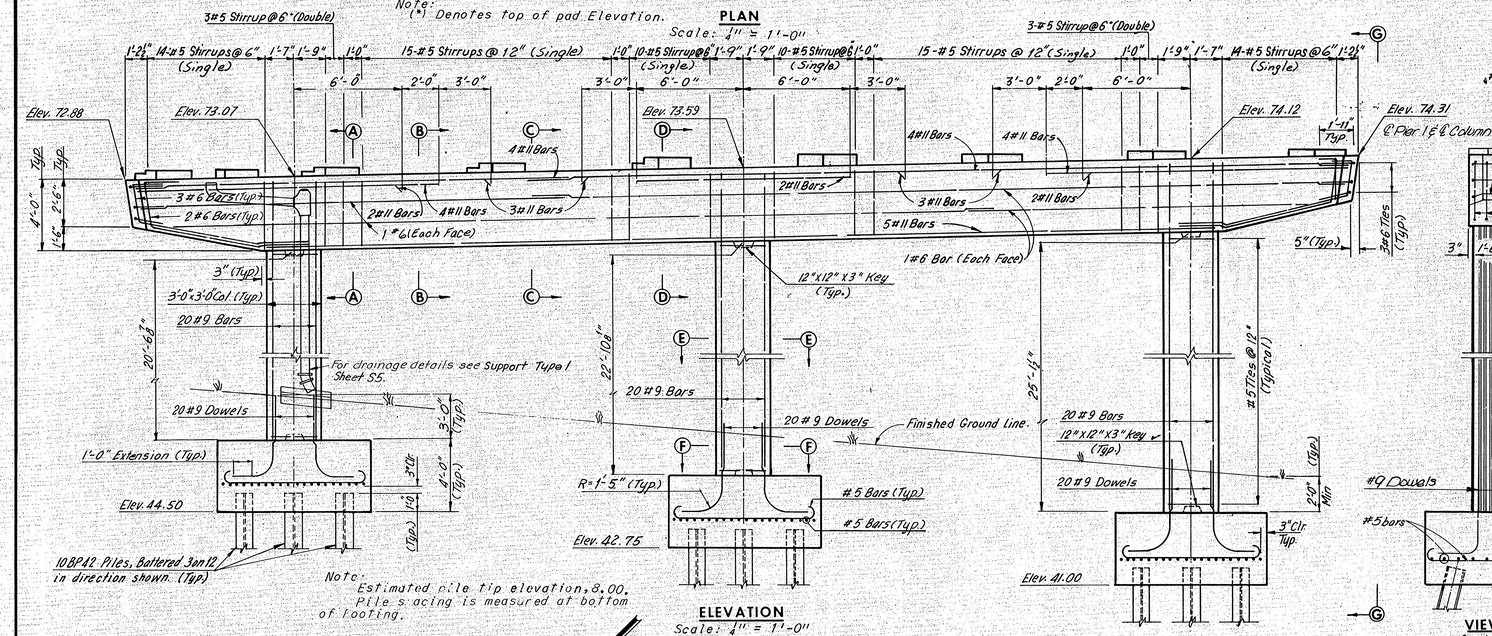
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	132	265



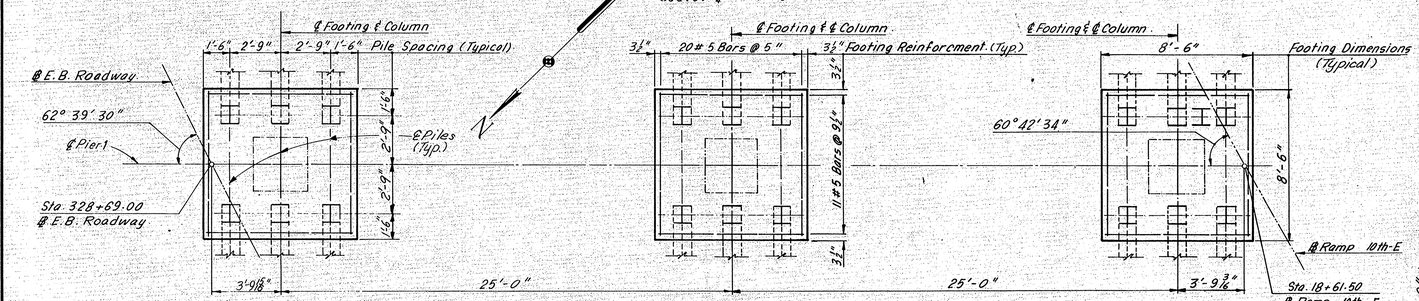
PLAN
Scale: 1/4" = 1'-0"



Note:
Estimated pile tip elevation, 8.00.
Pile spacing is measured at bottom of footing.

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

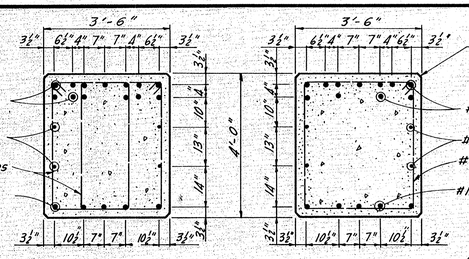
Note:
For architectural treatment of columns, see Sheet 57.



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

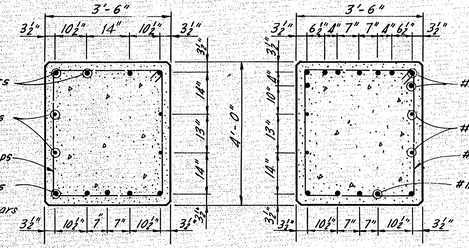
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheets S1and S2
For Framing Plan, see Sheet 14.
For Steel Pile Details, See Sheet 11



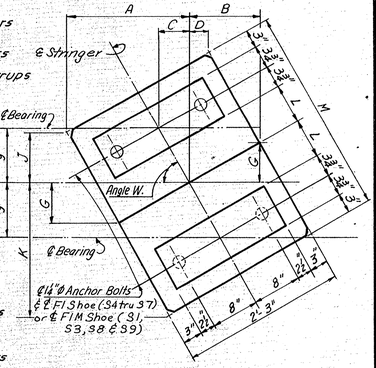
SECTION A-A
Scale: 1/2" = 1'-0"

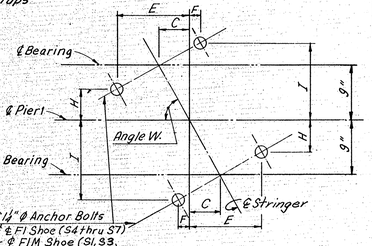
SECTION B-B
Scale: 1/2" = 1'-0"



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

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





Case ① & ②

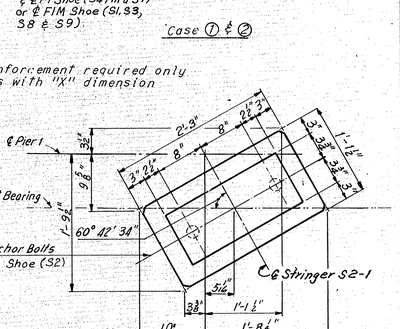
VIEW G-G
Scale 1/4"=1'-0"

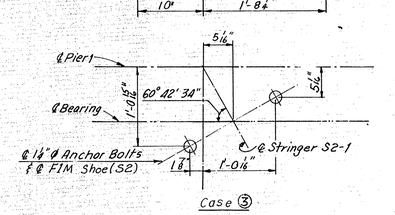
SECTION E-E
Scale: 3/4" = 1'-0"

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

ELEVATION
REINFORCING PAD DETAILS
Scale: 3/4" = 1'-0"

Note: Reinforcement required only for pads with "X" dimension over 4'.





Case ③

PAD AND ANCHOR BOLT SETTING PLAN
Scale: 1" = 1'-0"

ANCHOR BOLT SETTING PLAN DIMENSIONS

Case	Angle W	A	B	C	D	E	F	G	H	I	J	K	L	M
1	62° 39' 30"	19⅜	12	4⅝	4½	11⅜	2⅛	6½	5⅛	12⅛	8⅜	21½	6⅜	33⅜
2	60° 42' 34"	20⅛	11⅞	5¼	3⅝	12⅛	1⅞	6⅜	5⅛	12⅛	8⅜	21½	6⅜	34⅛

Dimensions are in inches.

	BY	DATE				
MADE	MAA	7-31-68	2	As Built	TEM	8-76
CHECKED	RLM	8-1548	1	Dimensions	RWZ	10-74
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

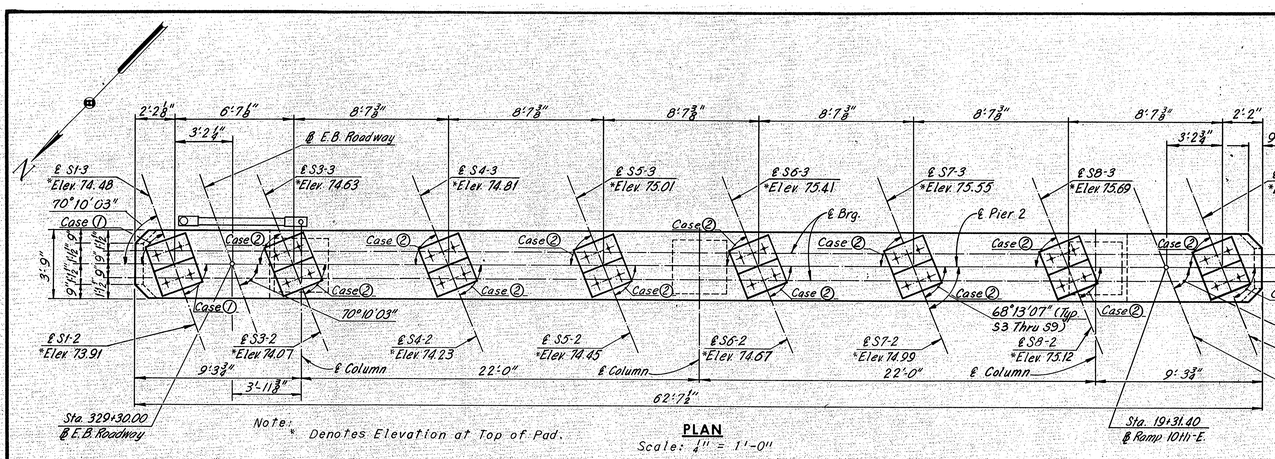
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 1

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

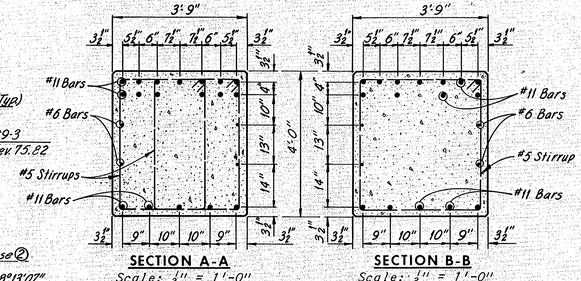
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 6 OF 46

AS BUILT

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	133	265

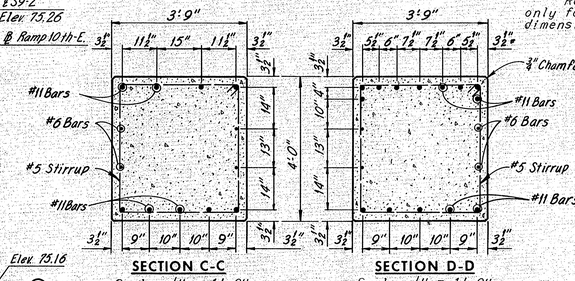


PLAN
Scale: ¼" = 1'-0"



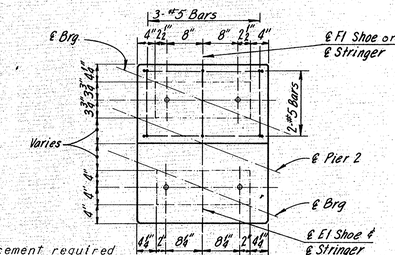
SECTION A-A
Scale: ½" = 1'-0"

SECTION B-B
Scale: ½" = 1'-0"



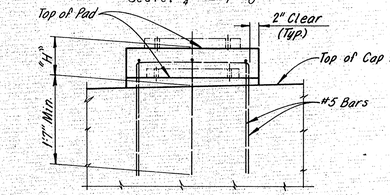
SECTION C-C
Scale: ½" = 1'-0"

SECTION D-D
Scale: ½" = 1'-0"



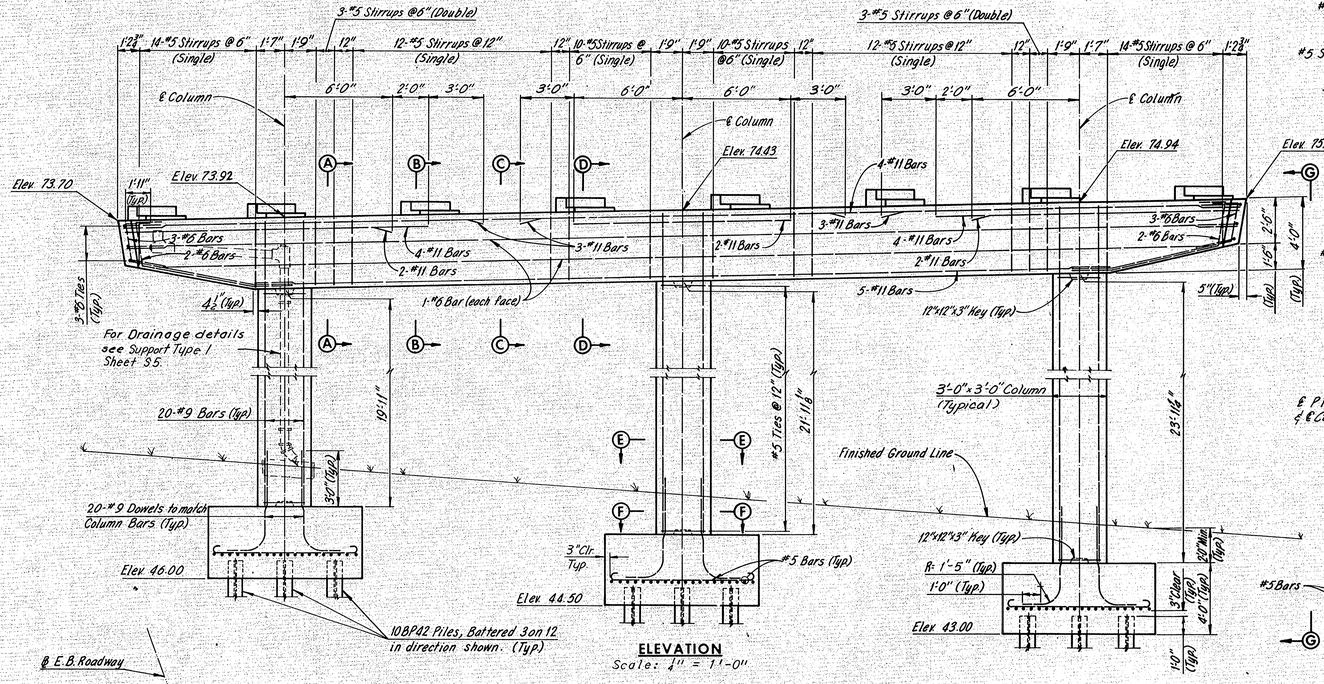
Note: Reinforcement required only for pads with "H" dimension over 4".

PLAN
Scale: ¾" = 1'-0"

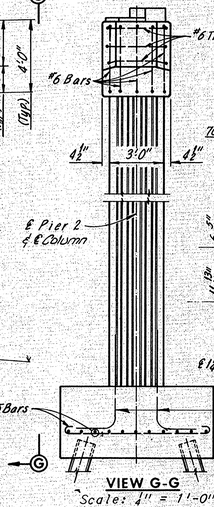


ELEVATION
Scale: ¾" = 1'-0"

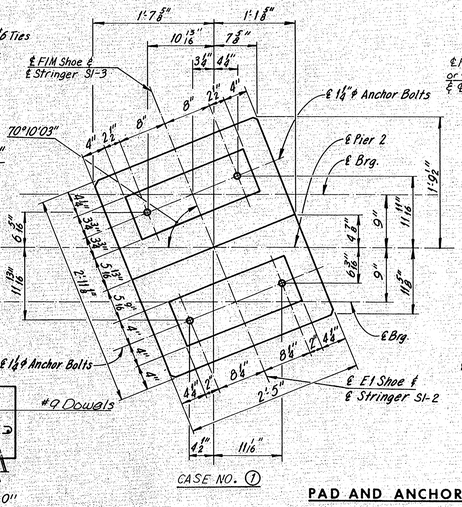
PAD REINFORCEMENT DETAILS



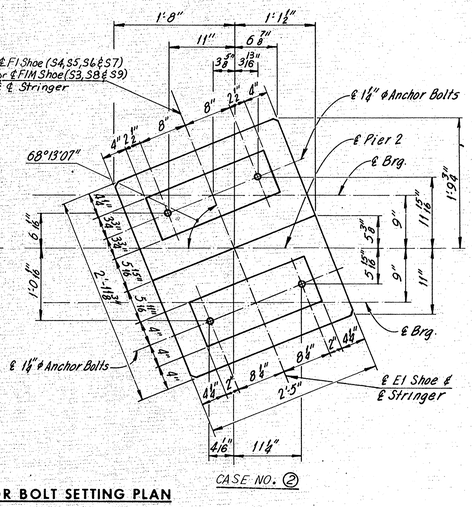
ELEVATION
Scale: ¼" = 1'-0"



VIEW G-G
Scale: ¼" = 1'-0"

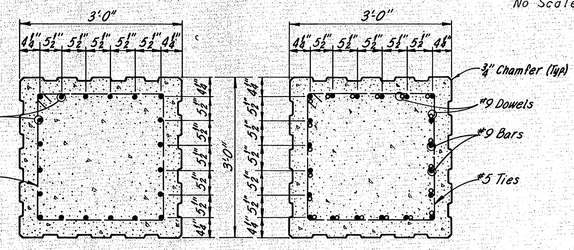


CASE NO. ①



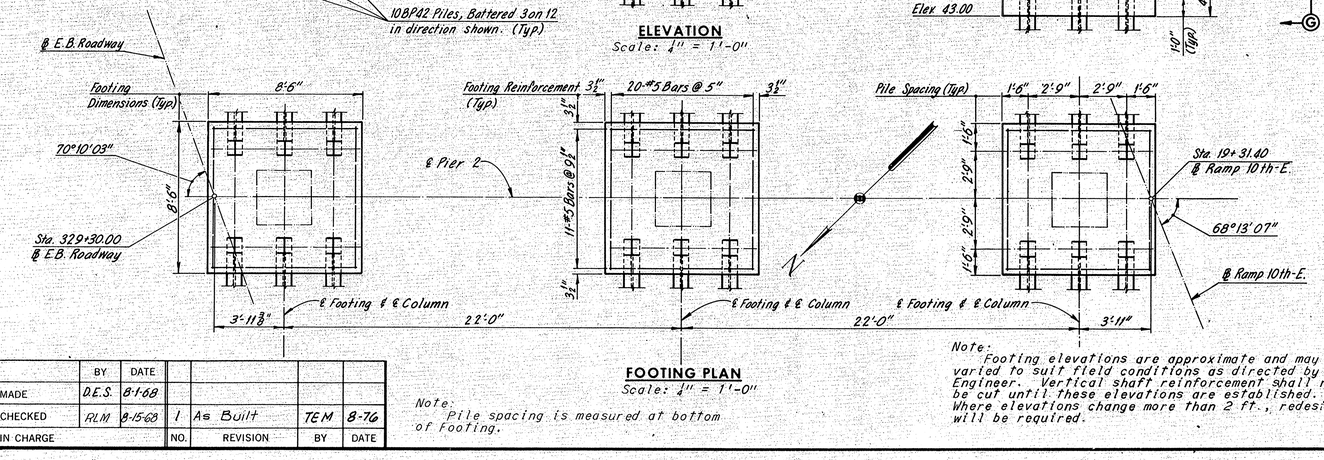
CASE NO. ②

PAD AND ANCHOR BOLT SETTING PLAN
No Scale



SECTION E-E
Scale: ¾" = 1'-0"

SECTION F-F
Scale: ¾" = 1'-0"



FOOTING PLAN
Scale: ¼" = 1'-0"

Note: Pile spacing is measured at bottom of Footing.

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

Note: For architectural treatment of columns, see Sheet 57.

Note:
All piles shall be 10BP42 steel piles (Design capacity = 45 tons).
Batter all pile 3" per foot in direction shown.
For Steel Pile Details, see Sheet 11.
For Standard Shoe Details, see Sheets S14 & S2.
For Framing Plan, see Sheet 14.
Estimated Pile Tip Elev., 8.00.

	BY	DATE				
MADE	D.E.S.	8-1-68				
CHECKED	R.L.M	8-15-68	1	As Built	T.E.M	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

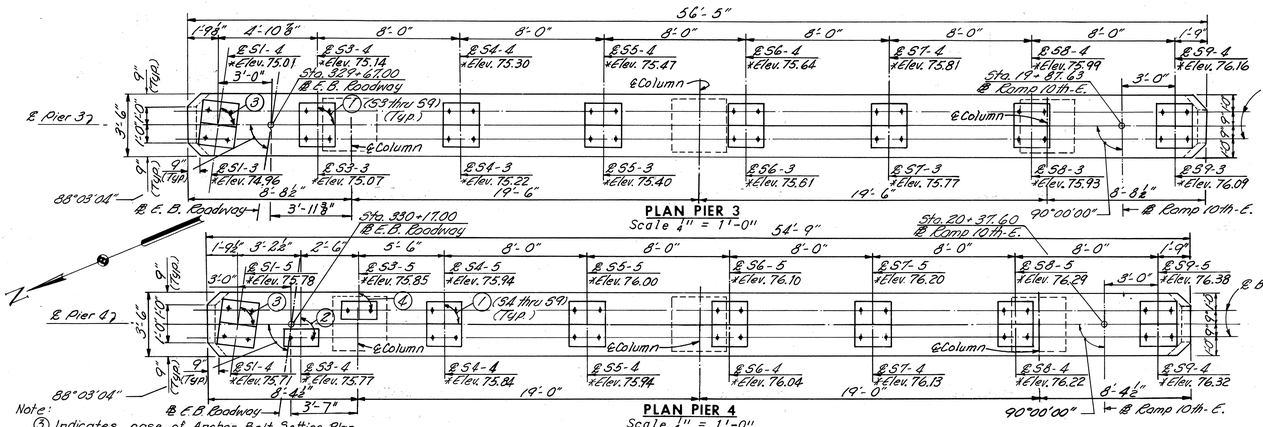
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

PIER 2

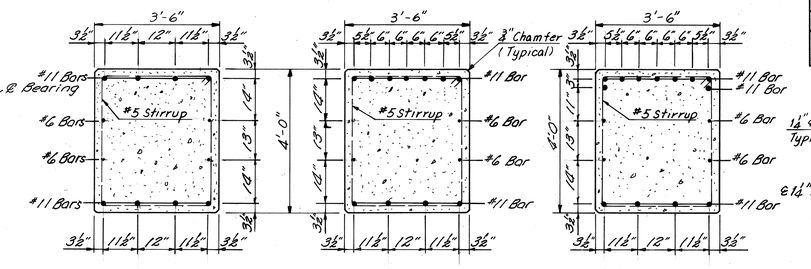
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

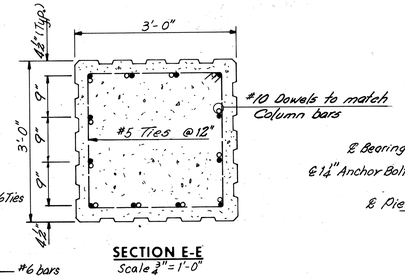
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 7 OF 46

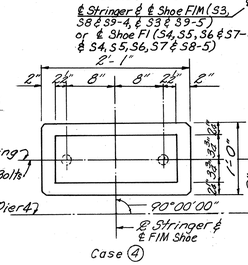
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	134	265

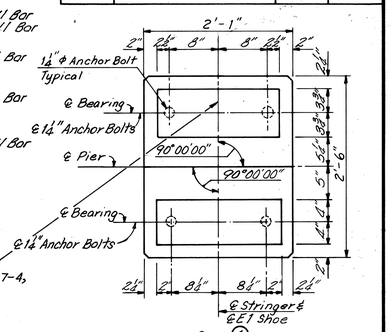


Note:
③ Indicates case of Anchor Bolt Setting Plan.
* Elevations given are at top of pad.

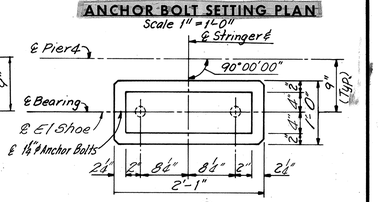


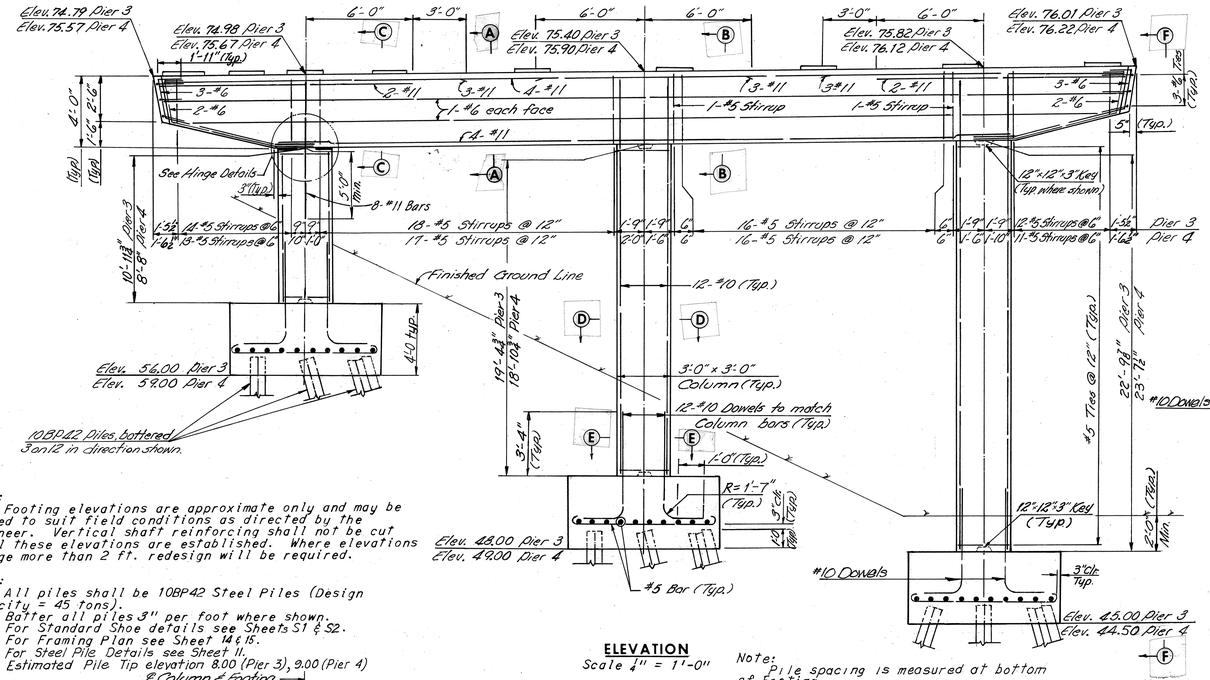






ANCHOR BOLT SETTING PLAN
Scale 1" = 1'-0"



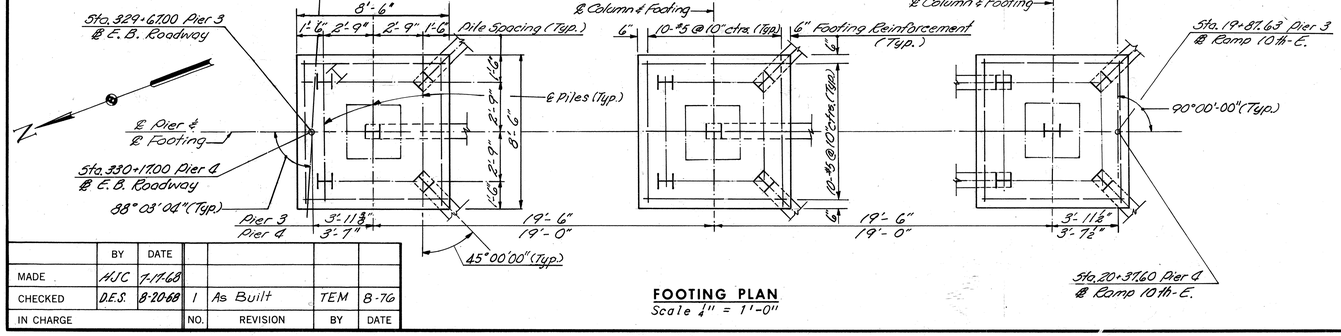


ELEVATION
Scale 1/4" = 1'-0"

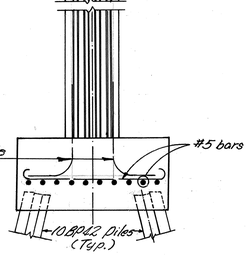
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets S1 & S2.
For Framing Plan see Sheet 14 & 15.
For Steel Pile Details see Sheet 11.
Estimated Pile Tip elevation 8.00 (Pier 3), 9.00 (Pier 4)

Note:
Pile spacing is measured at bottom of Footing.

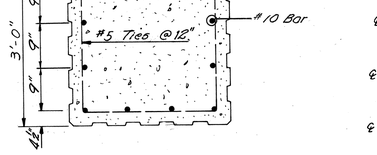


FOOTING PLAN
Scale 1/4" = 1'-0"

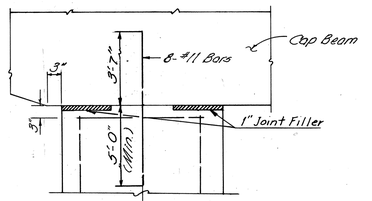


VIEW F-F
Scale 1/4" = 1'-0"

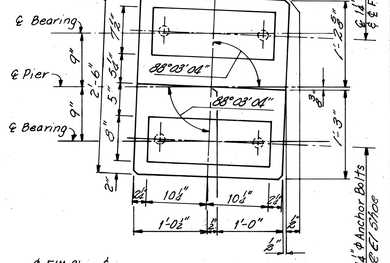
Note:
For architectural treatment of columns, see Sheet 37.



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



HINGE DETAILS
Scale 3/4" = 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
Scale 1" = 1'-0"

	BY	DATE				
MADE	MJC	7-17-68				
CHECKED	D.E.S.	8-20-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

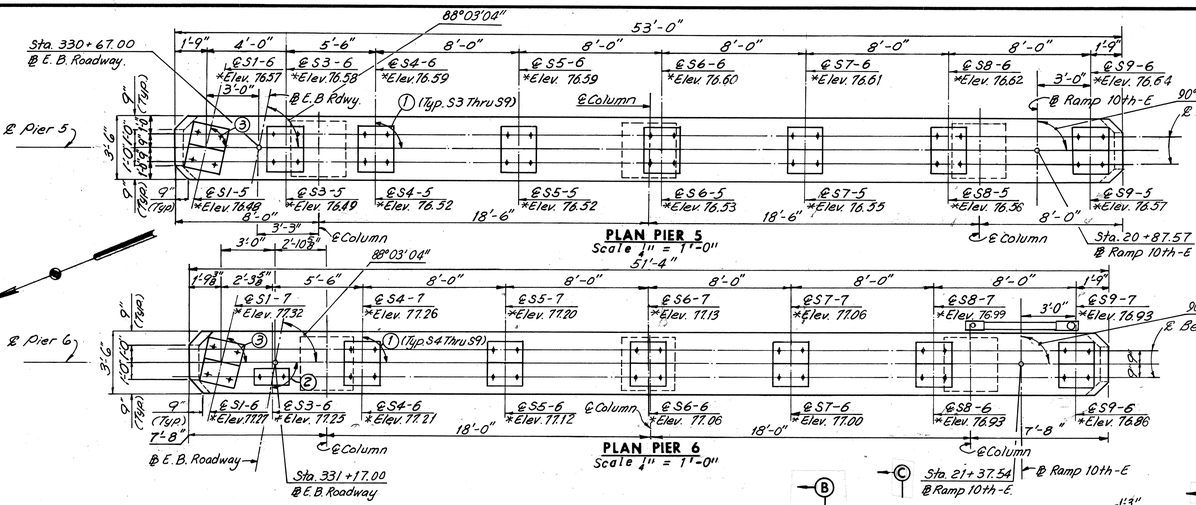
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

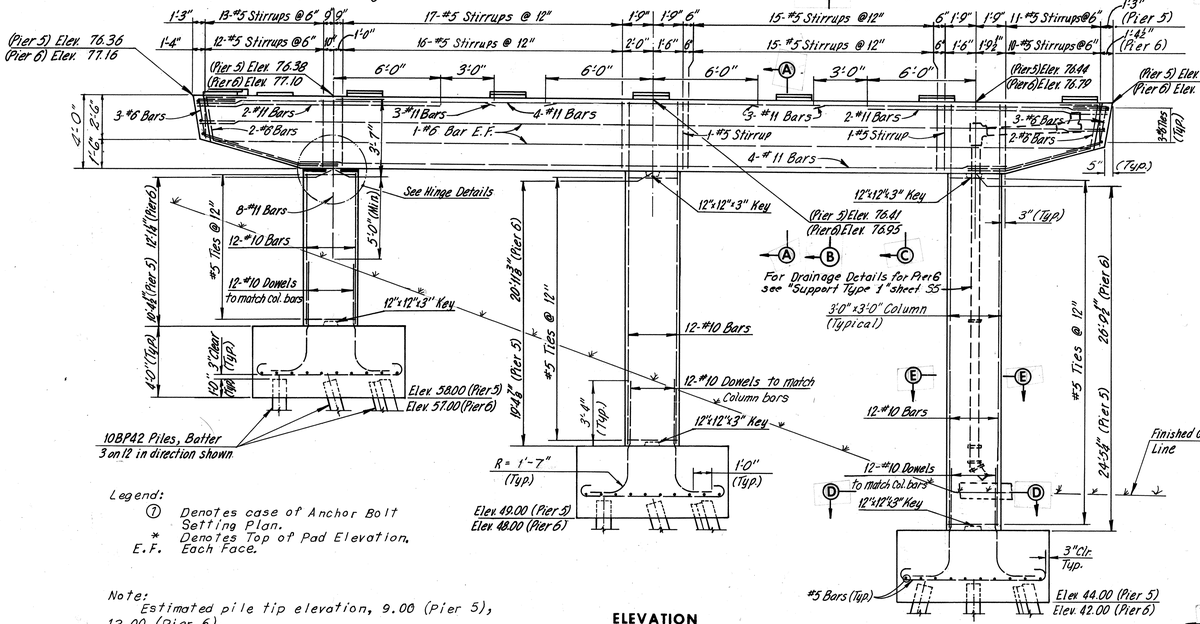
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 3 AND 4

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

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 8 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	135	265

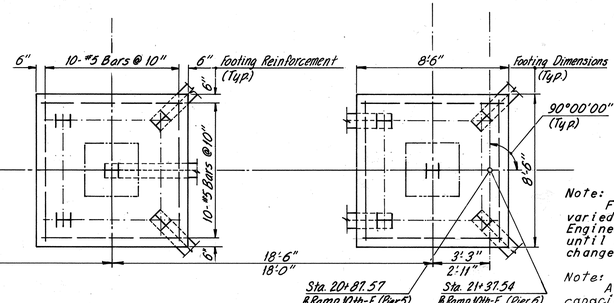


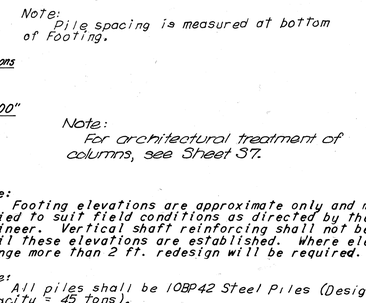


ELEVATION
Scale 1" = 1'-0"

Legend:
① Denotes case of Anchor Bolt Setting Plan.
* Denotes Top of Pad Elevation.
E.F. Each Face.

Note:
Estimated pile tip elevation, 9.00 (Pier 5), 12.00 (Pier 6).





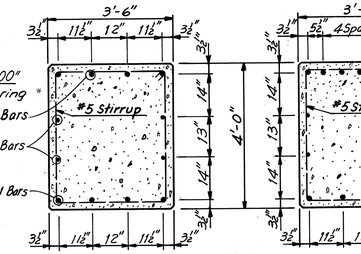
FOOTING PLAN
Scale 1" = 1'-0"

Note:
Pile spacing is measured at bottom of Footing.

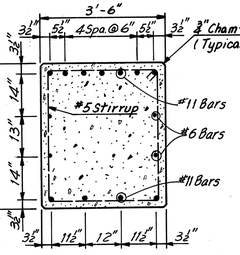
Note:
For architectural treatment of columns, see Sheet 37.

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

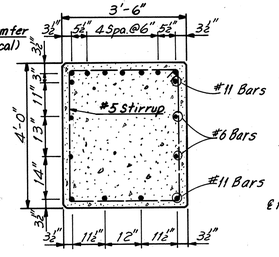
Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 Tons).
Batter all Piles 3" per foot where shown.
For Standard Shoe Details, see Sheets S1 & S2.
For Framing Plan, see Sheet 15
For Steel Pile Details, see Sheet 11.



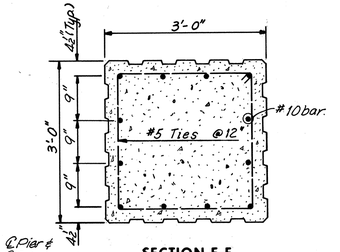
SECTION A-A
Scale ½" = 1'-0"



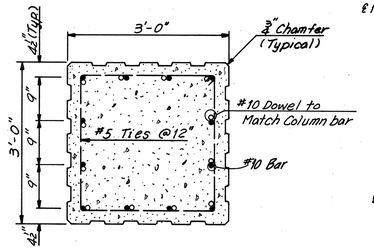
SECTION B-B
Scale ½" = 1'-0"



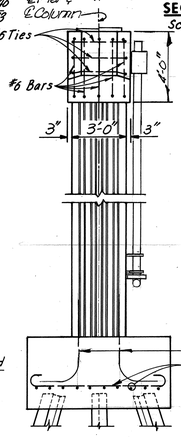
SECTION C-C
Scale ½" = 1'-0"



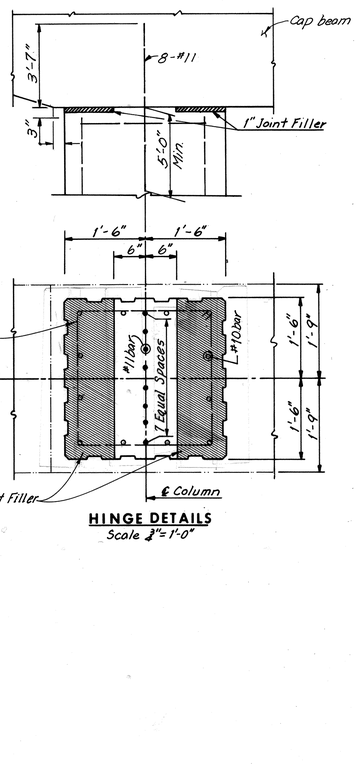
SECTION E-E
Scale ¾" = 1'-0"



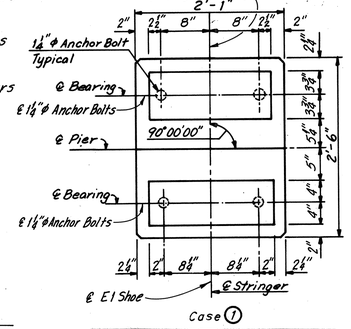
SECTION D-D
Scale ¾" = 1'-0"



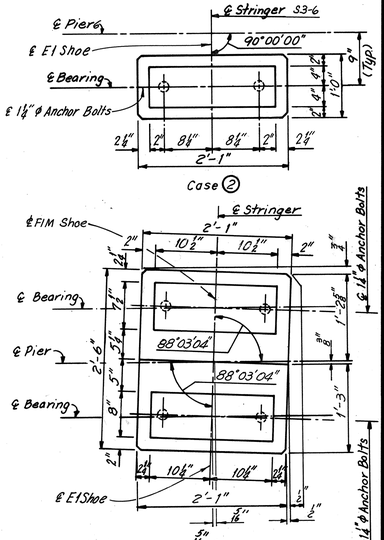
VIEW F-F
No Scale

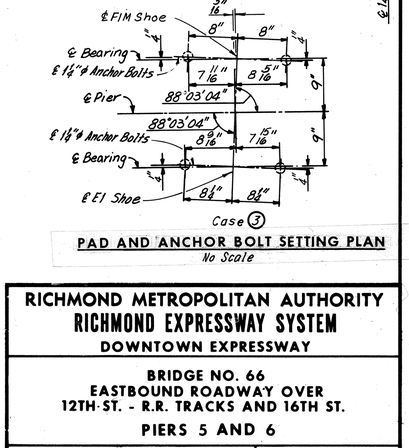


HINGE DETAILS
Scale ¾" = 1'-0"



ANCHOR BOLT SETTING PLAN
No Scale





PAD AND ANCHOR BOLT SETTING PLAN
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	D.E.S	7-2-68				
CHECKED	G.C.C	8-20-68	1	As Built	TEM	8-76
IN CHARGE						

AS BUILT

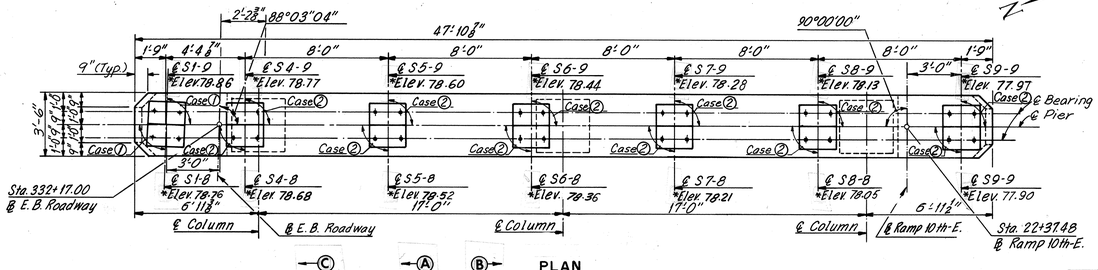
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 5 AND 6

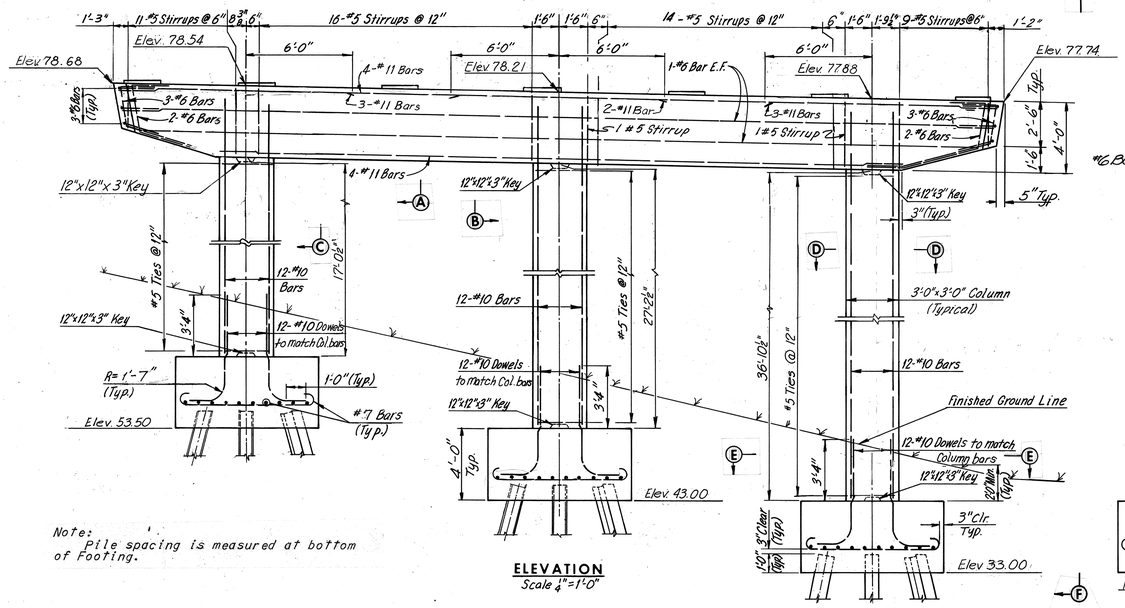
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 9 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	136A	265

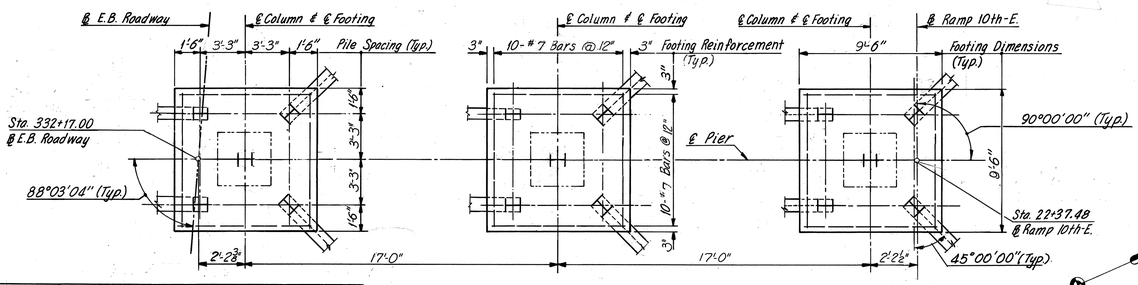


PLAN
Scale : 1/4"=1'-0"

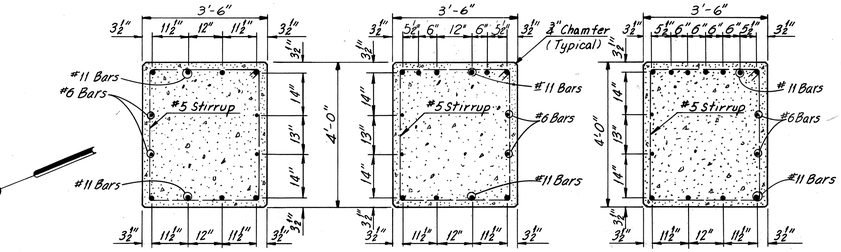


ELEVATION
Scale 1/4"=1'-0"

Note:
Pile spacing is measured at bottom of Footing.



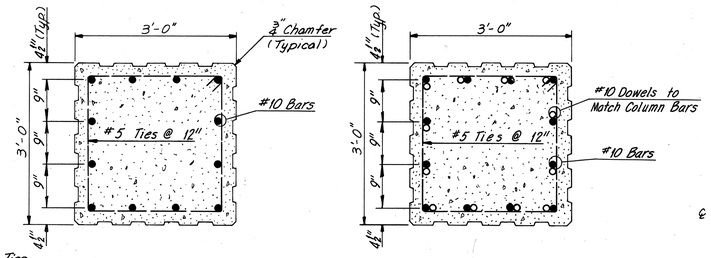
FOOTING PLAN
Scale 1/4"=1'-0"



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

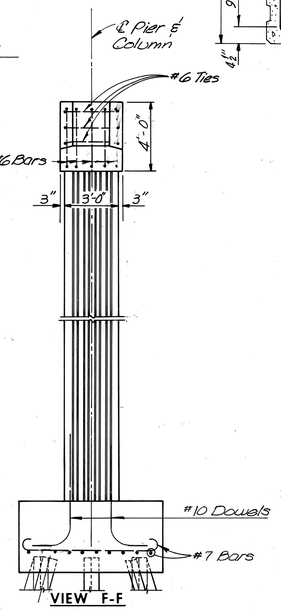
SECTION B-B
Scale 1/2"=1'-0"

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



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

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

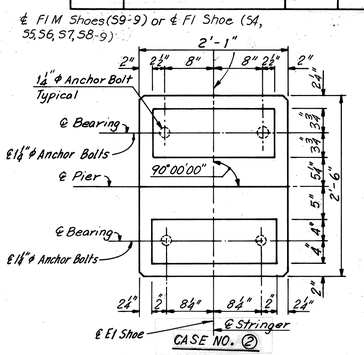


VIEW F-F
No Scale

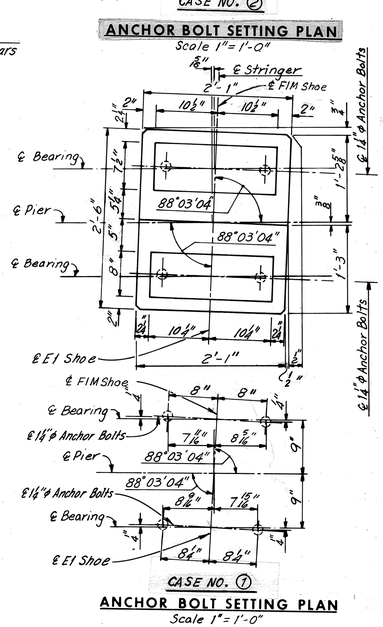
Note:
For architectural treatment of columns, see Sheet 57.

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

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets 51and52
For Framing Plan see Sheet 15.
For Steel Pile Details, see Sheet 11.
E. F. = Each Face.
Denotes Top of pad elevation.
Estimated Pile Tip elevation, 15.00



ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"



CASE NO. ①

ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"

	BY	DATE
MADE	DES.	7-10-68
CHECKED	M.A.A.	7-31-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	8-76
1	Pier 7 eliminted this sheet, Fig. elev. dim+ Point Pile, call-outs, Hinge eliminted	R.B.H.	8-74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

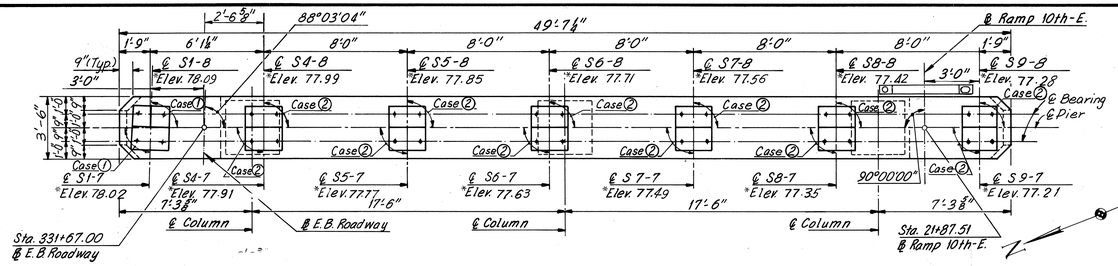
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 8

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

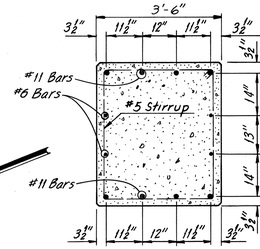
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10A OF 46

AS BUILT

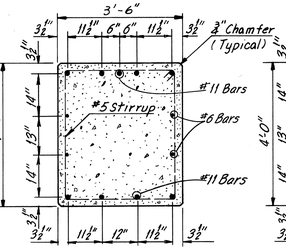
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	136	265



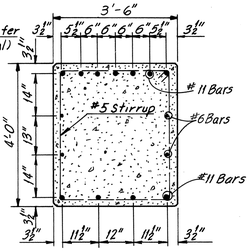
PLAN
Scale: 1/4"=1'-0"



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

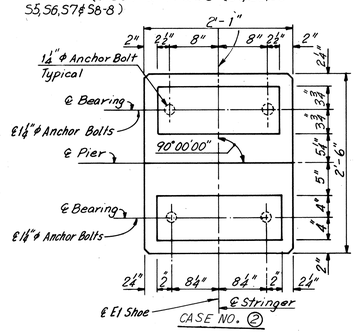


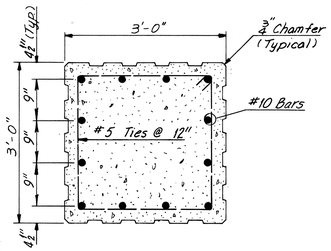
SECTION B-B
Scale 1/2"=1'-0"



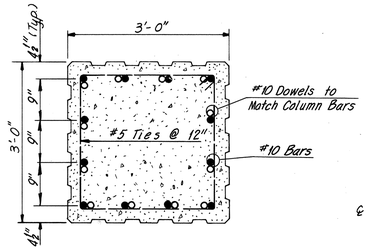
SECTION C-C
Scale 1/2"=1'-0"

FIM Shoe (S9-8) or FI Shoe (S4, S5, S6 S5, S6, S7 & S8-8)



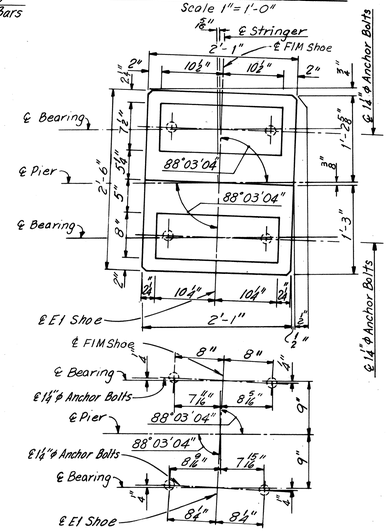


SECTION D-D
Scale 3/4"=1'-0"

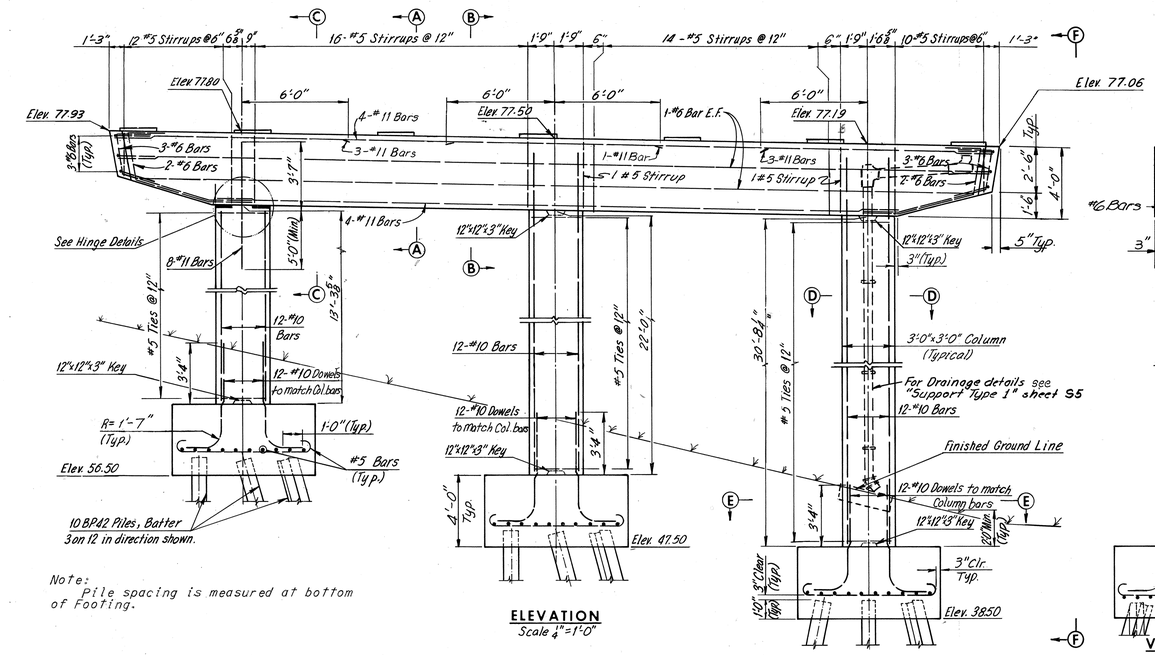


SECTION E-E
Scale 3/4"=1'-0"

ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"



ANCHOR BOLT SETTING PLAN
Scale 1"=1'-0"



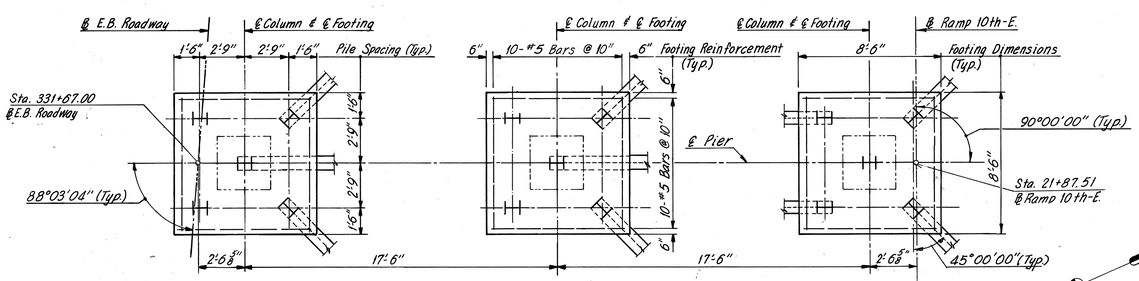
ELEVATION
Scale 1/4"=1'-0"

VIEW F-F
No Scale

HINGE DETAILS
Scale 1/2"=1'-0"

Note:
Pile spacing is measured at bottom of Footing.

Note:
For architectural treatment of columns, see Sheet 57.



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

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

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets S1 and S2
For Framing Plan see Sheet 16.
For Steel Pile Details, see Sheet 11.
E.F. = Each Face.
Denotes Top of pad elevation.
Estimated Pile Tip elevation, 18.00

	BY	DATE	NO.	REVISION	BY	DATE
MADE	DES.	7-10-68	1	As Built	TEM	8-76
CHECKED	M.A.A.	7-31-68	⚠	Pier 8 Elimited this Sheet	R.B.H.	8-74
IN CHARGE						

AS BUILT

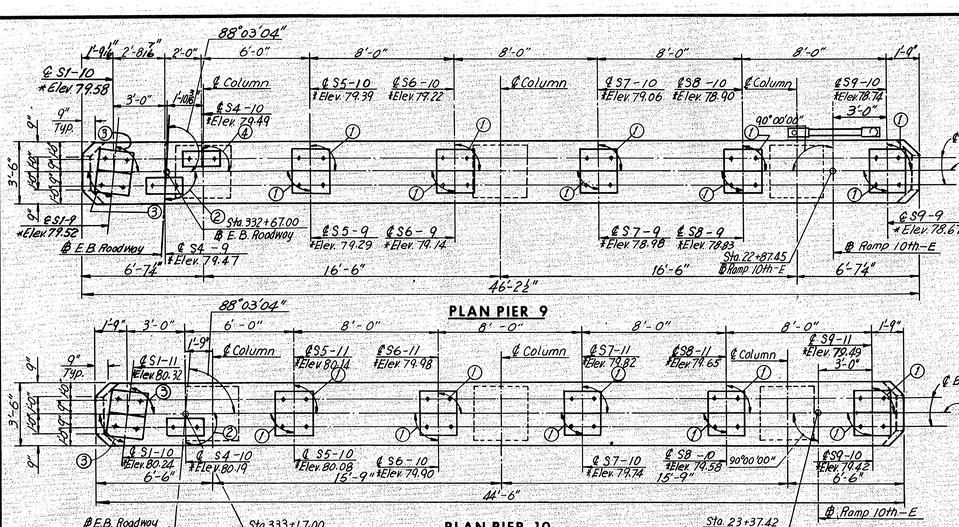
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 7

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	137	265

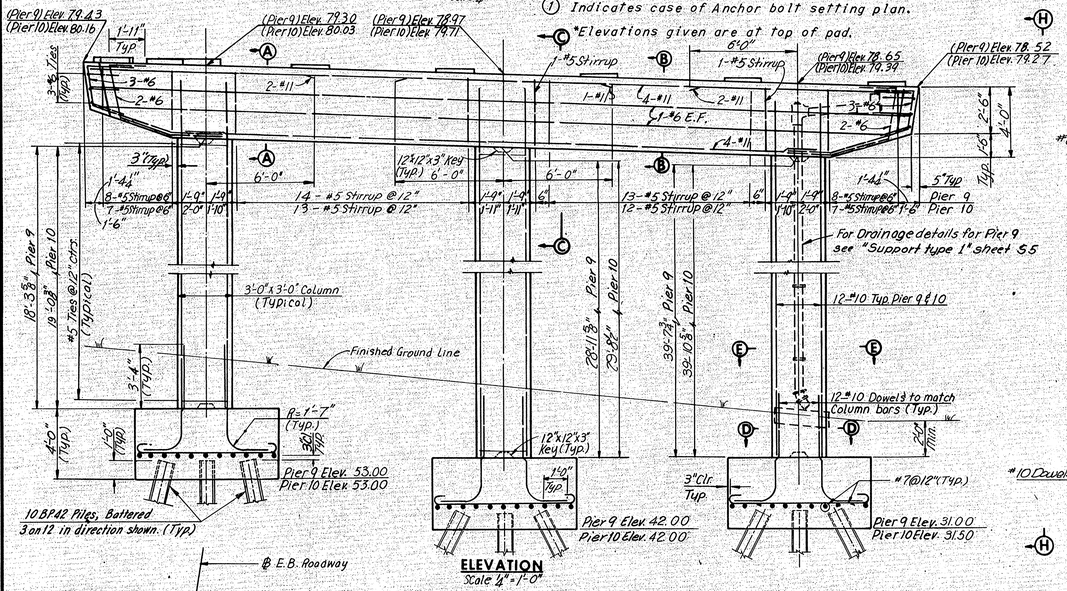


PLAN PIER 9

PLAN PIER 10

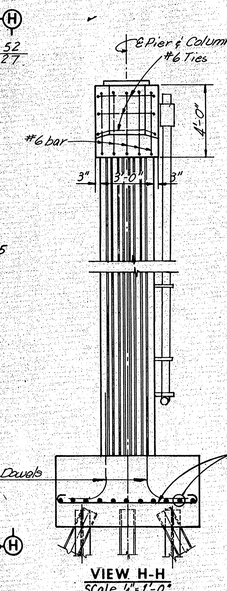
Scale ½" = 1'-0"

① Indicates case of Anchor bolt setting plan.



ELEVATION

Scale ¼" = 1'-0"

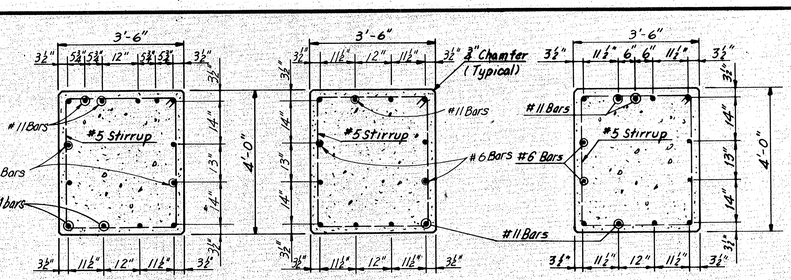


VIEW H-H

Scale ¼" = 1'-0"

FOOTING PLAN

Scale ¼" = 1'-0"



SECTION A-A

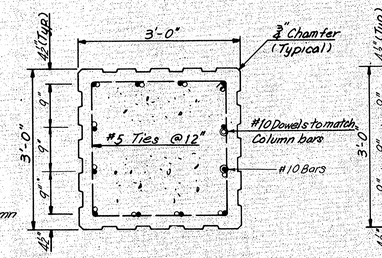
Scale ½" = 1'-0"

SECTION B-B

Scale ½" = 1'-0"

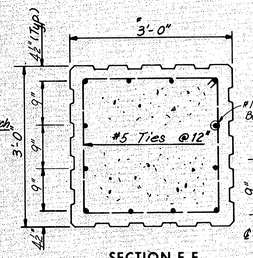
SECTION C-C

Scale ½" = 1'-0"



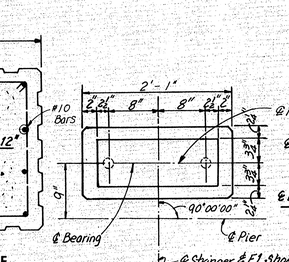
SECTION D-D

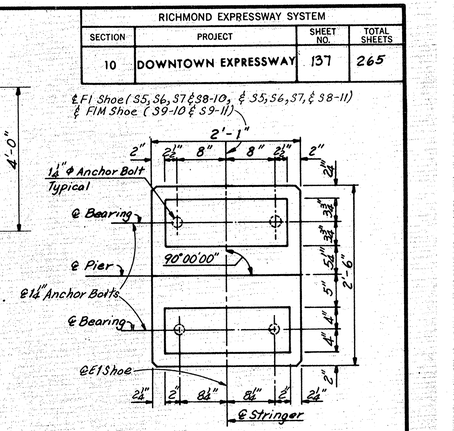
Scale ½" = 1'-0"



SECTION E-E

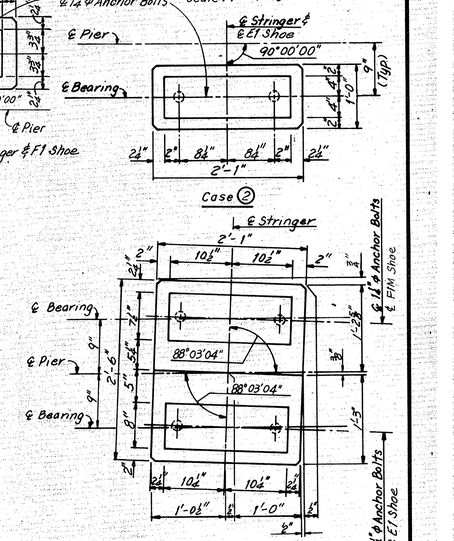
Scale ½" = 1'-0"





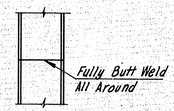
ANCHOR BOLT SETTING PLAN

Scale: 1" - 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN

Scale 1" = 1'-0"



DETAIL OF STEEL PILE SPLICE

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

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheets 51 and 52.
For Framing Plan, see Sheets 15 & 16.
Estimated Pile Tip elevation 10.00 (Pier 9), 8.00 (Pier 10).

For architectural treatment of column, see Sheet 37.

AS BUILT

.	BY	DATE
MADE	G.S.H.	7-24-68
CHECKED	G.C.C.	8-21-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	T.E.M.	8-76
1	Footing Elev., Dims., Reinf. & pile pattern, Col. heights	R.B.H.	8-74

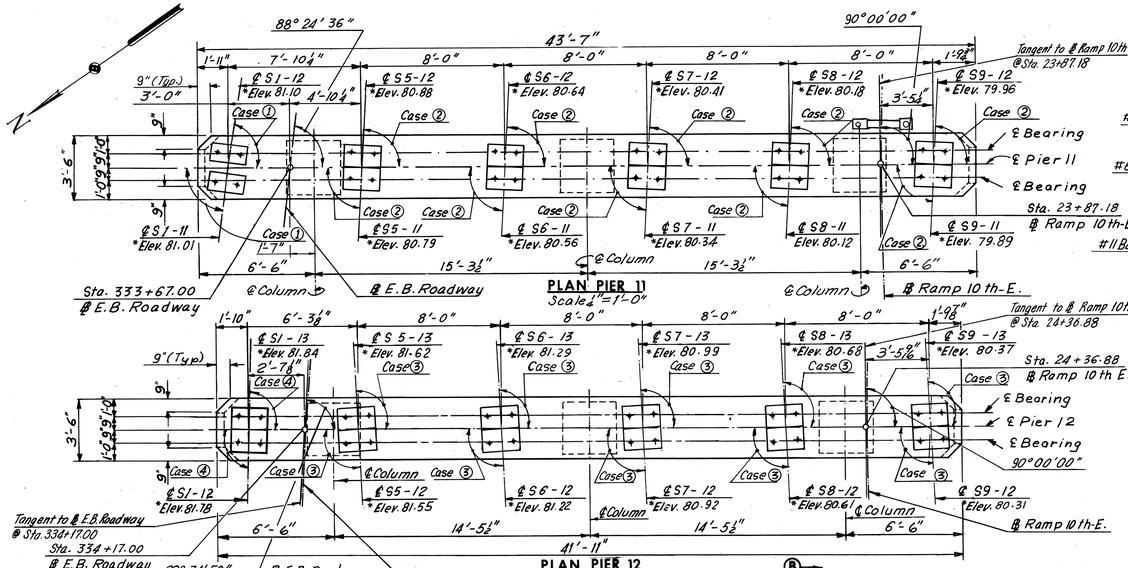
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

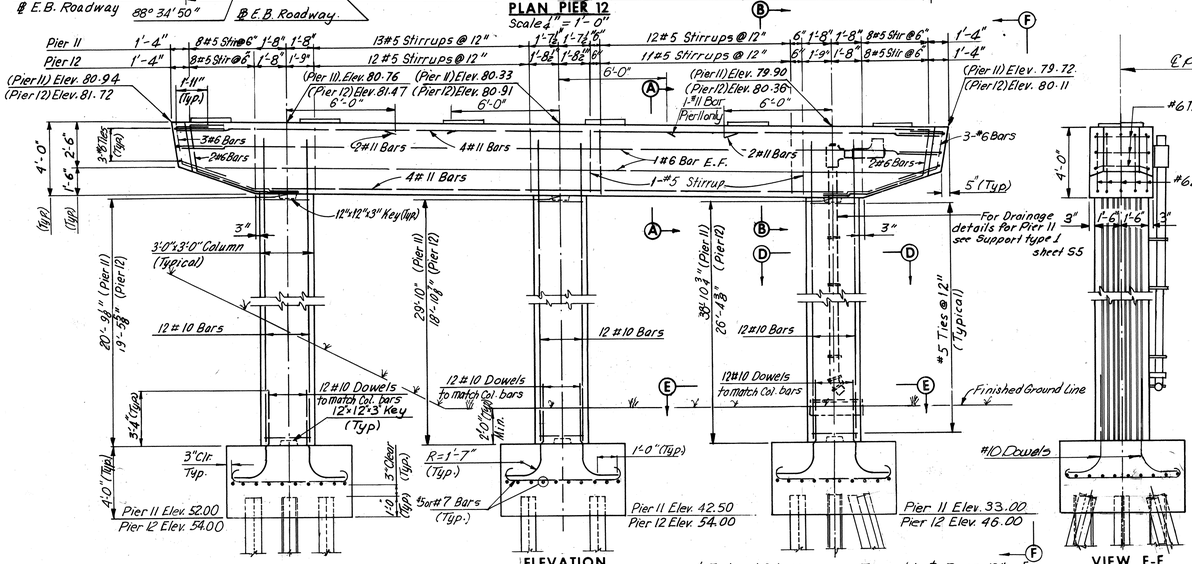
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 9 AND 10

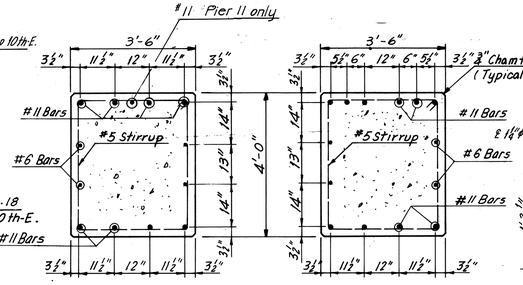
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 11 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	138	265



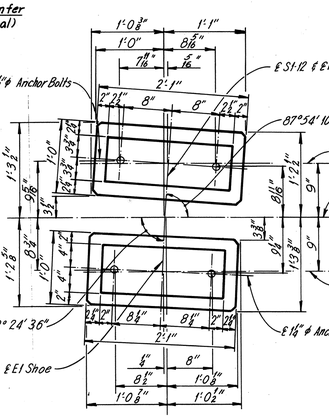




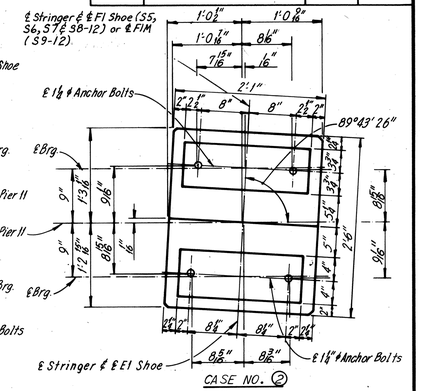
Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheets 51 and 52.
For Framing Plan, see Sheet 16.
For Steel Pile Details, see Sheet 11.

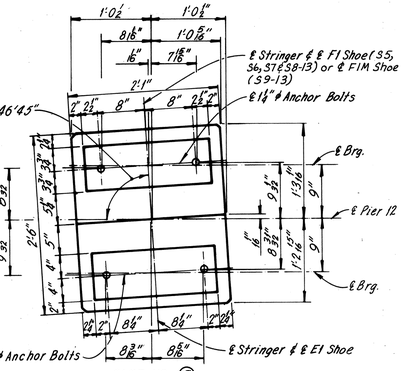
For architectural treatment of columns, see Sheet 57.

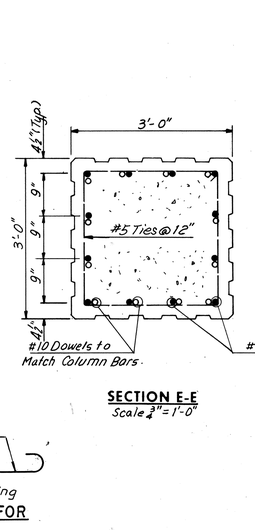
Note:
* Denotes top of pad elevation.
Estimated pile tip elevation, 8.00 (Piers 11 and 12).
E.F. Denotes Each Face.



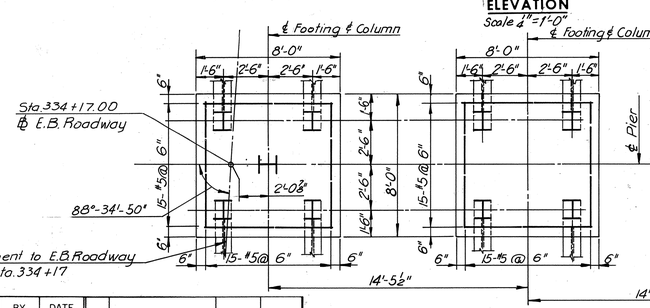
PAD AND ANCHOR BOLT SETTING PLAN
No Scale

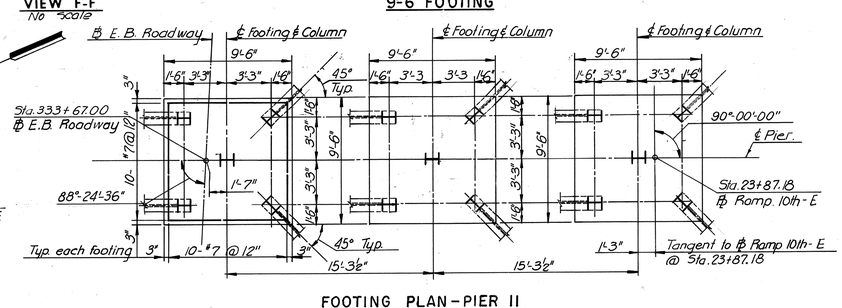




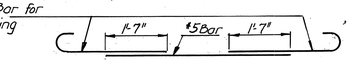


PAD AND ANCHOR BOLT SETTING PLAN
No Scale





℄ #5 Bar for 8' Footing



Space reinf. @ 6" each way in footing

ALTERNATE REINFORCING FOR 9'-6" FOOTING

	BY	DATE				
MADE	M.A.A.	7-17-68	2	As Built	TEM	8-76
CHECKED	GCC	8-20-68	⚠	Hg. sizes, Reinf & Piling.	P.R.Y.	8-74
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

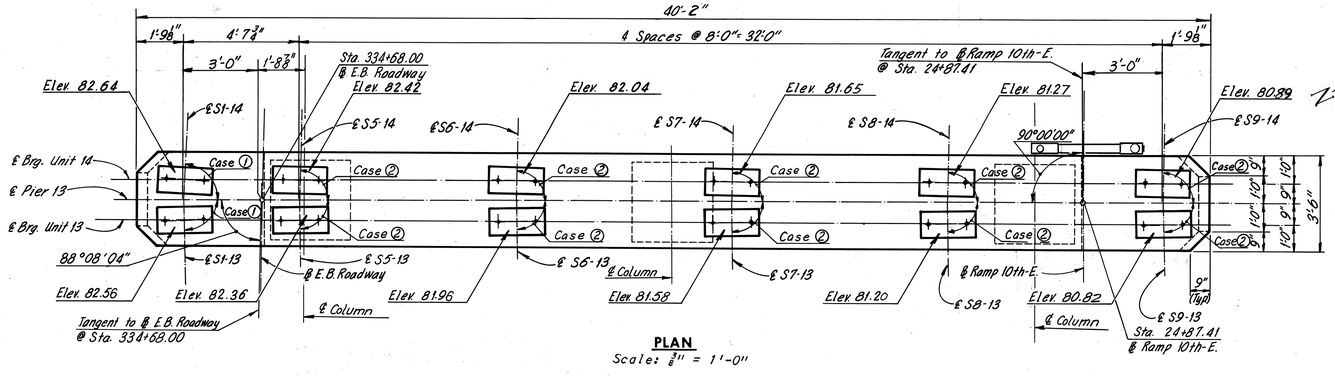
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIERS 11 AND 12

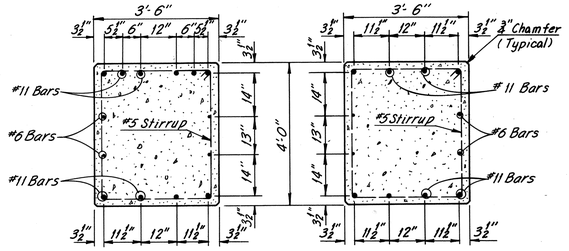
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 12 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	139	265

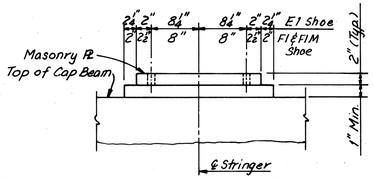


PLAN
Scale: $\frac{3}{8}$" = 1'-0"

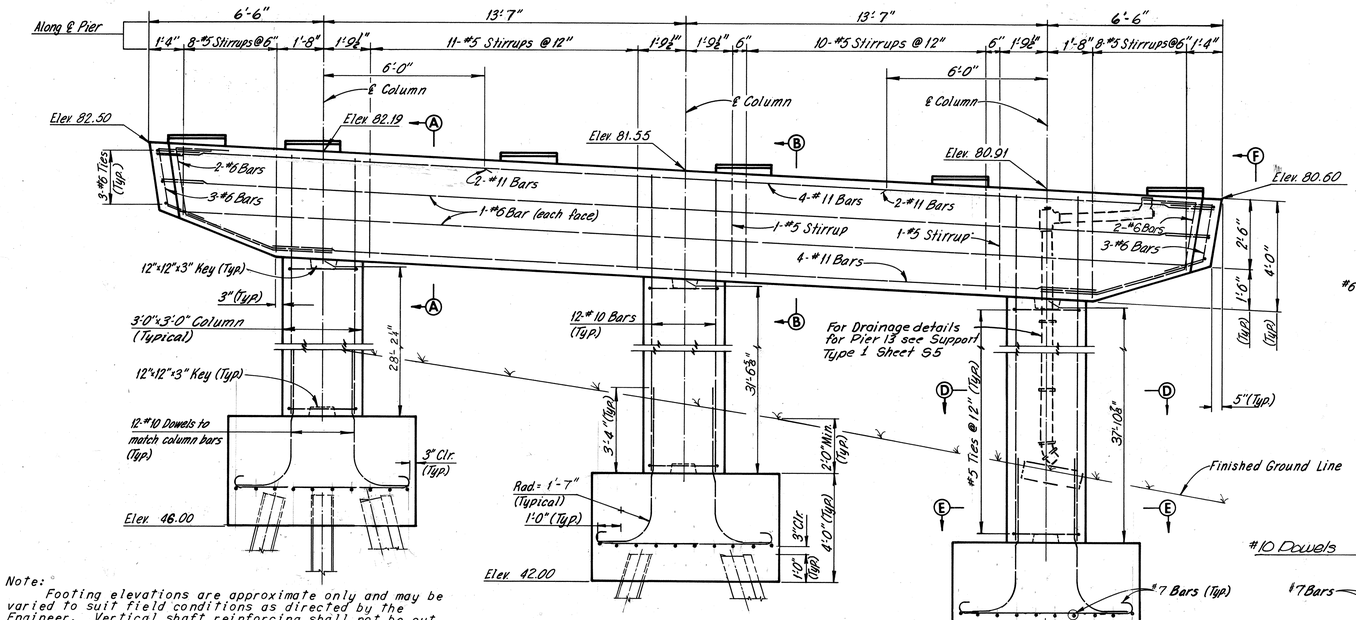


SECTION A-A
Scale: $\frac{1}{2}$" = 1'-0"

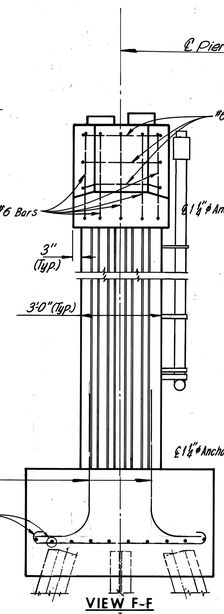
SECTION B-B
Scale: $\frac{1}{2}$" = 1'-0"



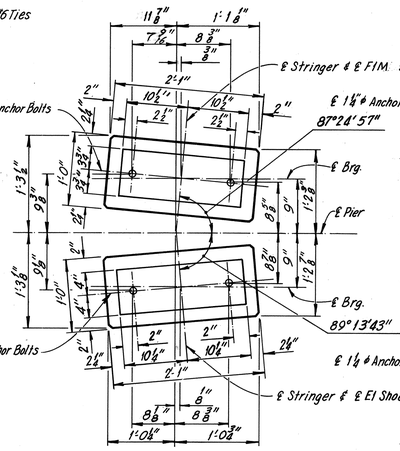
PAD ELEVATION VIEW
No Scale



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



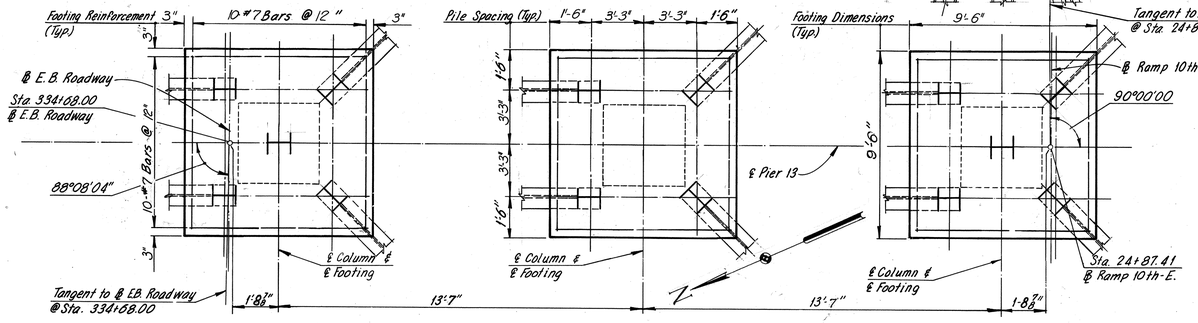
VIEW F-F
Scale: $\frac{3}{8}$" = 1'-0"



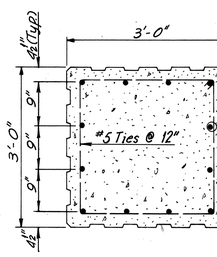
CASE NO. ①

CASE NO. ②

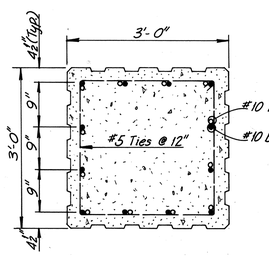
PAD AND ANCHOR BOLT SETTING PLAN
No Scale



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



SECTION D-D
Scale: $\frac{3}{4}$" = 1'-0"



SECTION E-E
Scale: $\frac{3}{4}$" = 1'-0"

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details see Sheets S1 and S2
For Framing Plan see Sheet 16.
For Steel Pile Details, see Sheet 11.
Estimated Pile Tip Elev., 5.00.
For architectural treatment of columns, see Sheet 37.

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

	BY	DATE
MADE	D.E.S.	7-3-68
CHECKED	G.C.C.	8-15-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	8-76
1	Footing elev. Reinf. Pile pattern, Dim. Col. heights	R.B.H	8-74

AS BUILT

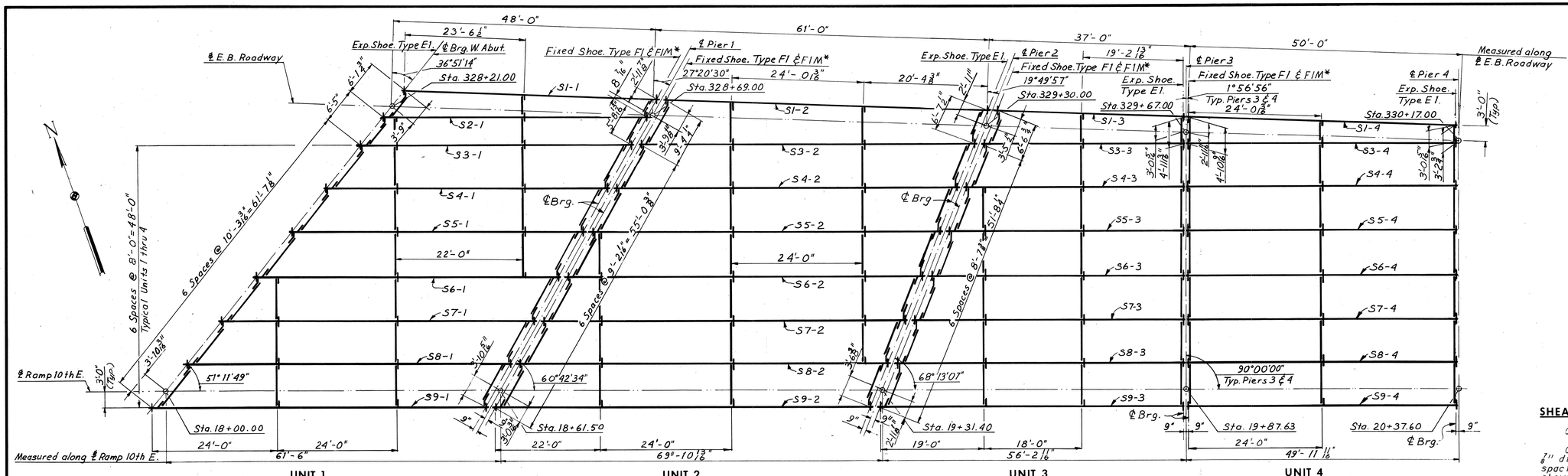
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
PIER 13

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 13 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	140	265



* All fixed shoes for stringers S1, S2, S3, S8 and S9 @ Piers 1, 2 and 3 shall be of type F1M, all other fixed shoes to be of type F1.

FRAMING PLAN

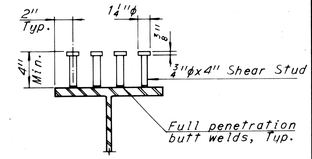
Scale: 1" = 10'-0"

STRINGER SCHEDULE															DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L		¼L	½L	¾L	¼L	½L	¾L
1	S1-1	33 WF 118	48'-6 3/8"	46'-5 1/2"	1'-4 1/4"	9"	0	0	13"	14 1/2"	17"	20 1/2"	24"		4"	3/8"	4"	5/16"	1/2"	5/16"
	S2-1	33 WF 118	50'-6 1/4"	48'-5 3/8"	1'-4 1/16"	8"	0	0	12 1/4"	13 1/4"	16"	19"	23 1/2"		3/16"	9/16"	3/8"	5/16"	11/16"	1/2"
	S3-1	33 WF 118	51'-9 1/16"	49'-8 3/16"	1'-4 1/16"	8"	0	0	9"	10"	11 1/2"	13 1/2"	16 1/2"		3/8"	9/16"	3/8"	1/2"	11/16"	1/2"
	S4-1	33 WF 118	53'-8 3/16"	51'-7 1/16"	1'-4 1/16"	8"	19'-0"	10x 1/2"	7 1/2"	8"	10"	11 1/2"	14"		1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S5-1	33 WF 118	55'-7 3/4"	53'-7 1/16"	1'-4 1/16"	8"	21'-0"	10x 5/8"	7 1/2"	8"	10"	11 1/2"	14"		9/16"	13/16"	9/16"	11/16"	15/16"	11/16"
	S6-1	36 WF135	57'-7 7/8"	55'-6 7/16"	1'-4 1/16"	8"	21'-0"	10 1/2 x 5/8"	8"	8 1/4"	10 3/4"	12 1/4"	15"		5/8"	15/16"	5/8"	13/16"	1 1/16"	1"
	S7-1	36 WF 135	59'-6 7/16"	57'-5 3/4"	1'-4 1/16"	8"	21'-6"	10 1/2 x 5/8"	8"	8 1/4"	10 1/4"	12 1/4"	15"		5/8"	15/16"	5/8"	13/16"	1 1/16"	1"
	S8-1	36 WF 135	61'-5 3/16"	59'-5 1/16"	1'-4 1/16"	8"	22'-6"	10 1/2 x 3/4"	8"	8 1/4"	10 1/2"	12 1/2"	15"		11/16"	15/16"	11/16"	13/16"	1 1/16"	13/16"
	S9-1	36 WF 135	63'-6 3/8"	61'-4 7/8"	1'-4 5/16"	9 3/8"	24'-0"	10 1/2 x 3/4"	7"	8 1/4"	9 1/2"	11 1/2"	14 1/2"		11/16"	15/16"	11/16"	7/8"	1 3/16"	7/8"
2	S1-2	36 WF 135	60'-4 3/16"	58'-10 1/16"	9"	8 1/4"	22'-0"	10 1/2 x 1/2"	8"	9 1/4"	11 1/2"	13 1/2"	17"		5/8"	15/16"	5/8"	3/4"	1"	3/4"
	S3-2	36 WF 135	62'-3 3/16"	60'-11 5/16"	8"	7 7/8"	22'-6"	10 1/2 x 5/8"	8"	9 1/4"	11 1/2"	13 1/2"	16 1/2"		3/4"	1"	11/16"	7/8"	1 1/16"	7/8"
	S4-2	36 WF 150	63'-6 1/16"	62'-3 1/16"	8"	7 7/8"	23'-3"	10 1/2 x 3/4"	8"	8 1/4"	11"	12 1/2"	15 1/2"		7/8"	1"	7/8"	15/16"	1 3/16"	15/16"
	S5-2	36 WF 150	64'-10 3/16"	63'-6 5/16"	8"	7 7/8"	24'-0"	10 1/2 x 3/4"	8"	8 1/4"	11"	12 1/4"	15 1/2"		11/16"	1"	11/16"	7/8"	1 1/16"	7/8"
	S6-2	36 WF 150	66'-1 11/16"	64'-10 1/16"	8"	7 7/8"	25'-0"	10 1/2 x 1"	8"	8 1/4"	10 1/2"	12 1/2"	15 1/2"		1"	1 3/8"	1"	1 1/16"	1 3/8"	1 1/16"
	S7-2	36 WF 150	67'-5 5/16"	66'-1 3/16"	8"	7 15/16"	25'-9"	10 1/2 x 1"	8"	8 1/4"	11"	12 1/2"	15 1/2"		1"	1 3/8"	1"	1 1/16"	2 3/16"	1 1/16"
	S8-2	36 WF 150	68'-8 11/16"	67'-5 1/16"	8"	7 15/16"	26'-6"	10 1/2 x 1 1/16"	8"	8 1/4"	11"	12 1/2"	15 1/2"		7/8"	1 1/4"	7/8"	1 1/16"	2 5/16"	1 1/16"
	S9-2	36 WF 150	70'-2 3/16"	68'-8 3/8"	9 3/16"	8 3/16"	27'-0"	10 1/2 x 1 1/4"	7 1/4"	8 1/4"	11"	13 1/2"	16 1/2"		7/8"	1 1/4"	7/8"	1 1/16"	2 5/16"	1 1/16"
3	S1-3	30 WF 99	35'-7 11/16"	34'-3 5/16"	8 1/2"	8"	0	0	11"	12"	14"	16 1/2"	20 1/2"		5/8"	3/4"	5/8"	3/4"	5/8"	3/4"
	S3-3	30 WF 99	37'-10 9/16"	36'-6 1/4"	7 7/8"	7"	0	0	9"	10"	11 1/2"	13 1/2"	16"		3/4"	7/8"	3/4"	7/8"	1"	7/8"
	S4-3	30 WF 108	41'-1 1/4"	39'-10 9/16"	7 7/8"	7"	0	0	7 1/2"	8"	9"	10 1/2"	13"		7/8"	1"	7/8"	1"	1 1/4"	1"
	S5-3	30 WF 108	44'-3 1/2"	43'-0 15/16"	7 7/8"	7"	15'-0"	9x 1/2"	7"	7 1/2"	9 1/2"	11"	13"		5/8"	11/16"	5/8"	3/4"	1"	3/4"
	S6-3	30 WF 108	47'-5 7/8"	46'-3 5/16"	7 7/8"	7"	17'-0"	9x 1/2"	7"	7 1/2"	9"	11"	13"		1/2"	5/8"	1/2"	5/8"	13/16"	5/8"
	S7-3	30 WF108	50'-8 1/4"	49'-5 1/16"	7 7/8"	7"	19'-3"	9x 3/4"	7"	7 1/2"	9"	11"	13"		9/16"	13/16"	9/16"	3/4"	1"	11/16"
	S8-3	30 WF 108	53'-10 3/8"	52'-8"	7 7/8"	7"	21'-6"	9x 1"	7"	7 1/2"	9 1/2"	11"	13"		5/8"	7/8"	5/8"	13/16"	1 1/16"	15/16"
	S9-3	30 WF 108	57'-3"	55'-10 3/16"	8 5/16"	8"	23'-3"	9x 1 1/8"	7"	7 1/2"	9 1/2"	11 1/2"	14"		3/4"	1"	3/4"	1 1/16"	1 3/8"	1 1/16"
4	S1-4	30 WF 108	49'-10"	48'-6"	8"	8"	0	0	10 1/2"	11 1/2"	13 1/2"	16 1/2"	20 1/2"		7/16"	5/8"	7/16"	1/2"	3/4"	1/2"
	S3-4	30 WF 99	49'-7 5/16"	48'-5 5/16"	7"	7"	18'-0"	9x 3/4"	8 1/4"	9 1/2"	11 1/2"	13 1/2"	16"		7/16"	5/8"	7/16"	9/16"	3/4"	9/16"
	S4-4	30 WF 108	49'-7 5/8"	48'-5 5/16"	7"	7"	18'-6"	9x 3/4"	7"	7 1/2"	9 1/2"	11"	13"		1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S5-4	30 WF 108	49'-7 7/8"	48'-5 5/16"	7"	7"	18'-6"	9x 3/4"	7"	7 1/2"	9 1/2"	11"	13"		1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S6-4	30 WF 108	49'-7 7/8"	48'-5 5/16"	7"	7"	18'-6"	9x 3/4"	7"	7 1/2"	9 1/2"	11"	13"		1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S7-4	30 WF108	49'-7 5/8"	48'-5 5/16"	7"	7"	18'-6"	9x 3/4"	7"	7 1/2"	9 1/2"	11"	13"		1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S8-4	30 WF 108	49'-7 5/8"	48'-5 5/16"	7"	7"	18'-6"	9x 3/4"	7"	7 1/2"	9 1/2"	11"	13"		1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S9-4	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-0"	9x 5/8"	7"	8"	9 1/2"	11 1/2"	14"		1/2"	11/16"	1/2"	9/16"	3/4"	9/16"

* Spacing begins at termination of 6 spaces @ 4".

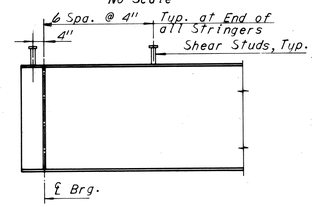
Note: All steel shall be A36 unless otherwise denoted.

Notes:
For Diaphragm and Connection Details, see Sheet 26.
For Joint Details, see Sheet 37.
For Shoe Details, see Sheets 31 and 32
For angles between ℄ Piers and Stringers, see Sheets 3, 6, 7 & 8.
For Superstructure steel quantities, see Sheet 2.



SHEAR STUD DETAIL

No Scale



DETAIL "A"

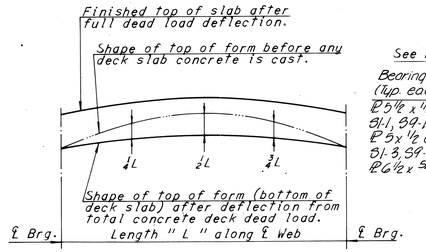
No Scale

SHEAR STUD NOTE

Capacity = 3,400 lbs. per stud.

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

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

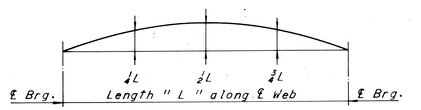


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



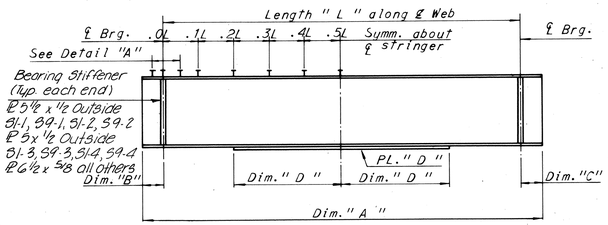
CAMBER DIAGRAM

NOTE TO FABRICATOR

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

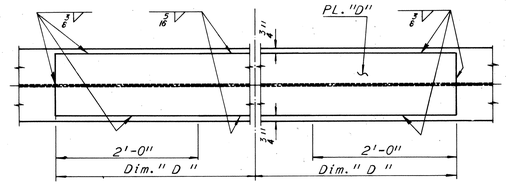
This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.

Dimensions are in inches.



STRINGER ELEVATION

No Scale



COVER PLATE DETAIL

No Scale

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

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 28.

SHOE SCHEDULE			
EXPANSION SHOES		FIXED SHOES	
TYPE	NO.REQD.	TYPE	NO.REQD.
E1	33	F1	16
		F1M	17

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.D.	8-6-68	2	As Built	TEM	8-76
CHECKED	J.V.	10-22-68	1	Pier 1 & 2 Dim. Change	LBP	10-16-78
IN CHARGE						

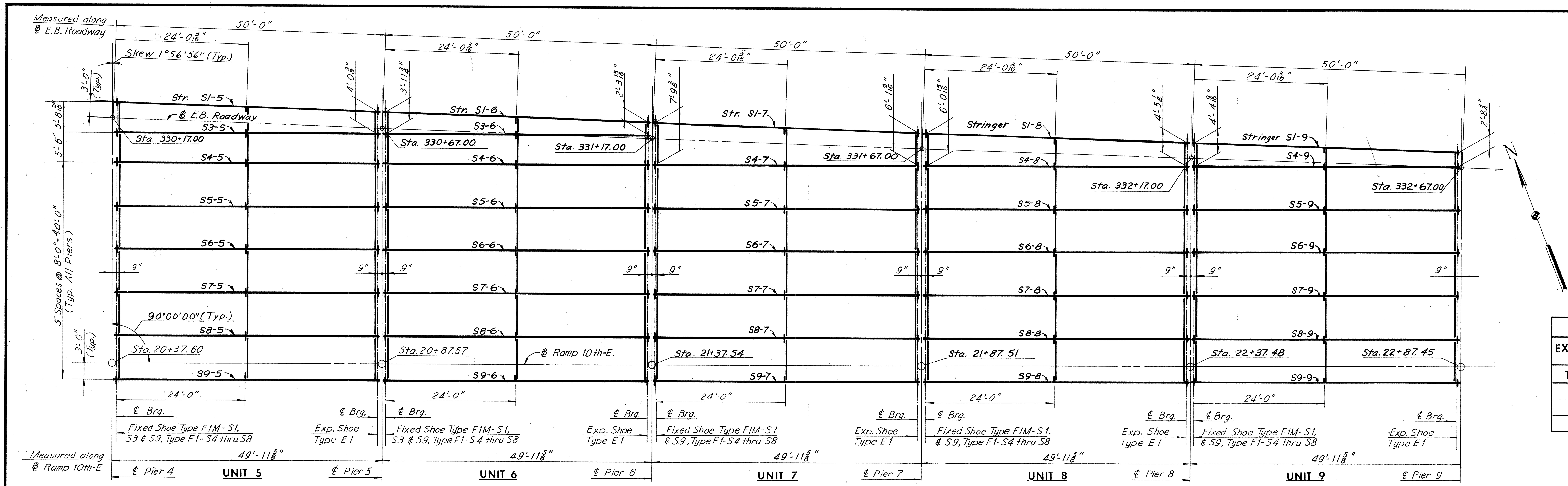
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING PLAN - UNITS 1,2,3 AND 4

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

SCALE: 1"=10' Unless as shown
CONTRACT NO.: 10
SHEET NO. 14 OF 46



FRAMING PLAN
Scale: 1" = 10'-0"

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	37	F1	25
		F1M	12

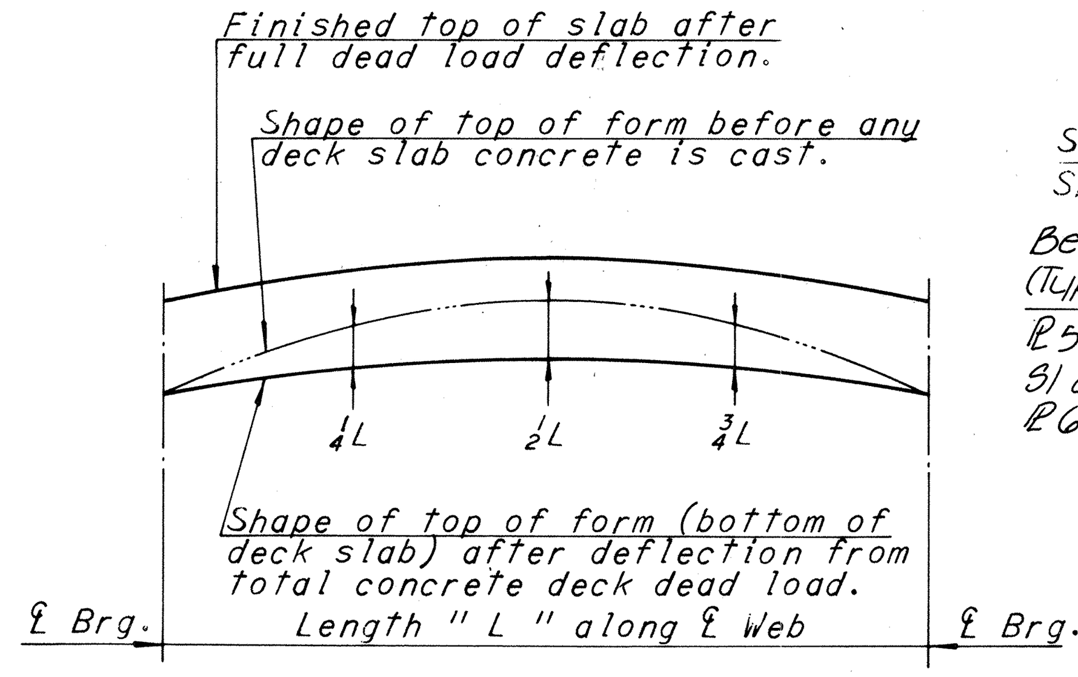
STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE 1/4L	1/2L	3/4L	CAMBER SCHEDULE 1/4L	1/2L	3/4L
5	S1-5	30 WF 108	49'-10"	48'-6"	8"	8"	0	0	11"	11 1/2"	13 1/2"	16 1/2"	20 1/2"	1/2"	11/16"	1/2"	9/16"	3/4"	9/16"
	S3-5	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	0	0	10"	11 1/2"	13"	15 1/2"	19"	7/16"	5/8"	7/16"	1/2"	3/4"	1/2"
	S4-5	30 WF 99	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-0"	9x5/8"	8"	9"	11"	12 1/2"	15"	7/16"	9/16"	7/16"	1/2"	11/16"	1/2"
	S5-5	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S6-5	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S7-5	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S8-5	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S9-5	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-0"	9x5/8"	7 1/2"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	9/16"	3/4"	9/16"
6	S1-6	30 WF 99	49'-10"	48'-6"	8"	8"	0	0	13 1/2"	15"	18"	22"	24"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S3-6	30 WF 99	49'-7 5/8"	48'-5 5/8"	7"	7"	0	0	11 1/2"	12 1/2"	14 1/2"	17 1/2"	21 1/2"	7/16"	9/16"	7/16"	1/2"	11/16"	1/2"
	S4-6	30 WF 99	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-0"	9x5/8"	8"	9"	11"	12 1/2"	15"	7/16"	9/16"	7/16"	1/2"	11/16"	1/2"
	S5-6	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S6-6	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S7-6	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S8-6	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S9-6	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-0"	9x5/8"	7 1/2"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	9/16"	3/4"	9/16"
7	S1-7	30 WF 108	49'-10"	48'-6"	8"	8"	17'-6"	9x1/2"	8"	8 1/2"	10 1/2"	12 1/2"	15 1/2"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S4-7	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S5-7	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S6-7	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8	1/2"	9/16"	3/4"	9/16"
	S7-7	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8	1/2"	9/16"	3/4"	9/16"
	S8-7	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S9-7	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-0"	9x5/8"	7 1/2"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	9/16"	3/4"	9/16"
8	S1-8	30 WF 108	49'-10"	48'-6"	8"	8"	17'-6"	9x1/2"	9 1/2"	10 1/2"	13"	15 1/2"	19 1/2"	7/16"	5/8"	7/16"	9/16"	3/4"	9/16"
	S4-8	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	8"	8 1/2"	11"	13"	15 1/2"	7/16"	5/8"	7/16"	1/2"	3/4"	1/2"
	S5-8	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13 1/2"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S6-8	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13 1/2"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S7-8	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13 1/2"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S8-8	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13 1/2"	1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S9-8	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-6"	9x5/8"	7"	7 1/2"	10"	12"	14 1/2"	1/2"	11/16"	1/2"	9/16"	3/4"	9/16"
9	S1-9	30 WF 99	49'-10"	48'-6"	8"	8"	0	0	14"	15"	18"	22"	24"	1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S4-9	30 WF 99	49'-7 5/8"	48'-5 5/8"	7"	7"	17'-0"	9x1/2"	9"	10"	12"	14"	17"	7/16"	5/8"	7/16"	9/16"	3/4"	3/4"
	S5-9	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S6-9	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18"-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S7-9	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	9/16"	3/4"	9/16"
	S8-9	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	11/16"	1/2"	9/16"	13/16"	9/16"
	S9-9	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-0"	9x5/8"	7 1/2"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	9/16"	3/4"	9/16"

* Spacing begins at termination of 6 spaces @ 4".

Note:
All steel shall be A36 unless denoted otherwise.

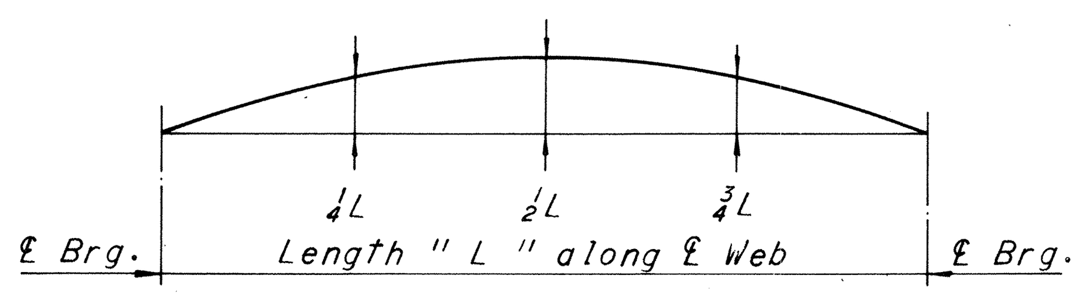
Notes:
For Diaphragm and Connection Details, see Sheet 29.
For Joint Details, see Sheet 37.
For Shoe Details, see Sheets S1 and S2
For Shear Stud Details, see Sheet 14.
For angles between ℄ Piers and Stringers, see Sheets 8, 9, 10 & 11.
For Superstructure steel quantities, see Sheet 2.



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

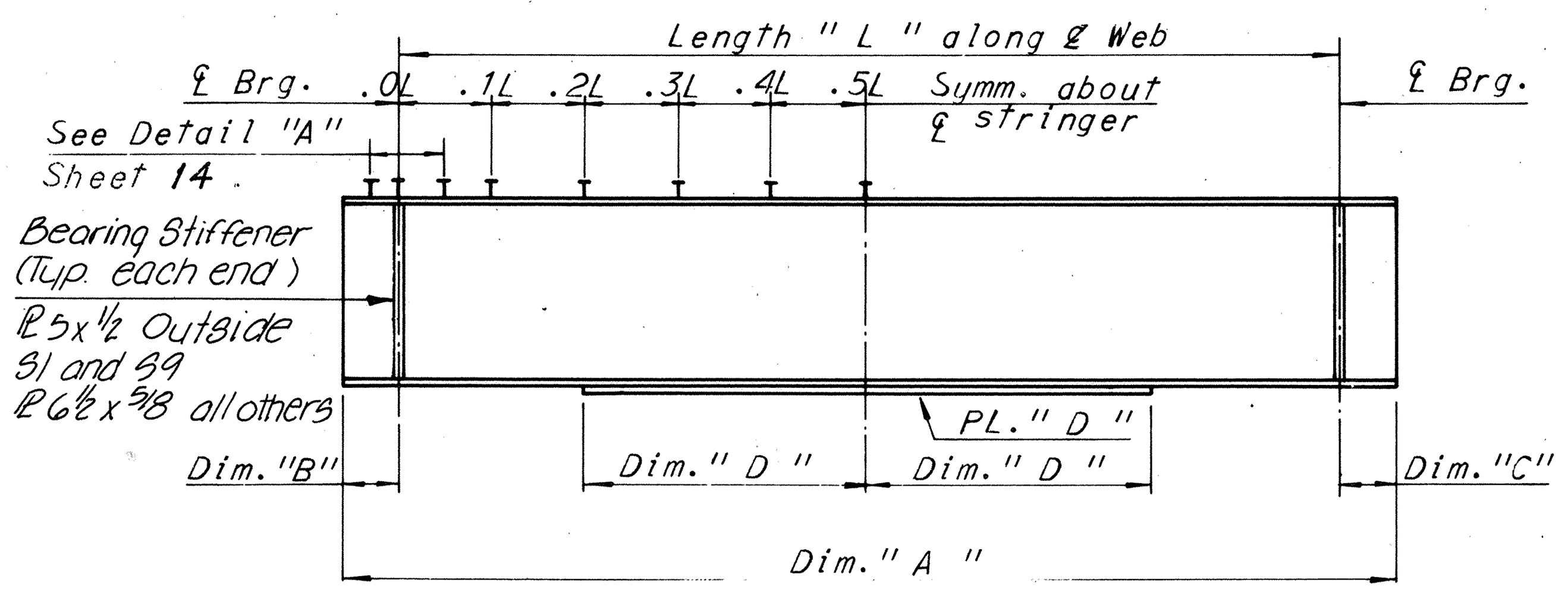
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting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



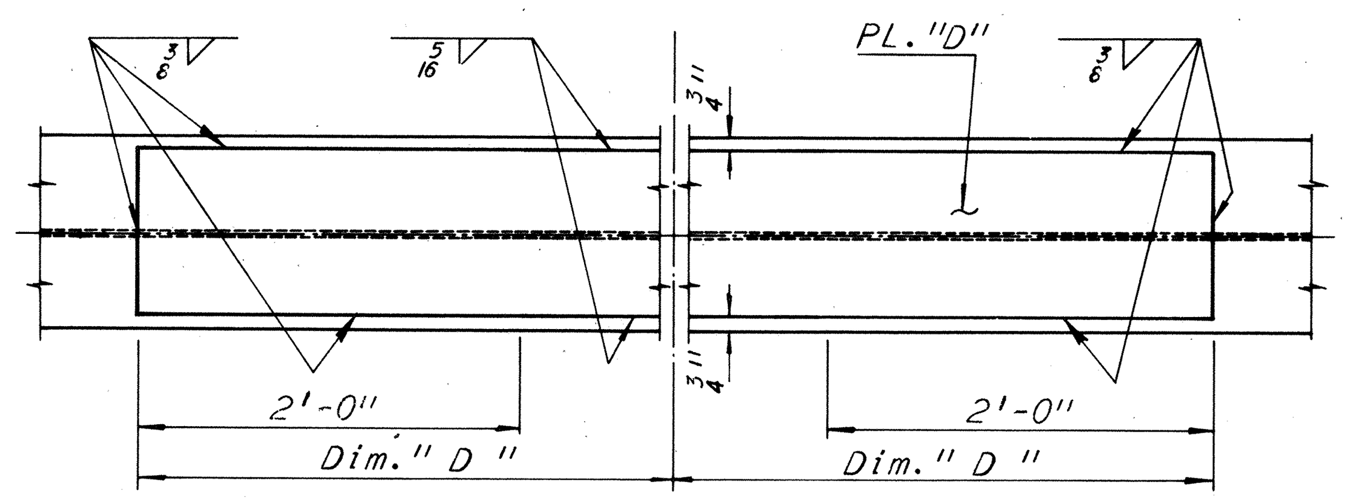
CAMBER DIAGRAM

NOTE TO FABRICATOR

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



STRINGER ELEVATION
No Scale



COVER PLATE DETAIL
No Scale

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 29.

	BY	DATE				
MADE	SHS	8-2-68				
CHECKED	JD	10-21-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

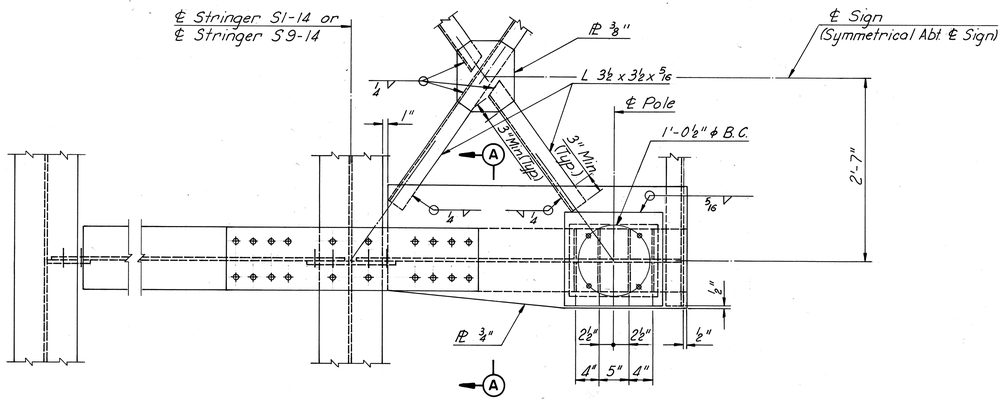
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 5,6,7,8, AND 9

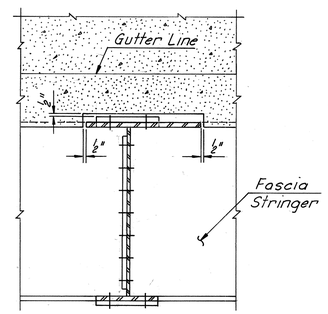
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=10' Unless as shown
CONTRACT NO.: 10
SHEET NO. 15 OF 46

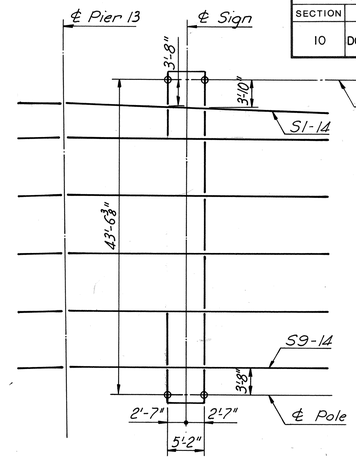
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	142A	265



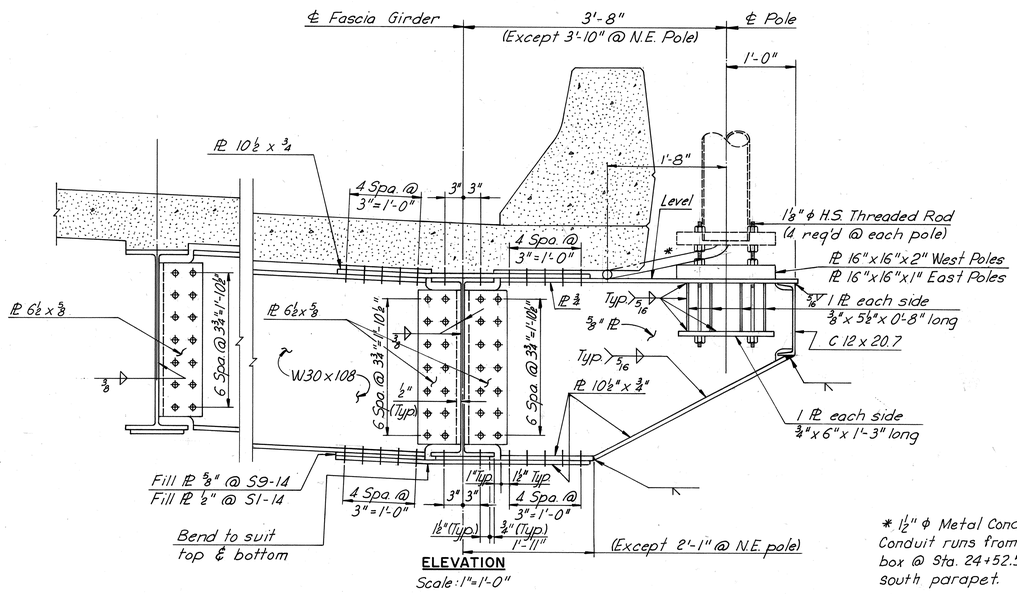
HALF PLAN
Scale: 1"=1'-0"



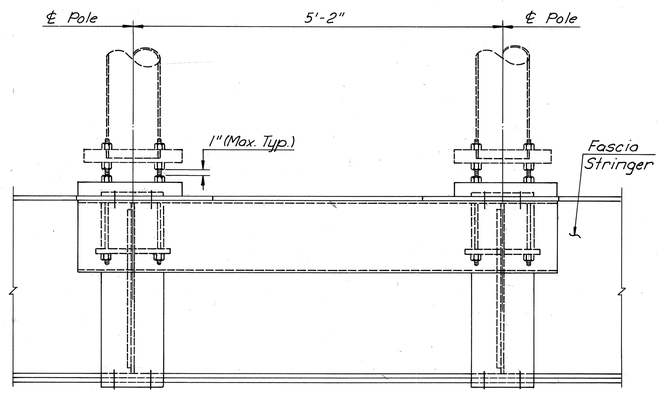
SECTION A-A
Scale: 1"=1'-0"



LAYOUT PLAN
Scale: 1"=10'-0"



ELEVATION
Scale: 1"=1'-0"



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

* 1½" ϕ Metal Conduit
Conduit runs from junction box @ Sta. 24+52.54 under south parapet.

NOTES:

1. See Framing Plan Sheet 16 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the end frame. Any vertical misalignment shall be taken up in the leveling nuts.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞" ϕ H.S. unless noted otherwise.

DESIGNED						
DRAWN	N.L.B.	8-74	2	As Built	TEM	8-76
CHECKED	R.B.H.	9-74	1	New Sheet Added.	R.B.H.	9-74
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

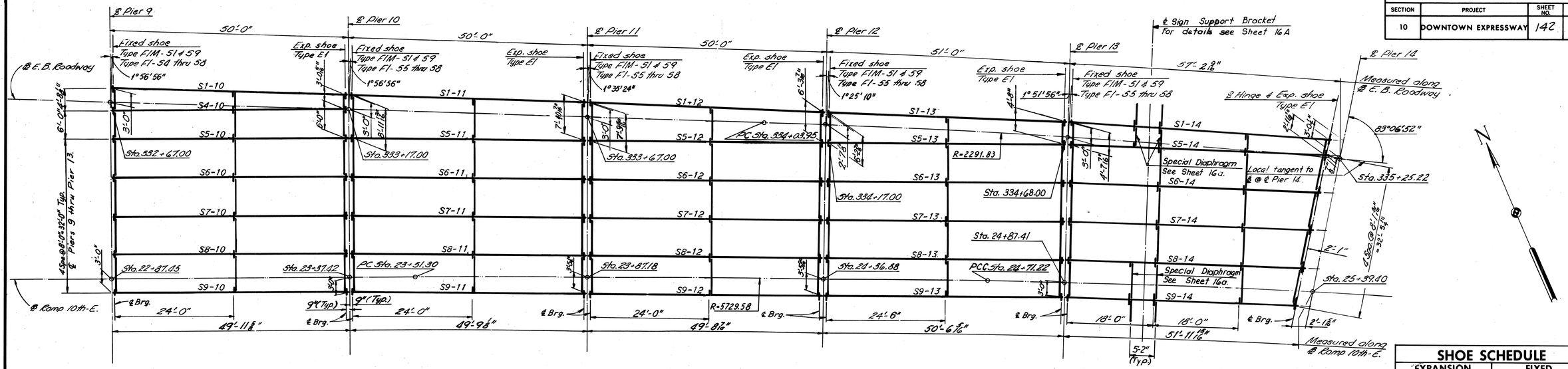
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
SIGN SUPPORT BRACKET DETAILS - UNIT 14

SCALE AS SHOWN
DATE
SHEET 16A OF 46

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	142	265



UNIT 10 **UNIT 11** **UNIT 12** **UNIT 13** **UNIT 14**

FRAMING PLAN

Scale 1" = 10'-0"

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO.REQD.	TYPE	NO.REQD.
E1	31	F1	21
		F1M	10

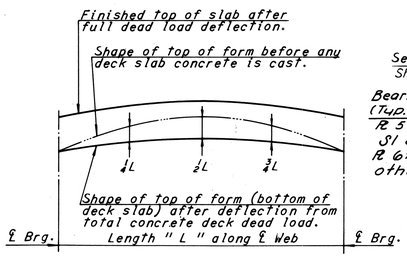
STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
10	S1-10	30 WF 108	49'-10"	48'-6"	8"	8"	——	——	11"	11 1/2"		16 1/2"	20 1/2"	7/16"	8"	7/16"	1/2"	3/4"	1/2"
	S4-10	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	——	——	10 3/8"	11 1/2"		15 1/2"	19"	7/16"	7/16"	7/16"	1/2"	11/16"	1/2"
	S5-10	30 WF 99	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-0"	9"x5/8"	8"	9"	11"	12 1/2"	15"	1/2"	5/8"	1/2"	3/4"	15/16"	3/4"
	S6-10	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9"x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S7-10	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9"x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S8-10	30 WF 108	49'-7 5/8"	48'-5 5/8"	7"	7"	18'-6"	9"x3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S9-10	30 WF 108	49'-9 5/8"	48'-5 5/8"	8"	8"	19'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	5/8"	3/4"	5/8"
11	S1-11	30 WF 108	49'-10 3/16"	48'-6 3/16"	8"	8"	18'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	9/16"	11/16"	9/16"	11/16"	13/16"	11/16"
	S5-11	30 WF 108	49'-7 5/8"	48'-5 5/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S6-11	30 WF 108	49'-6 3/4"	48'-4 3/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S7-11	30 WF 108	49'-6 1/4"	48'-4 3/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S8-11	30 WF 108	49'-5 1/4"	48'-3 1/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S9-11	30 WF 108	49'-6 5/8"	48'-2 1/16"	8"	8"	19'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	5/8"	3/4"	5/8"
12	S1-12	30 WF 99	49'-10 6/16"	48'-6 6/16"	8"	8"	18'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	5/8"	13/16"	5/8"
	S5-12	30 WF 108	49'-7 3/8"	48'-5 3/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S6-12	30 WF 108	49'-6 8/16"	48'-4 9/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S7-12	30 WF 108	49'-5 3/4"	48'-3 3/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S8-12	30 WF 108	49'-4 7/16"	48'-2 3/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S9-12	30 WF 108	49'-6 1/16"	48'-2 1/16"	8"	8"	19'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	1/2"	11/16"	1/2"	5/8"	3/4"	5/8"
13	S1-13	30 WF 99	50'-10 8/16"	49'-6 8/16"	8"	8"	18'-0"	9"x5/8"	9 1/2"	10 1/2"	13"	15 1/2"	19 1/2"	7/16"	1/2"	7/16"	1/2"	3/4"	7/16"
	S5-13	30 WF 99	50'-7 5/8"	49'-5 3/16"	7"	7"	18'-0"	9"x4 1/2"	8 1/2"	9 1/2"	11 1/2"	13 1/2"	16"	7/16"	1/2"	7/16"	5/8"	5/8"	5/8"
	S6-13	30 WF 108	50'-5 5/8"	49'-3 5/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S7-13	30 WF 108	50'-4 8/16"	49'-2 9/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S8-13	30 WF 108	50'-3 4/16"	49'-1 8/16"	7"	7"	18'-6"	9"x4 3/4"	7"	7 1/2"	9 1/2"	11"	13"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
	S9-13	30 WF 108	50'-3 3/4"	48'-11 3/4"	8"	8"	19'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"
14	S1-14	30 WF 108	56'- 1 13/16"	54'-10 3/16"	8"	7 1/16"	20'-0"	9"x5/8"	9"	10 1/2"	13"	15 1/2"	19 1/2"	5/8"	13/16"	5/8"	13/16"	18"	13/16"
	S5-14	30 WF 108	55'- 6 1/16"	54'-3 16/16"	7"	7 1/8"	20'-9"	9"x4 3/4"	7 1/2"	8 1/2"	11"	13"	15 1/2"	5/8"	11/16"	5/8"	3/4"	1"	3/4"
	S6-14	30 WF 108	54'- 0 3/4"	52'-10 3/16"	7"	7 1/2"	21'-6"	9"x1 1/4"	6 1/2"	7 1/2"	9 1/2"	11"	13"	5/8"	13/16"	5/8"	3/4"	1"	3/4"
	S7-14	30 WF 108	52'- 7 11/16"	51'-5 9/16"	7"	7 1/2"	20'-6"	9"x1"	7"	7 1/2"	9 1/2"	11"	13"	9/16"	3/4"	9/16"	11/16"	15/16"	11/16"
	S8-14	30 WF 108	51'- 2 5/8"	50'-0 5/16"	7"	7 1/2"	19'-0"	9"x5/8"	7"	7 1/2"	9"	11"	13"	9/16"	3/4"	9/16"	5/8"	7/8"	5/8"
	S9-14	30 WF 108	49'-10 4/16"	48'-7 8/16"	8"	7 8/16"	19'-0"	9"x5/8"	7"	8"	9 1/2"	11 1/2"	14"	1/2"	5/8"	1/2"	5/8"	3/4"	5/8"

Note :
All steel shall be A36 unless otherwise shown.

* Spacing begins at termination of 6 spaces @ 4".

Notes:
For Joint Details, see Sheet 37
For Superstructure steel quantities, see Sheet 2.
For Framing Details, see Sheet 22
For Diaphragm Details, see Sheet 30
For Shear Stud Details, see Sheet 14.
For angles between ℄ Piers and Stringers, see Sheets 11, 12, 13 & 22.
For Shoe Details, see Sheet S1 & S2.

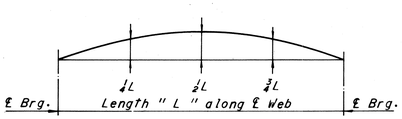


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



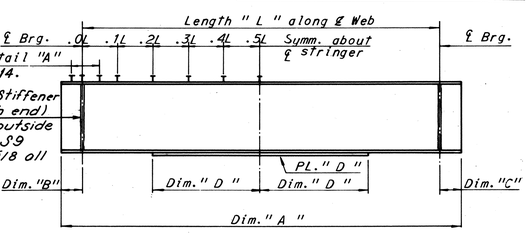
CAMBER DIAGRAM

NOTE TO FABRICATOR

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

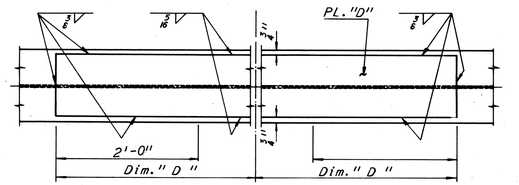
This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.



STRINGER ELEVATION

No Scale



COVER PLATE DETAIL

No Scale

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

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 30 .

	BY	DATE
MADE	MJC	7-30-68
CHECKED	P.T.A	11-5-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Add Sign Support Bracket	T.E.M.	7-74
1	As Built	TEM	8-76

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

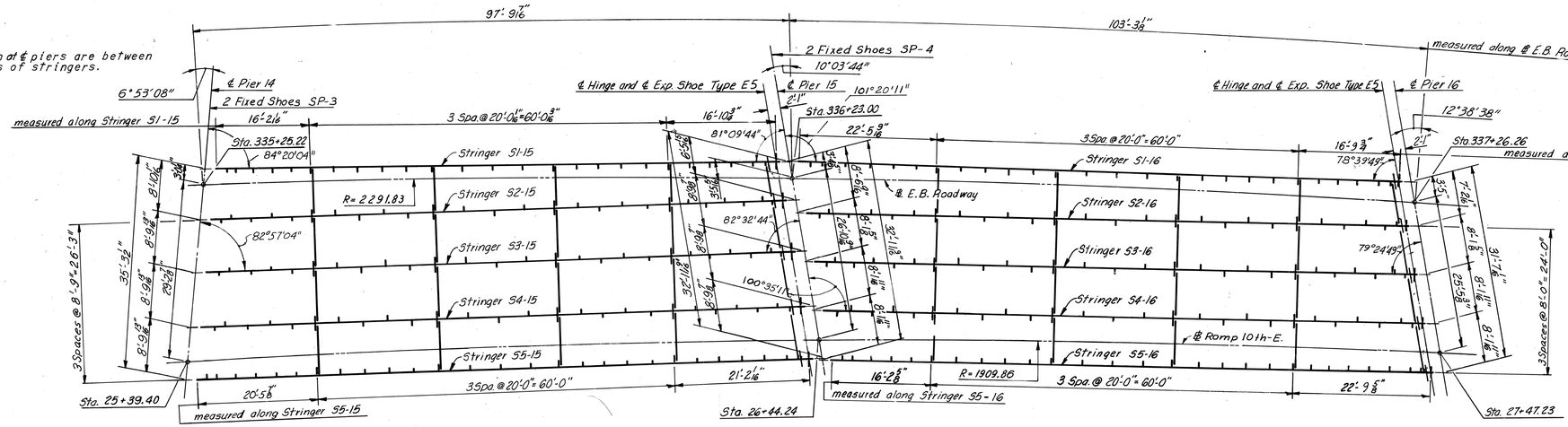
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 10, 11, 12, 13 AND 14

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

SCALE: 1"=10' Unless as shown
CONTRACT NO.: 10
SHEET NO. 16 OF 46

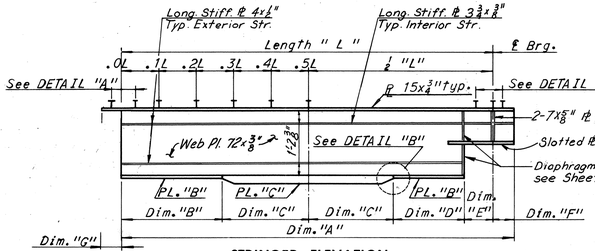
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	143	265

Note:
Dimensions shown at ℄ piers are between extended Centerlines of stringers.

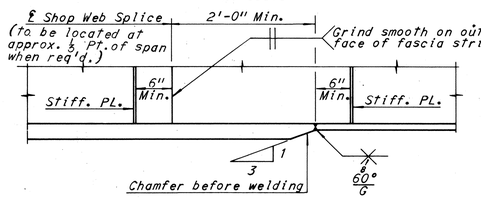


Note:
Stringers S2-15 thru S5-15 and Stringers S2-16 thru S5-16 are parallel.
Diaphragm spacing is shown along stringer length "L".

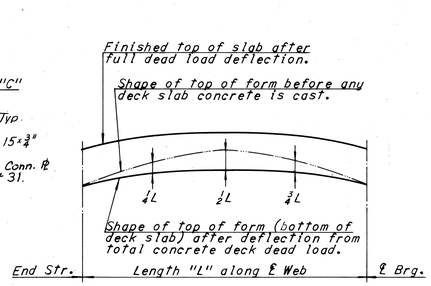
UNIT 15



STRINGER ELEVATION
No Scale



DETAIL "B"
No Scale



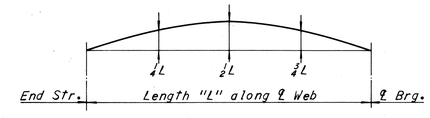
DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

UNIT 16

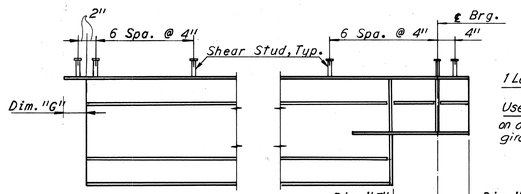
FRAMING PLAN
Scale: 3/32" = 1'-0"



CAMBER DIAGRAM

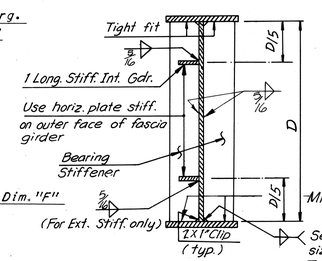
NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 31.



DETAIL "A"
No Scale

DETAIL "C"
No Scale



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS
No Scale

Note: Web to flange weld size shall be determined by flange thickness as follows:

to 1 1/2" ..... 5/16 weld
over 1 1/2" to 2 1/4" ..... 3/8 weld

SHOE SCHEDULE

FIXED SHOES		EXPANSION SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
SP-3	2	E5	10
SP-4	2		

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
15	S1-15	93'- 8 1/4"	93'- 1"	23'-3 1/2"	23'-3"	22'-5 3/8"	10 1/4"	7 1/16"	6 3/8"	15x3/8"	15x1 1/4"	13 1/4"	15 1/2"	19"	24"	24"
	S2-15	95'- 6 7/16"	94'-11 15/16"	24'-5 7/16"	23'-0"	23'-7 7/16"	10 1/4"	7 1/16"	6 3/8"	15x3/8"	15x1 1/4"	14"	16"	18 1/2"	21 1/2"	23 1/2"
	S3-15	97'- 9 9/16"	97'- 2 1/2"	22'-1 1/4"	26'-6"	21'-3 3/16"	10 1/4"	7 1/16"	6 3/8"	15x7/16	15x1 3/8"	14"	16"	18"	21"	22 1/2"
	S4-15	100'- 0 5/8"	99'- 5 1/4"	24'-2 3/8"	25'-6"	23'-4 3/8"	10 1/4"	7 1/16"	6 3/8"	15x1"	15x1 1/4"	14"	16"	18 1/2"	21"	23"
	S5-15	102'- 3"	101'- 7 15/16"	24'-4"	26'-6"	23'-5 3/8"	10 1/4"	7 1/16"	6 3/8"	15x1"	15x1 1/4"	13 1/2"	15 1/2"	18 1/2"	23"	24"
16	S1-16	99'-10 7/16"	99'- 3 5/16"	23'-7 5/16"	26'-0"	22'-9 1/16"	10 3/16"	7 1/16"	6 5/16"	15x7/16	15x1 3/16"	14"	16"	19"	24"	24"
	S2-16	99'- 7 3/16"	99'- 0 1/4"	24'-6 1/16"	25'-0"	23'-7 15/16"	10 3/16"	7 1/16"	6 5/16"	15x7/16	15x1 1/4"	15"	17"	19 1/2"	22 1/2"	24"
	S3-16	99'- 7 3/16"	99'- 0 1/4"	24'-0 1/4"	25'-6"	23'-1 15/16"	10 3/16"	7 1/16"	6 5/16"	15x3/8"	15x1 1/4"	15"	17"	19 1/2"	22 1/2"	24"
	S4-16	99'- 7 3/16"	99'- 0 1/4"	24'-0 1/4"	25'-6"	23'-1 15/16"	10 3/16"	7 1/16"	6 5/16"	15x7/16	15x1 1/4"	15"	17"	19 1/2"	22 1/2"	24"
	S5-16	99'- 7 3/16"	99'- 0 1/4"	24'-0 1/4"	25'-6"	23'-1 15/16"	10 3/16"	7 1/16"	6 5/16"	15x7/16	15x1 3/8"	14"	16 1/2"	19 1/2"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

1/4L	1/2L	3/4L
15/16"	1 1/16"	1 1/16"
7/8"	1 1/8"	1"
15/16"	1 3/16"	15/16"
1 1/16"	1 3/16"	1 1/16"
1 1/16"	1 3/16"	1 1/16"
15/16"	1 3/16"	15/16"
15/16"	1 3/16"	15/16"
1"	1 1/8"	1"
1"	1 1/8"	1"
1"	1 1/8"	1"

CAMBER SCHEDULE

1/4L	1/2L	3/4L
1 5/8"	2 1/16"	1 5/16"
1 1/2"	2"	1 7/16"
1 5/8"	2 1/16"	1 1/2"
1 7/16"	2 5/16"	1 3/8"
1 3/4"	2 5/16"	1 5/8"
1 3/16"	1 9/16"	1 3/16"
1"	1 7/16"	1"
1"	1 3/16"	1"
1"	1 7/16"	1"

Note All structural steel in Units 15 and 16 is A36.

* Spacing begins at termination of 6 spaces @ 4"

Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.

Intermediate stiffener Pls. 4 1/2 x 3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

Notes:
For Superstructure steel quantities, see Sheet 2.
For Joint Details, see Sheet 38.
For Shoe Details, see Sheets 51 and 52
For Diaphragm Details, see Sheet 31.
For Framing Details, see Sheet 22.
For Shear Stud Details, see Sheet 14.
For Angles between ℄ Piers and Stringers see Sheet 22.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	RLM	7-31-68				
CHECKED	PTA	11-4-68	1	As Built	TEM	8-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING PLAN - UNITS 15 AND 16

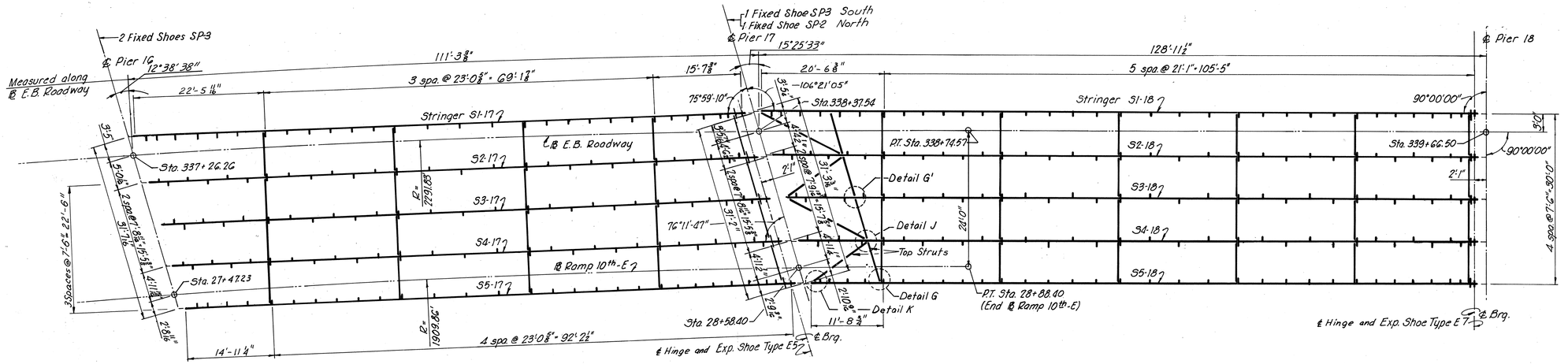
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK · ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 17 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	144	265

Note:
Stringers S2-17 thru S5-17 and Stringers S1-18 thru S5-18 are parallel.
Diaphragm spacing is shown along stringer length "L".

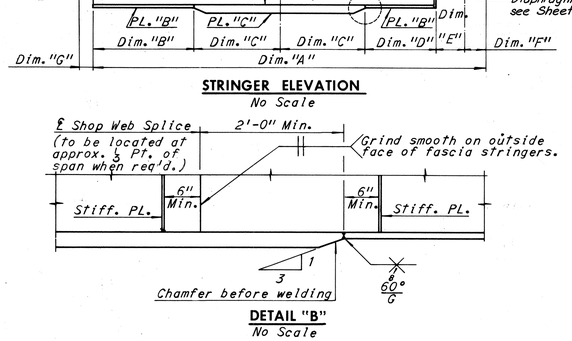
Dimensions shown at ℄ Piers are between extended center lines of stringers.



UNIT 17

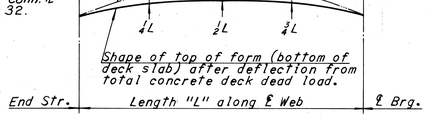
UNIT 18

FRAMING PLAN
Scale: 1"=10'-0"



STRINGER ELEVATION
No Scale

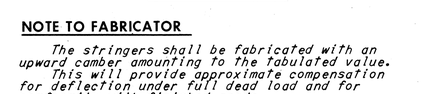
DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

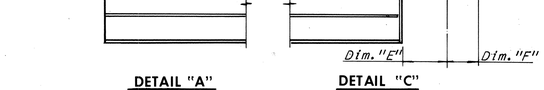
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting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



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for conformity with finished grade.
Dimensions are in inches.
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 32.



DETAIL "A"
No Scale

DETAIL "C"
No Scale

Note:
For web to flange weld sizes and longitudinal stiffener plate details see Sheet 17.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E5	5	SP-2	1
E7	5	SP-3	3

Note:
Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.
Intermediate stiffener Pls. 4½x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All steel shall be A36 unless otherwise noted.

Notes:
For Framing Details, see Sheet 22 and 23.
For Joint Details, see Sheet 38.
For Shoe Details, see Sheets 51 & 52.
For Diaphragm Details, see Sheet 32.
For Superstructure steel quantities, see Sheet 2.
For Details G, G', J and K, see Sheet 27.
For Shear Stud Details, see Sheet 14.
For Angles between ℄ Piers and Stringers, see Sheets 22 & 23.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
17	S1-17	107'-10 3/8"	107'-2 5/8"	26'-7 1/2"	27'-0"	25'-9 1/4"	10 3/8"	7 1/4"	6 1/4"	‡ 15x3/8"	‡ 15x1 1/4"	13 1/2"	15 1/4"	18 1/2"	23"	24"
	S2-17	107'-9"	107'-1 3/8"	28'-6 7/8"	25'-0"	27'-8 3/8"	10 3/8"	7 1/4"	6 1/4"	‡ 15x3/8"	‡ 15x1"	14 1/2"	17"	19 1/2"	22"	24"
	S3-17	107'-9"	107'-1 3/4"	28'-6 7/8"	25'-0"	27'-8 3/8"	10 3/8"	7 1/4"	6 1/4"	‡ 15x3/8"	‡ 15x1"	14 1/2"	17"	19 1/2"	22"	24"
	S4-17	107'-9"	107'-1 3/4"	28'-6 7/8"	25'-0"	27'-8 3/8"	10 3/8"	7 1/4"	6 1/4"	‡ 15x3/8"	‡ 15x1"	14 1/2"	17"	19 1/2"	22"	24"
	S5-17	107'-9"	107'-1 3/4"	28'-0 7/8"	25'-6"	27'-2 9/16"	10 3/8"	7 1/4"	6 1/4"	‡ 15x3/8"	‡ 15x1 1/4"	14"	16"	19"	24"	24"
18	S1-18	126'-6 3/8"	125'-11 3/16"	30'-11 11/16"	32'-0"	30'-1 11/16"	10"	7"	6 3/4"	‡ 18x3/8"	‡ 18x1 1/4"	14"	16 1/2"	19 1/2"	24"	24"
	S2-18	124'-4"	123'-9"	34'-10 1/2"	27'-0"	34'-0 1/2"	10"	7"	6 3/4"	‡ 18x3/8"	‡ 18x1 1/4"	16"	18 1/2"	21 1/2"	24"	24"
	S3-18	122'-1 13/16"	121'-6 9/16"	36'-3 5/16"	24'-6"	35'-5 1/4"	10"	7"	6 3/4"	‡ 18x3/8"	‡ 18x1 1/4"	16"	18 1/2"	21 1/2"	23 1/4"	24"
	S4-18	119'-11 13/16"	119'-4 5/16"	——	118'-6 13/16"	——	10"	7"	6 3/4"	‡ 18x3/8"	‡ 18x1	16"	18 1/2"	21 1/2"	23 1/4"	24"
	S5-18	117'-8 3/4"	117'-1 3/4"	37'-0 7/8"	21'-6"	36'-2 5/8"	10"	7"	6 3/4"	‡ 18x3/8"	‡ 18x1 1/4"	14 1/2"	17"	20"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1 3/8"	2 1/4"	1 5/8"
1 3/8"	2 1/4"	1 5/8"
1 3/8"	2 1/4"	1 5/8"
1 3/8"	2 1/4"	1 5/8"
1 3/8"	2 1/4"	1 5/8"
1 3/8"	2 3/8"	1 3/8"
2 1/4"	3 1/4"	2 1/4"
2 5/8"	4 1/16"	2 5/8"
2 5/8"	3 5/8"	2 3/4"
2 1/4"	3 1/4"	2 1/4"
1 7/8"	2 5/8"	1 7/8"
2 1/8"	3 1/8"	2 1/16"
2 1/4"	3 3/8"	2 5/8"

CAMBER SCHEDULE

¼L	½L	¾L
2"	2 3/4"	2 1/16"
1 11/16"	2 5/8"	1 5/8"
1 1/2"	2"	1 3/8"
1 5/8"	1 5/8"	1 1/16"
1"	1 1/4"	3/4"
2 5/8"	4 1/16"	2 5/8"
2 5/8"	3 5/8"	2 3/4"
2 1/8"	3 1/8"	2 5/8"
2 1/8"	3 1/8"	2 1/16"
2 1/4"	3 3/8"	2 5/8"

*Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

	BY	DATE	NO.	REVISION	BY	DATE
MADE	FRD	8-20-68	2	As Built	TEM	8-76
CHECKED	PTA	4-25-69	1	Pier 17 Shoes	DWB	11-14-74
IN CHARGE						

AS BUILT

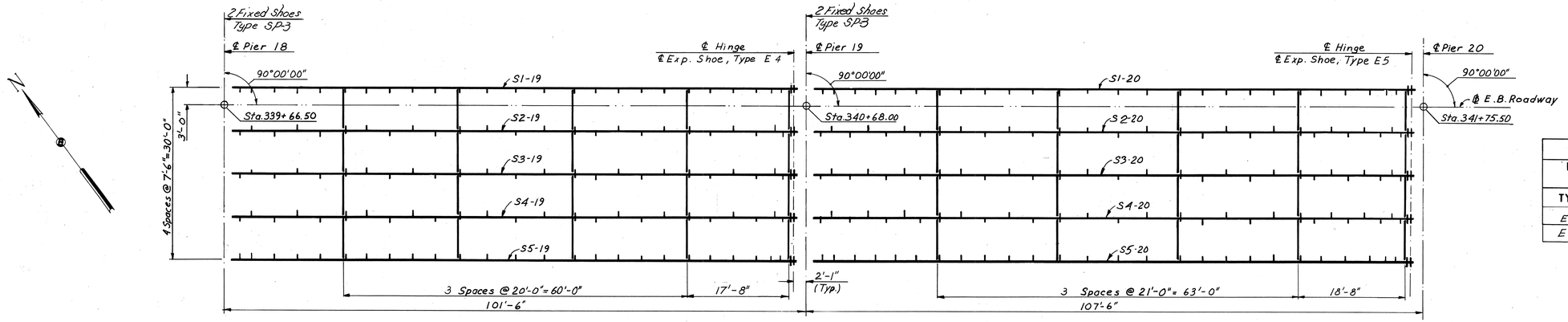
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 17 AND 18

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 18 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	145	265



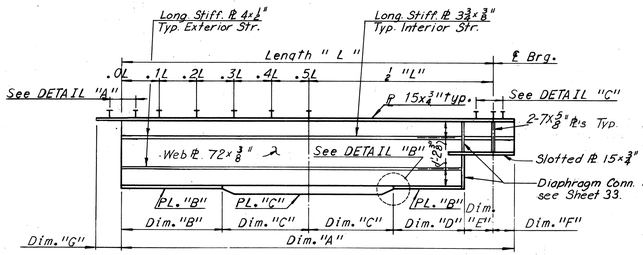
UNIT 19 UNIT 20

FRAMING PLAN
Scale: 1" = 10'-0"

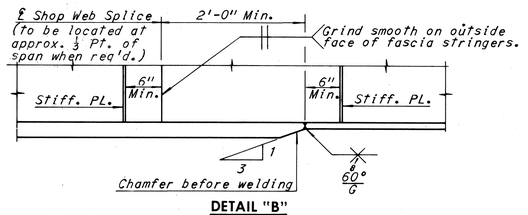
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	5	SP-3	4
E5	5		

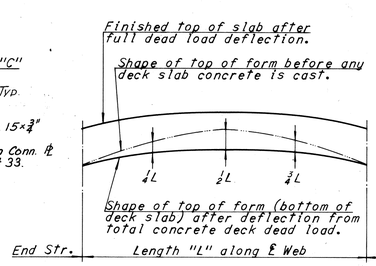
Note: For web to flange weld sizes and Longitudinal Stiffener Plate details see Sheet 17.



STRINGER ELEVATION
No Scale



DETAIL "B"
No Scale

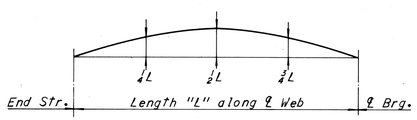


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

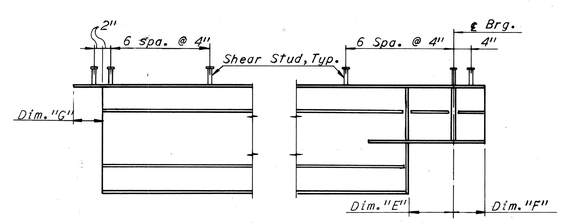
The stringers shall be fabricated with an upward camber amounting to the tabulated value.

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

Dimensions are in inches.

Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 33.



DETAIL "A"
No Scale

DETAIL "C"
No Scale

Note: Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.

Intermediate stiffener Pls. 4 1/2 x 3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
19	S1-19	98'-2 1/4"	97'-7 1/4"	23'-9 5/8"	25'-0"	22'-11 5/8"	10"	7"	6 1/2"	15x5/8"	15x1 1/4"	14 1/2"	17"	20"	24"	24"
	S2-19	98'-2 1/4"	97'-7 1/4"	24'-9 5/8"	24'-0"	23'-11 3/8"	10"	7"	6 1/2"	15x5/8"	15x1 1/4"	16"	18"	21"	24"	24"
	S3-19	98'-2 1/4"	97'-7 1/4"	24'-9 5/8"	24'-0"	23'-11 5/8"	10"	7"	6 1/2"	15x5/8"	15x1 1/4"	16"	18"	21"	24"	24"
	S4-19	98'-2 1/4"	97'-7 1/4"	24'-9 5/8"	24'-0"	23'-11 5/8"	10"	7"	6 1/2"	15x5/8"	15x1 1/4"	16"	18"	21"	24"	24"
	S5-19	98'-2 1/4"	97'-7 1/4"	23'-9 5/8"	25'-0"	22'-11 3/8"	10"	7"	6 1/2"	15x5/8"	15x1 1/4"	14 1/2"	17"	20"	24"	24"
20	S1-20	104'-2 1/4"	103'-7 1/4"	24'-3 5/8"	27'-6"	23'-5 5/8"	10"	7"	6 1/2"	15x1"	15x1 1/2"	14 1/2"	17"	20"	24"	24"
	S2-20	104'-2 1/4"	103'-7 1/4"	22'-3 5/8"	29'-6"	21'-5 5/8"	10"	7"	6 1/2"	15x5/8"	15x1 3/8"	15 1/2"	18"	21"	24"	24"
	S3-20	104'-2 1/4"	103'-7 1/4"	22'-3 5/8"	29'-6"	21'-5 5/8"	10"	7"	6 1/2"	15x5/8"	15x1 3/8"	15 1/2"	18"	21"	24"	24"
	S4-20	104'-2 1/4"	103'-7 1/4"	22'-3 5/8"	29'-6"	21'-5 5/8"	10"	7"	6 1/2"	15x5/8"	15x1 3/8"	15 1/2"	18"	21"	24"	24"
	S5-20	104'-2 1/4"	103'-7 1/4"	24'-3 5/8"	27'-6"	23'-5 5/8"	10"	7"	6 1/2"	15x1"	15x1 1/2"	14 1/2"	17"	20"	24"	24"

DEAD LOAD DEFLECTION SCHEDULE		
1/4L	1/2L	3/4L
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1"	1 3/16"	1"
1 1/16"	1 5/16"	1 1/16"
1 1/16"	1 5/16"	1 1/16"
1 1/16"	1 5/16"	1 1/16"
1 1/16"	1 5/16"	1 1/16"
1 1/16"	1 5/16"	1 1/16"

CAMBER SCHEDULE		
1/4L	1/2L	3/4L
1 1/4"	1 3/4"	1 1/4"
1 1/4"	1 3/4"	1 1/4"
1 1/4"	1 3/4"	1 1/4"
1 1/4"	1 3/4"	1 1/4"
1 1/4"	1 3/4"	1 1/4"
1 1/16"	2"	1 3/16"
1 3/16"	2 1/16"	1 11/16"
1 1/16"	2 1/16"	1 7/16"
1 1/16"	2 1/16"	2 1/16"
1 7/16"	2 5/16"	2 5/16"

* Spacing begins at termination of 6 spaces @ 4"

Note: All structural steel in Units 19 and 20 is A36.

Notes:
For Superstructure steel quantities, see Sheet 2.
For Diaphragm Details, see Sheet 33.
For Shoe Details, see Sheets 51&52
For Joint Details, see Sheet 38.
For Framing Details, see Sheet 23.
For Shear Stud Details, see Sheet 14.
For Angles between ℄ Piers and Stringers, see Sheet 23.

	BY	DATE				
MADE	J.D.	8-6-68				
CHECKED	PTA	11-4-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

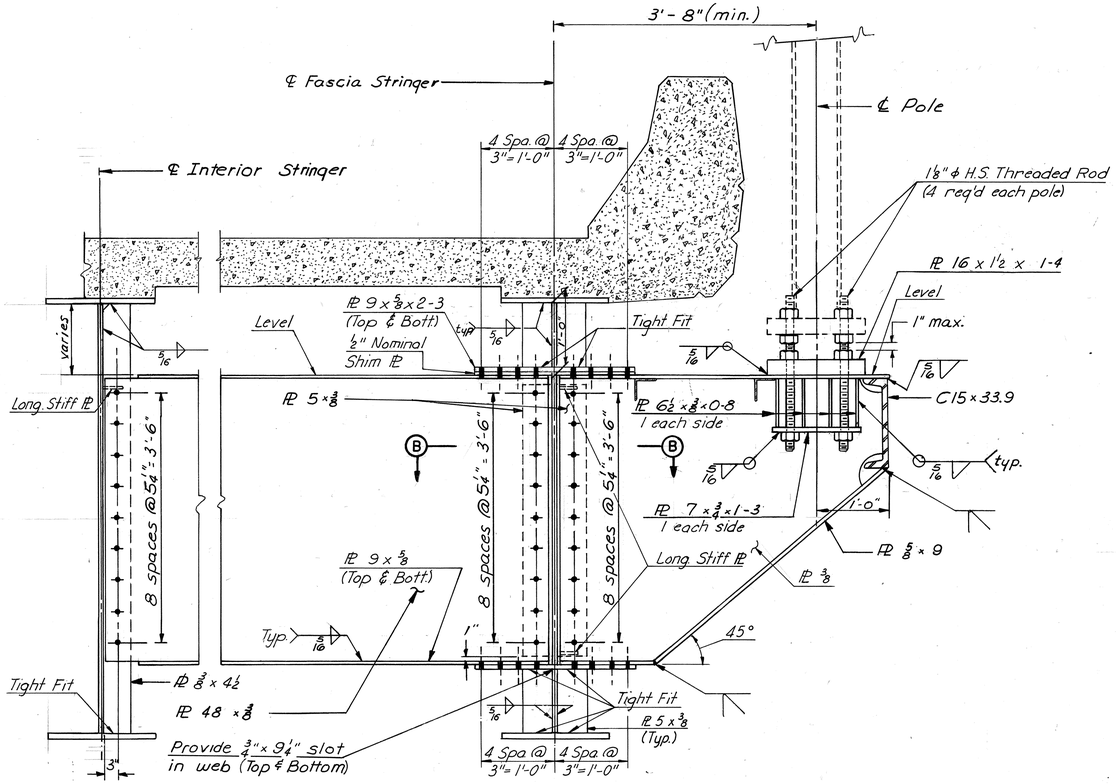
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

FRAMING PLAN - UNITS 19 AND 20

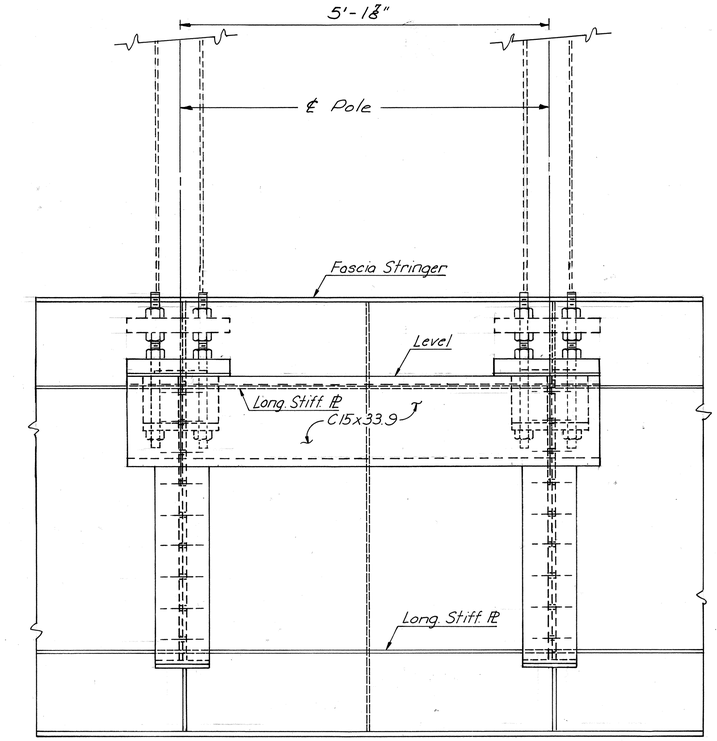
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 10
SHEET NO. 19 OF 46

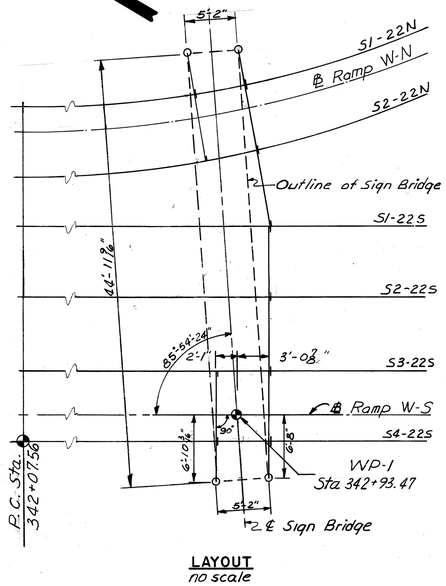
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	146A	265



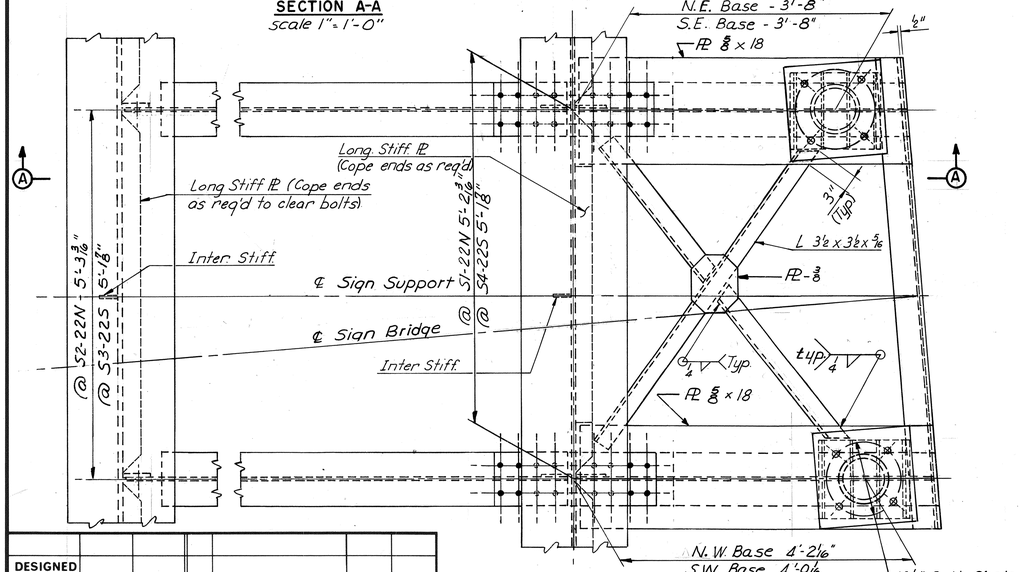
SECTION A-A
scale 1"=1'-0"



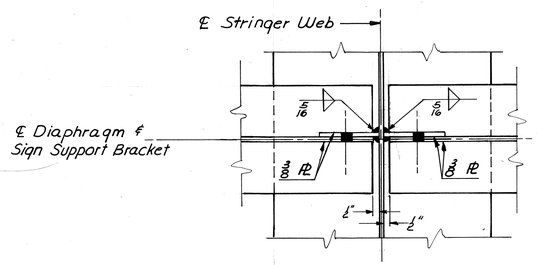
ELEVATION
scale 1"=1'-0"



LAYOUT
no scale



PLAN
scale 1"=1'-0"



SECTION B-B
Scale: None

NOTES:

1. All bolts to be ⅞" ϕ H.S. (except as noted)
2. See Framing Plan, Sheet 20, for location of sign support diaphragms.
3. All material shall be ASTM-A36 steel except anchor bolt assemblies.
4. Care shall be taken to insure vertical alignment of the end frame. Any misalignment shall be taken up in the leveling nut.
5. For signing and sign pole details see roadway plans.

DESIGNED						
DRAWN	WAM	8-74	2	As Built	TEM	8-76
CHECKED	R.B.H.	9-74	△	New Sheet Added	R.B.H.	9-74
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12th. STREET
R.R. TRACKS and 16th. STREET

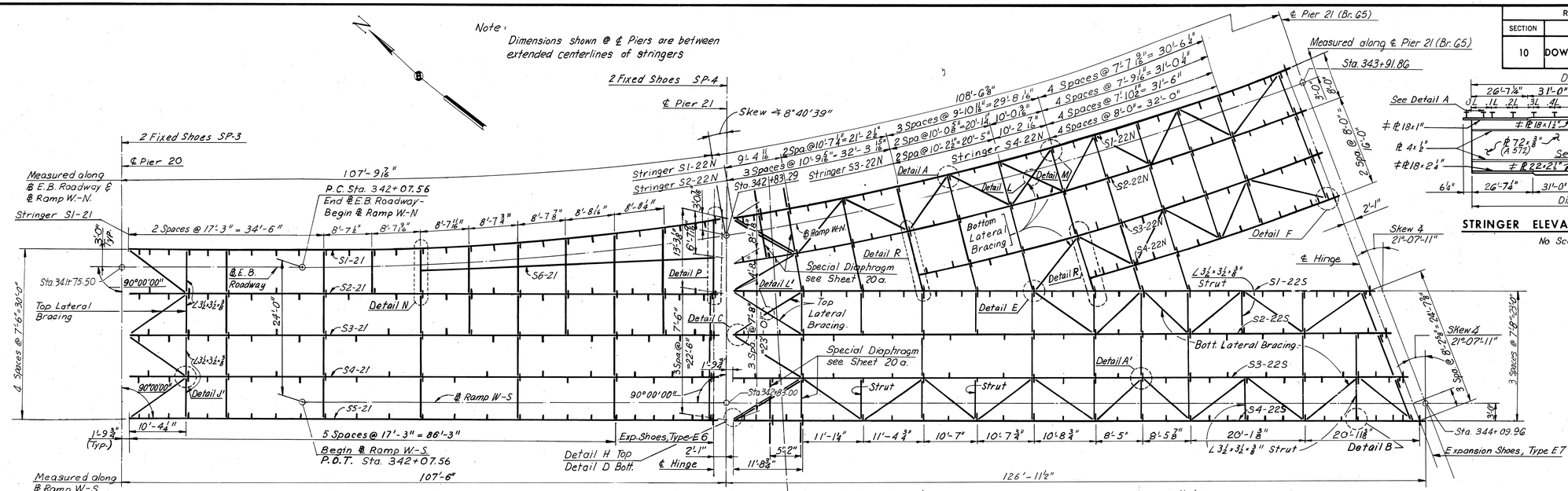
SIGN SUPPORT DETAILS — UNIT 22

SCALE As Noted
DATE
SHEET 20A OF 46

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	146	265

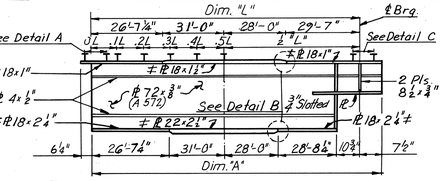
Note:
Dimensions shown @ ℄ Piers are between extended centerlines of stringers



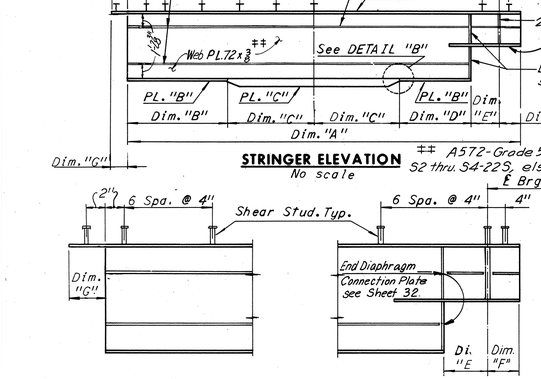
FRAMING PLAN
Scale: 1" = 10'-0"

UNIT 21 — UNIT 22

Note:
All Diagonals in Top and Bottom Lateral Bracing are ST5WF10.5.



STRINGER ELEVATION FOR S1-22S
No Scale

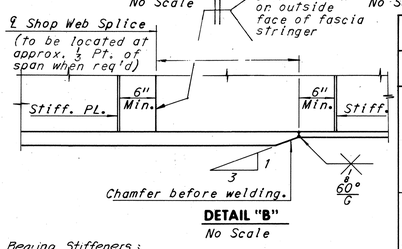


STRINGER ELEVATION
No scale

‡‡ A572-Grade 50 for S2-21, S2 thru. S4-22S, else A36.

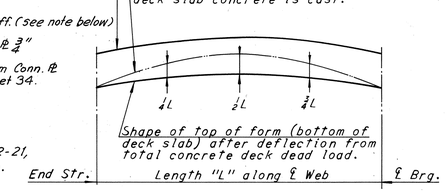
DETAIL "A"
No Scale

DETAIL "C"
No Scale



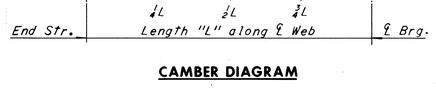
DETAIL "B"
No Scale

Bearing Stiffeners:
2-PL 8 1/2 x 3/8" for S1-21, S1 & S2-22N, S1, S2, S3 & S4-22S. 2-PL 7 x 5/8" for S3, S4 & S5-21, 2PL 8 1/2 x 3/4" for S3 & S4-225 & 2PL 5 1/2 x 7/8" for S2-21.



DEAD LOAD DEFLECTION DIAGRAM

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



CAMBER DIAGRAM

NOTE TO FABRICATOR
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

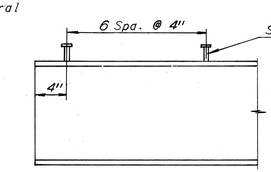
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 34.

SHOE SCHEDULE

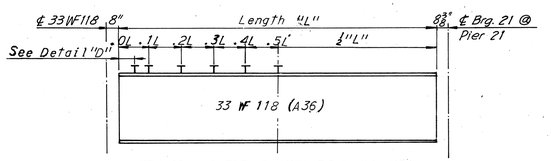
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E6	5	SP-3	2
E7	8	SP-4	2

Note:
All steel shall be A36 unless otherwise noted.
Longitudinal stiffeners shall be located on the exterior face of the exterior Stringers.
Intermediate stiffener pls. 4½"x ⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

Note:
For web to flange weld sizes and horizontal plate stiffener details see Sheet 17.



DETAIL D
No Scale



STRINGER ELEVATION FOR S6-21
No Scale

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "B"	PL. "C"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
21	S1-21	104'-5 8/16"	103'-10 1/16"	19'-5 1/16"	32'-6"	18'-7 1/16"	10 1/16"	7 1/16"	6 1/16"	18x3/8	18x1 1/8	14"	16"	20"	24"	24"
	S2-21	104'-2 1/16"	103'-7 1/16"	15'-9 5/16"	36'-0"	14'-11 5/16"	10"	7"	6 1/16"	12x3/8 ±	12x1 3/8 ±	11"	12 1/16"	16"	18 1/16"	23"
	S3-21	104'-2 1/16"	103'-7 1/16"	22'-3 5/16"	29'-6"	21'-5 5/16"	10"	7"	6 1/16"	15x3/8 ○	15x1 1/8	15 2/16"	18"	21"	24"	24"
	S4-21	104'-2 1/16"	103'-7 1/16"	22'-3 5/16"	29'-6"	21'-5 5/16"	10"	7"	6 1/16"	15x3/8 ○	15x1 1/8	15 2/16"	18"	21"	24"	24"
	S5-21	104'-2 1/16"	103'-7 1/16"	24'-3 5/16"	27'-6"	23'-5 5/16"	10"	7"	6 1/16"	15x1 ○	15x1 1/2	14 1/16"	17"	20"	24"	24"
	S6-21	—	50'-4 3/8"	—	—	Stringer Size 33 WF 118				—	—	12"	13 1/2"	15"	17 1/2"	20 1/2"
22	S1-22N	104'-1 3/8"	103'-6 7/8"	21'-9 13/16"	30'-0"	20'-11 3/16"	10"	7"	6 9/16"	18x3/8	18x1/2	15"	17 1/2"	22"	24"	24"
	S2-22N	107'-0 7/8"	106'-5 7/8"	17'-2 15/16"	36'-0"	16'-4 15/16"	10"	7"	6 9/16"	18x3/8	18x1 3/8	13"	14 1/2"	17 1/2"	20 1/2"	24"
	S3-22N	75'-4 5/8"	74'-9 1/8"	16'-4 1/4"	21'-0"	15'-6 7/8"	10"	7"	---	12x5/8	12x1 1/4	12 1/2"	13 1/2"	15 1/2"	19"	22 1/2"
	S4-22N	45'-5 5/8"	44'-10 3/8"	22'+5 1/8"	—	21'-7 1/4"	10"	7"	---	10x5/8	---	17 1/2"	19"	22"	24"	24"
	S1-22S	115'-9 3/4"	115'-2 1/4"	For Dimensions, see Stringer Elevation for Stringer S1-22S.								10"	10 1/2"	11 1/2"	14 1/2"	24"
	S2-22S	118'-9 5/16"	118'-1 13/16"	38'-6 7/8"	20'-6"	37-8 3/16"	10 3/4"	7 1/2"	6 1/4	18x7/8 ‡	18x1 ‡	15 1/2"	17 1/2"	20 1/2"	22"	24"
	S3-22S	121'-8 13/16"	121'-1 5/16"	35'-0 5/8"	25'-6"	34'-1 5/16"	10 3/4"	7 1/2"	6 1/4"	18x7/8 ‡	18x1 1/8 ‡	15 2/16"	17 1/2"	20 1/2"	23"	24"
	S4-22S	124'-8 3/8"	124'-0"	31'-0"	31'-0"	30-11 1/16"	10 5/8"	7 1/2"	6 1/4"	18x7/8 ‡	18x1 1/4 ‡	14"	16"	19"	24"	24"

‡ Denotes A572 Grade 50 steel for thickness of ¾" and under, and A588 steel for thickness over ¾".

*Spacing begins at termination of 6 spaces @ 4".

○ Top Pl. 15x¼

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
13/16"	1'-8"	2'-8"
1'-5 13/16"	2'-11 1/16"	1'-3 1/16"
1 5/16"	2'-8"	1'-1 1/2"
1'-1 1/2"	2'-3 1/16"	1'-1 1/2"
1'-1 1/2"	2'-3 1/16"	1'-1 1/2"
1'-1 1/2"	2'-3 1/16"	1'-1 1/2"
1'-1 1/2"	2'-3 1/16"	1'-1 1/2"
3/8"	1/2"	3/8"
7/8"	1'-3 1/16"	7/8"
3/8"	1/2"	3/8"
1'-3 1/16"	2'-6 1/16"	1'-3 1/16"
1'-3 1/16"	2'-6 1/16"	1'-3 1/16"
1'-3 1/16"	2'-6 1/16"	1'-3 1/16"
1'-3 1/16"	2'-6 1/16"	1'-3 1/16"
1'-3 1/16"	2'-6 1/16"	1'-3 1/16"
1/16"	1/8"	1/16"
1'-1 5/16"	2'-3 1/16"	1'-3 1/16"
1'-3 5/16"	2'-6 1/16"	1'-3 1/16"
1'-3 5/16"	2'-6 1/16"	1'-3 1/16"
1'-3 5/16"	2'-6 1/16"	1'-3 1/16"
1'-3 5/16"	2'-6 1/16"	1'-3 1/16"

CAMBER SCHEDULE

¼L	½L	¾L
2'-8"	3'-7 1/16"	2'-8"
1'-3 1/16"	2'-6 1/16"	1'-3 1/16"
1 1/2"	2'-8"	1'-1 1/2"
1'-1 1/2"	2'-8"	1'-1 1/2"
1'-1 1/2"	2'-8"	1'-1 1/2"
1'-1 1/2"	2'-8"	1'-1 1/2"
1'-1 1/2"	2'-8"	1'-1 1/2"
7/8"	1'-3 1/16"	7/8"
3'-3 1/4"	4'-1 5/16"	3'-1 1/16"
4'-1 1/16"	5'-1 1/16"	4'-3 1/4"
2'-3 1/16"	3'-1 3/8"	2'-3 1/16"
1'-1 1/16"	1'-3 1/8"	1'-1 1/16"
3'-1 1/16"	3'-11 1/16"	3'-1 1/16"
4"	5'-3 1/16"	4'-1 1/16"
4'-1 1/16"	6"	4'-1 1/16"
4'-1 1/16"	6'-2 1/16"	4'-1 1/16"

Notes:
For Superstructure steel quantities, see Sheet 2.
For Joint details, see Sheet 38
For framing details, see Sheets 23 thru 27.
For Shoe details, see Sheets S1 & S2
For Shear stud detail, see Sheet 14.
For Diaphragm details, see Sheets 33 & 34.
For Details A, A', B, C, D, E, F, H, J', L, L' and M, see Sheet 27.
For Details N, P and R, see Sheet 26.
For Angles between ℄ Piers and Stringers, see Sheets 23 & 24.

	BY	DATE
MADE	GSH	08-06-68
CHECKED	JD	10-21-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes, Deflections & Cambers Completed	PRMS	4-19-74
2	Dim. & Mat. Change	K.D.P.	6-74
3	Add Sign Support Bracket	TEM	7-74
4	As Built	TEM	8-76

AS BUILT

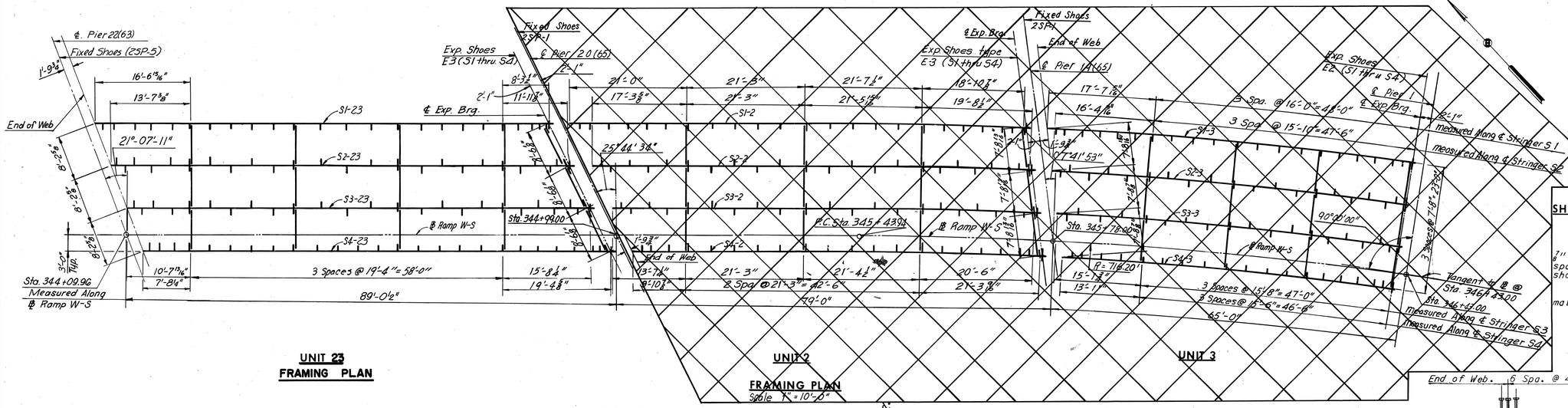
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING PLAN - UNITS 21 AND 22

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

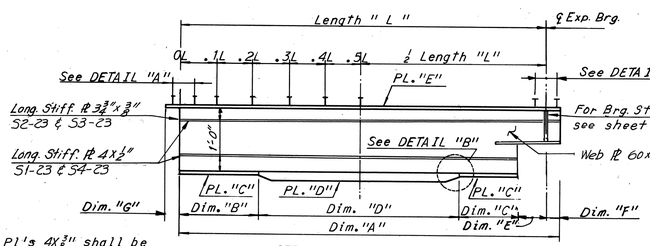
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 20 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	147	265



UNIT 23 FRAMING PLAN

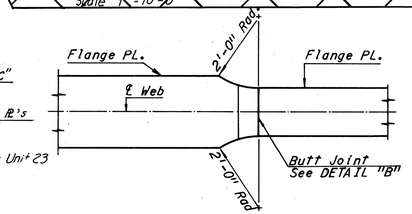
FRAMING PLAN
Scale 1"=10'-0"



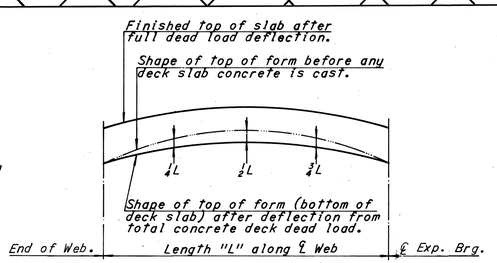
STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.

Note :
Intermediate stiffener Pl's 4X3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.



FLANGE PLATE SPLICE DETAIL
No Scale

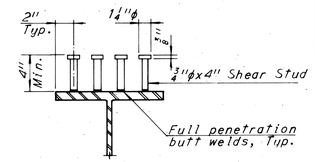


DEAD LOAD DEFLECTION DIAGRAM

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.

DETAIL "B"
No Scale



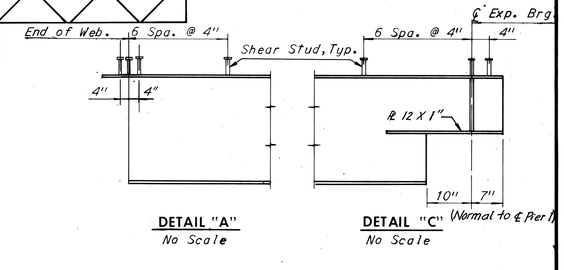
SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE

Capacity = 3,400 lbs. per stud.

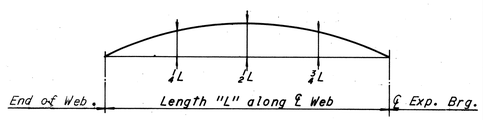
Contractor may, if he elects, use three 7/8" diameter studs at the same longitudinal spacing in lieu of the four 3/4" diameter studs shown.

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



DETAIL "A"
No Scale

DETAIL "C"
(Normal to ℄ Pier)
No Scale



CAMBER DIAGRAM

NOTE TO FABRICATOR

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

Note:
For web to flange weld sizes and horizontal plate stiffener details see Sheet 17.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E3	4	Sp-5	2

Notes:
For Framing Details @ piers 22(63), and 20(65), see Sheet 25.
For Diaphragm connections see Sheet 35.
For Shoe Details, see Sheet S1 and S2
For superstructure steel quantities, see sheet 2.
For joint details, see Sheet 38.
Exterior stringer longitudional stiffeners shall be located on the exterior face of the stringer.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
23	S1 - 23	83'-6 7/16"	82'-10 7/16"	9'-5 1/4"	8'-6 1/16"	64'-0"	11 1/8"	7 3/8"	6 11/16"	12 x 3/8"±	12 x 1 3/8"	12 x 3/8"±	11 3/8"	13 1/2"	17"	20 1/2"	24"	1"	1 3/8"	1"	1 3/8"	1 7/8"	1 3/8"
	S2 - 23	84'-3"	83'-7 4"	11'-3 5/8"	10'-4 1/2"	61'-0"	11 1/8"	7 3/8"	6 11/16"	12 x 3/8"±	12 x 1 1/4"	12 x 3/8"±	11 3/8"	14 1/2"	17 1/8"	20 1/2"	24"	1 1/16"	1 7/16"	1 1/16"	1 3/8"	1 7/8"	1 3/8"
	S3 - 23	84'-1 11 13/16"	84'-1 4 1/16"	11'-8 1/16"	10'-8 7/8"	61'-0"	11 1/8"	7 3/8"	6 11/16"	12 x 3/8"±	12 x 1 1/4"	12 x 3/8"±	11 3/8"	14 1/2"	17 1/8"	20 1/2"	24"	1 1/16"	1 7/16"	1 1/16"	1 3/8"	1 7/8"	1 3/8"
	S4 - 23	85'-8 5/8"	85'-0 7/8"	10'-6 7/16"	9'-7 5/16"	64'-0"	11 1/8"	7 3/8"	6 11/16"	12 x 3/8"±	12 x 1 3/8"	12 x 3/8"±	11 3/8"	13 1/2"	17"	20 1/2"	24"	1 1/8"	1 9/16"	1 1/8"	1 1/2"	2 1/16"	1 1/2"
2	S1 - 2	83'-4 5/16"	82'-9 3/16"	12'-10 5/16"	12'-0 3/16"	57'-0"	10 1/8"	7 1/8"	6 5/8"	12 x 3/8"	12 x 1 1/2"	12 x 3/8"	12 1/8"	14 1/2"	17 1/8"	21 1/2"	24"	3/4"	1 1/16"	3/4"	1 5/16"	2 1/16"	1 5/16"
	S2 - 2	80'-4 1/16"	79'-9 1/16"	14'-4 1/16"	13'-6 1/16"	51'-0"	10 1/8"	7 1/8"	6 5/8"	12 x 3/8"	12 x 1 1/2"	12 x 3/8"	13"	14 1/2"	18"	21 1/2"	24"	11/16"	1"	11/16"	1 1/16"	1 5/16"	1 1/16"
	S3 - 2	77'-3 15/16"	76'-8 3/4"	—	—	75'-10 7/16"	10 1/8"	7 1/8"	6 11/16"	—	12 x 1 1/8"	12 x 3/8"	13 1/2"	15 1/2"	17 1/8"	20 1/2"	24"	5/8"	7/8"	5/8"	1 1/16"	1 3/16"	1 1/8"
	S4 - 2	74'-3 1/4"	73'-8 1/16"	—	—	72'-10 7/16"	10 1/8"	7 1/8"	6 11/16"	—	12 x 1 1/8"	12 x 3/8"	13"	15"	17 1/8"	21"	24"	1/2"	11/16"	1/2"	1 1/16"	1 3/16"	1 1/16"
3	S1 - 3	66'-2 7/8"	65'-7 7/8"	10'-3 5/8"	9'-5 1/16"	45'-0"	10"	7"	6 5/8"	12 x 1"	12 x 1 1/4"	12 x 3/8"	10"	11 1/2"	14"	17"	22"	1/2"	11/16"	1/2"	1 1/8"	1 7/8"	1 1/8"
	S2 - 3	64'-5 7/8"	63'-10 7/8"	9'-11 1/4"	9'-1 5/8"	44'-0"	10"	7"	6 5/8"	12 x 1"	16 x 1 1/4"	12 x 3/8"	10 1/2"	12"	14"	16"	19 1/2"	7/16"	5/8"	7/16"	1 1/16"	2 1/16"	1 1/16"
	S3 - 3	62'-8 3/4"	62'-1 3/4"	11'-6 7/8"	10'-2 7/8"	40'-0"	10"	7"	6 5/8"	12 x 1"	16 x 1 1/8"	12 x 3/8"	12"	13 1/2"	16"	18 1/2"	22"	3/8"	9/16"	3/8"	1 1/16"	1 1/2"	1 1/16"
	S4 - 3	61'-0"	60'-5"	—	—	59'-7"	10"	7"	6 5/8"	—	12 x 1 1/4"	12 x 3/8"	12"	14"	16"	19 1/2"	24"	5/16"	7/16"	3/16"	3/4"	1"	3/4"

Note : All steel shall be A36 unless shown otherwise.

* Spacing begins at termination of 6 spaces @ 4"
‡ Denotes A572-Grade 50 Steel for thickness of 1/4" and under and A588 Steel for thickness over 3/4".

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	12-1068	2	As Built	TEM	8-76
CHECKED	JD	4-28-69				
IN CHARGE				Shoe Callout Added	PRMS	4-19-71

AS BUILT

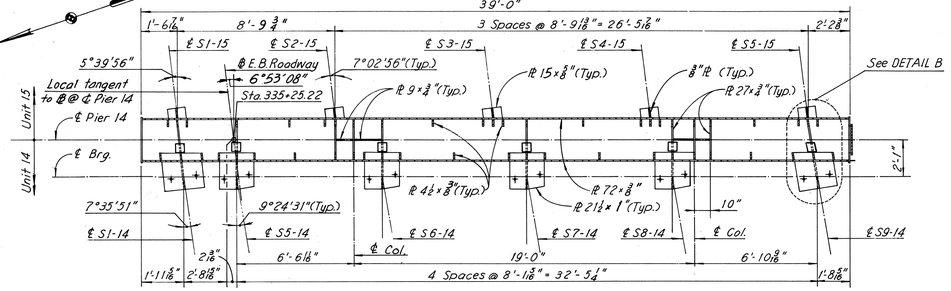
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST.- R.R. TRACKS AND 16TH ST.
FRAMING PLAN UNIT 23

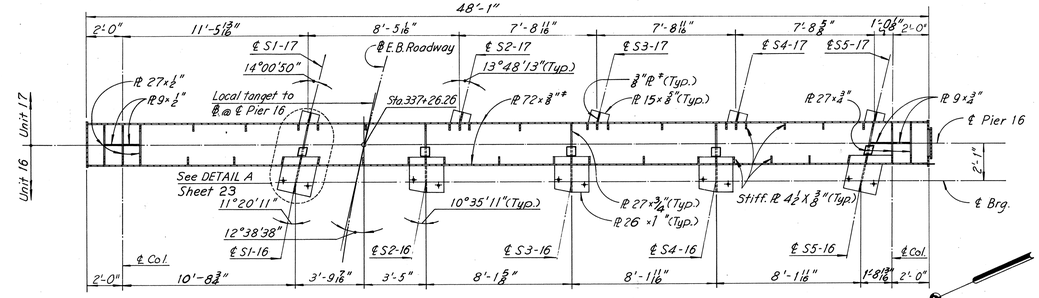
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 21 OF 46

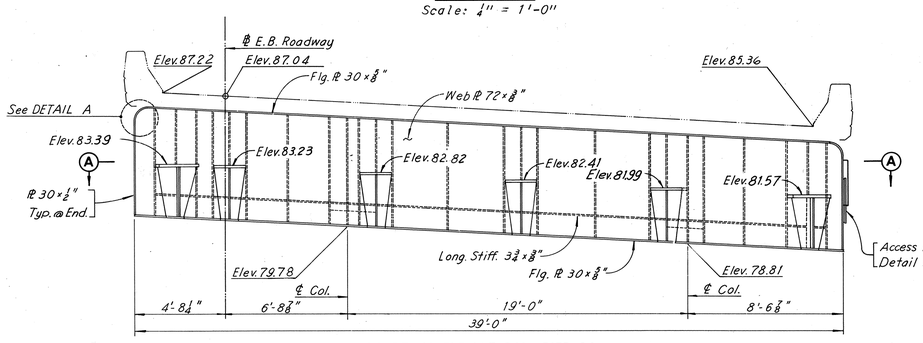
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	148	265



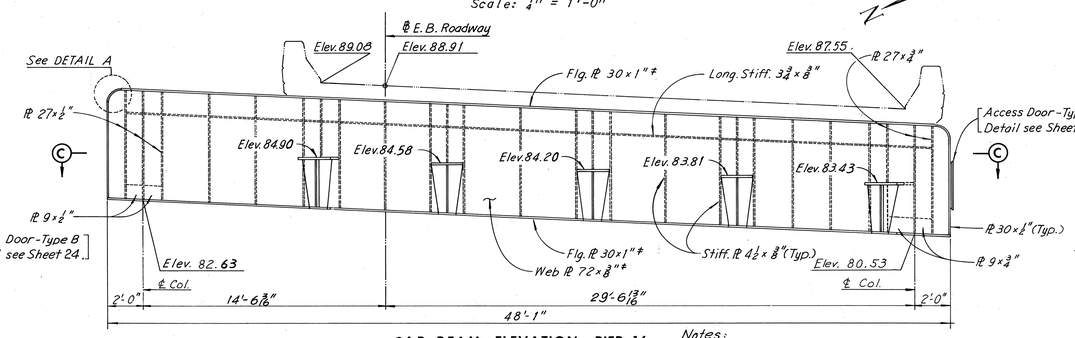
SECTION A-A
Scale: ¼" = 1'-0"



SECTION C-C
Scale: ¼" = 1'-0"



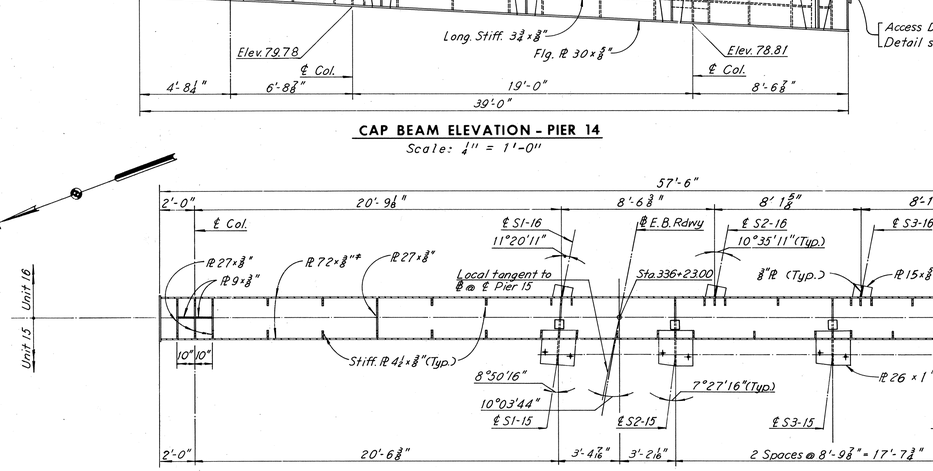
CAP BEAM ELEVATION - PIER 14
Scale: ¼" = 1'-0"



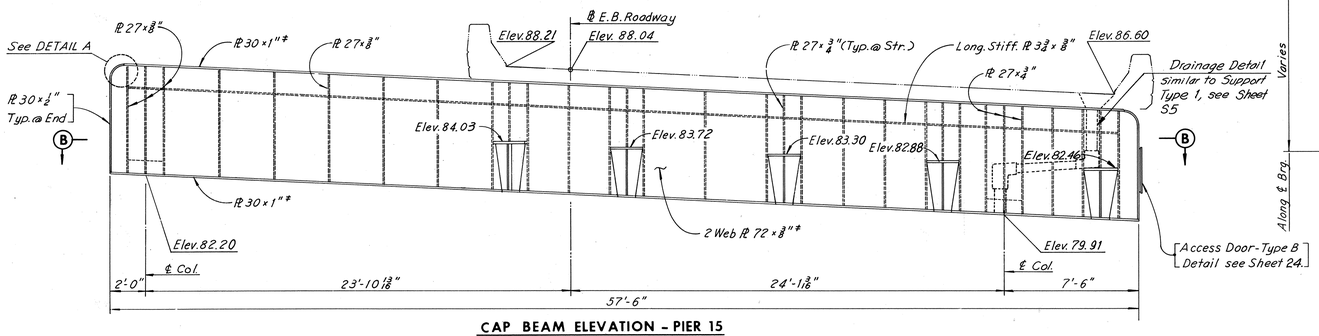
CAP BEAM ELEVATION - PIER 16
Scale: ¼" = 1'-0"

Notes:
For Framing Plans see:
Sheet 16 for Unit 14,
Sheet 17 for Units 15 & 16,
Sheet 18 for Unit 17.

For Deck Plans see:
Sheet 30 for Unit 14,
Sheet 31 for Units 15 & 16,
Sheet 32 for Unit 17.



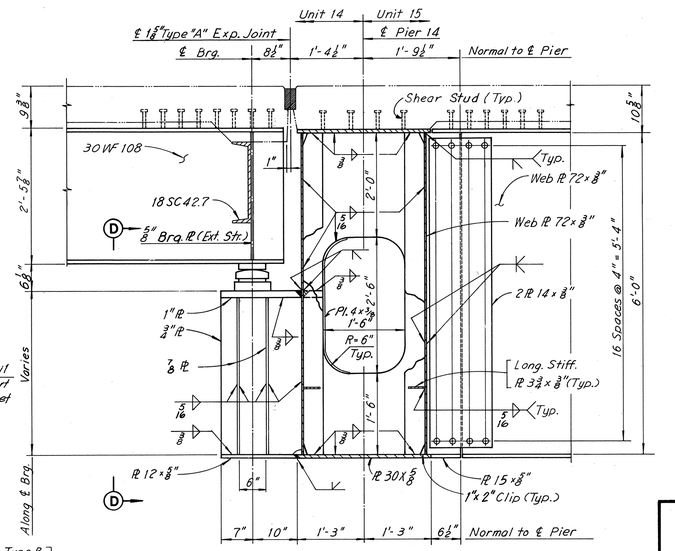
SECTION B-B
Scale: ¼" = 1'-0"



CAP BEAM ELEVATION - PIER 15
Scale: ¼" = 1'-0"

Note:
All steel shall be A36 unless denoted otherwise.
≠ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾".

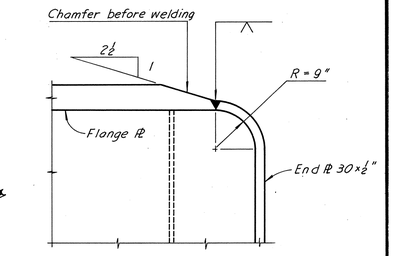
Provide Drain Holes at lower end of cap beam.
All elevations shown are final elevations.



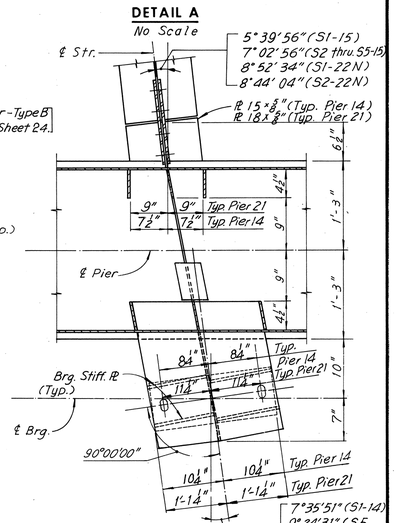
TYPICAL SECTION - PIER 14
Scale: ¾" = 1'-0"

Note: TYPICAL SECTION for Piers 15 and 16, see TYPICAL SECTION, Sheet 23.

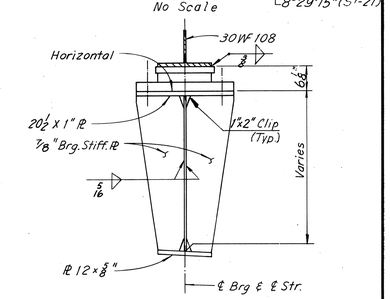
Note:
Shear studs are placed in rows, with four shear studs in each row. Rows are spaced at 24" centers within limits of concrete deck.



DETAIL A
No Scale



DETAIL B
No Scale



SECTION D-D
No Scale

	BY	DATE
MADE	M.H.H	12-7-68
CHECKED	J. D.	1-29-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note changed	PRMS	4-19-71
2	As Built	TEM	8-76

AS BUILT

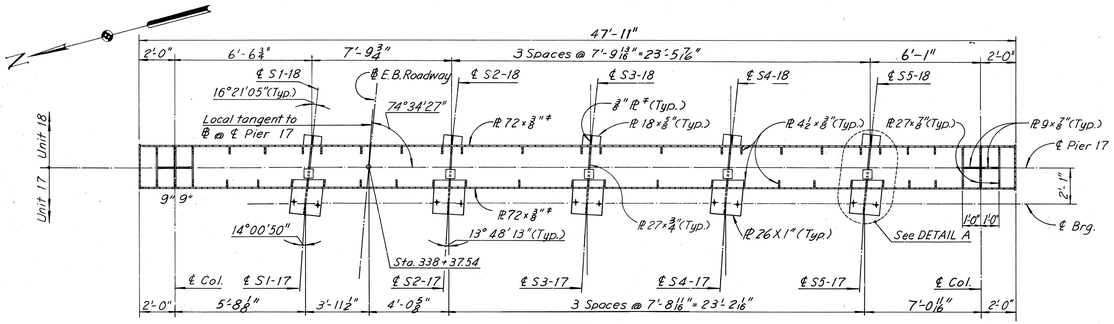
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
PIERS 14, 15 AND 16

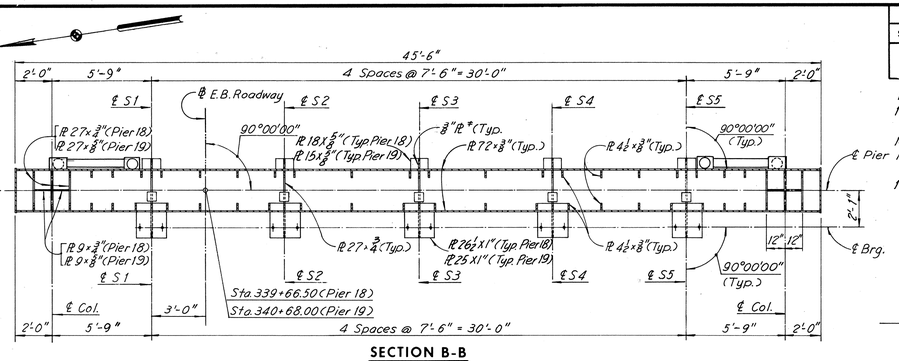
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 22 OF 46

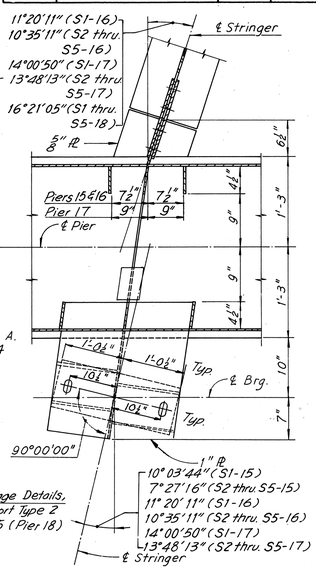
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	149	265



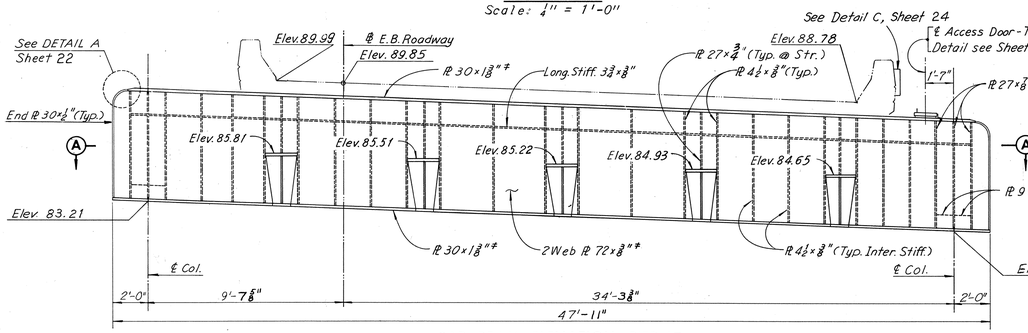
SECTION A-A
Scale: ¼" = 1'-0"



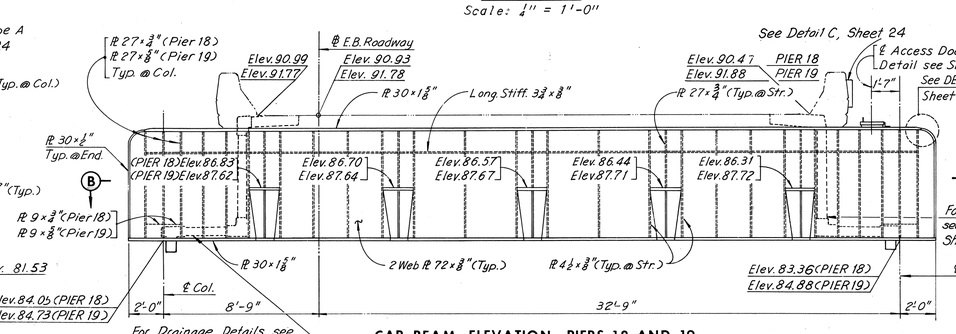
SECTION B-B
Scale: ¼" = 1'-0"



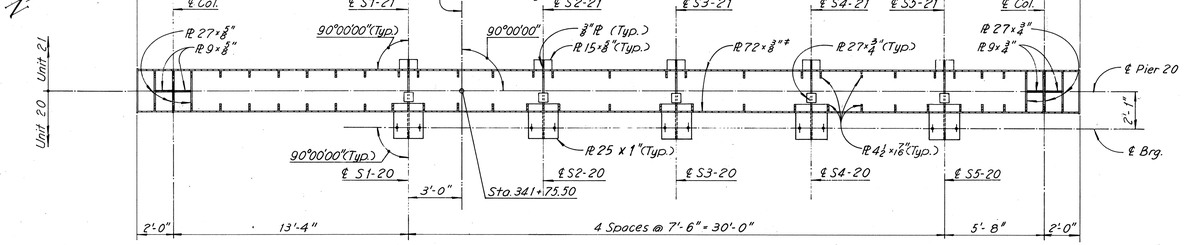
DETAIL A
No Scale



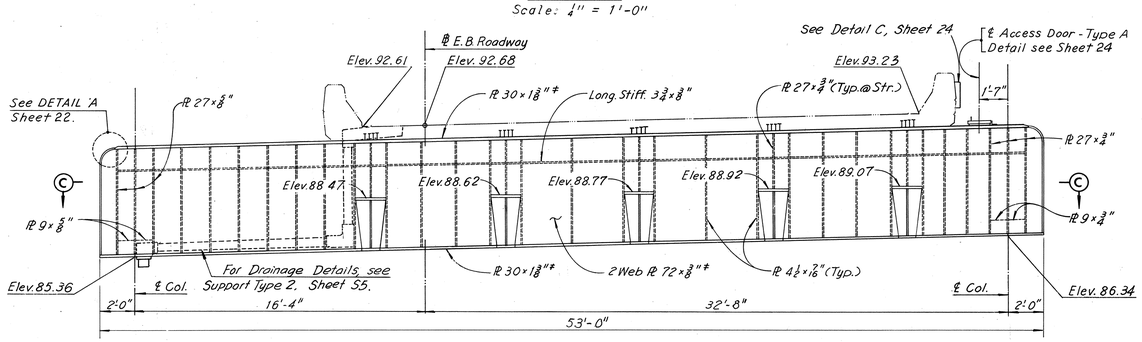
CAP BEAM ELEVATION - PIER 17
Scale: ¼" = 1'-0"



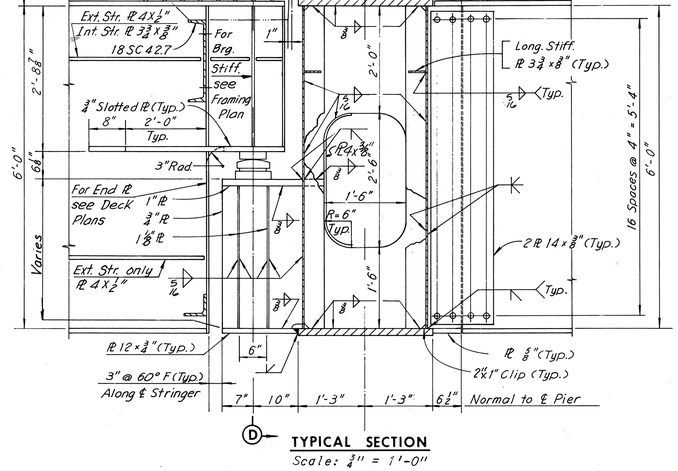
CAP BEAM ELEVATION - PIERS 18 AND 19
Scale: ¼" = 1'-0"



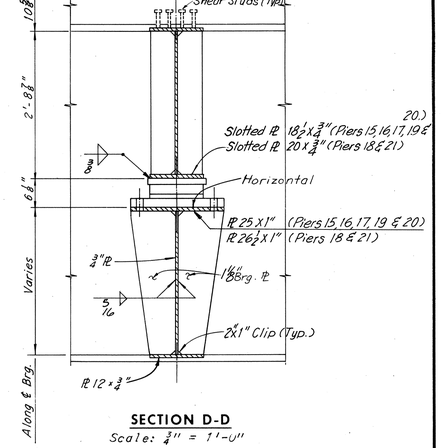
SECTION C-C
Scale: ¼" = 1'-0"



CAP BEAM ELEVATION - PIER 20
Scale: ¼" = 1'-0"



TYPICAL SECTION
Scale: ¾" = 1'-0"



SECTION D-D
Scale: ¾" = 1'-0"

Notes:
For Framing Plans see:
Sheet 18 for Units 17 & 18.
Sheet 19 for Units 19 & 20.
Sheet 20 for Units 21 & 22.
For Deck Plans see:
Sheet 32 for Units 17 & 18.
Sheet 33 for Units 19 & 20.
Sheet 34 for Units 21 & 22.

Note:
All steel shall be A36 unless denoted otherwise.
# Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾".

Provide Drain Holes at lower end of cap beam.
All elevations shown are final elevations.

	BY	DATE				
MADE	M.H.H.	12-17-68				
CHECKED	J.D.	1-29-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

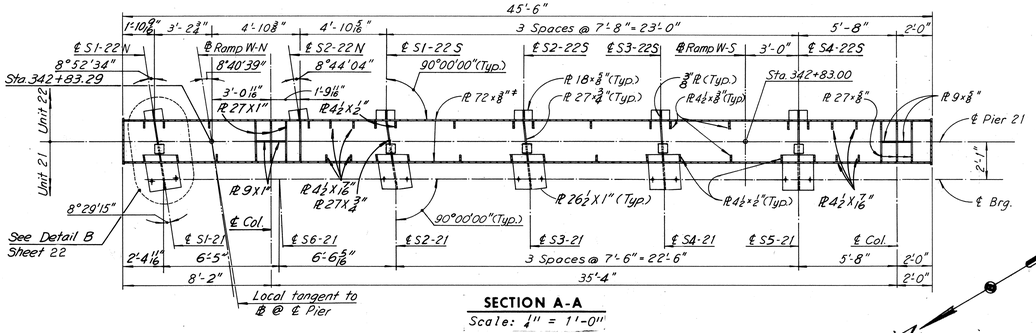
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
PIERS 17,18,19 AND 20

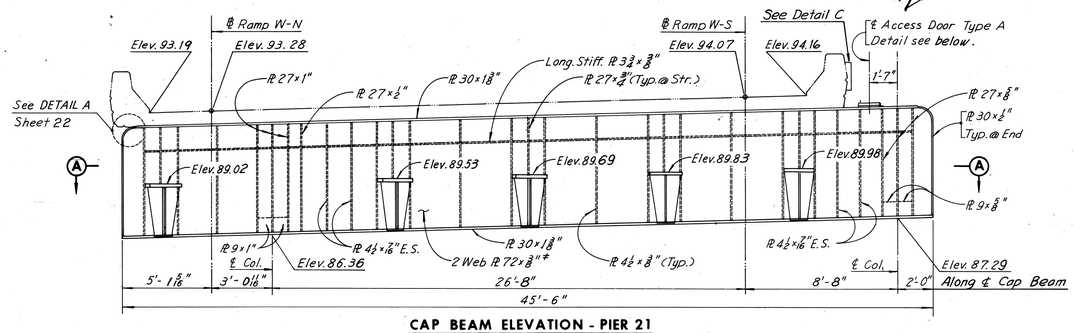
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 23 OF 46

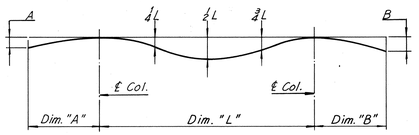
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	150	265



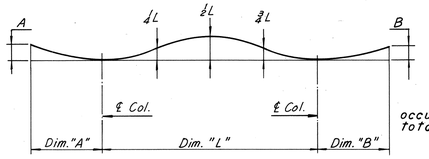
SECTION A-A
Scale: 1" = 1'-0"



CAP BEAM ELEVATION - PIER 21
Scale: 1" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM
No Scale



CAMBER DIAGRAM
No Scale

CAP BEAM SCHEDULE				DEAD LOAD DEFLECTION SCHEDULE					CAMBER SCHEDULE				
PIER	Dim "A"	Dim. "L"	Dim. "B"	A	¼L	½L	¾L		A	¼L	½L	¾L	B
14	11'-5⅛"	19'-0"	8'-6⅞"	0	0	0	0	0	0	0	0	0	0
15	2'-0"	48'-0"	7'-6"	0	3/16	5/16	1/4	-0	0	1/4	1/8	5/16	-1/16
16	2'-0"	44'-1"	2'-0"	0	1/4	3/8	1/4	0	0	1/16	1/16	1/16	0
17	2'-0"	43'-11"	2'-0"	0	1/4	1/16	1/4	0	0	1/16	1/8	1/16	0
18	2'-0"	41'-6"	2'-0"	0	0	1/16	0	0	0	1/16	1/4	1/16	0
19	2'-0"	41'-6"	2'-0"	0	0	1/16	0	0	0	1/16	1/4	1/16	0
20	2'-0"	49'-0"	2'-0"	0	3/16	1/16	1/16	0	0	1/8	1/2	1/8	0
21	8'-2"	35'-4"	2'-0"	-1/16	1/16	1/8	1/16	0	-1/16	1/8	3/16	1/8	0

Note: A negative deflection indicates an upward deflection, and a negative camber indicates a downward camber.

NOTE TO CONTRACTOR

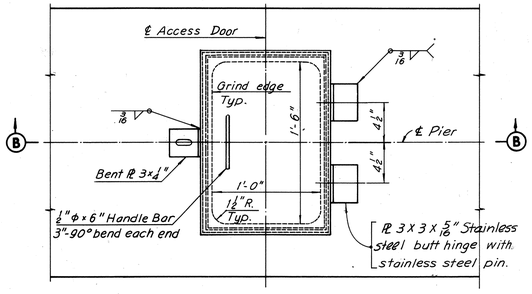
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

NOTE TO FABRICATOR

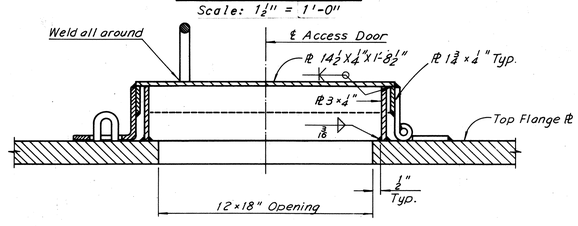
The cap beams shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

Note:
Cap beams having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If cap beams are not cambered, distance top of cap beams to top of slab will vary along the cap beams in accordance with the offset dimensions shown in the Camber Diagram and Contractor shall adjust the bearing pads.

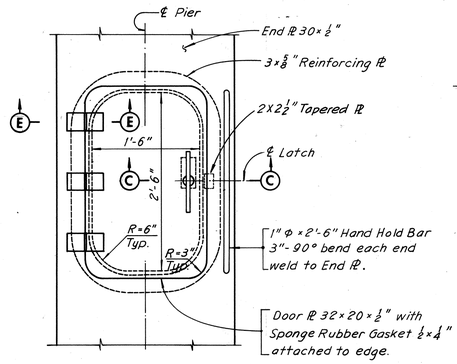
Notes :
For Framing Plan Units 21 and 22, see Sheet 20.
For Typical Section through Cap Beam see Sheet 23.
For Deck Plan Units 21 & 22, see Sheet 34.



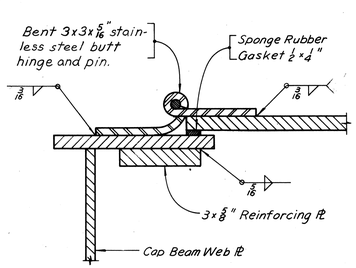
ACCESS DOOR - TYPE A
Scale: 1½" = 1'-0"



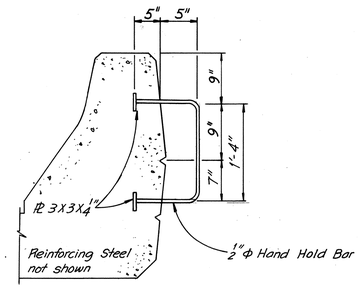
SECTION B-B
No Scale



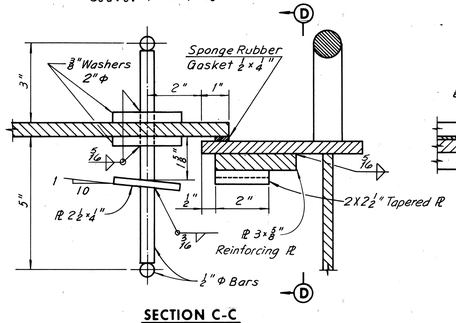
ACCESS DOOR - TYPE B
Scale: 1" = 1'-0"



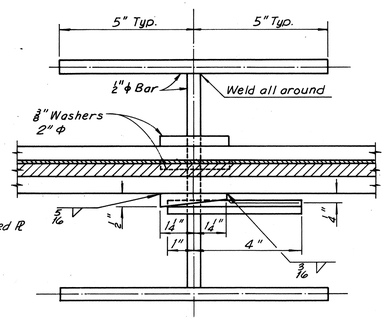
SECTION E-E
No Scale



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



SECTION C-C
No Scale



SECTION D-D
No Scale

Notes :
All Steel is A36 unless otherwise shown.
‡Use A572 Grade 50 for thickness of ¾" and less, and A588 for thickness over ¾".

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	M.H.H.	12-2768	2	As Built	TEM	8-76
CHECKED	JD	5-7-69				
IN CHARGE			1	Note & Welds Chngd	PRMS	4-19-74

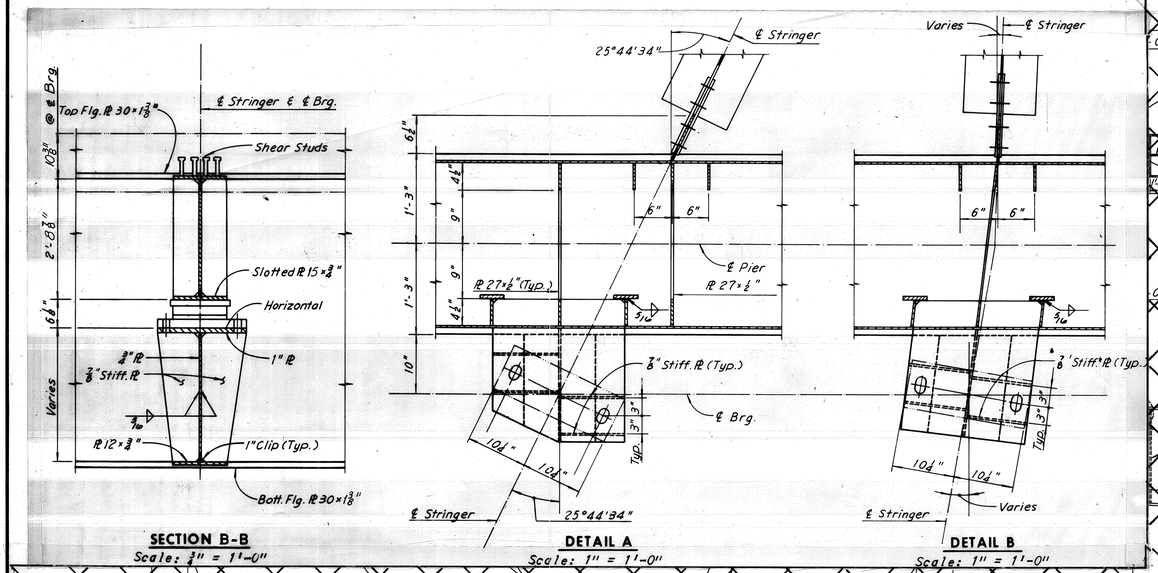
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS PIER 21

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 46

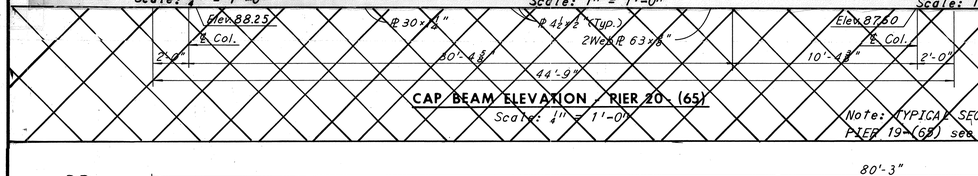
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	151	265



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

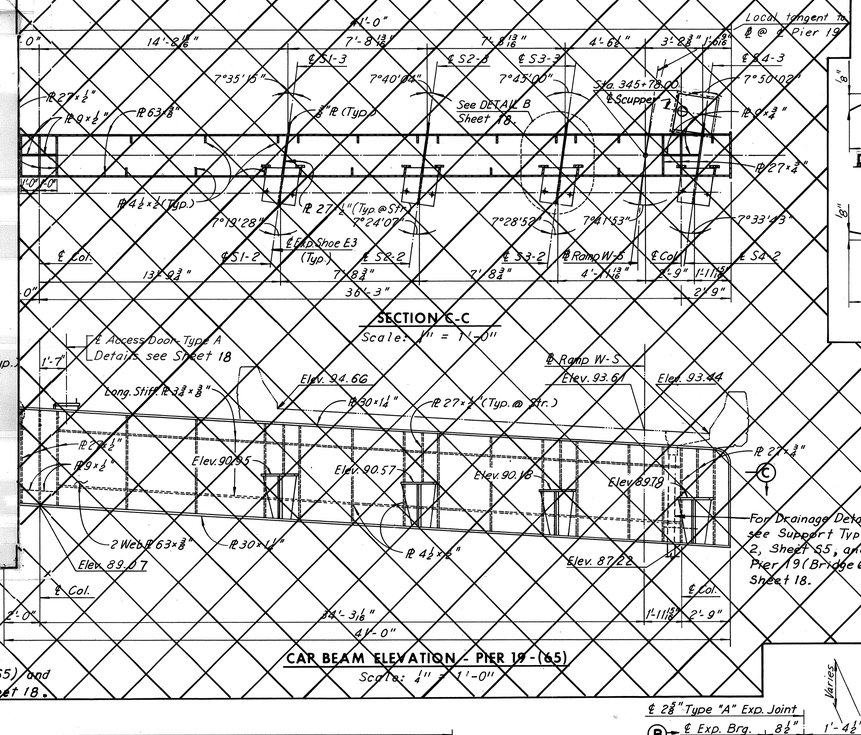
DETAIL A
Scale: 1" = 1'-0"

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



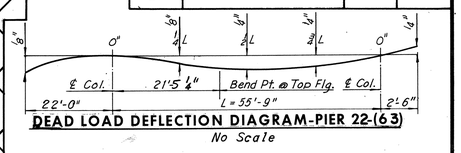
CAP BEAM ELEVATION - PIER 20-(65)
Scale: 1/4" = 1'-0"

Note: TYPICAL SECTION for PIER 20-(65) and PIER 19-(68) see TYPICAL SECTION Sheet 18.

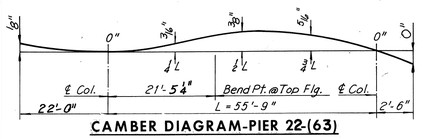


SECTION C-C
Scale: 1" = 1'-0"

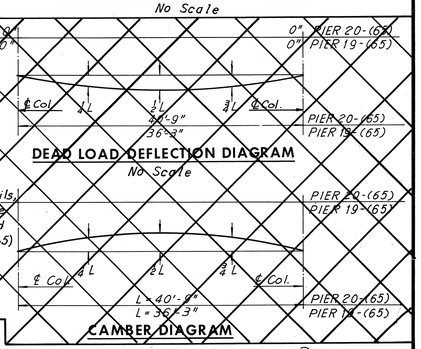
CAR BEAM ELEVATION - PIER 19-(65)
Scale: 1/4" = 1'-0"



DEAD LOAD DEFLECTION DIAGRAM-PIER 22-(63)
No Scale

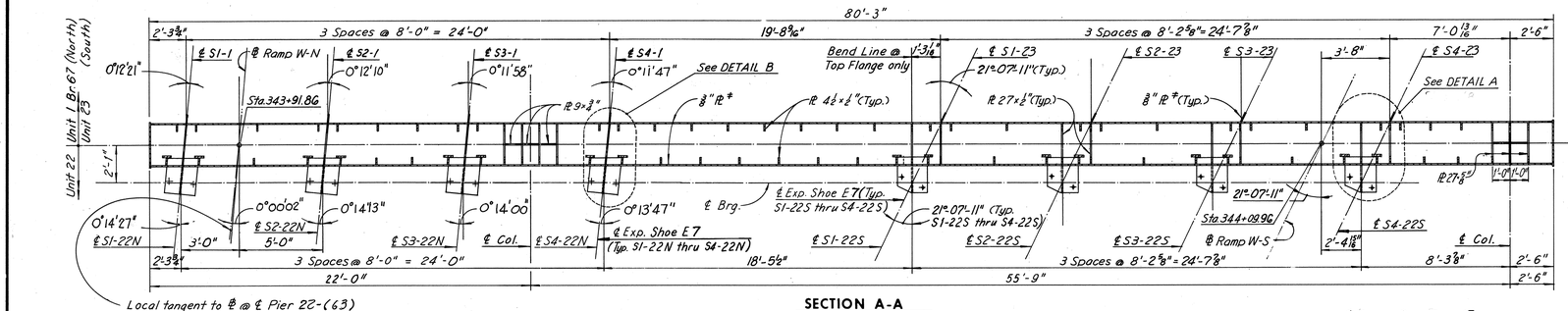


CAMBER DIAGRAM-PIER 22-(63)
No Scale

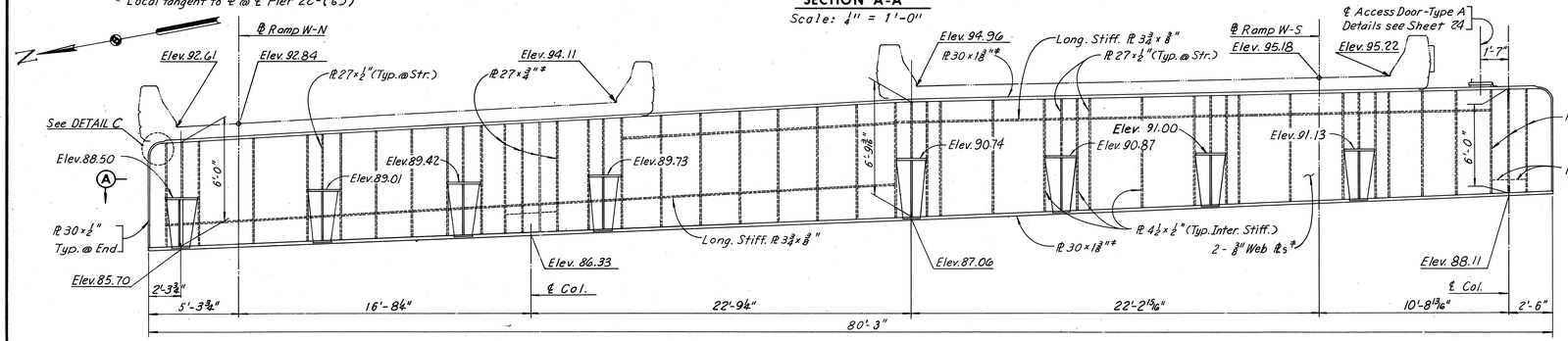


DEAD LOAD DEFLECTION DIAGRAM
No Scale

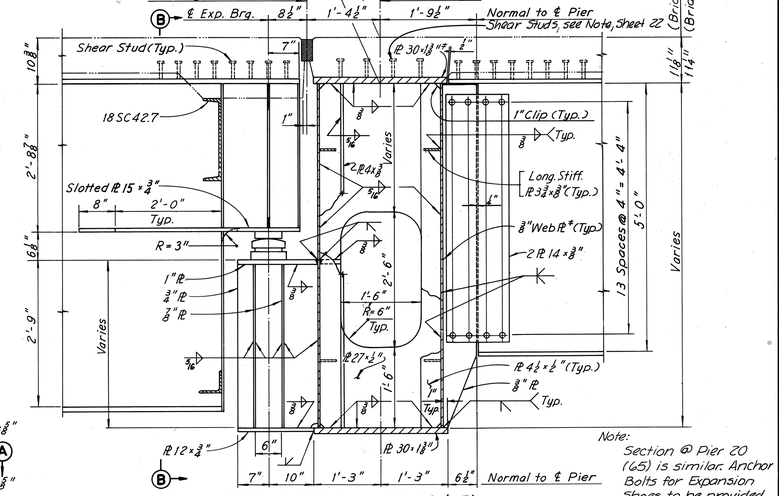
CAMBER DIAGRAM



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

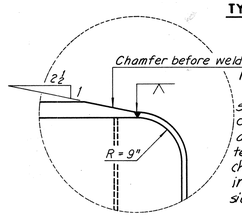


CAP BEAM ELEVATION - PIER 22-(63)
Scale: 1/4" = 1'-0"



TYPICAL SECTION - PIER 22-(63)
Scale: 3/4" = 1'-0"

Note:
Section @ Pier 20 (65) is similar. Anchor Bolts for Expansion Shoes to be provided under this contract.



DETAIL C
No Scale

Note:
The Contractor shall supply the fabrication of the capbeam at Pier 20(65) with a template for the anchor bolts in the bearing seat for the expansion shoes at Unit 23.

Note:
All steel shall be A36 unless denoted otherwise.
* Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 3/4".

Notes:
Provide Drain Holes at lower end.
All elevations shown are final elevations.

For Framing Plan, see Sheet 21.
For Joint Details, see Sheet 38.

	BY	DATE
MADE	MHH	2-1-69
CHECKED	JD	6-6-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built, Deflections & Cambers Added	TEM	8-76
		PRM℄	4-19-71

AS BUILT

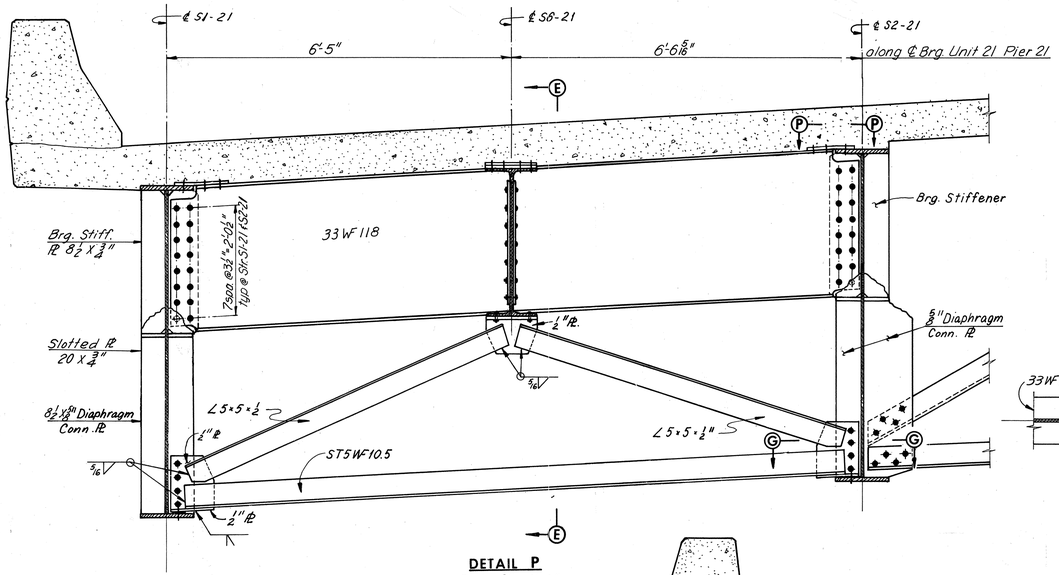
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
PIER 22 (BR. 63)

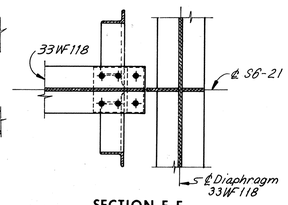
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 25 OF 46

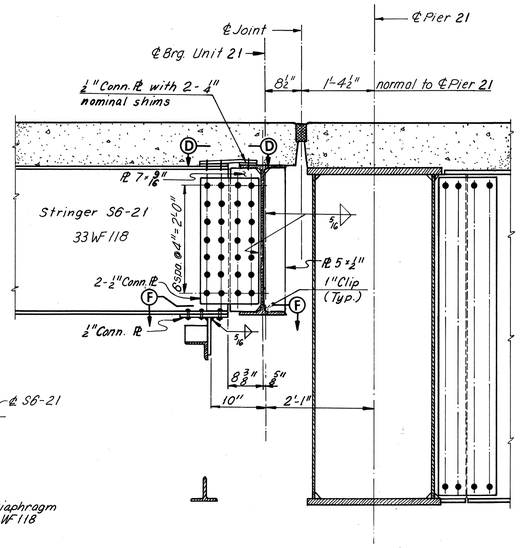
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	152	265



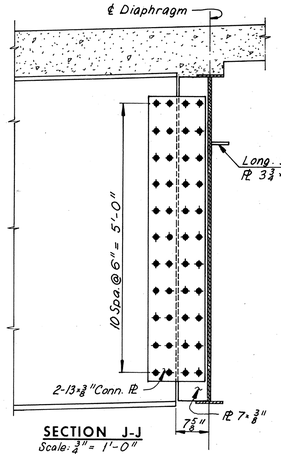
DETAIL P
Scale: 3/4" = 1'-0"
Looking East.



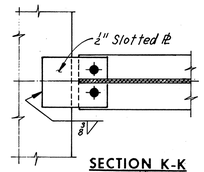
SECTION F-F
Scale: 3/4" = 1'-0"



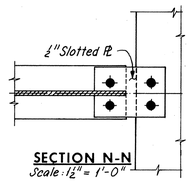
SECTION E-E
Scale: 3/4" = 1'-0"



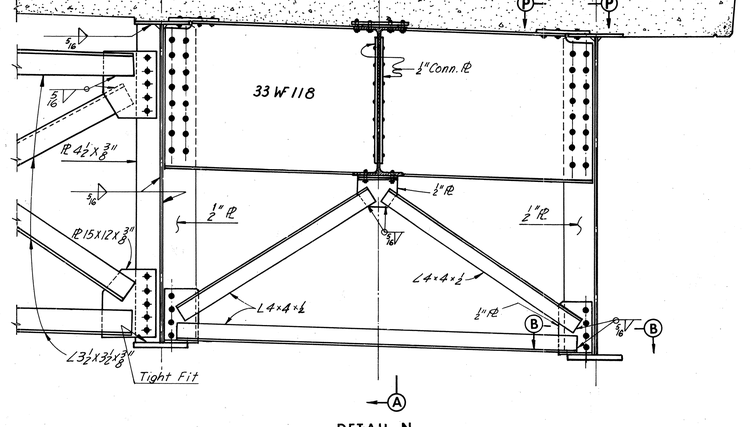
SECTION J-J
Scale: 3/4" = 1'-0"



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

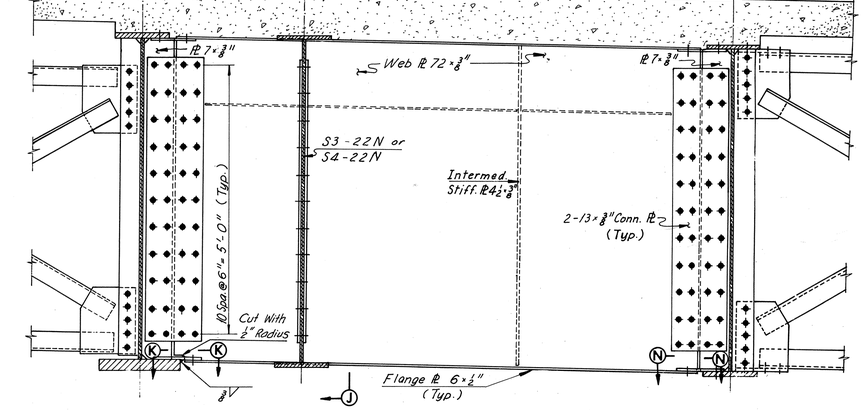


SECTION N-N
Scale: 1 1/2" = 1'-0"

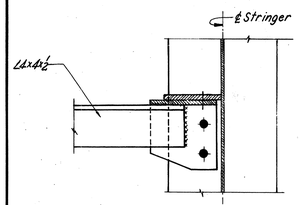


DETAIL N
Scale: 3/4" = 1'-0"
Looking West

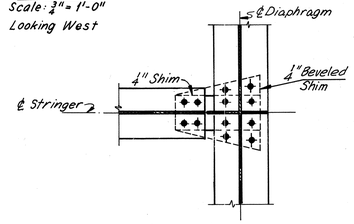
SECTION A-A
Scale: 3/4" = 1'-0"



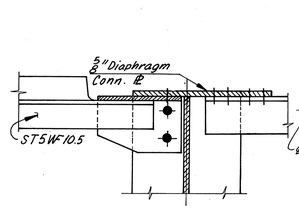
DETAIL R
Scale: 3/4" = 1'-0"
Looking West



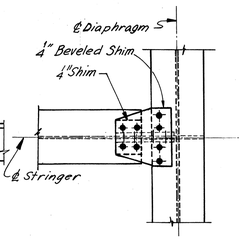
SECTION B-B
Scale: 1 1/2" = 1'-0"



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



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



SECTION D-D
Scale: 3/4" = 1'-0"
Section P-P similar

Note: For location of Details N, P and R, see Sheet 20.
All steel for diaphragms and connections shall be A36 unless otherwise noted.

	BY	DATE				
MADE	PTA	12-12-68				
CHECKED	AMH	2-7-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

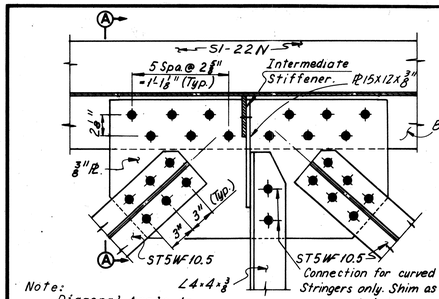
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
UNITS 21 AND 22

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

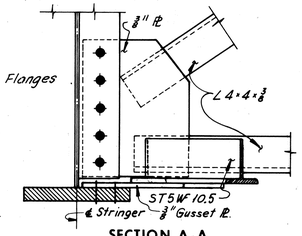
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 26 OF 45

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	153	265

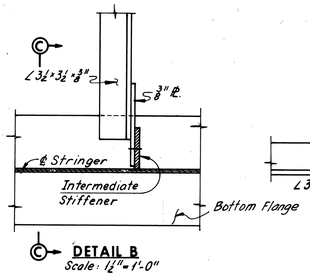


Note: Diagonal Angle in Intermediate Diaphragm is not shown.

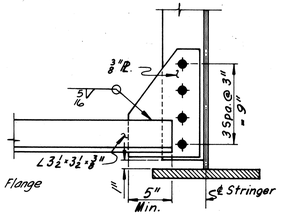
DETAIL A
Scale: 1/2" = 1'-0"
Detail A' Similar.



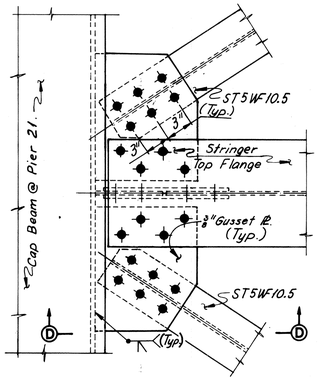
SECTION A-A
Scale: 1/2" = 1'-0"



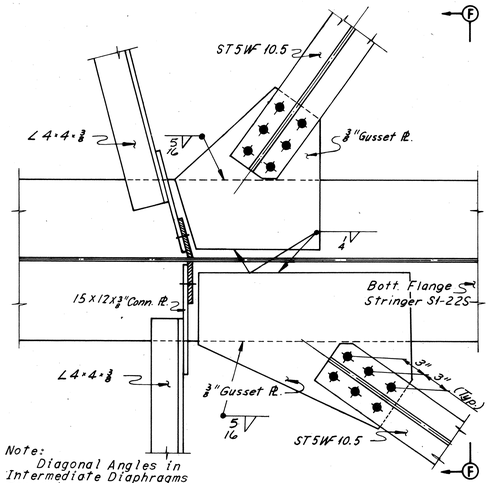
DETAIL B
Scale: 1/2" = 1'-0"



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

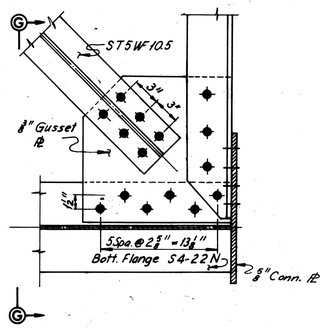


DETAIL C
Scale: 1/2" = 1'-0"

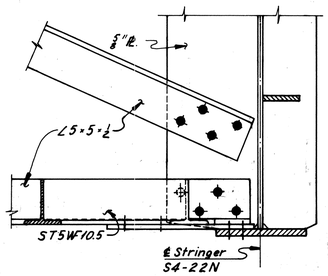


Note: Diagonal Angles in Intermediate Diaphragms are not shown.

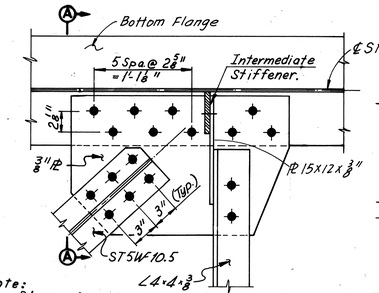
DETAIL E
Scale: 1/2" = 1'-0"



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

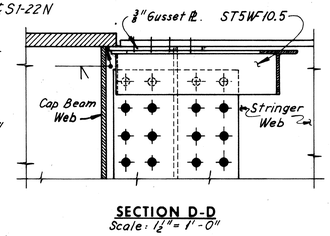


SECTION G-G
Scale: 1/2" = 1'-0"

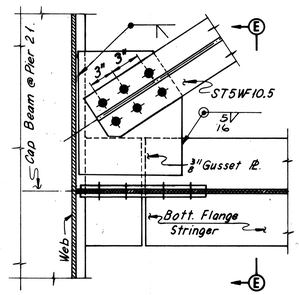


Note: Diagonal Angle in Intermediate Diaphragm is not shown.

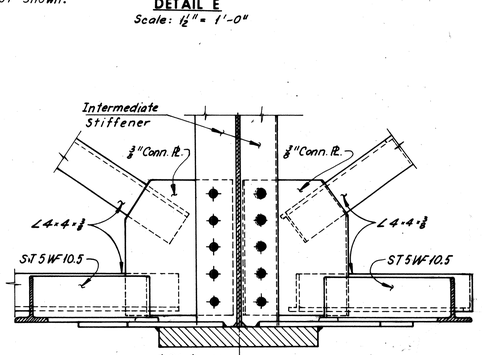
DETAIL M
Scale: 1/2" = 1'-0"



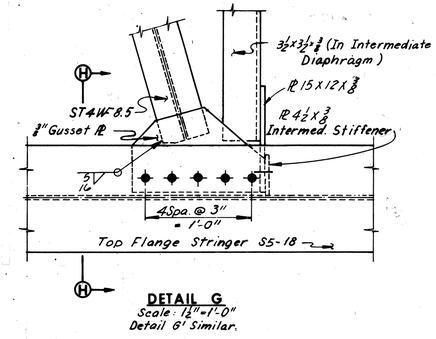
SECTION D-D
Scale: 1/2" = 1'-0"



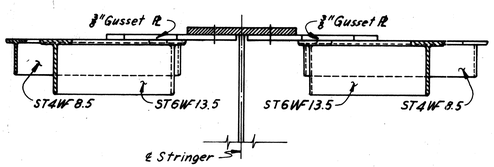
DETAIL D
Scale: 1/2" = 1'-0"



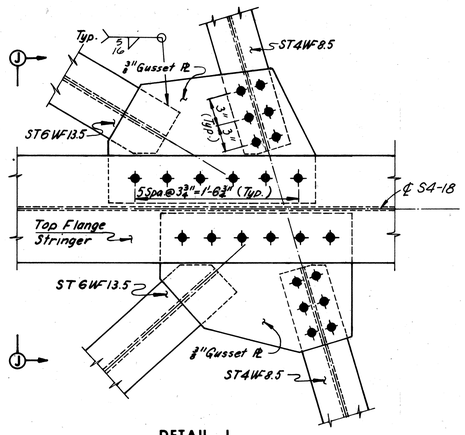
SECTION F-F
Scale: 1/2" = 1'-0"



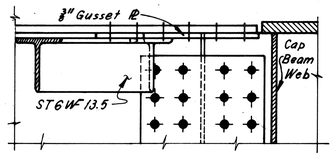
DETAIL G
Scale: 1/2" = 1'-0"
Detail G' Similar.



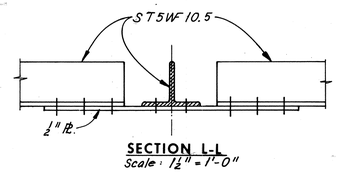
SECTION J-J
Scale: 1/2" = 1'-0"



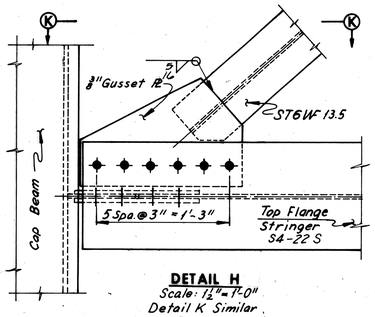
DETAIL J
Scale: 1/2" = 1'-0"
Detail J' Similar.



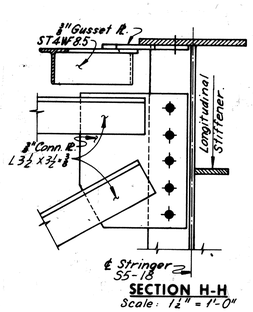
SECTION K-K
Scale: 1/2" = 1'-0"



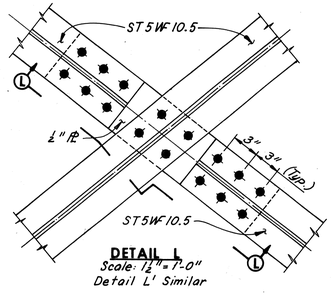
SECTION L-L
Scale: 1/2" = 1'-0"



DETAIL H
Scale: 1/2" = 1'-0"
Detail K Similar.



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



DETAIL L
Scale: 1/2" = 1'-0"
Detail L' Similar

Note:
For location of Details A, A', B, C, D, E, F, H, J', L, L' and M, see Sheet 20.
For location of Details G, G', J and K, see Sheet 18.

	BY	DATE				
MADE	PTA	12-14-68				
CHECKED	AMH	2-10-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

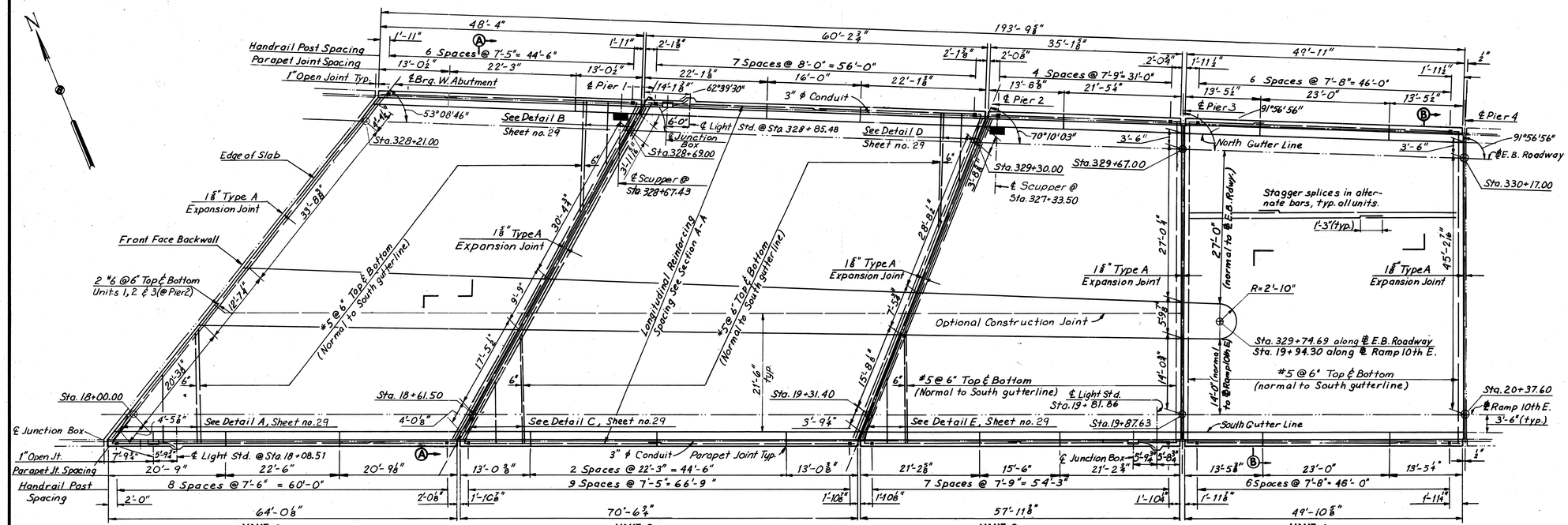
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST., R.R. TRACKS AND 16TH ST.
FRAMING DETAILS
UNITS 18, 21 AND 22

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

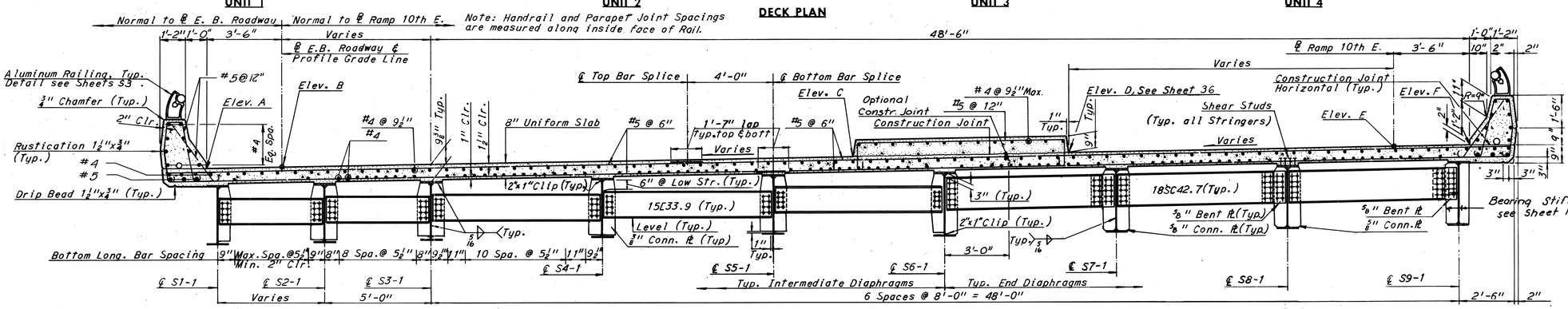
SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 27 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	154	265

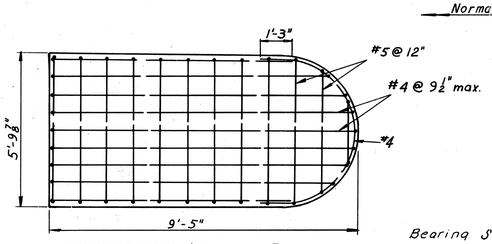


DECK PLAN

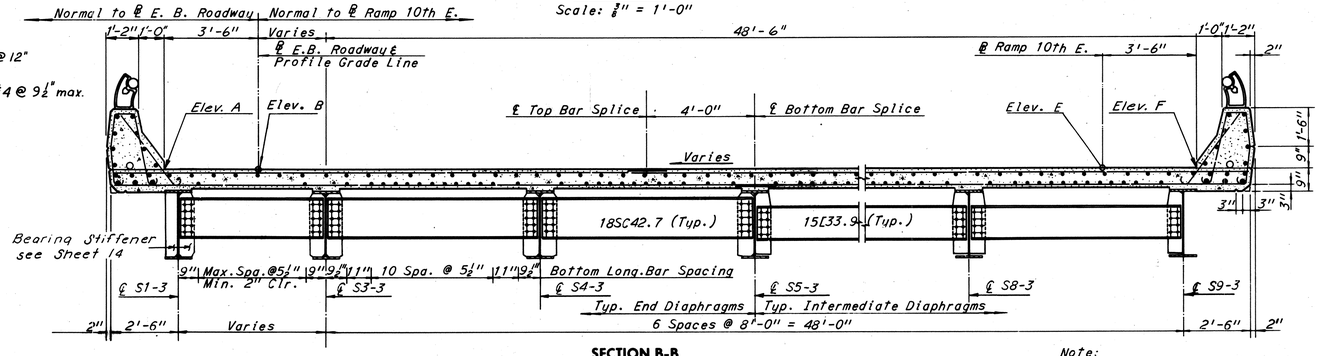
Note: Handrail and Parapet Joint Spacings are measured along inside face of Rail.



SECTION A-A
Scale: ⅜" = 1'-0"



REINFORCING DETAIL AT NOSE
Scale: ⅜"=1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"

Note: Transverse dimensions given in Sections A-A and B-B are normal to ℄ Ramp 10th-E.

ELEVATION TABLE					
STATION	ELEV. A	ELEV. B	ELEV. C	ELEV. E	ELEV.
328+00.00	76.13	76.33	77.81	—	—
+00.00	—	—	77.81	—	—
+10.00	76.29	76.48	77.91	—	—
+20.00	76.44	76.63	78.00	—	—
+21.00	—	76.64	—	—	—
+23.62	76.50	—	—	—	—
+30.00	76.61	76.77	78.10	—	—
+40.00	76.76	76.92	78.19	—	—
+50.00	76.91	77.07	78.28	—	—
+55.04	—	—	78.33	—	—
+60.00	77.07	77.22	78.38	—	—
+69.00	—	77.35	—	—	—
+70.00	77.22	77.37	78.47	—	—
+70.81	77.25	—	—	—	—
+80.00	77.38	77.51	78.57	—	—
+90.00	77.53	77.66	78.66	—	—
329+00.00	77.68	77.81	78.75	—	—
+10.00	77.84	77.96	78.85	—	—
+20.00	77.99	78.11	78.94	—	—
+20.26	—	—	78.95	—	—
+30.00	78.16	78.25	79.04	—	—
+31.26	78.17	—	—	—	—
+40.00	78.31	78.40	79.13	—	—
+50.00	78.46	78.55	79.22	—	—
+60.00	78.62	78.70	79.32	—	—
+66.88	78.73	—	—	—	—
+67.00	—	78.80	—	—	—
+67.92	—	—	79.39	—	—
+70.00	78.77	78.85	79.41	—	—
+80.00	78.93	78.99	—	79.88	79.94
+90.00	79.08	79.14	—	79.93	79.99
330+00.00	79.23	79.29	—	79.98	80.03
+10.00	79.39	79.44	—	80.03	80.08
+16.88	79.51	—	—	—	—
+17.00	—	79.54	—	—	—
+18.54	—	—	—	80.08	—
+18.64	—	—	—	—	80.12
+20.00	79.54	79.59	—	80.08	80.13

Note: For Elevations along ℄ Ramp 10th East, see Sheet 33.

Notes:
For Joint Details, see Sheet 37
For Framing Plan, see Sheet 14.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.
For Details A, B, C, D and E, see Sheet 29
For Standard Drainage Details, see Support Type 1, Sheet S5 & S6.

	BY	DATE
MADE	J.D.	8-6-68
CHECKED	J.V.	10-23-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Bar Space Added	PRMS	4-19-74
	As Built	T.E.M.	8-76

AS BUILT

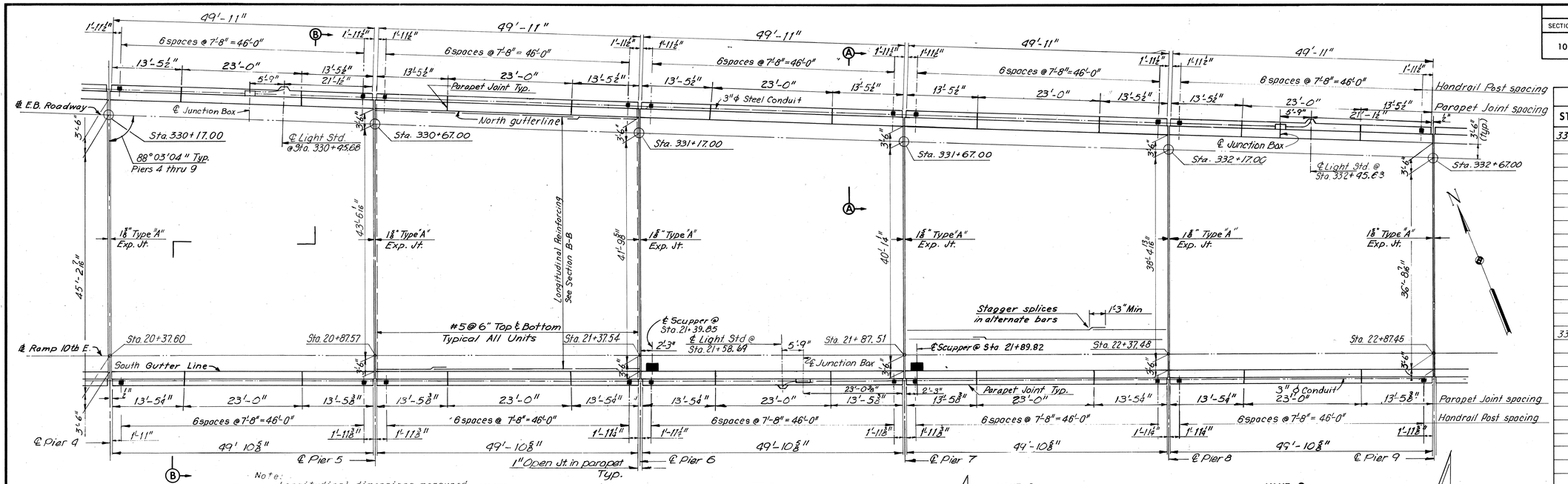
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 1,2,3 AND 4

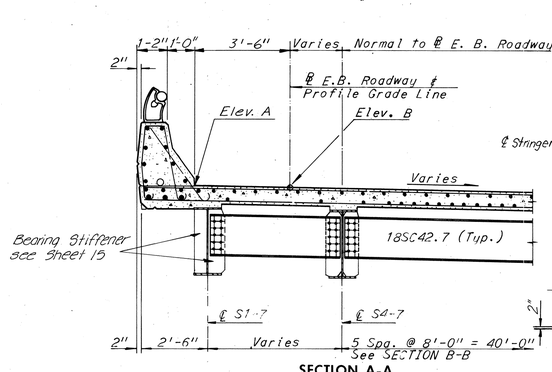
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=10' Unless as shown
CONTRACT NO: 10
SHEET NO. 28 OF 46

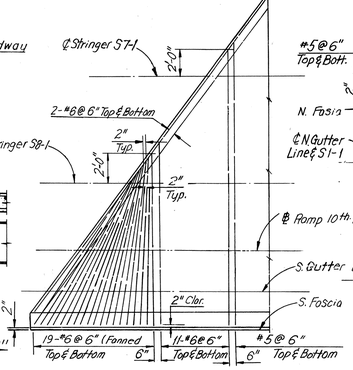
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	155	265



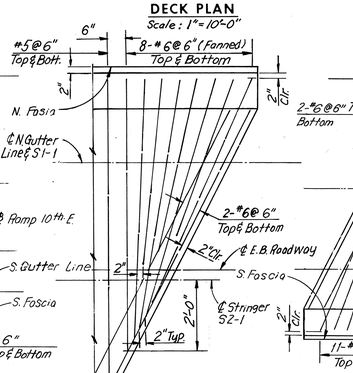
Note: Longitudinal dimensions measured along inside face of rail.



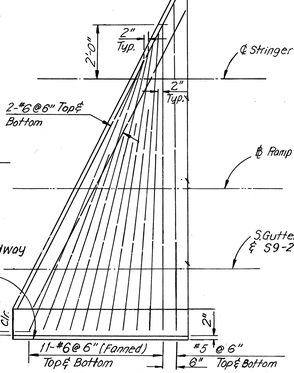
SECTION A-A
Scale: ⅜" = 1'-0"



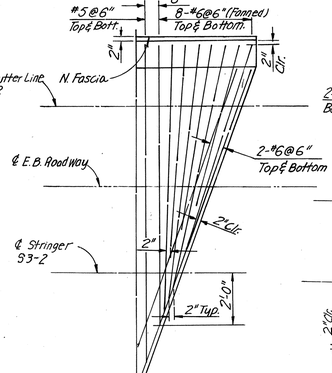
DETAIL A
Scale: ⅛" = 1'-0"



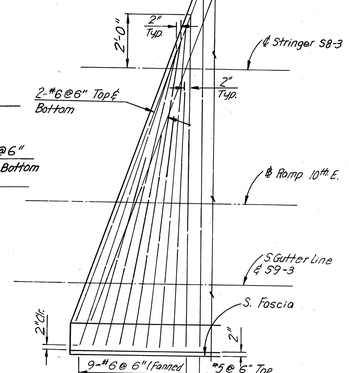
DETAIL B
Scale: ½" = 1'-0"



DETAIL C
Scale: ⅜" = 1'-0"

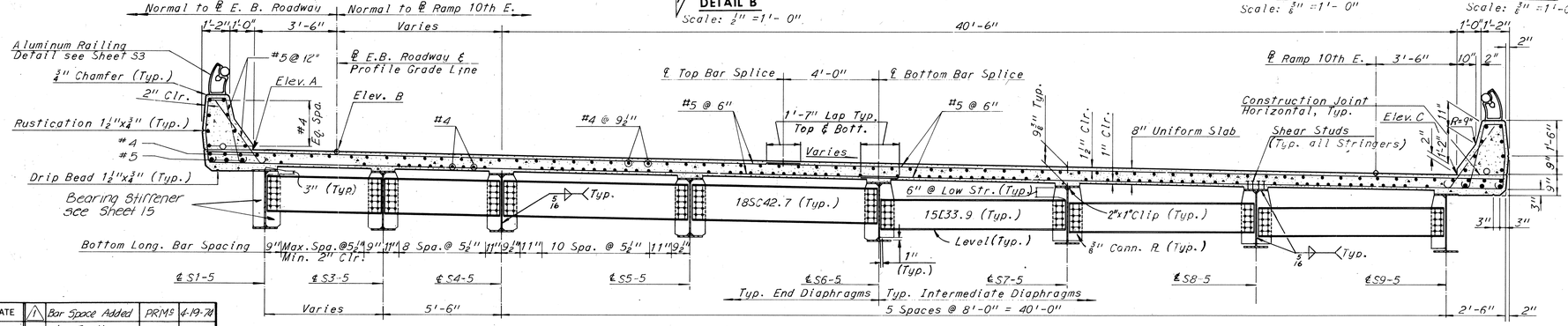


DETAIL D
Scale: ⅜" = 1'-0"



DETAIL E
Scale: ⅜" = 1'-0"

Note: Details A through E belong to DECK-PLAN-UNITS 1,2,3 and 4, see Sheet 28
For Joint Details, see Sheet 37
For Framing Plan, see Sheet 15.
For Handrail Details, see Sheet S3.
For Superstructure Quantities, see Sheet 2.
For Standard Drainage Details, see Support Type 1, Sheet S5 & S6.



SECTION B-B
Scale: ⅜" = 1'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
330+10.00	79.39	79.44	80.08
+16.88	79.50	--	--
+17.00	--	79.54	--
+18.66	--	--	80.12
+20.00	79.54	79.59	80.13
+30.00	79.71	79.73	80.16
+40.00	79.86	79.88	80.21
+50.00	80.02	80.03	80.27
+60.00	80.17	80.18	80.32
+66.88	80.28	--	--
+67.00	--	80.28	--
+68.60	--	--	80.36
+70.00	80.32	80.33	80.37
+80.00	80.48	80.47	80.43
+90.00	80.63	80.62	80.49
331+00.00	80.79	80.77	80.54
+10.00	80.94	80.92	80.60
+16.88	81.05	--	--
+17.00	--	81.02	--
+18.54	--	--	80.65
+20.00	81.09	81.07	80.66
+30.00	81.26	81.21	80.72
+40.00	81.41	81.36	80.78
+50.00	81.57	81.51	80.84
+60.00	81.72	81.66	80.92
+66.88	81.82	--	--
+67.00	--	81.76	--
+68.48	--	--	81.00
+70.00	81.87	81.81	81.01
+80.00	82.02	81.95	81.12
+90.00	82.17	82.10	81.25
332+00.00	82.32	82.25	81.40
+10.00	82.47	82.40	81.56
+16.88	82.57	--	--
+17.00	--	82.50	--
+18.42	--	--	81.69
+20.00	82.62	82.55	81.71
+30.00	82.76	82.69	81.86
+40.00	82.91	82.84	82.02
+50.00	83.06	82.99	82.17
+60.00	83.21	83.14	82.33
+66.88	83.31	--	--
+67.00	--	83.24	--
+68.37	--	--	82.46
+70.00	83.36	83.29	82.48

	BY	DATE
MADE	SHS	8-2-68
CHECKED	AHH	11-1-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	8-76

AS BUILT

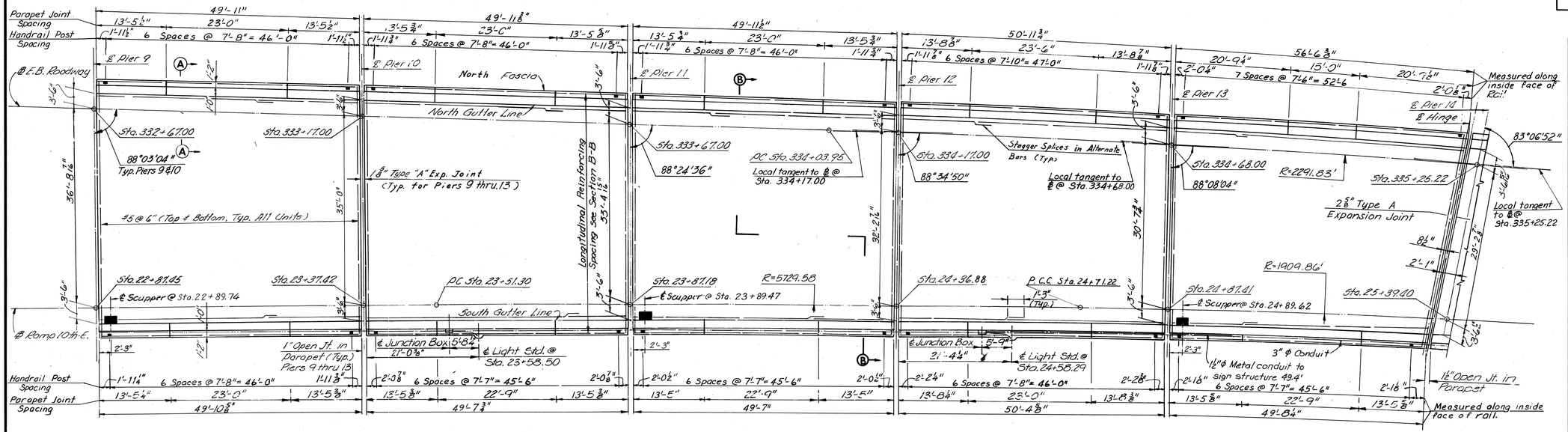
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 5, 6, 7, 8, AND 9

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 29 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	156	265

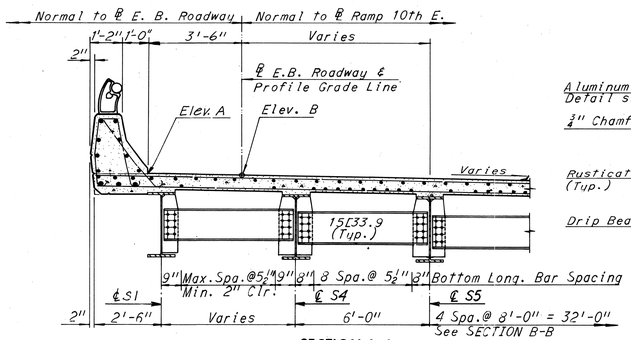


UNIT 10 UNIT 11 UNIT 12 UNIT 13 UNIT 14

DECK PLAN

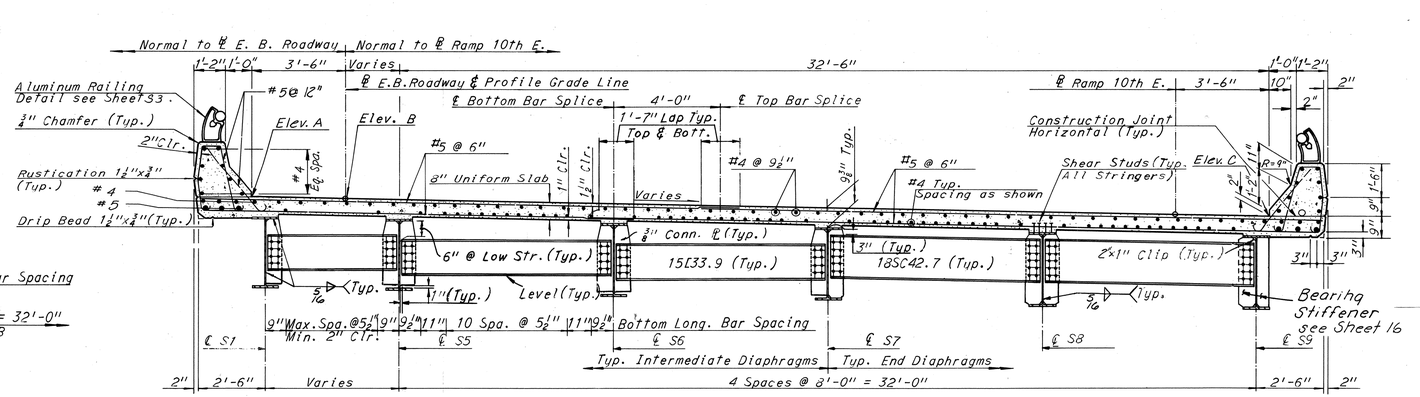
Scale 1" = 10'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
332+60.00	83.21	83.14	82.33
332+66.88	83.31	——	——
332+67.00	——	83.24	——
332+68.37	——	——	82.46
332+70.00	83.36	83.29	82.48
332+80.00	83.50	83.43	82.64
332+90.00	83.65	83.58	82.79
333+00.00	83.80	83.73	82.95
333+10.00	83.95	83.88	83.10
333+16.88	84.05	——	——
333+17.00	——	83.98	——
333+18.31	——	——	83.21
333+20.00	84.10	84.03	83.23
333+30.00	84.25	84.17	83.35
333+40.00	84.40	84.32	83.45
333+50.00	84.56	84.47	83.54
333+60.00	84.71	84.62	83.62
333+66.90	84.82	——	——
333+67.00	——	84.72	——
333+68.02	——	——	83.69
333+70.00	84.86	84.77	83.70
333+80.00	85.03	84.91	83.78
333+90.00	85.18	85.06	83.86
334+00.00	85.34	85.21	83.94
334+10.00	85.49	85.36	84.03
334+16.91	85.60	——	——
334+17.00	——	85.46	——
334+17.88	——	——	84.10
334+20.00	85.64	85.51	84.12
334+30.00	85.80	85.65	84.20
334+40.00	85.95	85.80	84.30
334+50.00	86.11	85.95	84.39
334+60.00	86.26	86.10	84.49
334+67.89	86.38	——	——
334+68.00	——	86.22	——
334+69.11	——	——	84.63
334+70.00	86.41	86.25	84.61
334+80.00	86.56	86.39	84.74
334+90.00	86.71	86.54	84.88
335+00.00	86.86	86.69	85.04
335+10.00	87.01	86.84	85.20
335+20.00	87.15	86.97	85.35
335+25.64	87.23	——	——
335+25.22	——	87.04	——
335+21.29	——	——	85.36
335+30.00	87.29	87.11	85.49



SECTION A-A

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



SECTION B-B

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

Notes:
For Joint Details, see Sheet 37
For Framing Plan, see Sheet 16.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.
For Standard Drainage Details, see Support Type ⁝, Sheet S5 ℄ S6.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	WJC	8-5-68	2	Bar Space Added	PRMS	4-19-74
CHECKED	JD	10-21-68		As Built	TEM	8-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

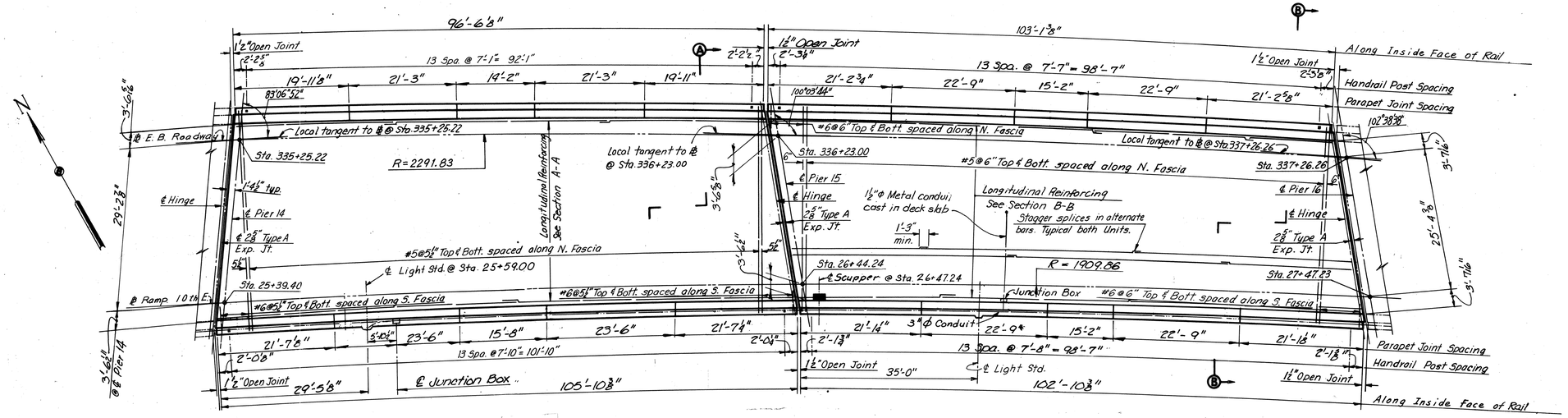
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 10.11.12.13 AND 14

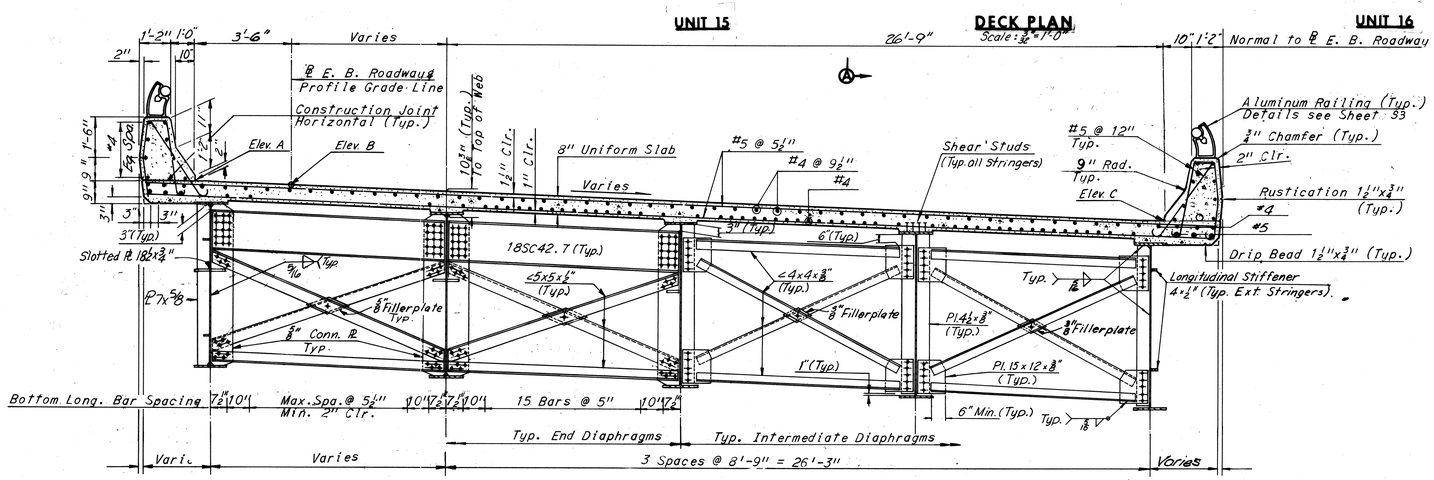
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 30 OF 46

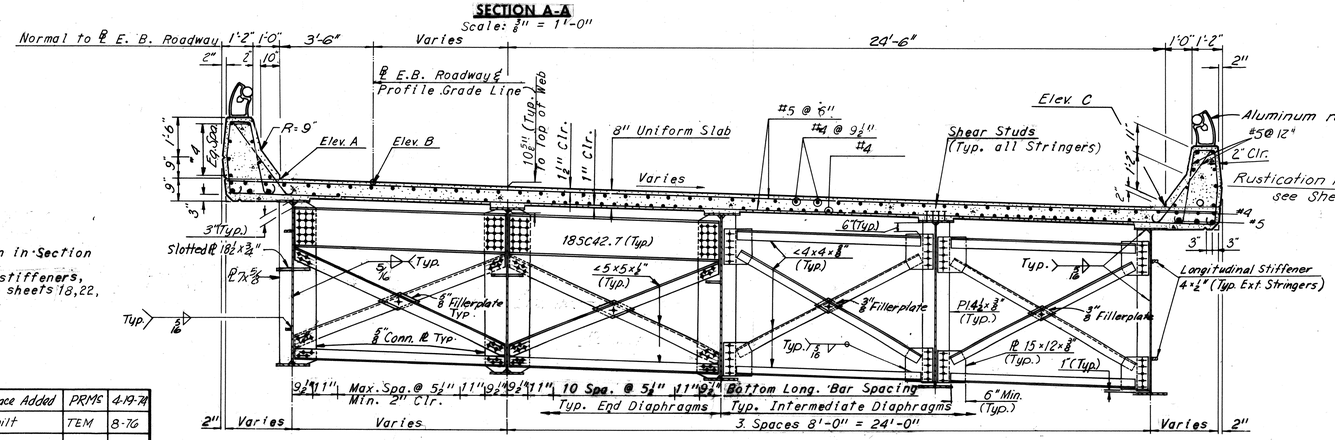
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	157	265

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
335+10.00	87.01	86.84	85.20
+20.00	87.15	86.97	85.35
+21.29	—	—	85.36
+25.22	87.22	—	—
+30.00	87.18	87.11	85.50
+40.00	87.40	87.23	85.64
+50.00	87.53	87.35	85.76
+60.00	87.63	87.46	85.89
+70.00	87.74	87.57	86.01
+80.00	87.85	87.67	86.11
+90.00	87.93	87.76	86.23
336+00.00	88.02	87.85	86.33
+10.00	88.10	87.93	86.42
+20.00	88.19	88.02	86.52
+22.38	88.21	—	—
+23.00	—	88.04	—
+28.25	—	—	86.60
+30.00	88.27	88.10	86.61
+40.00	88.36	88.19	86.70
+50.00	88.44	88.27	86.80
+60.00	88.52	88.35	86.89
+70.00	88.61	88.44	86.98
+80.00	88.69	88.52	87.08
+90.00	88.78	88.61	87.17
337+00.00	88.86	88.69	87.26
+10.00	88.94	88.77	87.35
+20.00	89.03	88.86	87.44
+25.98	89.08	—	—
+26.26	—	88.91	—
+30.00	89.11	88.94	87.53
+32.60	—	—	87.55
337+40.00	89.20	89.03	87.62





SECTION A-A
Scale: ⅜" = 1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"

Notes:
For details not shown in Section B-B, see Section A-A.
For details of brg. stiffeners, long. stiffeners, see sheets 18, 22, and 23.

Notes:
For Joint Details, see Sheet 38.
For Framing Plan, see Sheet 17.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.
For Standard Drainage Details, see Support Type 2 Sheet 55&56.

	BY	DATE				
MADE	RLM	8-6-68	2	As Built	PRMC	4-19-74
CHECKED	SCC	10-21-68			TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

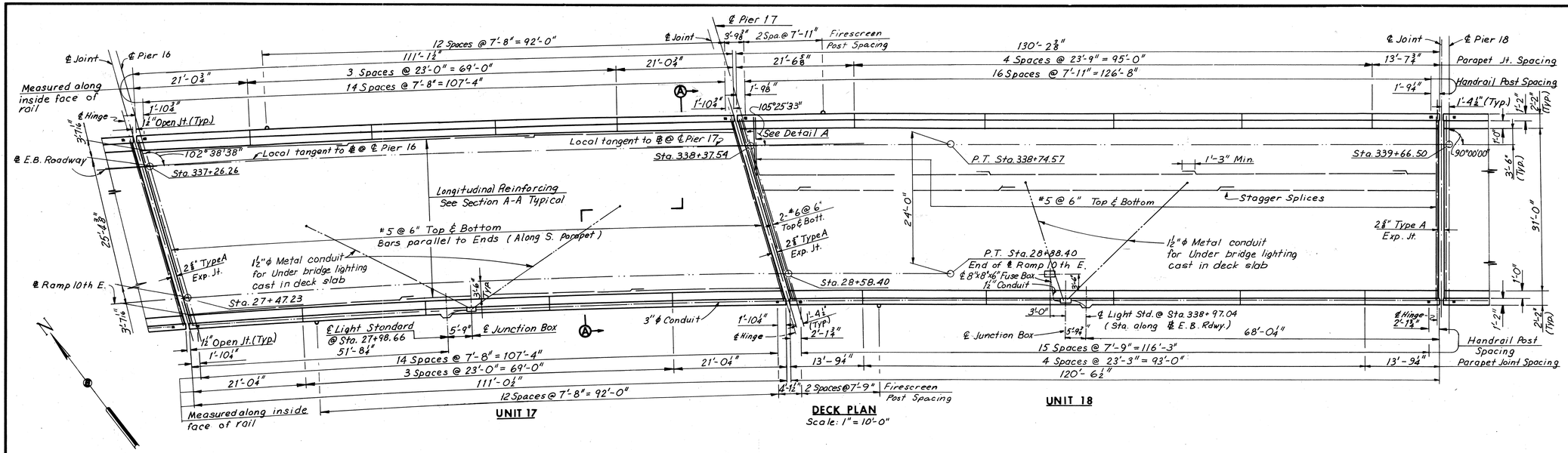
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN - UNITS 15 AND 16

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

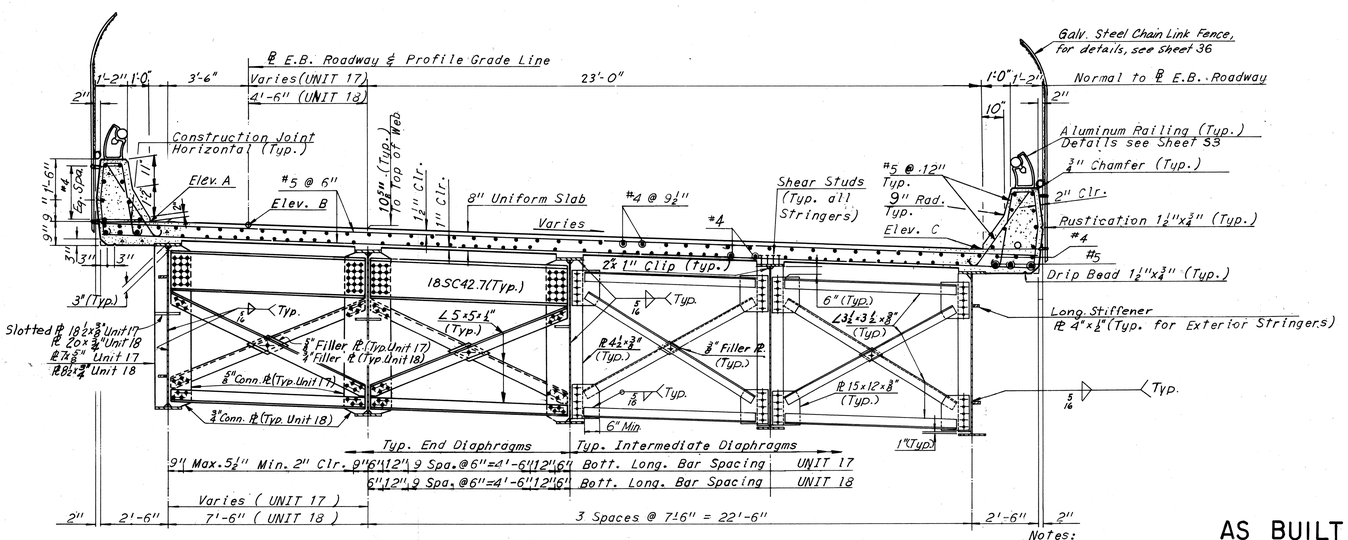
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 31 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	158	265

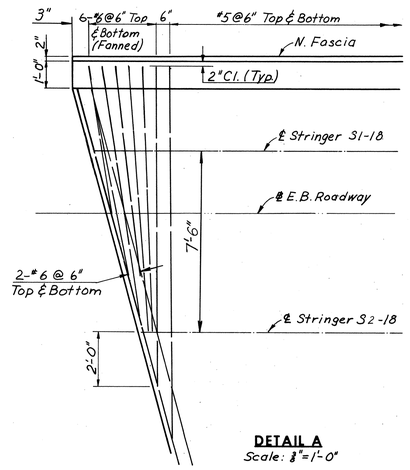


ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
337+20.00	89.03	88.86	87.44
+25.48	89.08	--	--
+26.26	--	88.91	--
+30.00	89.11	88.94	87.53
+32.60	--	--	87.55
+40.00	89.20	89.03	87.62
+50.00	89.28	89.11	87.71
+60.00	89.36	89.19	87.80
+70.00	89.45	89.28	87.89
+80.00	89.53	89.36	87.98
+90.00	89.62	89.45	88.07
338+00.00	89.70	89.53	88.18
+10.00	89.78	89.61	88.30
+20.00	89.86	89.70	88.43
+30.00	89.93	89.78	88.57
+36.58	89.99	--	--
+37.54	--	89.85	--
+40.00	90.01	89.87	88.71
+45.13	--	--	88.78
+50.00	90.09	89.95	88.85
+60.00	90.17	90.03	88.99
+70.00	90.25	90.12	89.13
+80.00	90.32	90.20	89.26
+90.00	90.40	90.29	89.40
339+00.00	90.48	90.37	89.54
+10.00	90.55	90.45	89.69
+20.00	90.63	90.54	89.83
+30.00	90.70	90.62	89.96
+40.00	90.78	90.71	90.10
+50.00	90.86	90.79	90.24
+60.00	90.94	90.87	90.38
+66.50	90.99	90.93	90.47
+70.00	91.02	90.96	90.52



SECTION A-A
Scale: ⅜" = 1'-0"



DETAIL A
Scale: ⅜" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.D.	8-9-68				
CHECKED	R.C.	10-18-68	1	As Built	TEM	8-76
IN CHARGE						

AS BUILT

Notes:
For Joint Details, see Sheet 38.
For Framing Plan, see Sheet 18..
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

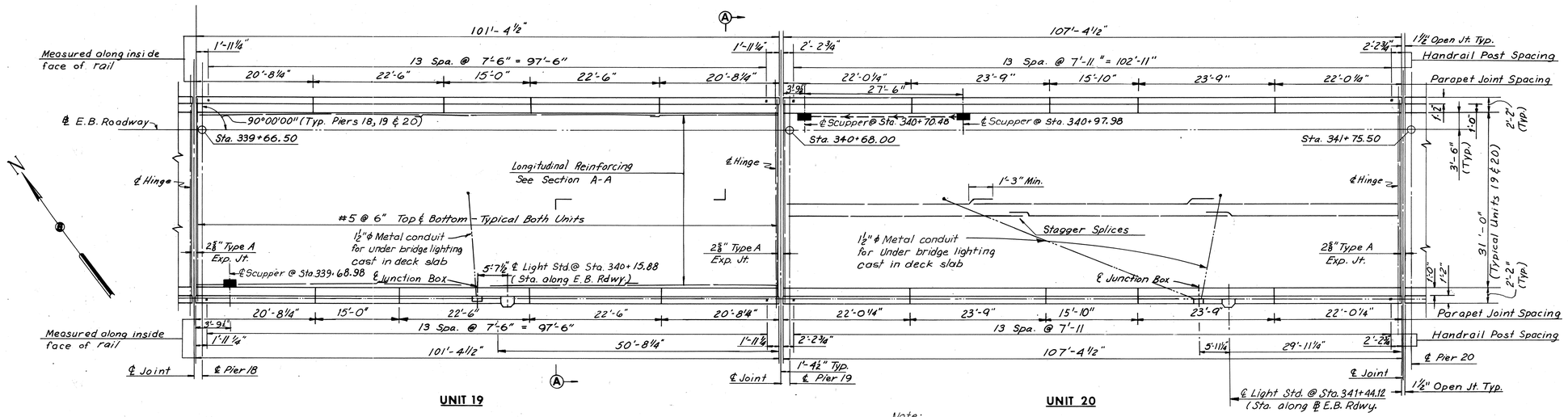
BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.

DECK PLAN – UNITS 17 AND 18

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

SCALE:
CONTRACT NO.: 10
SHEET NO. 32 OF 46

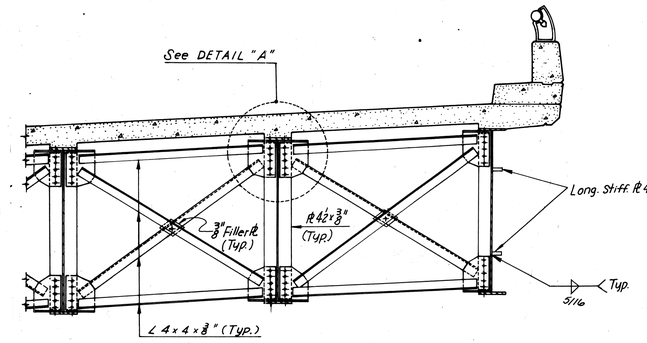
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	159	265



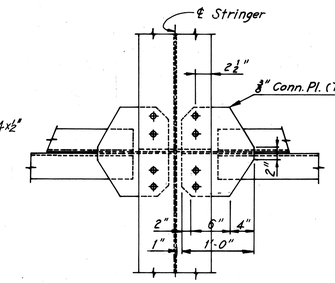
Note: For Standard Drainage details for Unit 19 See Support Type 2 Sheet S5 and for Unit 20 Support Type 7 Sheet S6.

ELEVATION TABLE

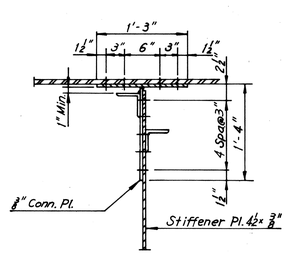
STATION	ELEV. A	ELEV. B	ELEV. C
339+60.00	90.94	90.87	90.38
+66.50	90.99	90.93	90.47
+70.00	91.02	90.96	90.52
+80.00	91.09	91.04	90.65
+90.00	91.17	91.13	90.79
340+00.00	91.24	91.21	90.94
+10.00	91.32	91.29	91.08
+20.00	91.40	91.38	91.22
+30.00	91.47	91.46	91.35
+40.00	91.55	91.55	91.49
+50.00	91.63	91.63	91.63
+60.00	91.71	91.71	91.77
+68.00	91.77	91.78	91.88
+70.00	91.79	91.80	91.91
+80.00	91.86	91.88	92.04
+90.00	91.94	91.97	92.18
341+00.00	92.02	92.05	92.32
+10.00	92.09	92.13	92.47
+20.00	92.17	92.22	92.61
+30.00	92.24	92.30	92.74
+40.00	92.32	92.39	92.87
+50.00	92.40	92.47	92.99
+60.00	92.49	92.55	93.09
+70.00	92.57	92.64	93.19
+75.50	92.61	92.68	93.23
+80.00	92.65	92.72	93.27



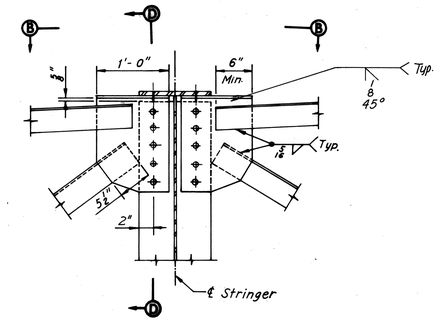
INTERMEDIATE DIAPHRAGM
Scale: ⅜"=1'-0"



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



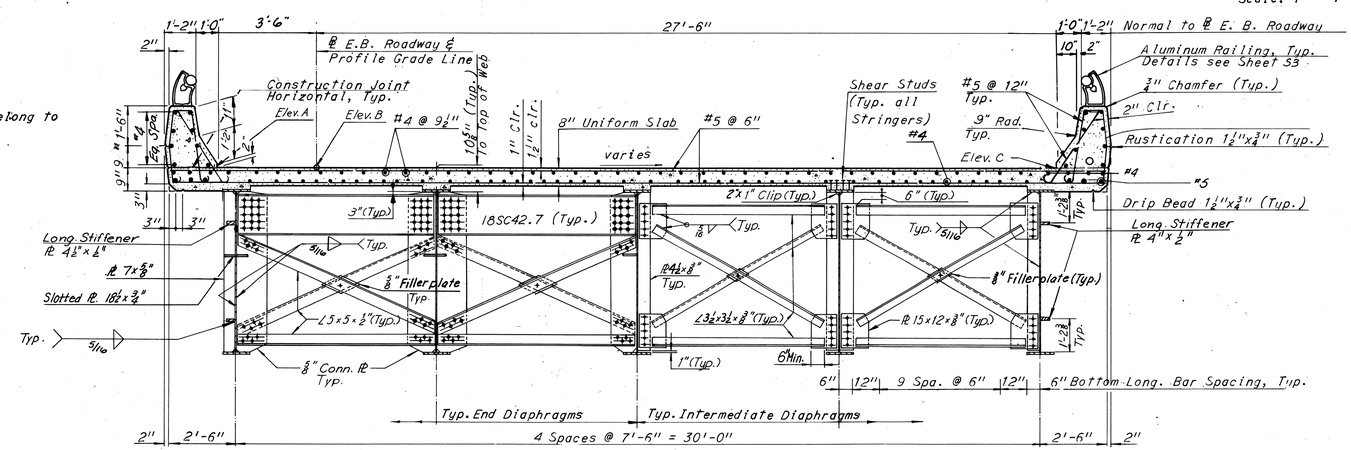
SECTION D-D
Scale:



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

Note: Intermediate Diaphragm Details belong to Units 21 and 22, see Sheet 34

Note: For details of brg. stiffeners, see sheets 19 & 23



SECTION A-A
Scale: ⅜" = 1'-0"

Notes:
For Joint Details, see Sheet 38
For Framing Plan, see Sheet 19.
For Handrail Details, see Sheet 53
For Superstructure quantities, see Sheet 2.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SHS	8-2-68				
CHECKED	R. C.	10-18-68	1	As Built	TEM	8-76
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

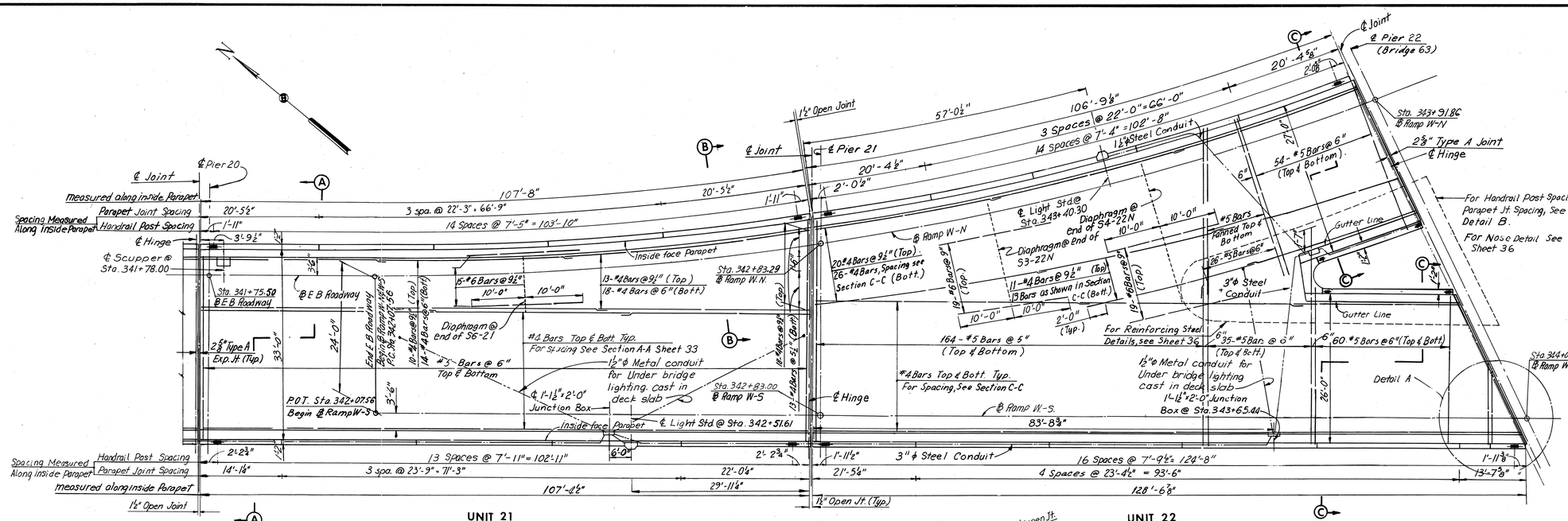
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.

DECK PLAN-UNITS 19 AND 20

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 33 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	160	265

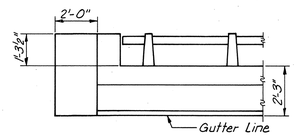


UNIT 21

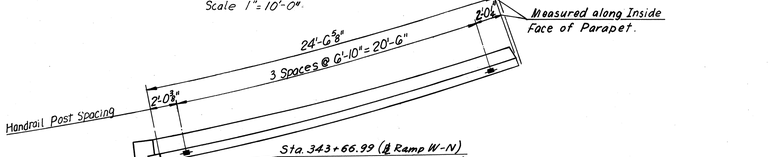
UNIT 22

DECK PLAN
Scale 1" = 10'-0"

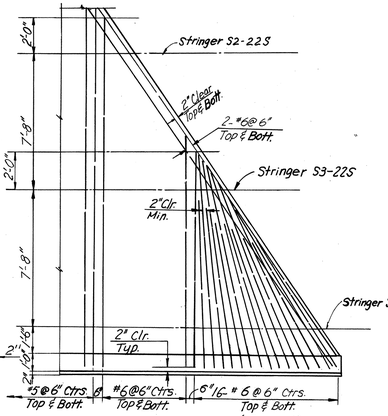
Note: For Section A-A, see Sheet 33.



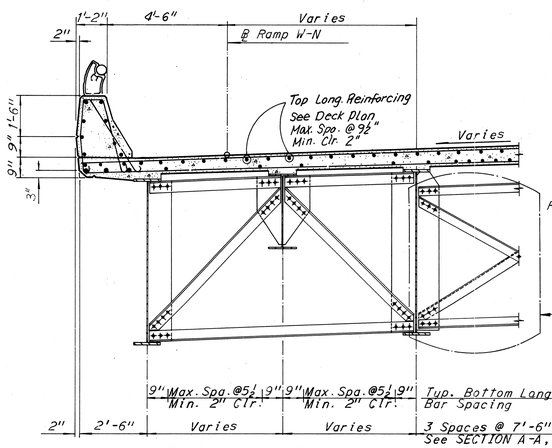
VIEW D-D
No Scale



DETAIL B
No Scale

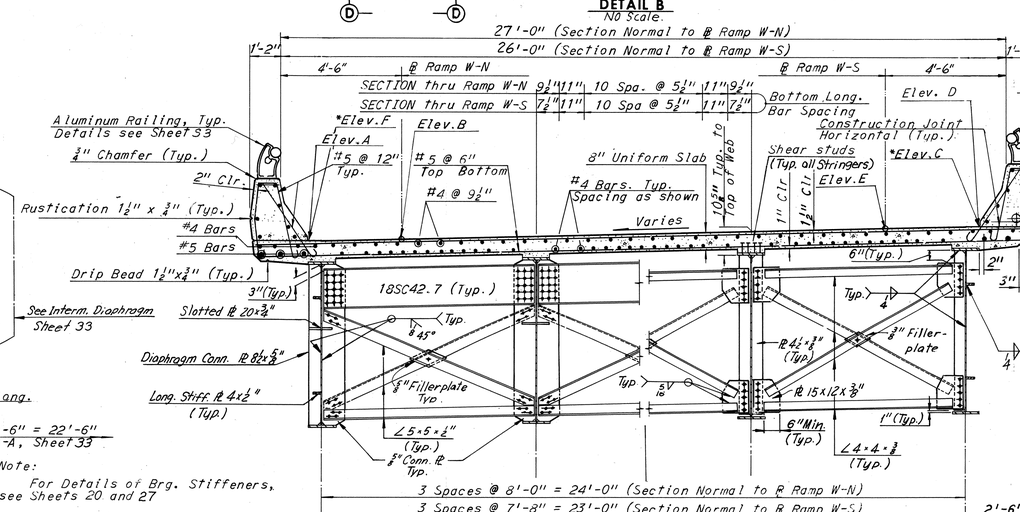


DETAIL A
Scale ½" = 1'-0"



SECTION B-B
Scale: ⅜" = 1'-0"

Note: For Details of Brg. Stiffeners, see Sheets 20 and 27



Typ. End Diaphragm

SECTION C-C
Scale: ⅜" = 1'-0"

Typ. Interm. Diaphragm

Note: Intermediate Diaphragms shown can only be used where stringers are straight. For Intermediate Diaphragm Details at curved stringers, see Sheet 33.

* Elev. C indicates the elevation of nose north gutter line.

* Elev. F indicates the elevation of nose south gutter line

Notes:
For Superstructure Quantities, see Sheet 2.
For Framing Plan see Sheet 20.
For Framing Details, see Sheets 23 thru 27.
For Joint Details, see Sheet 38.
For Standard Drainage Details, see Support Type 2 Sheet S-5.36.

ELEVATION TABLE

STATION ℄ RampW-N	ELEV. A	ELEV. B	*ELEV. C
341+75.50	92.61	92.68	—
+80.00	92.65	92.72	—
+90.00	92.74	92.81	—
342+00.00	92.82	92.89	—
+10.00	92.90	92.97	—
+20.00	92.98	93.06	—
+30.00	93.06	93.15	—
+40.00	93.14	93.24	—
+50.00	93.21	93.32	—
+60.00	93.26	93.38	—
+70.00	93.32	93.45	—
+80.00	93.35	93.49	—
+90.00	93.37	93.52	—
343+00.00	93.39	93.55	—
+10.00	93.40	93.57	—
+20.00	93.38	93.56	—
+30.00	93.35	93.54	—
+40.00	93.30	93.50	—
+50.00	93.22	93.43	—
+60.00	93.14	93.35	94.64
+70.00	93.02	93.23	94.52
+80.00	92.86	93.07	94.36
+90.00	92.66	92.87	94.16

ELEVATION TABLE

STATION ℄ RampW-S	ELEV. D	ELEV. E	*ELEV. F
342+07.56	93.50	93.43	—
+10.00	93.52	93.45	—
+20.00	93.61	93.54	—
+30.00	93.69	93.62	—
+40.00	93.78	93.71	—
+50.00	93.87	93.80	—
+60.00	93.97	93.90	—
+70.00	94.08	94.01	—
+80.00	94.20	94.13	—
+90.00	94.31	94.24	—
343+00.00	94.42	94.35	—
+10.00	94.53	94.46	—
+20.00	94.64	94.57	—
+30.00	94.74	94.67	—
+40.00	94.84	94.77	—
+50.00	94.93	94.86	—
+60.00	95.01	94.94	94.53
+70.00	95.07	95.00	94.59
+80.00	95.14	95.07	94.69
+90.00	95.18	95.12	94.79
344+00.00	95.21	95.16	94.89
+10.00	95.22	95.18	94.96

	BY	DATE				
MADE	G.S.H.	08-09-68				
CHECKED	S.C.C.	10-25-68	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

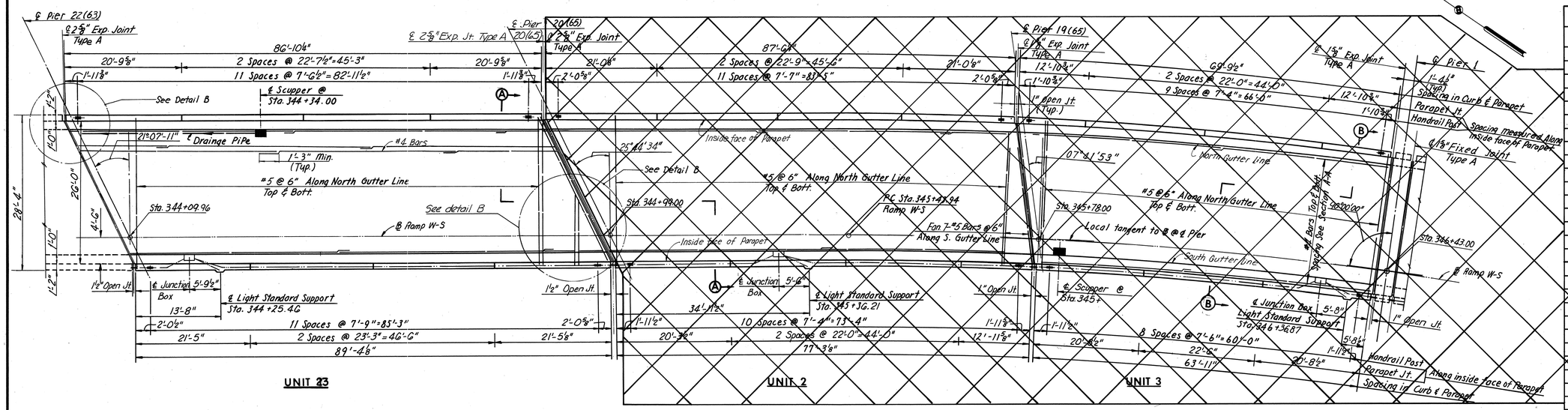
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
DECK PLAN — UNITS 21 AND 22

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 34 OF 46

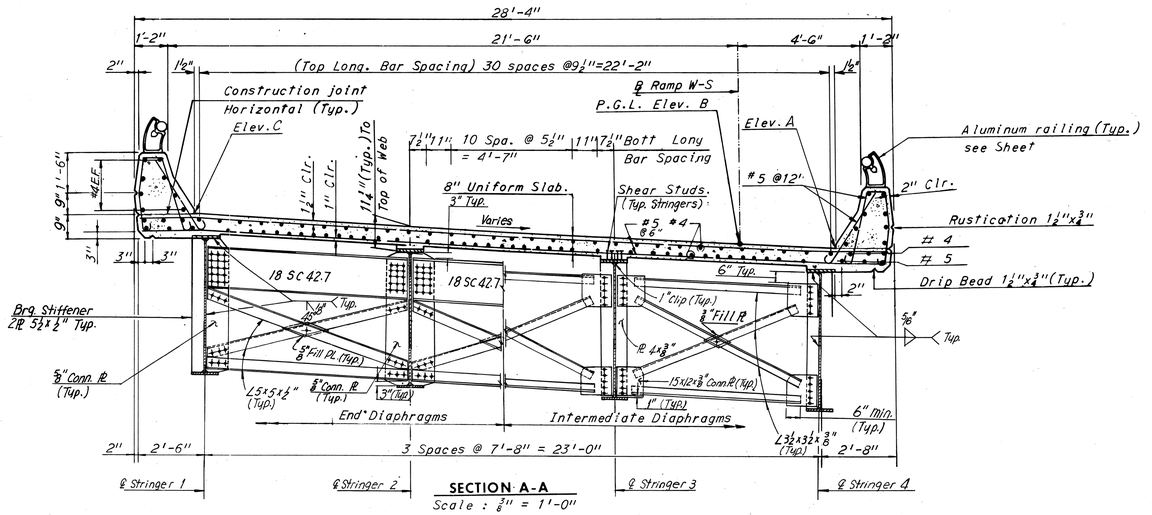
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	161	265



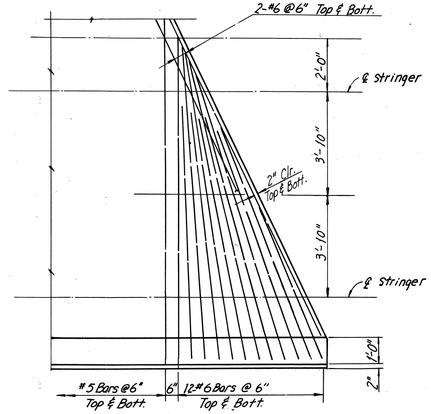
DECK PLAN
Scale: 1"=10'-0"

Note:
Section B-B, see Sheet 20.

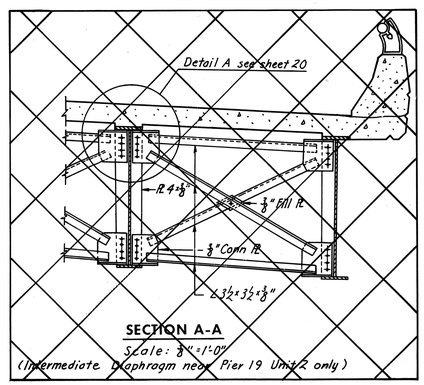
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
344+00.00	95.21	95.16	94.89
+10.00	95.22	95.18	94.96
+20.00	95.21	95.18	95.02
+30.00	95.19	95.17	95.06
+40.00	95.14	95.13	95.08
+50.00	95.08	95.08	95.08
+60.00	95.01	95.02	95.10
+70.00	94.91	94.94	95.10
+80.00	94.81	94.85	95.10
+90.00	94.69	94.75	95.08
345+00.00	94.47	94.06	93.99
+10.00	94.51	94.02	93.94
+20.00	94.55	93.98	93.89
+30.00	94.60	93.94	93.83
+40.00	94.63	93.89	93.76
+50.00	94.65	93.83	93.69
+60.00	94.66	93.76	93.61
+70.00	94.66	93.68	93.52
+73.84	94.66	---	---
+77.08	---	---	93.44
+78.00	---	93.61	---
+80.00	94.66	93.59	93.41
345+90.00	94.62	93.49	93.29
346+00.00	94.56	93.38	93.17
+10.00	94.47	93.25	93.05
+20.00	94.35	93.12	92.91
+30.00	94.20	92.97	92.76
+40.00	94.06	92.82	92.61
+41.63	---	---	92.59
+41.66	94.02	---	---



SECTION A-A
Scale : ⅜" = 1'-0"



DETAIL B
Scale: ⅜"=1'-0"



SECTION A-A
Scale: ⅜"=1'-0"
(Intermediate Diaphragm near Pier 19 Unit 2 only)

Notes
For Framing Plan, see Sheet 21.
For Standard Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 2 Sheet S5&S6.
For Joint Details, see Sheet 38.
For Standard Handrail Details, see Sheet S3.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	10-29-68	2	As Built	TEM	8-76
CHECKED	A.H.H	12-13-68	1	Bar Call-outs Added	PRMS	4-19-74
IN CHARGE						

AS BUILT

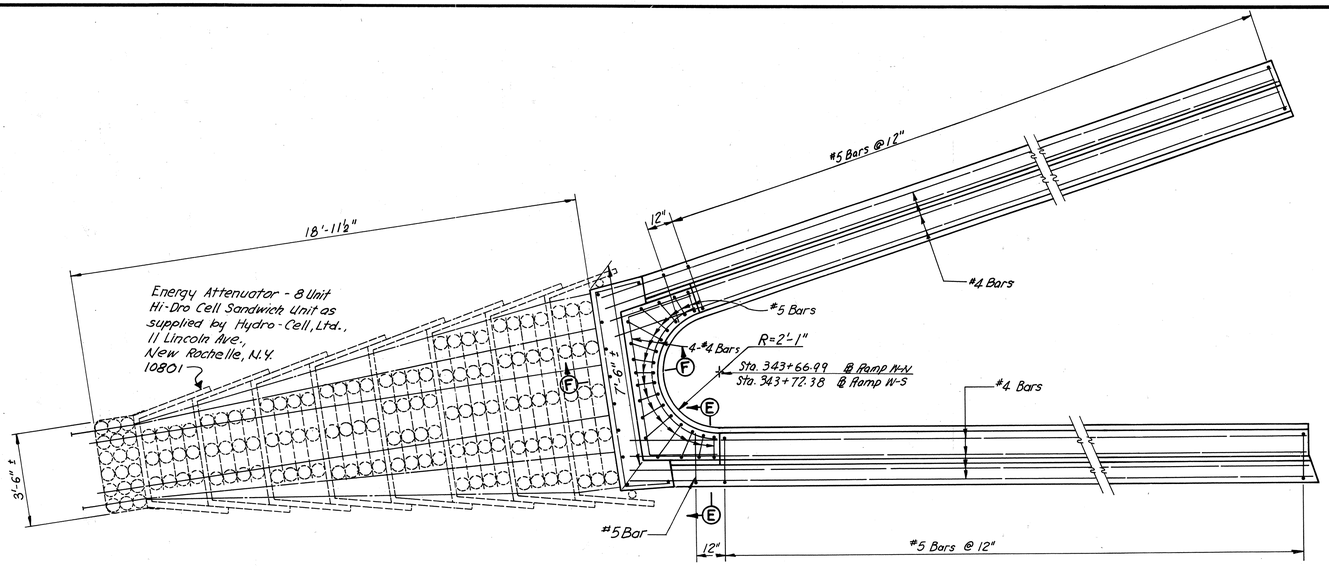
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST.-R.R. TRACKS AND 16TH ST.
DECK PLAN — UNIT 23

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

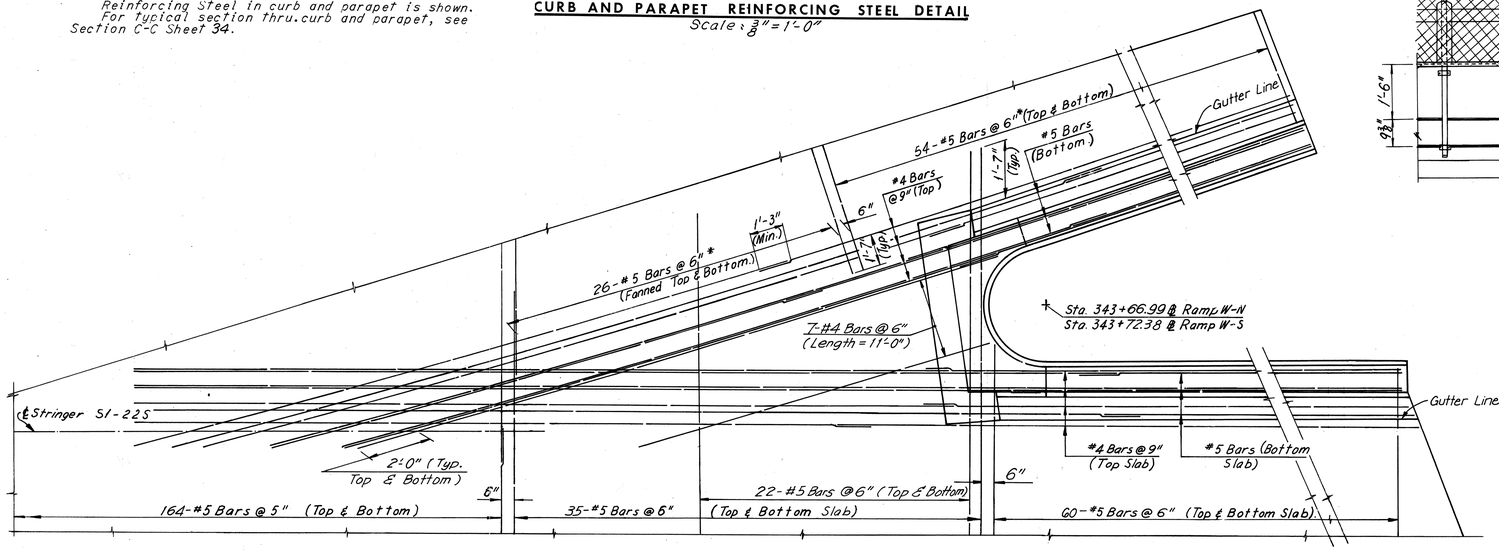
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 35 OF 46

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	162	265



Note:
Reinforcing Steel in curb and parapet is shown.
For typical section thru. curb and parapet, see Section C-C Sheet 34.

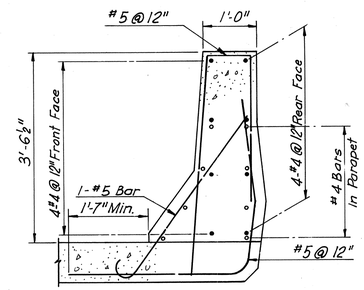
CURB AND PARAPET REINFORCING STEEL DETAIL
Scale : ⅜" = 1'-0"



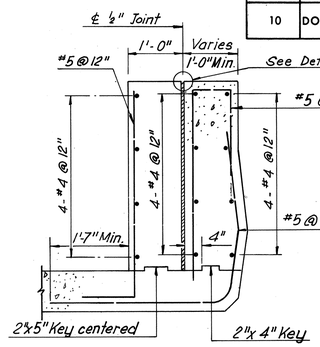
Note:
Reinforcing Steel in Slab is shown.

* Spacing measured along north curb of nose.

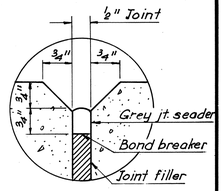
SLAB REINFORCING STEEL DETAIL
Scale : ⅜" = 1'-0"



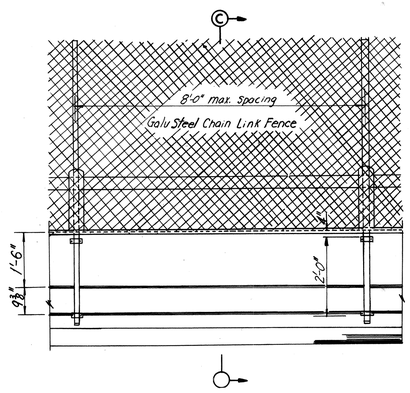
SECTION E-E
(Deck Steel Not Shown)
Scale : ¾" = 1'-0"



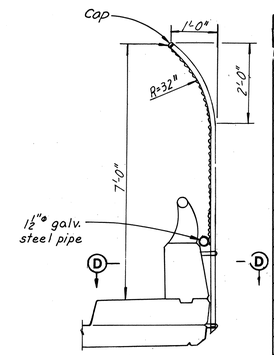
SECTION F-F
(Deck Steel Not Shown)
Scale : ¾" = 1'-0"



DETAIL A
Scale : Half Size



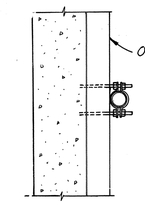
ELEVATION VIEW



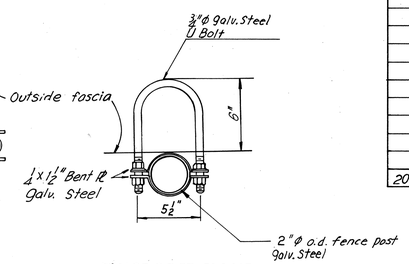
SECTION C-C

ELEVATION TABLE			
STATION ℄ Ramp 10th ℄	ELEV. D	ELEV. E	ELEV. F
17 + 90.00	76.88	77.20	77.26
+ 97.59	—	—	77.41
18 + 00.00	77.08	77.40	77.46
+ 10.00	77.28	77.60	77.66
+ 12.70	77.33	—	—
+ 20.00	77.48	77.79	77.85
+ 30.00	77.68	77.99	78.05
+ 40.00	77.87	78.18	78.24
+ 50.00	78.07	78.38	78.44
+ 59.82	—	—	78.63
+ 60.00	78.26	78.57	78.63
+ 61.50	—	78.60	—
+ 70.00	78.44	78.74	78.80
+ 70.04	78.44	—	—
+ 80.00	78.60	78.90	78.96
+ 90.00	78.75	79.05	79.11
19 + 00.00	78.88	79.18	79.24
+ 10.00	79.00	79.30	79.36
+ 20.00	79.11	79.40	79.46
+ 30.00	79.20	79.49	79.55
+ 30.20	—	—	79.55
+ 31.40	—	79.50	—
+ 37.22	79.25	—	—
+ 40.00	79.27	79.56	79.62
+ 50.00	79.33	79.62	79.68
+ 60.00	79.39	79.67	79.73
+ 70.00	79.44	79.72	79.78
+ 80.00	79.49	79.78	79.84
+ 87.63	79.53	79.82	79.88
+ 90.00	79.55	79.83	79.89
+ 94.30	79.58	79.85	79.91
20 + 00.00	—	79.88	79.94

Note:
See Sheet 28 for Location of Elevations above.



SECTION D-D



FENCE POST CLAMP

FIRE SCREEN DETAILS
No Scale

Note:
For location of fence, see Sheet 32.
For location of nose, see Sheet 34.

	BY	DATE				
MADE	GSH/BTA	12-14-68				
CHECKED	JD	2-19-69	1	As Built	TEM.	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

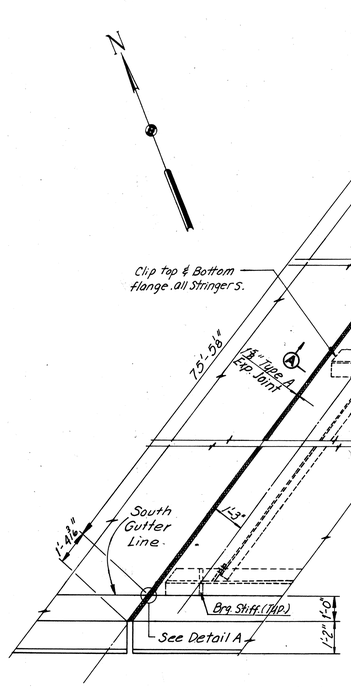
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
SUPERSTRUCTURE DETAILS

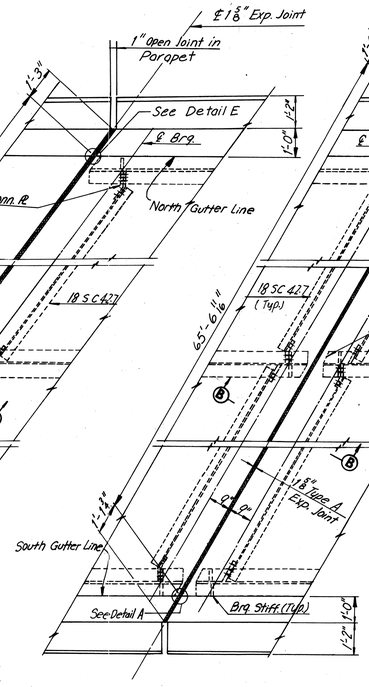
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 36 OF 46

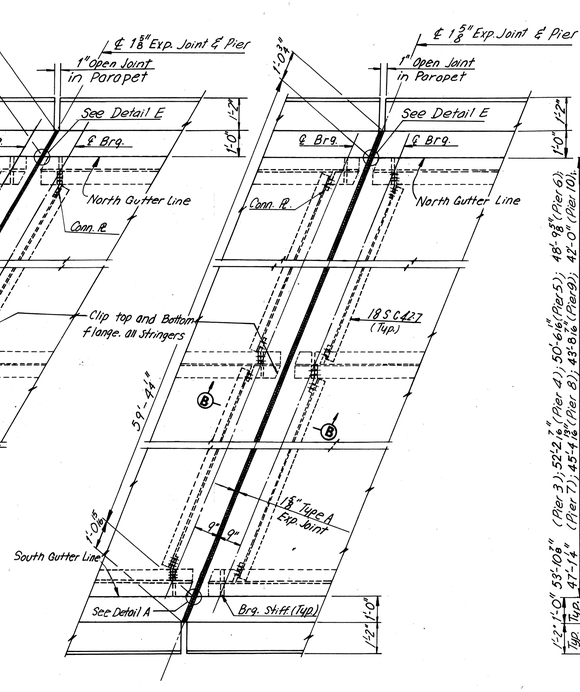
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	163	265



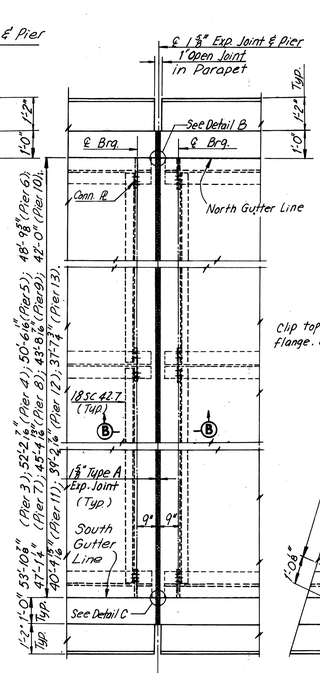
PLAN — JOINT AT WEST ABUTMENT
Scale : ⅜" = 1'-0"



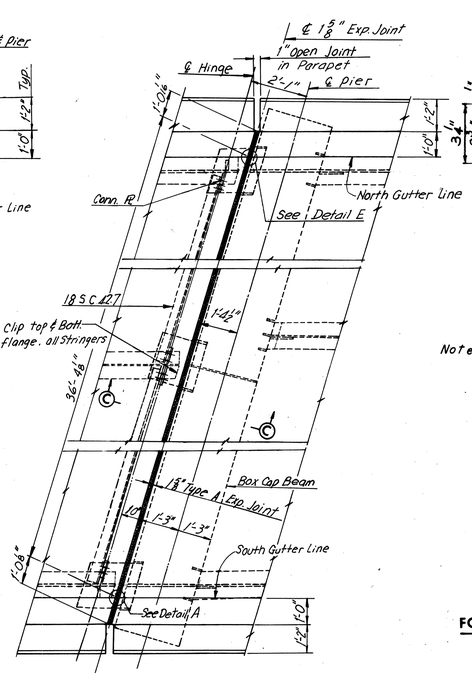
PLAN — JOINT AT PIER 1
Scale : ⅜" = 1'-0"



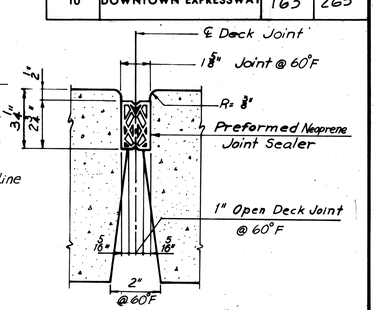
PLAN — JOINT AT PIER 2
Scale : ⅜" = 1'-0"



PLAN — JOINT AT PIERS 3 THRU. 13
Scale : ⅜" = 1'-0"

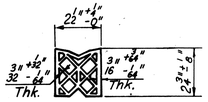


PLAN — JOINT AT PIER 14
Scale : ⅜" = 1'-0"

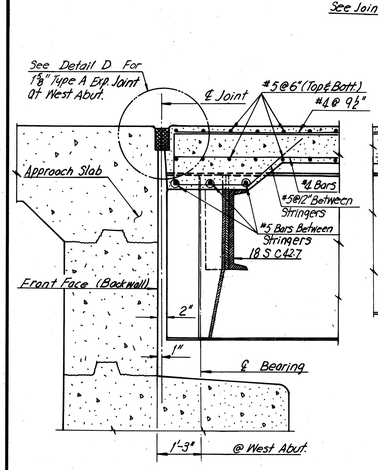


1⅝" TYPE "A" EXPANSION JOINT

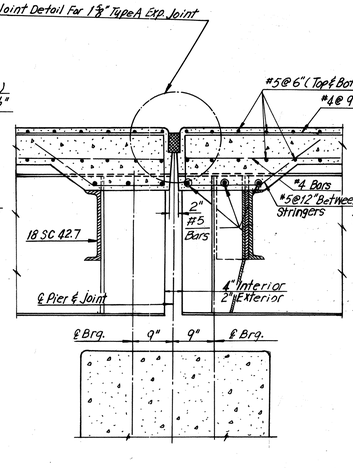
Note: For Joint Detail @ Abutment see Detail D.



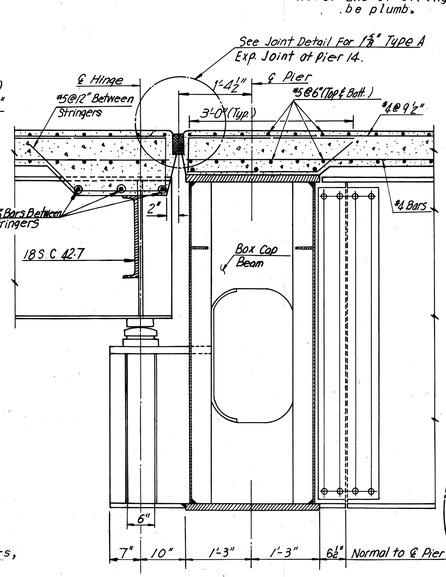
PREFORMED NEOPRENE JOINT SEALER FOR 1⅝" TYPE "A" EXPANSION JOINT



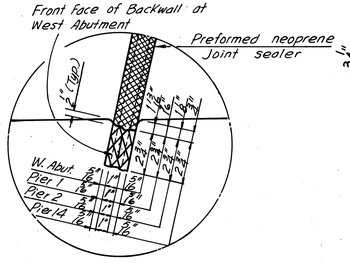
SECTION A-A
Scale : ¾" = 1'-0"



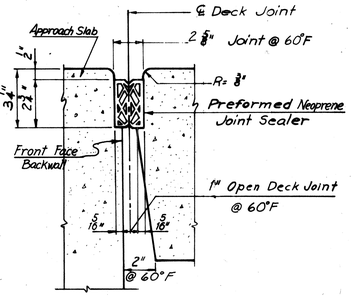
SECTION B-B
Scale : ¾" = 1'-0"



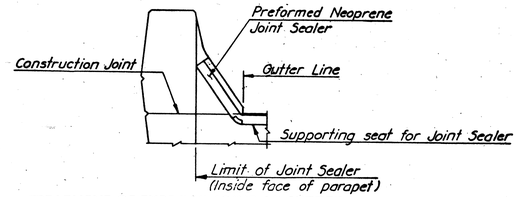
SECTION C-C
Scale : ¾" = 1'-0"



DETAIL A
No Scale

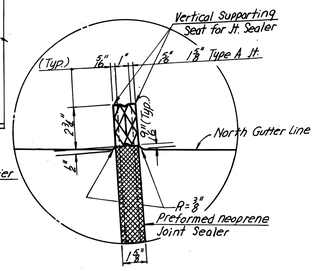


DETAIL D
No Scale

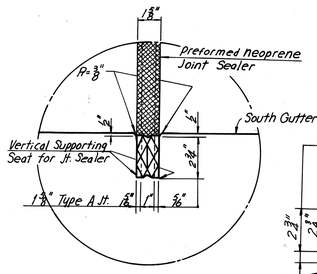


TREATMENT OF TYPE "A" JOINT AT GUTTER

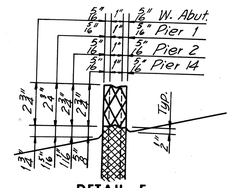
AS BUILT



DETAIL B
No Scale
Typical for Piers 3 thru. 13.



DETAIL C
No Scale
Typical for Piers 3 thru 13



DETAIL E
No Scale

Note: End of stringers and connection ℄'s shall be plumb.

Note: All horizontal dimensions of Sections shown above are normal to ℄ joint and pier.

Note: For details of bearing stiffeners, see Deck Plan Sheets 28, 29, & 30.

Note: It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	10-10-68				
CHECKED	C.E.B	2-5-69	1	As Built	TEM	8-76
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

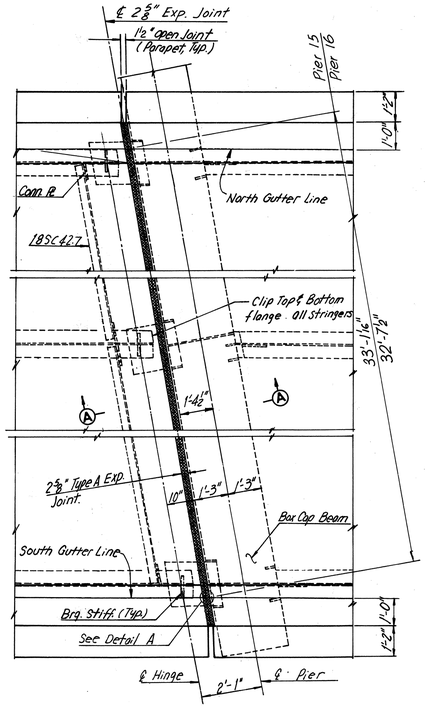
BRIDGE NO. 66
EASTBOUND ROADWAY O\
12TH ST. - R.R. TRACKS AND 161

JOINT DETAILS

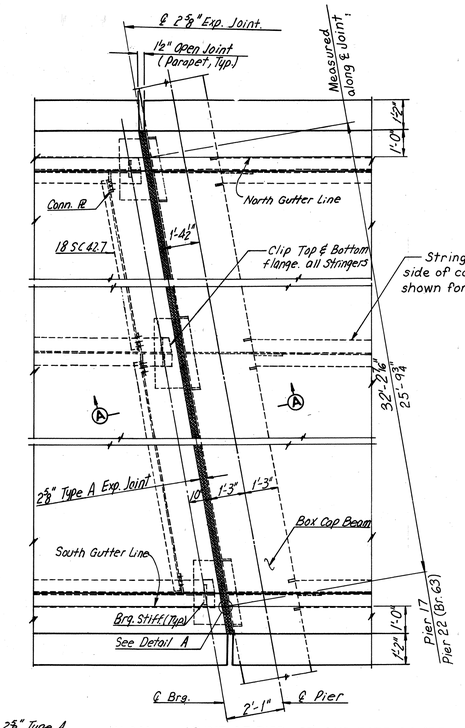
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 10
SHEET NO. 37 OF 46

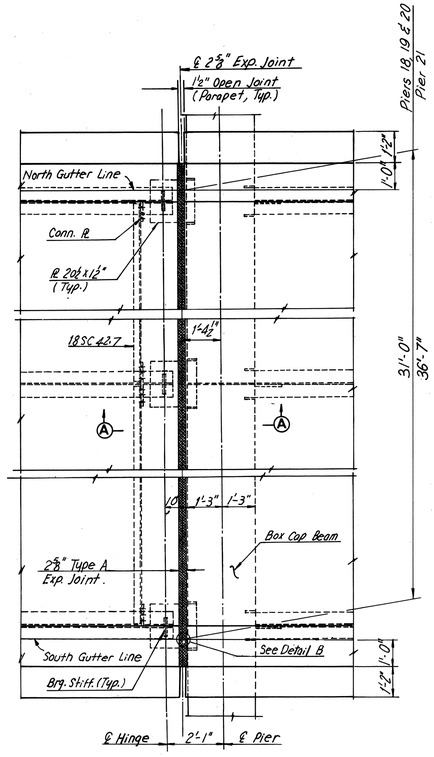
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	164	265



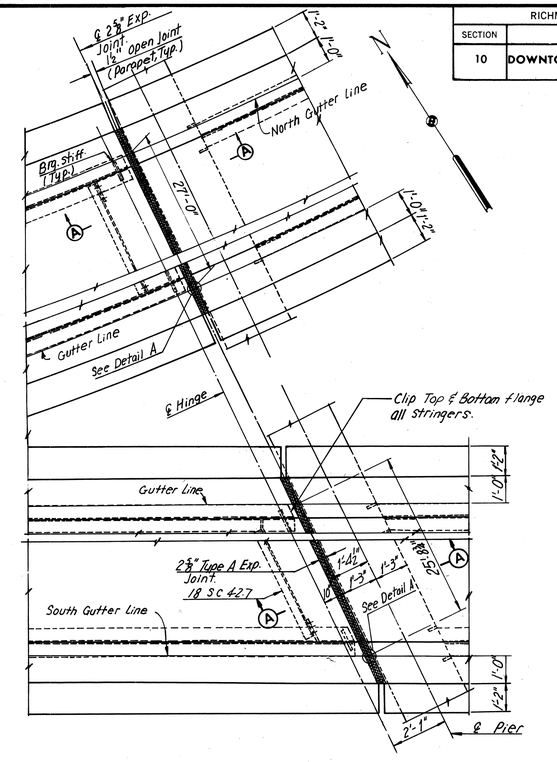
PLAN — JOINT AT PIERS 15 AND 16
Scale ⅜" = 1'-0"



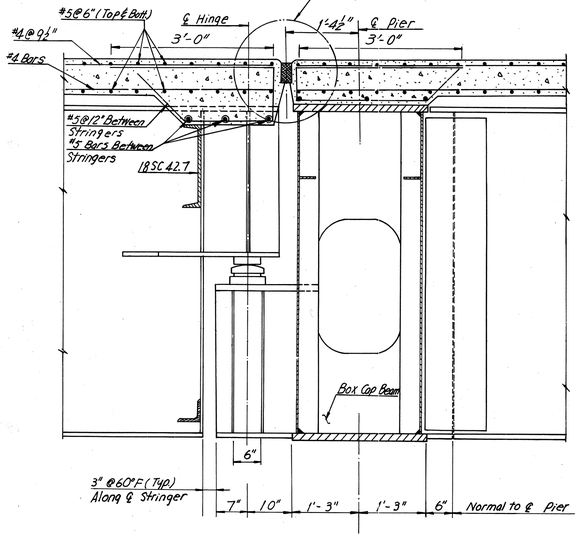
PLAN — JOINT AT PIER 17 AND PIER 22 (BR. 63)
Scale ⅜" = 1'-0"



PLAN — JOINT AT PIERS 18 19 ,20 AND 21 (BRIDGE 63)
Scale ⅜" = 1'-0"



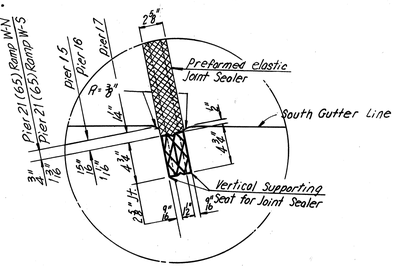
PLAN — JOINT AT PIER 22 (BRIDGE 63)
Scale ⅜" = 1'-0"



SECTION A-A
Scale ⅜" = 1'-0"

Note:
All horizontal dimensions of Section shown above are normal to ℄ joint and pier.

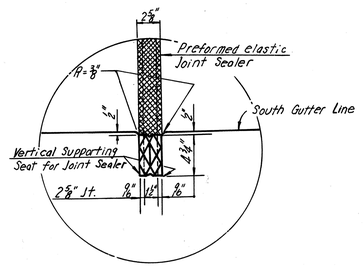
Note:
End of stringers and connection ℝ's shall be plumb.



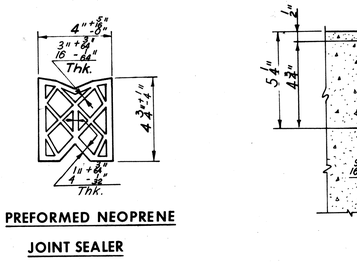
DETAIL A
No Scale
Typical for Piers 15 thru. 17 & Pier 21 (Br. 65)

Note:
For details of bearing stiffeners, see Framing Plan Sheets 17 thru 21.

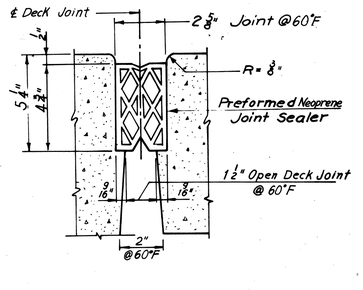
Note:
It is absolutely essential that the openings for the preformed neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of ends of the slab and for the temperature at the time of construction.



DETAIL B
No Scale
Typical for Piers 18 thru. 20 & Pier 21 (Br. 63.)

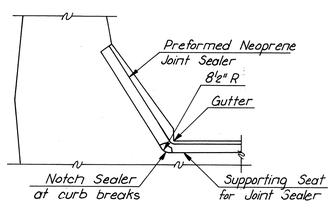


PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" EXPANSION JOINT
No Scale



2⅝" TYPE "A" EXPANSION JOINT
No Scale

Note:
All horizontal dimensions shown above are normal to ℄ Joint.



TREATMENT OF TYPE "A" JOINT AT CURB
No Scale

AS BUILT

	BY	DATE				
MADE	G.S.H.	10-15-68				
CHECKED	C.E.B.	2-5-69	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

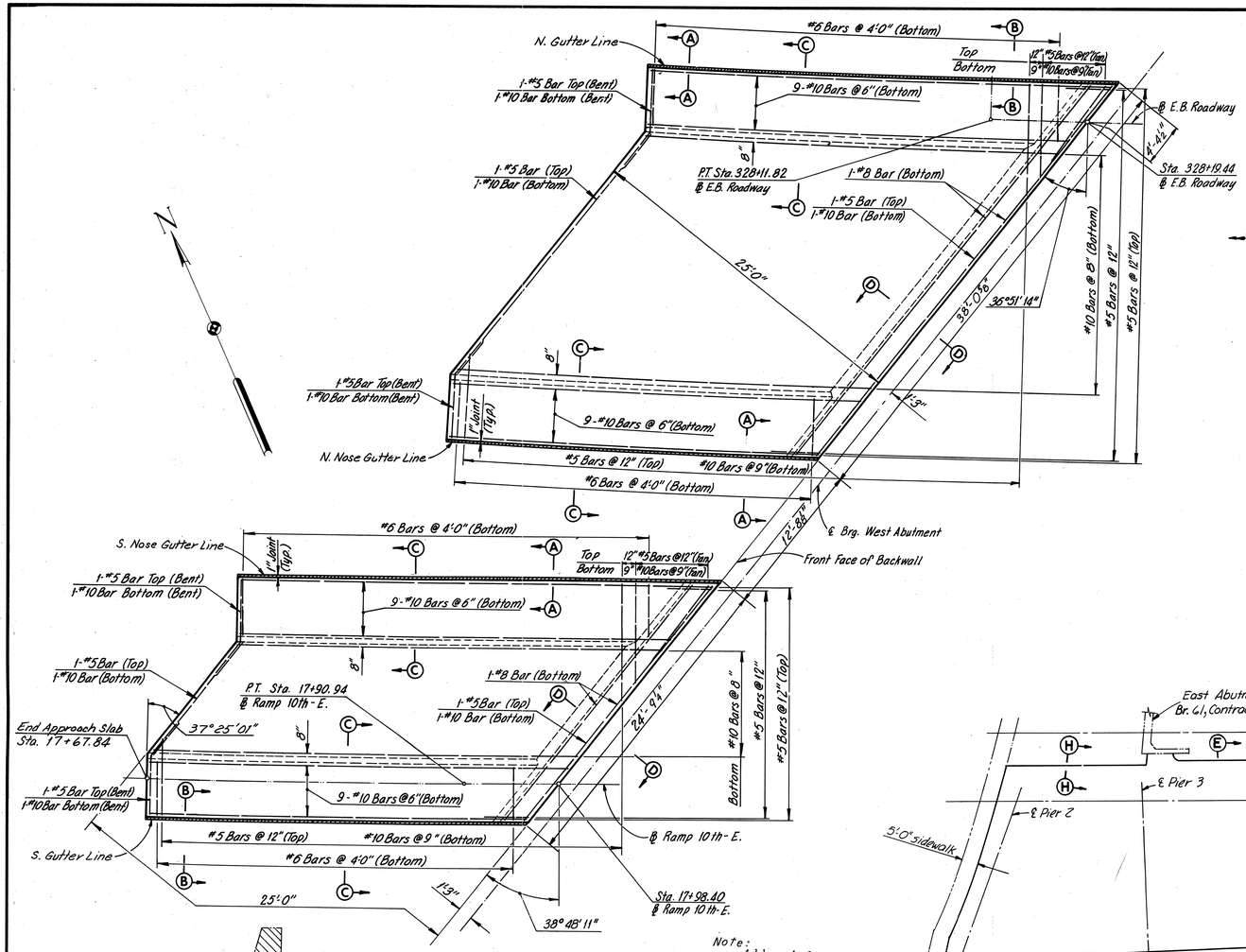
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
JOINT DETAILS

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

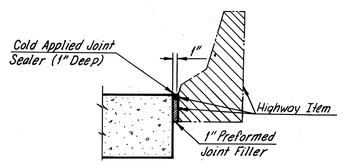
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 38 OF 46

PROJECT NO.	RICHMOND EXPRESSWAY SYSTEM			
7095-127-101	SECTION	PROJECT	SHEET NO	TOTAL SHEETS
	10	DOWNTOWN EXPRESSWAY	165	265



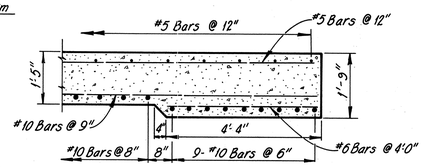
WEST APPROACH SLAB - PLAN

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



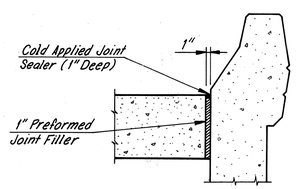
SECTION A-A

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



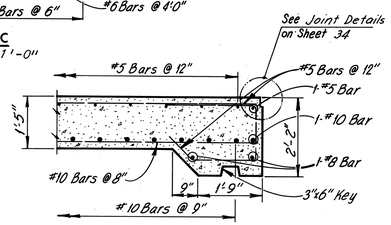
SECTION C-C

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



SECTION B-B

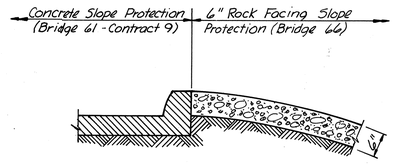
Scale: 1/2" = 1'-0"



SECTION D-D

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

Note:
All reinforcing bars shall be minimum 2" clear at exposed face of concrete.



SECTION H-H

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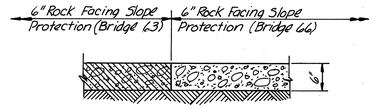
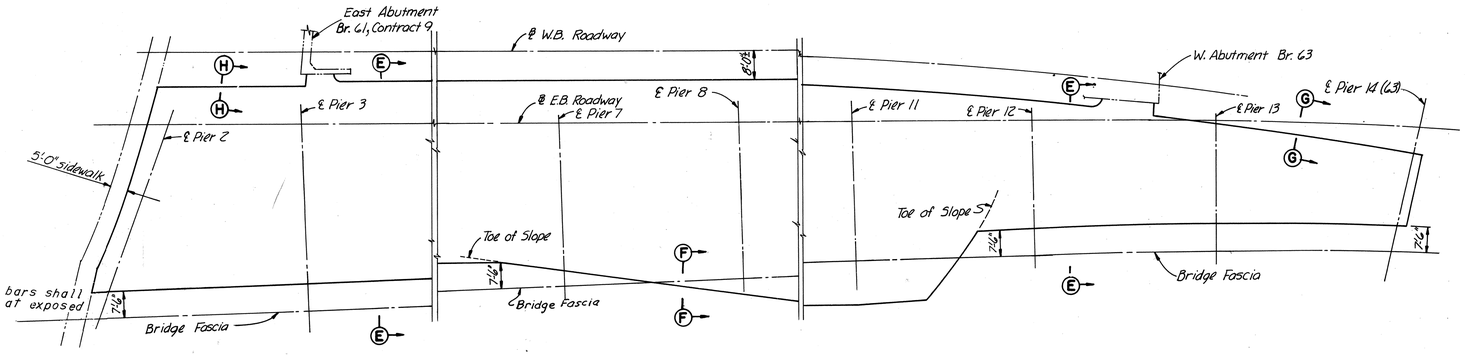


SECTION G-G

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

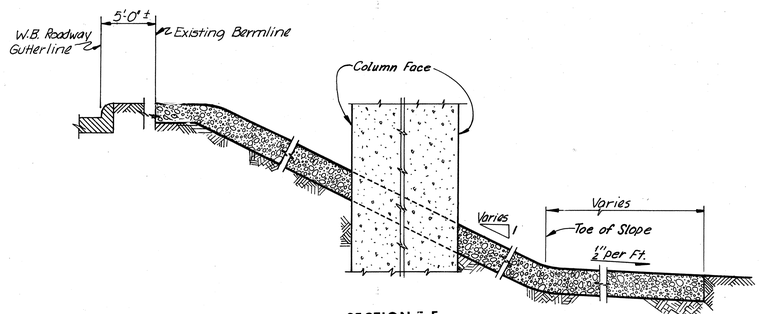
SECTION F-F

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



ROCK FACING SLOPE PROTECTION PLAN

Scale: 1" = 20'-0"



SECTION E-E

Scale: 1" = 1'-0"

AS BUILT

	BY	DATE				
MADE	D.E.S.	7-2-68				
CHECKED	HJC	7-9-68	1	As Built	TEM	8-7-68
IN CHARGE			NO.	REVISION	BY	DATE

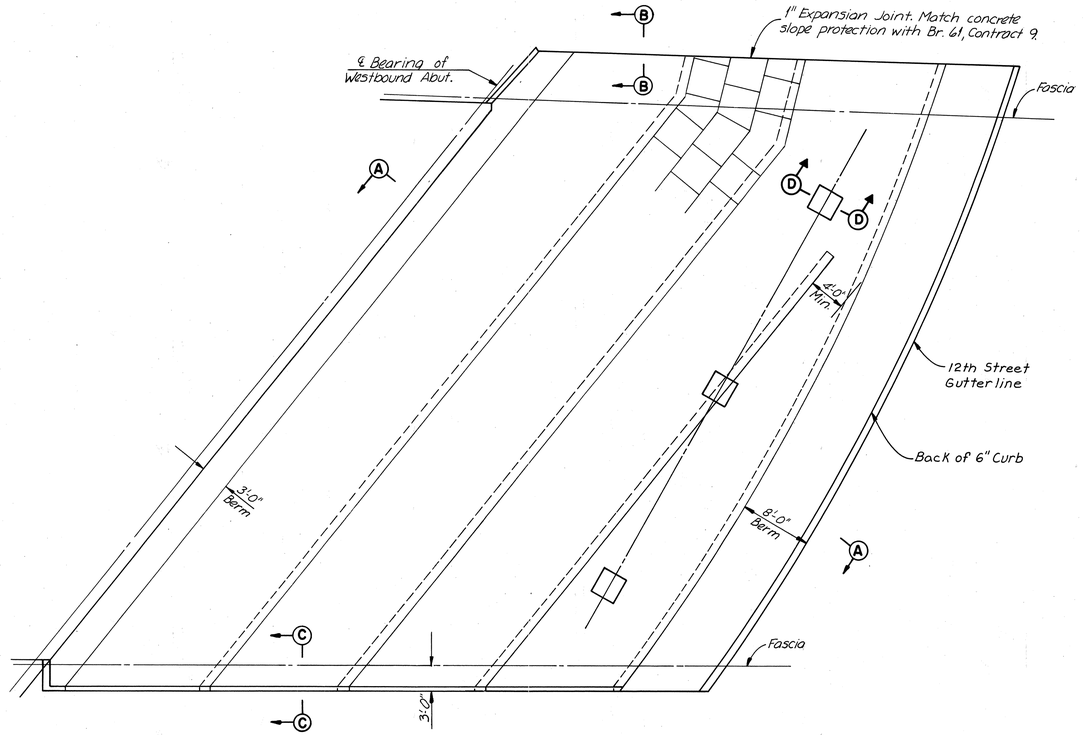
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 66
EASTBOUND ROADWAY OVER 12TH ST. - R.R. TRACKS AND 16TH ST.
APPROACH SLAB AND ROCK FACING SLOPE PROTECTION DETAILS

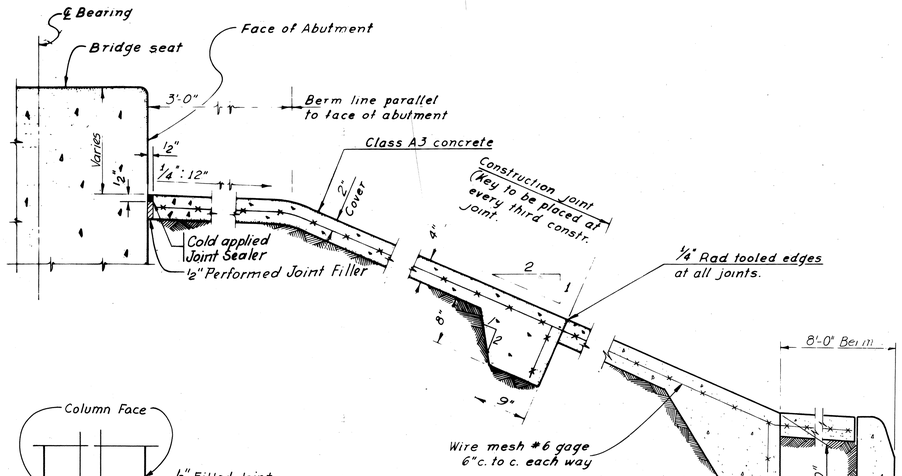
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 39 OF 46

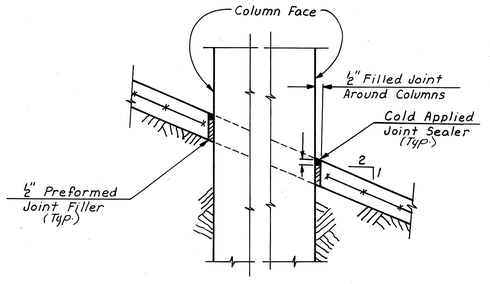
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	166	265



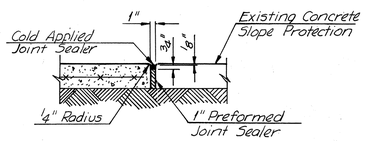
WEST ABUTMENT
Scale: 1/8"=1'-0"



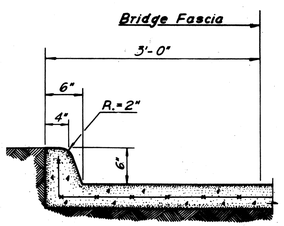
SECTION A-A
Scale: 1"=1'-0"



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



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



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

SLOPE PROTECTION NOTE

The item "Cast-in-place Concrete Slab Slope Protection" shall include the excavation of, or the placing and compaction of any embankment material necessary to bring the surface of the paved slopes to the finished elevations shown on the plans.

"Cast-in Place Concrete Slab Slope Protection shall be paid for at the contract unit price per square yard, which price shall include the concrete slab including wire mesh and joint filler. The slab shall be constructed in 4'-0" x 4'-0" panels, placed in horizontal courses, alternate panels being poured in a staggered pattern, with adjacent panels poured later. The slab shall be Class A3 Concrete of such consistency that it can be placed without the use of top forms, the surface shall be finished with a wood float.

Reinforcing shall consist of wire mesh No.6 gage, 6" C.C. each way, placed at the center of the slab, and continuous through construction joints.

DESIGNED	D.E.S.	7-68				
DRAWN	J.P.F.	4-74				
CHECKED	L.P.H.	4-74	1	As Built	TEM	8-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE NO. 66
EASTBOUND ROADWAY OVER
12TH ST. - R.R. TRACKS AND 16TH ST.
CONCRETE SLOPE PROTECTION DETAILS

SCALE As shown
CONTRACT 10
SHEET 40 OF 46

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

RICHMOND EXPRESSWAY SYSTEM
CONTRACT NO. PC – 2018
PROTECTIVE COATING OF STRUCTURES
****

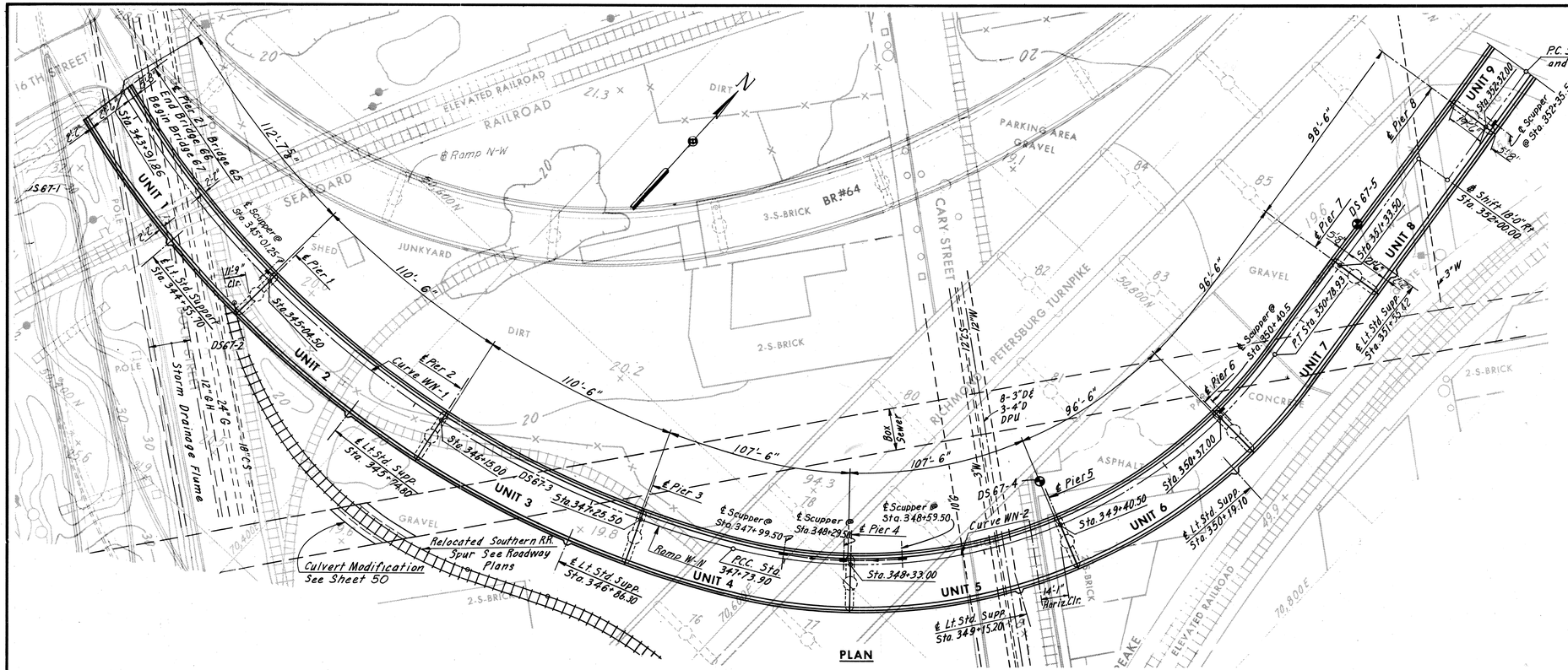
Bridge 67

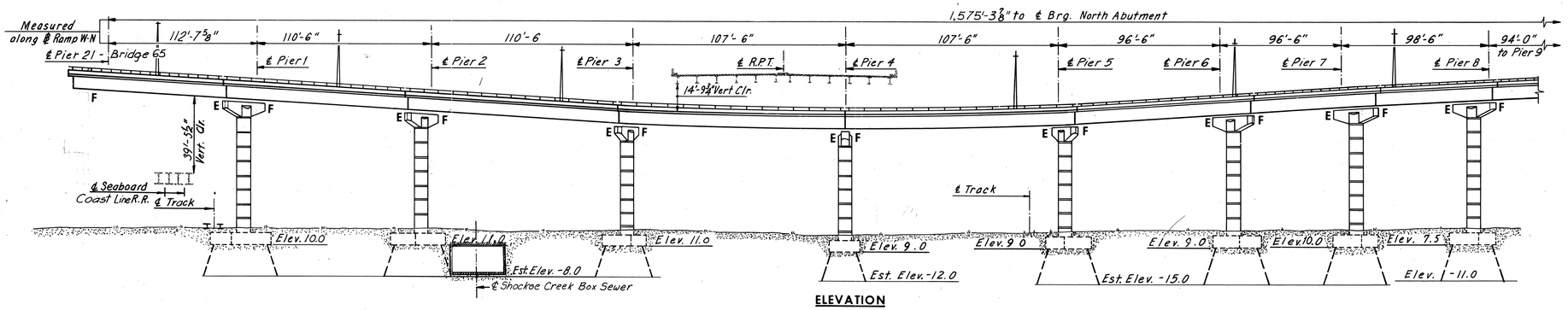
Downtown Expressway

Ramp W-N Connection to
Richmond - Petersburg Turnpike

RECORD SET PLANS (Next 50)

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	173	265





CURVE DATA

℄ R.P.T.

Curve: R.P.T.-1
P.I. = Sta. 1704+68.83
Δ = 15°03'56"
D = 1°00'
T = 757.65'
L = 1,506.56'
R = 5,729.58

Curve: R.P.T.-2
P.I. = Sta. 1723+07.01
Δ = 33°27'07"
D = 4°00'
T = 430.45'
L = 836.30'
R = 1,432.39'

℄ Ramp W-N

Curve: WN-1
P.I. = Sta. 345+25.47
Δ = 64°53'49"
D = 11°27'33"
T = 317.90'
L = 566.33'
R = 500.00

Curve: WN-2
P.I. = Sta. 349+47.64
Δ = 68°32'15"
D = 22°28'08"
T = 173.75'
L = 305.03'
R = 255.00'

Curve: WN-3
P.I. = Sta. 353+19.15
Δ = 6°23'54"
D = 6°00'
T = 53.38'
L = 106.64'
R = 954.93'

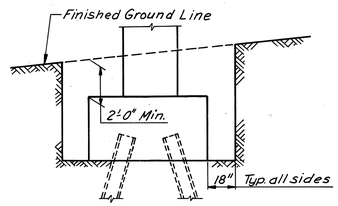
Curve: WN-4
P.I. = Sta 355+39.85
Δ = 5°01'11"
D = 1°30'
T = 167.43'
L = 334.65'
R = 3,819.72'

Curve: WN-5
P.I. = Sta. 358+17.39
Δ = 13°10'51"
D = 6°00'
T = 110.33'
L = 219.68'
R = 954.93'

Curve: WN-6
P.I. = Sta. 361+67.68
Δ = 19° 35' 06"
D = 4° 09' 03"
T = 238.25'
L = 471.85'
R = 1,380.39'

℄ Ramp N-W

Curve: NW-1
P.I. = Sta. 13+42.50
Δ = 32° 01' 34"
D = 3° 51' 36"
T = 426.01'
L = 829.72'
R = 1,484.39



LIMITS OF STRUCTURE EXCAVATION
No Scale

INDEX

Note:
For General Notes, see Sheet 4.
For Quantity Table, see Sheet 3

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	3-5-69	3	As Built	TEM	6-77
CHECKED	KCT	5-12-69	2	Light Sta. Location Unit 8	JLK	6-6-75
IN CHARGE			1	Sheets 42 & 45 added	LBP	3-5-76

AS BUILT

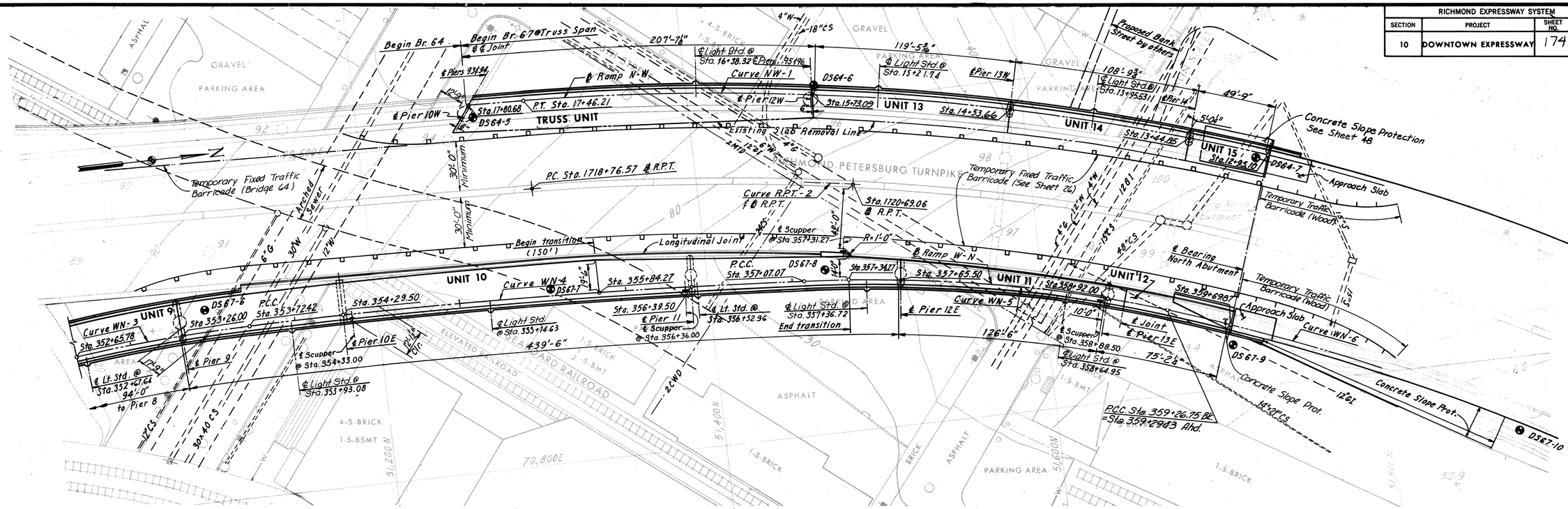
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

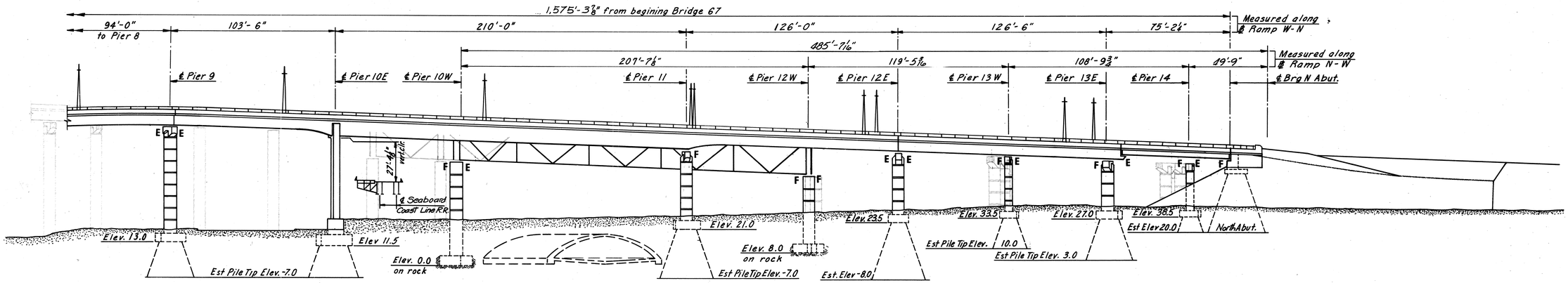
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1" = 30'-0"
CONTRACT NO.: 10
SHEET NO. 1 OF 54

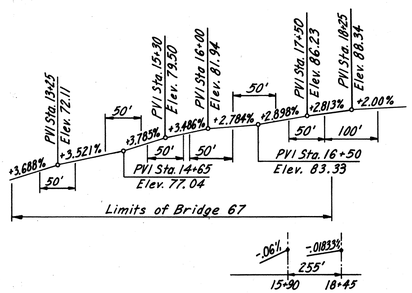
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	174	265



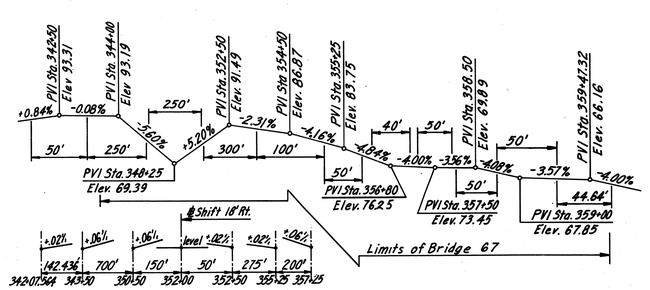
PLAN
Scale: 1"=30'-0"



ELEVATION
Scale: 1"= 30'-0"



PROFILE GRADE CROSS SLOPE - RAMP N-W



PROFILE GRADE AND CROSS SLOPE - RAM W-N

	BY	DATE
MADE	AMH	12-30-68
CHECKED	KCT	5-12-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	'As Built	TEM	6-77
1	Revised Piers 6 Abut Sta. & Span Length	DMB	1-24-75

AS BUILT

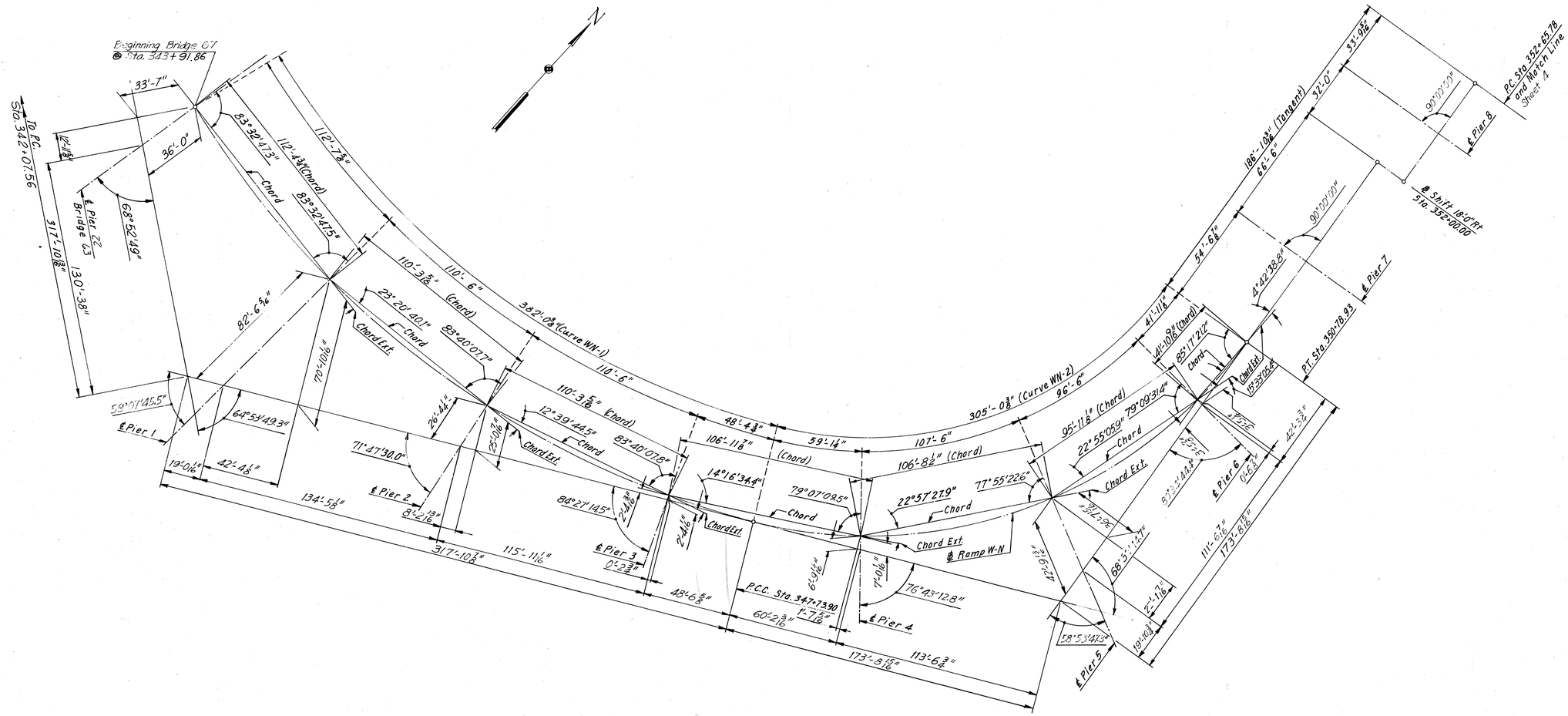
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 2 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	175	265



LAYOUT SKETCH
Scale: 1"=30'-0"

ESTIMATED QUANTITIES

	Structure Excavation Cu. Yds.	Concrete (‡) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild Carbon Lbs.	Str. Steel High Stregth Lbs.	Aluminum Railing (1-Rail) Lin. Ft.	Porous Backfill Cu. Yds.	Underdrain 6" Dia. Pipe Lin. Ft.	Steel Piles 10BP42 Lin.Ft.	Steel Piles 12BP53 Lin.Ft.
Superstructure	---	1,729.0	394,000	1,852,700	550,750	2,930	---	---	---	---
Substructure	2,821	2,456.0	376,600	125,200	1,850	---	14	27	630	5,745
Total	2,821	4,185.0 ‡	770,600	1,977,900	552,600	2,930	14	27	630	5,745

	Steel Piles 14BP73 Lin. Ft	Asphalt Damp-proofing Sq. Yds.	Approach Slab Concrete(‡) Cu. Yds.	Approach Slab Reinforcing Steel Lbs.	Metal Conduit 3" Dia. Lin. Ft.	Sheet Piling Lump Sum	Bridge Drainage Metal Work Lbs.	Concr. Slab Slope Prot. Sq. Yds.	Modifications to existing Shockoe Creek Box Sewer Lump Sum	Modifications To R.P. Turn-pike Bridge Lump Sum	Elastomeric Expansion Dam Type 250 Lin. Ft.	Elastomeric Expansion Dam Type 400A Lin. Ft.
Superstructure	---	---	---		2,030	--	14,020	---	---	1	18	25
Substructure	760	27	38.0	7900	--	1	---	291	1	-	--	--
Total	760	27	38.0 ‡	7900	2,030	1	14,020	291	1	1	18	25

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

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	3-28-69				
CHECKED	KCT	5-5-69	1	As Built	TEM	6-77
IN CHARGE						

AS BUILT

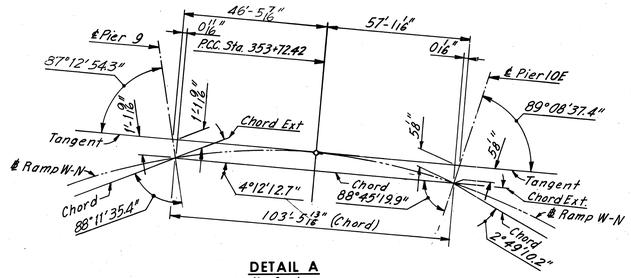
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
LAYOUT

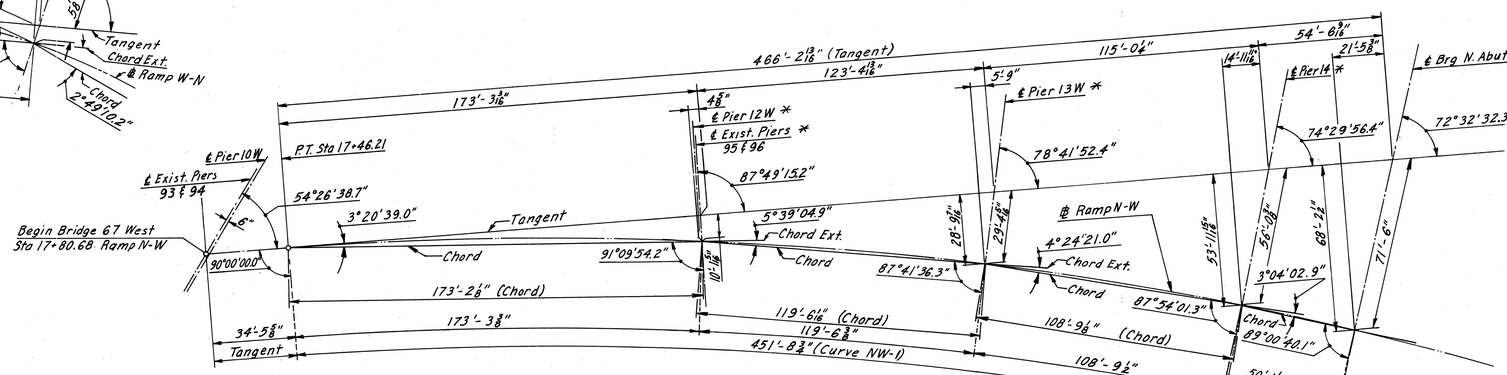
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 3 OF 54

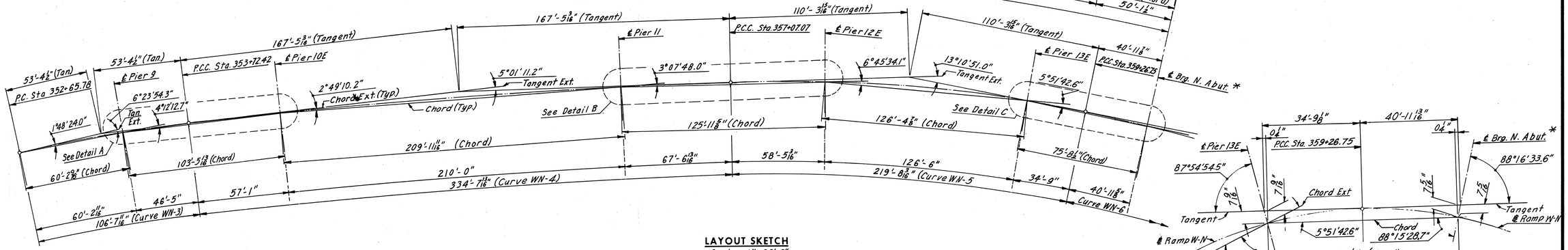
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	176	265



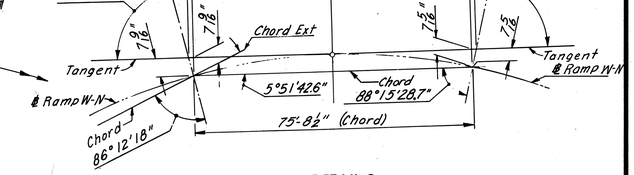
DETAIL A
No Scale



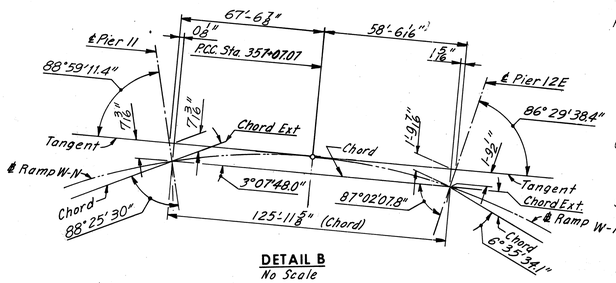
*Note:
The centerline shown is for layout only. See abutment and pier drawings for exact locations of columns.



LAYOUT SKETCH
Scale : 1"= 30'-0"



DETAIL C
No Scale



DETAIL B
No Scale

GENERAL NOTES:

ROADWAY: One variable width roadway connecting Br.66 (E.B. Roadway) with Richmond-Petersburg Turnpike.

Face to face of railing is 27'-0" thru the Ramp section, transitioning to 13'-0" widening along Northbound Lanes of the R.P.T.
Also included is 13'-0" widening of Southbound Lanes of the R.P.T. from North Abutment to Pier 94.

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

SPECIFICATIONS:

GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.
DESIGN: A.A.S.H.O. Standard Specifications for Highway Bridges 1973, modified by Special Design provisions.
WELDING: 1972 Standard Specifications for Welded Highway and Railway Bridges of the American Welding Society.

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

DATUM: City of Richmond

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

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

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

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

CONCRETE NOTES: Concrete in superstructure shall be Class A-4. All other concrete shall be Class A-3. All exposed edges and corners shall have a ¾" chamfer or fillet unless otherwise noted. Care in the method of vibration, the use of low-slump concrete, and or other means shall be employed to prevent downgrade movement of newly placed slab concrete. Finishing Concrete Surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face to concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted. All reinforcing steel shall conform to ASTM 615 Grade 40

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

AS BUILT

	BY	DATE				
MADE	AMH	3-27-69	2	As Built	TEM	6-77
CHECKED	KCT	5-6-69				
IN CHARGE			NO.	REVISION	BY	DATE

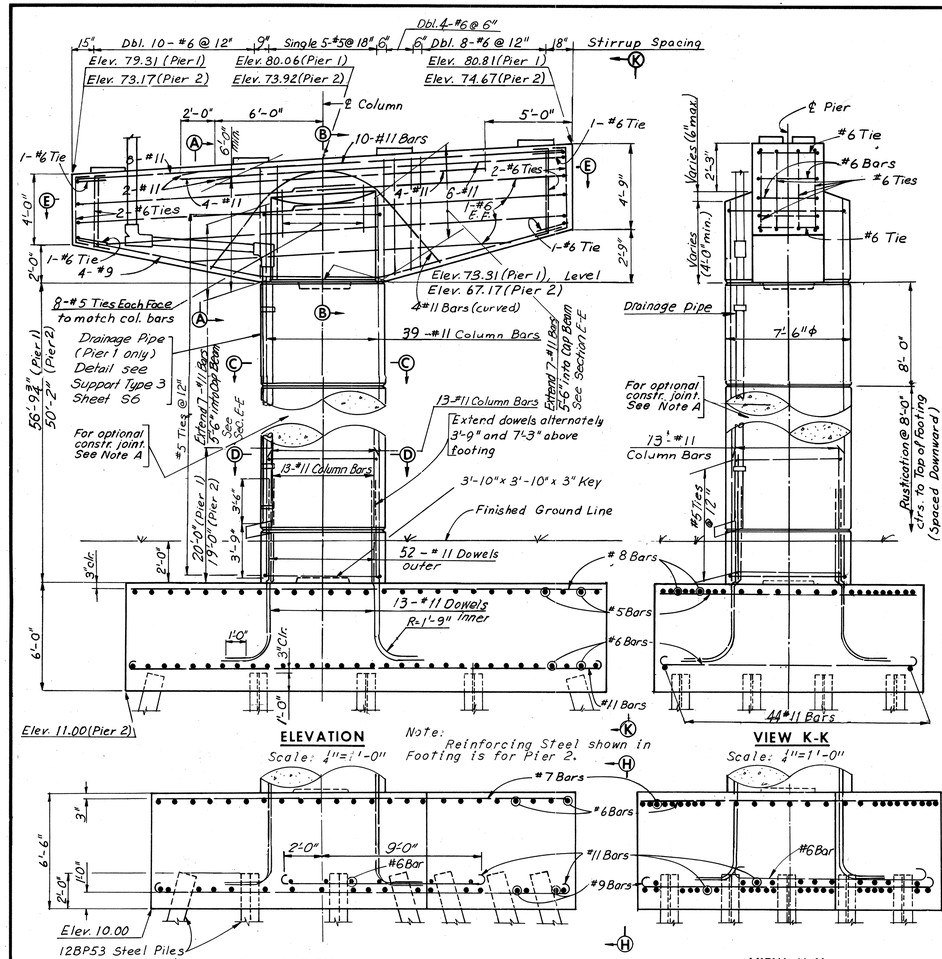
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
LAYOUT

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 4 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	177	265



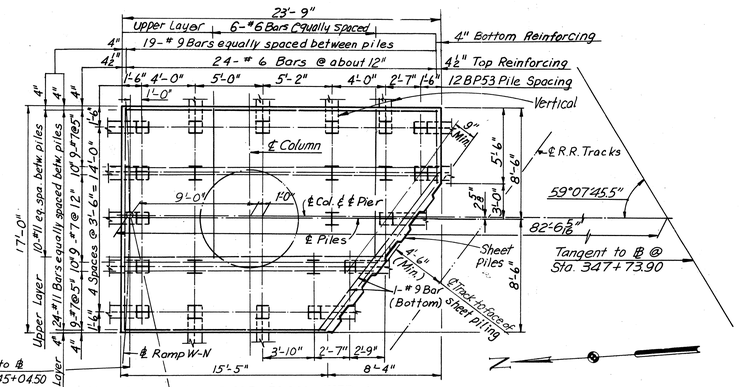
ELEVATION
Scale: 1/4"=1'-0"

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

Note: Reinforcing Steel shown in Footing is for Pier 2.

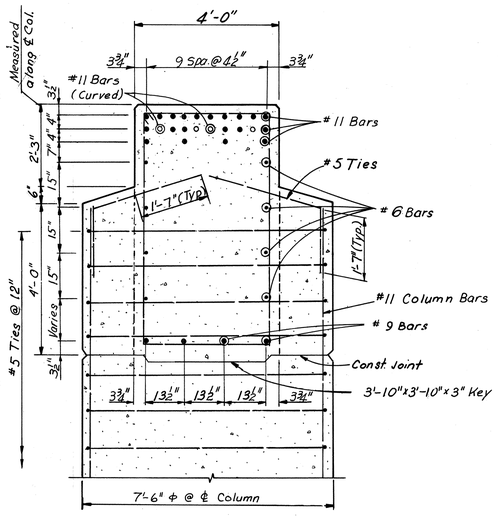
FOOTING ELEVATION - PIER 1
Scale: 1/4"=1'-0"

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

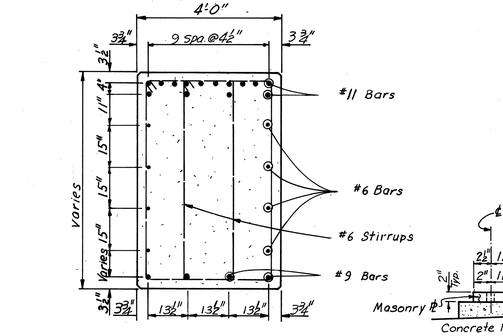


FOOTING PLAN - PIER 1
Scale: 1/8"=1'-0"

Note: For 12BP53 Steel Pile Details, see Sheet 6. All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons). Batter all piles 3" per foot where shown. For Standard Shoe details, See Sheets S16,S32. For Framing Plan, See Sheet 19 & 20. Estimated Pile tip Elevation 78.00.

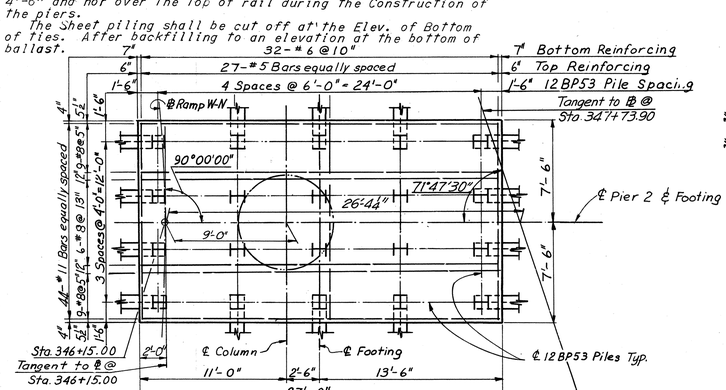


SECTION B-B
Scale: 1/2"=1'-0"



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

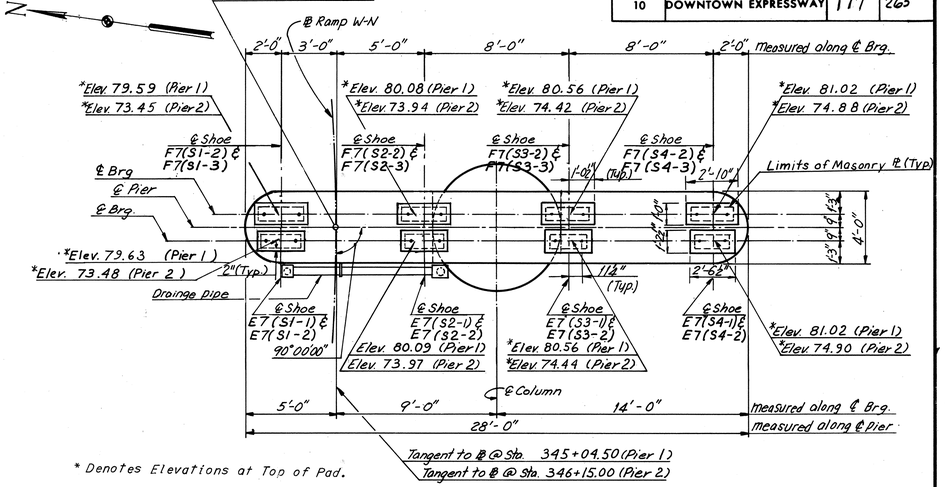
Note: (Pier 1 only) The face of the Sheet piling to ℄ Track not encroach within 4'-6" and nor over the top of rail during the Construction of the piers. The Sheet piling shall be cut off at the Elev. of Bottom of ties. After backfilling to an elevation at the bottom of ballast.



FOOTING PLAN - PIER 2
Scale: 1/8"=1'-0"

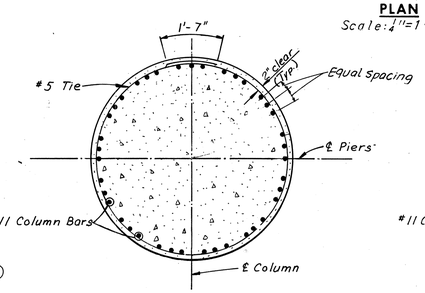
Note: Footing is eccentric.

FOOTINGS FOR PIERS 1 AND 2 ARE ECCENTRIC AS SHOWN ON FOOTING PLANS ABOVE

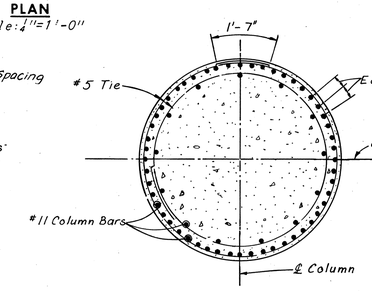


* Denotes Elevations at Top of Pad.

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

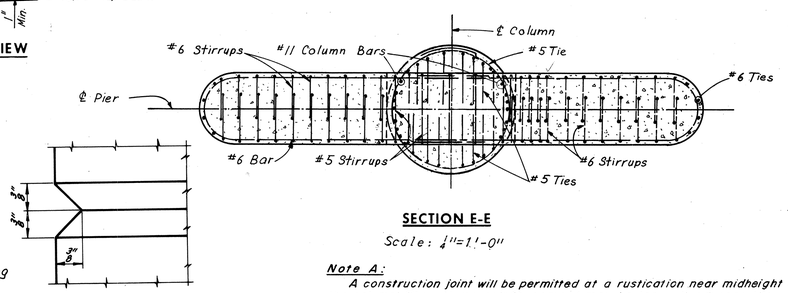


SECTION C-C
Scale: 3/8"=1'-0"

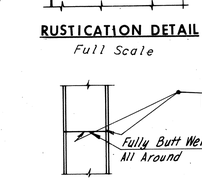


SECTION D-D
Scale: 3/8"=1'-0"

PAD ELEVATION VIEW
No Scale



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



RUSTICATION DETAIL
Full Scale

PILE SPLICE DETAIL
No Scale

Note A:
A construction joint will be permitted at a rustication near midheight of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minmum of 3'-6". Splices shall be staggered atleast 3'-3" between adjacent bars.

	BY	DATE				
MADE	J.D.	9-16-68				
CHECKED	G.S.H.	4-21-69	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

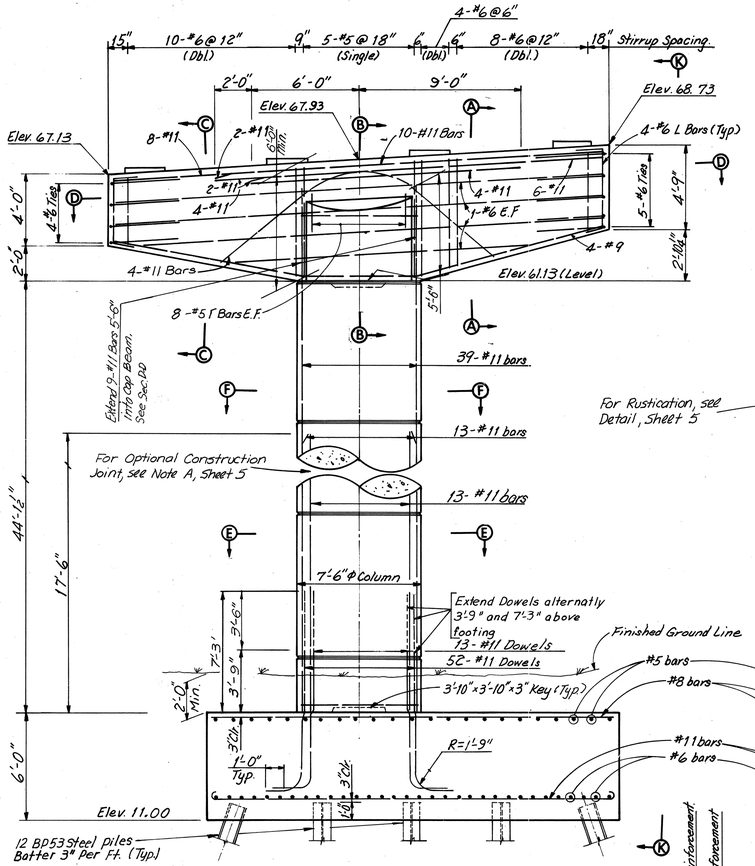
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

PIERS 1 AND 2

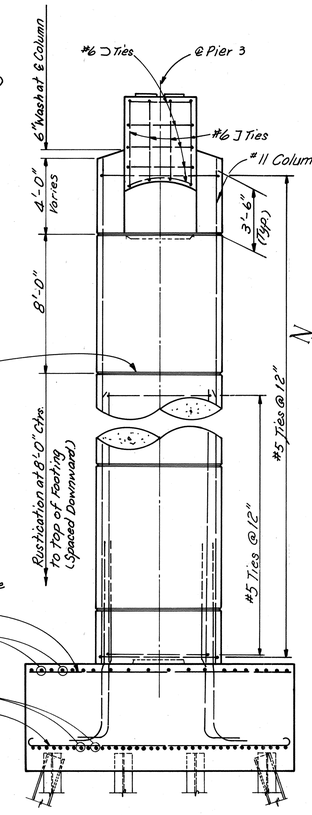
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 5 OF 54

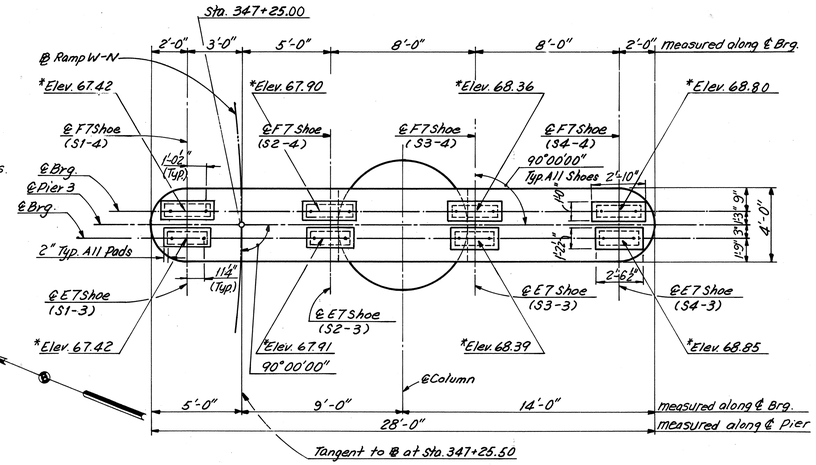
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	178	265



ELEVATION
Scale ¼"=1'-0"

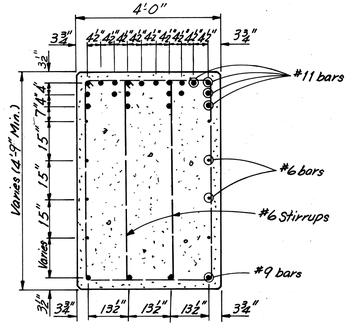


VIEW K-K
Scale ¼"=1'-0"

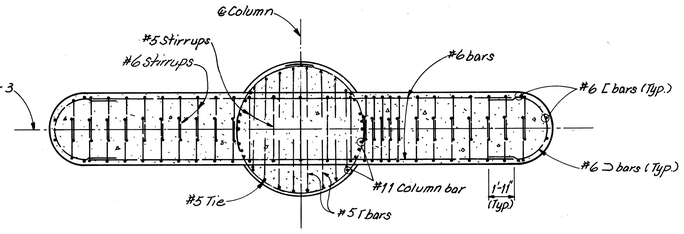


PLAN
Scale 1/4"=1'-0"

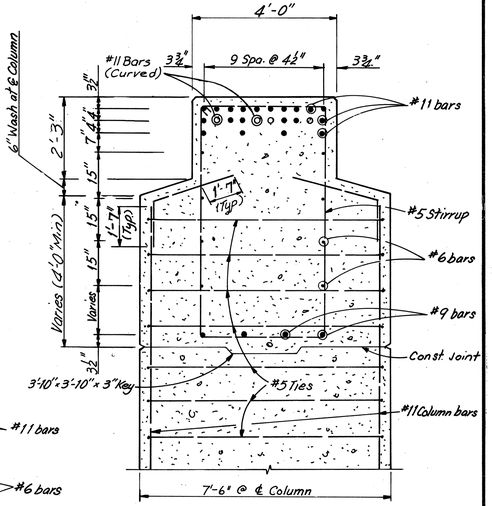
* Denotes top elevation of Concrete Pad.



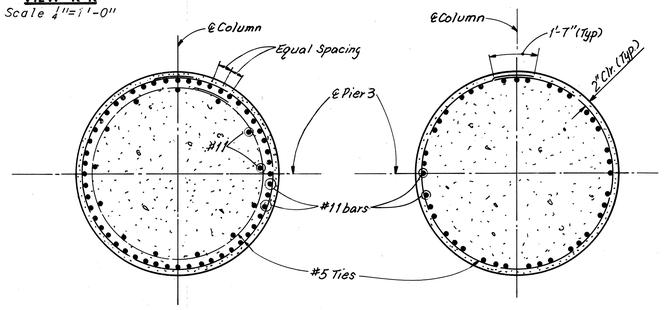
SECTION A-A
Scale ½"=1'-0"



SECTION D-D
Scale ¼"=1'-0"

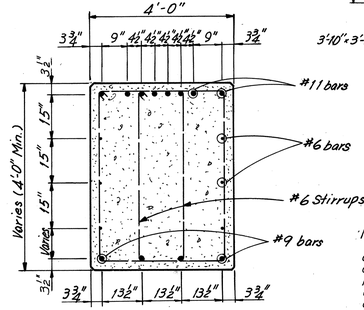


SECTION B-B
Scale ½"=1'-0"

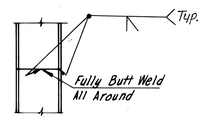


SECTION E-E
Scale ⅜"=1'-0"

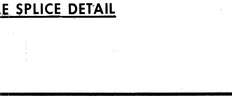
SECTION F-F
Scale ⅜"=1'-0"



SECTION C-C
Scale ½"=1'-0"



PILE SPLICE DETAIL



FOOTING PLAN
Scale ¼"=1'-0"

	BY	DATE
MADE	G.C.C.	9-17-68
CHECKED	P.T.A.	4-21-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes Added	LRH	4-19-74
2	As Built	TEM	6-77

FOOTING FOR PIER 3 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

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

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Framing Plan, see Sheet 20.
Estimated Pile tip Elevation -8.00.
For Standard Shoe details, see Sheets S1 & S2.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

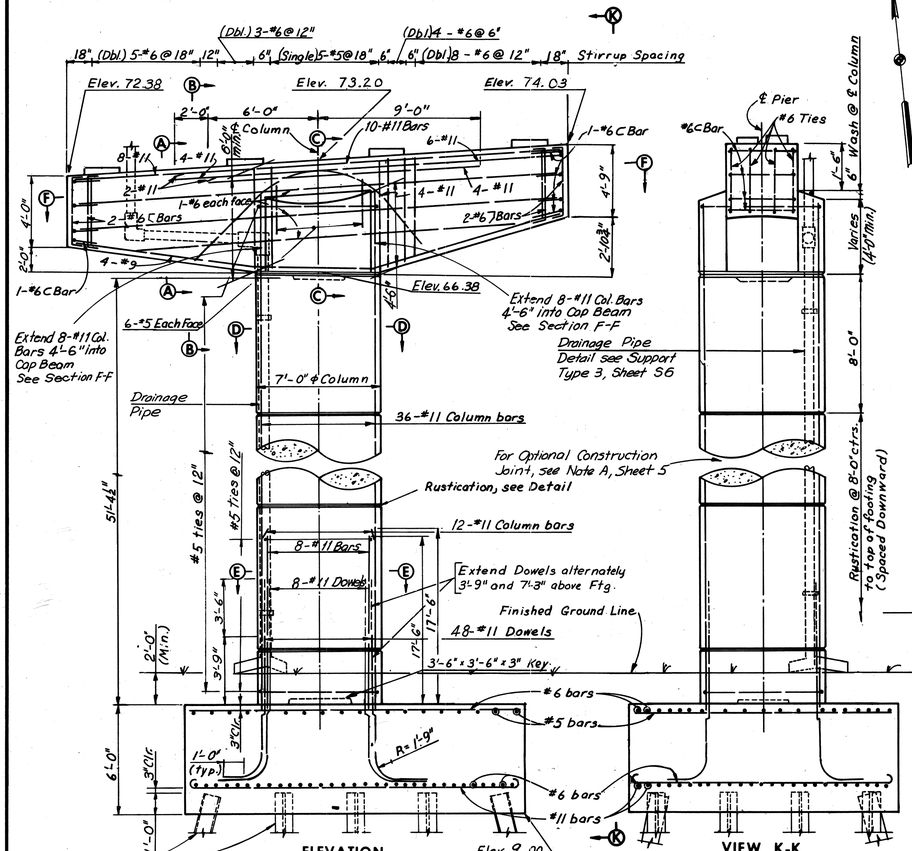
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 3

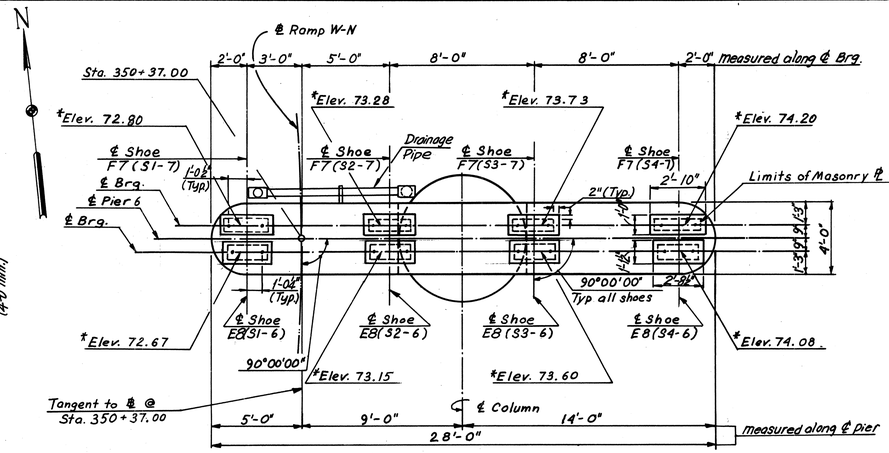
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 6 OF 54


RICHMOND EXPRESSWAY SYSTEM
SECTION 10 | PROJECT DOWNTOWN EXPRESSWAY | SHEET NO. 179 | TOTAL SHEETS 265
ELEVATION
Scale 1/4"=1'-0"
Note: Reinforcing Steel in Footing is for Pier 5, Pier 4 is similar.
VIEW K-K
Scale 1/4"=1'-0"
PLAN
Scale 1/4"=1'-0"
* Denotes top elevation of Concrete pad.
RUSTICATION DETAIL
No Scale
SECTION C-C
Scale 1/4"=1'-0"
(Pier 5 Column Reinforcing shown, Pier 4 similar)
SECTION D-D
Scale 3/8"=1'-0"
(PIER 5)
SECTION D-D
Scale 3/8"=1'-0"
(PIER 4)
SECTION E-E
Scale 3/8"=1'-0"
(PIERS 4 AND 5)
SECTION F-F
Scale 3/8"=1'-0"
(PIERS 4 AND 5)
SECTION A-A
Scale 1/2"=1'-0"
SECTION B-B
Scale 1/2"=1'-0"
FOOTING PLAN
Scale 1/4"=1'-0"
(PIER 5)
FOOTING PLAN
Scale 1/4"=1'-0"
(PIER 4)
Note: Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2ft., redesign will be required.
FOOTINGS FOR PIERS 4 AND 5 ARE ECCENTRIC AS SHOWN ON FOOTING PLANS ABOVE
Note: All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheets S1 & S2.
For Framing Plan, see Sheet 20 & 21.
Estimated Pile tip Elevation -12.00 (Pier 4) and -15.00 (Pier 5).
MADE | BY G.C.C. | DATE 9-14-68
CHECKED | J.D. | 9-17-68
IN CHARGE
1 | Note Added | LRH | 4-19-74
2 | As Built | TEM | 6-77
NO. | REVISION | BY | DATE
AS BUILT
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 4 AND 5
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 7 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	180	265

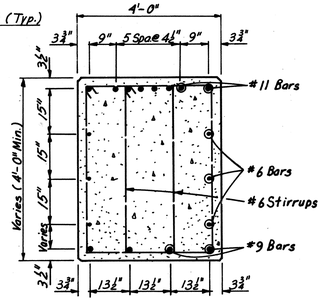




PIER CAP PLAN

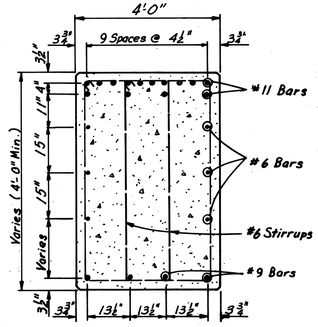
Scale: 1/4"=1'-0"

* Denotes top elevation of Concrete Pad.



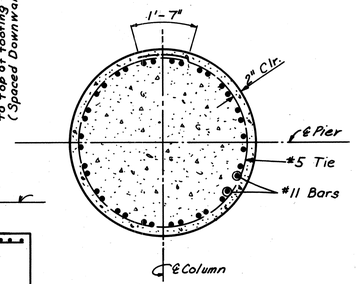
SECTION A-A

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



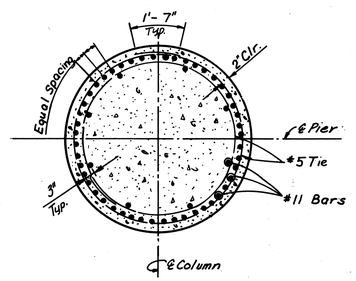
SECTION B-B

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



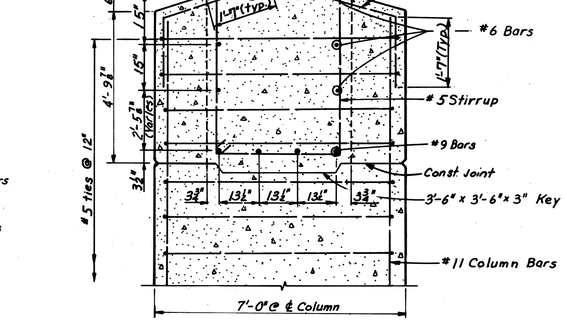
SECTION D-D

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



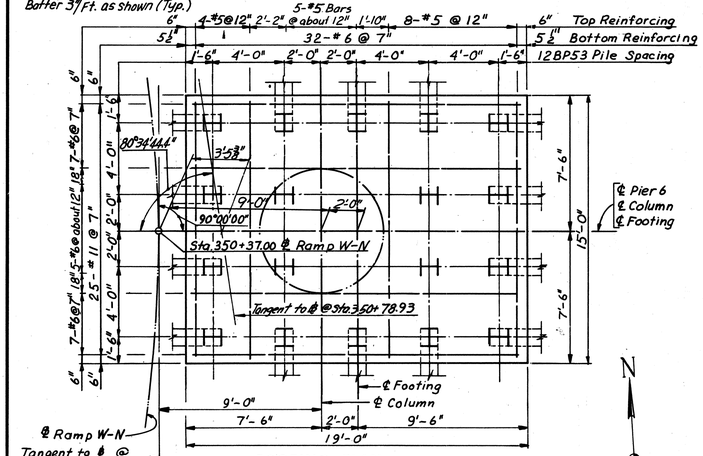
SECTION E-E

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



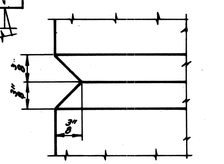
SECTION C-C

Scale 1/2"=1'-0"

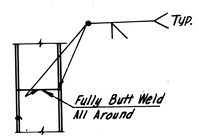


FOOTING PLAN

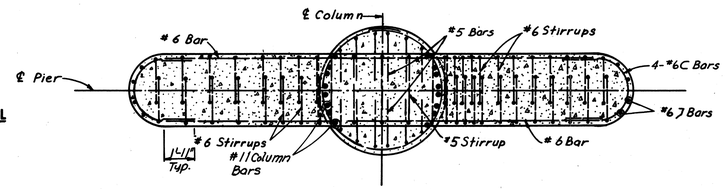
Scale: 1/4"=1'-0"



RUSTICATION DETAIL

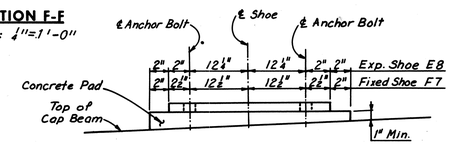


PILE SPLICE DETAIL



SECTION F-F

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



ANCHOR BOLT SETTING PLAN

No Scale

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

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheets S1&S2.
For Framing Plan, see Sheet 21.
Estimated Pile Tip Elevation, -15.00.

FOOTING FOR PIER 6 IS ECCENTRIC AS SHOWN ON FOOTING PLAN

	BY	DATE	NO.	REVISION	BY	DATE
MADE	J.D.	9-12-68	1	Note Added	LRH	4-19-74
CHECKED	Y.C.P	5-15-69	2	As Built	TEM	6-77
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

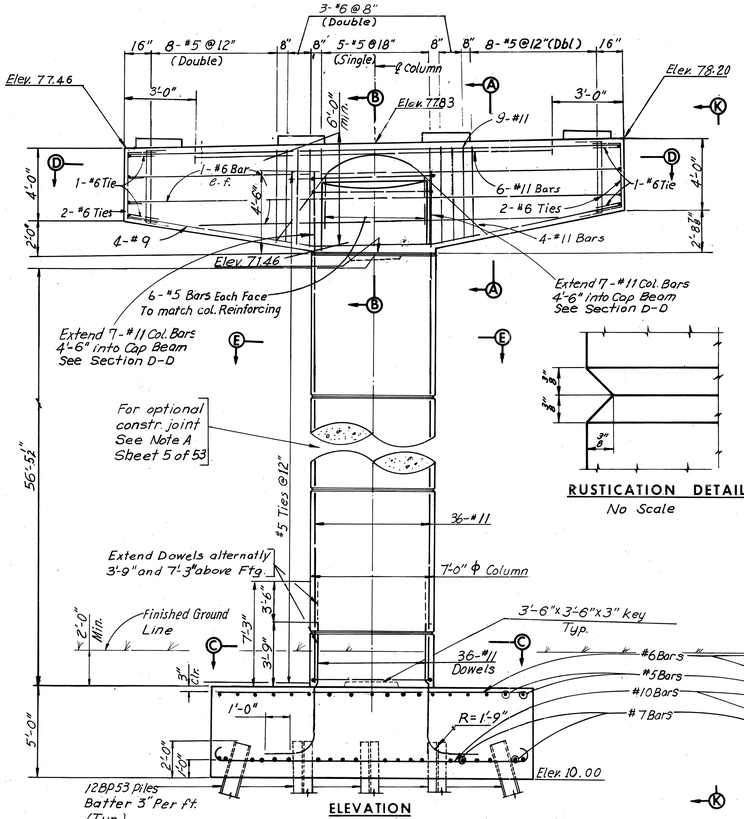
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

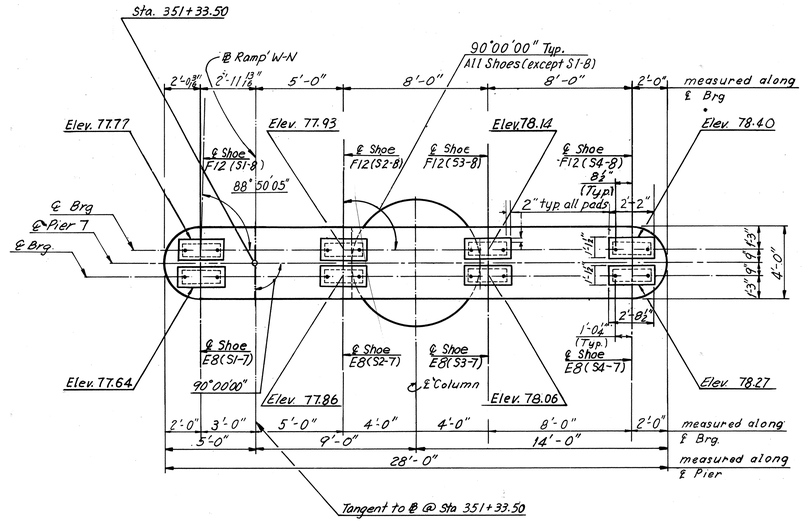
PIER 6

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

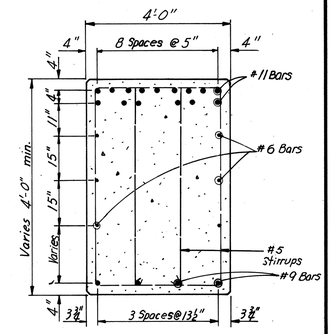
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 8 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	181	265

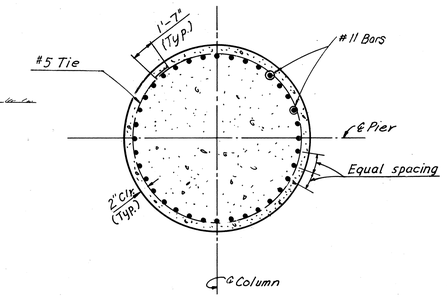




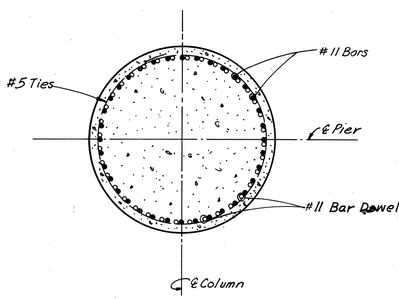
PLAN
Scale 1"=1'-0"



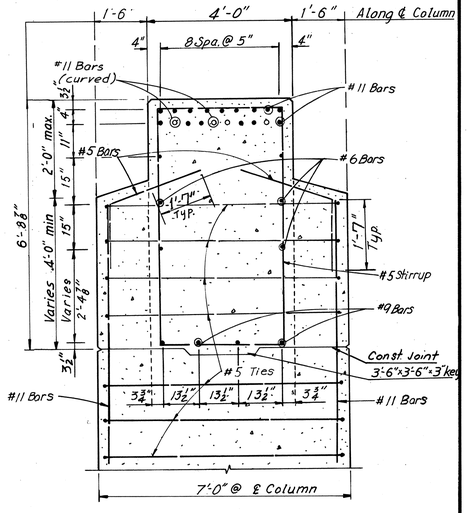
SECTION A-A
Scale ½"=1'-0"



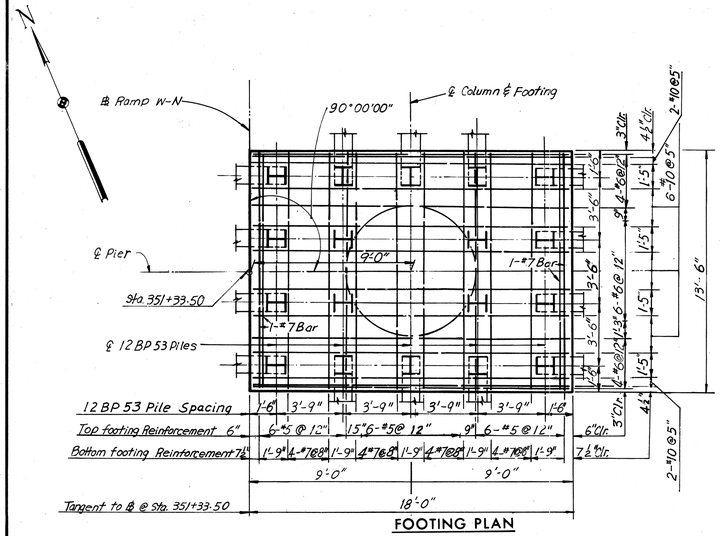
SECTION E-E
Scale ⅜"=1'-0"



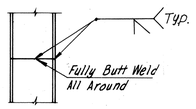
SECTION C-C
Scale ⅜"=1'-0"



SECTION B-B
Scale ½"=1'-0"



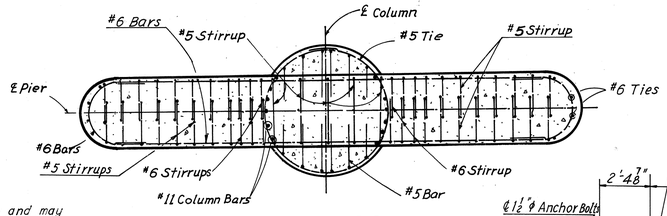
FOOTING PLAN
Scale: 1"=1'-0"



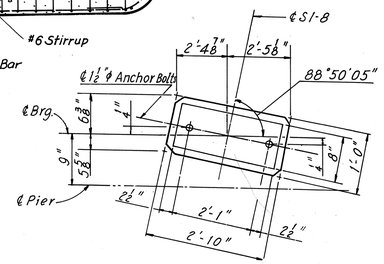
PILE SPLICE DETAIL
No Scale

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

Note:
All piles shall be 12BP53 Steel Piles (Design capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe details, see Sheet S1.
For Framing Plan, see Sheet 21 & 22.
Estimated pile Tip Elevation -15.00.



SECTION D-D
Scale ¼"=1'-0"



PAD AND ANCHOR BOLT SETTING PLAN

	BY	DATE				
MADE	GSH	9-12-68	2	As Built	TEM	6-77
CHECKED	YCP	5-13-69	⚠	Revise Pad elevs. Span B	AMB	2-6-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

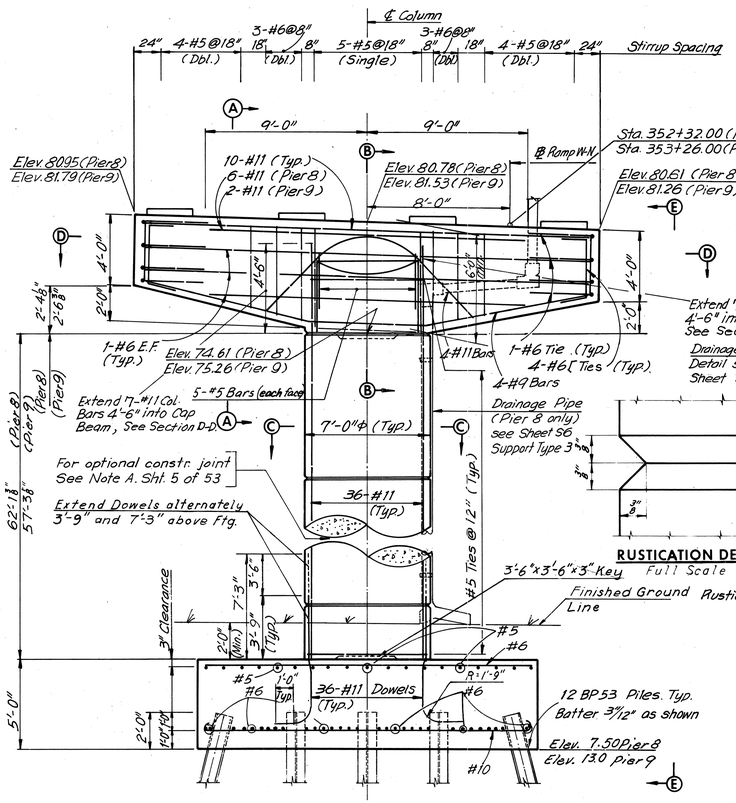
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 7

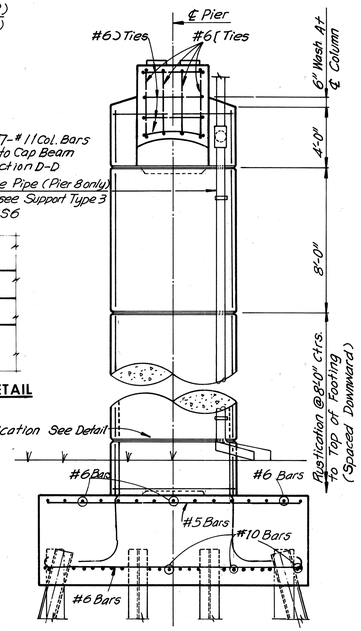
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 9 OF 54

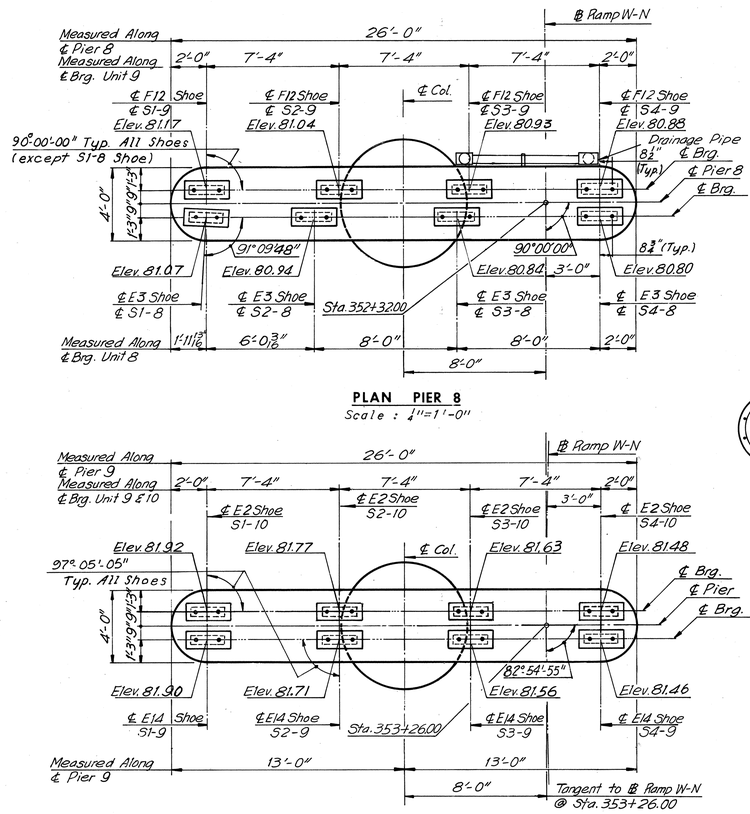
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	182	265



ELEVATION PIERS 8 AND 9
Scale : ¼"=1'-0"

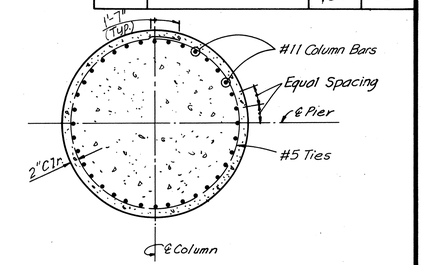


VIEW E-E
Scale : ¼"=1'-0"

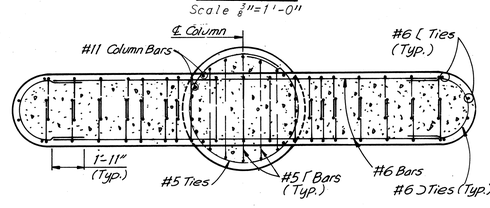


PLAN PIER 8
Scale : ¼"=1'-0"

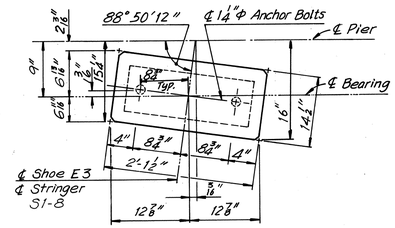
PLAN PIER 9
Scale : ¼"=1'-0"



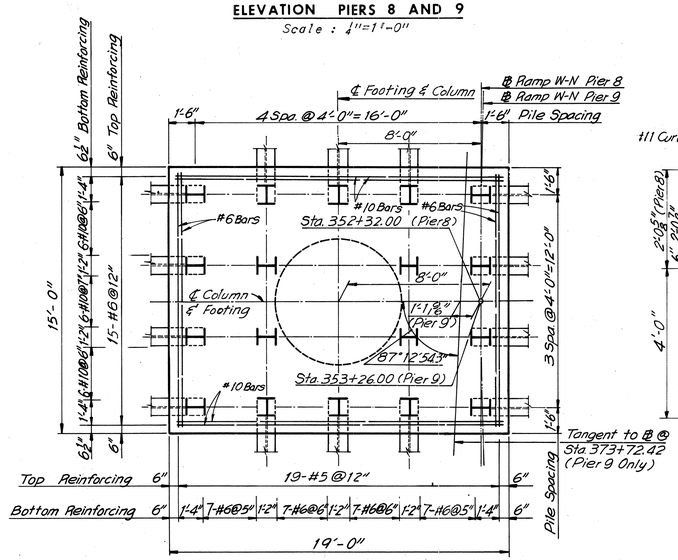
SECTION C-C
Scale ¾"=1'-0"



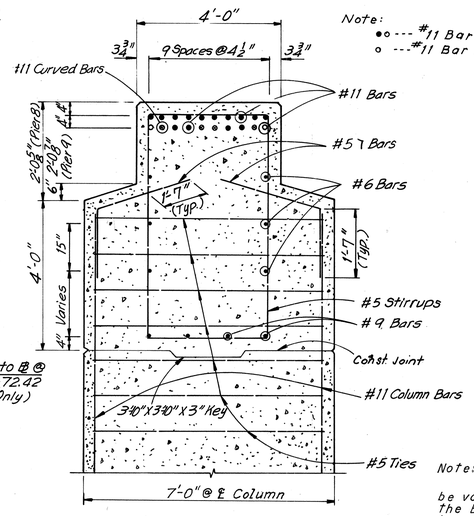
SECTION D-D
Scale : ¼"=1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

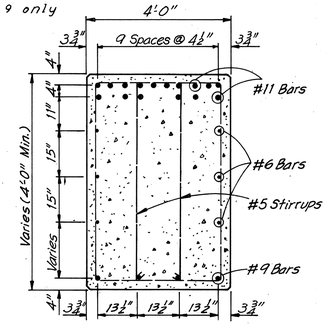


FOOTING PLAN PIERS 8 AND 9
Scale : ¼"=1'-0"

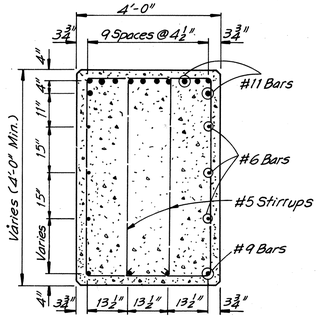


SECTION B-B
Scale ½"=1'-0"

Note:
●--- #11 Bar for Pier 8
○ --- #11 Bar for Pier 9 only



SECTION A-A
Scale ½"=1'-0"
(PIER 8)



SECTION A-A
Scale ½"=1'-0"
(Pier 9)

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:
Overexcavation will not be permitted between existing pier and new pier.

Note:
All piles shall be 12BP53 Steel Piles. (Design capacity = 57 Tons.)
For Standard Shoe Details, see Sheet S1 & S2.
For Framing Plans, see Sheet 22 & 23.
Estimated Pile tip elevations
Pier 8 = -11
Pier 9 = -7

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	SCC.	2.14.69	2	As Built	TEM	6-77
CHECKED	PTA	4-19-69	1	Revise Pad Elevs. S2-8 & S3-8	D.W.B.	2-6-75
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

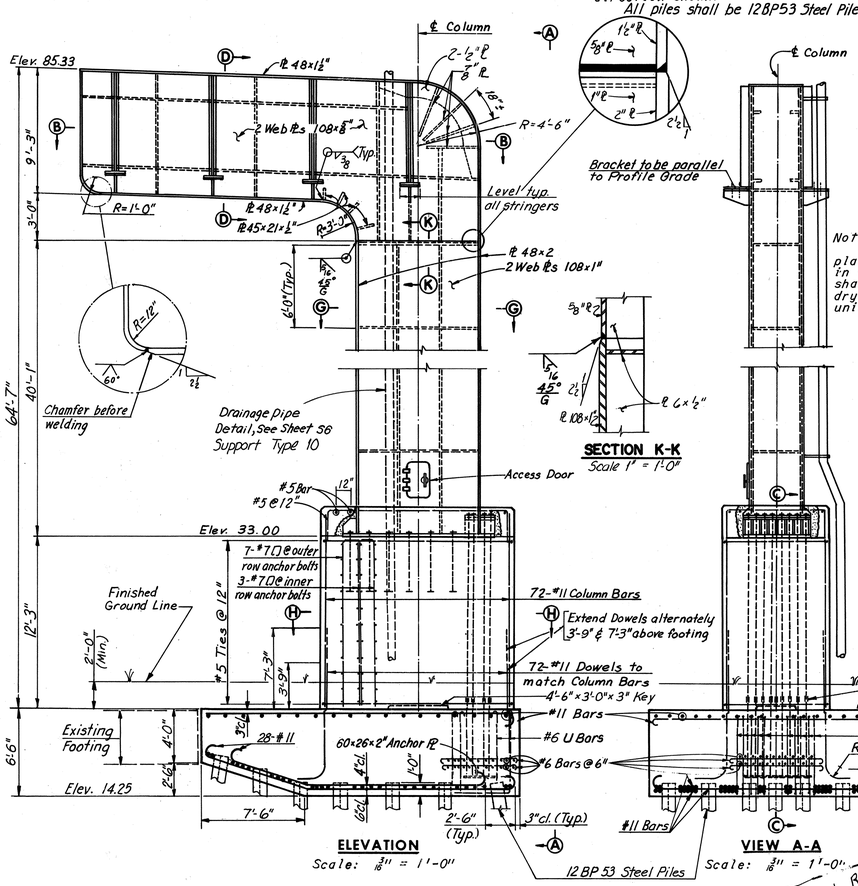
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 8 AND 9

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 10 OF 54

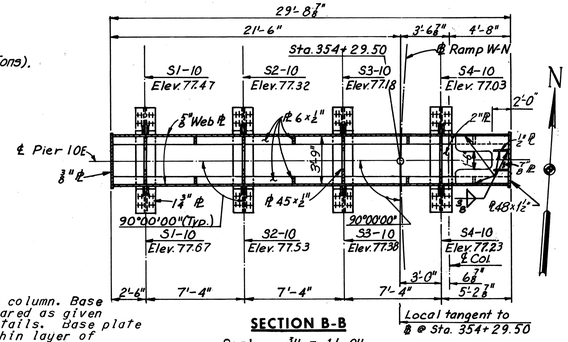
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	183	265

Note:
All Steel shall be A36 except otherwise shown.
Pile Tip Elev. -7.00
Batter exterior piles 2" per foot in direction shown.
All piles shall be 12BP53 Steel Piles (Design Cap. = 57 Tons).



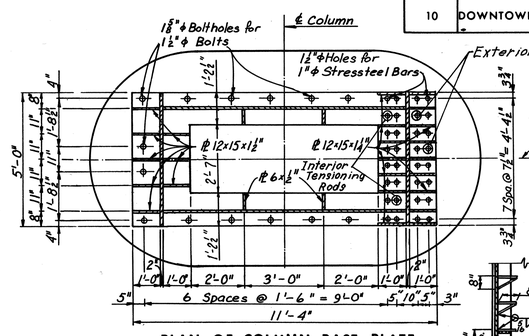
ELEVATION
Scale: 3/16" = 1'-0"

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

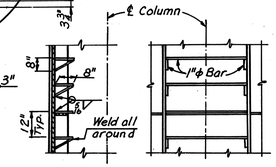


SECTION B-B
Scale: 3/16" = 1'-0"

Note:
Concrete under column. Base plate shall be prepared as given in standard shoe details. Base plate shall be set on a thin layer of dry cement powder to provide a uniform bearing.

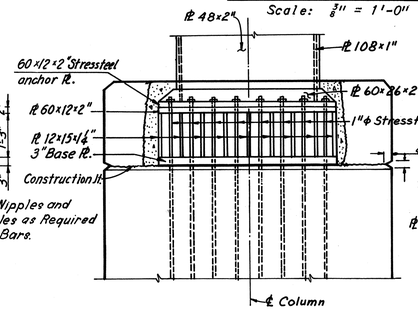


PLAN OF COLUMN BASE PLATE
Scale: ⅜" = 1'-0"

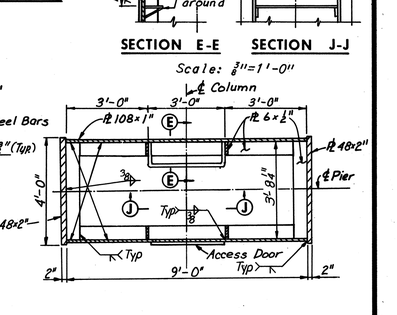


SECTION E-E

SECTION J-J
Scale: ⅜"=1'-0"



VIEW F-F
Scale: ½" = 1'-0"



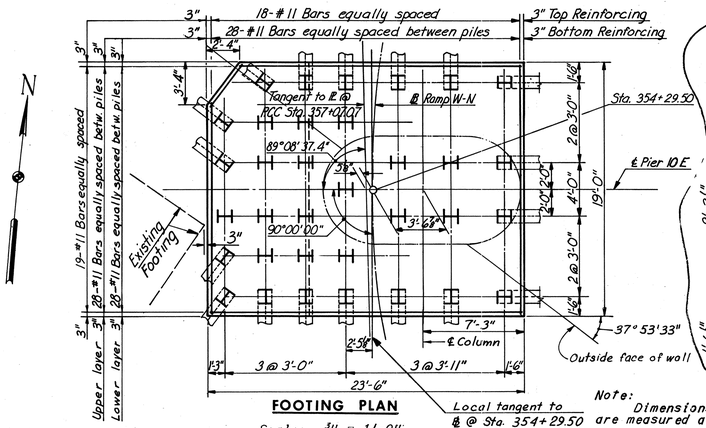
SECTION G-G
Scale: ⅜" = 1'-0"

Note:
Stressteel rods shall be 1"℄ Special Grade, 160 ksi. min. ult Strength, 32 rods req'd. Rods to be grouted after tensioning. Initial Jacking Force Required. = 88K± ⅛" for seating wedge.

Rods shall be tensioned as outlined in the construction sequence. Rods need not be tensioned in pairs, However, tensioning shall proceed outward from the centerline of Pier 10.

Rods of the first group shall be checked in the same sequence as initial tensioning, checking shall continue until two successive 1"℄ rods checked have a tension of at least 80 K.

The contractor is cautioned against nicking the stress rods and he shall follow The manufacturers recommended handling procedures The contractor shall provide adequate safety measures. The contractor shall submit his proposed construction procedures to the engineer for approval.

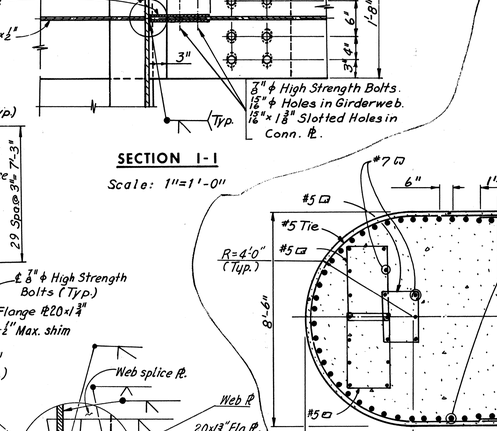


FOOTING PLAN
Scale: 3/16" = 1'-0"

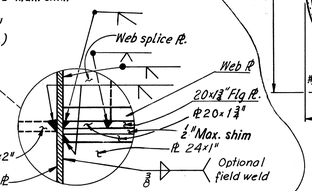
Note:
Dimensions in Footing Plan are measured at bottom of Footing.

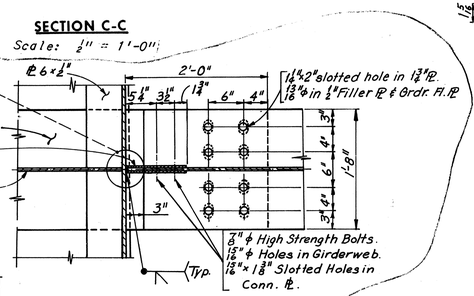
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

FOOTING FOR PIER 10E IS ECCENTRIC AS SHOWN ON FOOTING PLAN



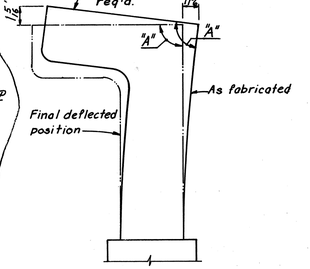
SECTION D-D
Scale: ⅜" = 1'-0"



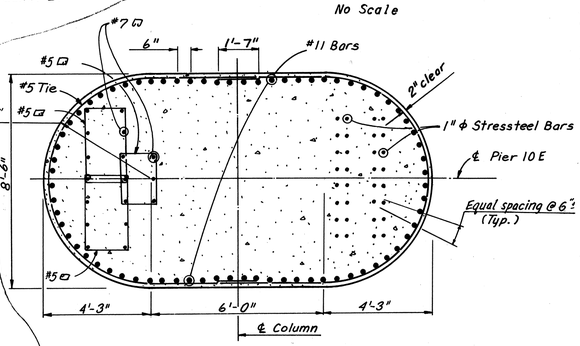


SECTION C-C
Scale: ½" = 1'-0"

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



CAMBERING OF COLUMN
No Scale



SECTION H-H
Scale: ⅜" = 1'-0"

	BY	DATE
MADE	J.D.	3-11-69
CHECKED	PTA	4-24-69
IN CHARGE		

NO.	REVISION	BY	DATE
3	As Built	TEM	6-77
2	Fig. Plan & Elev. changed	S.B.P.	7-23-75
1	Changed dim. Sect H-H Elev Sect. B-B	REG	1-24-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

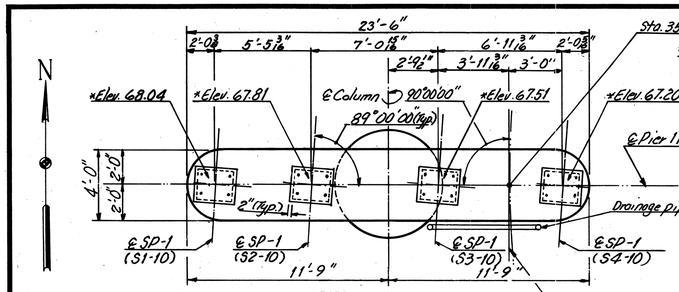
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

PIER 10 E

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

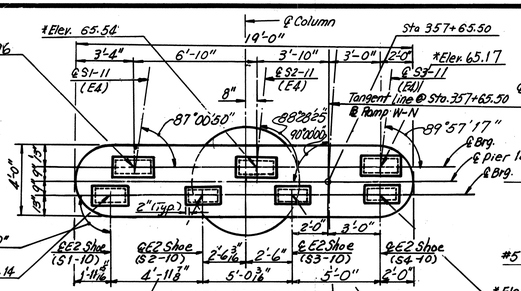
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 11 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	184	265

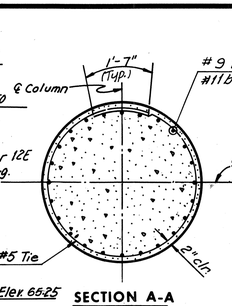


PIER CAP PLAN
Scale : 1" = 1'-0"

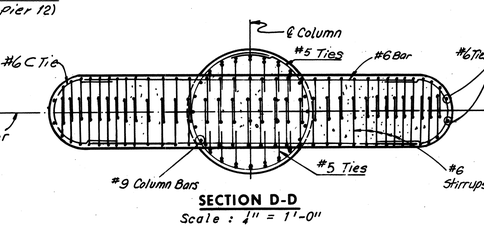
* Denoted top elevations of pad.



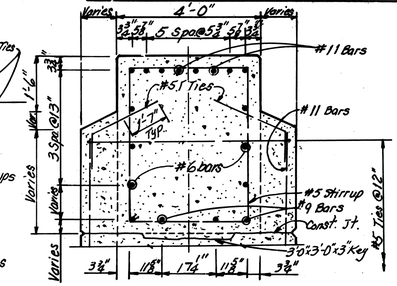
PIER CAP PLAN
Scale : 1" = 1'-0"



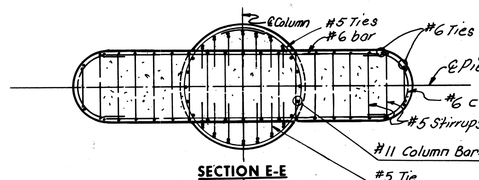
SECTION A-A
Scale : 3/8" = 1'-0"



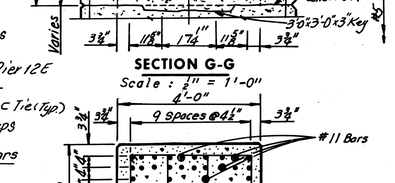
SECTION D-D
Scale : 1" = 1'-0"



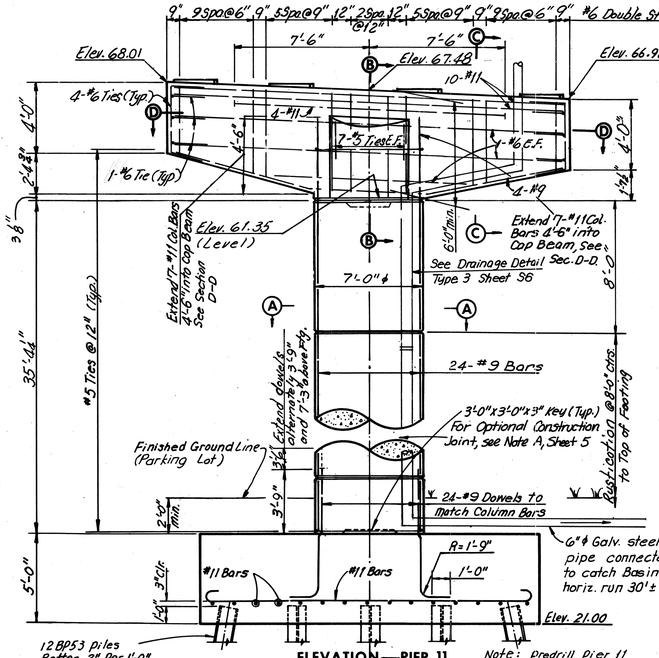
SECTION G-G
Scale : 1/2" = 1'-0"



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

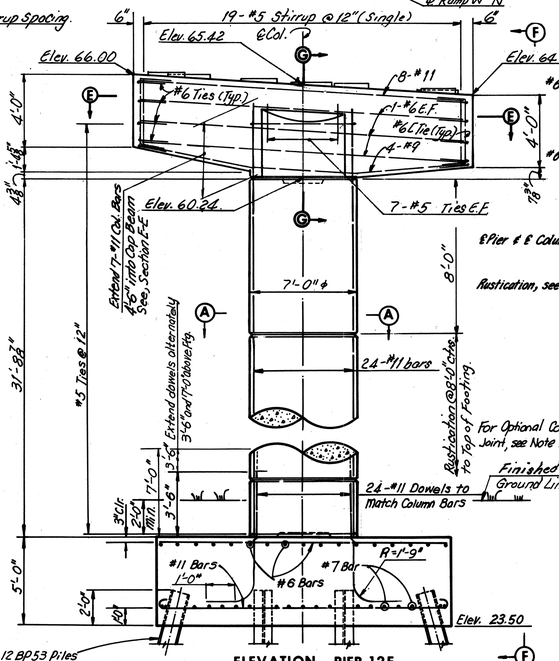


SECTION C-C
Scale : 1/2" = 1'-0"

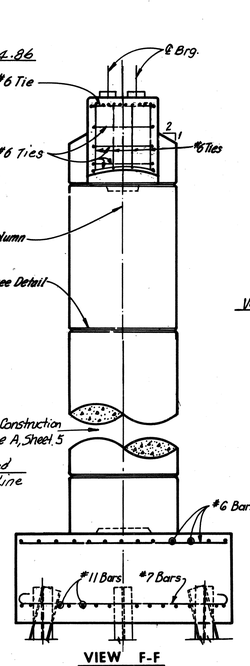


ELEVATION—PIER 11
Scale : 1" = 1'-0"
15-#11 Bars @15"

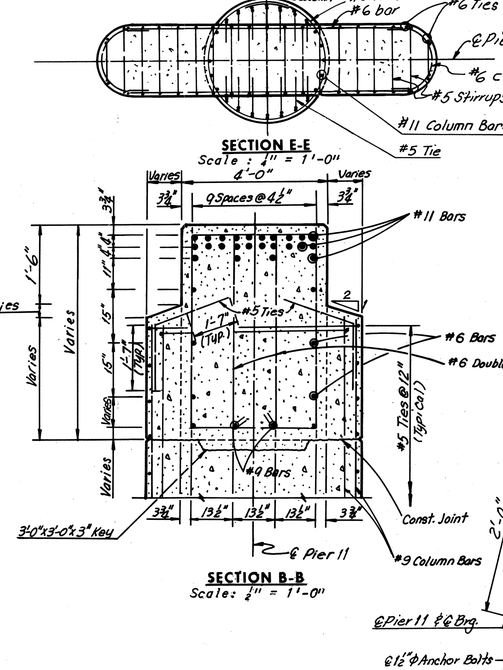
Note: Predrill pier 11 all Piles to Elev. 5'-0" below F.L. Arch Sewer



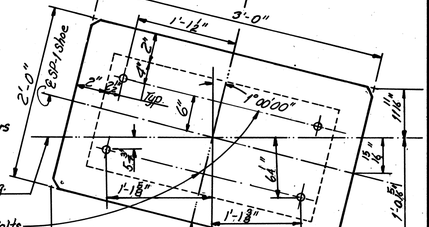
ELEVATION—PIER 12E
Scale : 1" = 1'-0"



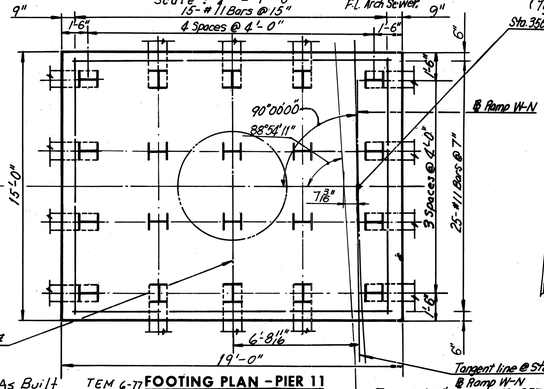
VIEW F-F
Scale : 1" = 1'-0"



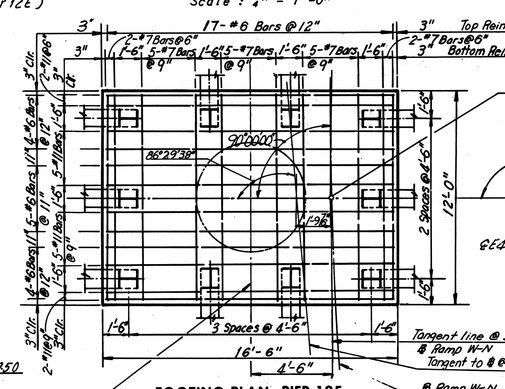
SECTION B-B
Scale: 1" = 1'-0"



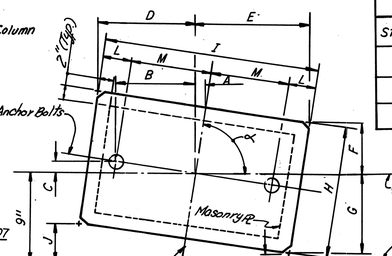
PAD AND ANCHOR BOLT SETTING PLAN
No Scale



FOOTING PLAN—PIER 11
Scale : 1" = 1'-0"



FOOTING PLAN—PIER 12E
Scale : 1" = 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

Notes:
For Standard Shoe Details, see Sheets S1 and S2
For Framing Plan, see Sheets 26 and 27
For Quantities of Steel and Concrete, see Sheet 2
All piles shall be 12BP53 Steel piles
(Design Capacity = 57 Tons)
Estimated pile tip elevation: Pier 11 = -5.0 ft.
Pier 12E = -8.0 ft.

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Stringer	α	A	B	C	D	E	F	G	H	I	J	K	L	M
S1-11	87°00'50"	3/16"	10 1/2"	3/16"	1'-2 3/8"	1'-2 15/16"	5 1/2"	7"	1'-0 1/2"	2'-5"	3 1/2"	2"	4"	10 1/2"
S2-11	88°28'25"	3/16"	10 1/2"	1/4"	1'-2 5/16"	1'-2 7/8"	5 7/8"	6 3/8"	1'-0 1/2"	2'-5"	3 1/8"	2 3/8"	4"	10 1/2"
S3-11	89°57'17"	0"	10 1/2"	0"	1'-2 1/2"	1'-2 1/2"	6 1/4"	6 1/4"	1'-0 1/2"	2'-5"	2 3/4"	2 3/4"	4"	10 1/2"

	BY	DATE
MADE	G.S.H.	3-19-69
CHECKED	PTA	5-7-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes Added	LRH	4-19-74
2	Column size	T.E.M.	9-10-74
3	BP1 12 size chg. Pier Cap Dim. Chg.	REV	11-13-74
4	Pad Elevs. Pier 12E	DWB	2-10-75
5	As Built	TEM	6-77

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

AS BUILT

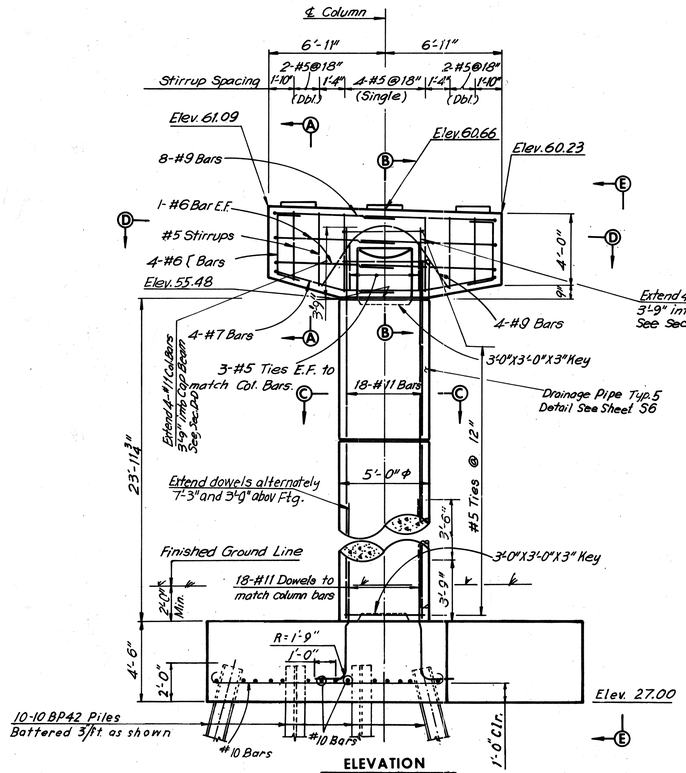
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 11 AND 12E

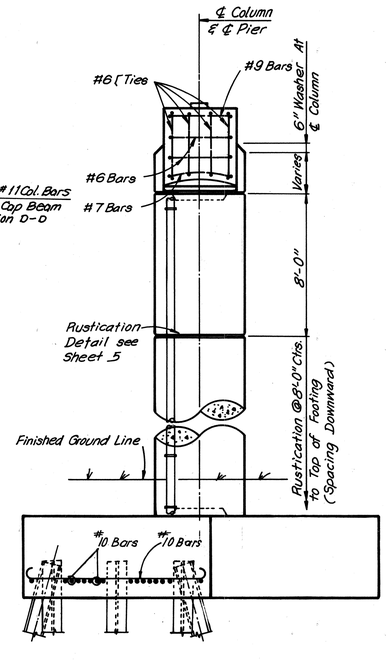
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 12 OF 54

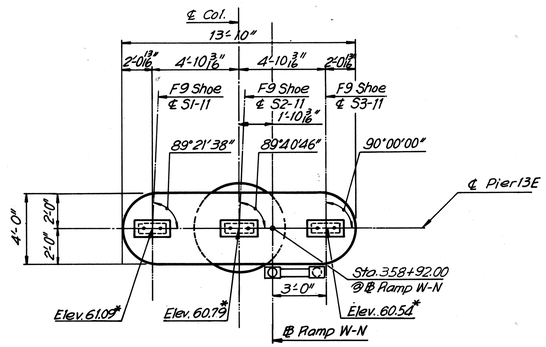
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	185	265



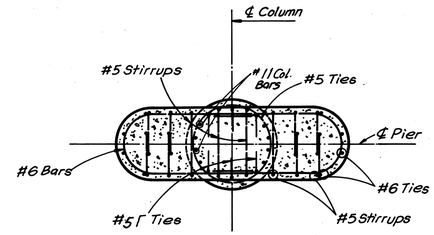
ELEVATION
Scale : 1"=1'-0"



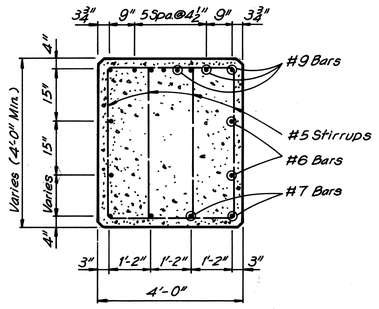
VIEW E-E
Scale : 1"=1'-0"



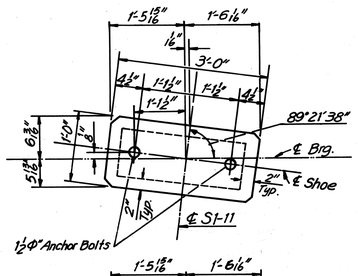
PLAN
Scale : 1"=1'-0"
*Denotes Elevations of Top Pad.

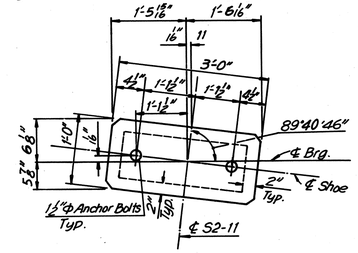


SECTION D-D
Scale : 1"=1'-0"

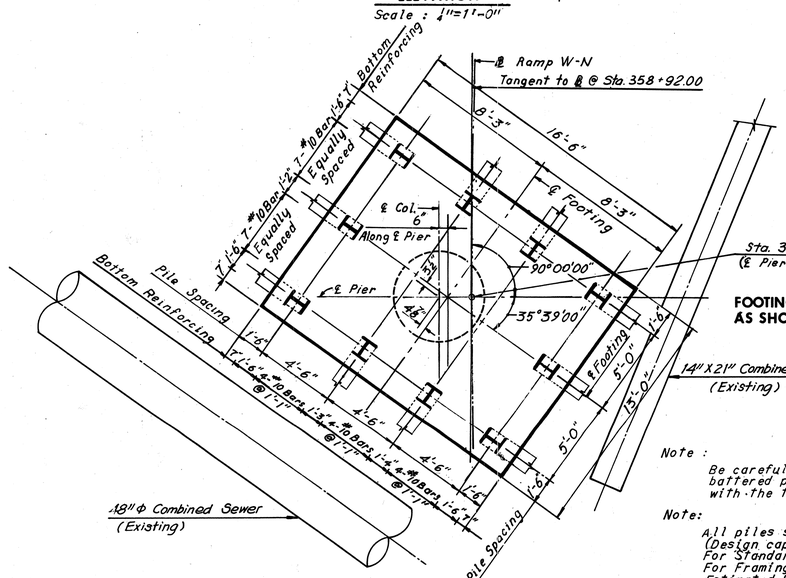


SECTION A-A
Scale : 1"=1'-0"





PAD AND ANCHOR BOLT SETTING PLAN
No Scale



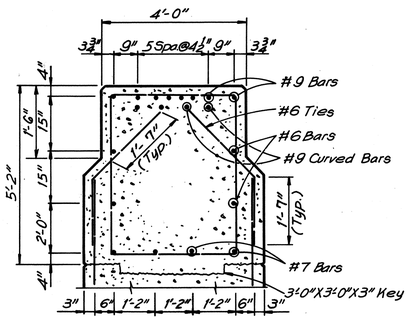
FOOTING PLAN
Scale : 1"=1'-0"

FOOTING FOR PIER 13E IS ECCENTRIC AS SHOWN ON FOOTING PLAN

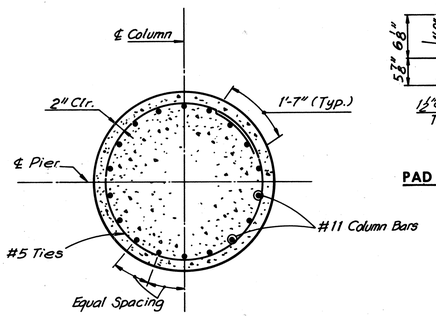
Note :
Be careful to avoid interference of battered piles and footing excavations with the two existing combined sewers.

Note:
All piles shall be 10BP42 Steel Piles (Design capacity = 45 tons.)
For Standard Shoe Details, see Sheet
For Framing Plans, see Sheets 26 & 27.
Estimated Pile tip elevation. 30
For 10BP42 Steel Piles details, see Sheet 5.

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



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



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

	BY	DATE				
MADE	SCC	2.19.69	2	As Built	TEM	6-77
CHECKED	GSH	4.19.69	1	Pad Elevations	D.M.S	2-10-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

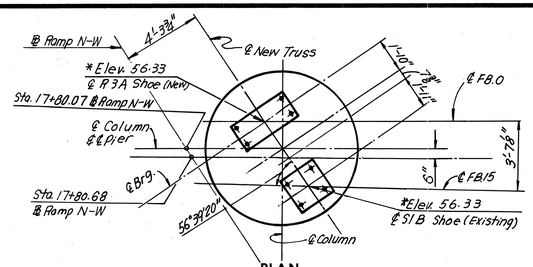
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 13E

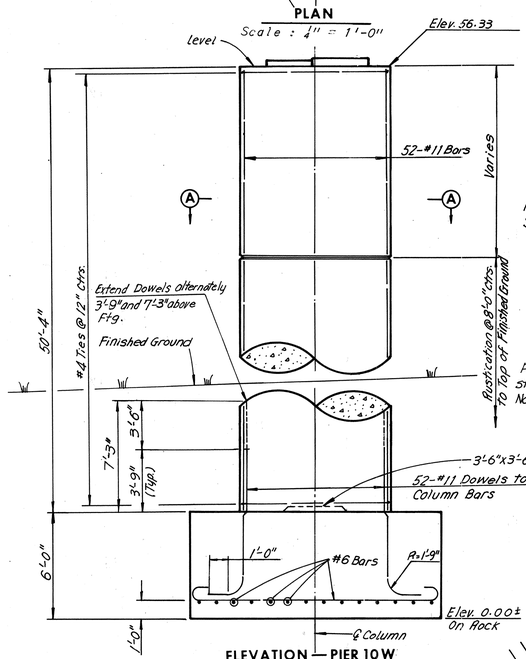
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 13 OF 54

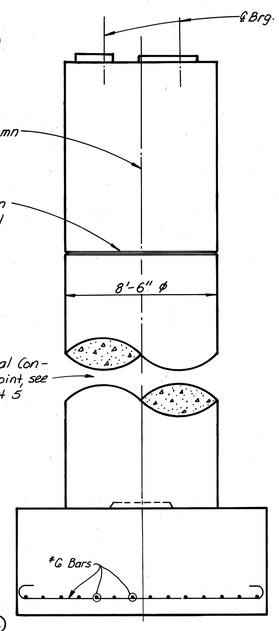
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	186	265



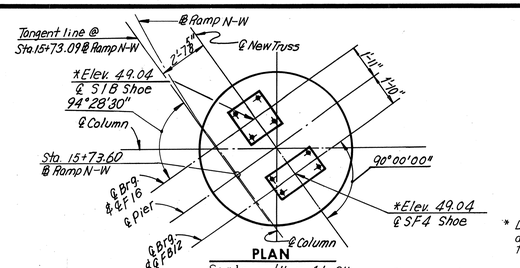
PLAN
Scale : 1/4" = 1'-0"



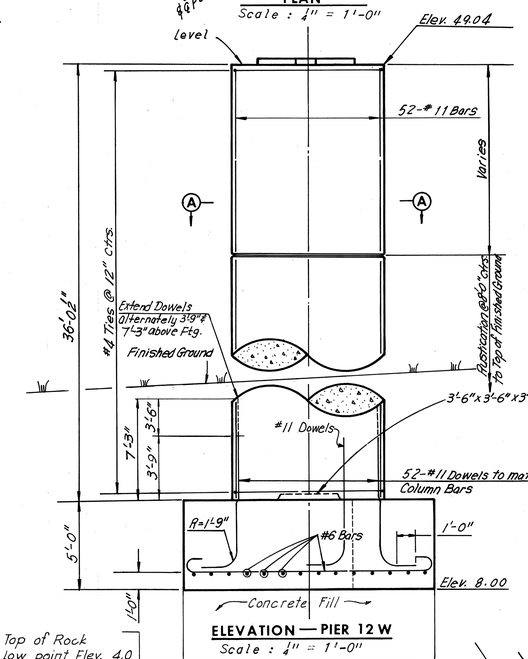
ELEVATION — PIER 10W
Scale : 1/4" = 1'-0"



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

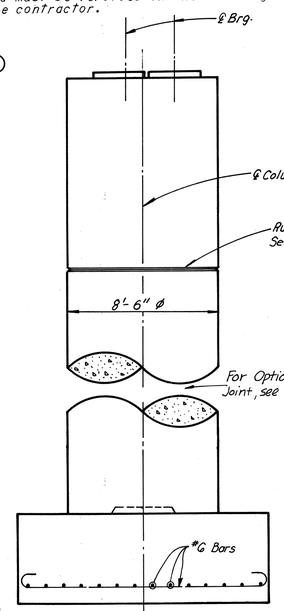


PLAN
Scale : 1/4" = 1'-0"

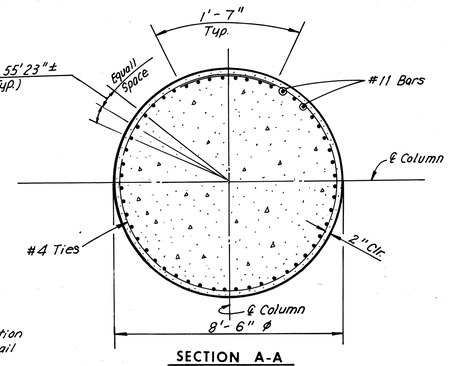


ELEVATION — PIER 12 W
Scale : 1/4" = 1'-0"

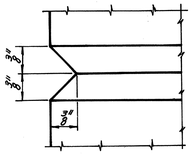
* Denotes the bottom elevations of shoe. and must be verified in the field by the contractor.



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

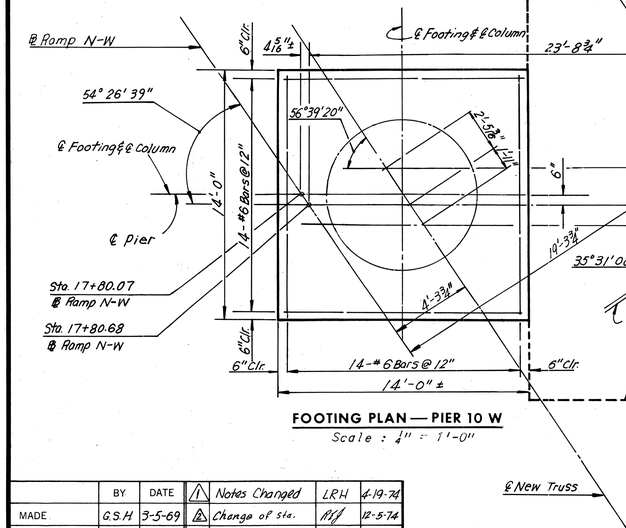


SECTION A-A
Scale : 3/8" = 1'-0"

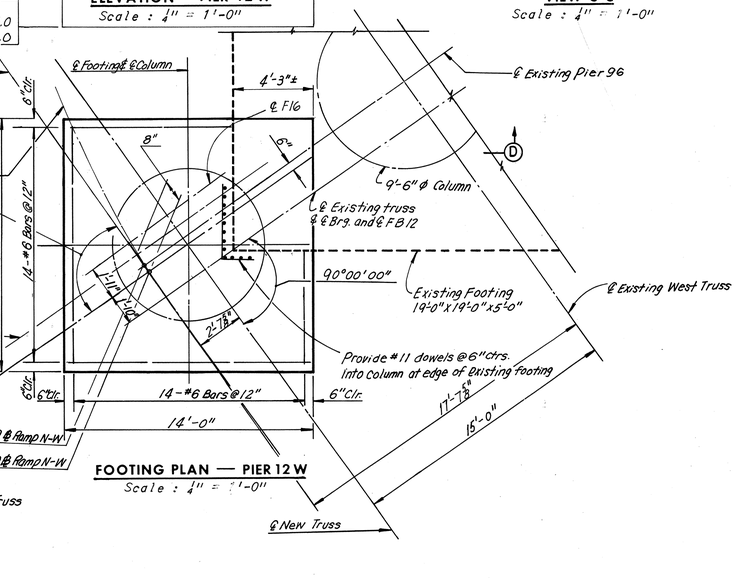


RUSTICTION DETAIL
Full Scale

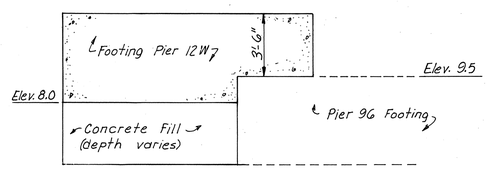
Notes:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 Ft., redesign will be required.
For Shoe Details, see Sheet 47.
For Framing Plan, see Sheets 26.
For Quantities of Steel and Concrete, see Sheet 3.



FOOTING PLAN — PIER 10 W
Scale : 1/4" = 1'-0"



FOOTING PLAN — PIER 12 W
Scale : 1/4" = 1'-0"



SECTION D-D
No Scale

	BY	DATE
MADE	G.S.H	3-5-69
CHECKED	K.C.T.	5-1-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Notes Changed	LRH	4-19-74
2	Change of sta.	LRH	12-5-74
3	As Built	TEM	6-77

AS BUILT

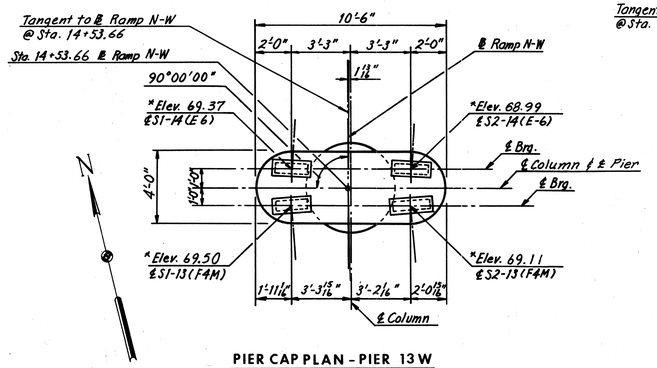
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 10 W AND 12 W

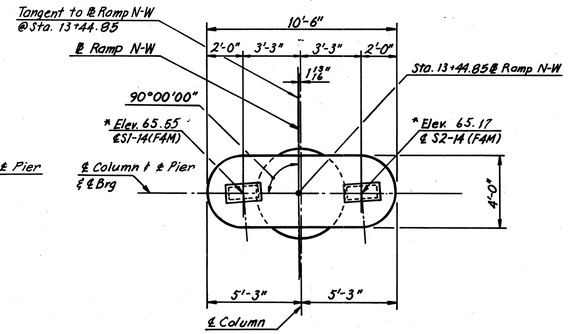
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 14 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	187	265

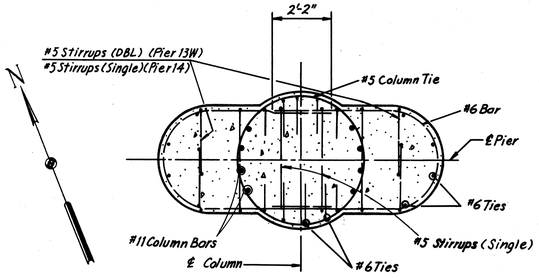


PIER CAP PLAN - PIER 13W
Scale: ¼"= 1'-0"

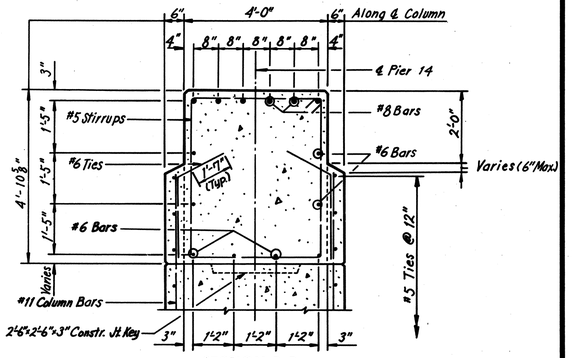


PIER CAP PLAN – PIER 14
Scale: ¼"= 1'-0"

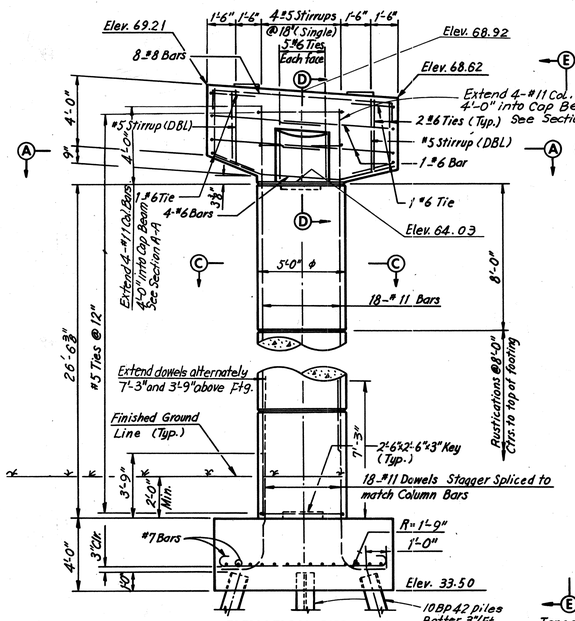
* Denotes the top Concrete pad Elevations.



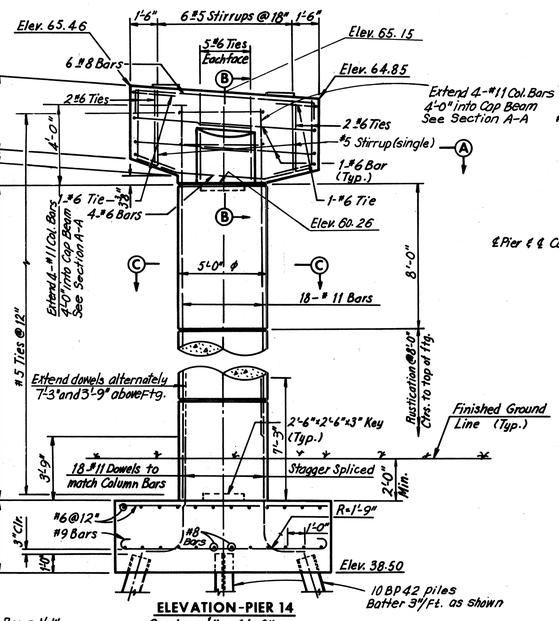
SECTION A-A
Scale: ⅜" = 1'-0"



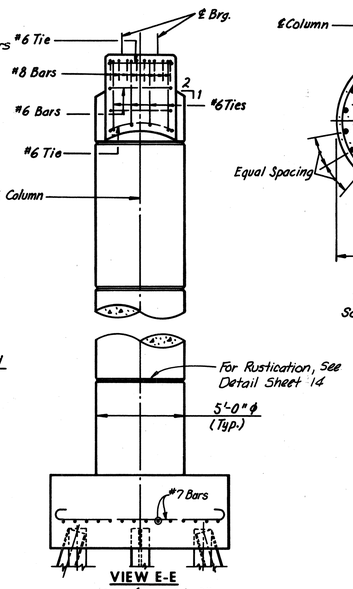
SECTION B-B
Scale: ½" = 1'-0"



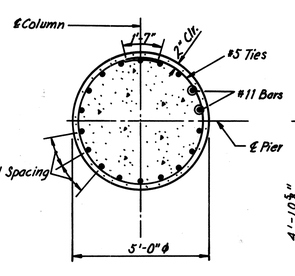
ELEVATION – PIER 13W
Scale: ¼"= 1'-0"



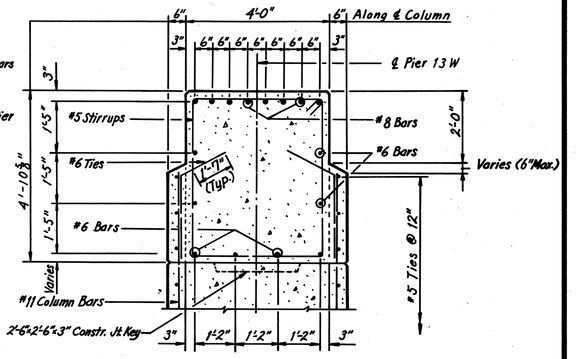
ELEVATION – PIER 14
Scale: ¼"= 1'-0"



VIEW E-E
Scale: ¼" = 1'-0"

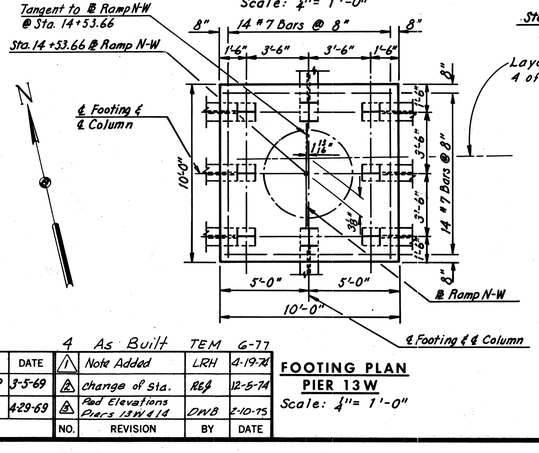


SECTION C-C
Scale: ⅜" = 1'-0"

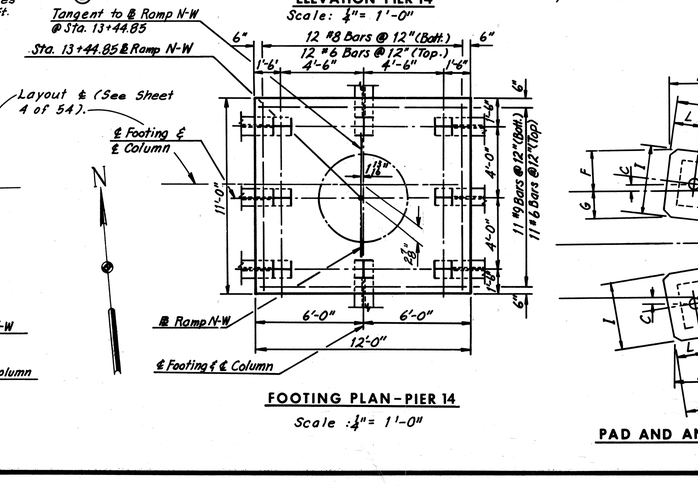


SECTION D-D
Scale: ½" = 1'-0"

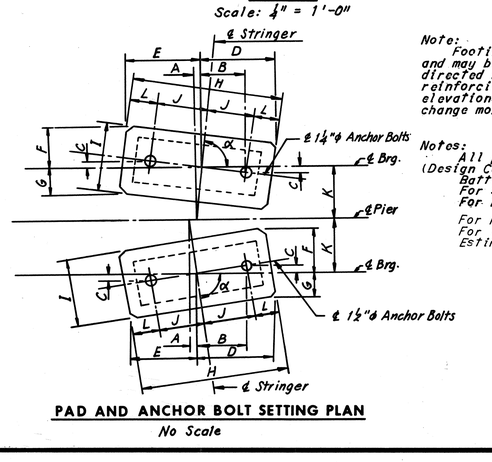
DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN													
Pier	Stringer	α	A	B	C	D	E	F	G	H	I	J	K	L
13W	S1-13	97°48'08"	7/16"	11½"	7/16"	1'-4⅛"	1'-3⅜"	6⅛"	4⅞"	2'-8"	11"	11½"	12"	4½"
	S2-13	97°48'00"	7/16"	11½"	7/16"	1'-4⅛"	1'-3⅜"	6⅛"	4⅞"	2'-8"	11"	11½"	12"	4½"
	S1-14	97°52'43"	7/16"	11¼"	7/16"	1'-3½"	1'-3"	6⅜"	5⅛"	2'-6½"	1'-0½"	11¼"	12"	4"
	S2-14	97°52'43"	7/16"	11¼"	7/16"	1'-3½"	1'-3"	6⅜"	5⅛"	2'-6½"	1'-0½"	11¼"	12"	4"
14	S1-14	97°55'17"	0"	11½"	7/16"	1'-4⅛"	1'-3⅜"	6⅛"	4⅛"	2'-8"	11"	11½"	0	4½"
	S2-14	97°55'17"	0"	11½"	7/16"	1'-4⅛"	1'-3⅜"	6⅛"	4⅛"	2'-8"	11"	11½"	0	4½"



FOOTING PLAN PIER 13W
Scale: ¼"= 1'-0"



FOOTING PLAN – PIER 14
Scale :¼"= 1'-0"



PAD AND 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.

Notes:
All piles shall be 10BP42 steel piles.
(Design Capacity= 45 tons)
Batter all piles 3" per foot where shown.
For Standard Shoe Details, see Sheet 51.
For Framing Plan, see Sheet 26.
For Rustication Details, see Sheet 14.
For 10BP42 Steel Pile Details, see Sheet 5.
Estimated Pile Tip Elevations
Pier 13W = 10.0
Pier 14 = 20.0

	BY	DATE
MADE	Y.C.P	3-5-69
CHECKED	K.C.T.	429-69
IN CHARGE		

NO.	REVISION	BY	DATE
4	As Built	TEM	6-77
3	Note Added	LRH	4-19-76
2	change of Sta.	REB	12-5-74
1	Pad Elevations Piers 13W & 14	DWB	2-10-75

AS BUILT

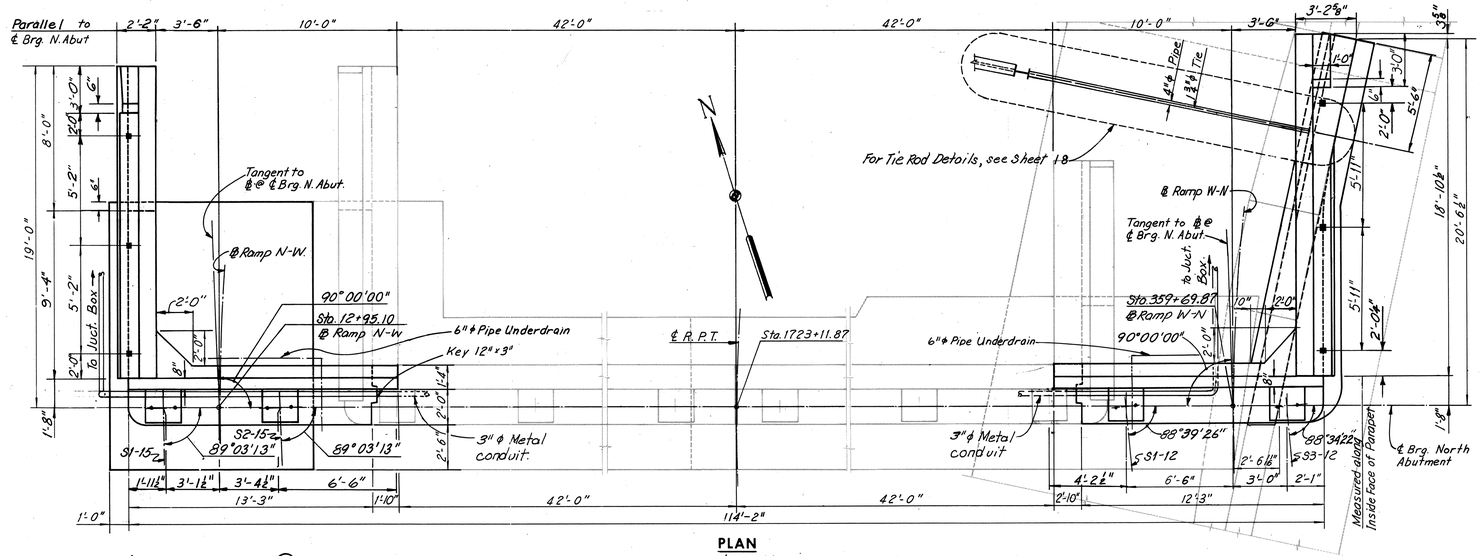
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 13W AND 14

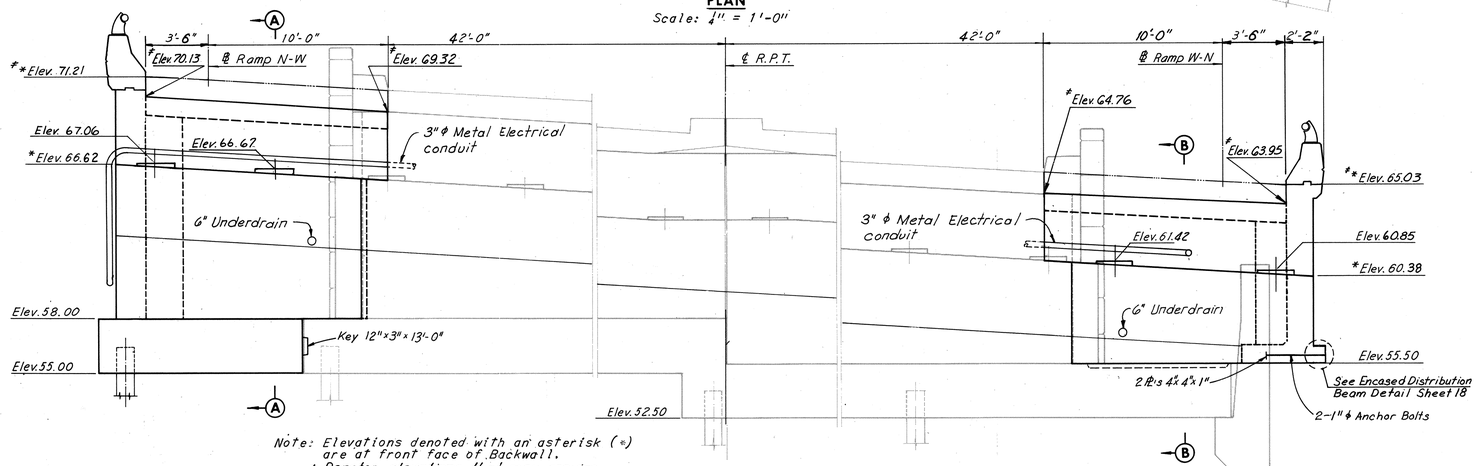
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 15 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	188	265

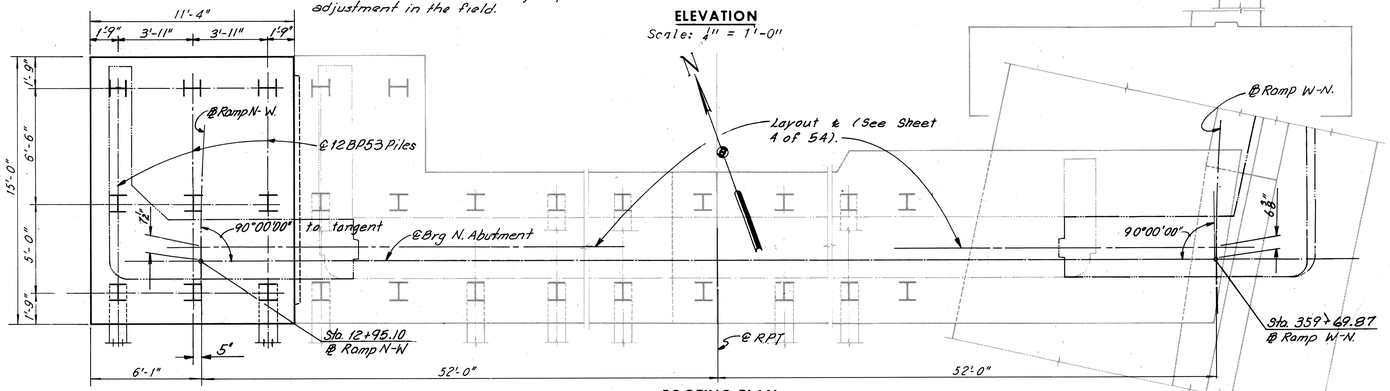


PLAN
Scale: 1/4" = 1'-0"



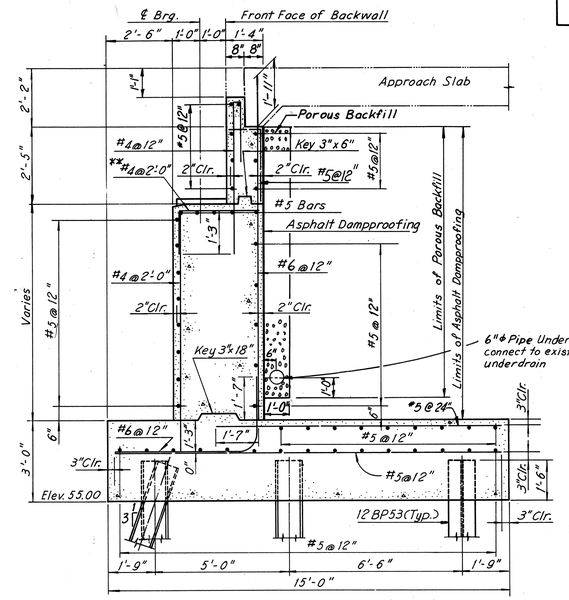
Note: Elevations denoted with an asterisk (*) are at front face of Backwall.
* Denotes elevations that may require adjustment in the field.

ELEVATION
Scale: 1" = 1'-0"



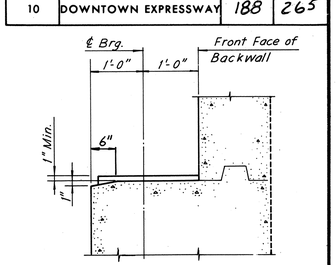
FOOTING PLAN
Scale: 1/4" = 1'-0"

	BY	DATE				
MADE	MHH	1-7-69	1	change of Sta.	REJ	12-5-74
CHECKED	AMH	5-13-69	2	Elevations & Note	DWB	2-10-75
IN CHARGE			3	As Built	TEM	6-77
			NO.	REVISION	BY	DATE

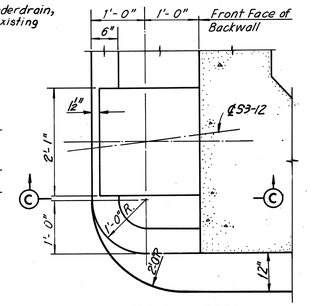


SECTION A-A
Scale: 3/8" = 1'-0"

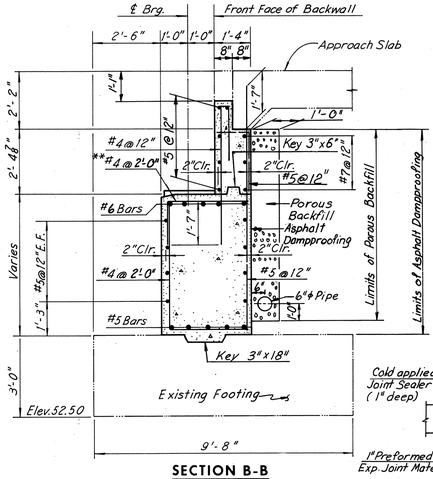
** Provide 2 additional #4 bars spaced at 2'-0" at each bearing pad.



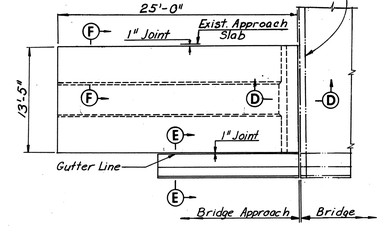
SECTION C-C
Scale: 3/4" = 1'-0"



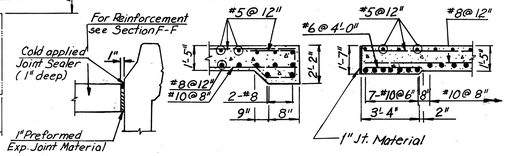
BEARING PAD DETAILS
Scale: 3/4" = 1'-0"



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



WEST APPROACH SLAB
Scale: 1/8" = 1'-0"
East Approach Slab similar



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

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

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

Note:
All reinforcement extending from existing barrel, backwall and footing shall be cleaned and extended into new barrel and backwall.
The existing wingwall shall be removed to a depth of 2'-0" below the bottom of the approach slabs.

Note:
For North Abutment Details see Sheet 17.
For Retaining Wall see Sheet 18.
For Framing Plan see Sheet 26.
All Piles in Footing are 12BP53 Steel Piles (Design Capacity = 57 tons).
Estimated Pile Tip Elevation 20.00.
The Contractor shall verify all Elevations and Dimensions.

AS BUILT

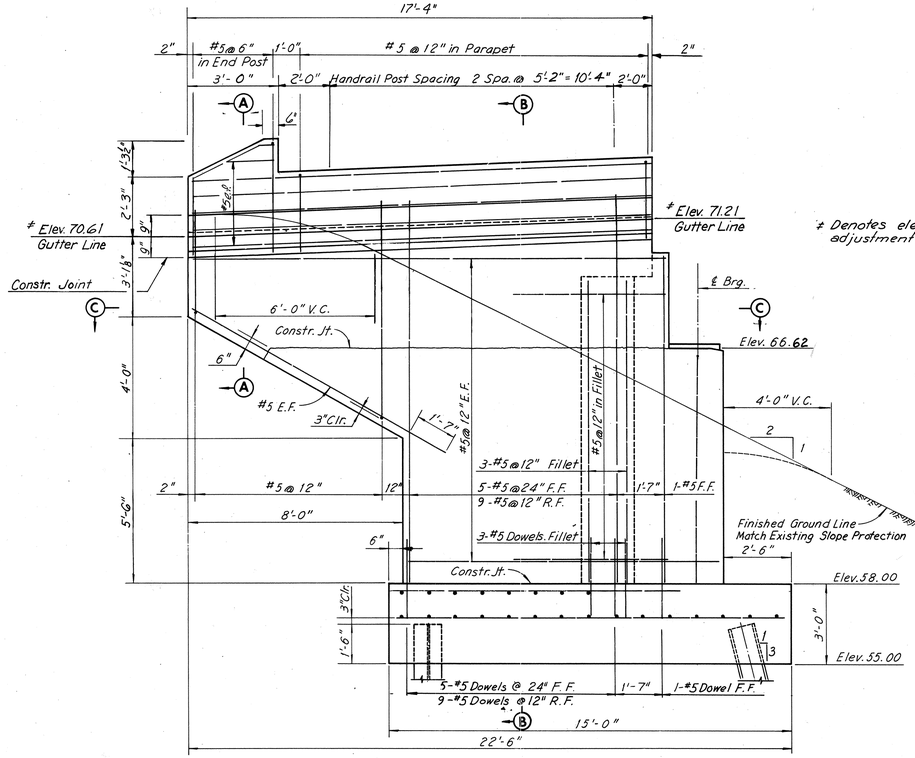
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
NORTH ABUTMENT

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

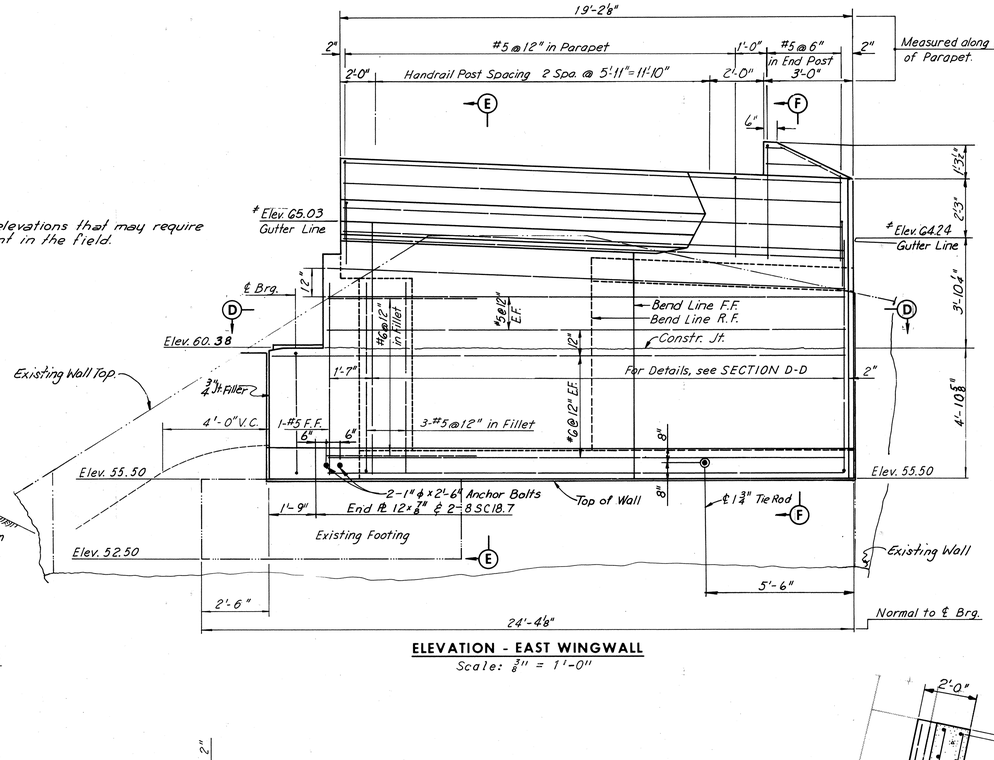
SCALE: As noted
CONTRACT NO.: 10
SHEET NO. 16 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	189	265

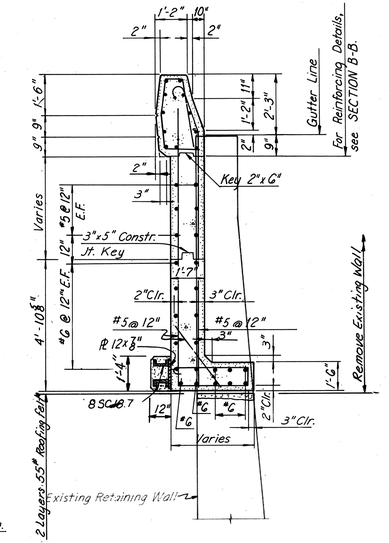


ELEVATION - WEST WINGWALL
Scale: ⅜" = 1'-0"

* Denotes elevations that may require adjustment in the field.

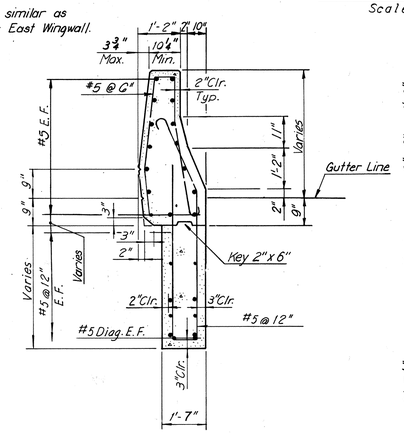


ELEVATION - EAST WINGWALL
Scale: ⅜" = 1'-0"

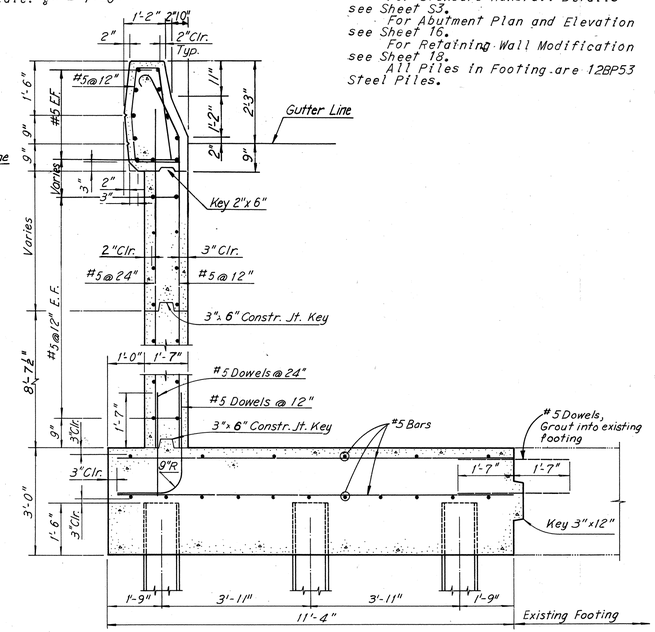


SECTION E-E
Scale: ⅜" = 1'-0"

* Detail is similar as shown for East Wingwall.

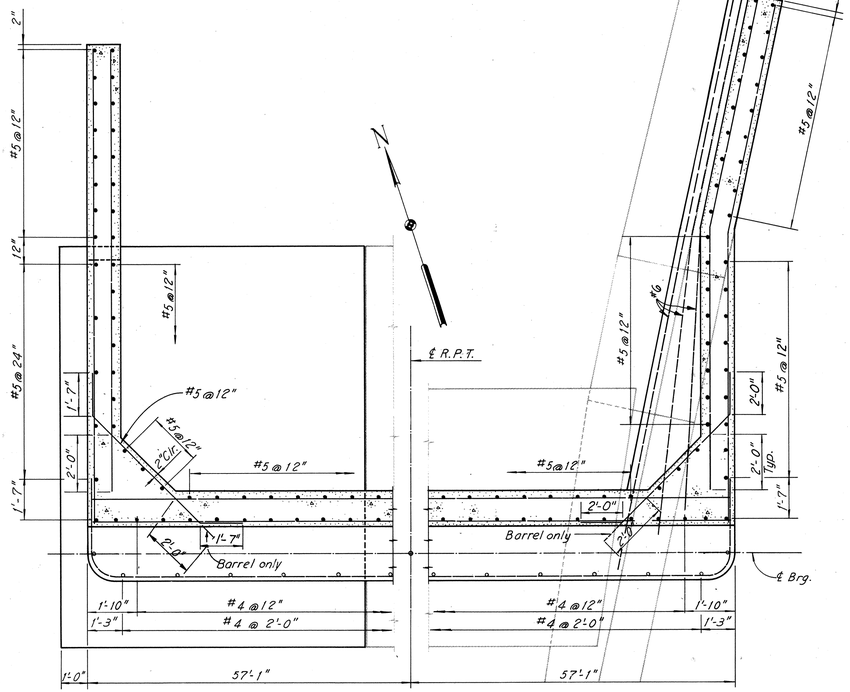


SECTION A-A
Scale: ½" = 1'-0"



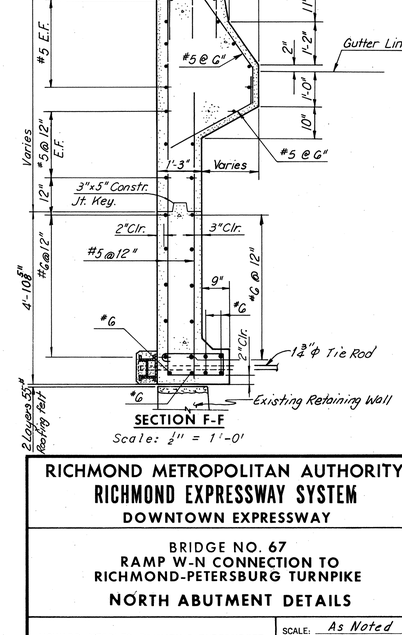
SECTION B-B
Scale: ½" = 1'-0"

Note:
For Standard Handrail Details see Sheet S3.
For Abutment Plan and Elevation see Sheet 16.
For Retaining Wall Modification see Sheet 18.
All Piles in Footing are 12BP53 Steel Piles.



SECTION C-C
Scale: ⅜" = 1'-0"

SECTION D-D
Scale: ⅜" = 1'-0"



SECTION F-F
Scale: ½" = 1'-0"

LEGEND: E.F. denotes each face.
F.F. denotes front face.
R.F. denotes rear face.

	BY	DATE
MADE	MHH	1-14-69
CHECKED	AMH	5-13-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEN	6-77
1	Gutterline Elevs. & Note	DWB	2-10-75

AS BUILT

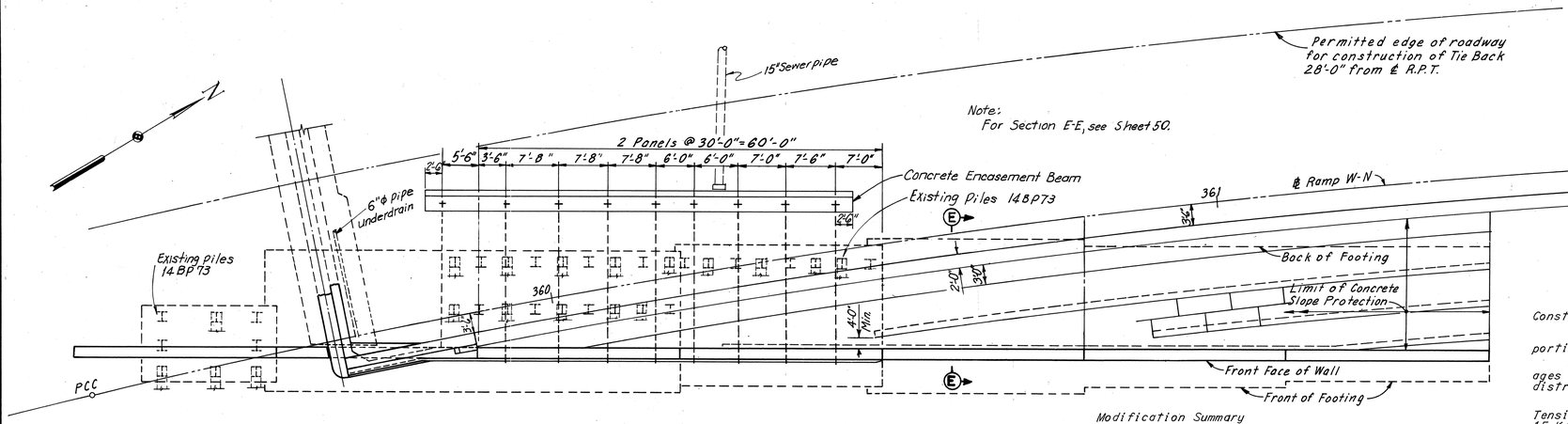
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
NORTH ABUTMENT DETAILS

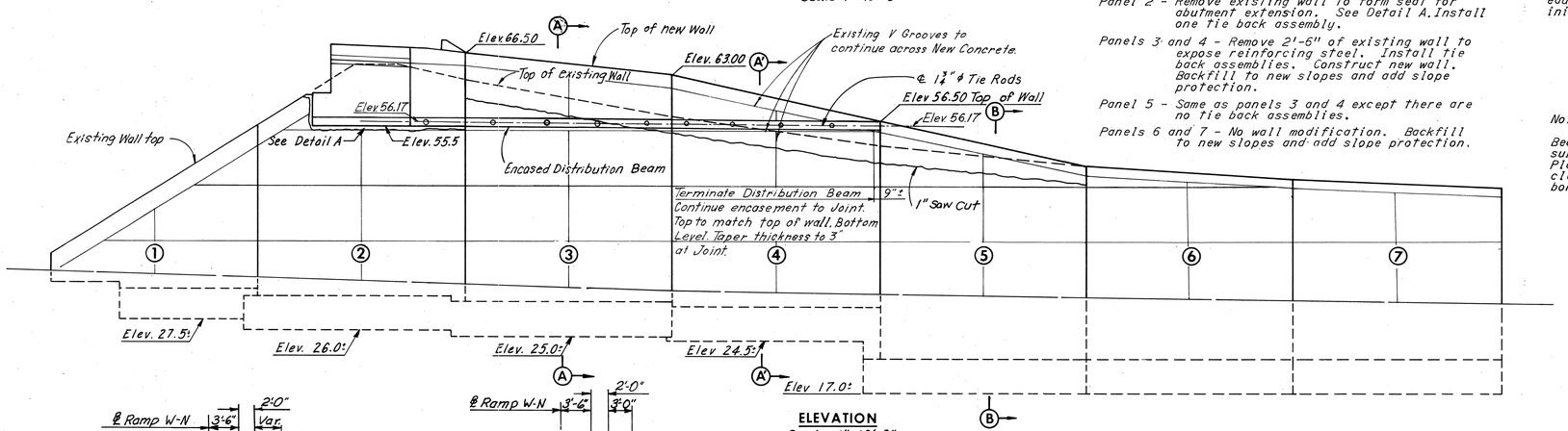
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 17 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	190	265



PLAN
Scale: 1"=10'-0"



ELEVATION
Scale: 1"=10'-0"

Modification Summary

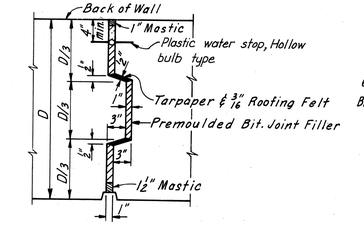
Panel 1 - No modification

Panel 2 - Remove existing wall to form seat for abutment extension. See Detail A. Install one tie back assembly.

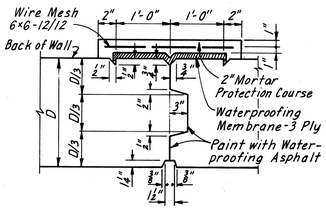
Panels 3 and 4 - Remove 2'-6" of existing wall to expose reinforcing steel. Install tie back assemblies. Construct new wall. Backfill to new slopes and add slope protection.

Panel 5 - Same as panels 3 and 4 except there are no tie back assemblies.

Panels 6 and 7 - No wall modification. Backfill to new slopes and add slope protection.



EXPANSION JOINT DETAIL
Scale: 1"=1'-0"



CONSTRUCTION JOINT DETAIL
Scale: 1"=1'-0"

Construction Sequence

Excavate sufficiently to remove required portions of wall. Extend wall to final height.

Make Excavation for placement of pile anchorages and tie rods. Drive piles and install steel distribution beam and tie rods.

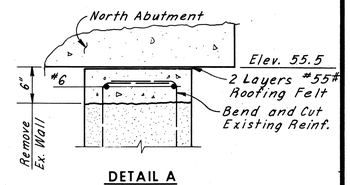
Bring tie rod nuts to "finger tight" condition. Tension tie rods to 18 K/rod, Panels 2 and 3; and 15 K/rod, Panel 4. Tension shall be determined by use of a Whitmore strain gage or other procedure approved by the Engineer. Gages shall be initilized after tie rod nuts are "finger tight"

Backfill wall to final slope.

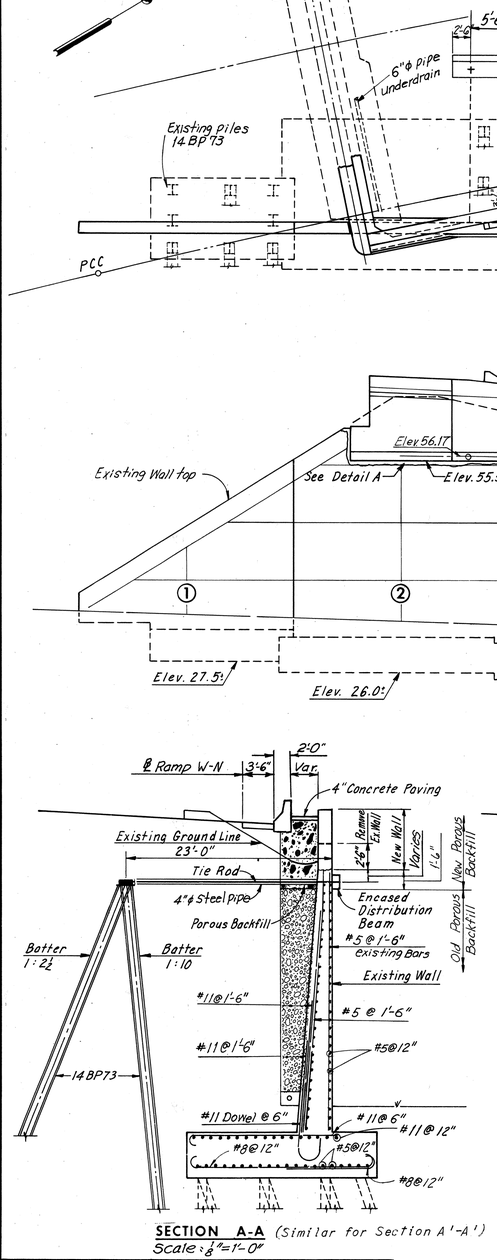
Place concrete slope protection

See Special Provision

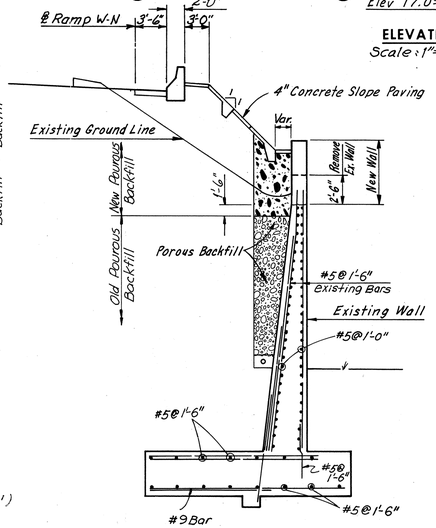
Note:
Rub wall with neat cement paste under 12"x⅜" Bearing Plate to provide reasonably smooth bearing surface. Roughen area between edge of Bearing Plate and limits of concrete encasement to provide clean bonding surface. See Special Provisions for bonding new concrete to existing.



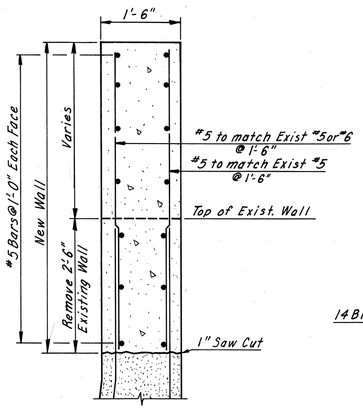
DETAIL A
Scale: 1"=1'-0"
Use similar detail for vertical face.



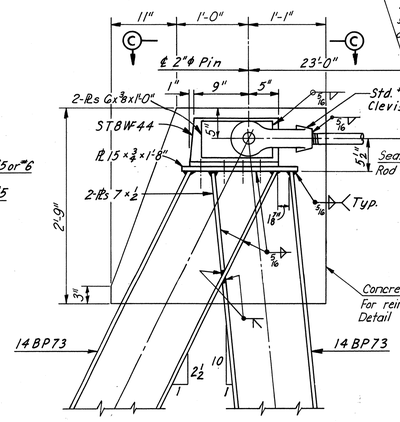
SECTION A-A (Similar for Section A'-A')
Scale: ⅛"=1'-0"



SECTION B-B
Scale: ⅛"=1'-0"



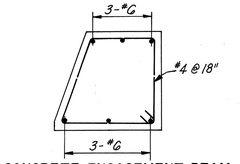
TYPICAL REINFORCING DETAIL TOP OF WALL
Scale: ½"=1'-0"



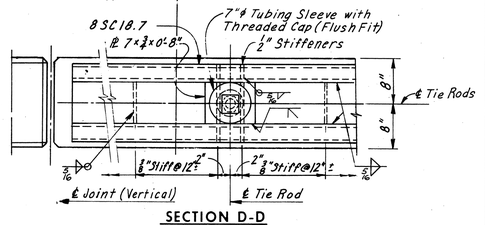
PILE CONNECTION DETAIL
Scale: 1"=1'-0"

Estimated Pile tip Elev. = 9.0

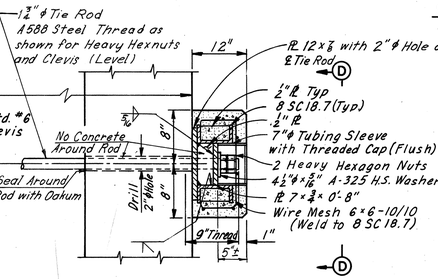
NOTE: *Load test of Piles is to be performed as specified in the Special Provisions.*



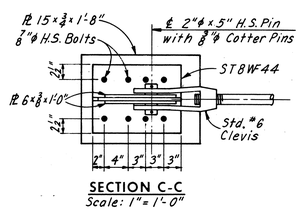
CONCRETE ENCASEMENT BEAM REINFORCING DETAIL
Scale: ½"=1'-0"



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



ENCASED DISTRIBUTION BEAM
Scale: 1"=1'-0"



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

	BY	DATE				
MADE	AMH	3-12-69				
CHECKED	KCT	6-24-69	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

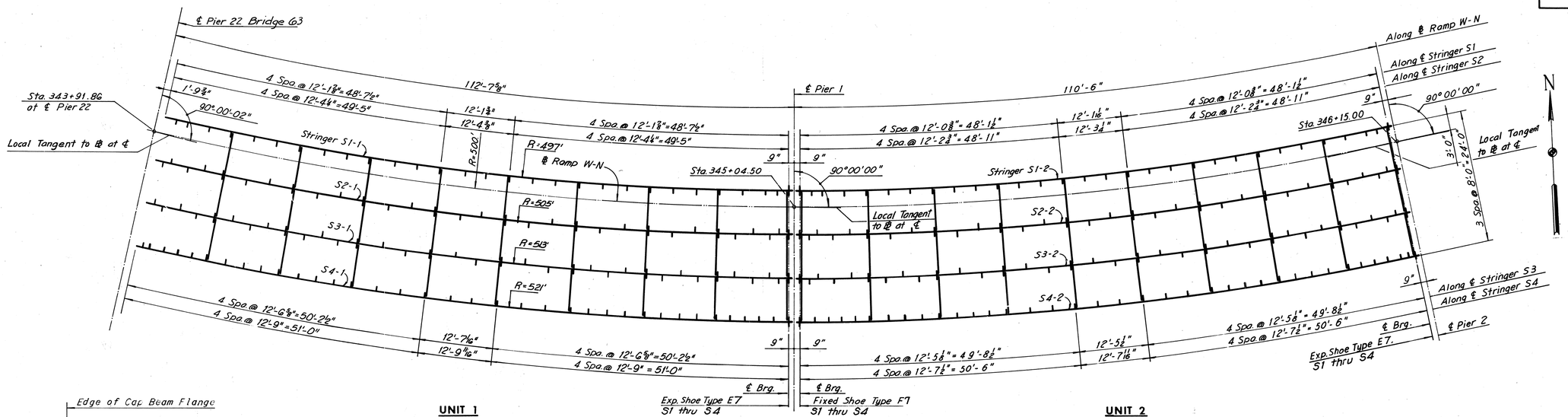
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
NORTH ABUTMENT RETAINING WALL MODIFICATION

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 18 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	191	265

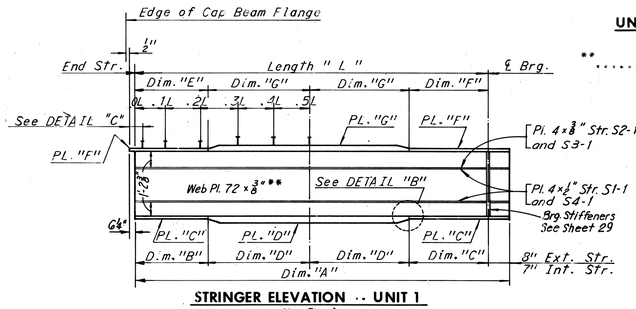


UNIT 1

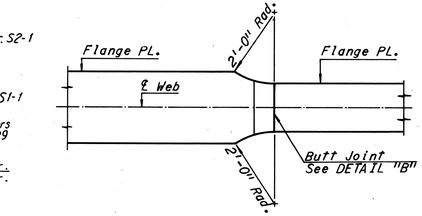
UNIT 2

** ..... A572 - Grade 50 steel typ. except for A36 steel for stringers S1-1 and S1-2

FRAMING PLAN
Scale: 1" = 10'-0"



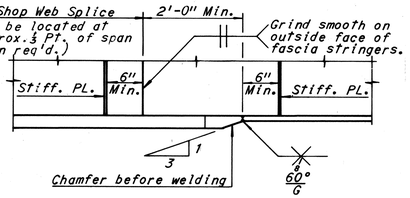
STRINGER ELEVATION - UNIT 1
No Scale



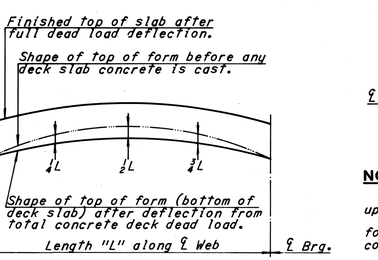
FLANGE PLATE SPLICE DETAIL
No Scale

STRINGER ELEVATION UNIT 2
No Scale

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.



DETAIL "B"
No Scale

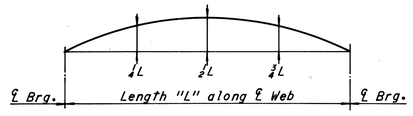


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

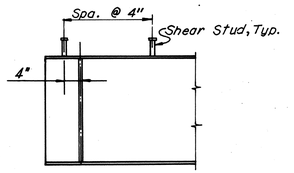
The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Notes:
For Standard Shoe details, see Sheet S1&S2.
For Deck Plan, see Sheet 29.
For Details of diaphragms, see Sheet 29.
For Joint Details, see Sheet 49.
For Web to Flange Weld size, see note, Sheet 20.

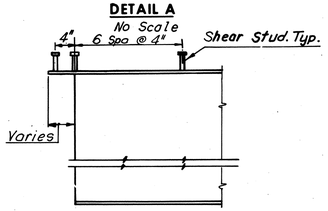
Note:
Shear lug spacing as shown is typical for both halves of the stringer.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E7	8	F7	4



DETAIL A
No Scale



DETAIL C
No Scale

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL "C"	PL "D"	PL "F"	PL "G"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION (CONCRETE ONLY) ¼L	½L	¾L	DEAD LOAD DEFLECTIONS (STEEL ONLY) ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
1	S1-1	110'-0¾"	109'-4¾"	19'-8⅜"	19'-8⅜"	35'-0"	54'-8⅜"	54'-8⅜"	-	16x⅝"	16x1⅛"	12x¾"	-	16½"	19"	24"	24"	24"	⅞"	1 3/16"	⅞"	⅛"	⅛"	⅛"	4 1/16"	5 1/2"	4 1/16"
	S2-1	111'-9⅝"	111'-2⅝"	20'-4⅛"	20'-4⅛"	35'-3"	55'-7⅜"	55'-7⅜"	-	16x1⅛"‡	16x1⅜"‡	12x1⅛"‡	-	12½"	15½"	20"	24"	24"	1⅛"	1⅜"	1⅛"	¼"	⅜"	¼"	4 1/16"	6 1/16"	4 1/16"
	S3-1	113'-7⅛"	113'-0⅛"	20'-3"	20'-3"	36'-3"	19'-3"	19'-3"	37'-3"	20x1¼"‡	20x1⅝"‡	12x1" ‡	16x1¼"‡	10½"	12½"	16½"	21½"	24"	1 3/16"	1 11/16"	1 3/16"	⅜"	½"	⅜"	4 5/16"	6¼"	4 5/16"
	S4-1	115'-5 11/16"	114'-9 11/16"	20'-7⅞"	20'-7 13/16"	36'-9"	20'-7⅞"	20'-7 13/16"	36'-9"	20x1½"‡	24x1⅝"‡	16x1" ‡	20x1¼"‡	8½"	10"	14"	19½"	24"	1⅜"	1⅞"	1⅜"	⅜"	9/16"	⅜"	4 3/16"	6½"	4 3/16"
2	S1-2	109'-8⅛"	108'-4⅛"	21'-2"	21'-2⅝"	33'-0"	54'-2"	54'-2⅛"	-	12x1⅛"	16x1¼"	12x¾"	-	16"	18½"	24"	24"	24"	⅞"	1¼"	⅞"	⅛"	3/16"	⅛"	1 7/8"	1 1/4"	1 3/16"
	S2-2	111'-3¼"	110'-1¼"	21'-5⅛"	21'-9⅝"	33'-3"	55'-0⅜"	55'-0⅜"	-	16x1" ‡	16x1⅜"‡	12x1" ‡	-	12½"	15½"	19½"	24"	24"	1¼"	1 11/16"	1¼"	¼"	⅜"	¼"	1 7/8"	2 5/16"	1 5/8"
	S3-2	113'-0⅛"	111'-10½"	22'-2¼"	22'-2¼"	33'-9"	22'-2¼"	22'-2¼"	33'-9"	20x1" ‡	20x1⅜"‡	12x⅞" ‡	16x1" ‡	10"	12½"	16½"	21½"	24"	1 3/8"	1 15/16"	1 3/8"	⅜"	½"	⅜"	2 1/8"	2 11/16"	1 7/8"
	S4-2	114'-11 11/16"	113'-7 11/16"	22'-6 13/16"	22'-6 13/16"	34'-3"	22'-6 13/16"	22'-6 13/16"	34'-3"	20x1¼"‡	20x1⅜"‡	16x⅞" ‡	16x1¼"‡	8½"	10"	14"	19½"	24"	1½"	2 1/16"	1½"	⅜"	⅝"	⅜"	2 3/4"	2 7/8"	2"

* Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thicknesses of ¾" and under and A588 steel for thicknesses over ¾".

Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.

Intermediate stiffener plates shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.

All intermediate stiffeners shall be 12.5x⅜".

AS BUILT

	BY	DATE
MADE	MHH	8-15-68
CHECKED	P.T.A.	10-18-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	Dead Load Defl. Steel Added	REG	11-14-74
3	As Built	TEM	6-77

P.T.A.

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

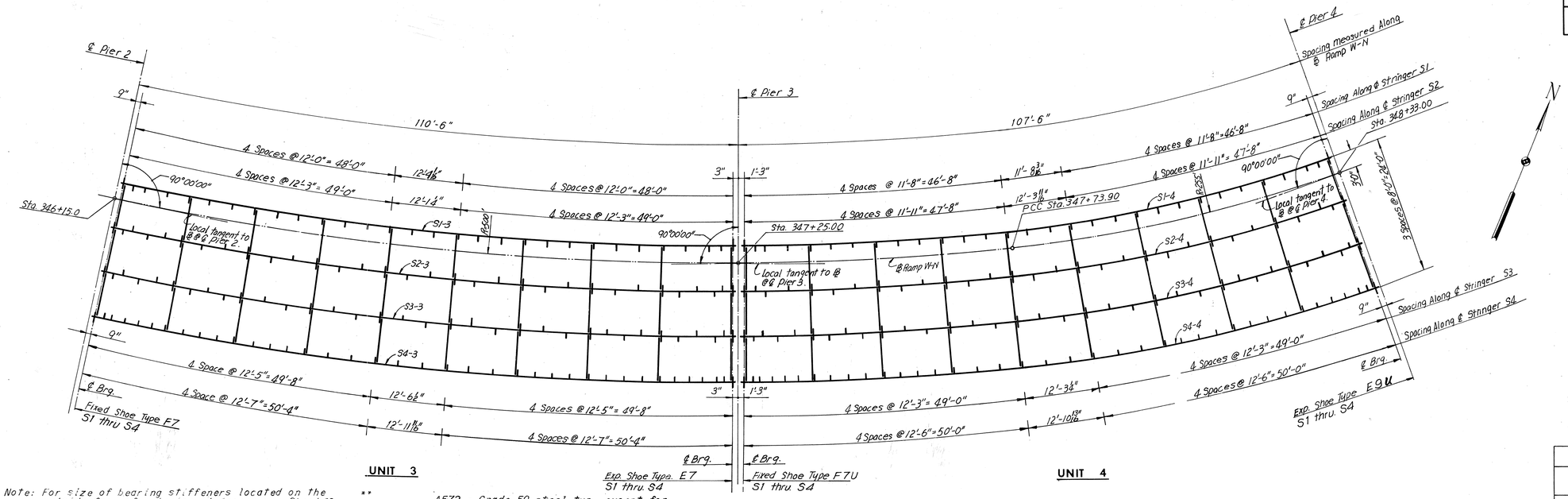
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN - UNITS 1 AND 2

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 19 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	192	265

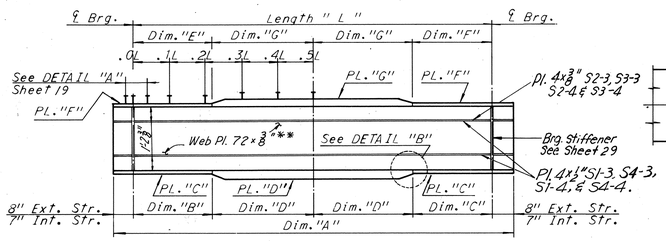


FRAMING PLAN

Scale: 1" = 10'-0"

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.

** ..... A572 - Grade 50 steel typ. except for A36 steel for stringers S1-3 and S1-4

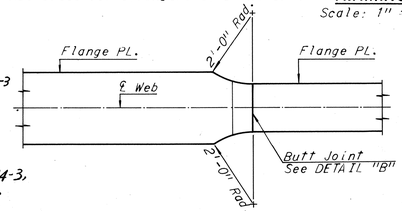


STRINGER ELEVATION

No Scale

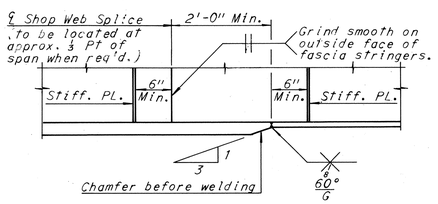
Note: All horizontal dimensions are measured along ℄ Web.

Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL 5"x⅜".



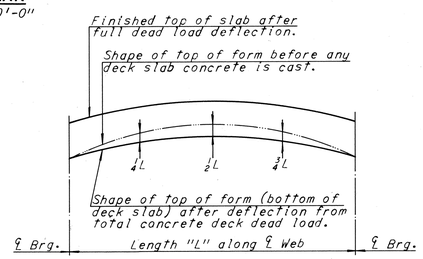
FLANGE PLATE SPLICE DETAIL

No Scale



DETAIL "B"

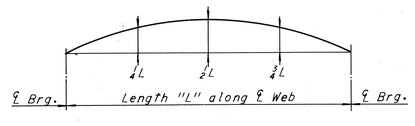
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

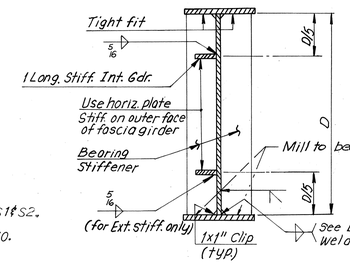


CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Notes:
For Standard Shoe details see Sheets S1 & S2.
For Deck Plan see, Sheet 30.
For Details of diaphragms, see Sheet 30.
For Joint details, see Sheet 49.



WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E7	4	F7	4
E9U	4	F7U	4

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL. "D"	PL."F"	PL. "G"#	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
3	S1-3	109'- 8⅛"	108'- 4⅛"	21'-2"	21'-2⅛"	33'-0"	54'-2"	54'-2⅛"	-	12x1⅛"	16x1¼"	12x ⅜"	-	16½"	18½"	24"	24"	24"
	S2-3	111'- 3⅛"	110'- 1⅛"	21'-9⅜"	21'-9⅜"	33'-3"	55'-0⅜"	55'-0⅜"	-	16x1" ‡	16x1⅜" ‡	12x1" ‡	-	12½"	15½"	19½"	24"	24"
	S3-3	113'- 0¼"	111'-10½"	22'-2¼"	22'-2¼"	33'-9"	22'-2¼"	22'-2¼"	33'-9"	20x1" ‡	20x1⅜" ‡	12x ⅞" ‡	16x1"	10"	12½"	16½"	21½"	24"
	S4-3	114'-11⅛"	113'- 7⅛"	22'-6⅝"	22'-6⅝"	34'-3"	22'-6⅝"	22'-6⅝"	34'-3"	20x1¼" ‡	20x1⅜" ‡	16x ⅞" ‡	16x1¼"	8½"	10"	14"	19½"	24"
4	S1-4	106'- 4⅜"	105'- 0⅜"	20'-9⅛"	20'-9⅛"	31'-9"	52'-6⅛"	52'-6⅛"	-	12x1"	16x1"	12x ⅝"	-	16½"	18½"	24"	24"	24"
	S2-4	108'- 9⅛"	107'- 7⅛"	21'-0⅝"	21'-0⅝"	32'-9"	53'-9⅛"	53'-9⅛"	-	16x1" ‡	16x1⅜" ‡	12x1" ‡	-	13"	15½"	19½"	24"	24"
	S3-4	111'- 5¼"	110'- 3¼"	21'-7⅝"	21'-7⅝"	33'-6"	21'-7⅝"	21'-7⅝"	33'-6"	20x1¼" ‡	20x1⅜" ‡	16x ⅞" ‡	16x1¼"	10"	12"	16"	20½"	24"
	S4-4	114'- 2⅝"	112'-10⅝"	21'-8⅜"	21'-8⅜"	34'-9"	21'-8⅜"	21'-8⅜"	34'-9"	20x1¼" ‡	24x1⅜" ‡	16x1¼" ‡	20x1½"	8"	9½"	13"	18"	24"

DEAD LOAD DEFLECTION (CONCRETE ONLY) ¼L	½L	¾L	DEAD LOAD DEFLECTIONS (STEEL ONLY) ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
⅞"	1¼"	⅞"	⅛"	⅜"	⅛"	⅝"	5/8"	-3/16"
¼"	1 11/16"	1¼"	¼"	⅜"	¼"	1 1/16"	1¼"	5/16"
1 3/64"	1 15/64"	1 39/64"	⅜"	½"	⅜"	1 5/64"	1 ⅜"	2/16"
1½"	2 1/64"	1½"	⅜"	9/16"	⅜"	1½"	1 13/16"	11/16"
9/16"	13/16"	9/16"	1/16"	1/16"	1/16"	-4 13/16"	-6 3/8"	-4 13/16"
1 1/16"	1 7/16"	1 1/16"	5/16"	5/16"	3/16"	-4¼"	-5 3/8"	-4¼"
5/16"	7/16"	5/16"	-4⅛"	-5 1/16"	-4 1/16"			
⅜"	9/16"	⅜"	-4 1/16"	-5¼"	-3 7/8"			

* Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾".

Note: Shear lug spacing as shown is typical for both halves of the stringer.

Note: Minus (-) sign in camber denotes downward camber.

Note: Web to flange weld size shall be determined by flange thickness as follows:
to 1¼" ..... ¼" weld
over 1¼" to 2¼" ..... ⅜" weld

	BY	DATE
MADE	G.S.H.	08-23-68
CHECKED	P.T.A.	10-18-68
IN CHARGE		

NO.	REVISION	BY	DATE
1	Shoes Revised, Camber & Note Added	LRH	4-19-74
2	Dead Load Defl. Steel added	REJ	11-14-74
3	As Built	TEM	6-77

AS BUILT

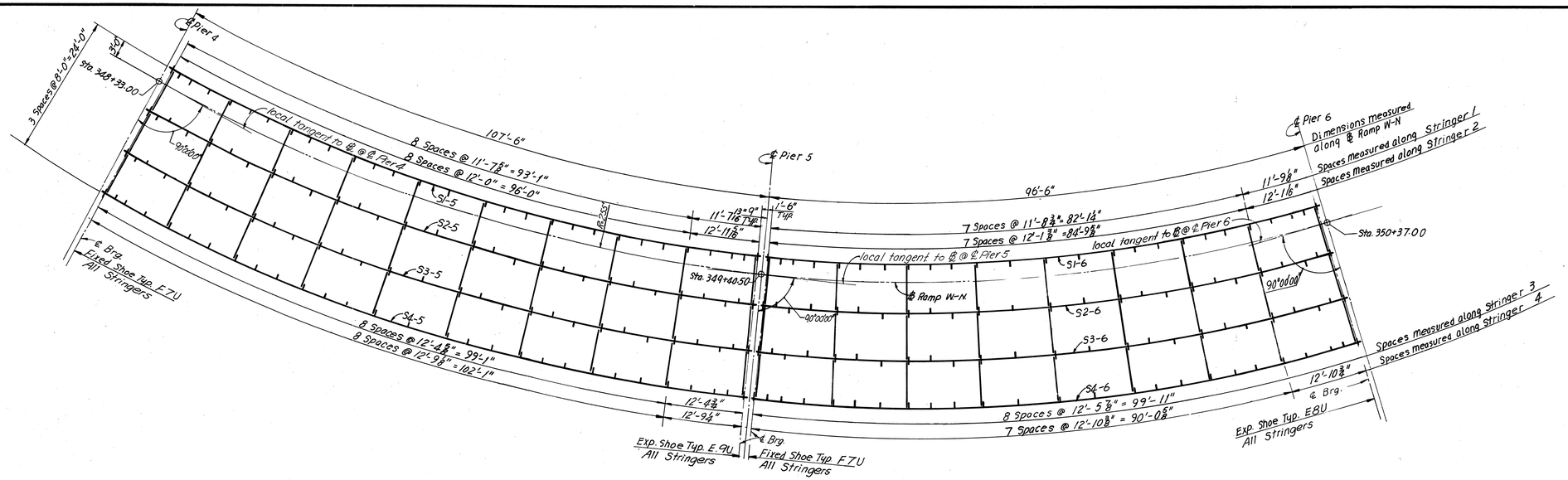
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN-UNITS 3 AND 4

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 20 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	193	265



UNIT 5

UNIT 6

SHOE SCHEDULE

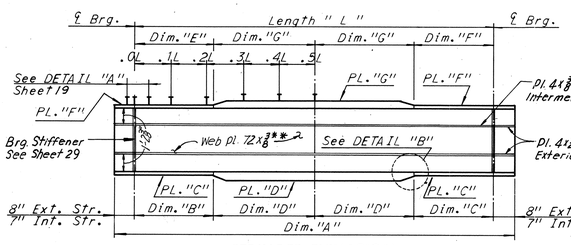
EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO REQD.
E8U	4	F7U	8
E9U	4		

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.

** ..... A572 - Grade 50 steel typ. except for A36 steel for stringers S1-5 and S1-6

FRAMING PLAN

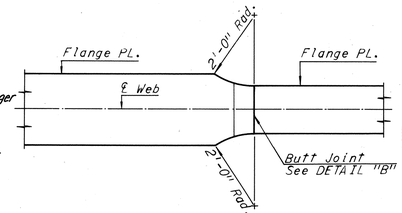
Scale 1" = 10'-0"



STRINGER ELEVATION

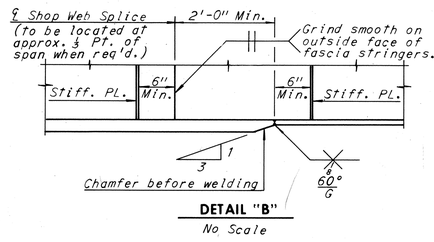
No Scale

Note: All horizontal dimensions are measured along ℄ Web.



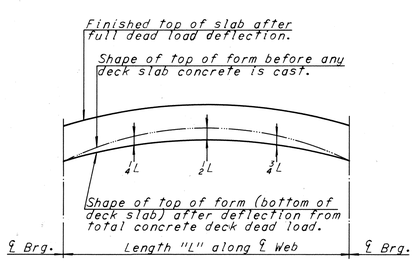
FLANGE PLATE SPLICE DETAIL

No Scale



DETAIL "B"

No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

Note: Falsework supports will be required under Units 5 and 6 until all stringers and tie-down bearings are in place.

Notes:
All steel shall be A36 unless otherwise shown.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphrams as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL 5x⅜".

Note: Minus (-) sign in camber denotes downword camber

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL "D"	PL."F"	PL "G" *	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION (CONCRETE ONLY) ¼L	½L	¾L	DEAD LOAD DEFLECTIONS (STEEL ONLY) ¼	½	¾	CAMBER SCHEDULE ¼	½	¾
5	S1-5	106'-0 15/16"	104'-8 15/16"	52'-4 7/16"	52'-4 5/16"	—	52'-4 7/16"	52'-4 5/16"	—	12x5/4"	—	12x5/4"	—	22½"	24"	24"	24"	24"	7/16"	9/16"	7/16"	1/8"	3/16"	1/8"	-5/8"	-6 1/4"	-5/8"
	S2-5	109'-3 5/16"	108'-1 5/16"	21'-3 7/16"	21'-3 5/16"	32'-9"	54'-0 11/16"	54'-0 5/16"	—	16x1" ‡	16x1 3/16" ‡	12x⅞" ‡	—	13½"	16½"	20½"	24"	24"	1 1/16"	1 7/16"	1 1/16"	¼"	5/16"	¼"	-4 5/16"	-5 1/2"	-4 5/16"
	S3-5	112'-1 7/16"	111'-5 5/16"	22'-2 5/16"	22'-2 3/16"	33'-6"	22'-2 5/16"	22'-2 3/16"	33'-6"	20x1 1/16" ‡	20x1 3/16" ‡	16x⅞" ‡	16x1 1/4"	9½"	12"	16"	20½"	24"	1 1/4"	1 11/16"	1 1/4"	5/16"	½"	5/16"	-3 7/8"	-5 1/4"	-3 7/8"
	S4-5	116'-2 1/4"	114'-10 1/4"	22'-8 1/16"	22'-8 1/16"	34'-9"	22'-8 1/16"	22'-8 1/16"	34'-9"	20x1 3/16" ‡	24x1 1/16"‡	16x1 1/4"‡	20x1 2"	7½"	9½"	13"	18"	24"	1 7/16"	2"	1 7/16"	7/16"	5/8"	7/16"	-3 9/16"	-4 5/8"	-3 9/16"
6	S1-6	95'-2 3/8"	93'-10 3/8"	46'-11 1/16"	46'-11 1/16"	0	46'-11 1/4"	46'-11 1/16"	—	12x1".	—	12x⅜" ‡	—	20"	23½"	24"	24"	24"	3/8"	9/16"	3/8"	1/16"	1/8"	1/16"	1/4"	7/16"	3/8"
	S2-6	98'-0 11/16"	96'-10 11/16"	19'-2 5/16"	19'-2 3/16"	29'-3"	48'-5 13/16"	48'-5 3/16"	—	12x1" ‡	12x1 3/16"‡	12x⅜" ‡	—	13½"	16½"	19½"	24"	24"	13/16"	1 1/8"	13/16"	1/8"	3/16"	1/8"	13/16"	1 5/16"	7/8"
	S3-6	101'-1"	99'-11"	20'-2½"	20'-2½"	29'-9"	49'-11½"	49'-11½"	—	16x1¼" ‡	20x1 3/16"‡	16x⅞" ‡	—	10"	12"	16"	20"	24"	1"	1 3/8"	1"	¼"	5/16"	¼"	1 1/16"	1 3/8"	1 1/4"
	S4-6	104'-3 3/8"	102'-11 3/8"	20'-8 1/16"	20'-8 1/16"	30'-9"	20'-8 1/16"	20'-8 1/16"	30'-9"	20x1¼" ‡	20x1 3/4"‡	16x⅞" ‡	16x1¼"	8"	9½"	13"	17½"	24"	1 3/16"	1 3/8"	1 3/16"	5/16"	7/16"	5/16"	1 3/8"	2"	1½"

* Spacing begins at termination of 6 spaces @ 4".

‡ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾"

Note: Shear lug spacing as shown is typical for both halves of the stringer.

Notes:
For Standard Shoe details see Sheets S1 S2.
For Deck Plan see, Sheet 31.
For Details of diaphragms, see Sheet 31.
For Joint details, see Sheet 49.
For Web to Flange Weld size, see note, Sheet 20.

	BY	DATE
MADE	GSH	08-16-68
CHECKED	SCC	10-21-68
IN CHARGE		

NO.	REVISION	BY	DATE
⚠	Notes added Shoe Revision & Camber	LRH	4-19-74
⚠	Dead Load Defl. Steel Added	REG	11-14-74
3	As Built	TEM	G-77

AS BUILT

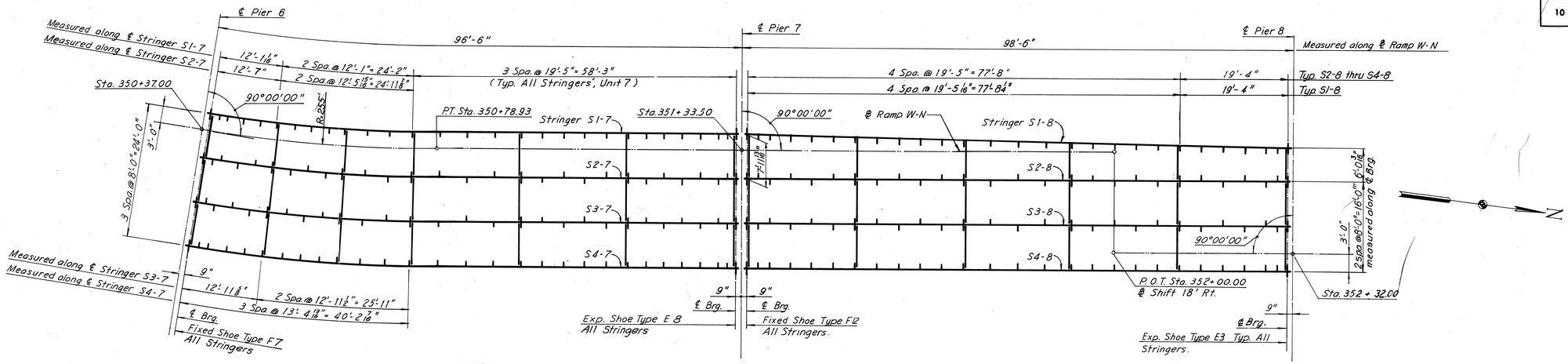
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN – UNITS 5 AND 6

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 21 OF 54

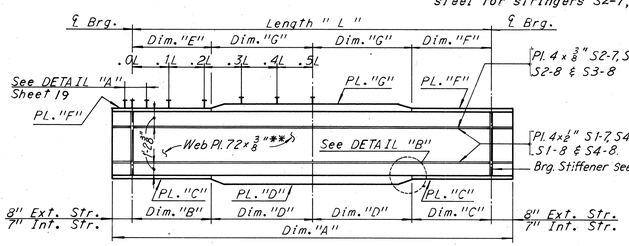
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	194	265



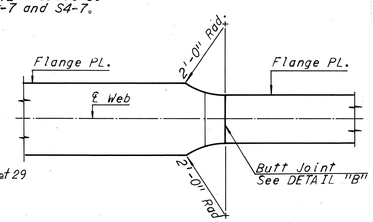
UNIT 7

UNIT 8

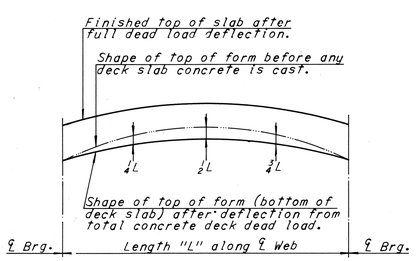
FRAMING PLAN
Scale: 1" = 10'-0"



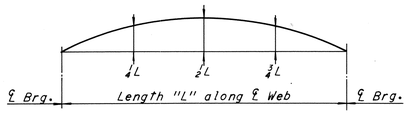
STRINGER ELEVATION
No Scale



FLANGE PLATE SPLICE DETAIL
No Scale



DEAD LOAD DEFLECTION DIAGRAM



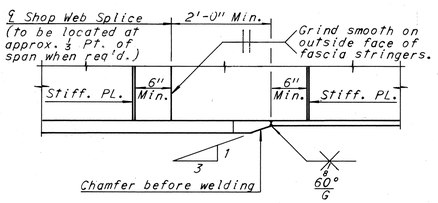
CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

NOTE TO CONTRACTOR

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



DETAIL "B"
No Scale

**..... A36 steel typ. except for A572 - Grade 50 steel for stringers S2-7, S3-7 and S4-7.

Notes:
All steel shall be A36 steel unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffener plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stingers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of PL 5x⅜".

Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 29.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E3	4	F7	4
E8	4	F12	4

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C"	PL. "D"	PL. "F"	PL. "G"#	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
7	S1-7	95'-10⅛"	94'-6⅛"	18'-9"	18'-9⅛"	28'-6"	47'- 3"	47'- 3⅛"	-	12x⅛"	16x¼"	12x⅜"	-	15½"	18"	23"	24"	24"
	S2-7	96'-11⅞"	95'-9⅞"	18'-7⅝"	18'-7⅝"	29'-3"	47'-10⅝"	47'-10⅝"	-	16x1" ‡	16x⅜" ‡	12x⅜" ‡	-	13½"	16½"	20½"	24"	24"
	S3-7	98'- 3⅝"	97'-1⅝"	18'-9⅝"	18'-9⅝"	29'-9"	48'- 6⅛"	48'- 6⅛"	-	16x1¼" ‡	20x⅜" ‡	16x⅜" ‡	-	9½"	12"	16"	20"	24"
	S4-7	99'- 9⅛"	98'-5⅛"	18'-5⅛"	18'-5⅛"	30'-9"	18'- 5⅛"	18'- 5⅛"	30'-9"	20x1¼" ‡	20x1⅛" ‡	16x⅜" ‡	16x1¼"	7½"	9½"	13"	17½"	24"
8	S1-8	98'- 4¼"	97'-0"	19'-0⅛"	19'-0⅛"	29'-6"	48'- 6⅛"	48'- 6⅛"	-	12x1"	12x⅝"	12x¾"	-	10½"	12"	16½"	24"	24"
	S2-8	98'- 2"	97'-0"	48'-6"	48'-6"	-	48'- 6"	48'- 6"	-	12x1⅝"	-	12x¾"	-	11½"	13½"	18"	23"	24"
	S3-8	98'- 2"	97'-0"	48'-6"	48'-6"	-	48'- 6"	48'- 6"	-	12x1⅝"	-	12x¾"	-	11½"	13½"	18"	23"	24"
	S4-8	98'- 4"	97'-0"	19'-0"	19'-0"	29'-6"	48'- 6"	48'- 6"	-	12x1"	12x⅝"	12x⅞"	-	10½"	12"	16½"	22"	24"

DEAD LOAD DEFLECTION (CONCRETE ONLY)			DEAD LOAD DEFLECTIONS (STEEL ONLY)			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L	¼L	½L	¾L
5/8"	7/8"	5/8"	1/8"	3/16"	1/8"	1 3/16"	1 1/16"	1 1/16"
3/8"	1 1/16"	3/8"	3/16"	1/4"	3/16"	1 1/16"	2"	1 15/16"
13/16"	1 1/8"	13/16"	3/16"	1/4"	3/16"	1 1/16"	2 1/16"	2"
3/16"	1/4"	3/16"	3/16"	5/16"	3/16"	1 1/16"	1 1/8"	1 15/16"
3/4"	1 1/16"	3/4"	1/16"	1/16"	1/16"	3 1/4"	4"	2 13/16"
7/8"	1 3/4"	7/8"	3/16"	5/16"	3/16"	3 1/8"	3 13/16"	2 5/8"
1/4"	1 3/16"	1/4"	1/16"	1/16"	1/16"	3 3/16"	3 7/8"	2 3/4"
15/16"	1 3/8"	15/16"	1/16"	1/16"	1/16"	3 1/8"	3 3/4"	2 3/8"

Note:
Shear lug spacing as shown is typical for both halves of the stringer.

* Spacing begins at termination of 6 spaces @ 4".
# Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾"

Notes:
For Standard Shoe details, see Sheets S1 & S2.
For Deck Plan see Sheet 32.
For Details of diaphragms, see Sheet 32.
For Joint Details, see Sheet 49.
For Web to Flange Weld size, see Note, Sheet 20.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	MHH	8-26-68	1	Notes & Camber Added	LRH	4-19-74
CHECKED	SCC	10-22-68	2	Dead Load Defl. of Steel added	REP	11-14-74
IN CHARGE			3	As Built	TEM	6-77

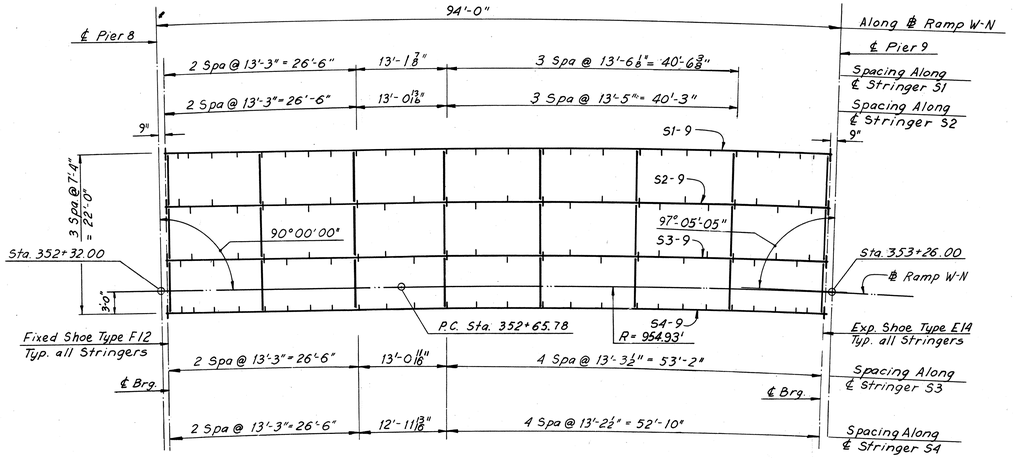
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 7 AND 8

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

SCALE: As Noted.
CONTRACT NO.: 10
SHEET NO. 22 OF 54

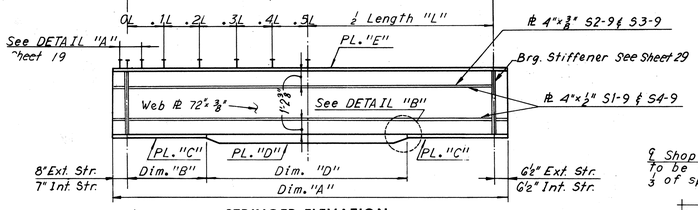
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	195	265



UNIT 9

FRAMING PLAN

Scale: 1" = 10'-0"

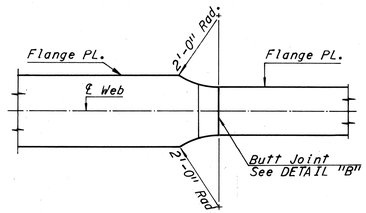


STRINGER ELEVATION

No Scale

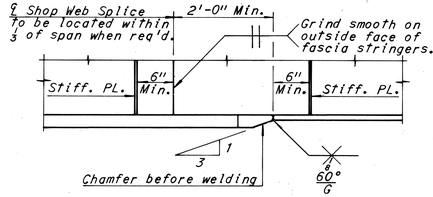
Note: All horizontal dimensions are measured along ℄ Web.

*Note: For size of bearing stiffeners located on the outside face of exterior stringers see Sheet 20.



FLANGE PLATE SPLICE DETAIL

No Scale

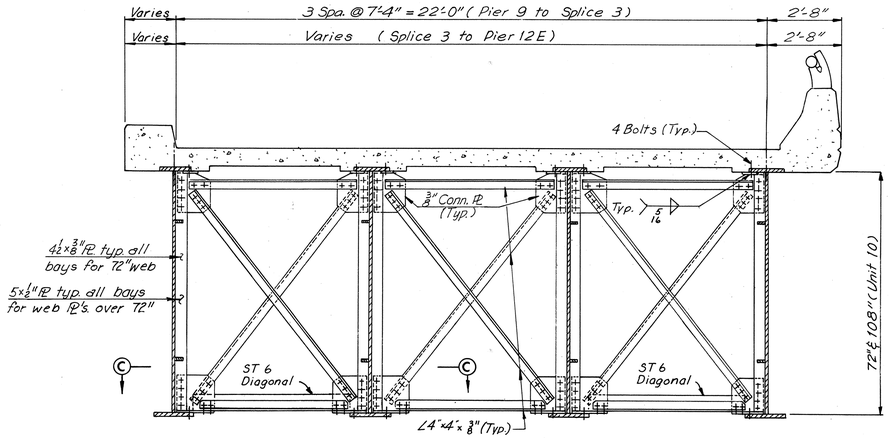


DETAIL "B"

No Scale

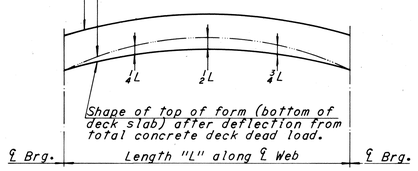
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E14	4	F12	4



TYPICAL INTERMEDIATE DIAPHRAGM-UNIT 10

Scale: ⅜" = 1'-0"

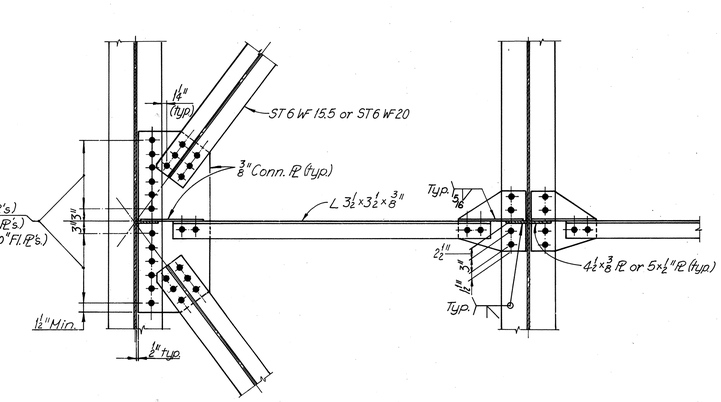


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



SECTION C-C

Scale ¾"=1'-0"

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
9	S1-9	97'-2 11/16"	96'-0 3/8"	19'-0"		55'-8 3/8"	12"x1"	12"x1 5/8"	12"x¾"	10 2/8"	12"	16 2/8"	24"	24"
	S2-9	95'-9 11/16"	94'-8 3/16"	—	—	93'-2 13/16"	—	12"x1 1/8"	12"x¾"	13 2/8"	15 2/8"	20 2/8"	24"	24"
	S3-9	94'-4 15/16"	93'-3 7/16"	—	—	92'-8 1/16"	—	12"x1 5/8"	12"x¾"	11 2/8"	13 2/8"	18"	23"	24"
	S4-9	93'-1 13/16"	91'-11 5/16"	19'-0"		54'-3 3/16"	12"x1"	12x1 5/8"	12"x¾"	10 2/8"	12"	16 2/8"	22"	24"

DEAD LOAD DEFLECTION (CONCRETE ONLY)			DEAD LOAD DEFLECTIONS (STEEL ONLY)			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L	¼L	½L	¾L
13/16"	1 8/8"	13/16"	3/16"	1/4"	3/16"	4"	5 8/8"	3 7/8"
13/16"	1 8/8"	13/16"	3/16"	1/4"	3/16"	3 3/4"	5 5/8"	3 11/4"
11/16"	1"	11/16"	3/16"	1/4"	3/16"	3 3/8"	4 5/8"	3 3/8"
5/8"	7/8"	5/8"	1/8"	3/16"	1/8"	3 1/8"	4 3/8"	3 1/8"

* Spacing begins at termination of 6 spaces @ 4".

Note: Shear lug spacing as shown is typical for both halves of the stringer.

Notes:
All steel shall be A36 steel unless denoted otherwise.
Exterior stringer longitudinal stiffeners shall be located on the exterior face of the stringer.
Intermediate stiffenor plates shall be equally spaced between diaphragms as shown.
The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.
All intermediate stiffeners shall be of ℄ 5x⅜"

Notes:
For Standard Shoe details see Sheets S1 & S2.
For Deck Plan see, Sheet 33.
For Details of diaphragms, see Sheet 33.
For Joint details, see Sheet 49.
For Web to Flange Weld size, see Note, Sheet 20.

	BY	DATE
MADE	C.E.B.	3-13-69
CHECKED	AMH	4-18-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note & Camber Added	LRH	4-19-74
2	Dead Load Defl. of steel added	REG	11-14-74
3	As Built	TEM	6-77

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN AND DETAILS
UNIT 9

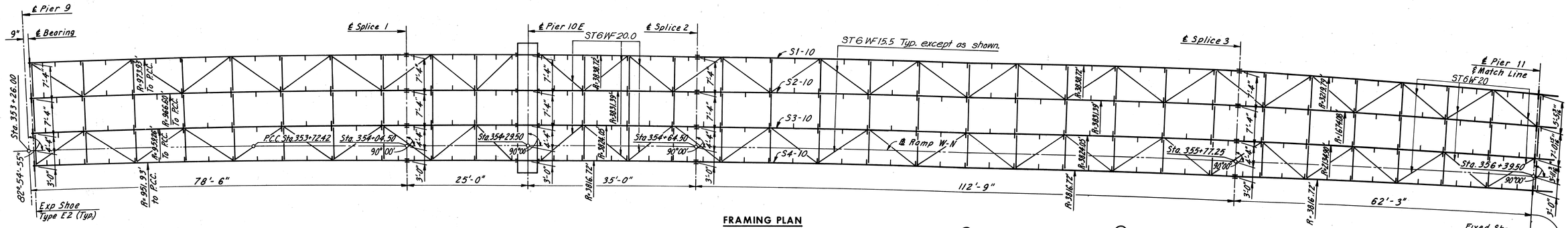
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 23 OF 54

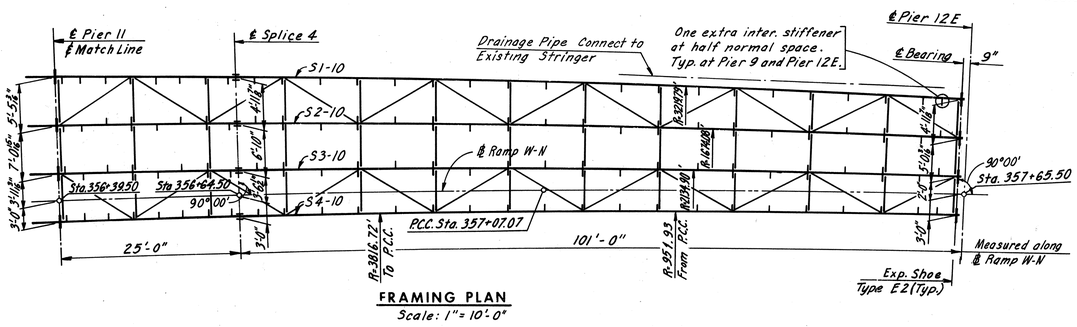
SHOE SCHEDULE			
EXP. SHOE		FIXED SHOE	
TYPE	NO.	TYPE	NO.
E2	8	SP-1	4

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	196	265

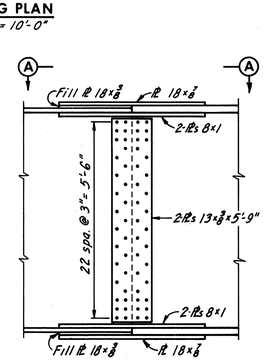
N



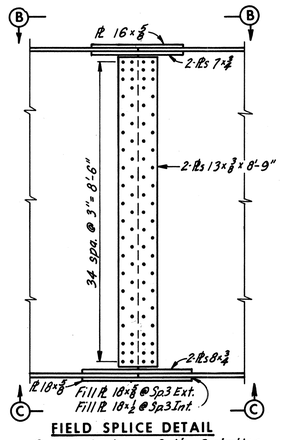
FRAMING PLAN
Scale: 1"= 10'-0"



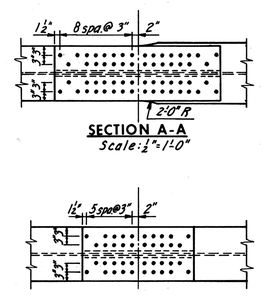
FRAMING PLAN
Scale: 1"= 10'-0"



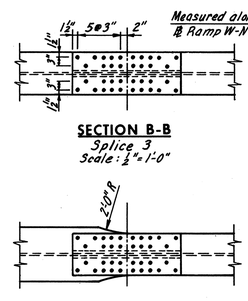
FIELD SPLICE DETAIL
Splice 1 Shown ; Splice 4 similar
Scale: ½"=1'-0"



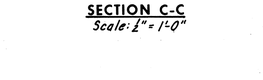
FIELD SPLICE DETAIL
Splice 2 shown; Splice 3 similar
Scale: ½"= 1'-0"



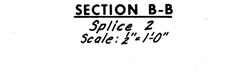
SECTION A-A
Scale: ½"=1'-0"



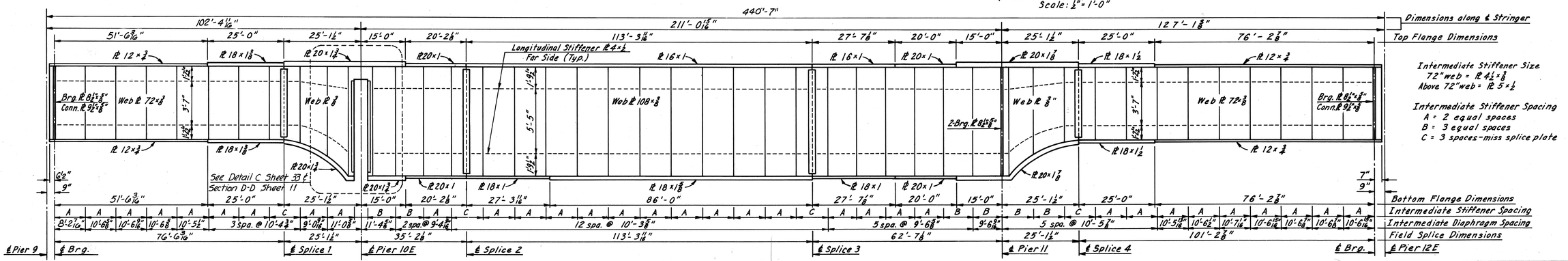
SECTION B-B
Splice 3
Scale: ½"=1'-0"



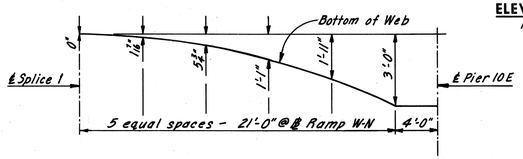
SECTION C-C
Scale: ½"= 1'-0"



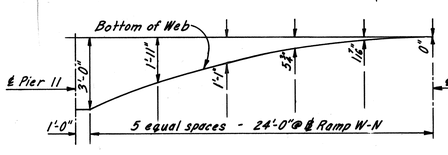
SECTION B-B
Splice 2
Scale: ½"=1'-0"



ELEVATION S1-10
No Scale



HAUNCH DETAIL
No Scale



HAUNCH DETAIL
No Scale

Notes:
For Deck Plan, see Sheet 34.
For Shoe Details, see Sheet S2.
For Details of Intermediate Diaphragms, see Sheet 23.
For Details of End Diaphragms, see Section D-D Sheet 33.
For Details of Lateral Bracing, see Sheet 23.
All steel is A36 unless otherwise noted.
For Joint Details, see Sheet 49.
For Web to Flange Weld, see Note, Sheet 20.

AS BUILT

	BY	DATE
MADE	AMH	2-2869
CHECKED	JD	4-26-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Note Added	LRH	4-19-74
2	As Built	TEM	6-77

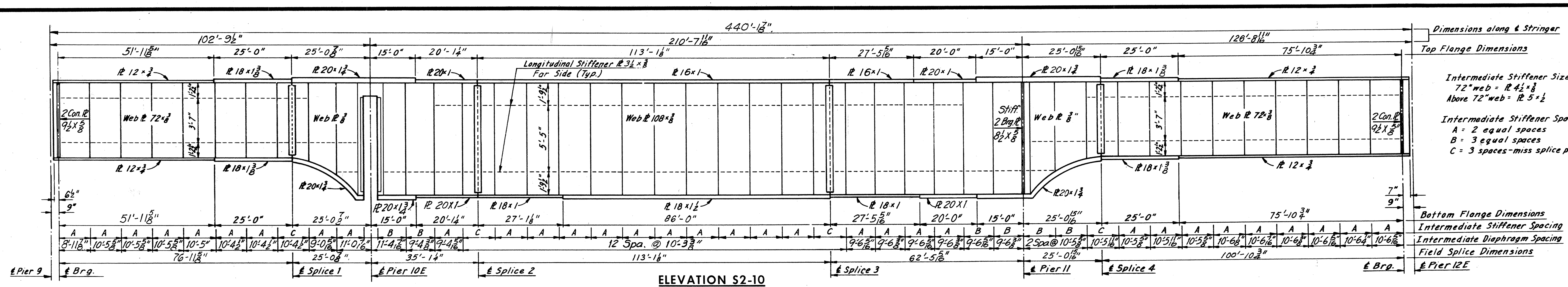
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNIT 10

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 24 OF 54

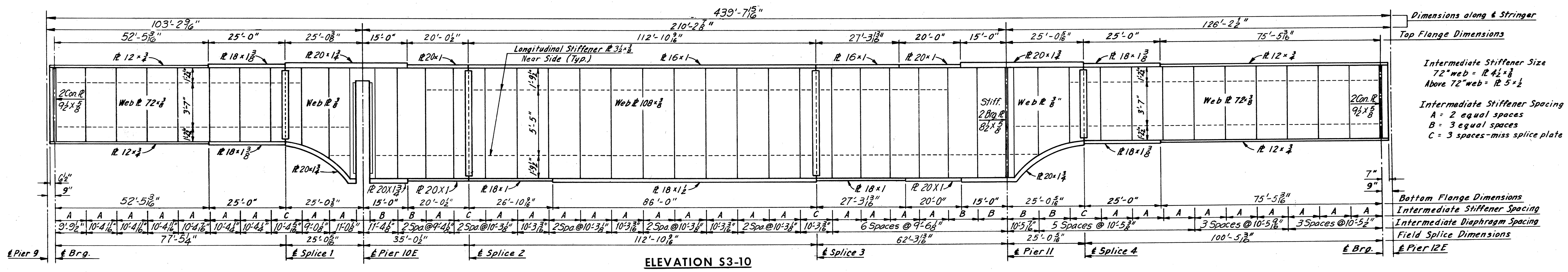
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	197	265



ELEVATION S2-10

Intermediate Stiffener Size
72"web = PL 4½×⅜
Above 72"web = PL 5×½

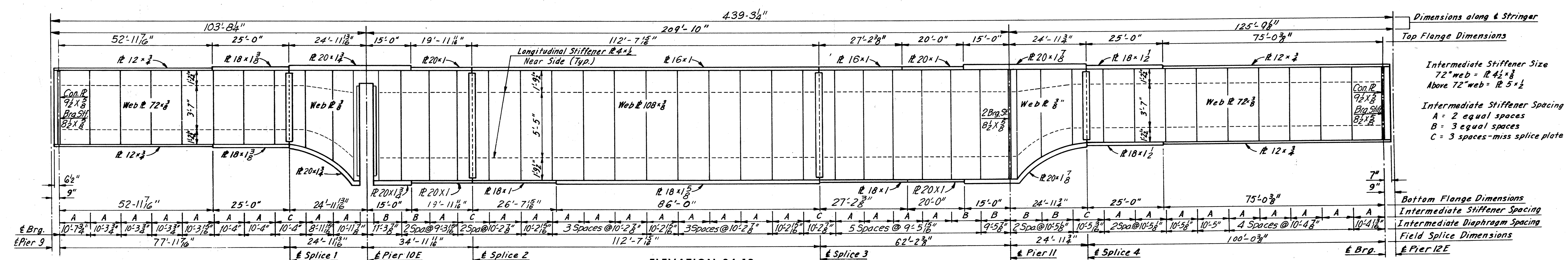
Intermediate Stiffener Spacing
A = 2 equal spaces
B = 3 equal spaces
C = 3 spaces-miss splice plate



ELEVATION S3-10

Intermediate Stiffener Size
72"web = PL 4½×⅜
Above 72"web = PL 5×½

Intermediate Stiffener Spacing
A = 2 equal spaces
B = 3 equal spaces
C = 3 spaces-miss splice plate



ELEVATION S4-10

Intermediate Stiffener Size
72"web = PL 4½×⅜
Above 72"web = PL 5×½

Intermediate Stiffener Spacing
A = 2 equal spaces
B = 3 equal spaces
C = 3 spaces-miss splice plate

STRINGER	ELEV. A	ELEV.B	ELEV. C	ELEV. D	ELEV. E	ELEV. F
S1-10	88.50	87.37	85.60	80.87	76.81	72.72
S2-10	88.35	87.23	85.46	80.65	76.57	72.42
S3-10	88.21	87.08	85.31	80.43	76.24	72.12
S4-10	88.06	86.93	85.16	80.20	75.93	71.82

NOTE TO CONTRACTOR

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

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

NOTE TO FABRICATOR

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

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

Note:

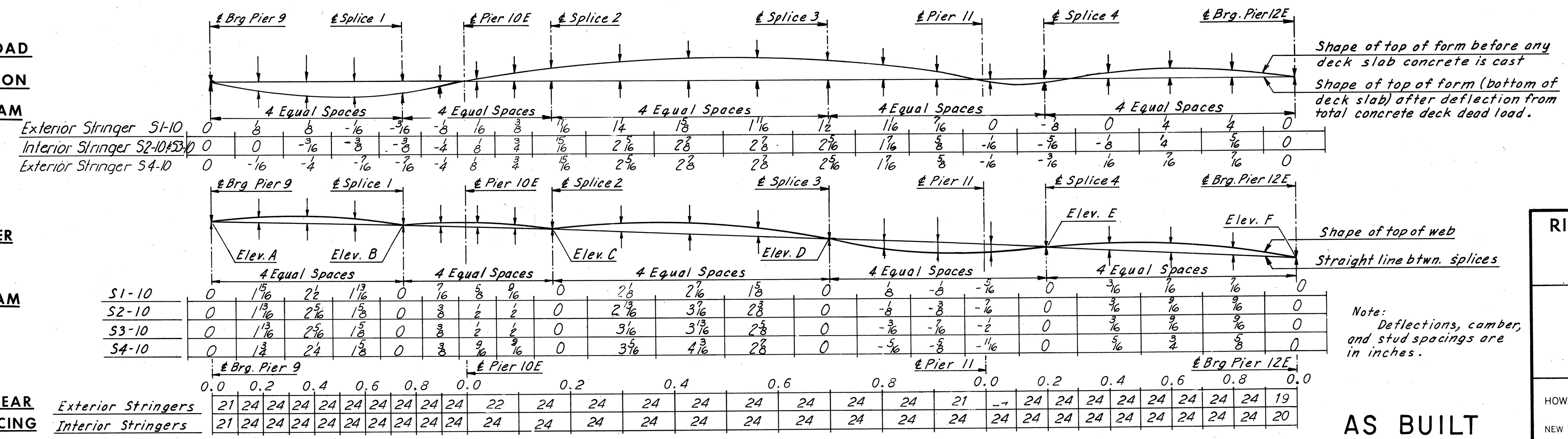
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet

DEAD LOAD DEFLECTION DIAGRAM

CAMBER DIAGRAM

MAX. SHEAR STUD SPACING



Note:
Deflections, camber, and stud spacings are in inches.

Note:
For Deck Plan, see Sheet 34.
All Steel shall be A36 unless otherwise noted.
For Details not shown, see Section D-D, sheet 11, and Detail C, sheet 33.
For Web to Flange Weld size, see Note, Sheet 20.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	2-28-69	1	Note Added	LRH	4-19-74
CHECKED	JD	4-29-69	2	As Built	TEM	6-77
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

GIRDER ELEVATIONS - UNIT 10

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

SCALE: No Scale
CONTRACT NO.: 10
SHEET NO. 25 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	198	265

UNIT 13 | UNIT 14 | UNIT 15

℄ Existing Piers 95 & 96 | ℄ Existing FB 16 | ℄ Pier 12W | ℄ Brg | ℄ Pier 13 W. | ℄ Pier 14 & ℄ Bearing (Radial) | 10" @ ℄ R.P.T. | ℄ Bearing Stringers (Radial)

119'-5 3/16"
4 Spa. @ 19'-6" = 78'-0"
4 Spa. @ 19'-6" = 78'-0"
17'-2 13/16"
16'-11 13/16"
22'-0 5/16"
21'-9 1/16"
108'-9 3/4"
3 Spa. @ 21'-4" = 64'-0"
3 Spa. @ 21'-4" = 64'-0"
21'-11 7/8"
21'-9"
24'-5 5/8"
24'-4 5/8"
49'-9"

Normal to ℄ Pier
85°31'30"
1:5 1/2
22'-3 5/16"
21'-5 15/16"
90°00'00"
89°03'35"
90°00'00"
89°03'35"

Measured Along ℄ Ramp N-W
Measured Along ℄ S-1
Measured Along ℄ S-2

S1-13 | S2-13 | S1-14 | S2-14 | S1-15 | S2-15

R=1494.39'
R=1432.39'

G13 | G14 | G15 | G16 | G17

Sta. 15+73.60 ℄ Ramp N-W
Sta. 15+73.09 ℄ Ramp N-W
Sta. 14+53.66 ℄ Ramp N-W.
Sta. 13+44.85 ℄ Ramp N-W
Sta. 12+95.10 ℄ Ramp N-W.

Fixed Shoe (Type F4M Typ.)
Exp. Shoe (Type E6 Typ.)
Fixed Shoe (Type F4M. Typ.)
Exp. Shoe (Type E1. Typ.)
Fixed Shoe (Type F1M. Typ.)

℄ Brg. N. Abutment.
℄ R.P.T.
℄ Ramp N-W

52'-0"
52'-0"

℄ Pier 96 Sta 1720+44.963
℄ Pier 95 Sta 1720+30.397
Sta 1720+49.115

5 Spa @ 7'-9 1/16" = 38'-9 5/16"

Note:
Dimensions from ℄ Pier to ℄ Brgs. are normal to ℄ Pier.

℄ Piers 97 & 98 Sta. 1721+58.811
℄ 1" Long. Jt.
90° typ. intermediate diaphragms
Sta. 358+92.00 ℄ Ramp W-N.
℄ Piers 99 & 100 Sta. 1722+63.871
90°00'00"
radial
℄ brg. of stringers
15L339
18L42.7

Exp. Shoe (Type E4 Typ.)
Fixed Shoe (Type F9 Typ.)
Exp. Shoe (Type E1 Typ.)
Fixed Shoe (Type F1 Typ.)

S1-11 | S2-11 | S3-11 | S1-12

R=1388.64'
R=1386.88'
R=1131.84'
R=951.93'
R=1380.39'

4 Spa. @ 19'-6" = 78'-0"
4 Spa @ 21'-4" = 64'-0"
4 Spa @ 12'-6 7/16" = 50'-1 3/4"
2 Spa @ 12'-6 3/8" = 25'-0 3/4"
126'-6"
3 Spa @ 16'-4 3/8" = 49'-1 3/8"
65'-2 1/4"
2 Spa @ 16'-4 3/8" = 32'-9 1/4"

90°00'00"
Sta. 357+65.50 ℄ Ramp W-N.
Sta. 359+69.87 ℄ Ramp W-N.
℄ Ramp W-N
R=954.93'
P.C.C. Sta. 357+07.01 ℄ Ramp W-N
℄ Pier 12 E
℄ Pier 13E
Sta. 359+02.00
P.C.C. Sta. 359+26.75 Bk. = Sta. 359+29.43 Ahd. ℄ Ramp W-N
℄ Brg. Stringers
℄ Brg. N. Abtmt. Sta. 1723+11.87

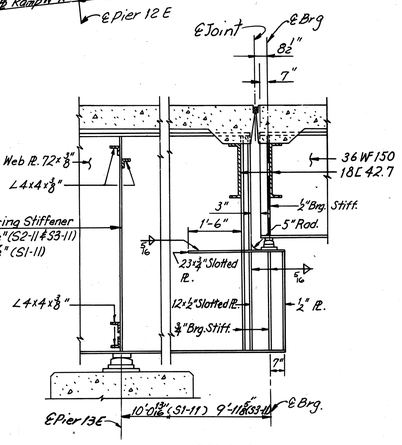
Note:
For Stringer Elevation, see Sheet 27.
For Stringer Schedule, see Sheet 27.
For Camber Schedule, see Sheet 27.
For FB 16 Details, see Sheet 28.
For Deck Plan, see Sheet 35.
For Shoe Details, see Sheets S1 & S2.

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to fabrication of new metalwork.
New Diaphragms are to match Existing Diaphragms, in Units 13, 14 and 15.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P. G.C.C.	2-24-69	1	Framing Revised Units 12, 13, 14, 15	RBJ	12-5-74
CHECKED	K.C.T.	4-2669	2	P.C.C. ℄ WN	DWB	12-11-74
IN CHARGE			3	As Built	TEM	6-77

UNIT 11

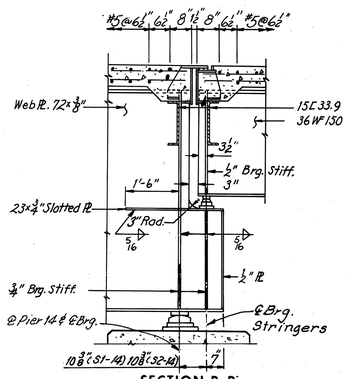
FRAMING PLAN
Scale: 1"=10'-0"



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

Note:
Intermediate stiffener Pls. 4x 3/8" shall be equally spaces between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

UNIT 12



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

AS BUILT

SHOE SCHEDULE

FIXED SHOES		EXPANSION SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
F1	2	E1	4
F1M	2	E4	3
F4M	4	E6	2
F9	3	-	-

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

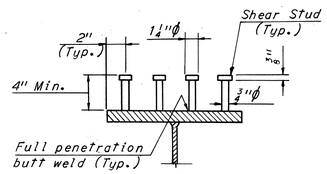
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN – UNITS 11, 12, 13, 14 AND 15

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 26 OF 54

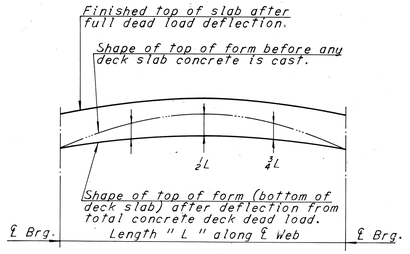
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	199	265



SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE

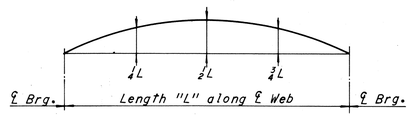
Capacity = 3,400 lbs. per stud.
The Contractor may, if he elects, use three ⅞" diameter studs at the same longitudinal spacing in lieu of the four ¾" diameter studs shown.
Stud rows shall be placed parallel to the main deck reinforcing.
Shear stud spacing shown is maximum spacing.



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

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

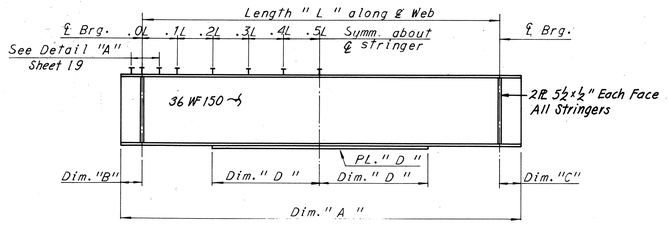


CAMBER DIAGRAM

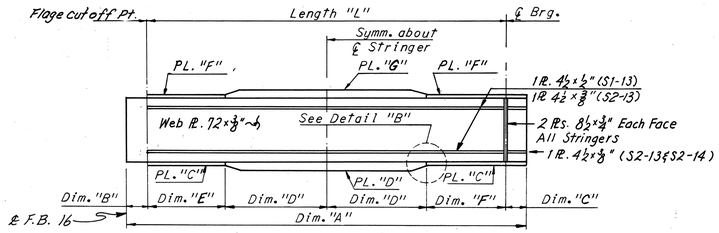
NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

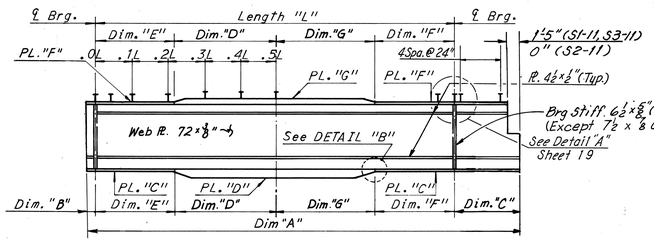
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet



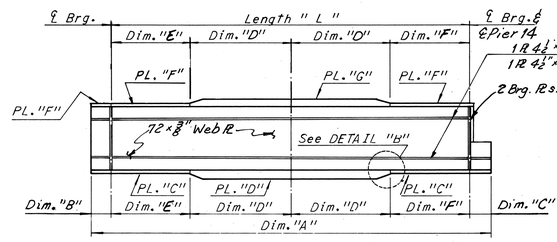
STRINGER ELEVATION
No Scale
(Unit 12 ℄ 15)



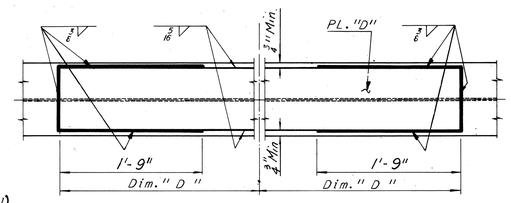
STRINGER ELEVATION
No Scale
(Unit 13)



STRINGER ELEVATION
No Scale
(Unit 11)

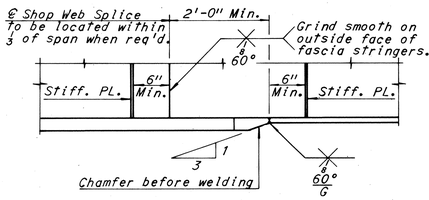


STRINGER ELEVATION
No Scale
(Unit 14)



COVER PLATE DETAIL
No Scale

Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered distance, top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 35 .



DETAIL "B"
No Scale
NOTE: Web to flange weld size see sheet 20.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL."C"	PL. "D"	PL."F"	PL. "G"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
11	S1-11	138'-1 15/16"	126'-11"	7"	10'-7 15/16"	38'-0"	25'-5⅛"	25'-5¼"	38'-0"	16'-1 9/16"	18 x 2"	12 x1"	16 x 1"	17"	19"	24"	24"	24"
	S2-11	127'-3 3/8"	126'-1 3/16"	7"	7"	31'-6"	31'-6 1/16"	31'-6 1/16"	31'-6"	14 x1½"	16 x 2"	12x1"	12 x1"	18"	20½"	24"	24"	24"
	S3-11	136'-5 7/16"	125'-4 1/16"	7"	10'-6 5/8"	37'-8"	25'-0 9/16"	18'-6 9/16"	44'-2"	14 x1"	14x2 "	12x⅞"	12x1"	.22"	24"	24"	24"	24"
12	S1-12	66'-9 7/16"	65'-6 7/16"	7"	8"	24'-0"	--	--	--	36WF150	10½x¾ "	-	-	8"	9"	11"	12½"	15"
	S3-12	66'-5 1/16"	65'-0 1/16"	7"	10"	23'-9"	--	--	--	36WF150	10½x¾ "	-	-	10"	11"	14½"	17½"	24"
13	S1-13	118'-4 5/16"	116'-7 1/16"	11"	10½"	37'-0"	21'-3 9/16"	21'-3 9/16"	-	18x1"	18x1⅝"	18x1"	18x1⅝"	-	-	-	-	-
	S2-13	117'-4 1/16"	115'-6 3/16"	11"	10½"	36'-0"	21'-9 3/8"	21'-9 3/8"	-	18x1"	18x1¼"	18x1"	18x1¼"	-	-	-	-	-
14	S1-14	110'-4 1/16"	108'-0 3/16"	10½"	1'-5 3/8"	35'-0"	19'-0 9/16"	19'-0 9/16"	-	18x1"	18x1¼"	18x1"	18x1¼"	-	-	-	-	-
	S2-14	109'-10 3/8"	107'-6 1/2"	10½"	1'-5 3/8"	35'-0"	18'-9 1/4"	18'-9 1/4"	-	18x⅞"	18x1⅜"	18x⅞"	18x1⅜"	-	-	-	-	-
15	S1-15	50'-1 1/4"	48'-11 3/16"	3½"	10"	-	-	-	-	36WF150	-	-	-	-	-	-	-	-
	S2-15	49'-8 11/16"	48'-9 7/16"	3½"	8"	-	-	-	-	36WF150	-	-	-	-	-	-	-	-

DEAD LOAD DEFLECTION SCHEDULE

¼L	½L	¾L
1 5/16	1 9/16	1 ¼
1 1/16	2 1/16	1 1/16
1 9/16	2 ⅛	1 7/16
¹⁵/₁₆	¾	¹⁵/₁₆
1 3/16	1 ⅜	1 3/16
1 ⅛	1 ⅜	1 3/16
1 ⅛	1 ½	1 ⅜
1	1 3/16	1
⅞	1 ⅛	⅞
⅝	¾	⅝
⅝	¾	⅝

CAMBER SCHEDULE

¼L	½L	¾L
2 3/4	3 3/8	2 9/16
2 1/16	4 ⅛	3 ⅛
2 5/8	4	2 15/16
¾	1	13/16
1	1 7/16	1 ⅛
1 9/16	2 3/16	1 13/16
1 ½	2 1/16	1 ½
1 1/16	1 ¾	1 5/16
⅞	1 ¼	⅞
⅝	¾	⅝
⅝	½	⅝

* Spacing begins at termination of 6 spaces @ 4".

	BY	DATE				
MADE	V.C.P. G.C.C.	2-26-69	2	As Built	TEM	12-5-74 G-77
CHECKED	K.C.T.	4-28-69				
IN CHARGE			NO.	REVISION	BY	DATE

Framing Revised Units 12, 13, 14, 15 — RFJ

NOTE.
All steel shall be A36 unless otherwise shown.
Longitudinal stiffeners of exterior stringer shall be located on the exterior face of the stringer.

AS BUILT

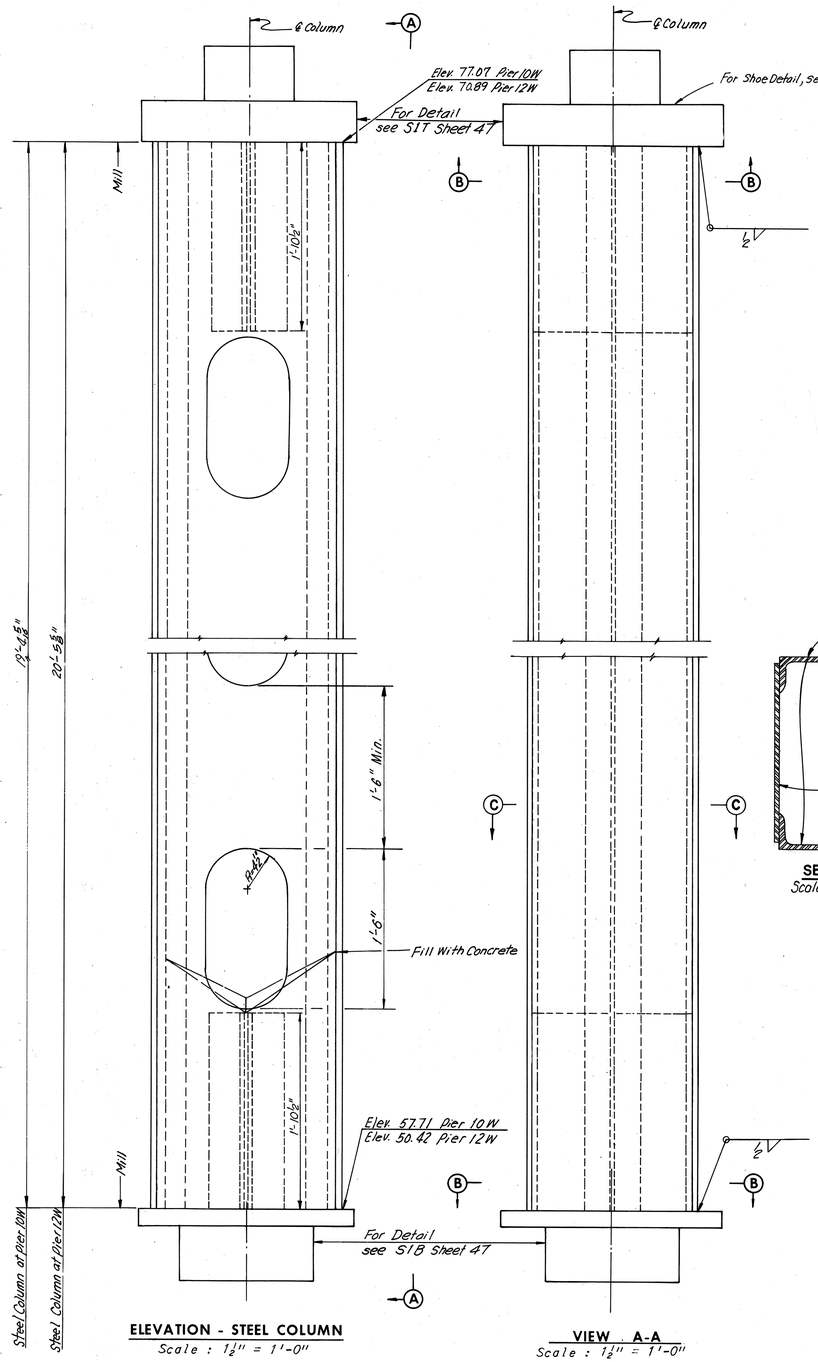
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

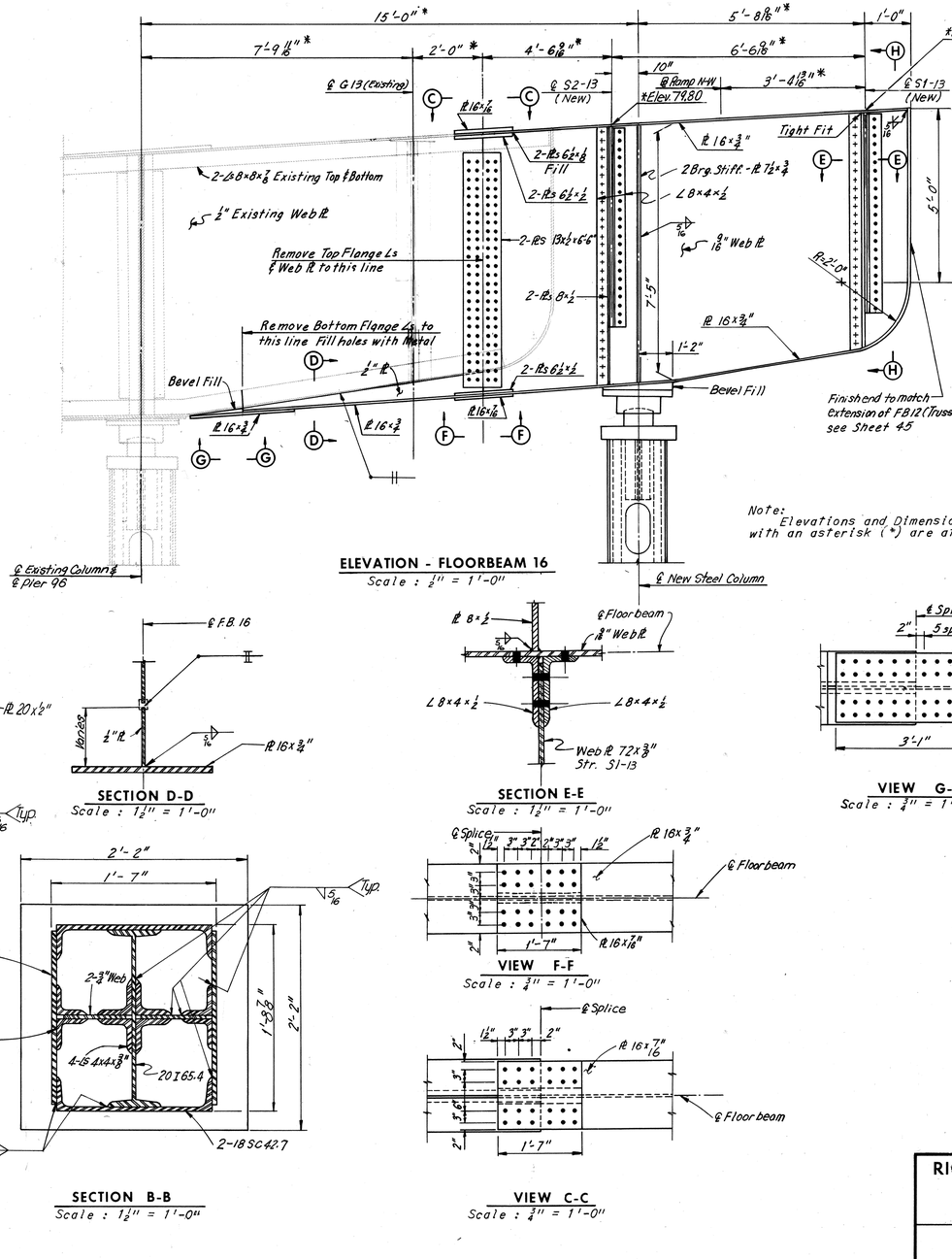
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 11,12,13,14 AND 15

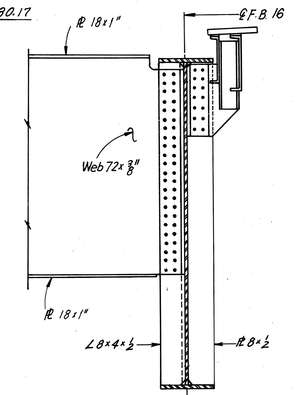
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: No Scale
CONTRACT NO.: 10
SHEET NO. 27 OF 54

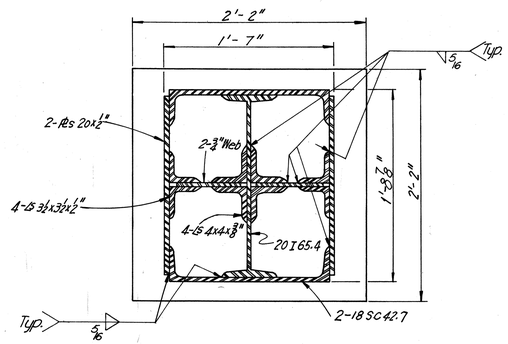
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	200	265

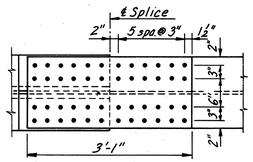






Note:
Elevations and Dimensions denoted with an asterisk (*) are at ℄ F.B. 16.





	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	3-11-69	3	As Built	TEM	6-77
CHECKED	S.C.C.	6-13-69	⚠	Revised Elev.	RGF	1-24-75
IN CHARGE			⚠	Bolts Deleted Welded Conn.	T.E.M.	10-74

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

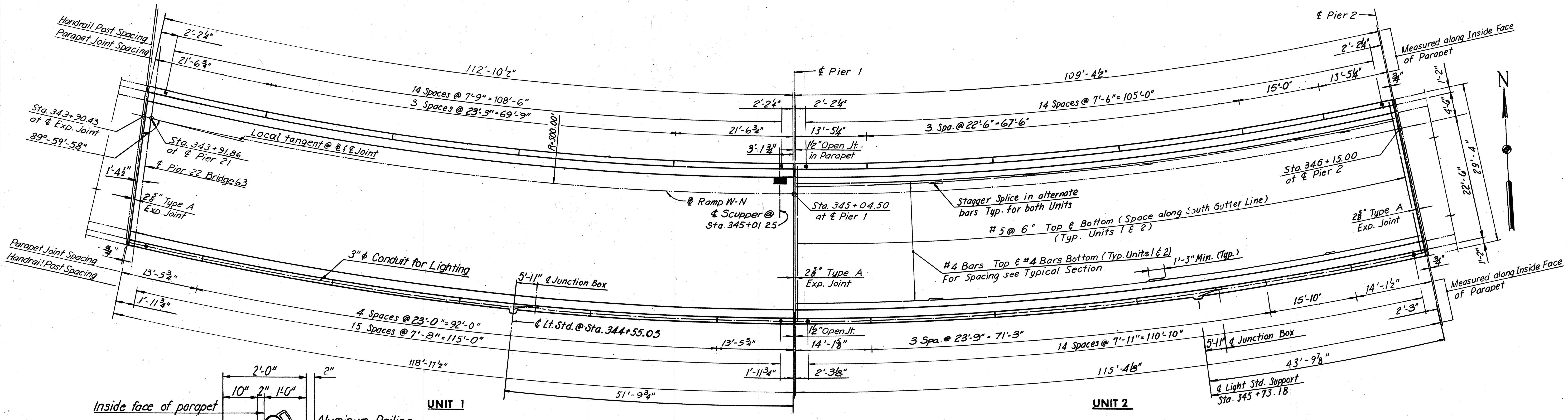
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

FLOORBEAM 16 AND STEEL COLUMNS

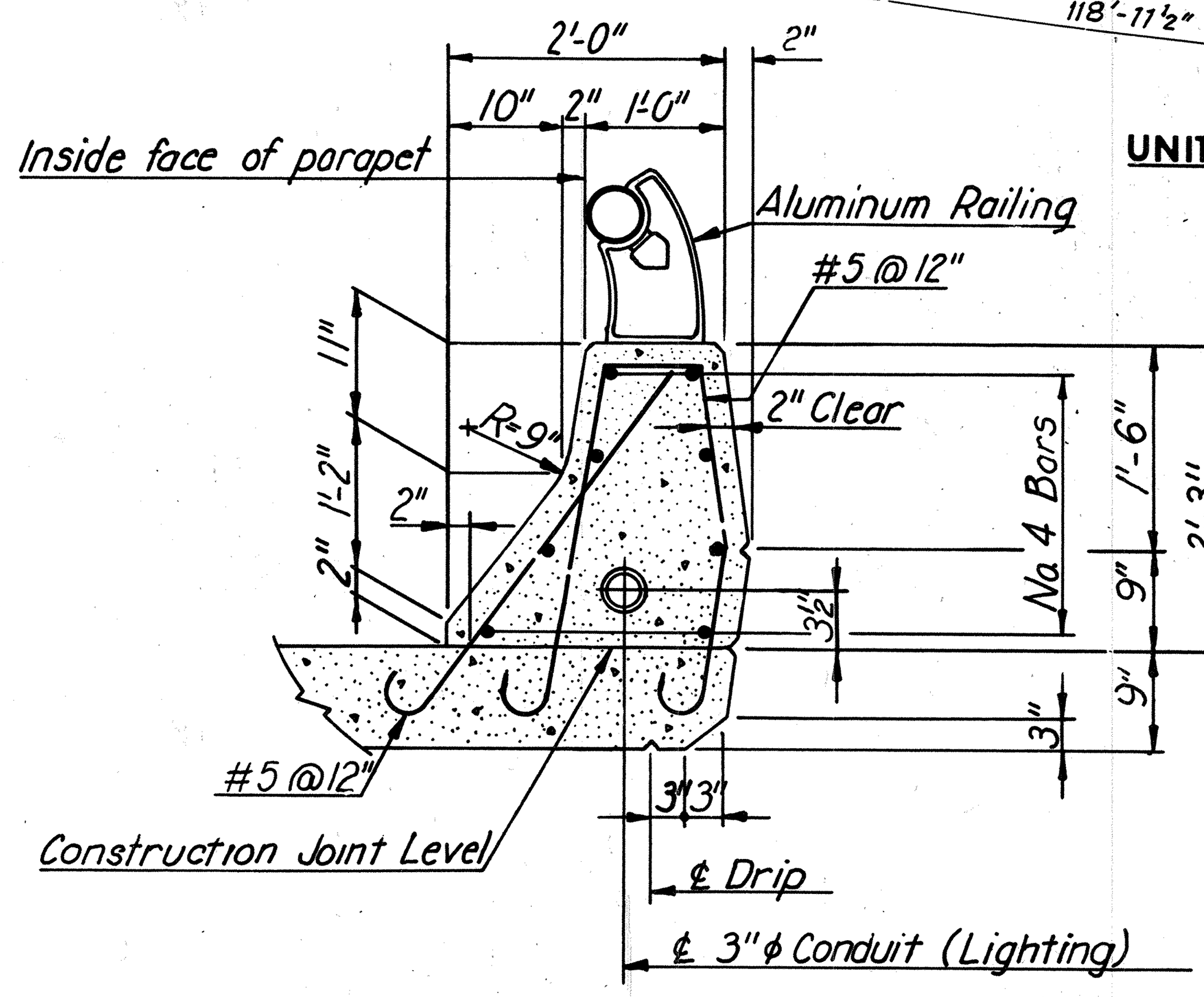
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 28 OF 54

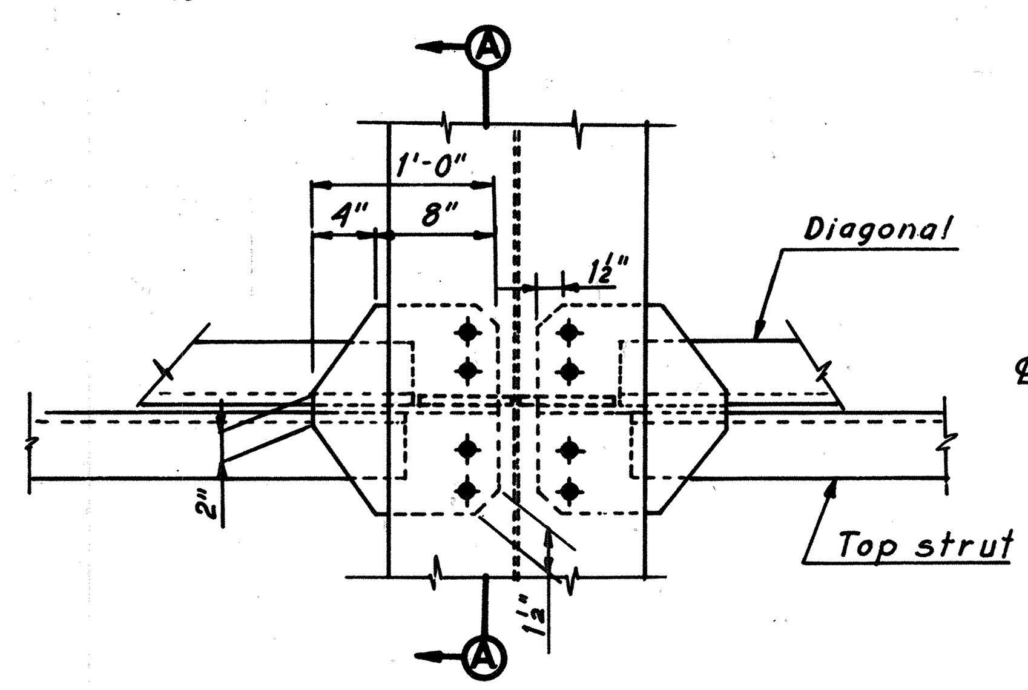
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
'0	DOWNTOWN EXPRESSWAY	201	265



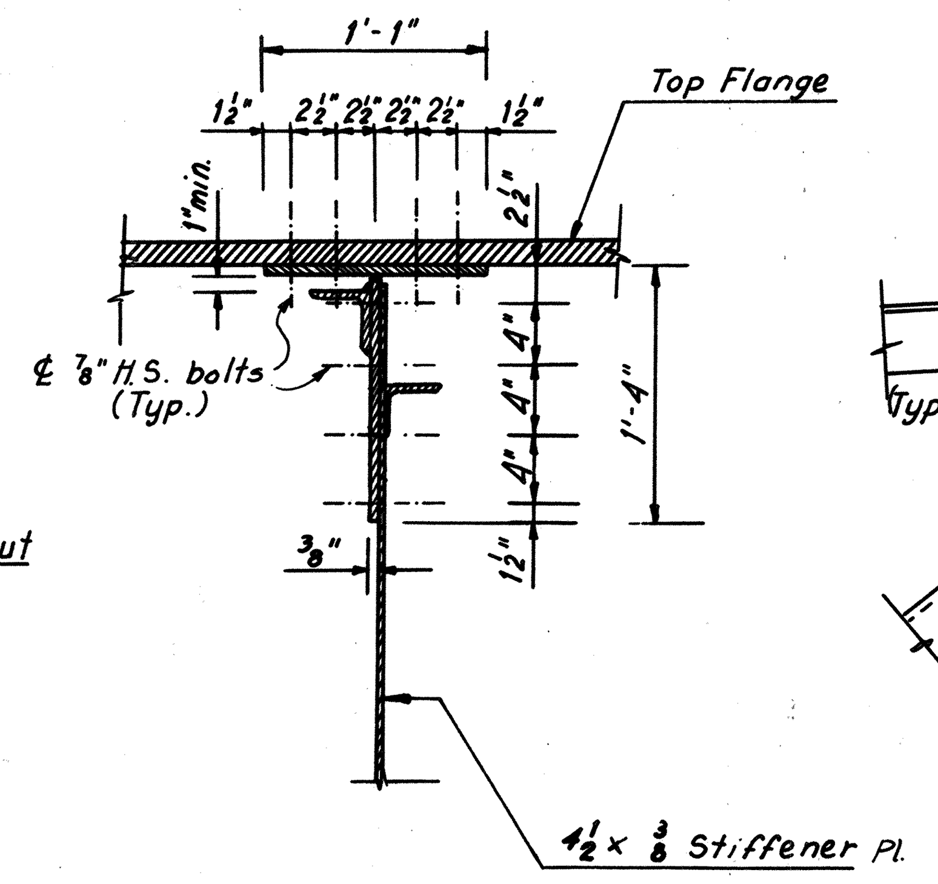
DECK PLAN
Scale: 1" = 10'-0"



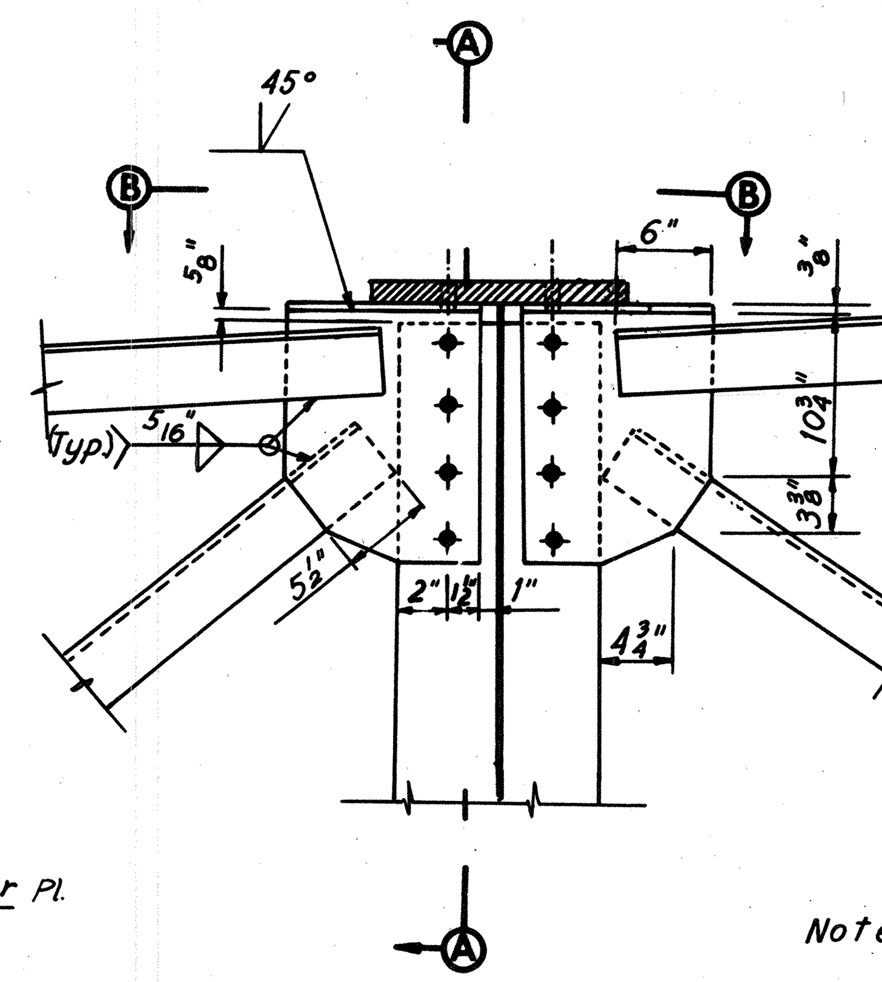
TYPICAL PARAPET DETAIL
Scale: ¾" = 1'-0"



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



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

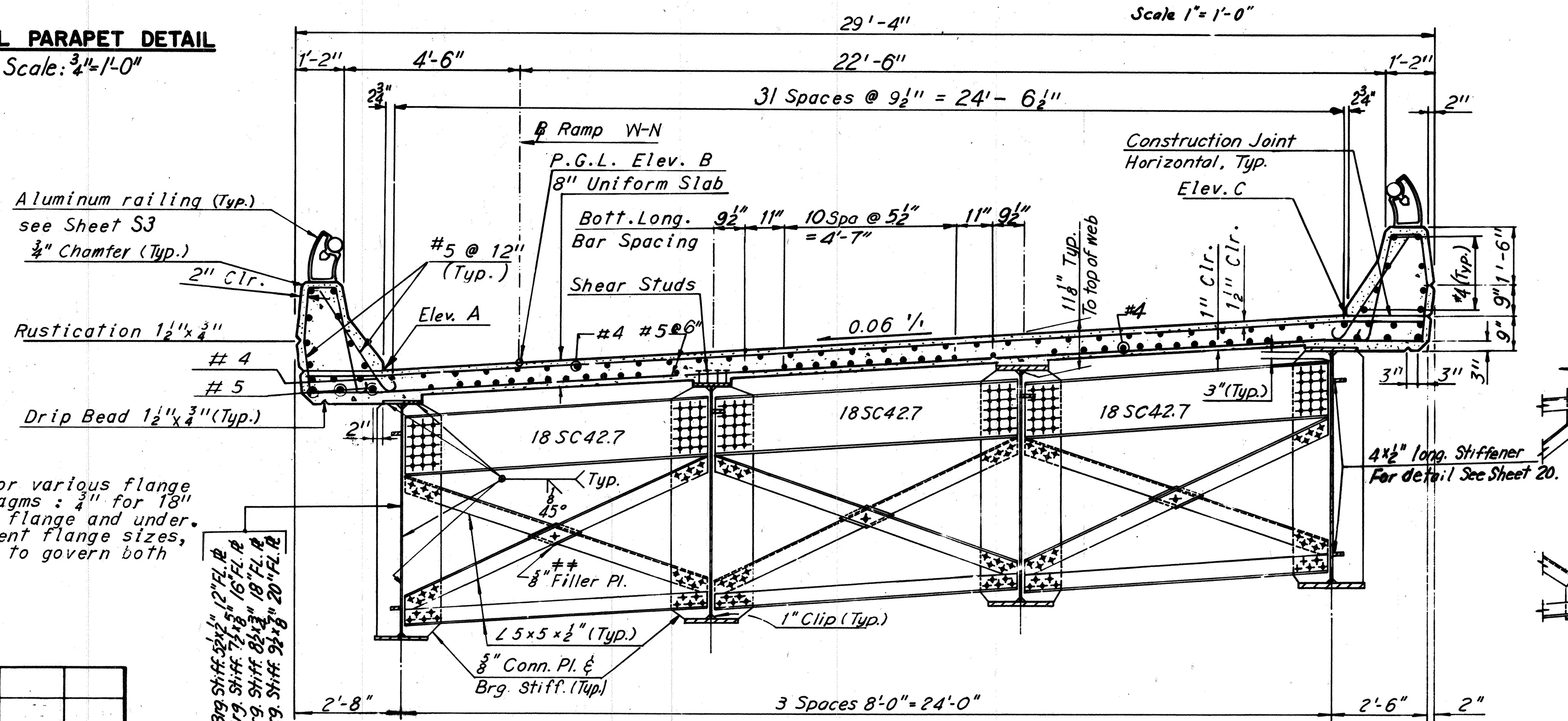


DETAIL "A"
Scale 1" = 1'-0"

Notes:
For Layout of Pier 21 see Sheet 2 of Bridge #65 (Ramp S-W).
For Framing Details of Pier 21 see Sheet 20 of Bridge #66 (E.B. Roadway).
Piers 1 and 2 both are radial to ℄ Ramp N-W (Curve NW-1)
For intermediate diaphragm and transverse stiffener spacing see Sheet 19.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Standard Drainage Details see Support Type 3 Sheet S6.
For Joint Details see Sheet 48.

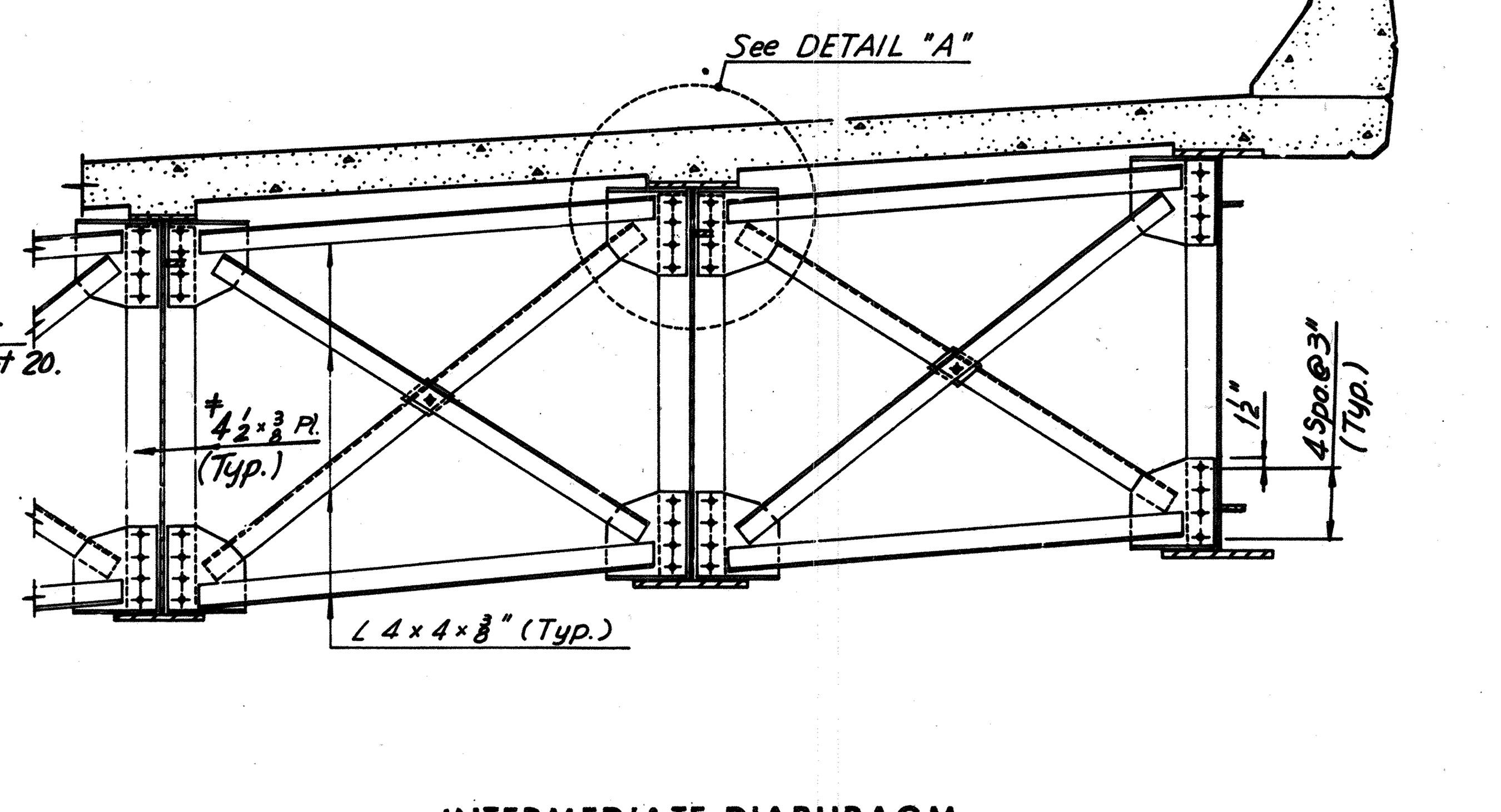
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
343+80.00	92.86	93.07	94.36
90.00	92.66	92.87	94.16
90.43	92.65	92.86	94.15
91.86	92.61	92.82	94.11
344+00.00	92.40	92.61	93.90
10.00	92.09	92.30	93.59
20.00	91.73	91.94	93.28
30.00	91.32	91.53	92.82
40.00	90.86	91.07	92.36
50.00	90.34	90.55	91.84
60.00	89.79	90.00	91.29
70.00	89.26	89.47	90.76
80.00	88.72	88.93	90.22
90.00	88.14	88.35	89.64
345+00.00	87.55	87.76	89.05
04.50	87.28	87.49	88.7[illegible]
10.00	86.94	87.15	88.44
20.00	86.35	86.56	87.85
30.00	85.75	85.96	87.25
40.00	85.17	85.38	86.67
50.00	84.58	84.79	86.08
60.00	84.02	84.23	85.52
70.00	83.46	83.67	84.96
80.00	82.90	83.11	84.40
90.00	82.34	82.55	83.84
346+00.00	81.78	81.99	83.28
10.00	81.22	81.43	82.72
15.00	80.94	81.15	82.44
20.00	80.66	80.87	82.16

‡ 4½"x⅜" transverse stiffeners are used throughout units 1 and 2 except for stringer S4-1 where 5x⅜" are used.



TYPICAL SECTION-END DIAPHRAGM
Scale: ⅜" = 1'-0"

‡‡ The following conn. ℞ thickness for various flange sizes shall be used at end diaphragms : ¾" for 18" flange, ⅝" for 15" and ½" for 12" flange and under. In bays where girders have different flange sizes, the conn. ℞ for the bigger one is to govern both conn. ℞'s.



INTERMEDIATE DIAPHRAGM
Scale: ⅜" = 1'-0"

AS BUILT

	BY	DATE				
MADE	M.H.H.	8-17-68				
CHECKED	S.C.C.	11-4-68	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

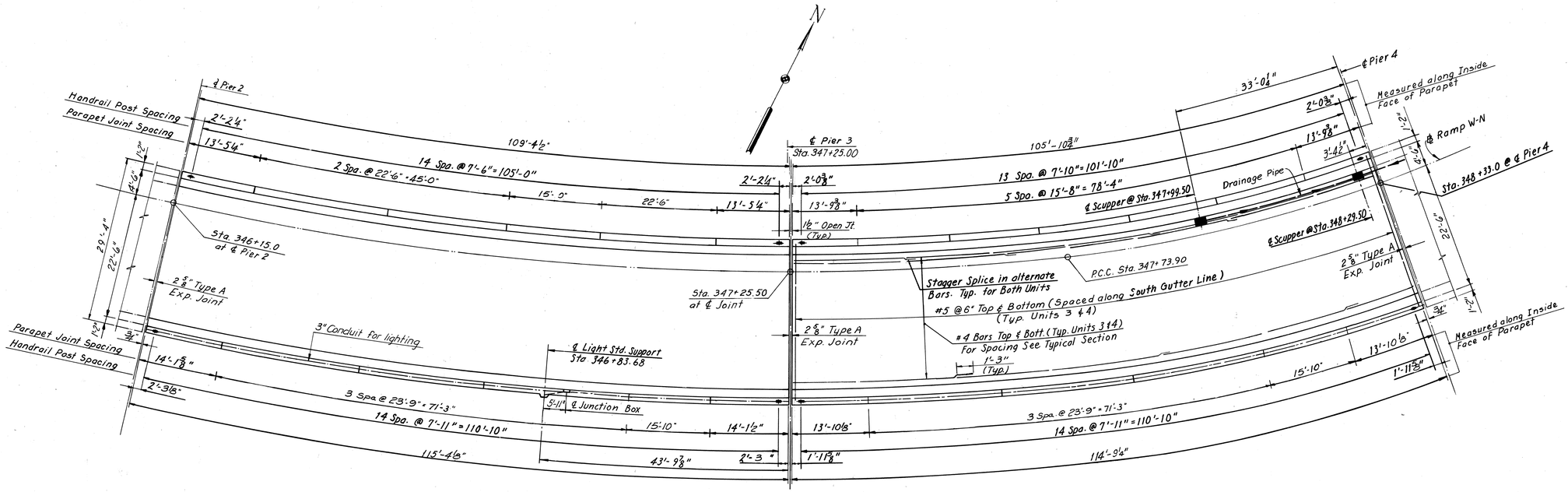
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
DECK PLAN - UNITS 1 AND 2

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

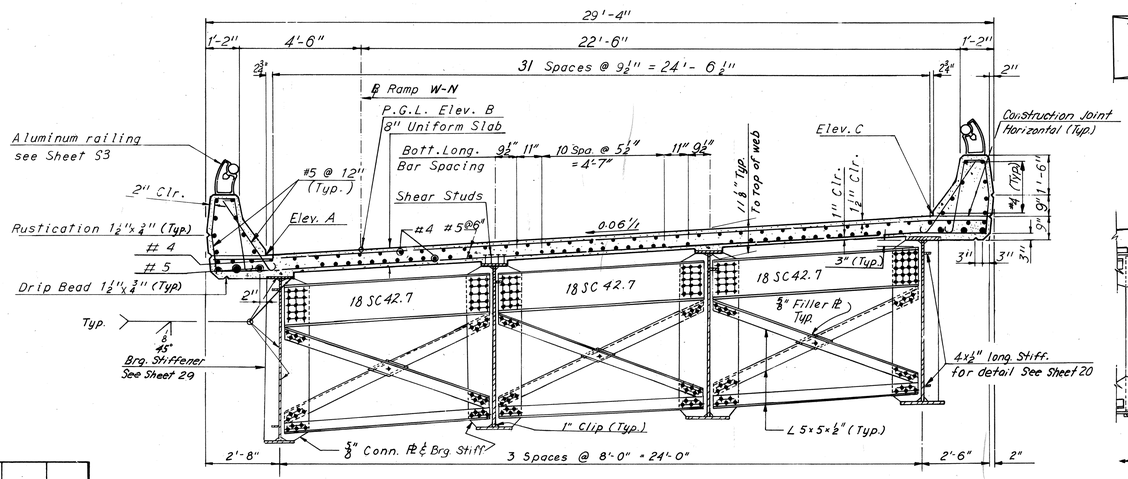
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 29 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	202	265



DECK PLAN
Scale: 1" = 10'-0"

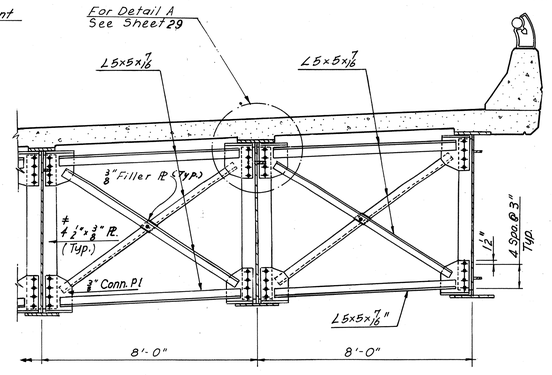
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
346+10.00	81.22	81.43	82.72
+15.00	80.94	81'15	82.44
+20.00	80.66	80.87	82.15
+30.00	80.10	80.31	81.60
+40.00	79.54	79.75	81.04
+50.00	78.98	79.19	80.48
+60.00	78.42	78.63	79.92
+70.00	77.86	78.07	79.36
+80.00	77.30	77.51	78.80
347+00.00	76.18	76.39	77.68
+10.00	75.64	75.85	77.14
+20.00	75.15	75.36	76.65
+25.50	74.89	75.10	76.39
+30.00	74.69	74.90	76.19
+40.00	74.29	74.50	75.79
+50.00	73.92	74.13	75.42
+60.00	73.60	73.81	75.10
+70.00	73.32	73.53	74.82
+80.00	73.08	73.29	74.58
+90.00	72.89	73.10	74.39
348+00.00	72.74	72.95	74.24
+10.00	72.63	72.84	74.13
+20.00	72.57	72.78	74.07
+30.00	72.55	72.76	74.05
+33.00	72.55	72.76	74.05
+40.00	72.57	72.78	74.07



TYPICAL SECTION - END DIAPHRAGM
Scale: ⅜" = 1'-0"

$4\frac{1}{2}\times\frac{3}{8}$" transverse stiffeners are used throughout units 1 and 2 except for stringer S4-4 where $5\times\frac{3}{8}$" are used.

~~* All intermediate diaphragms in Unit 3 and the first three in Unit 4 consist of L5 4x4x⅜ Last five intermediate diaphragms in Unit 4 consist of L5x4x½ and L5x5x⅞~~



INTERMEDIATE DIAPHRAGM
Scale: ⅜" = 1'-0"

Notes:
Piers 2, 3 and 4 are all radial to ℄ Ramp W-N (Curves WN-1 and WN-2).
For intermediate diaphragm and transverse stiffener spacing see Sheet 20.
For Details of diaphragm connections to top and bottom flanges of stringers see Sheet 29.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Standard Drainage Details see Support Type 3, Sheet S6.
(Pipes between Scuppers in Unit 4 to be connected as shown for Support Type 7, Sheet S6.)
For Typical Parapet Detail, see Sheet 29.
For Joint Details see Sheet 48.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.		2	As Built	TEM	G-77
CHECKED	K.C.T.	11-4-68	1	Revised angle Size Intermediate diap.	RSH	1-24-75
IN CHARGE						

AS BUILT

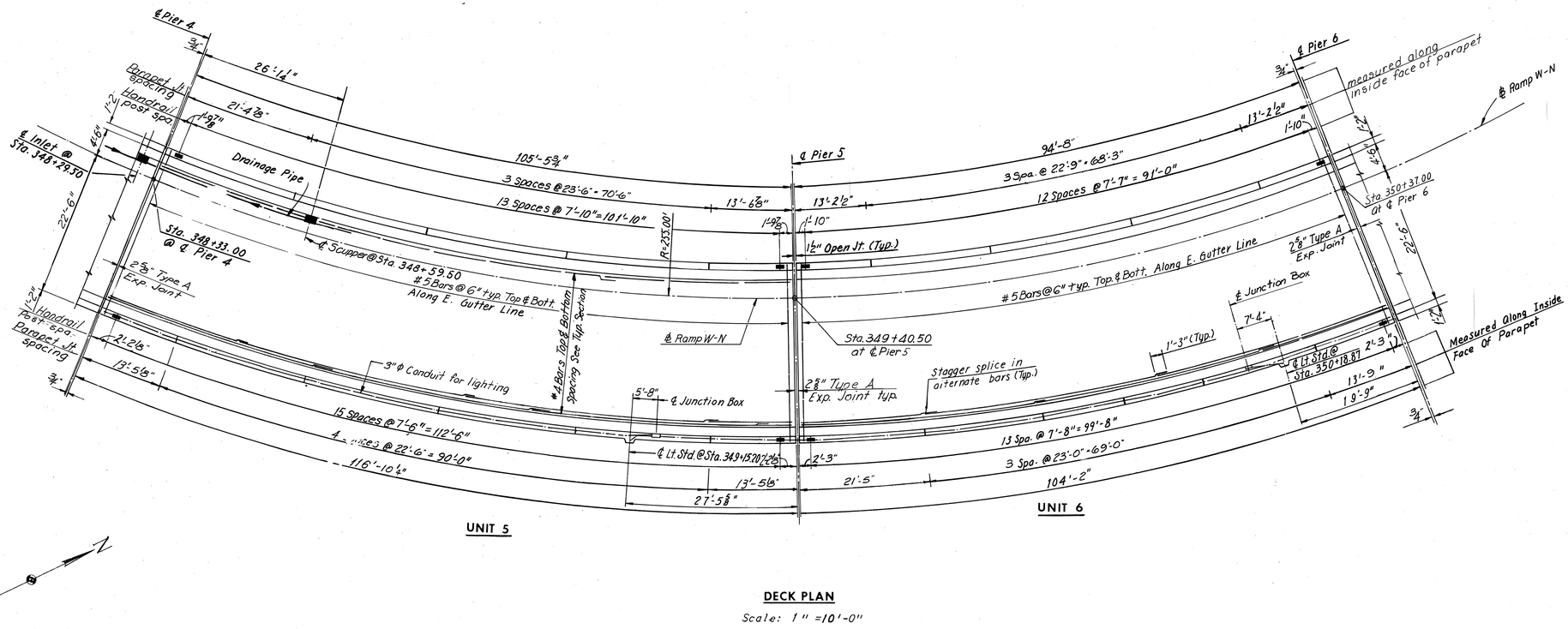
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS 3 AND 4

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

SCALE: As noted
CONTRACT NO.: 10
SHEET NO. 30 OF 54

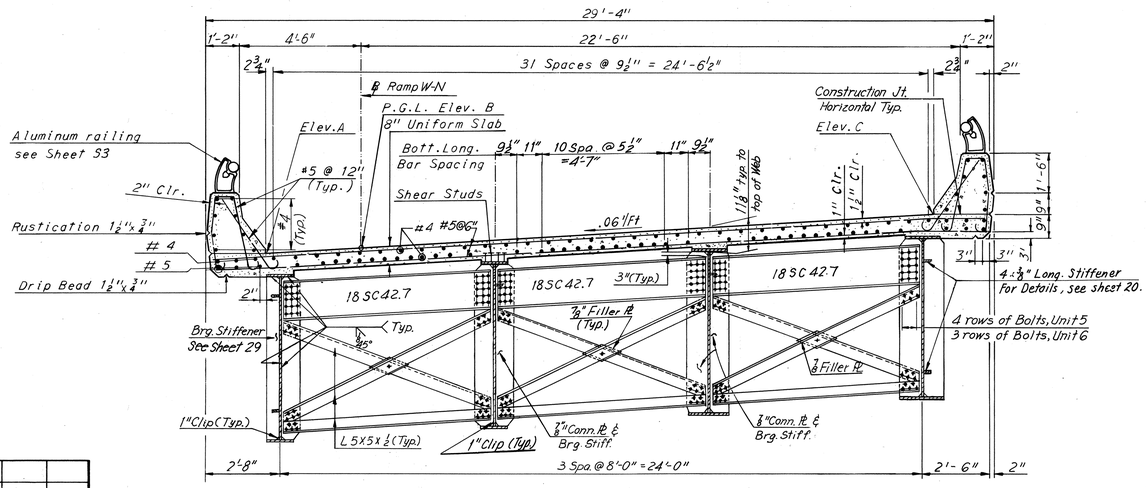
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	203	265



DECK PLAN

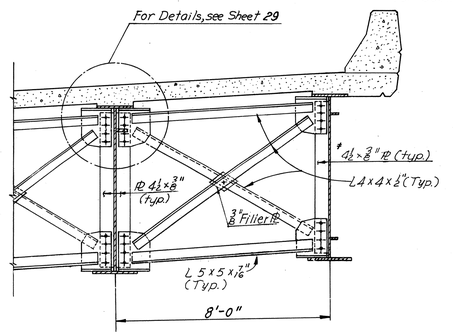
Scale: 1" = 10'-0"

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
348+33.00	72.55	72.76	74.05
+40.00	72.57	72.78	74.07
+50.00	72.64	72.85	74.14
+60.00	72.75	72.96	74.25
+70.00	72.90	73.11	74.40
+80.00	73.10	73.31	74.60
+90.00	73.34	73.55	74.84
349+00.00	73.62	73.83	75.12
+10.00	73.95	74.16	75.45
+20.00	74.31	74.52	75.81
+30.00	74.73	74.94	76.23
+40.00	75.18	75.39	76.68
+40.50	75.21	75.42	76.71
+50.00	75.68	75.89	77.18
+60.00	76.20	76.41	77.70
+70.00	76.72	76.93	78.22
+80.00	77.24	77.45	78.74
+90.00	77.76	77.97	79.27
350+00.00	78.28	78.49	79.78
+10.00	78.80	79.01	80.30
+20.00	79.32	79.53	80.82
+30.00	79.84	80.05	81.34
+37.00	80.21	80.41	81.69
+40.00	80.36	80.57	81.84



TYPICAL SECTION – END DIAPHRAGM

Scale: ⅜" = 1'-0"



INTERMEDIATE DIAPHRAGM

Scale: ⅜" = 1'-0"

Notes:

Piers 4, 5 and 6 are all radial to ℄ Ramp W-N (Curve WN-2)
For Details of diaphragm connections to top and bottom flanges of stringers see Sheet 29.
For intermediate diaphragm and transverse stiffener spacings see Sheet 21.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Standard Drainage Details see Support Type 7 Sheet S6.
For Typical Parapet Detail, see Sheet 29.
For Joint Details see Sheet 48.

4½x⅜ transverse stiffeners are used throughout Units 5 and 6 except for Stringer S4-5 where 5x⅜ are used.

	BY	DATE				
MADE	AHH	8-26-68				
CHECKED	KCT	11-1-68	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

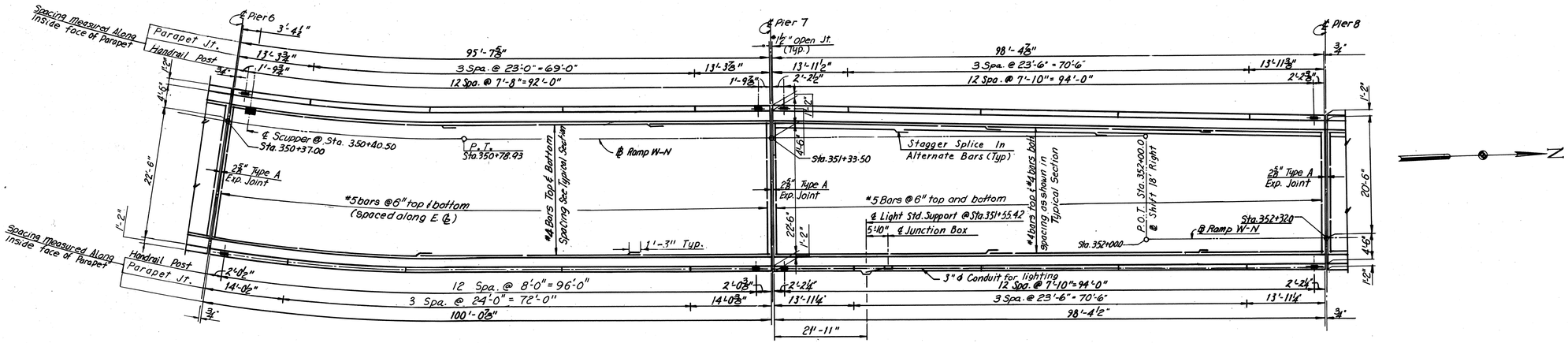
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN–UNITS 5 AND 6

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

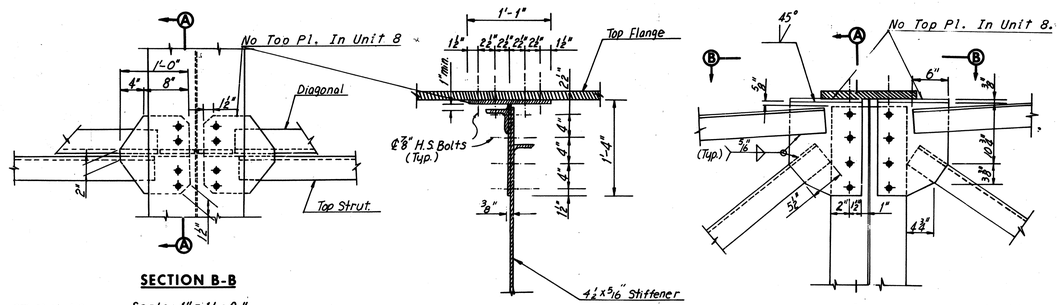
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 31 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	204	265

ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
350+37.00	80.21	80.41	81.69
+40.00	80.36	80.57	81.84
+50.00	80.89	81.09	82.33
+60.00	81.41	81.61	82.80
+70.00	81.94	82.13	83.25
+80.00	82.49	82.65	83.68
+90.00	83.02	83.17	84.11
351+00.00	83.55	83.69	84.55
+10.00	84.07	84.20	84.97
+20.00	84.56	84.68	85.37
+30.00	85.04	85.13	85.73
+33.50	85.20	85.29	85.86
+40.00	85.49	85.57	86.08
+50.00	85.91	85.97	86.40
+60.00	86.31	86.36	86.70
+70.00	86.69	86.71	86.97
+80.00	87.03	87.05	87.22
+90.00	87.35	87.35	87.44
352+00.00	87.64	87.64	87.64
+10.00	87.97	87.89	87.88
+20.00	88.28	88.13	88.10
+30.00	88.56	88.33	88.30
+32.00	88.62	88.37	88.34



UNIT 7 — **DECK PLAN** Scale 1" = 10'-0" — UNIT 8

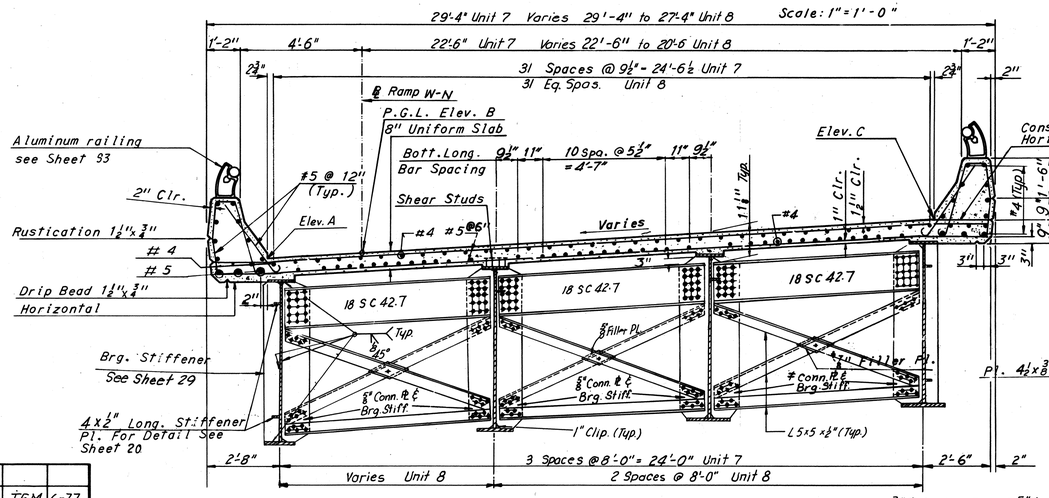


SECTION B-B Scale: 1" = 1'-0"

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

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

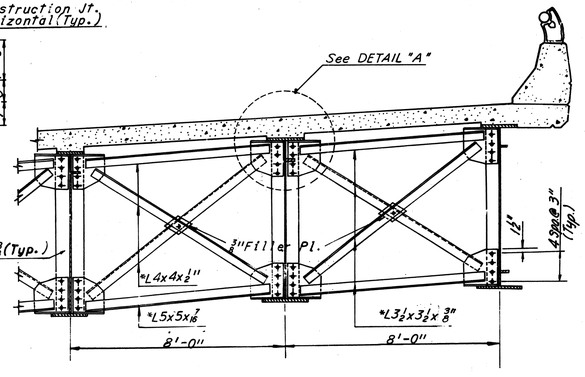
* The first three intermediate diaphragms in Unit 7 consist of L s4x4x½ (curved portion of roadway). All intermediate diaphragms in Unit 8 and the last two in Unit 7 consist of L s3½x3½x⅝ (tangent portion of roadway).



TYPICAL SECTION — END DIAPHRAGM Scale ⅜" = 1'-0"

* Use ⅞" ⌀ in Unit 7 and ⅝" ⌀ in Unit 8

Note: For connection of stringer S4-8 to 18SC42.7 @ end-Diaphragms use 3 rows of bolts instead of 4 rows as shown above for Unit 7.



INTERMEDIATE DIAPHRAGM Scale ⅜" = 1'-0"

Notes:
1. For intermediate diaphragm and transverse stiffener spacings see Sheet 22.
2. For Handrail Details see Sheet 53.
3. For Lighting Details see Sheet 54.
4. For Standard Drainage Details see Support Type 3 Sheet 56.
5. For Typical Parapet Details, see Sheet 29

	BY	DATE
MADE	GSH	08-22-68
CHECKED	KCT	11-1-68
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	6-77
1	Light Sta. Location	JLK	6-6-75

AS BUILT

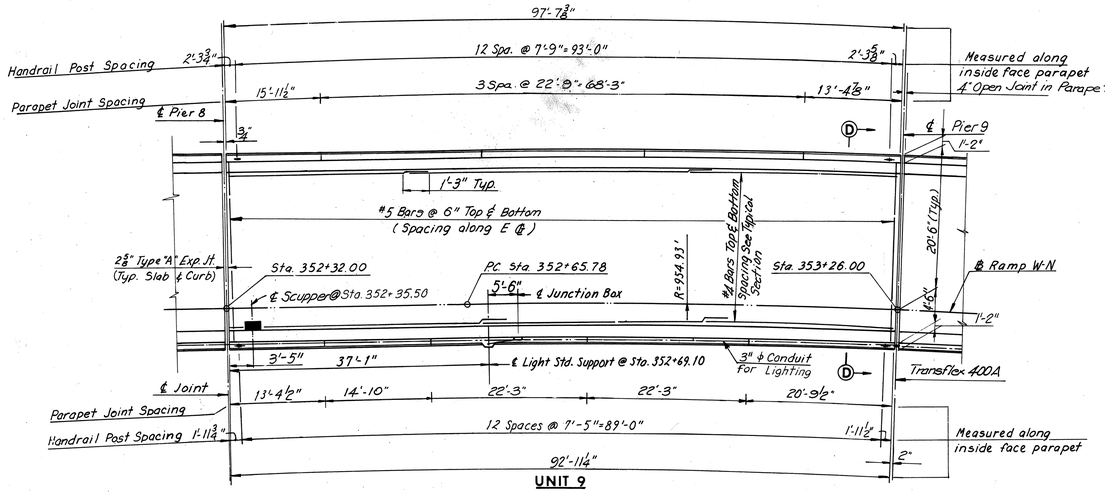
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN UNITS – 7 AND 8

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 32 OF 54

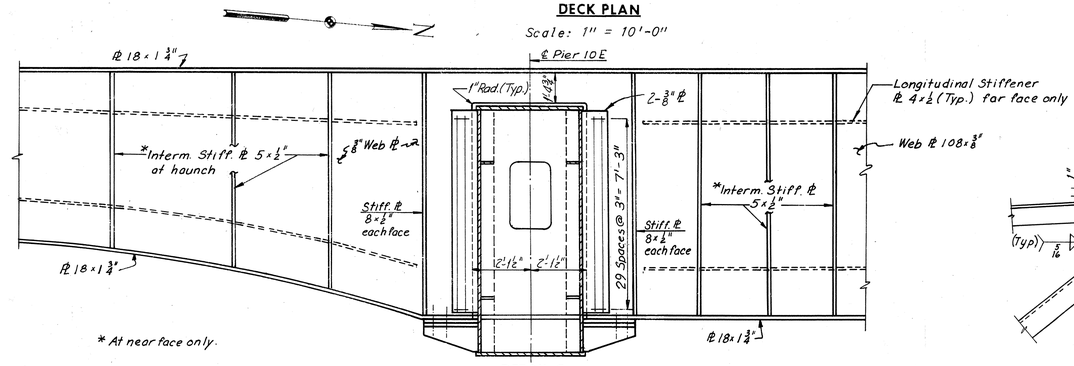
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	205	265



UNIT 9

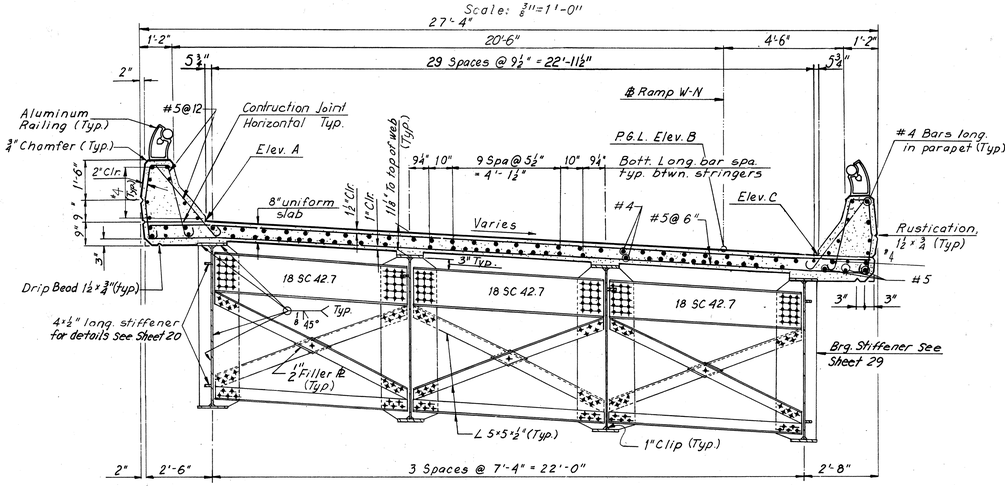
DECK PLAN

Scale: 1" = 10'-0"



DETAIL C

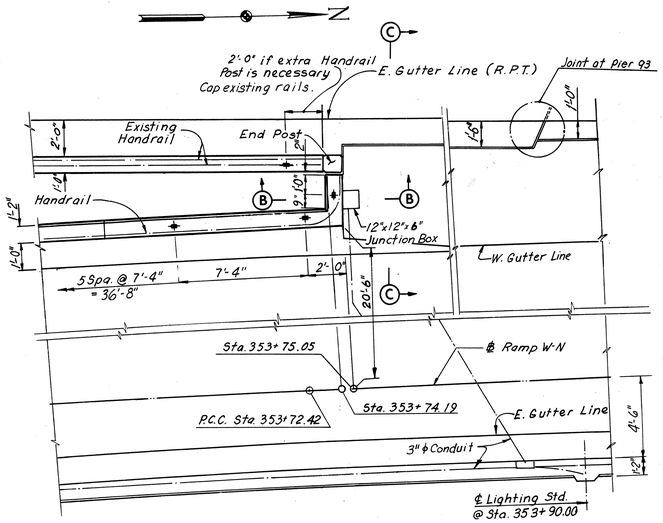
Scale: 3/8" = 1'-0"



SECTION D-D — END DIAPHRAGM

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

Unit 9 shown, Unit 10 Diaphragm similar

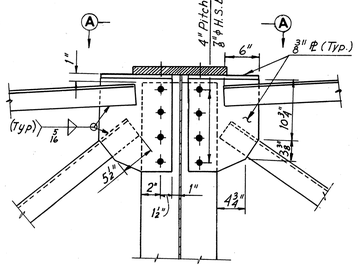


ELEVATION TABLE			
STATION	ELEV A	ELEV B	ELEV C
352+30.00	88.57	88.33	88.29
32.00	88.63	88.37	88.33
40.00	88.83	88.52	88.46
50.00	89.06	88.67	88.60
60.00	89.20	88.81	88.74
70.00	89.30	88.91	88.84
80.00	89.39	89.00	88.93
90.00	89.44	89.05	88.98
353+00.00	89.47	89.08	89.01
10.00	89.48	89.09	89.02
20.00	89.46	89.07	89.00
26.00	89.44	89.05	88.98
30.00	89.42	89.03	88.96

Note: Connect Lighting Conduit in existing structure with Junction Box at nose of new part of structure.

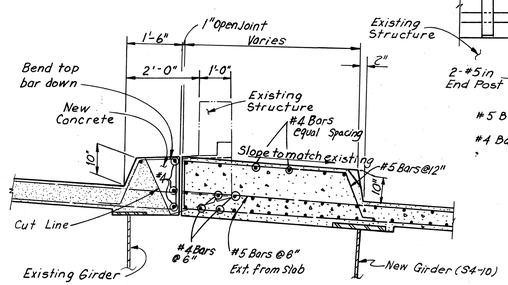
DETAIL A

Scale: 1" = 1'-0"



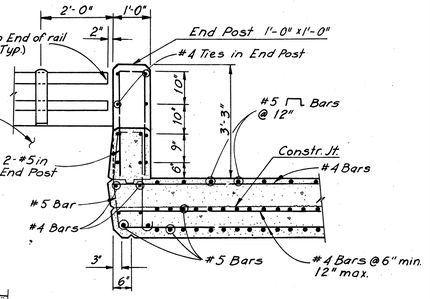
DETAIL B

Scale: 1"=1'-0"



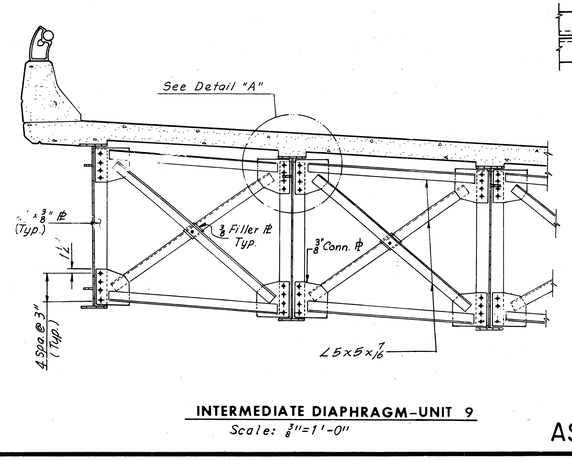
SECTION C-C

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



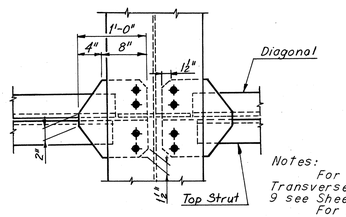
SECTION B-B

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



INTERMEDIATE DIAPHRAGM-UNIT 9

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



VIEW A-A

Scale: 1"=1'-0"

Notes:
For Intermediate Diaphragm and Transverse Stiffener Spacing for Unit 9 see Sheet 23.
For Handrail Details see Sheet S3.
For Lighting Details see Sheet S4.
For Location of Detail B see Sheet 34.
For Standard Drainage Details see Support Type 3 Sheet S6.
For Location of Detail C see Stringer S1-10 Sheet 24.
For Typical Parapet Detail, see Sheet 29.

	BY	DATE				
MADE	C.E.B.	3-7-69	2	As Built	TEM	6-77
CHECKED	A.M.H.	4-21-69	1	Revised L size, Intermediate Diap. Unit 9	RKF	1-24-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

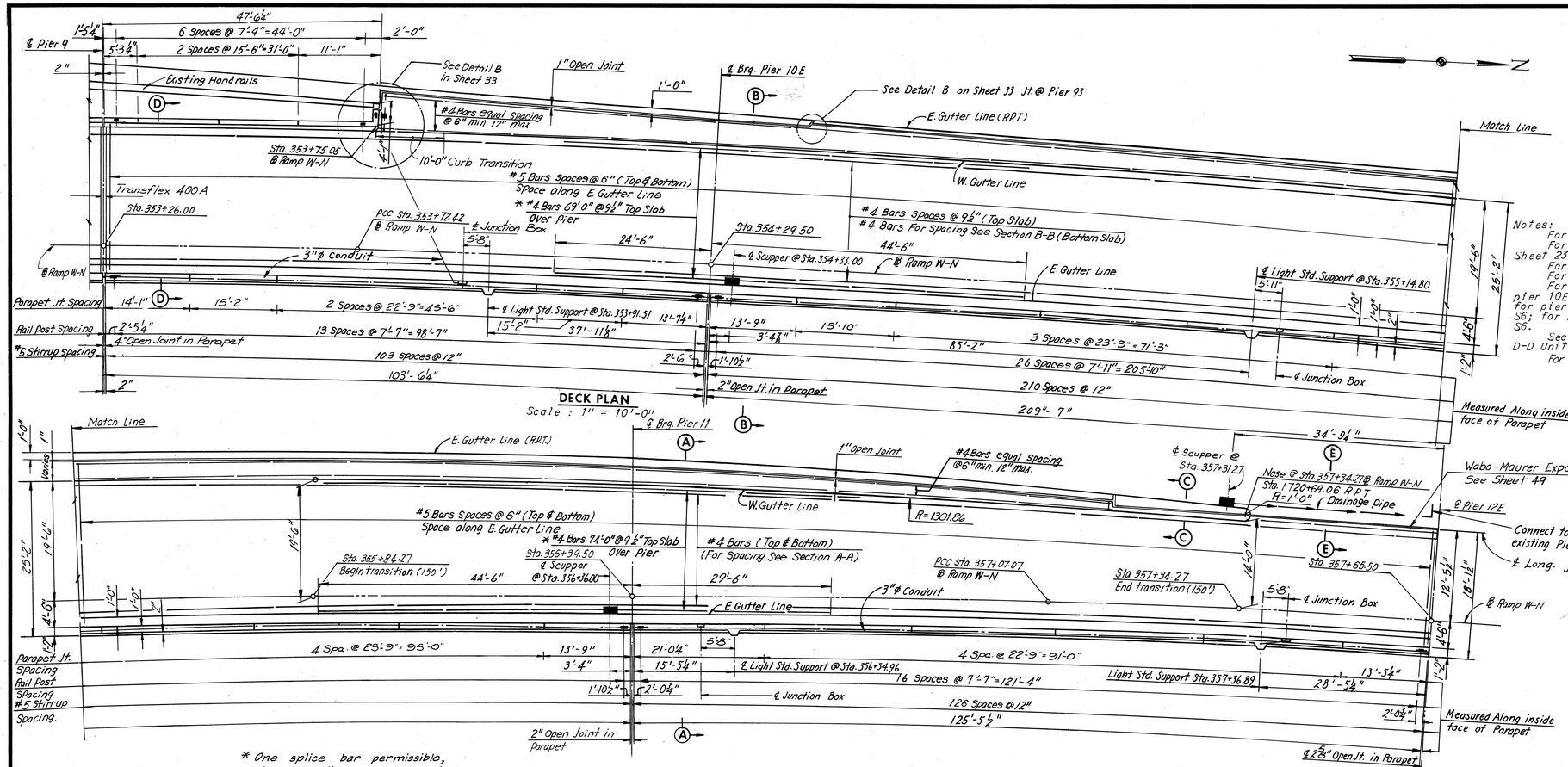
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN AND SUPERSTRUCTURE DETAILS UNIT 9

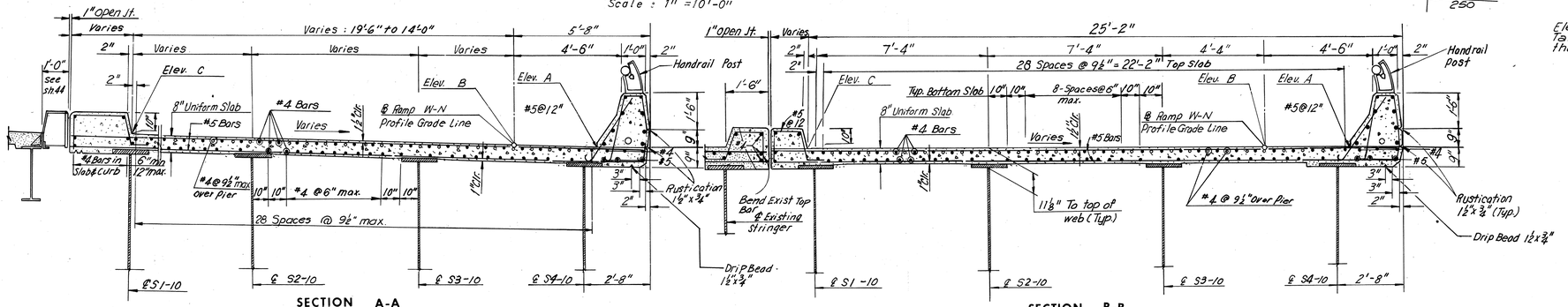
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 33 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	206	265

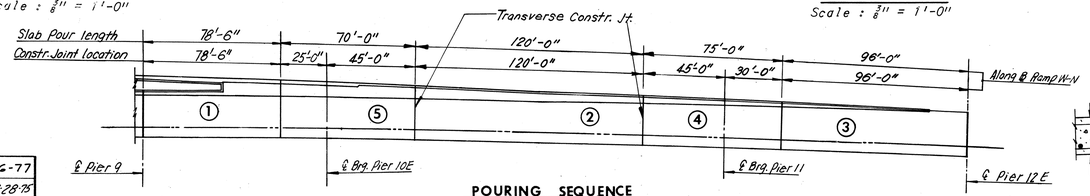


* One splice bar permissible, stagger splices on adjacent bars

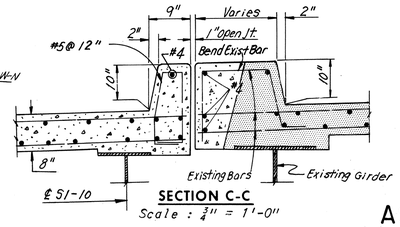


SECTION A-A
Scale : ⅜" = 1'-0"

SECTION B-B
Scale : ⅜" = 1'-0"

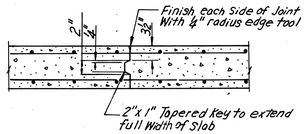


POURING SEQUENCE
Scale : 1" = 40'-0"



SECTION C-C
Scale : ¾" = 1'-0"

Elevations given in the Elevation Table, may require adjustment in the field.



TRANSVERSE CONSTRUCTION

JOINT DETAIL
No Scale

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
353+26.00	88.98	89.05	89.43
+30.00	88.96	89.03	89.41
+40.00	88.89	88.96	89.34
+50.00	88.80	88.87	89.25
+60.00	88.68	88.75	89.13
+70.00	88.54	88.61	88.99
+80.00	88.37	88.44	88.82
+90.00	88.17	88.24	88.62
354+00.00	87.96	88.03	88.41
+10.00	87.72	87.79	88.17
+20.00	87.46	87.53	87.91
+29.50	87.19	87.26	87.64
+30.00	87.17	87.24	87.62
+40.00	86.88	86.95	87.33
+50.00	86.57	86.64	87.02
+60.00	86.24	86.31	86.69
+70.00	85.89	85.96	86.34
+80.00	85.52	85.59	85.97
+90.00	85.13	85.20	85.58
355+00.00	84.72	84.79	85.17
+10.00	84.30	84.37	84.75
+20.00	83.86	83.93	84.33
+30.00	83.41	83.48	83.90
+40.00	82.94	83.02	83.46
+50.00	82.45	82.54	83.02
+60.00	81.97	82.06	82.57
+70.00	81.48	81.57	82.12
+80.00	80.99	81.09	81.68
+90.00	80.49	80.61	81.23
356+00.00	80.00	80.12	80.77
+10.00	79.51	79.64	80.31
+20.00	79.02	79.15	79.85
+30.00	78.53	78.67	79.39
+39.50	78.06	78.21	78.95
+40.00	78.04	78.19	78.92
+50.00	77.55	77.70	78.46
+60.00	77.06	77.22	77.99
+70.00	76.58	76.74	77.53
+80.00	76.11	76.29	77.10
+90.00	75.67	75.86	76.68
357+00.00	75.25	75.45	76.28
+10.00	74.85	75.05	75.88
+20.00	74.44	74.65	75.48
+30.00	74.04	74.25	75.09
+40.00	73.65	73.86	—
+50.00	73.27	73.48	—
+60.00	72.89	73.10	—
+65.50	72.69	72.90	—

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H	2-26-69	3	As Built	TEM	C-77
CHECKED	AMH	4-23-69	2	Note for Table of Elevations	DWB	1-28-75
IN CHARGE			1	Rev. length of bars, Rev. Road width	RKJ	1-24-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

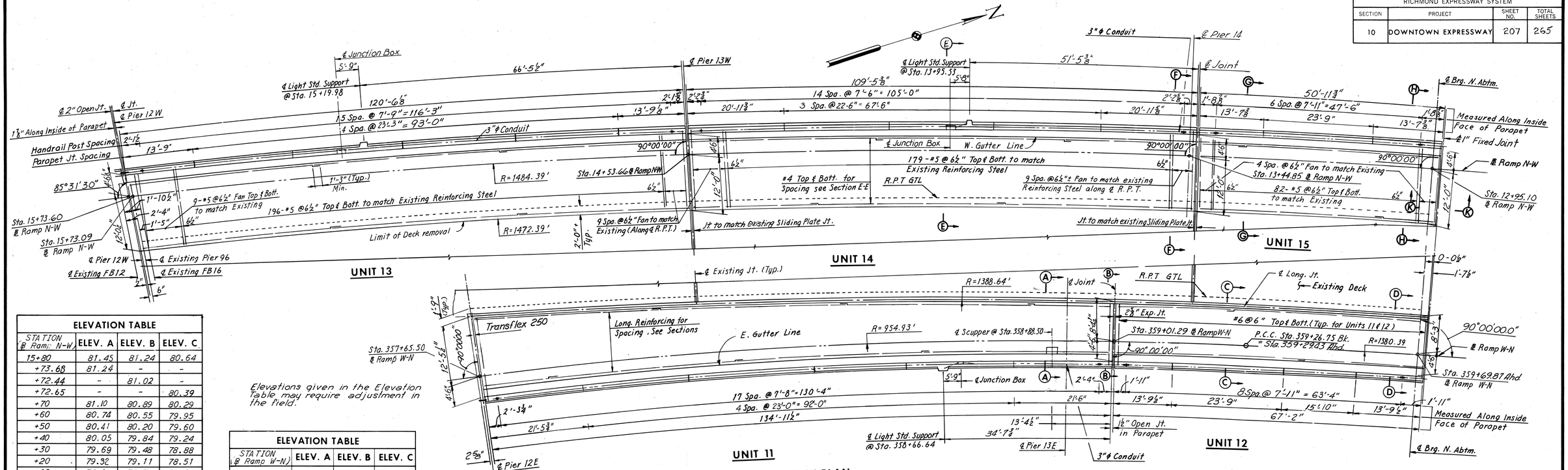
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

DECK PLAN — UNIT 10

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 34 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	207	265



ELEVATION TABLE

STATION (℄ Ramp N-W)	ELEV. A	ELEV. B	ELEV. C
15+80	81.45	81.24	80.64
+73.68	81.24	-	-
+72.44	-	81.02	-
+72.65	-	-	80.39
+70	81.10	80.89	80.29
+60	80.74	80.55	79.95
+50	80.41	80.20	79.60
+40	80.05	79.84	79.24
+30	79.69	79.48	78.88
+20	79.32	79.11	78.51
+10	78.95	78.74	78.14
15+00	78.57	78.36	77.76
14+90	78.20	77.99	77.39
+80	77.82	77.61	77.01
+70	77.45	77.24	76.64
+60	77.08	76.87	76.27
+53.40	76.85	76.64	76.04
+50	76.72	76.51	75.91
+40	76.37	76.16	75.56
+30	76.02	75.81	75.21
+20	75.67	75.46	74.86
+10	75.31	75.10	74.50
14+00	74.96	74.75	74.15
13+90	74.61	74.40	73.80
+80	74.26	74.05	73.45
+70	73.91	73.70	73.10
+60	73.55	73.34	72.74
+50	73.20	72.99	72.39
+44.61	73.01	72.80	72.20
+40	72.85	72.64	72.04
+30	72.49	72.28	71.68
+20	72.13	71.92	71.32
+10	71.77	71.56	70.96
13+00	71.40	71.19	70.59
12+92.81	71.12	70.91	70.31

Elevations given in the Elevation Table may require adjustment in the field.

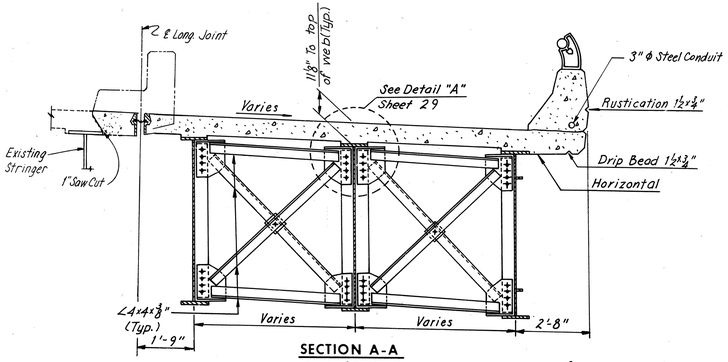
ELEVATION TABLE

STATION (℄ Ramp W-N)	ELEV. A	ELEV. B	ELEV. C
357+60	72.89	73.10	74.28
+65.50	72.69	72.90	73.65
+70	72.53	72.74	73.48
+80	72.17	72.38	73.09
+90	71.82	72.03	72.70
358+00	71.46	71.67	72.32
+10	71.10	71.31	71.94
+20	70.75	70.96	71.56
+30	70.39	70.60	71.19
+40	70.02	70.23	70.80
+50	69.65	69.86	70.41
+60	69.26	69.47	70.01
+70	68.86	69.07	69.60
+80	68.46	68.67	69.18
+90	68.06	68.27	68.78
+92	67.98	68.19	68.70
359+00	67.67	67.88	68.38
+02.00	67.60	67.81	68.31
+10	67.29	67.50	68.00
+20	66.93	67.14	67.63
+30	66.57	66.78	67.27
+40	66.20	66.41	66.91
+50	65.82	66.03	66.53
+60	65.44	65.65	66.14
+69.39	65.06	65.27	65.78
+70	65.04	65.25	65.75

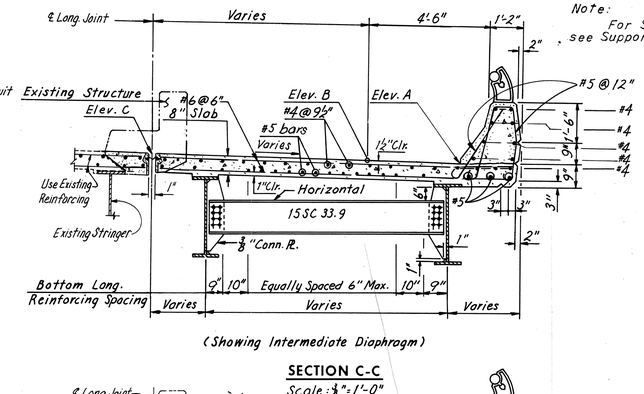
Note:
For Sections E-E, F-F, G-G and H-H, see Sheet 47.
For Framing Plan, see Sheet 26.
For Joint Details, see Sheet 48 and 49.
Elevation C is to be confirmed by Contractor.
For Handrail Details, see Sheet 53.
For Typical Parapet Details, see Sheet 29.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P. G.C.C.	2-27-69	3	As Built	TEM	6-77
CHECKED	K.C.T.	5-1-69	2	Note for Table of Elevations	DWB	1-28-75
IN CHARGE			1	Piers & Abutment No. Change	DWB	1-17-75

DECK PLAN
Scale: 1" = 10'-0"

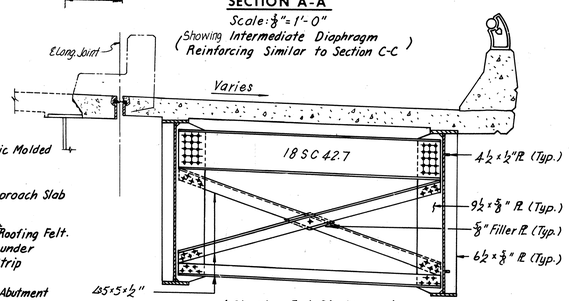


SECTION A-A
Scale: ⅜" = 1'-0"



(Showing Intermediate Diaphragm)

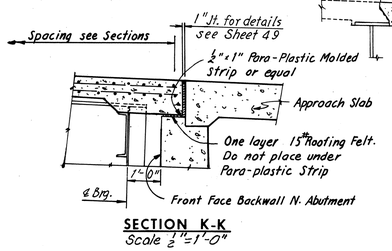
Note:
For Standard Drainage Details for Unit 11, see Support Type 3 Sheet 36,



(Showing End Diaphragm)

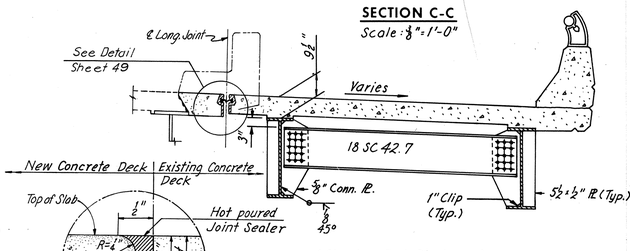
SECTION B-B
Scale: ⅜" = 1'-0"

(Showing Intermediate Diaphragm Reinforcing Similar to Section C-C)



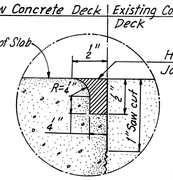
SECTION K-K
Scale ½" = 1'-0"

SECTION C-C
Scale: ⅜" = 1'-0"



(Showing End Diaphragm)

SECTION D-D
Scale: ⅜" = 1'-0"



DETAIL C
Full Scale

NOTE:
For the proposed joint details between the existing and the new slab, see Detail C.

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN-UNITS 11, 12, 13, 14 AND 15

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

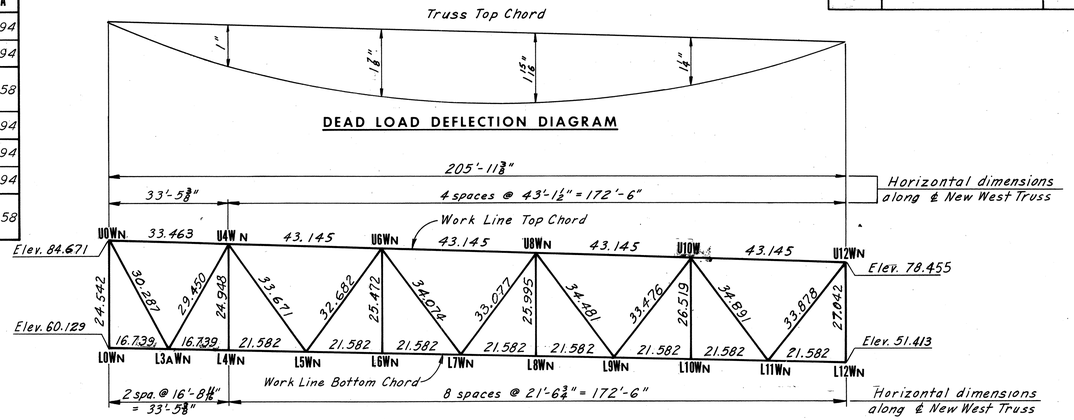
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 35 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	208	265

NEW WEST TRUSS

	MEMBER	STRESSES: DEAD LOAD	LIVE LOAD	IMPACT	DESIGN LOAD	ALLOWABLE STRESS	L/r	AREA REQUIRED: GROSS	NET	SECTION	AREA PROVIDED: GROSS	NET
TOP CHORDS	U0WN-U4WN	218C	68	10	296C	15.43	43.4	19.2	—	1-Top PL 24x5/8 2-Web PLs 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	—
	U4WN-U6WN	649C	183	28	860C	15.02	57.1	57.3	—	1-Top PL 24x5/8 2-Web PLs 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	—
	U6WN-U8WN	780C	228	35	1043C	14.96	59.0	69.7	—	1-Top PL 24x5/8 2-Web PLs 24x1 1/8 1-Bott. Perf. PL 24x5/8	76.50	—
	U8WN-U10WN	644C	194	30	868C	15.02	57.1	57.8	—	1-Top PL 24x5/8 2-Web PLs 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	—
	U10WN-U12WN	257C	79	12	348C	15.06	56.0	23.1	—	1-Top PL 24x5/8 2-Web PLs 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	—
BOTTOM CHORDS	L0WN-L3AWN	0	0	0	0	20.00		—	—	1-Top PL 24x5/8 2-Web PLs 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	51.00
	L3AWN-L5WN	506T	134	20	660T	20.00		—	33.0	1-Top PL 24x7/8 2-Web PLs 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L5WN-L7WN	777T	224	34	1035T	20.00		—	51.8	1-Top PL 24x5/8 2-Web PLs 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L7WN-L9WN	777T	240	36	1047T	20.00		—	52.4	1-Top PL 24x5/8 2-Web PLs 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L9WN-L11WN	508T	160	24	692T	20.00		—	34.6	1-Top PL 24x5/8 2-Web PLs 24x7/8 1-Bott. Perf. PL 24x5/8	64.50	55.75
	L11WN-L12WN	0	0	0	0	20.00		—	—	1-Top PL 24x5/8 2-Web PLs 24x3/4 1-Bott. Perf. PL 24x5/8	58.50	51.00
DIAGONALS	U0WN-L3AWN	394T	132	20	546T	20.00	48.9	—	27.3	1-Top PL 24x9/16 2-Web PLs 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	36.00
	L3AWN-U4WN	380C	134	20	534C	15.32	47.6	34.9	—	1-Top PL 24x9/16 2-Web PLs 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	—
	U4WN-L5WN	226T	100	15	341T	20.00	65.7	—	17.1	2-Web PLs 15x9/16 2-Perf. PLs 24x9/16	30.38	25.88
	L5WN-U6WN	212C	101	15	328C	14.78	63.8	22.2	—	2-Web PLs 15x9/16 2-Perf. PLs 24x9/16	30.38	—
	U6WN-L7WN	17T	46C 54T	7 8	36C 79T	14.67 20.00	66.5	2.5	4.0	2-Web PLs 15x9/16 2-Perf. PLs 24x9/16	30.38	25.88
	L7WN-U8WN	1T	55C 47T	8 7	62C 55T	14.74 20.00	64.7	4.2	2.8	2-Web PLs 15x9/16 2-Perf. PLs 24x9/16	30.38	25.88
	U8WN-L9WN	188C	87	13	288C	14.64	67.4	19.7	—	2-Web PLs 15x9/16 2-Perf. PLs 24x9/16	30.38	—
	L9WN-U10WN	210T	88	13	311T	20.00	65.6	—	15.6	2-Web PLs 15x9/16 2-Perf. PLs 24x9/16	30.38	25.88
	U10WN-L11WN	390C	138	21	549C	15.03	56.8	36.5	—	1-Top PL 24x9/16 2-Web PLs 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	—
	L11WN-U12WN	416T	141	21	578T	20.00	55.2	—	28.9	1-Top PL 24x9/16 2-Web PLs 18x9/16 1-Bott. Perf. PL 24x9/16	40.50	36.00
	U0WN-L0WN	394C	137	20	551C	15.50	40.7	35.5	-	2-Web PLs 18x5/8 2-Perf PLs 24x5/8	37.50	—
VERTICALS	U4WN-L4WN TO U10WN-L10WN	0	0	0	0	20.00				2-12[25.0 Intermediate Stay PLs 15x7/16 x1'-11½" End Stay PLs 26x7/16 x1'-11½"	14.64	11.09
	U12WN-L12WN	394C	137	20	551C	15.38	45.4	35.8	—	2-Web PLs 18x5/8 2 Perf. PLs 24x5/8	37.50	—

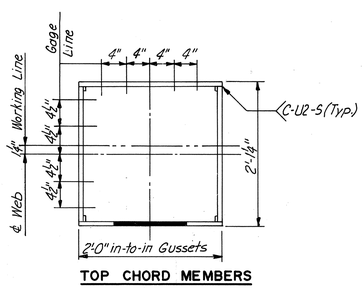
MEMBER		SECTION	L/r	ALLOWABLE STRESS	GROSS AREA
END SWAY AT P.P. 0	U0WN-L2W	14WF61	93.1	13.40	17.94
	L0WN-L2W	14WF61			17.94
INTERMEDIATE SWAYS	U4WN-M4N M4N-M4N	12BP53	67.1	14.65	15.58
	L4WN-L4W	14WF61	53.0		17.94
END SWAY AT P.P. 12	U12WN-L12W	14WF61	88.2	13.67	17.94
	L12WN-L12W	14WF61	53.0		17.94
CENTER POST	SEE TYPICAL SECTION		58.7	14.97	15.58



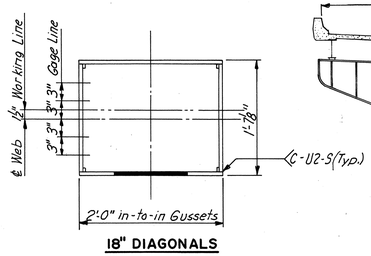
Note: Elevations given must be verified in the field by the contractor. Bottom Chord shall be in the same plane as the bottom chords of the existing trusses.

NEW WEST TRUSS DIMENSIONS

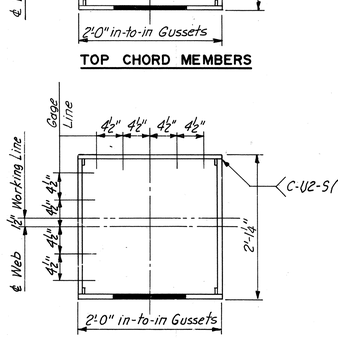
No Scale



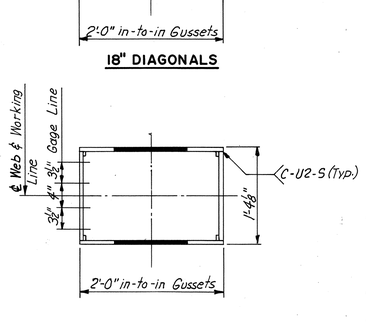
TOP CHORD MEMBERS



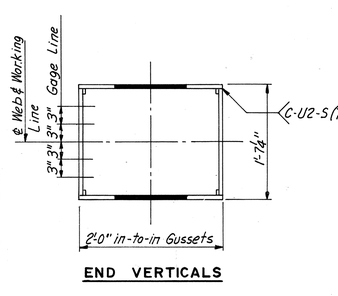
18" DIAGONALS



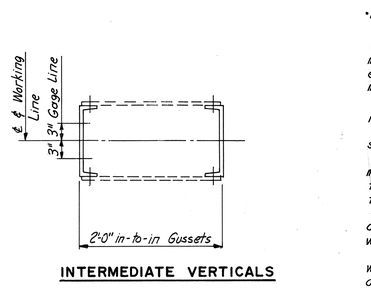
BOTTOM CHORD MEMBERS



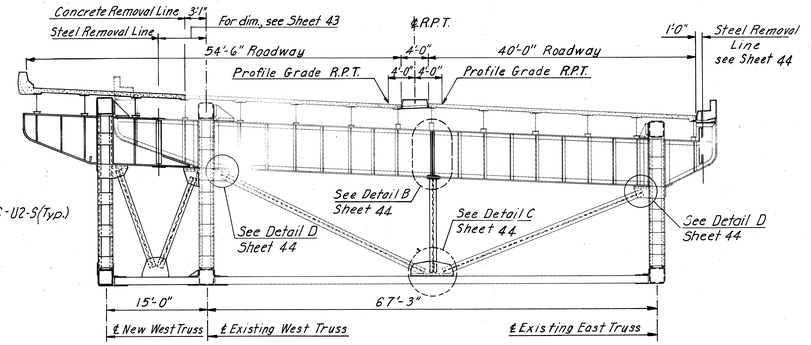
15" DIAGONALS



END VERTICALS



INTERMEDIATE VERTICALS



TYPICAL SECTION

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

STRINGERS										FLOORBEAMS					
	A			B			C			FB 0		FB 4,6,8,10		FB 12	
	MOMENT	REACTION	SHEAR	MOMENT	REACTION	SHEAR	MOMENT	REACTION	SHEAR	MOMENT	SHEAR	MOMENT	SHEAR	MOMENT	SHEAR
DEAD LOAD	188	48	26	225	56	31	175	61	32	123	28	546	106	105	33
LIVE LOAD	245	44	17	265	48	19	275	40	20	233	51	321	68	154	50
IMPACT	74	13	5	80	14	6	83	12	6	70	15	96	20	46	15
TOTAL	407	105	48	570	118	56	533	113	58	426	94	963	194	305	98
REQ'D. SEC. MOD.	244			342			320			254		577		183	
SECTION	33 WF 118*			33 WF 130*			33 WF 130*			Web 82½ x ½" Flanges 16x4 11/16"		Web 83 x ½" Flanges 12x3 11/16"		Web 82½ x ½" Flanges 16x4 11/16"	
PROV. SEC. MOD. G	358.3			404.8			404.8								
PROV. SEC. MOD. N										1,227		1,103		1,227	

* Live Load Deflection governs design.

Notes:
Cross-section area of the structural members shown in the tables are in square inches, applied loads, reactions and sheers are all given in kips, allowable stresses in kips per square inch and section moduli in inches cubed. C and T in the stress columns denotes respectively compression and tension.

GENERAL NOTES FOR TRUSS SPAN

For General Design Notes, see Sheet 4.

Truss and floorbeams shall be cambered for full dead load.

All truss joints shall be detailed to make axes of members conform to full dead load layout of truss. Reaming or drilling of connections shall be done with chords assembled in that position. Reaming of connections for web members shall be made to carefully set metal templets. All chords shall be milled to bear at both ends.

All truss verticals and floorbeams shall lie in truly vertical planes under full dead load.

Prior to removal of any existing structure, the existing floorbeams and sway frames are to be modified by adding posts and strengthening connections. (See Details B, C & D, Sheet 44.) No modification required at Floorbeam 0.

Sway frame connection modifications shall be restricted as follows:

a. Adjacent sway frames shall not be modified simultaneously.

b. Connections in a sway frame are to be modified one at a time. A minimum of one-half the existing connection must be maintained at all times.

c. Holes 3/16" oversize are permitted for connection modifications provided a hardened washer is used under both the head and nut.

d. Traffic on Richmond-Petersburg Turnpike within the truss span shall be limited to 25 MPH during the sway frame modifications.

e. Post connections shall be made after all other sway frame connections at that floorbeam are completed.

The new truss has been designed to carry all the added dead load resulting from the widened roadway.

The new truss shall be temporarily loaded to simulate full dead load prior to making permanent connections to the existing structure.

The concrete deck to be placed after the permanent connections are made and the temporary loads removed.

AS BUILT

	BY	DATE
MADE	D.E.S.	12-17-68
CHECKED	JV	5-15-69
IN CHARGE		

3 As Built TEM 6-77

NO.	REVISION	BY	DATE
⚠	Notes Added	E.J.M.	3-5-75
⚠	Detail C & D added, notes removed, F.B. Web PL size & truss dims. rev.	C.B.P.	2-7-75

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

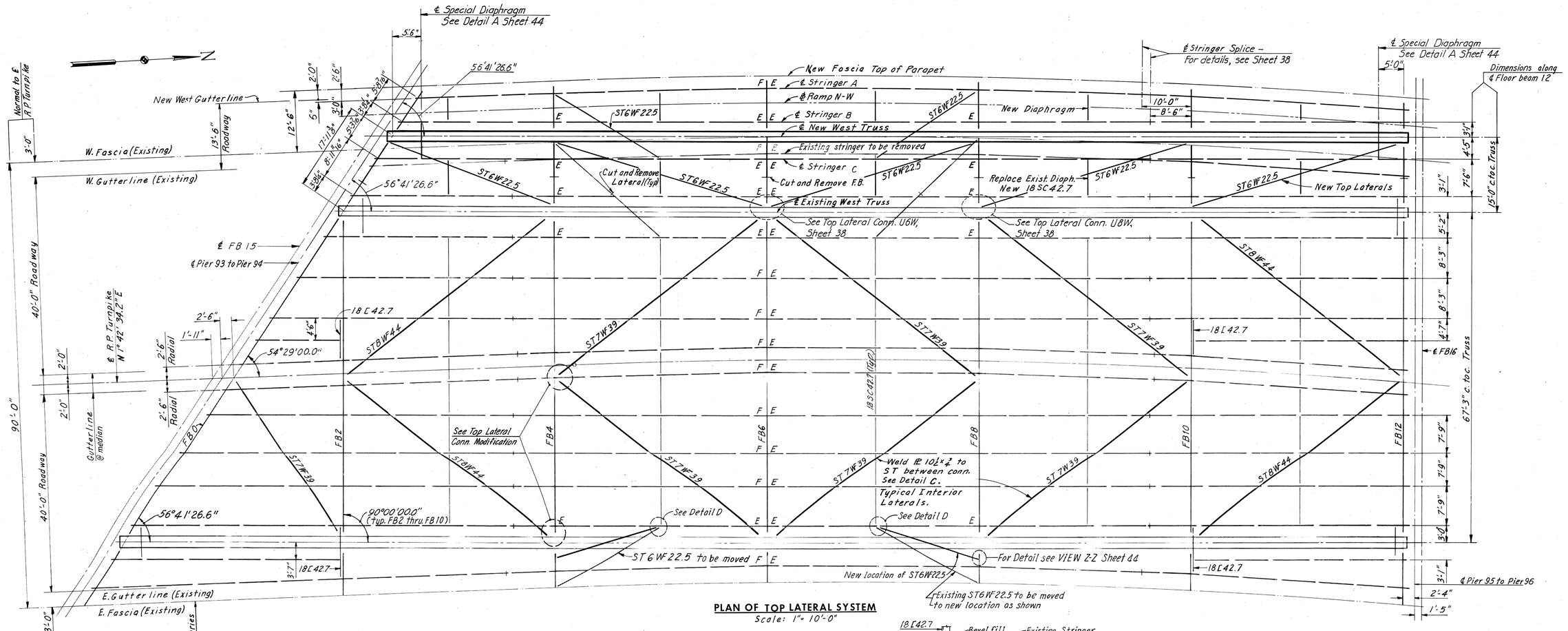
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

STRESS SHEET TRUSS SPAN

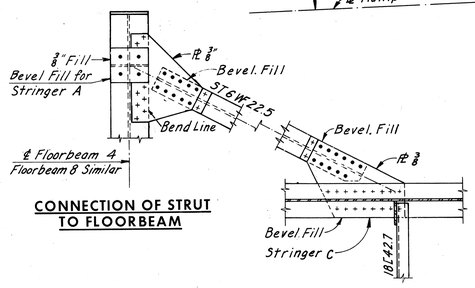
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 36 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	209	265

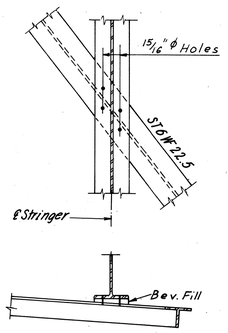


PLAN OF TOP LATERAL SYSTEM
Scale: 1" = 10'-0"



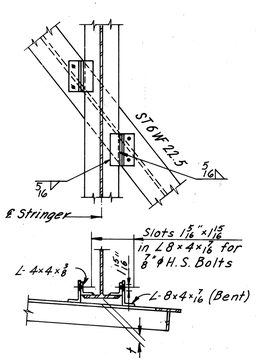
CONNECTION OF STRUT TO FLOORBEAM

CONNECTION OF STRUT TO STRINGER C



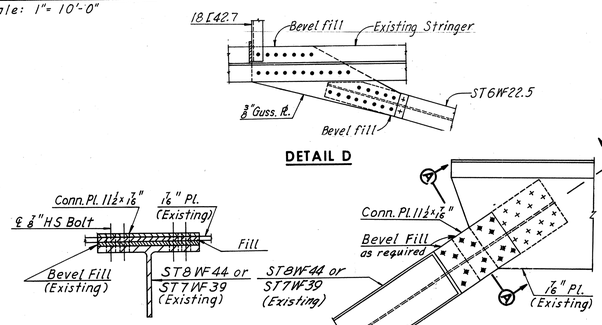
TYPICAL STRINGER TO LATERAL CONNECTION

Bolt with hand tightened ⅝" ϕ erection bolts. Replace erection bolts with ⅞" ϕ bolts after concrete has been poured.



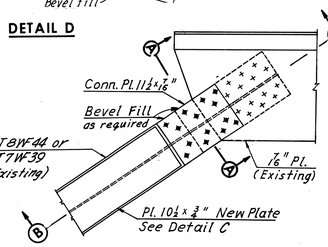
ALTERNATE CONNECTION

May be used where "t" is greater than 1". Bolt with hand tightened ⅞" ϕ H.S. Bolts during erection tighten bolts with torque wrench after concrete has been poured.

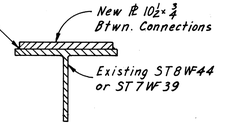


DETAIL D

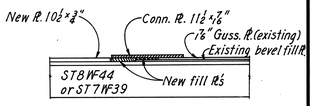
SECTION A-A



DETAIL B



DETAIL C



SECTION B-B
No Scale

Note:
Support at Stringer B. Use details similar to lateral connection.

TOP LATERAL CONN. MODIFICATION

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	12-2-68	2	As Built	TEM	6-77
CHECKED	JV	5-15-69	1	Dim's. ℄ angles revised	C.B.P.	2-7-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

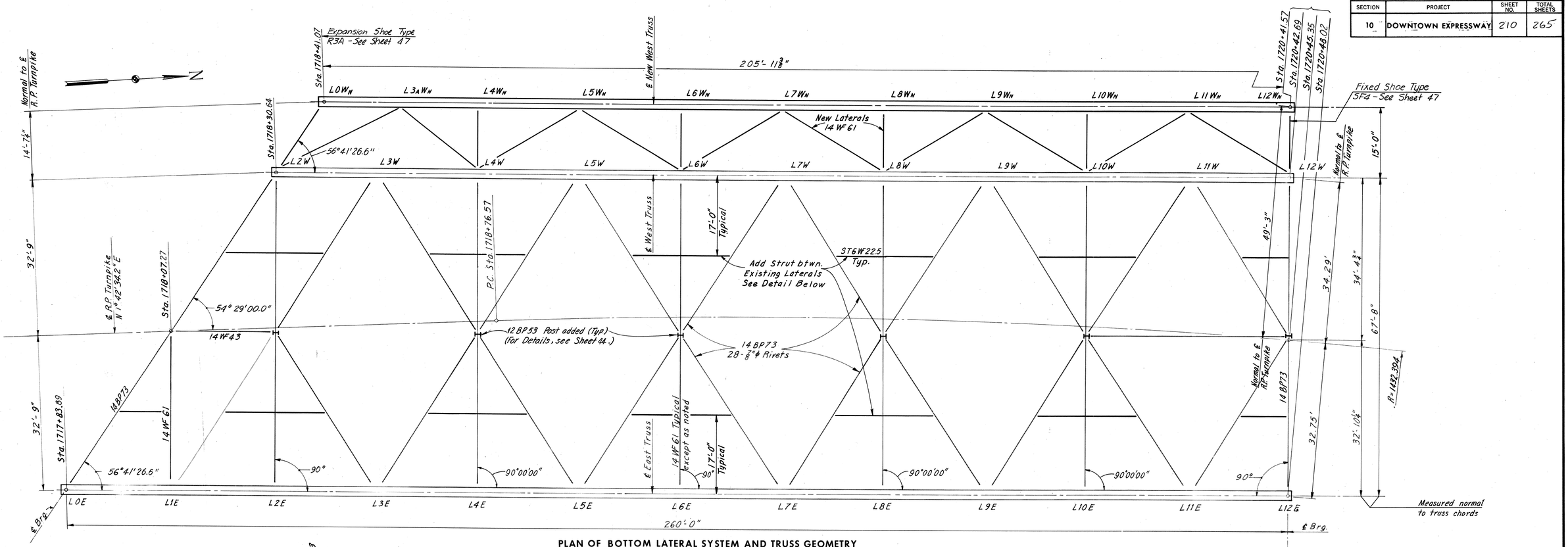
BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

TOP LATERAL SYSTEM

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

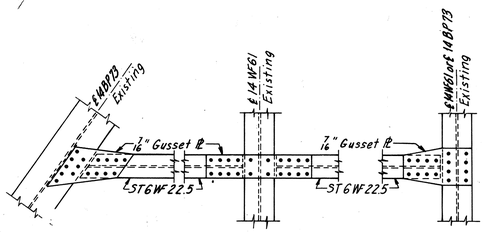
SCALE: 1" = 1'-0" or As Noted
CONTRACT NO.: 10
SHEET NO 37 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	210	265

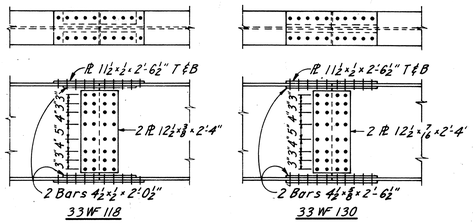


PLAN OF BOTTOM LATERAL SYSTEM AND TRUSS GEOMETRY

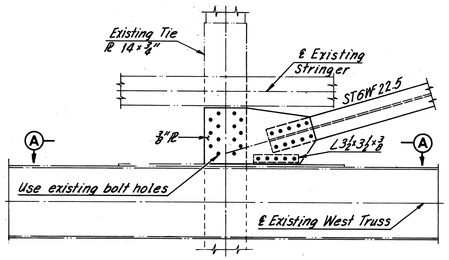
Scale: 1" = 10'-0"



CONNECTION OF STRUT TO BOTTOM LATERAL

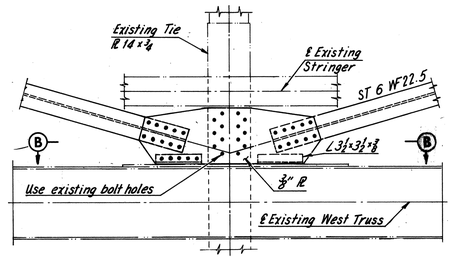


DETAILS OF STRINGER SPLICES

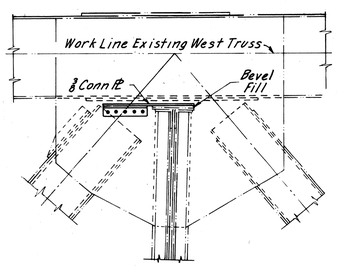


TOP LATERAL CONNECTION U8W

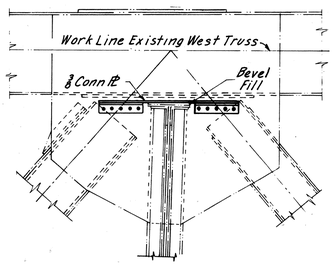
(U10W Typical, U4W Similar)



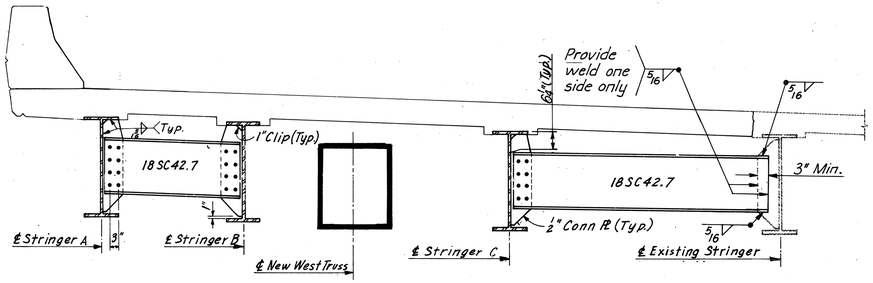
TOP LATERAL CONNECTION U6W



SECTION A-A



SECTION B-B



INTERMEDIATE STRINGER DIAPHRAGM

	BY	DATE	NO.	REVISION	BY	DATE
MADE	AMH	12-4-68	1	Shoes Added	LRH	4-19-74
CHECKED	JV	5-15-69	2	Station & angle chg. & Girder conn.	C.B.P.	2-7-75
IN CHARGE			3	Post at T80 deleted	C.B.P.	3-5-75
			4	As Built	TEM	6-77

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

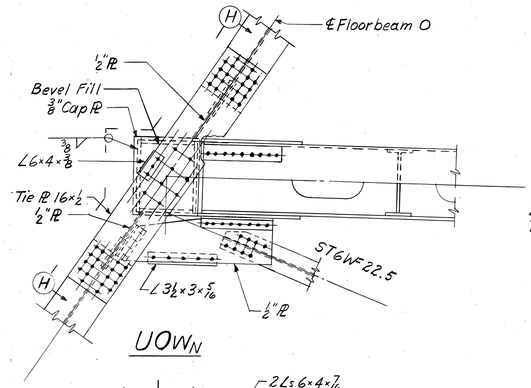
BOTTOM LATERAL SYSTEM

AS BUILT

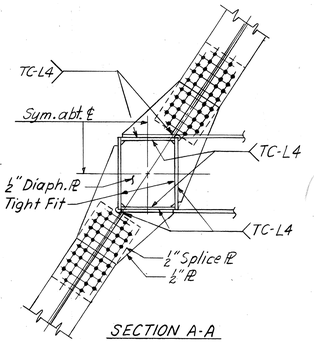
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=1'-0" or As Noted
CONTRACT NO.: 10
SHEET NO. 38 OF 54

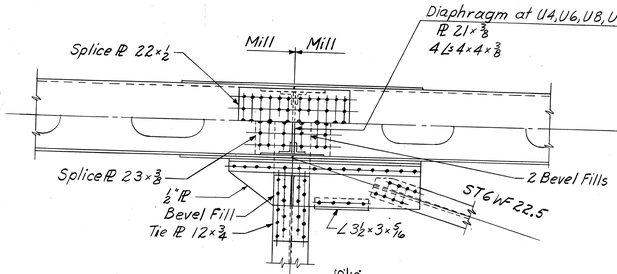
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	211	265

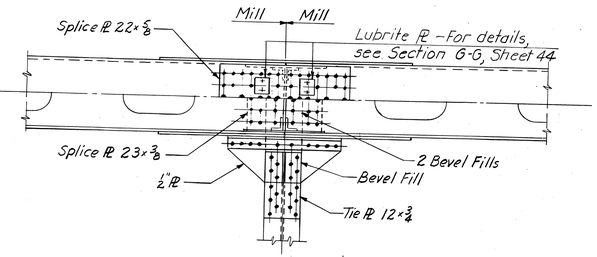


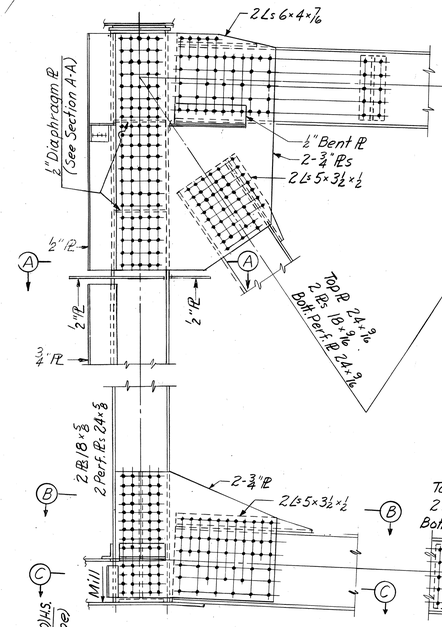
U0W$_N$

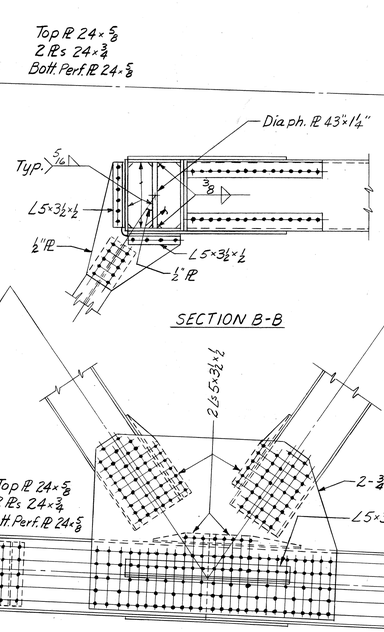


SECTION A-A

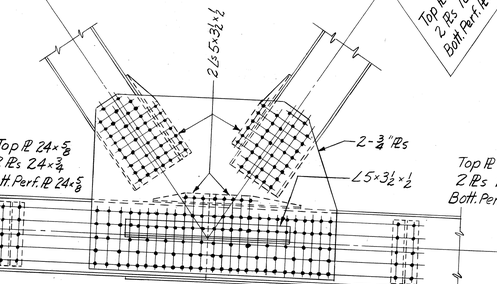


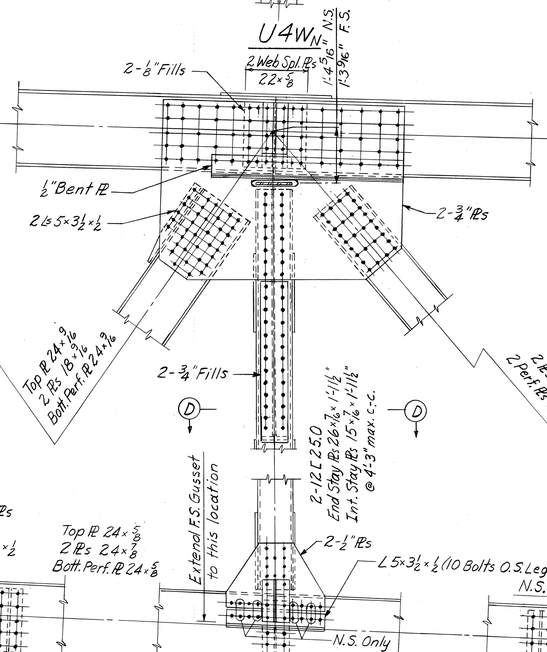


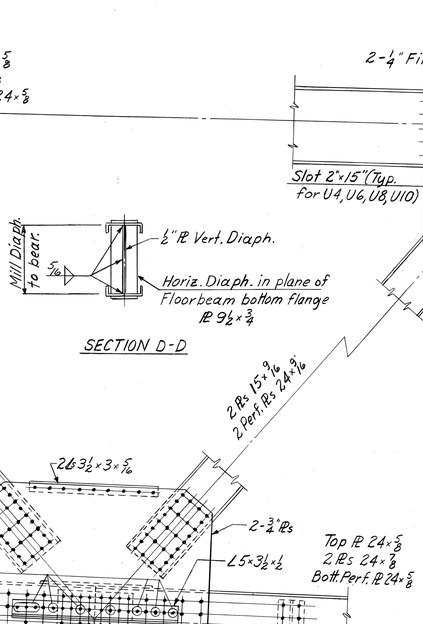




SECTION B-B

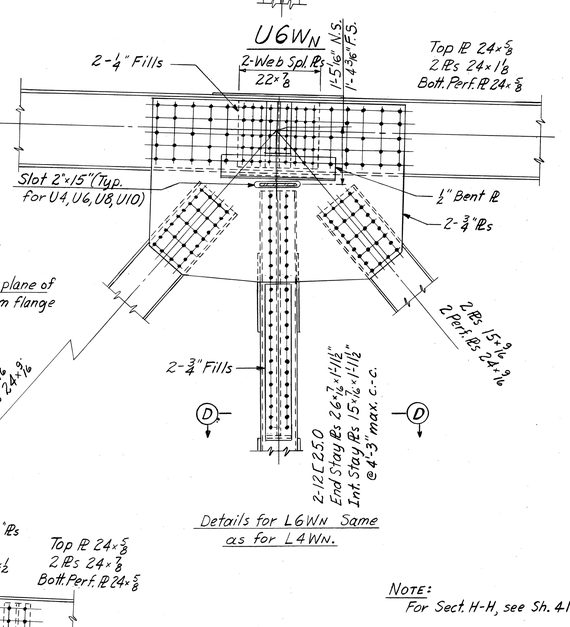






SECTION D-D

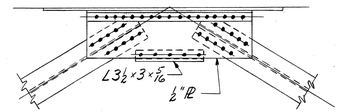
L5W$_N$



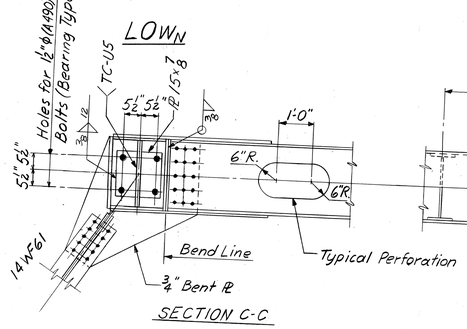
Details for L6W$_N$ Same as for L4W$_N$.

NOTE:
For Sect. H-H, see Sh. 41.

L6W$_N$

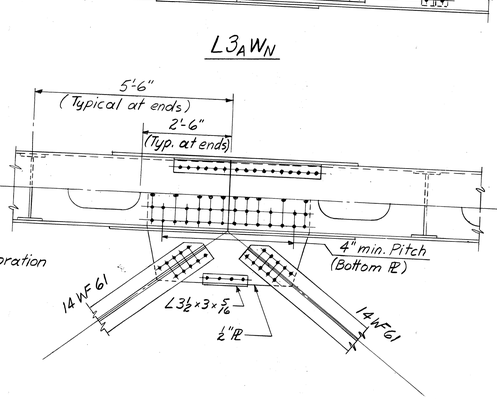


TYPICAL TOP FLANGE CONNECTION BOTTOM LATERALS

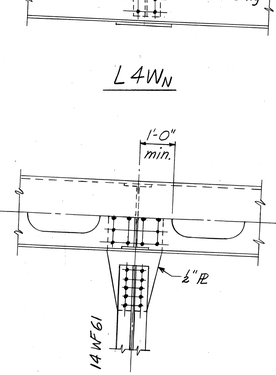


SECTION C-C

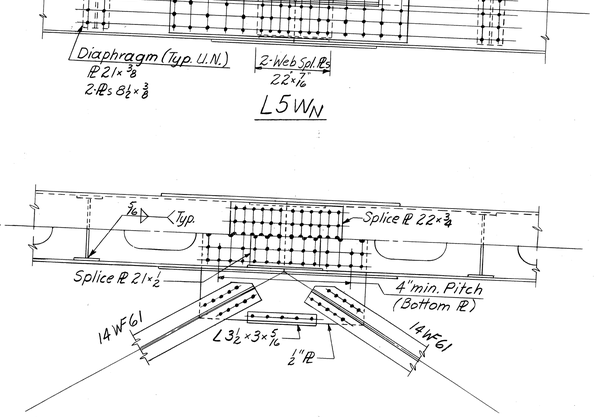
L0W$_N$



L3$_A$W$_N$



L4W$_N$



AS BUILT

DESIGNED						
DRAWN	PRY	1-74	2	As Built	TEM	6-77
CHECKED			⚠	Slot location & misc. changes	J.B.P.	2-7-75
IN CHARGE	PRY		NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

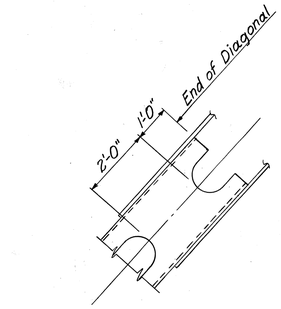
TRUSS DETAILS - P.P.O TO P.P.6

SCALE ½"=1'-0"
DATE

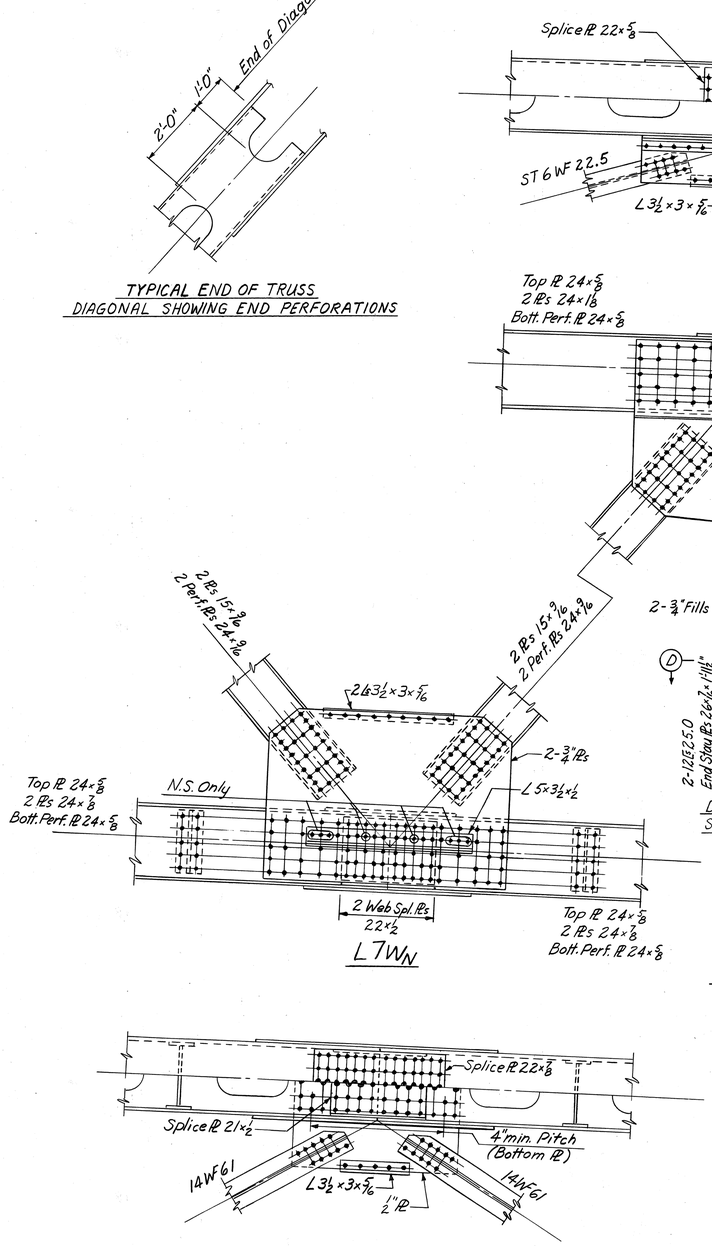
SHEET 39 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

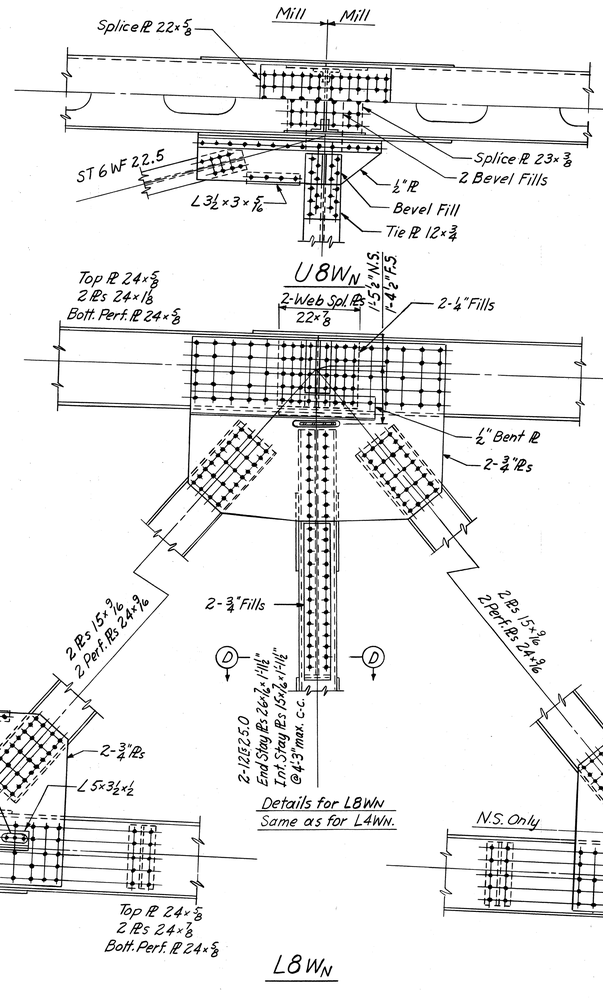
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	212	265



TYPICAL END OF TRUSS
DIAGONAL SHOWING END PERFORATIONS

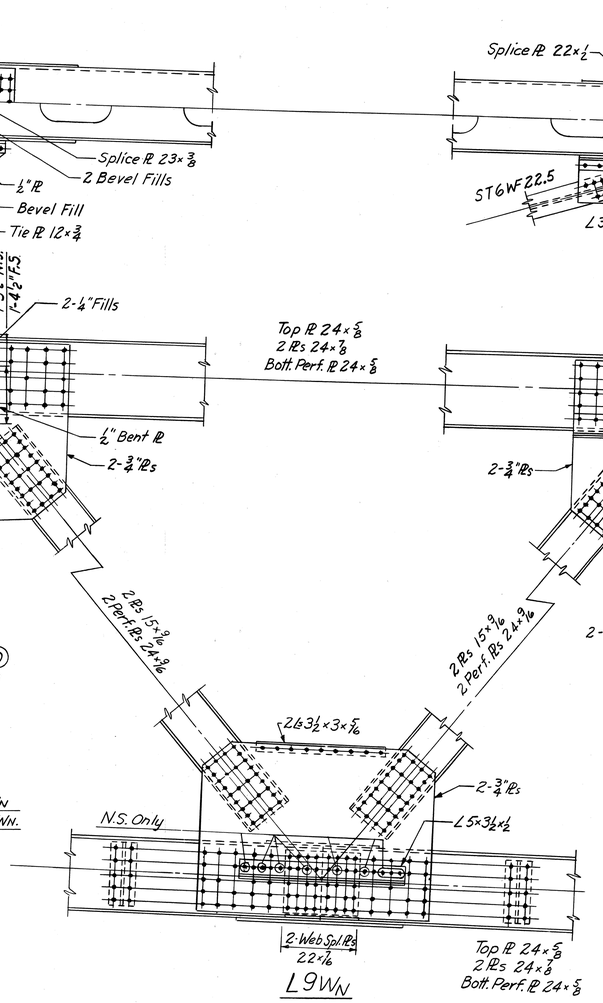


L7WN

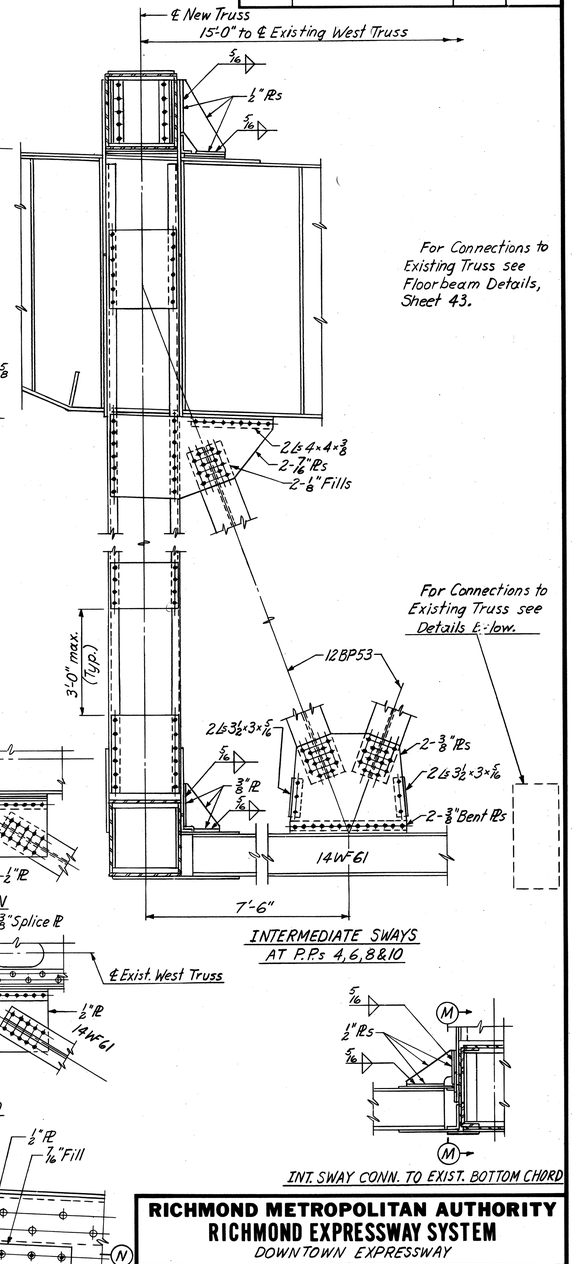


Details for L8WN
Same as for L4WN.

L8WN



L9WN



For Connections to
Existing Truss see
Floorbeam Details,
Sheet 43.

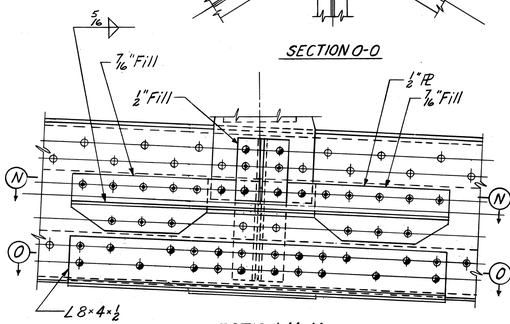
For Connections to
Existing Truss see
Details Below.

INTERMEDIATE SWAYS
AT P.Ps 4, 6, 8 & 10

L10WN

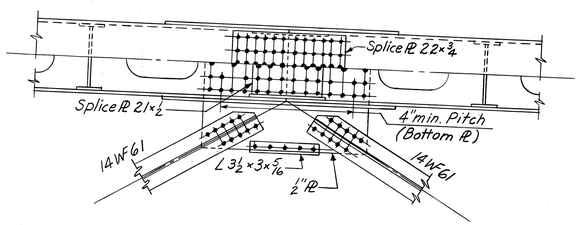
SECTION N-N

SECTION O-O



SECTION M-M
1"=1'-0"
For Legend see Sheet 41.

INT. SWAY CONN. TO EXIST. BOTTOM CHORD



DESIGNED						
DRAWN	PRY	1-74	2	As Built	TEM	6-77
CHECKED			⚠	Slot location	d.B.P.	2-7-75
IN CHARGE	PRY		NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
TRUSS DETAILS - P.P.7 TO P.P.10

SCALE ½"=1'-0" U.N.
DATE
SHEET 40 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	213	265

Existing Gusset PL $\frac{3}{8}$
Fill PL $\frac{7}{8}$ x 6
PL 1 x 6
Gusset PL $\frac{1}{2}$
PL $\frac{1}{2}$ x 3$\frac{1}{2}$
W.L.
Fill PL
$\frac{5}{16}$
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
13$\frac{1}{2}$" (W14x61)
Gusset PL $\frac{5}{8}$
Gusset PL $\frac{3}{4}$
$\frac{7}{8}$" Fill PL
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
L 4 x 3$\frac{1}{2}$ x $\frac{1}{2}$
$\frac{1}{2}$" PL
T
Q
R
S

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

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

SECTION R-R

SECTION S-S

℄ Existing West Truss
$\frac{7}{8}$" Fill PL
1" PL
14WF61
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
Bend Line PL 3$\frac{1}{2}$ x $\frac{1}{2}$
$\frac{5}{8}$" Gusset PL
L 4 x 3$\frac{1}{2}$ x $\frac{1}{2}$
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
$\frac{7}{8}$" Fill PL

℄ Special Diaphragm
Tie PL 16 x $\frac{1}{2}$
℄ Floorbeam 12
PL 18 x $\frac{3}{8}$
$\frac{3}{8}$" Cap PL
Bevel Fill
ST 6 WF 22.5
L $\frac{1}{2}$" PL
L 3$\frac{1}{2}$ x 3 x $\frac{5}{16}$
$\frac{5}{16}$

U12WN

Top PL 24 x $\frac{5}{8}$
2 PLs 24 x $\frac{3}{4}$
Bott. Perf. PL 24 x $\frac{5}{8}$
2 Ls 6 x 4 x $\frac{7}{16}$
I
$\frac{1}{2}$" Bent PL
2-$\frac{3}{4}$" PLs
2 Ls 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
E
2-$\frac{3}{4}$" Fills
2 PLs 18 x $\frac{5}{8}$
2 Perf. PLs 24 x $\frac{5}{8}$

Diaph. PL 43 x $\frac{1}{4}$
$\frac{3}{8}$
$\frac{1}{2}$" Bent PL
Bend Line

SECTION F-F

Top PL 24 x $\frac{9}{16}$
2 PLs 18 x $\frac{9}{16}$
Bott. Perf. PL 24 x $\frac{9}{16}$
2 Ls 3$\frac{1}{2}$ x 3 x $\frac{5}{16}$
2 Ls 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
2-$\frac{3}{4}$" PLs
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
Top PL 24 x $\frac{5}{8}$
2 PLs 24 x $\frac{5}{8}$
Bott. Perf. PL 24 x $\frac{5}{8}$

Mill Diagh. to Bear $\frac{7}{16}$
9" x $\frac{9}{16}$ PL Vert. Diaph.
Tight Fit
Horiz. Diaph. in plane of Floor beam bottom flange
PL 18 x $\frac{3}{4}$

SECTION E-E

Top PL 24 x $\frac{5}{8}$
2 PLs 24 x $\frac{3}{4}$
Bott. Perf. PL 24 x $\frac{5}{8}$
2 Ls 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
2-$\frac{3}{4}$" PLs
L 4 x 3$\frac{1}{2}$ x $\frac{1}{2}$
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
F
G
Mill

L11WN

14WF61
L 3$\frac{1}{2}$ x 3 x $\frac{5}{16}$
2 L" PL
4" min. Pitch (Bottom PL)

L12WN

PL 15 x $\frac{7}{8}$
TC-U5
5$\frac{1}{2}$" 5$\frac{1}{2}$"
$\frac{3}{8}$
12
Holes for 1$\frac{1}{2}$"ϕ (A490) H.S. Bolts (Bearing Type)
5$\frac{1}{2}$" 5$\frac{1}{2}$"
$\frac{3}{4}$" Bent PL
Bend Line

SECTION G-G

- ⊕ Indicates existing $\frac{7}{8}$"ϕ rivets to remain in place.
- ⊕ Indicates existing $\frac{7}{8}$"ϕ rivets to be replaced with $\frac{7}{8}$"ϕ H.S. Bolts.
- ⊕ Indicates new holes to be drilled for $\frac{7}{8}$"ϕ H.S. Bolts

2$\frac{3}{4}$"
$\frac{7}{8}$" Fill PL
$\frac{1}{2}$" PL
$\frac{3}{4}$" Gusset PL

SECTION T-T
Scale: 1"=1'-0"

℄ New Truss
15'-0" to ℄ Existing West Truss
$\frac{1}{2}$" PL
2-$\frac{3}{8}$" PLs
L 4 x 4 x $\frac{3}{8}$
$\frac{3}{8}$" Fill
2-$\frac{3}{8}$" PLs
2 Ls 6 x 4 x $\frac{3}{8}$
TC-L4
$\frac{3}{4}$" PL
Cut & chip T. & B. Flange, F.S.
PL 11 x $\frac{9}{16}$
$\frac{3}{4}$" Fill
14WF61
$\frac{1}{2}$" Diaph. PL
See Sect. A-A, Sheet 39
℄ Existing West Truss
2 Ls 4 x 3$\frac{1}{2}$ x $\frac{3}{8}$
2 Ls 3$\frac{1}{2}$ x 3 x $\frac{5}{16}$
2-$\frac{3}{8}$" PLs
14WF61

Exist. Perf. = 9" x $\frac{1}{16}$"
℄ Existing West Truss
W.L. Exist. West Truss El. 51.46 @ P.P. 12
J
2-$\frac{1}{2}$" PLs
2 Ls 3$\frac{1}{2}$ x 3 x $\frac{5}{16}$
2 Ls 6 x 4 x $\frac{1}{2}$
$\frac{5}{16}$
$\frac{7}{16}$" PLs
14WF61

℄ End Vertical Exist. Truss

SECTION I-I
END SWAY AT P.P. 12

$\frac{1}{2}$" Gusset PLs
$\frac{7}{8}$" Fills
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$
K
L
L 4 x 3$\frac{1}{2}$ x $\frac{1}{2}$
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$

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

- ⊕ Indicates existing 1"ϕ rivets to remain in place.
- ⊕ Indicates existing 1"ϕ rivets to be replaced with 1"ϕ H.S. Bolts.
- ⊕ Indicates new holes to be drilled for 1"ϕ H.S. Bolts.

℄ Exist. Truss
$\frac{1}{4}$" Fill PL
$\frac{1}{2}$" Bent PL
$\frac{1}{2}$" Fill PL
Bend Line

SECTION K-K

℄ Exist. Truss
$\frac{1}{2}$" Bent PL
14WF61
Bend Line

SECTION L-L

℄ New Truss
15'-0" to ℄ Existing West Truss
L 4 x 4 x $\frac{3}{8}$
2-$\frac{3}{8}$" PLs
$\frac{3}{8}$" Fill
2-$\frac{3}{8}$" PLs
℄ Existing West Truss
2 Ls 6 x 4 x $\frac{3}{8}$
TC-L4
$\frac{3}{4}$" PL
Cut & chip T. & B. Flange, F.S.
PL 11 x $\frac{9}{16}$
$\frac{3}{4}$" Fill
14WF61
$\frac{3}{4}$" Fill PL
PL 11 x $\frac{9}{16}$
$\frac{3}{4}$" Gusset PL
L 5 x 3$\frac{1}{2}$ x $\frac{1}{2}$ N.S.
L 4 x 3$\frac{1}{2}$ x $\frac{1}{2}$ F.S.
W.L. Existing El. 60.59
2-$\frac{3}{8}$" PLs
14WF61
$\frac{3}{8}$" PL
TC-L4
P
U

SECTION H-H
END SWAY AT P.P. 0

℄ Existing West Truss
TC-L4a
$\frac{9}{16}$ PL
14WF61
PL $\frac{1}{2}$
$\frac{3}{4}$" Fill PL
$\frac{3}{4}$" Gusset PL
TC-L4b
PL $\frac{1}{2}$
$\frac{7}{8}$" Fill PL

Note: Bott. laterals, gusset PLs & chord not shown.

SECTION U-U

AS BUILT

DESIGNED			2	As Built	TEM	G-77
DRAWN	PRY	1-74	1	Connections to Exist. Truss at P.P.0 added, Depth of Floor Beam, rev. & Spec. Diaph. add.	A.B.P.	2-7-75
CHECKED						
IN CHARGE	PRY		NO.	REVISION	BY	DATE

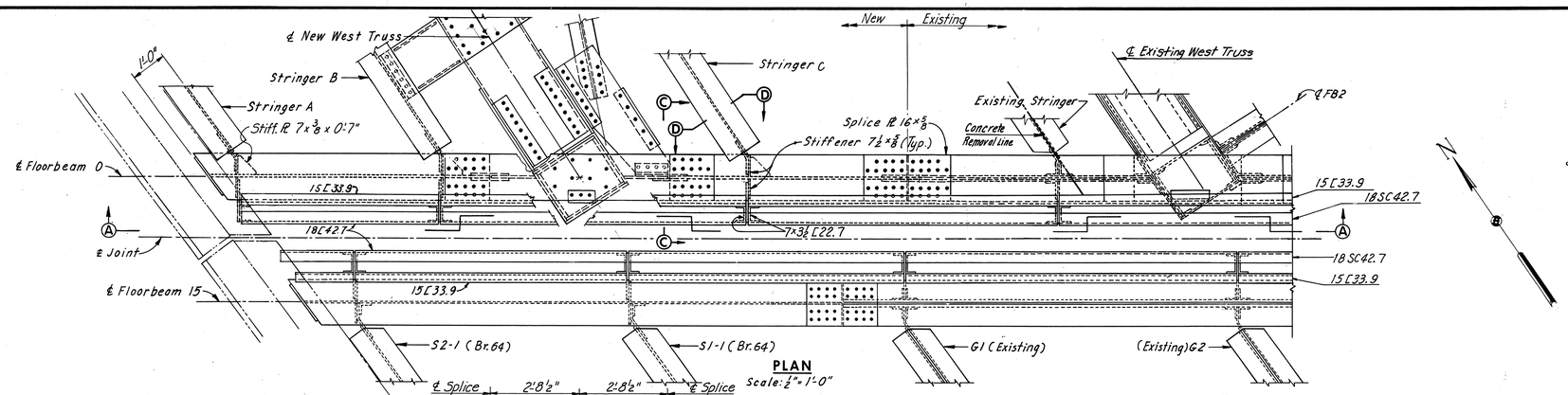
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
TRUSS DETAILS - P.P. 11 & 12

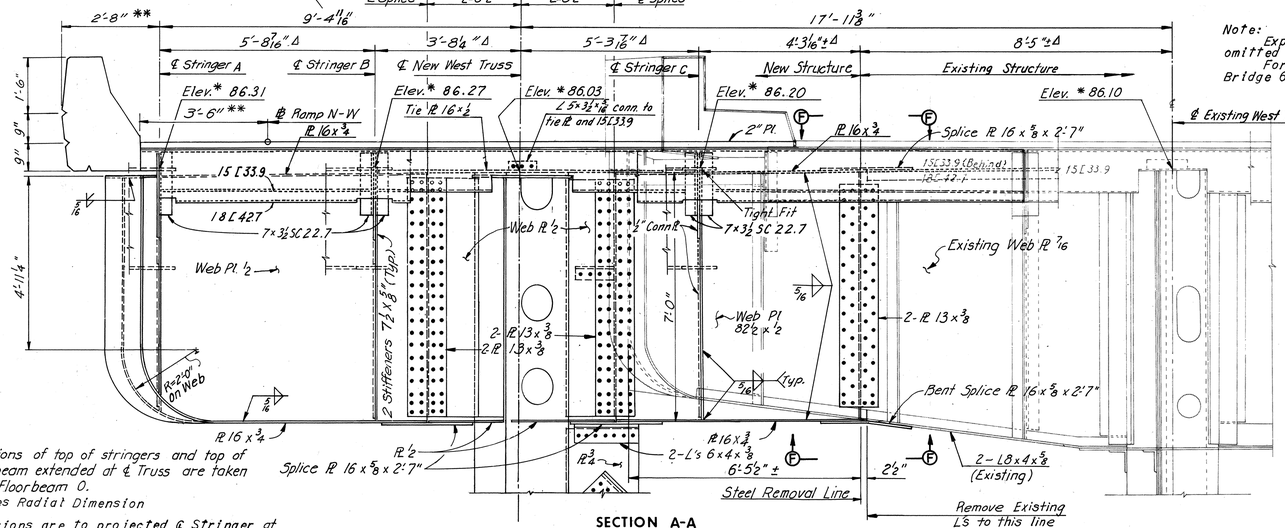
SCALE $\frac{1}{2}$"=1'-0" U.N.
DATE _____
SHEET 41 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	214	265



PLAN
Scale: ½"=1'-0"



SECTION A-A
ELEVATION-FLOORBEAM 0
Scale: ½" = 1'-0"

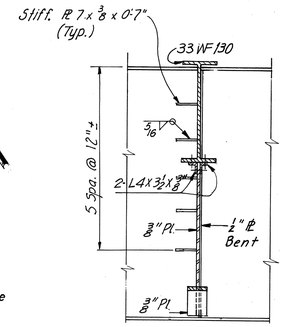
LEGEND:

* Elevations of top of stringers and top of Floorbeam extended at ℄ Truss are taken at ℄ Floorbeam 0.

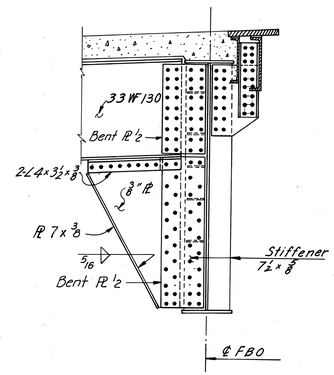
** Denotes Radial Dimension

Δ Dimensions are to projected ℄ Stringer at ℄ Floorbeam. Connection - Stiffener Plate shall be located by the Fabricator.

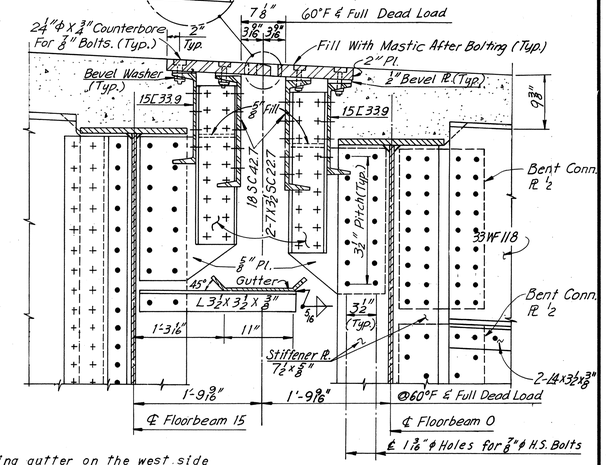
Note: Expansion plates and curb plates are omitted from Plan. For Elevation of Floorbeam 15, see Bridge 64 Sheet 18.



SECTION D-D
Scale: ½"= 1'-0"

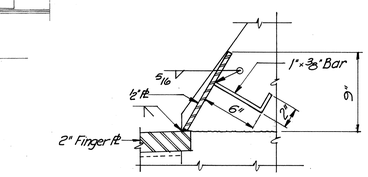


SECTION C-C
Scale: ½"=1'-0"

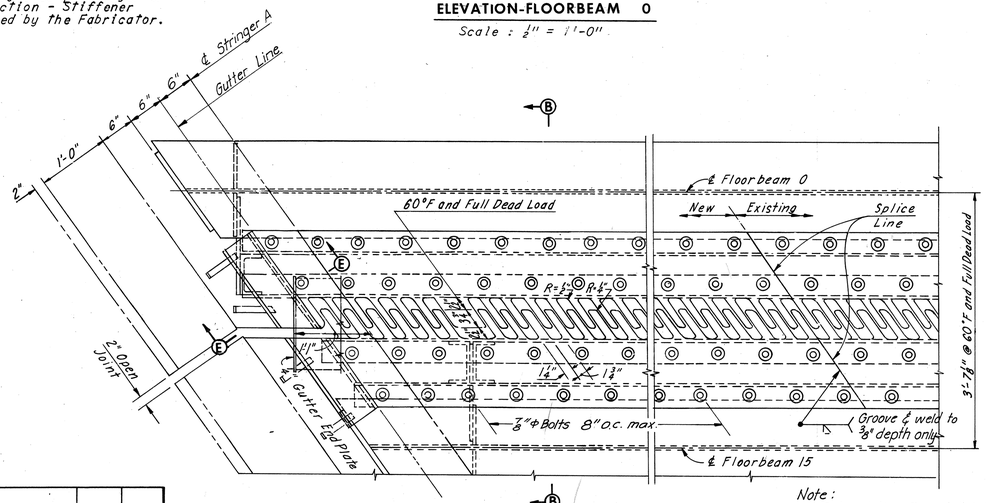


Note: Cut existing gutter on the west side of the existing stringer and set the new gutter into the existing gutter. Bolt the two together with existing bolts. Provide an 8" lap.

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

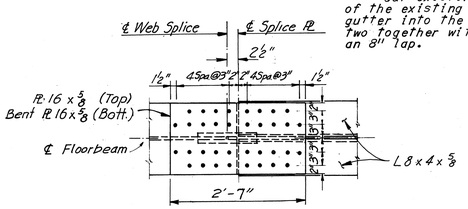


SECTION E-E
Scale = 1½"=1'-0"



PART PLAN OF EXPANSION DEVICE
Scale: 1" = 1'-0"

Note: Cut existing finger plate as close to the existing gutter line as possible. New plate shall be provided long ℄ cut to exact length after existing plate is cut.



VIEW F-F
Scale = ¾"=1'-0"
bottom Splice Similar

	BY	DATE
MADE	J.B.B./ R.C.	1-75
CHECKED		
IN CHARGE		

NO.	REVISION	BY	DATE
2	As Built	TEM	6-77
1	New sheet added	J.B.P.	2-7-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FLOORBEAM 0 AND JOINT DETAILS

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

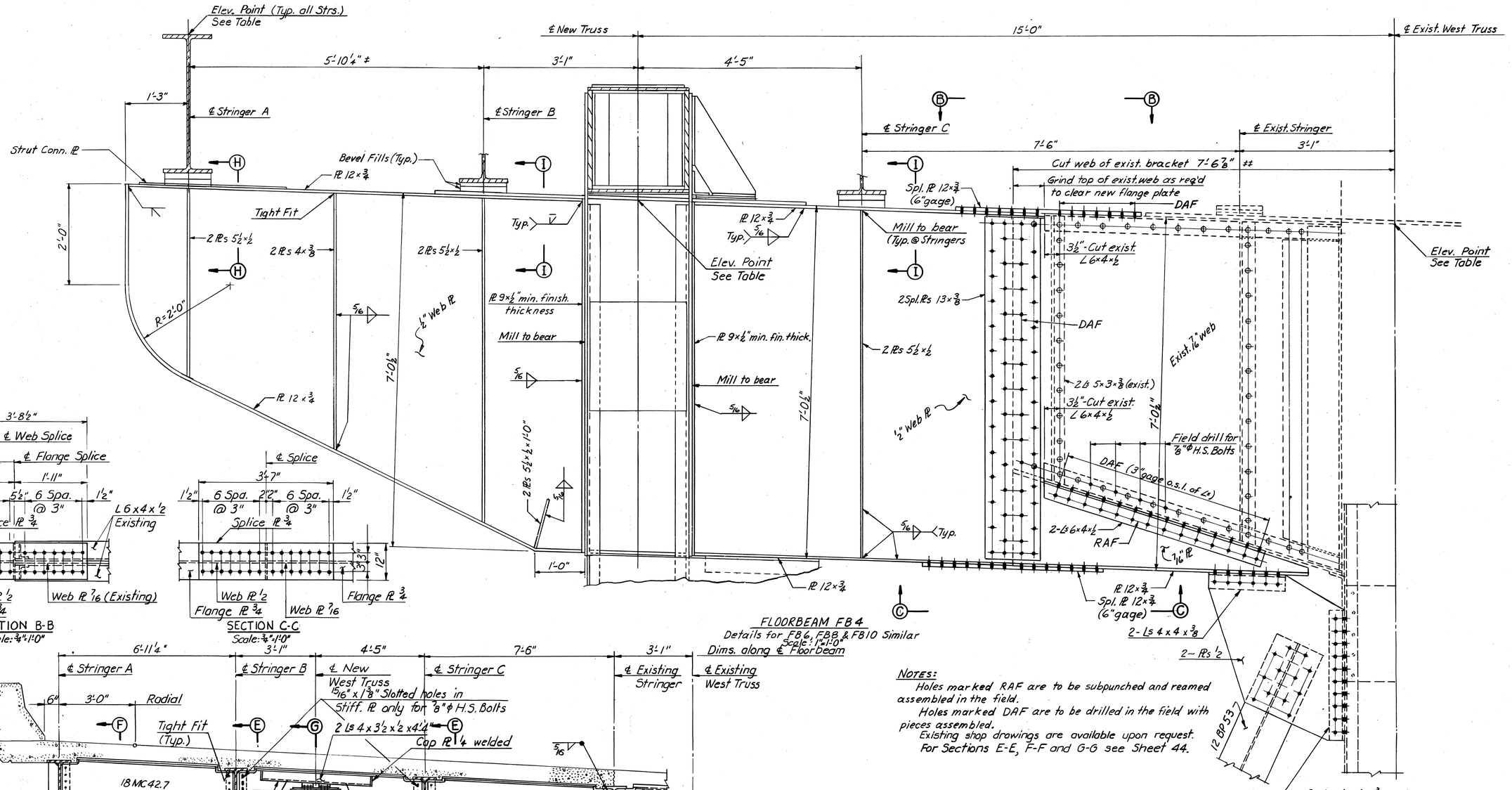
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 42 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWN TOWN EXPRESSWAY	215	265

± 6'-11¼" @ FB6
± 6'-9⁷⁄₁₆" @ FB8
± 5'-4⁵⁄₁₆" @ FB10

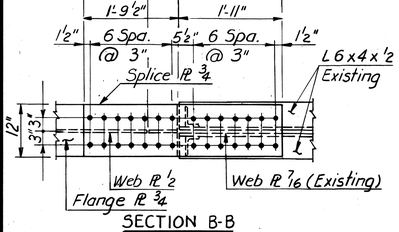
FLOORBEAM FB4

Details for FB6, FB8 & FB10 Similar
Scale: ½"=1'-0"
Dims. along ℄ Floorbeam



SECTION B-B

Scale: ¾"=1'-0"

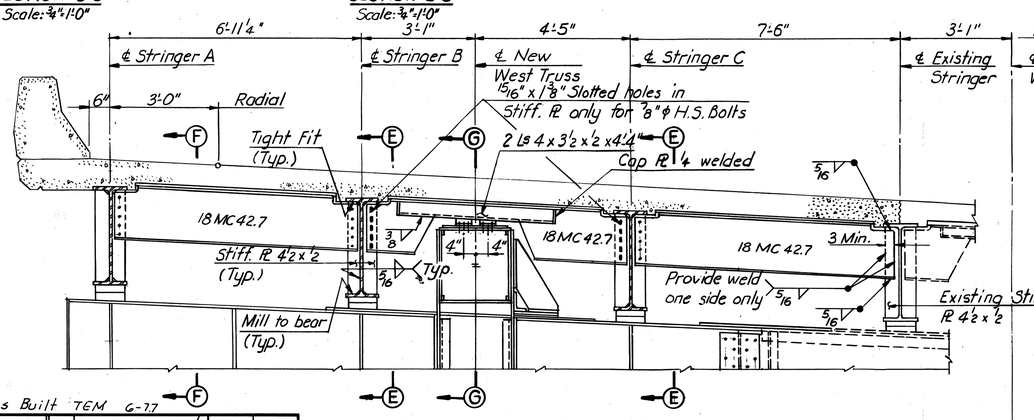


SECTION C-C

Scale: ¾"=1'-0"

DIAPHRAGMS AT FLOORBEAM FB6 ONLY

Scale: ½"=1'-0"



NOTES:

Holes marked RAF are to be subpunched and reamed assembled in the field.

Holes marked DAF are to be drilled in the field with pieces assembled.

Existing shop drawings are available upon request.

For Sections E-E, F-F and G-G see Sheet 44.

TABLE OF ELEVATIONS

LOCATION	STR. A	STR. B	STR. C	New TRUSS	EXISTING TRUSS
FB4	85.53	85.33	85.08	82.30	81.85
FB6	84.32	84.04	83.73	80.94	80.41
FB8	83.12	82.79	82.42	79.61	78.97
FB10	81.92	81.62	81.19	78.37	77.62

Note:
Elevations shown are taken at ℄ Floorbeam.

AS BUILT

DESIGNED			2	As Built TEM G-77		
DRAWN	PRY	4-74	⚠	Table of Elev. & Diaph. Det. added, F.B. Web PL thick. rev. notes removed & connection added.	C.B.P.	2-7-75
CHECKED						
IN CHARGE	PRY		NO.	REVISION	BY	DATE

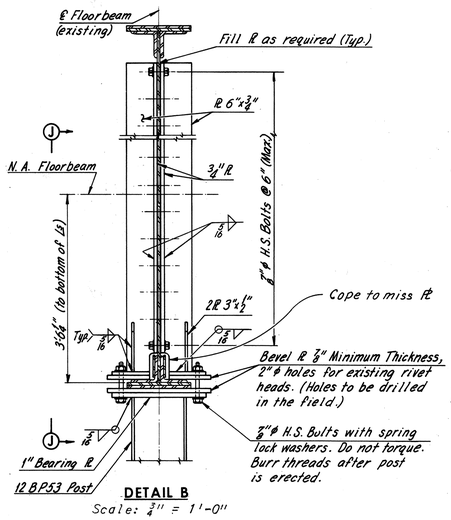
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
INTERMEDIATE FLOORBEAMS

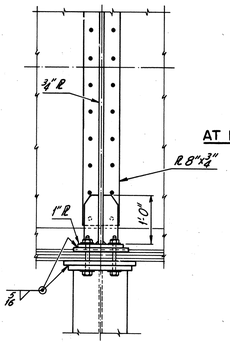
SCALE As Noted
DATE
SHEET 43 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

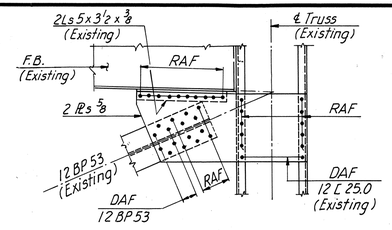
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	216	265



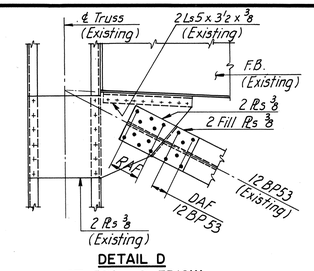
DETAIL B
Scale: 3/4" = 1'-0"



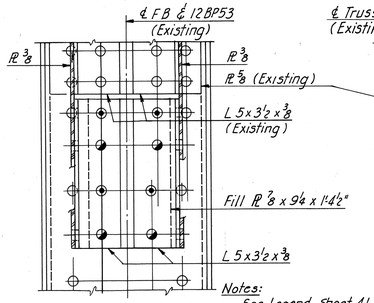
VIEW J-J
Scale: 3/4" = 1'-0"



DETAIL D
AT FB2E, FB4E, FB6E, FB8E, FB10E, FB4W & FB6W
Scale: 1/2"=1'-0"

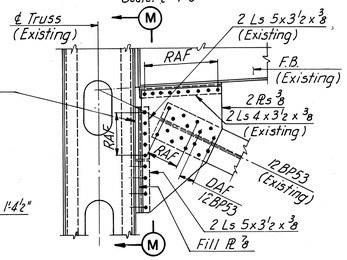


DETAIL D
AT FB8W & FB10W
Scale: 1/2"=1'-0"



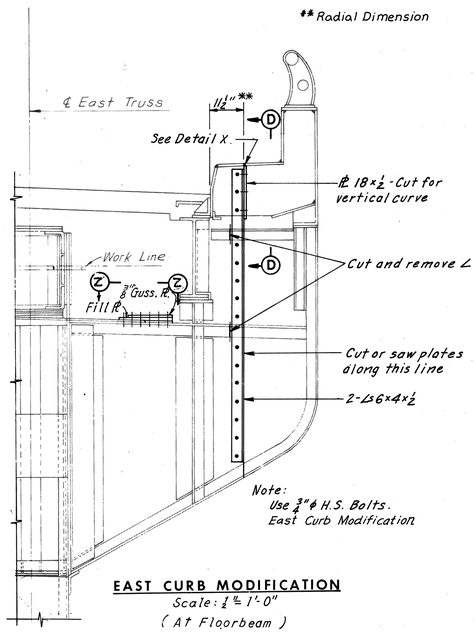
SECTION M-M
Scale: 1 1/2"=1'-0"

Notes:
- See Legend, Sheet 41.
- ⊕ Indicates RAF for 1" ϕ H.S. Bolts.
- ⊕ Indicates DAF for 1" ϕ H.S. Bolts



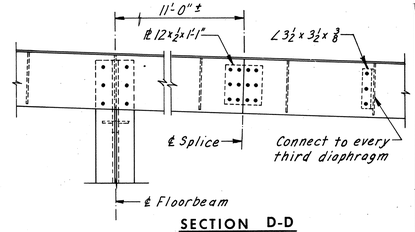
DETAIL D
AT FB12E & FB12W
Scale: 1/2"=1'-0"

** Radial Dimension

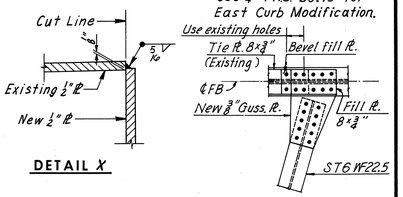


Note:
Use 3/4" ϕ H.S. Bolts. East Curb Modification

EAST CURB MODIFICATION
Scale: 1/2" = 1'-0"
(At Floorbeam)



SECTION D-D

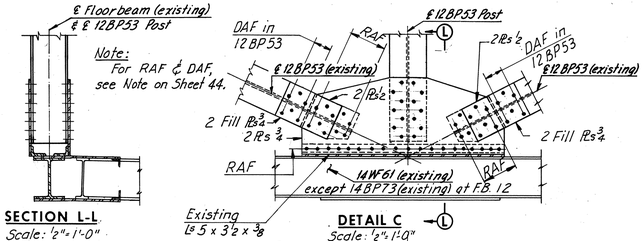


Note:
Use 3/4" ϕ H.S. Bolts for East Curb Modification.

DETAIL X

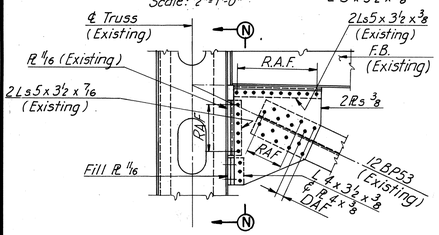
VIEW Z-Z
Scale: 1/2" = 1'-0"

Note:
New bearing stiffeners (also includes 1" PL and 3/8" Min. bevel PL) are to be set with full bearing on the bottom flange angles before drilling holes in existing web. If existing rivets are removed, holes in new stiffeners shall be drilled to match present holes while in bearing on the bottom flange.
The post shall then be drawn into full contact with the bottom of floorbeam by means of the erection bolts.
No welding or cutting will be permitted on existing alloy material.



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

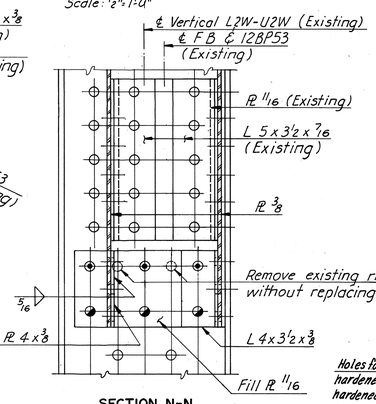
DETAIL C
Scale: 1/2"=1'-0"



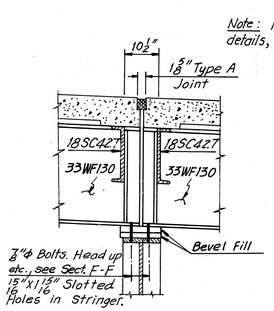
DETAIL D
AT FB2W
Scale: 1/2"=1'-0"

Notes:
- See Legend, Sheet 41.
- ⊕ Indicates RAF for 1" ϕ H.S. Bolts.
- ⊕ Indicates DAF for 1" ϕ H.S. Bolts.

3 As Built TEM G-77



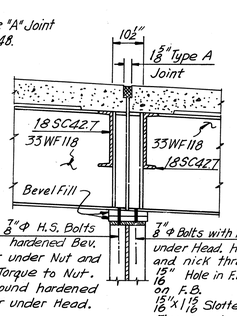
SECTION N-N
Scale: 1/2"=1'-0"



3/4" ϕ Bolts. Head up etc., see Sect. F-F
13/16"x1 15/16" Slotted Holes in Stringer.

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

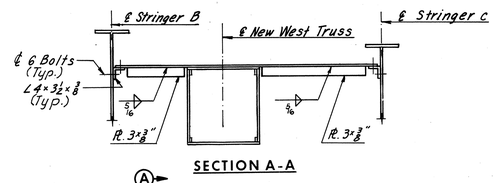
Note: For 1 5/8" Type "A" Joint details, see Sheet 48.



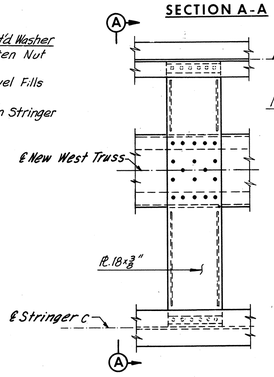
7/8" ϕ H.S. Bolts Use hardened Bev. Washer under Nut and apply Torque to Nut. St'd round hardened Washer under Head.

7/8" ϕ Bolts with Head up Std Washer under Head. Hand tighten Nut and nick thread. 15" Hole in F.B. and Bevel Fills 16 on F.B. 13/16"x1 15/16" Slotted Holes in Stringer Flange only.

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

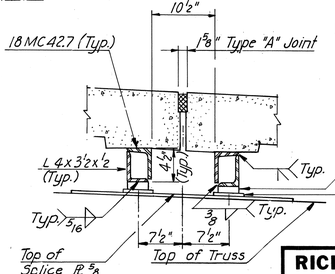


SECTION A-A



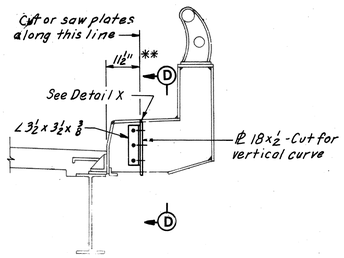
DETAIL A

(For location of Detail A see sheet 37.



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

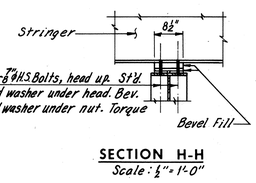
(For location of Section G-G see Sheet 43.)



EAST CURB MODIFICATION
Scale: 1/2" = 1'-0"
(At Diaphragm)

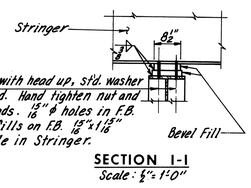
Bevelled PL 3 1/2 x 5 (Typ.)

Bronze PL 5 x 1/2 x 0'-5" Lubrite or equal, fastened to chord with two 1/2" ϕ Tap Screws or countersunk head bolts (Typ.)



Holes for 7/8" H.S. Bolts, head up. St'd. hardened washer under head. Bev. hardened washer under nut. Torque at nut.

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



7/8" ϕ Bolts with head up, std. washer under head. Hand tighten nut and nick threads. 18" ϕ holes in F.B. and bevel fills on F.B. 13/16"x1 15/16" slotted hole in Stringer.

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

DESIGNED			2	Details B, C & D & Sections J-J, L-L, M-M & N-N added	A.B.P.	3-5-75
DRAWN			1	Post & 1 5/8" Joint Det. deleted	L.B.P.	2-7-75
CHECKED			1	Detail A & Section A-A revised	A.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

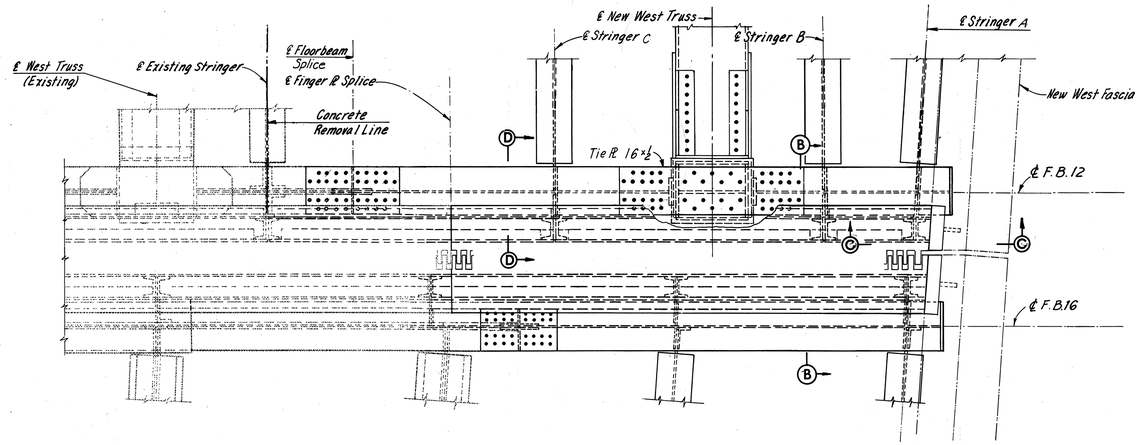
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND - PETERSBURG TURNPIKE
MISCELLANEOUS DETAILS

SCALE As Noted
DATE
SHEET 44 OF 54

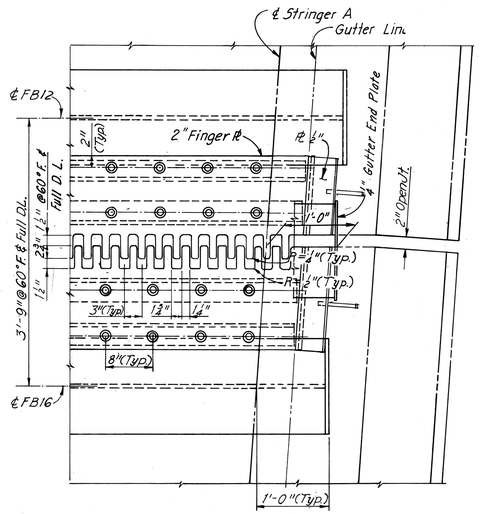
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	217	265



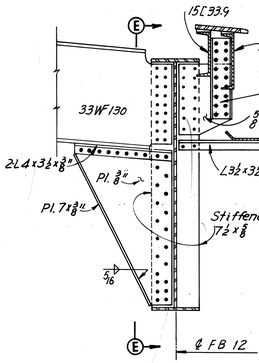
PLAN

Scale: ½" = 1'-0"



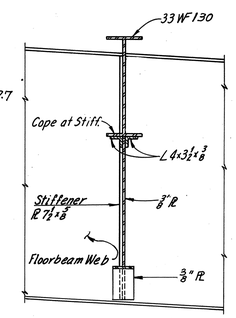
PART PLAN OF EXPANSION DEVICE

Scale: 1" = 1'-0"



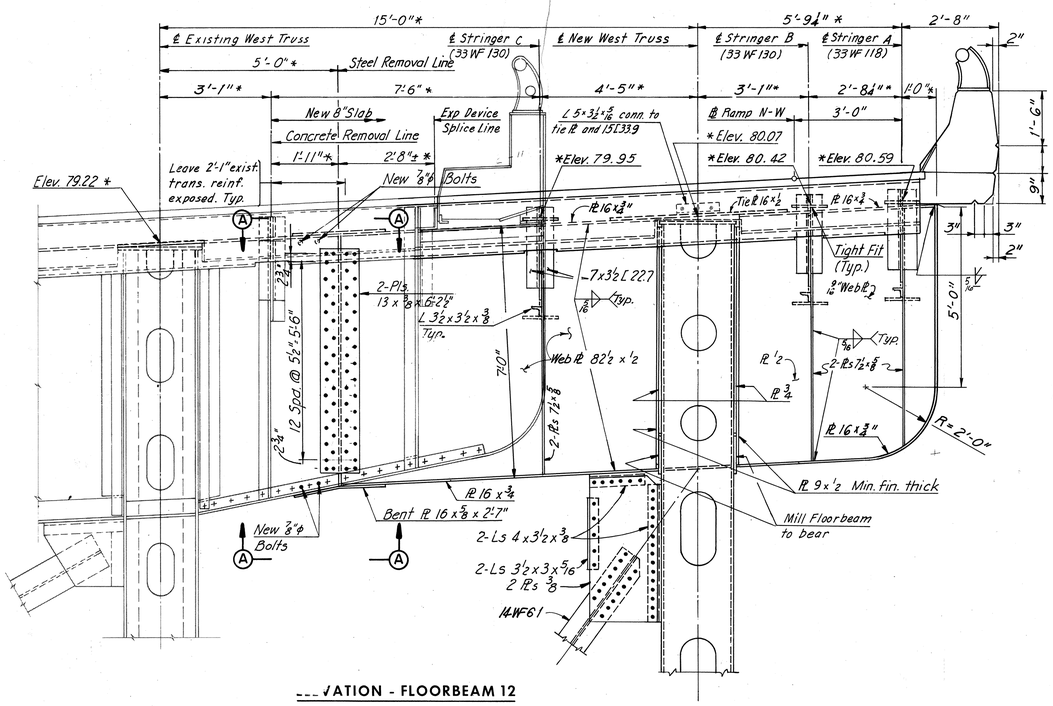
SECTION D-D

Scale: ½" = 1'-0"



SECTION E-E

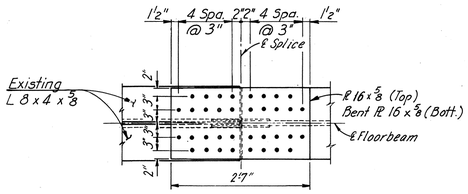
Scale: ½" = 1'-0"



---√ATION - FLOORBEAM 12

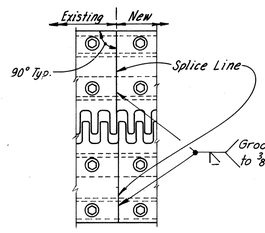
Scale: ½" = 1'-0"

LEGEND:
- * Indicates Elevations of top of stringers and top of Floorbeam extended at ℄ Truss are taken at ℄ Floorbeam 12.
- ○ or • Indicates new ⅞"ϕ H.S. Bolts, for connection to New West Truss, see Sh. 41.



SECTION A-A

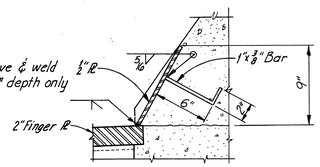
Scale: ¾" = 1'-0"



EXPANSION DEVICE SPLICE DETAIL

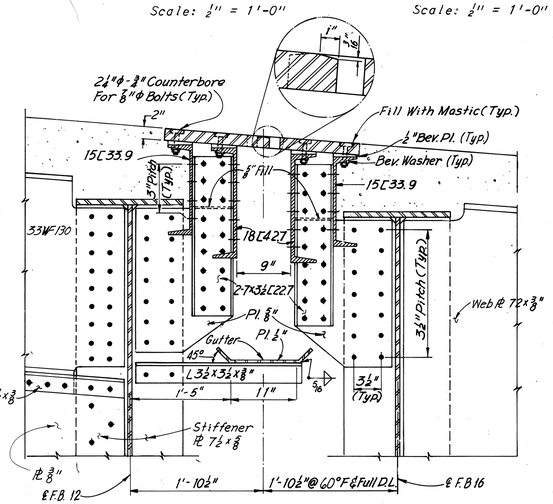
Scale: 1" = 1'-0"

Note: Cut existing finger plate as close to the existing gutter line as possible. New plate shall be provided long ℄ cut to exact length after exist. plate is cut.



SECTION C-C

Scale: 1½" = 1'-0"



SECTION B-B

Scale: 1" = 1'-0"

Note: Cut existing gutter on the west side of the existing stringer and set the new gutter into the existing gutter. Bolt the two together with existing bolts. Provide an 8" lap.

	BY	DATE				
MADE	A.B.P./A.H.	1-75	2	As Built	TEM	6-77
CHECKED			1	New sheet added	A.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

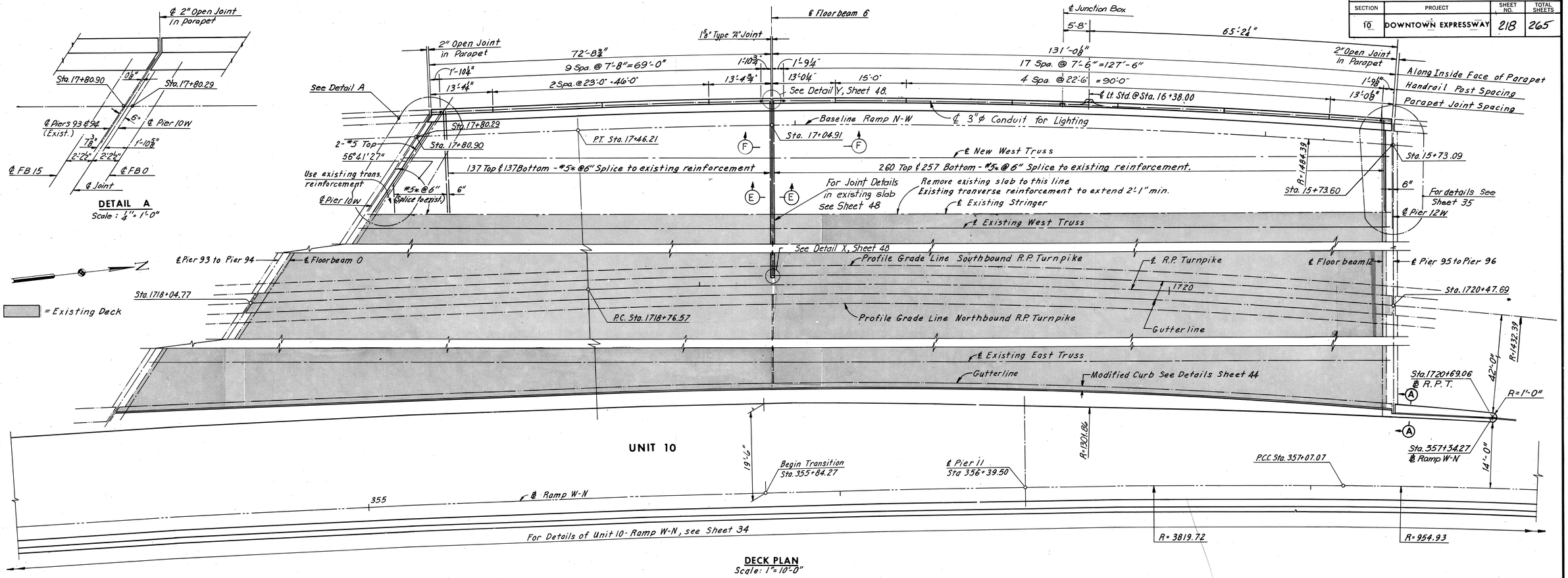
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FLOORBEAM 12 AND JOINT DETAILS

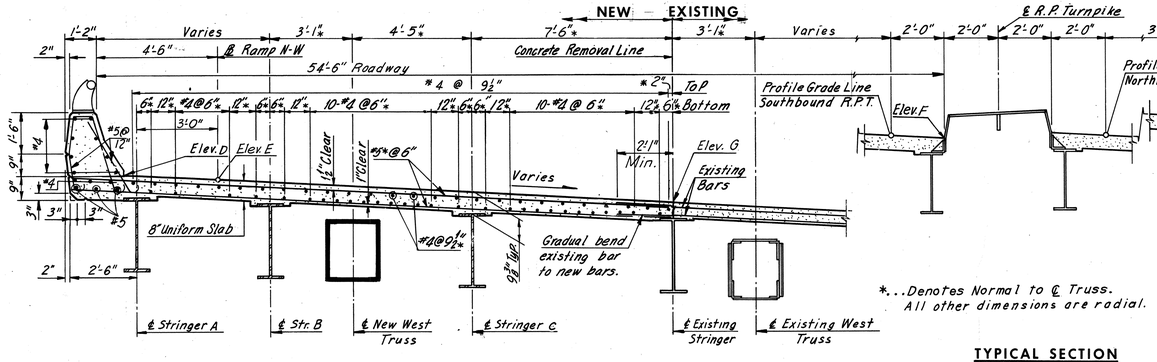
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 45 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	218	265



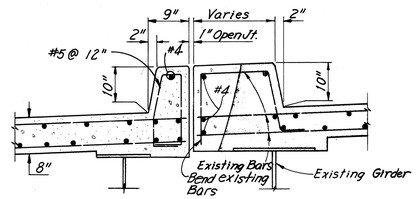
DECK PLAN
Scale: 1"= 10'-0"



*...Denotes Normal to ℄ Truss.
All other dimensions are radial.

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

Note:
For Elev. D, Elev. E, Elev. F and Elev. G see Sheet 47.



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

Note:
For Unit 10 see Sheets 24, 25 and Sheet 34.
For Typical Parapet Detail see sheet 29.
For Section E-E and F-F see sheet 44.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	A.M.H.	2-11-69	3	As Built	TEM	6-77
CHECKED	K.C.T.	6-25-69	2	Joint details at F.B. 6 rev.	L.B.P.	2-25-75
IN CHARGE			1	Stations, angle ℄ conc. rem. line rev.	L.B.P.	2-7-75

AS BUILT

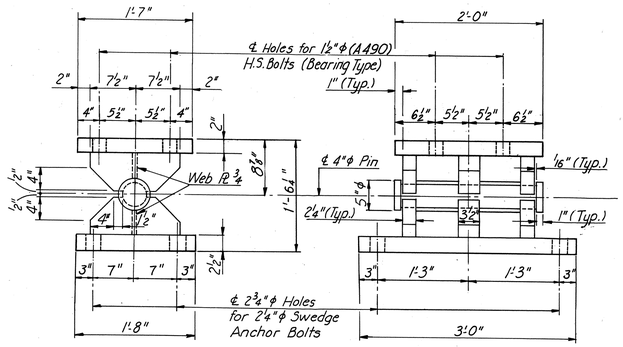
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN - TRUSS SPAN

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

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 46 OF 54

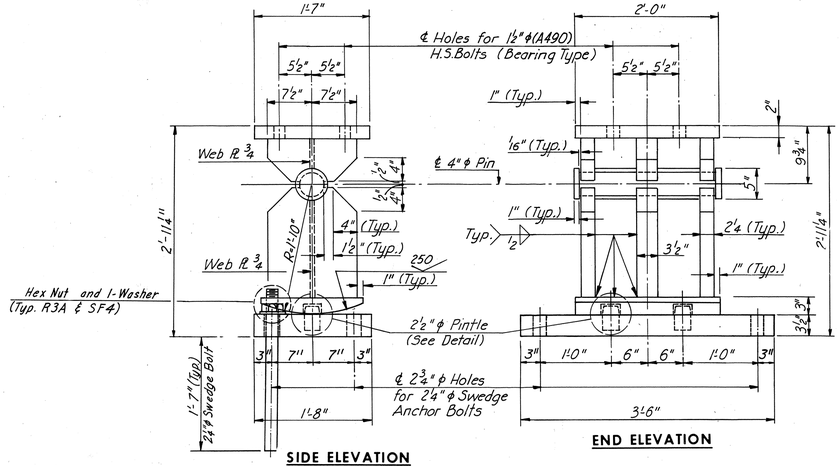
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT.	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	219	265



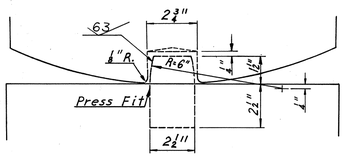
SIDE ELEVATION **END ELEVATION**

S F 4
Scale: 1"=1'-0"

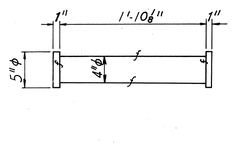
NOTE:
For shoe notes, see Standard Shoe Details Sheet S2, except that all material for shoes shall conform to A.S.T.M. A588.



SIDE ELEVATION **END ELEVATION**



DETAIL OF PINTLE FOR R3A
Scale: 3"=1'-0"



PIN

R 3 A
Scale: 1"=1'-0"

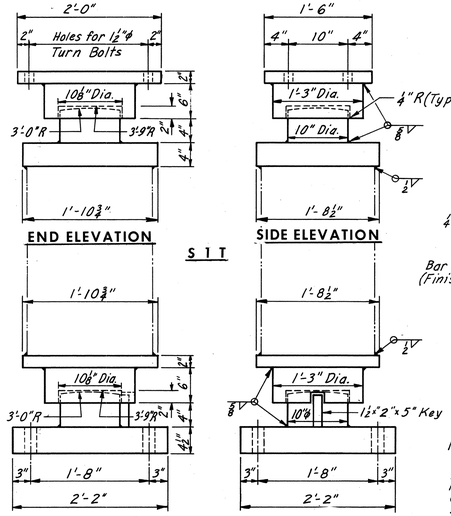
	BY	DATE				
MADE	KCT YCP	12-7-68	2	As Built	TEM	6-77
CHECKED	KCT	6-25-69	1	Shoes SF4 & R3A & Table of Elev rev.	J.B.P.	2-7-75
IN CHARGE			NO.	REVISION	BY	DATE

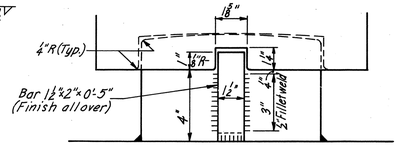
ELEVATION TABLE

*STATION	ELEV. D	ELEV. E	ELEV. F	ELEV. G
17+92.49				87.01
+90.00				86.93
+80.90		87.13		
+80.00	87.21	87.11	85.77	86.62
+78.40	87.17			
+70.00	86.94	86.83	85.42	86.31
+60.00	86.66	86.55	85.06	85.99
+50.00	86.39	86.26	84.69	85.66
+46.21	86.27	86.15	84.55	85.53
+40.00	86.10	85.98	84.33	85.33
+30.00	85.82	85.69	83.97	85.00
+20.00	85.55	85.41	83.61	84.68
+10.00	85.27	85.13	83.26	84.36
+05.12				84.20
+04.91		84.98		
+04.88	85.12			
17+00.00	84.99	84.84	82.90	84.04
16+90.00	84.71	84.56	82.54	83.72
+80.00	84.43	84.27	82.18	83.41
+70.00	84.15	83.99	81.82	83.10
+60.00	83.88	83.71	81.46	82.79
+50.00	83.60	83.42	81.10	82.49
+40.00	83.32	83.14	80.75	82.19
+30.00	83.04	82.85	80.39	81.90
+20.00	82.76	82.57	80.03	81.61
+10.00	82.48	82.29	79.67	81.32
16+00.00	82.21	82.00	79.31	81.04
15+90.00	81.92	81.71	78.95	80.77
+80.00	81.56	81.35	78.59	80.45
+73.52	81.33			
+73.09		81.10		
15+71.95				80.19

* The stations are along ℄ Ramp N-W.

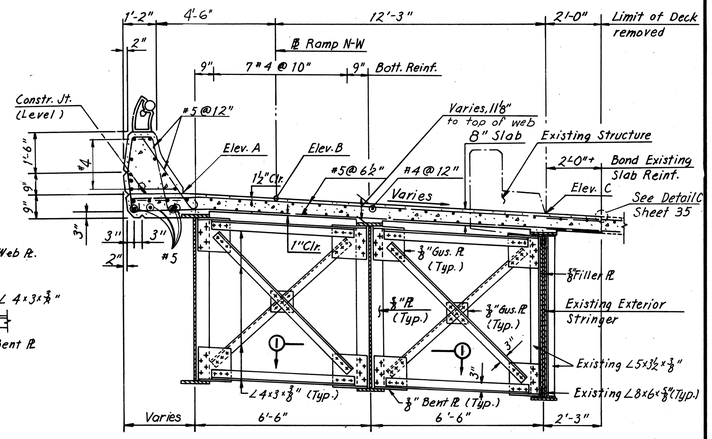
Note: For Elevations A, B, C, See Sheet 35.
For Typical parapet detail, see Sheet 29.



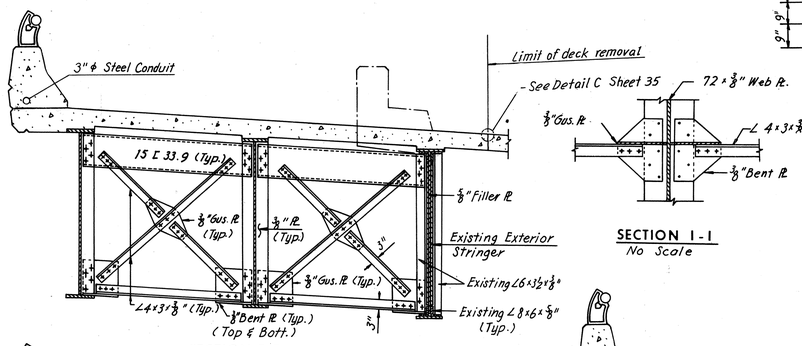


KEY DETAIL

Note:
Location of S1T and S1B shoes are at the top and bottom of steel columns supporting Floorbeam 15 and 16. They rest on Pier 10W and Pier 12W. For details of Floorbeam 15, see Bridge 64.

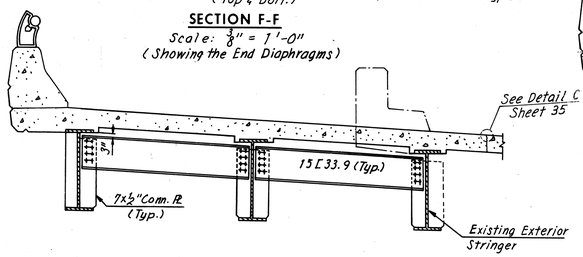


SECTION E-E
Scale: ⅜" = 1'-0"
(Showing the intermediate Diaphragms)

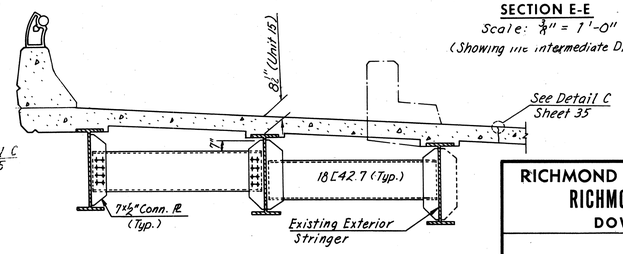


SECTION F-F
Scale: ⅜" = 1'-0"
(Showing the End Diaphragms)

SECTION 1-1
No Scale



(Showing the End Diaphragms)
SECTION H-H
Scale: ⅜" = 1'-0"



SECTION G-G
Scale: ⅜" = 1'-0"
(Showing the Intermediate Diaphragms)

Note:
For locations of Section E-E, F-F, G-G, and H-H see Sheet 35.

AS BUILT

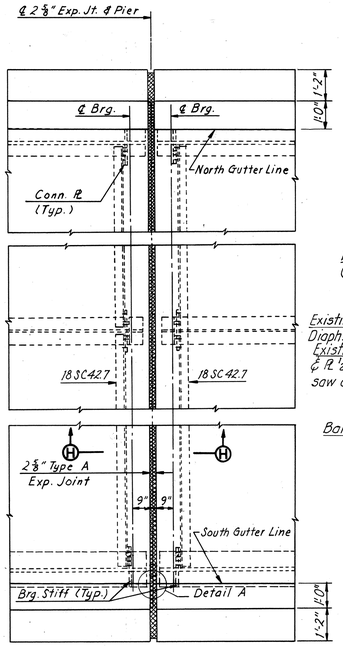
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
SHOE DETAILS AND DECK ELEVATIONS

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

SCALE: As Shown
CONTRACT NO.: 10
SHEET NO. 47 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	220	265

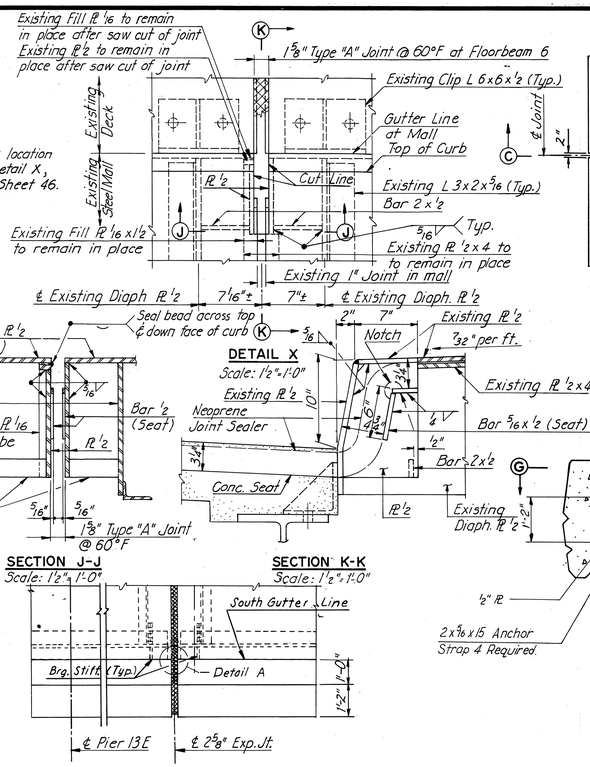


PLAN — JOINT AT PIERS 1 THRU 8

Scale: ⅜" = 1'-0"

SECTION H-H

Scale: ½" = 1'-0"



SECTION J-J

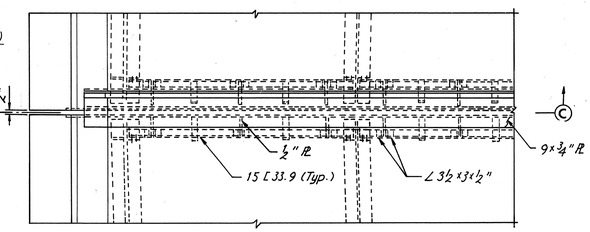
Scale: 1½" = 1'-0"

PLAN — JOINT AT PIER 13 E

Scale: ⅜" = 1'-0"

SECTION K-K

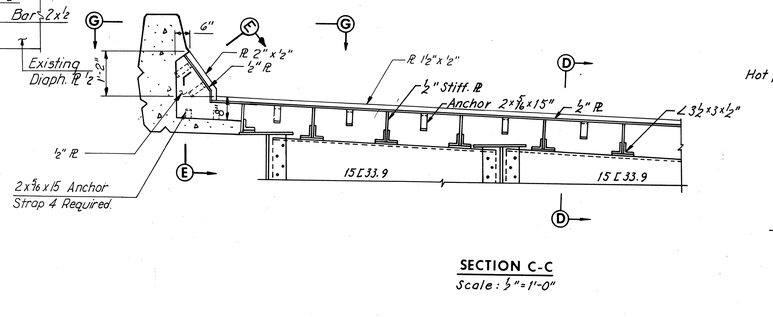
Scale: 1½" = 1'-0"



PLAN — JOINT AT PIERS 13W AND 14

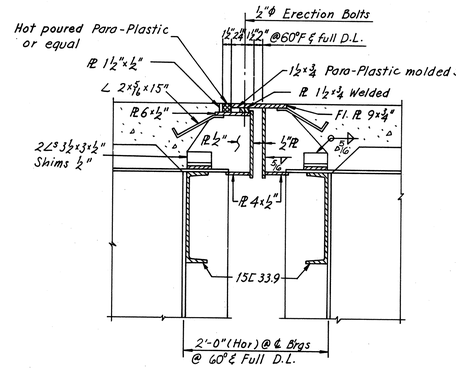
Scale: ½" = 1'-0"

(Pier 13 W Shown, Pier 14 Similar)



SECTION C-C

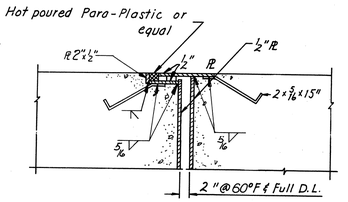
Scale: ½" = 1'-0"



SECTION D-D

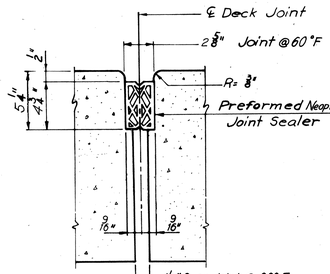
Scale: 1" = 1'-0"

(Pier 13 W shown, Pier 14 similar)



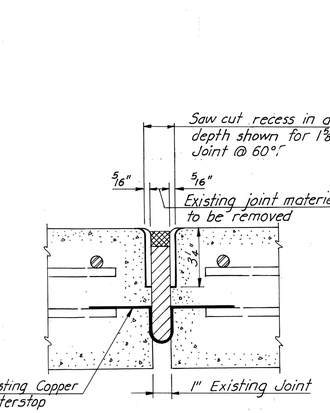
SECTION E-E

Scale: 1" = 1'-0"



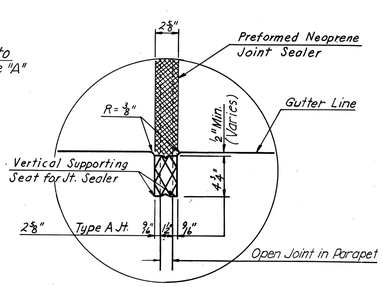
2⅝" TYPE "A" JOINT

No Scale



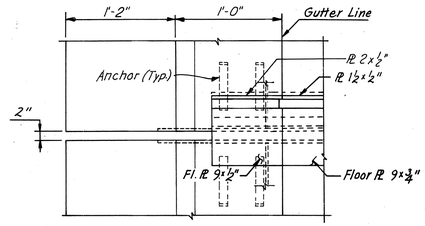
TYPICAL SECTION THRU EXISTING DECK JOINT AT FLOORBEAM 6

Scale: 3" = 1'-0"



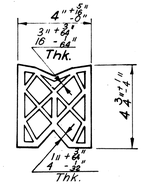
DETAIL A

No Scale



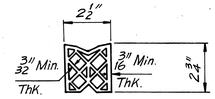
VIEW G-G

No Scale



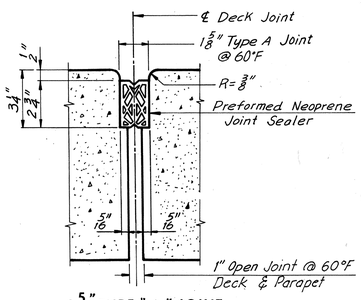
PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT

No Scale



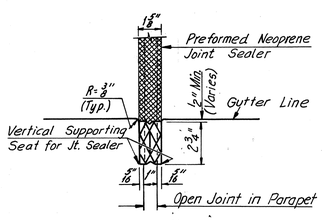
PREFORMED NEOPRENE JOINT SEALER

No Scale



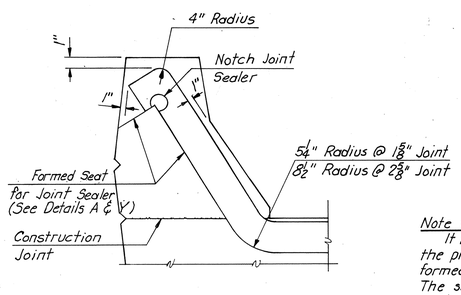
1⅝" TYPE "A" JOINT

Scale: 3" = 1'-0"



DETAIL Y

No Scale



TREATMENT OF TYPE "A" JOINT AT CURB

No Scale

Note for Type "A" Joints:

It is absolutely essential that the opening for the preformed Neoprene joint sealers be accurately formed and constructed to smooth, straight lines. The size of opening shall be adjusted to allow for anticipated dead load rotation of the ends of the slab and for the temperature at the time of construction.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	Y.C.P	3-25-69	3	As Built	TEM	6-77
CHECKED	G.S.H.	7-10-69	2	Joint Det. for exist. Joint & Mall added	J.B.P.	2-25-75
IN CHARGE			1	1⅝" Type "A" Joint details added	J.B.P.	2-7-75

RICHMOND METROPOLITAN AUTHORITY

RICHMOND EXPRESSWAY SYSTEM

DOWNTOWN EXPRESSWAY

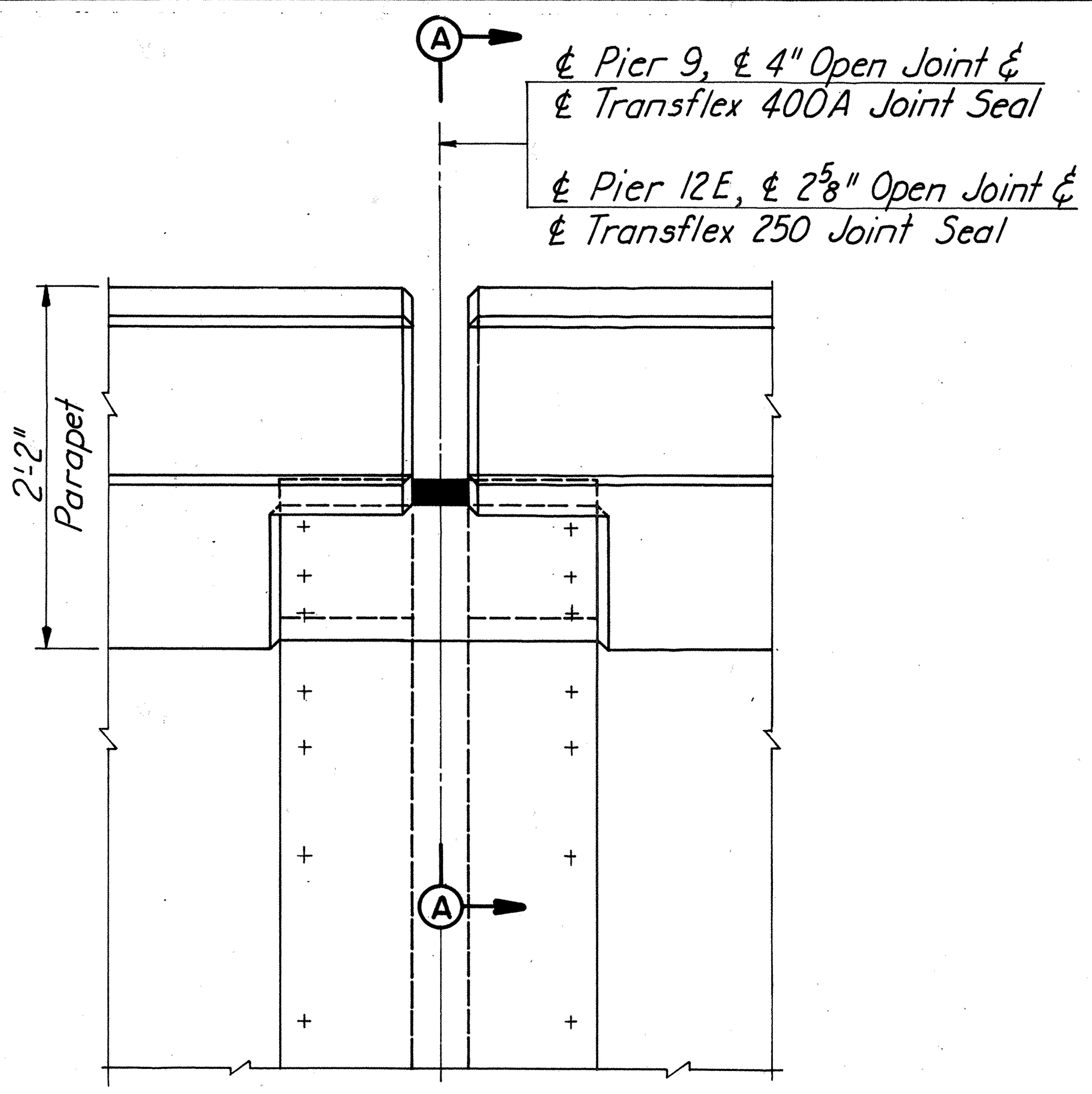
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

JOINT DETAILS

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

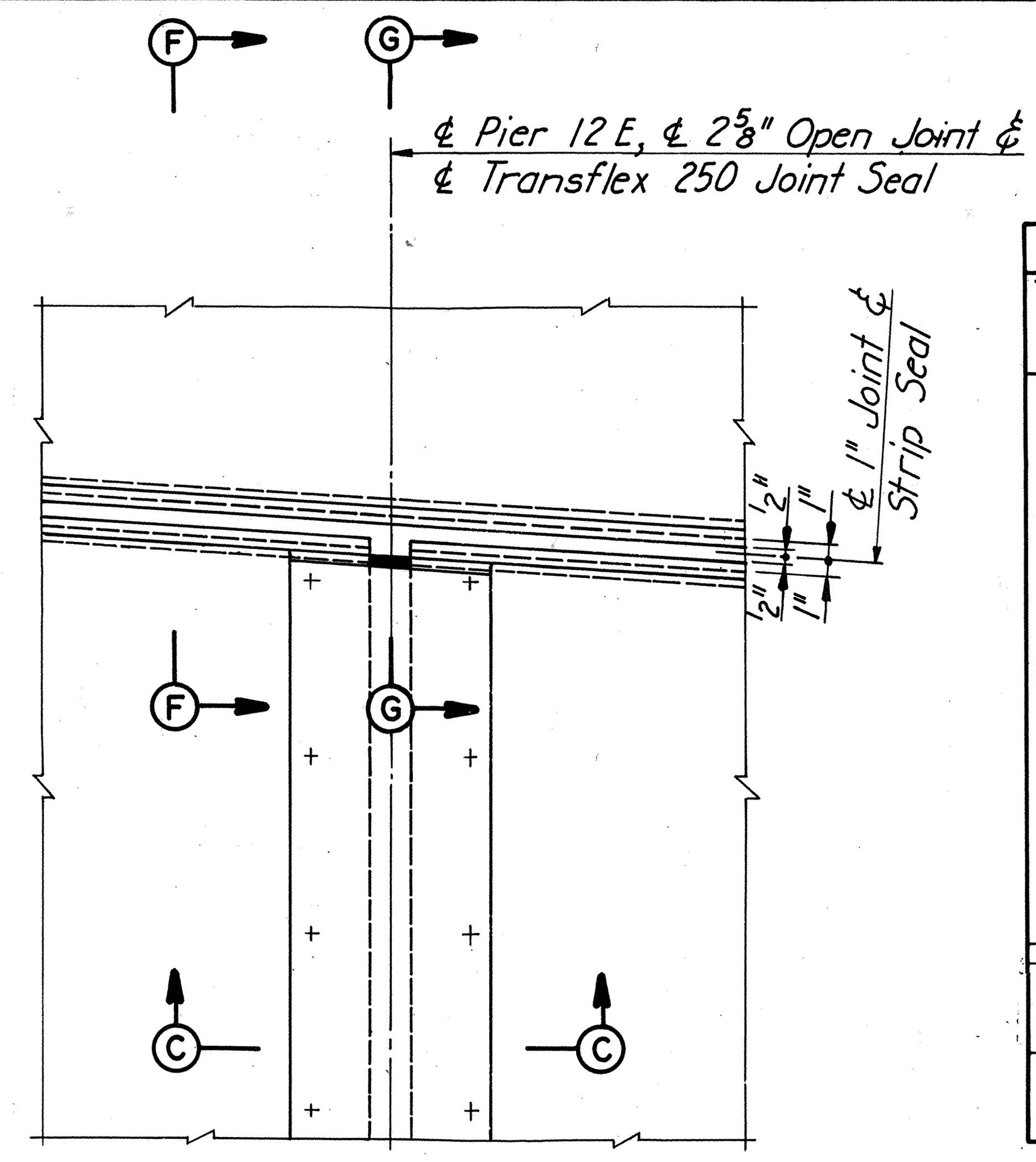
SCALE: As Noted
CONTRACT NO.: 10
SHEET NO 48 OF 54

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	221	265



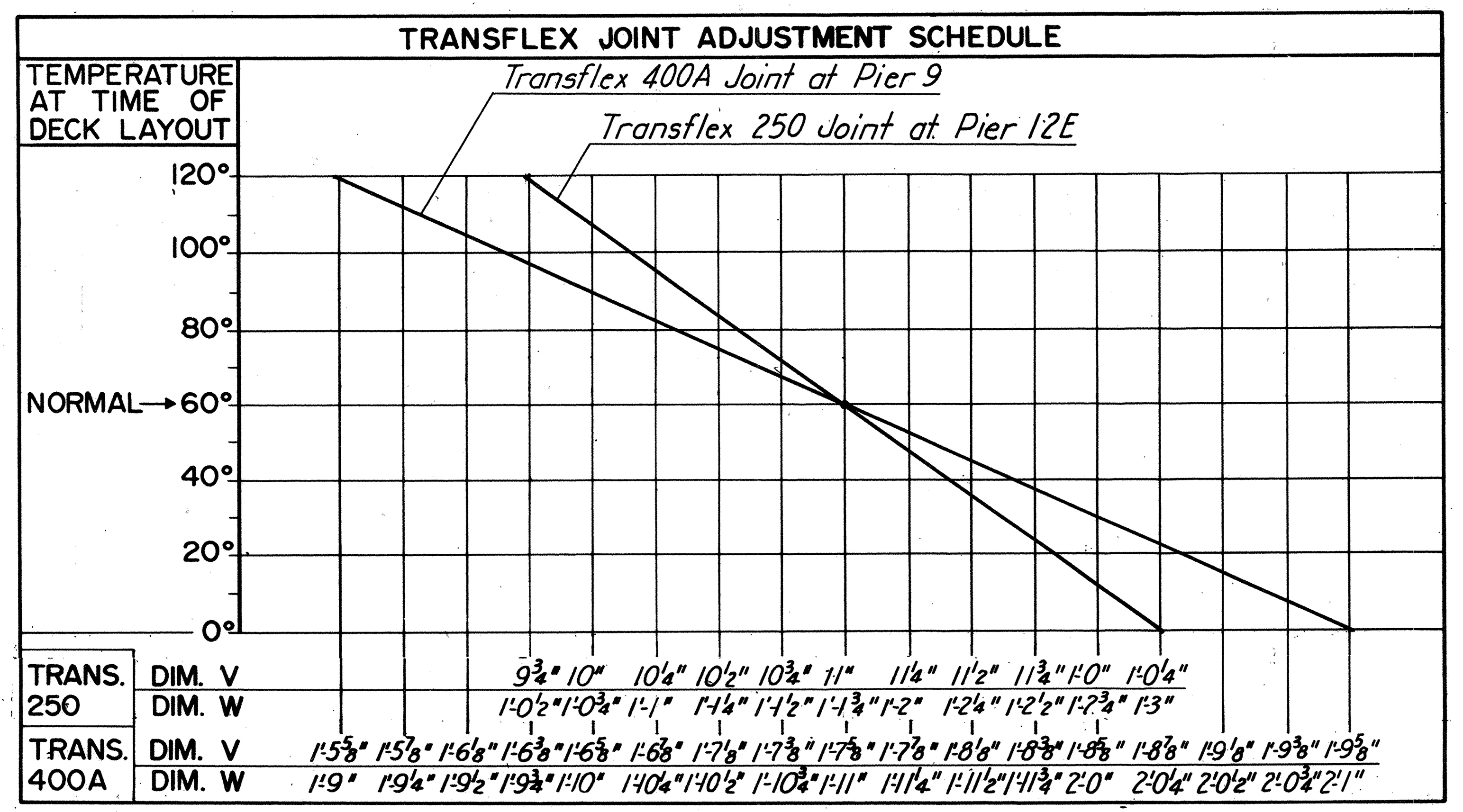
PARTIAL PLAN OF JOINTS AT PIERS 9 & 12E

Scale: 1"=1'-0"



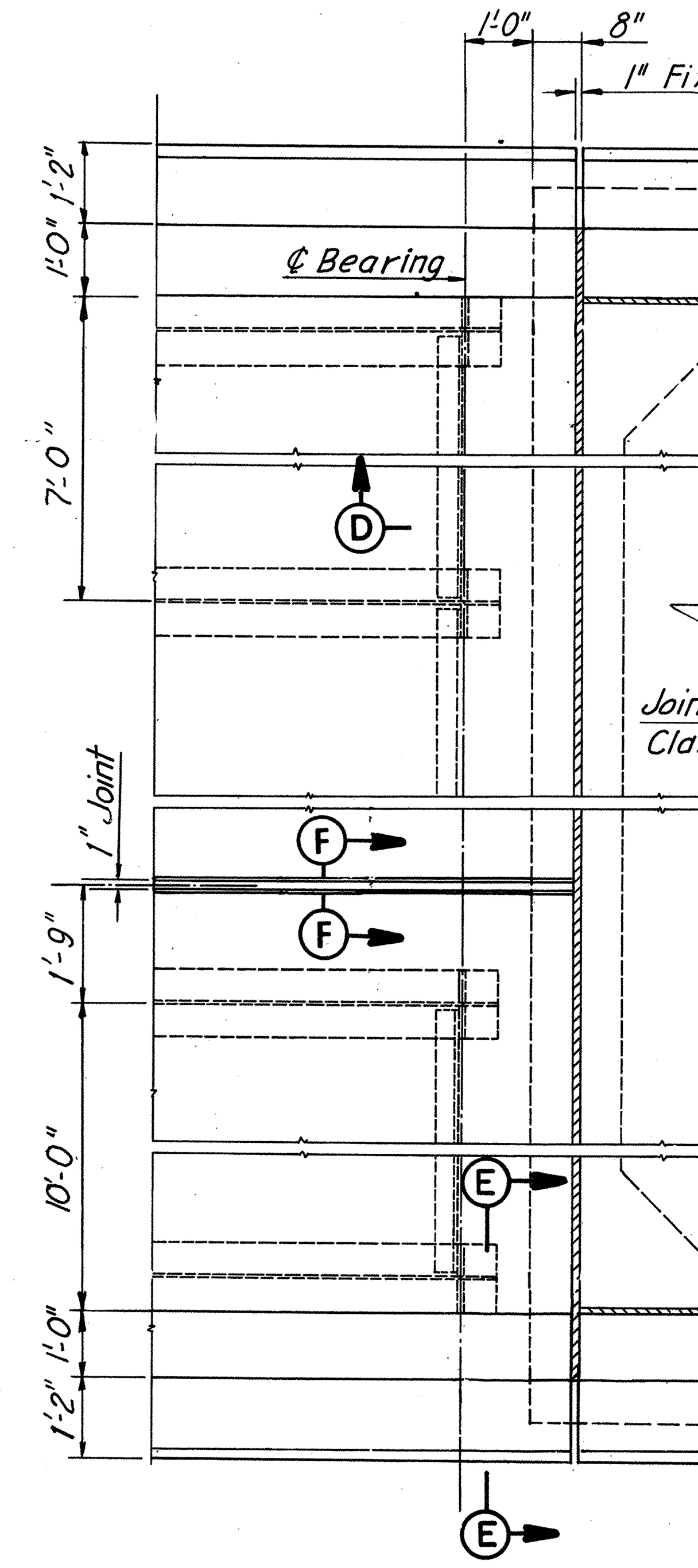
PARTIAL PLAN OF JOINT AT PIER 12E

Scale: 1"=1'-0"



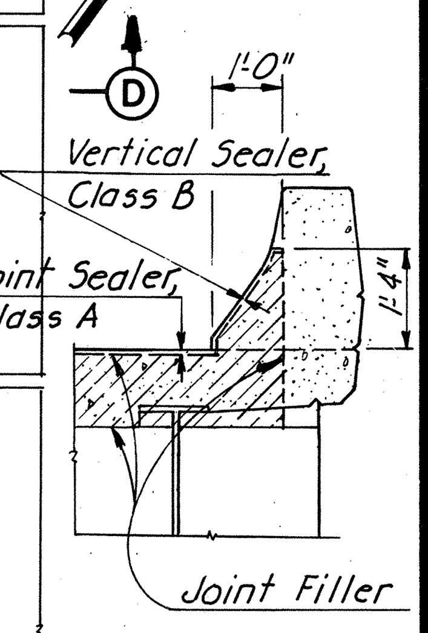
NOTES FOR FILLED JOINTS:

Joints shall be free of cracked and spalled areas and their faces shall be free of all foreign matter, curing compound, oils, greases and dirt. All faces must be sandblasted or brushed with a mechanical rotary wire brush. Just prior to sealing, the joint shall be blown out with oil-free and water-free compressed air.



PLAN JOINT AT NORTH ABUTMENT

Scale: ⅜"=1'-0"



SECTION E-E

Scale: ⅜"=1'-0"

Note:
For Section F-F
See Detail B

NOTES FOR WABO-MAURER JOINTS:

Do not use steel extrusions as screed support.

Steel extrusion shall conform to ASTM A36.

Structural steel shall conform to ASTM A588.

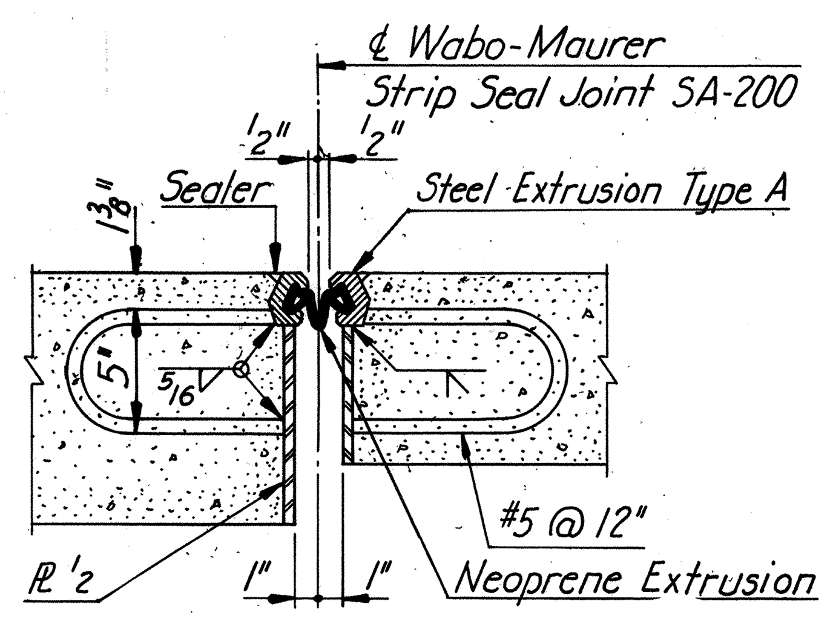
Steel assembly shall be shop welded to convenient lengths and butt welded in the field to desired length. Joint shall conform to grade of deck slab.

Steel assembly shall be sandblasted in the shop prior to painting.

Steel assembly shall receive one shop coat of epoxy zinc paint.

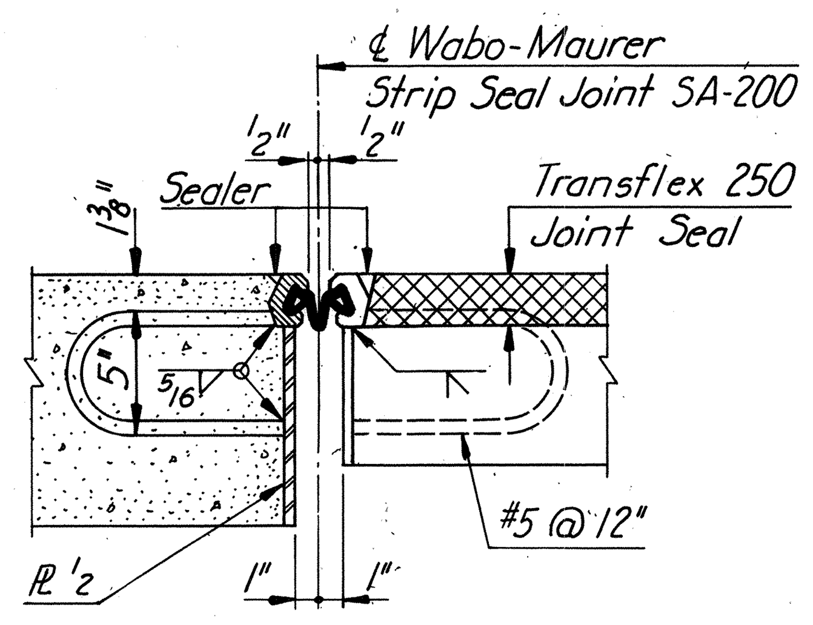
Neoprene extrusion shall be roughened with a wire brush before bonding to steel extrusion with Bon Lastic Adhesive. Groove in steel extrusion to be blown out with oil-free and water-free compressed air prior to installation of Neoprene extrusion.

The Wabo-Maurer joint assembly shall be installed in accordance with manufacturer's recommended construction methods.



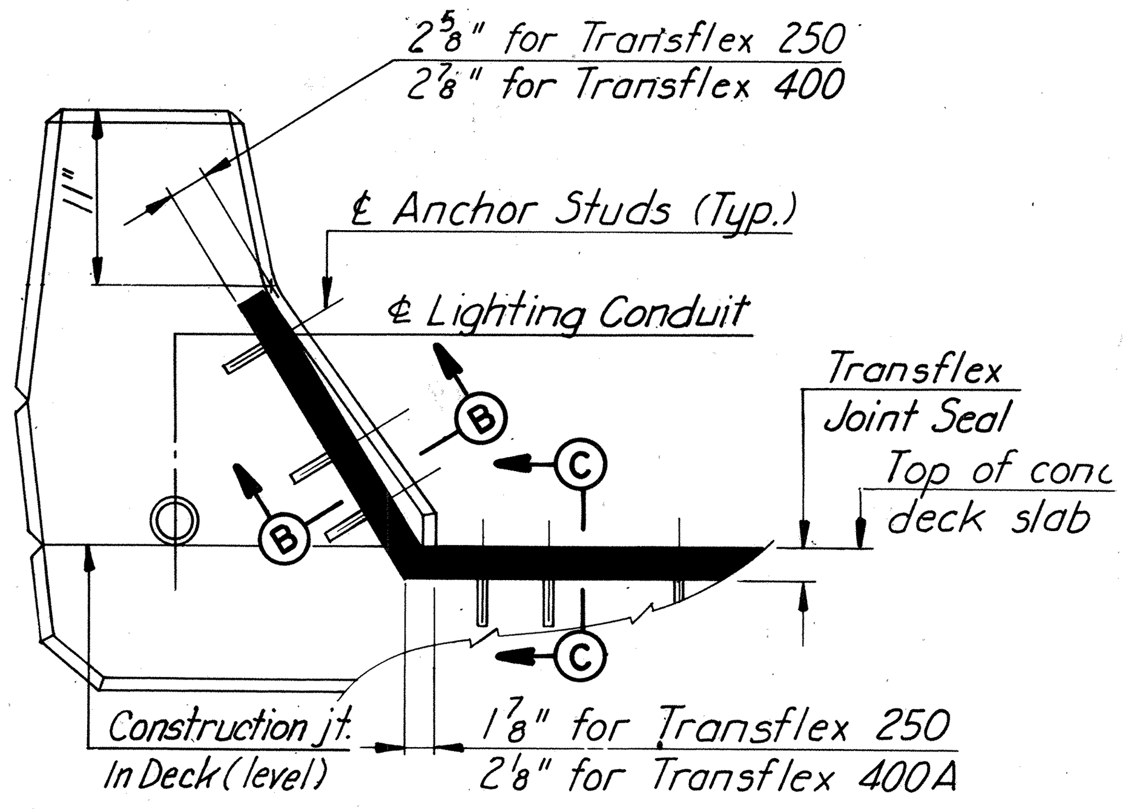
SECTION F-F

Scale: 1½"=1'-0"



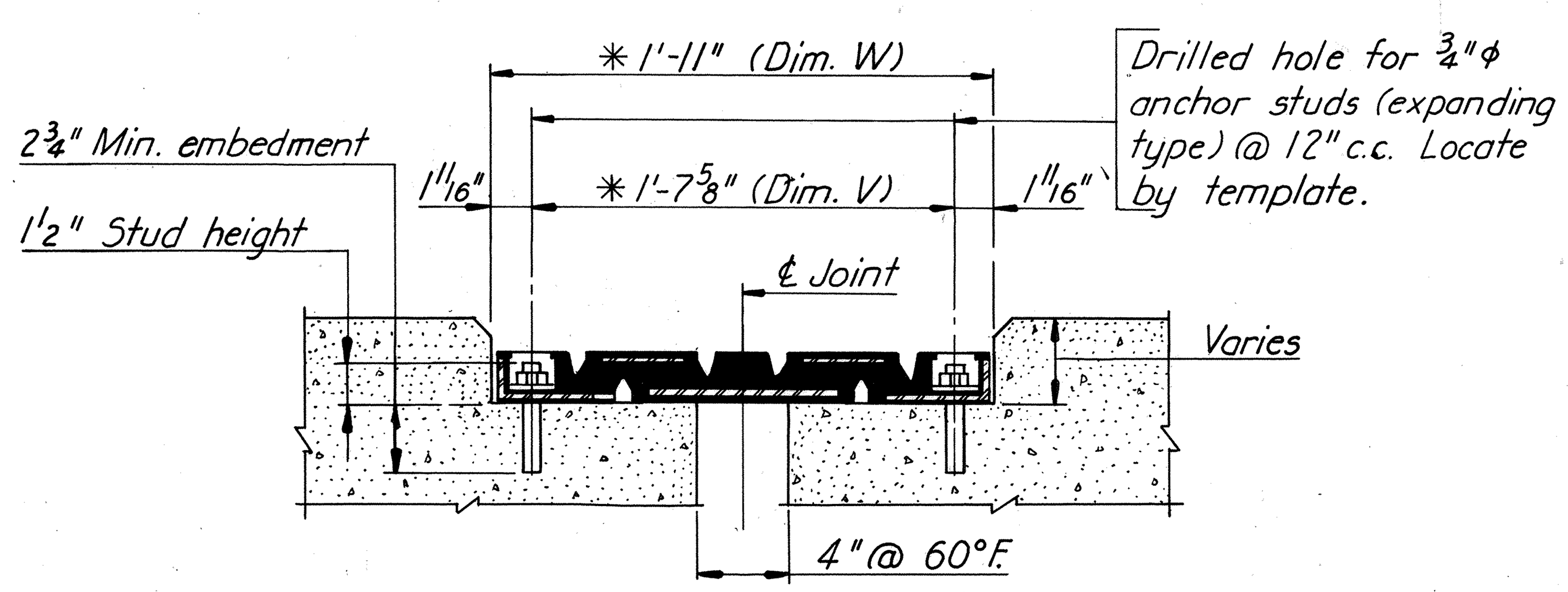
SECTION G-G

Scale: 1½"=1'-0"



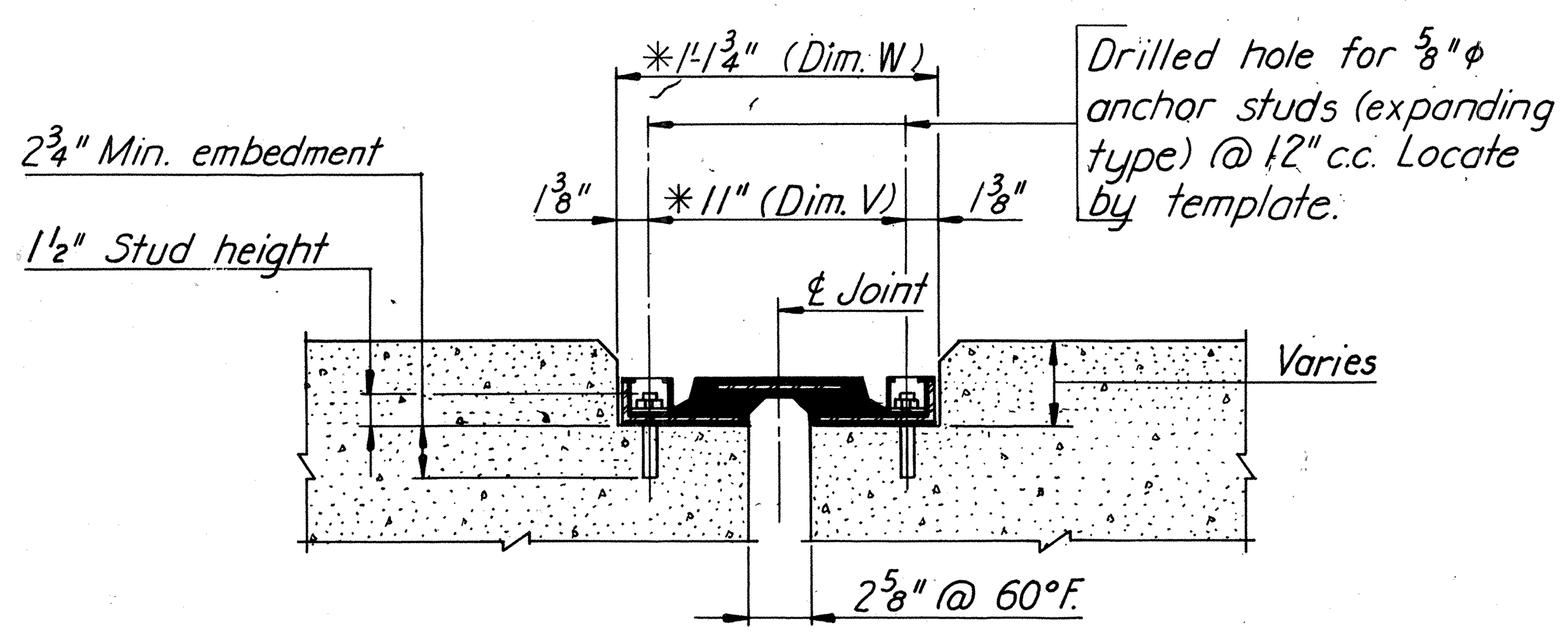
SECTION A-A

Scale: 1"=1'-0"



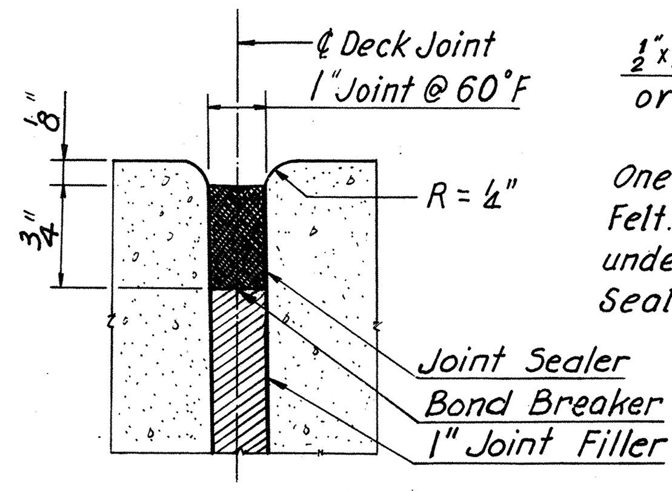
SECTION B-B
TRANSFLEX 400A JOINT

Scale: 1½"=1'-0"



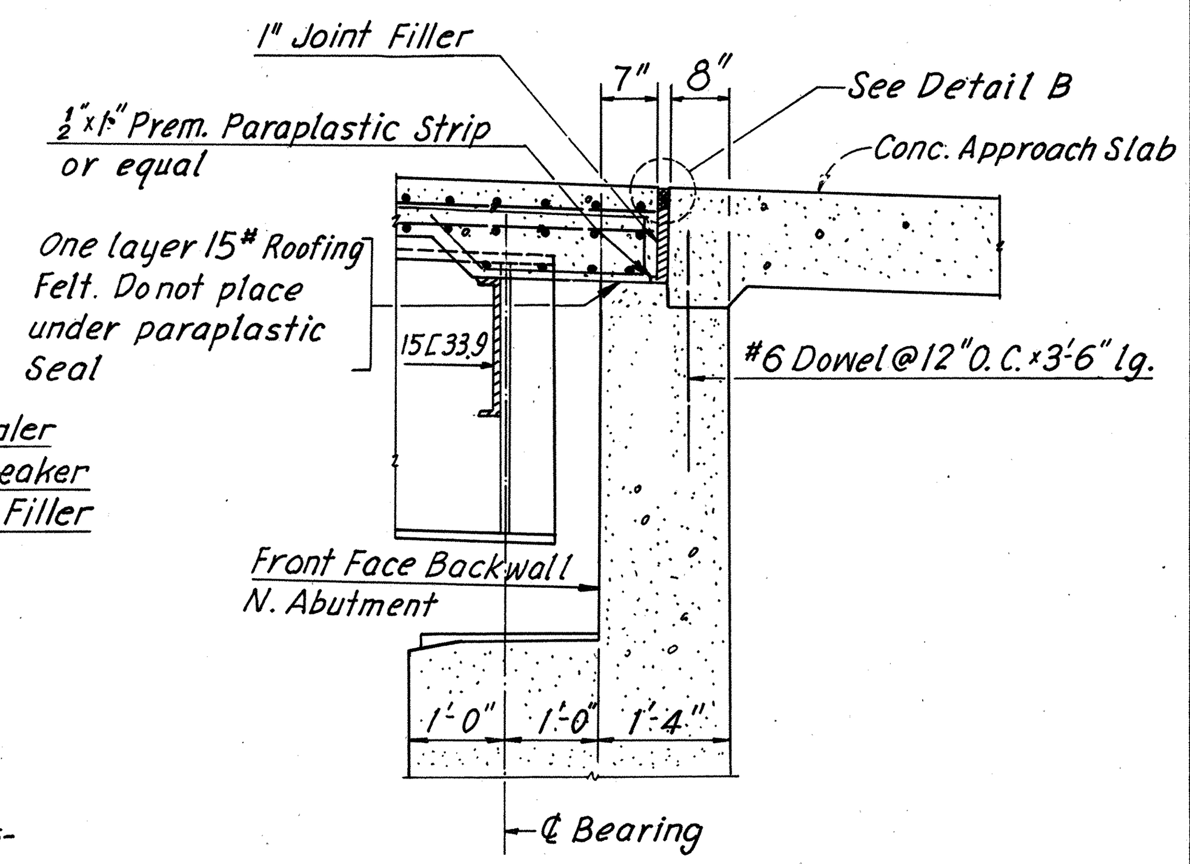
SECTION B-B
TRANSFLEX 250 JOINT

Scale: 1½"=1'-0"



DETAIL B

No Scale



SECTION D-D

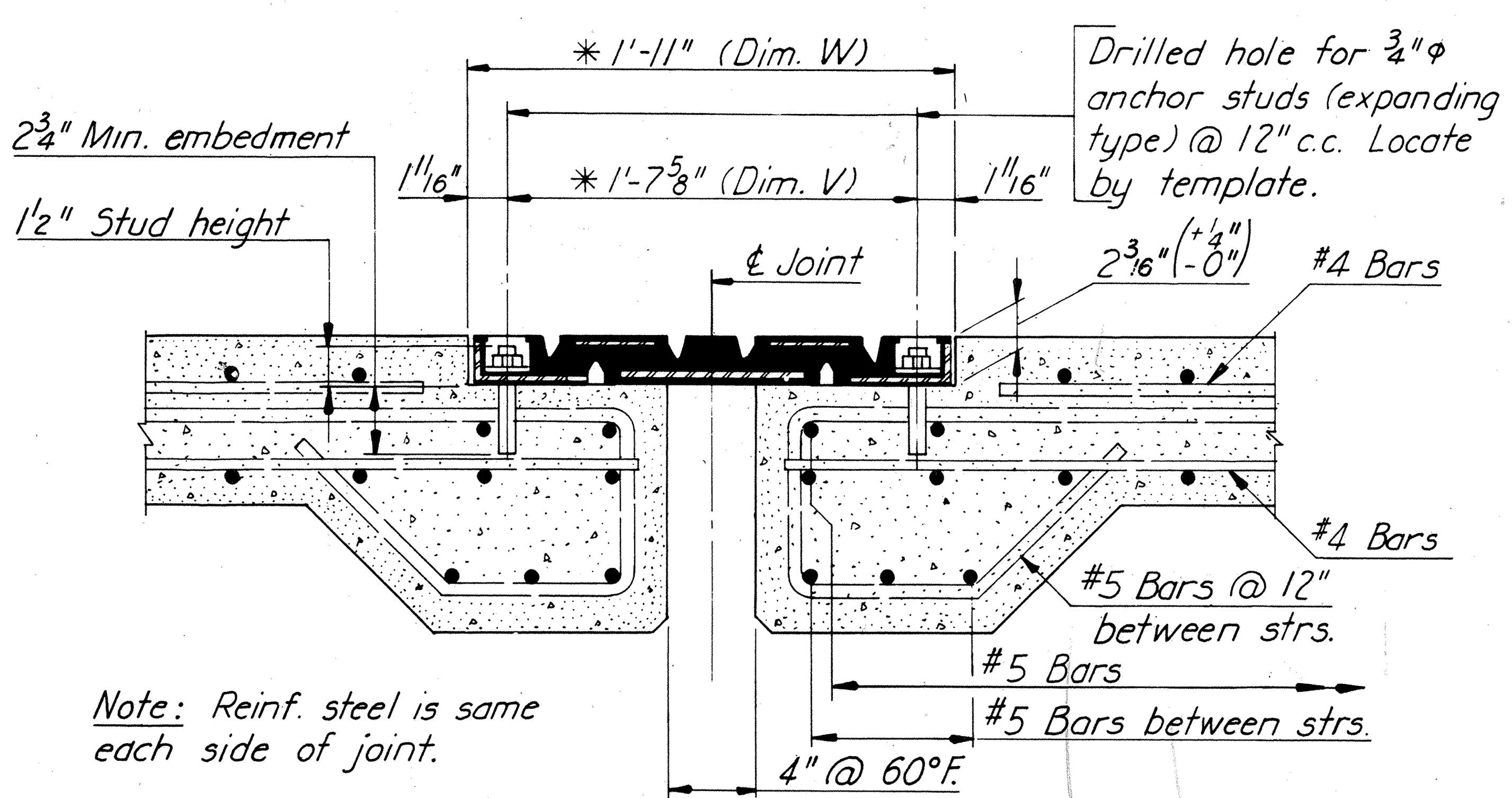
Scale: ½"=1'-0"

NOTES FOR TRANSFLEX JOINTS:

* Dimension shown is at 60°F. For Dim. V and W adjustment due to temperature change, see Joint Adjustment Schedule.

Anchors may be drilled in as shown, or cast-in-place Swedge bolts, 6" long. If they are drilled in, care shall be exercised in placing the deck reinf. steel so that the bars will not interfere with the drilling.

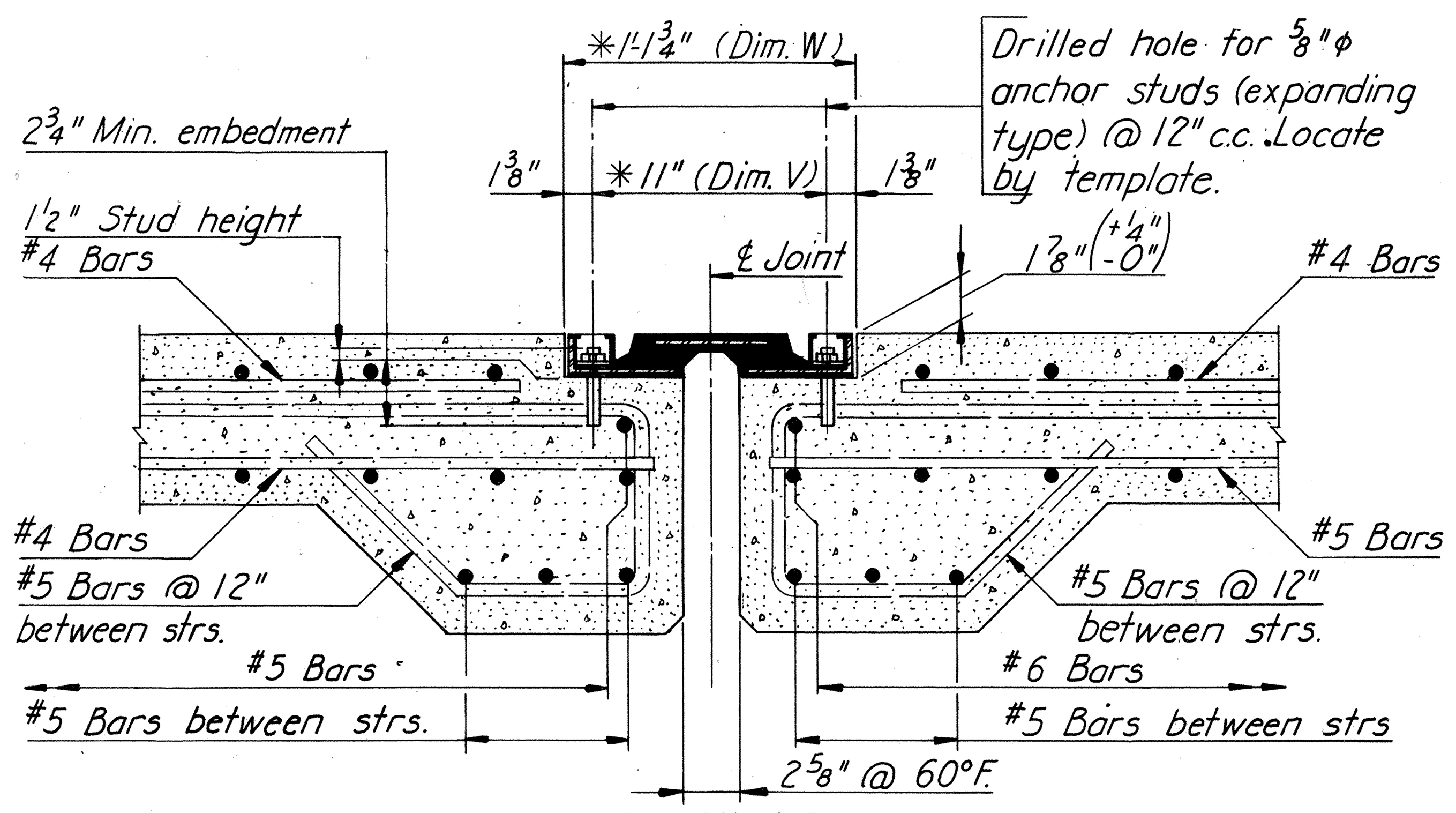
Transflex Seals shall be installed in accordance with manufacturer's recommendations.



Note: Reinf. steel is same each side of joint.

SECTION C-C
TRANSFLEX 400A JOINT

Scale: 1½"=1'-0"



SECTION C-C
TRANSFLEX 250 JOINT

Scale: 1½"=1'-0"

Note:
Transflex 250 Joints and Transflex 400A Joints shall be paid for as Elastomeric Expansion Dams, Type 250 and Elastomeric Expansion Dams, Type 400A respectively.
The neoprene and the steel be considered a incidental pay item to the bridge structural steel

AS BUILT

	BY	DATE				
MADE	K.C.T.	4-3-69				
CHECKED	G.S.H.	7-17-69	1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

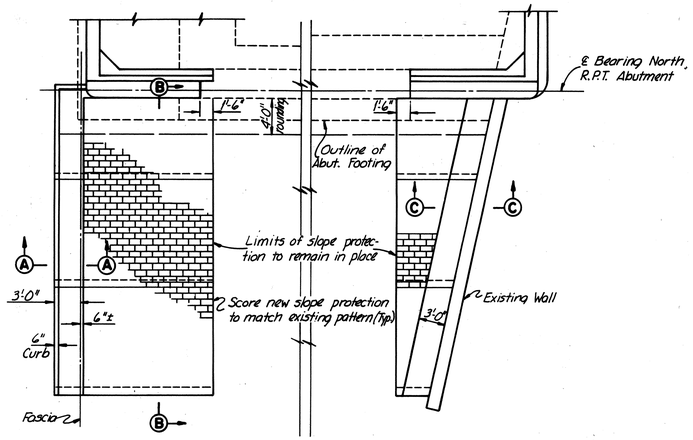
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
JOINT DETAILS

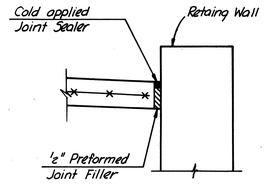
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 10
SHEET NO. 49 OF 54

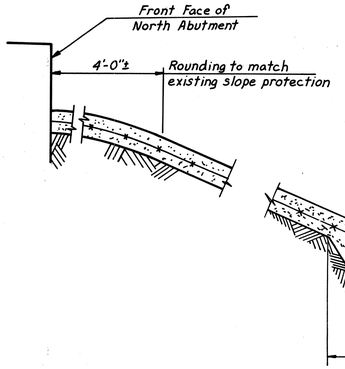
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
10	DOWNTOWN EXPRESSWAY	222	265



PLAN OF SLOPE PROTECTION
NORTH ABUTMENT
Scale: 1/8" = 1'-0"



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



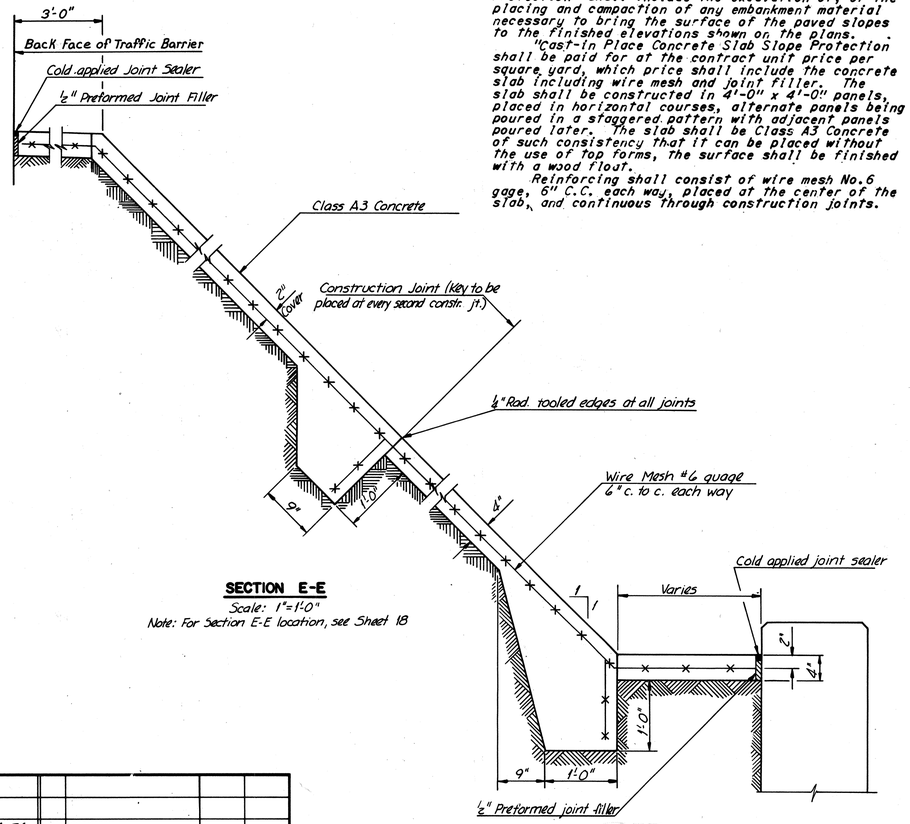
SECTION B-B
Scale: 1"=1'-0"
See Section E-E this sheet for details not shown, except place keys every third construction joint.

SLOPE PROTECTION NOTE

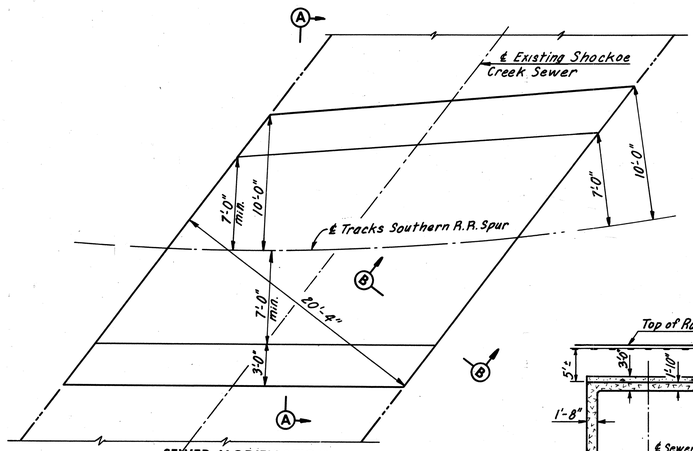
The item "Cast-in-place Concrete Slab Slope Protection" shall include the excavation of, or the placing and compaction of any embankment material necessary to bring the surface of the paved slopes to the finished elevations shown on the plans.

"Cast-in Place Concrete Slab Slope Protection shall be paid for at the contract unit price per square yard, which price shall include the concrete slab including wire mesh and joint filler. The slab shall be constructed in 4'-0" x 4'-0" panels, placed in horizontal courses, alternate panels being poured in a staggered pattern with adjacent panels poured later. The slab shall be Class A3 Concrete of such consistency that it can be placed without the use of top forms, the surface shall be finished with a wood float.

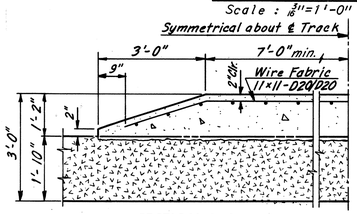
Reinforcing shall consist of wire mesh No.6 gage, 6" C.C. each way, placed at the center of the slab, and continuous through construction joints.



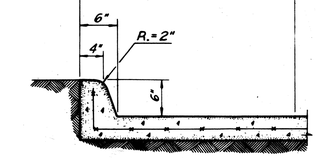
SECTION E-E
Scale: 1"=1'-0"
Note: For Section E-E location, see Sheet 18



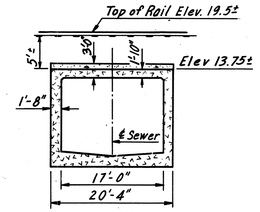
SEWER MODIFICATION
Scale : 3/16"=1'-0"



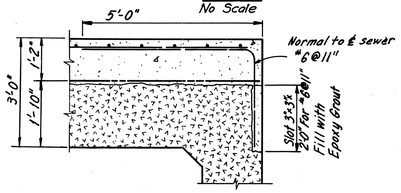
SECTION A-A
Scale: 1/2"=1'-0"



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



SKETCH
No Scale



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

DESIGNED						
DRAWN	JPE	4-74				
CHECKED			1	As Built	TEM	6-77
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY
BRIDGE NO. 67
RAMP W-N CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE
SLOPE PROTECTION DETAILS

SCALE As shown
CONTRACT 10
SHEET 50 OF 54

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND METROPOLITAN TRANSPORTATION AUTHORITY

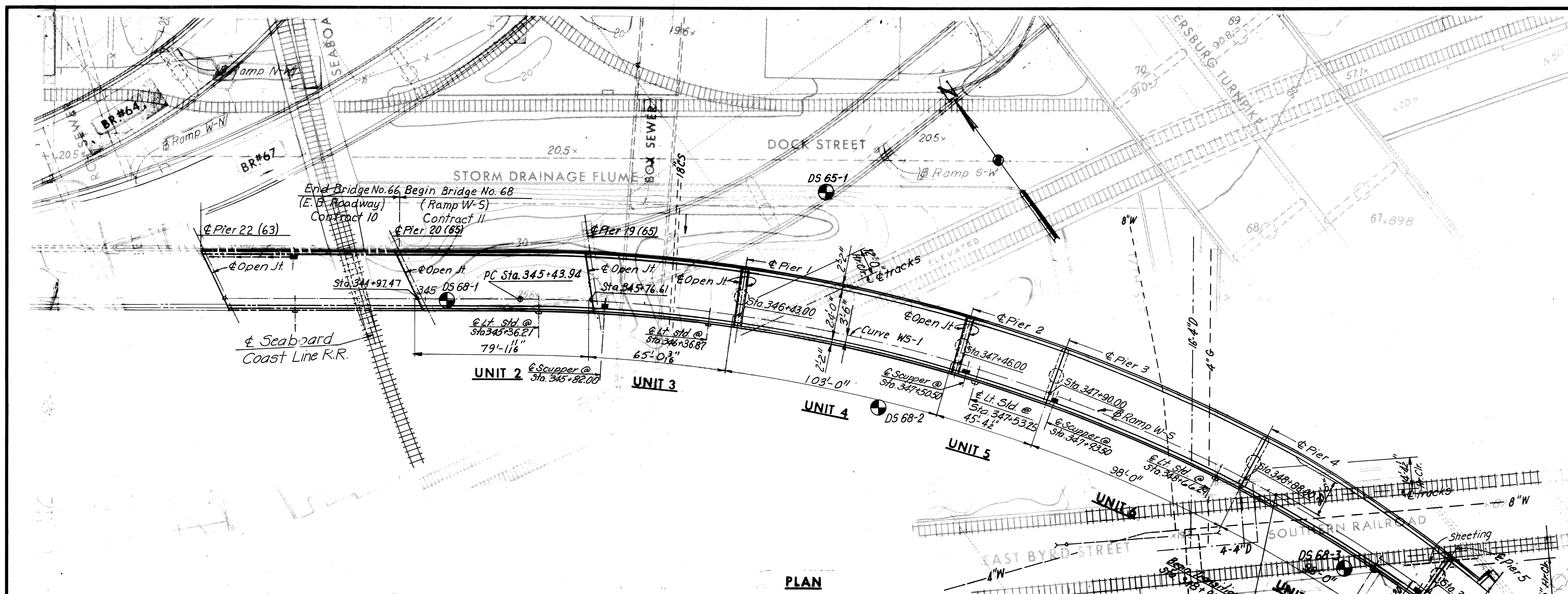
RICHMOND EXPRESSWAY SYSTEM
CONTRACT NO. PC – 2018
PROTECTIVE COATING OF STRUCTURES
****

Bridge 68

Downtown Expressway

Ramp W-S Connection to
Richmond - Petersburg Turnpike

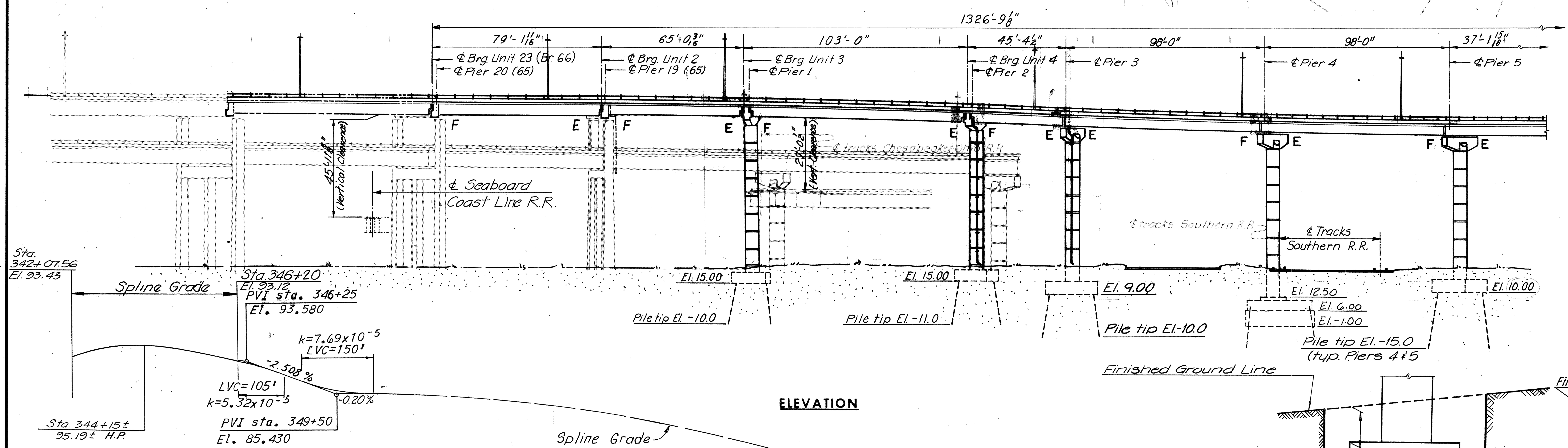
RECORD SET PLANS (Next 36)



PLAN

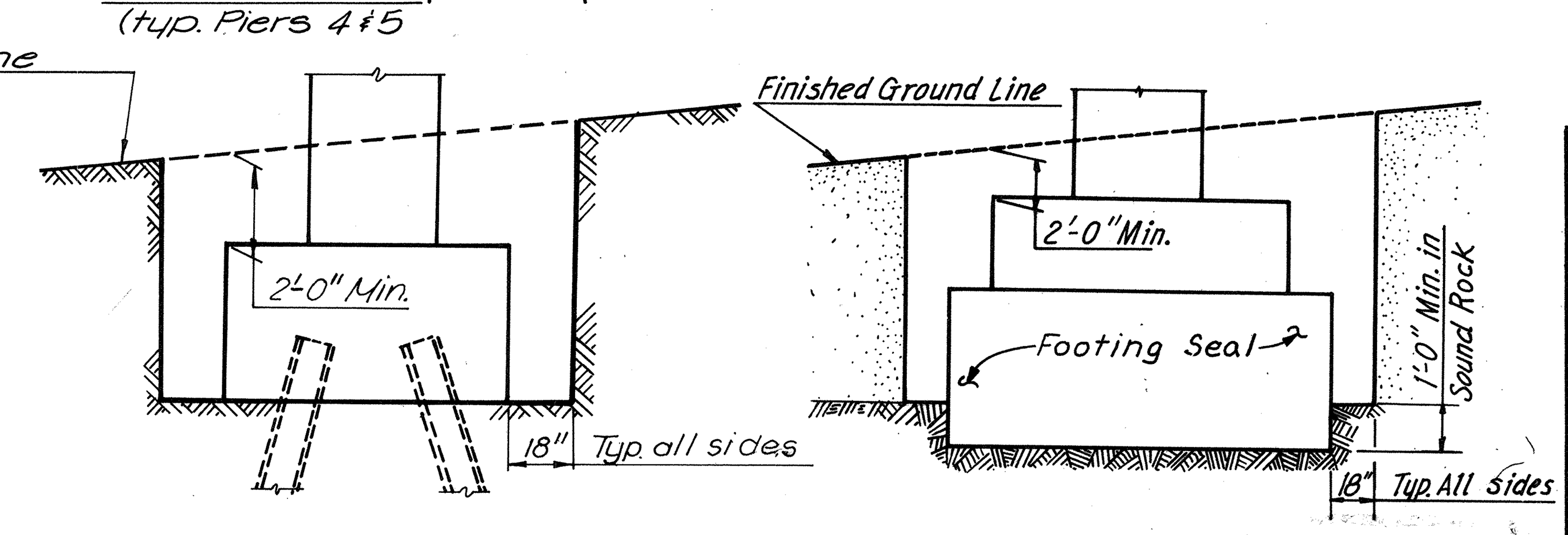
HORIZONTAL CURVE DATA

CURVE WS-1		CURVE WS-2		CURVE WS-3	
P.I.	= 348+62.09	P.I.	= 353+50.46	P.I.	= 356+91.20
Δ	= 47°54'11.6"	Δ	= 04°06'55.5"	Δ	= 02°39'48.6"
D	= 8°00'	D	= 0°59'27.6"	D	= 1°00'
T	= 318.147	T	= 207.727	T	= 133.199
L	= 598.790	L	= 415.276	L	= 266.349
R	= 716.197	R	= 5,781.578	R	= 5,729.578



ELEVATION

△2 PROFILE GRADE ℄ RAMP W-S



LIMITS OF STRUCTURE EXCAVATION

No Scale

INDEX

GENERAL NOTES

ROADWAY: One 24'-0" clear. roadway transitioning into a 13'-6" widening of existing Richmond-Petersburg Turnpike.

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

SPECIFICATIONS:

GENERAL: Virginia Department of Highway Road and Bridge Specifications 1970.

DESIGN: A.A.S.H.O. Stnadard Specifications for Highway Bridges 1973, modified by Special Design provisions.

WELDING: 1972 Structural Welding Code of the American Welding Society.

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

DATUM: City of Richmond

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

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

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

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

CONCRETE NOTES: Concrete in superstructure shall be Class A-4. All other concrete shall be Class A-3. All exposed edges and corners shall have a 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. Finishing Concrete Surfaces: See Standard Architectural Detail Sheets and the Contract Special Provisions for types and details. All reinforcing steel shall be deformed bars conforming to ASTM A615 Grade 40. All reinforcing bar dimensions on the detailed drawings are to centers of bars unless otherwise noted. Clear distance between reinforcing steel and face of concrete shall be as noted on the plans. All bar laps shall be 30 diameters of the smaller diameter bar unless otherwise noted.

STEEL NOTES: Structural steel shall conform to A.S.T.M. Designations A36, A572-Grade 50 and A588 as noted. See Special Provisions. All field connections shall be made with high strength bolts. High strength bolts shall be 7/8" diameter unless otherwise noted and shall conform to A.S.T.M. Specification A-325.

	BY	DATE	NO.	REVISION	BY	DATE
			3	Rev. Profile Grade ℄ Ramp W-S	SSS	12-75
MADE	J.V.	4-2-69	2	Profile Grade W-S, Index	TEM	8-26-75
CHECKED	G.S.H.	7-16-69	1	Seaboard Coast Line Added	TEM	6-74
IN CHARGE						

AS BUILT

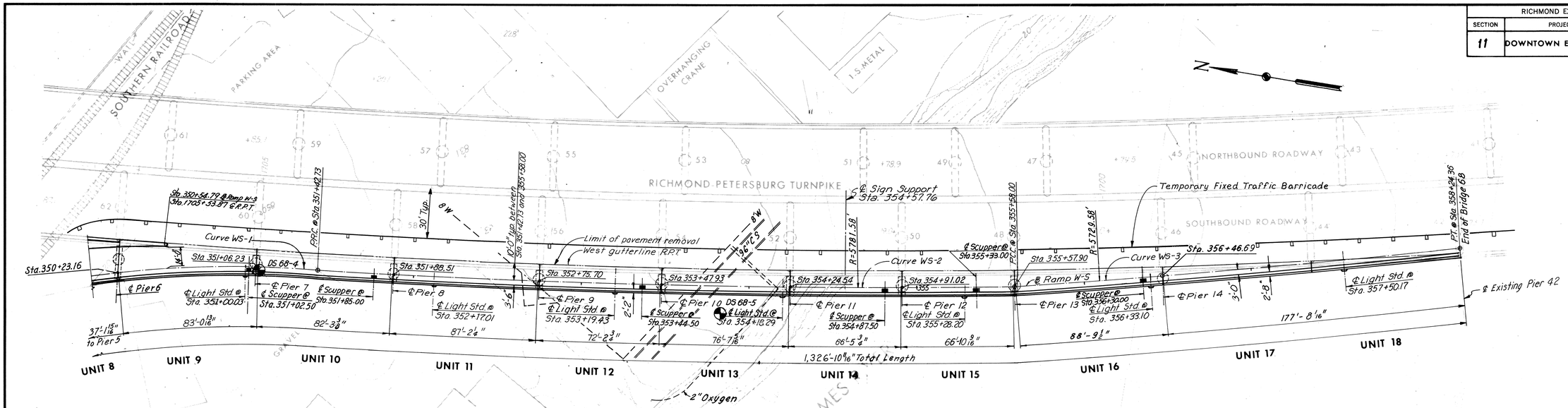
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

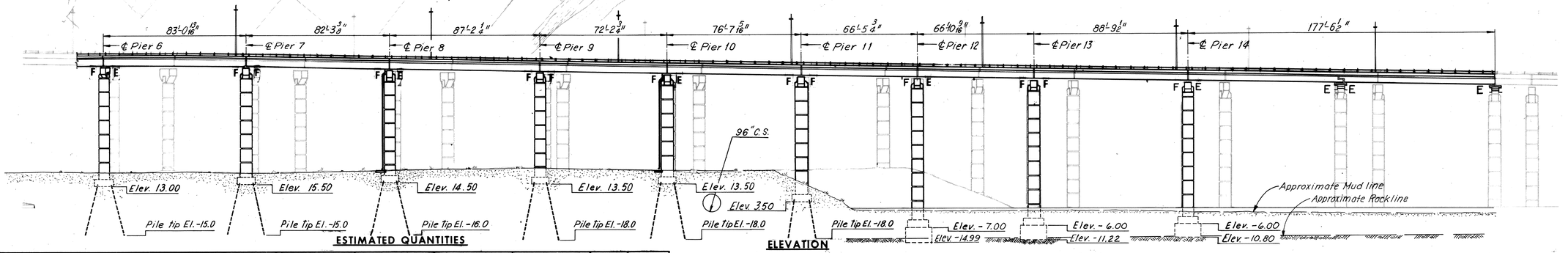
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=30'
CONTRACT NO.: 11
SHEET NO. 1 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	65	97



PLAN



ELEVATION

ESTIMATED QUANTITIES

	Structure Excavation Cu. Yds.	Concrete (†) Cu. Yds.	Reinforcing Steel Lbs.	Str. Steel Mild carbon Lbs.	Str. Steel High Strength Lbs.	Aluminum Railing (1-rail) Lin. Ft.	Steel Piles 10BP42 Lin. Ft.
Superstructure	----	888.7	215,200	600,400	255,600	1,849	-----
Substructure	1,415*	1,751.0	245,300	31,600	8,400	---	2,630
Total	1,415*	2,639.7	460,500	632,000	264,000	1,849	2,630

	Steel Piles 12BP53 Lin. Ft.	Tremie Concrete Class T3 Cu. Yds	Sheeting Pier 5 Lump Sum	Metal Conduit Lin. Ft.	Bridge Drainage Metal work Lbs.	Modifications to R.P. Turnpike Bridge Lump Sum	Modifications to Existing Retaining Wall Cu. Yds.	Temporary Barricade Lin. Ft.
Superstructure	---	---		1310	11,450	1	50	
Substructure	1,412	173.3	1	---	---	-	-	
Total	1,412	173.3	1	1,310	11,450	1	50	990

	BY	DATE
MADE	J.V.	4-3-69
CHECKED	G.S.H.	7-16-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	At Pier 44 & 42 Struc. Steel Quan.	T.E.M.	8-26-75

* Including 365 Cu. Yds. of " Underwater " Excavation for Piers 12, 13 and 14.

* All concrete for Superstructure shall be Class A4 and for Substructure Class A3. Concrete for Footing Seals shall be Tremie Concrete, Class T3 and is listed separately.

AS BUILT

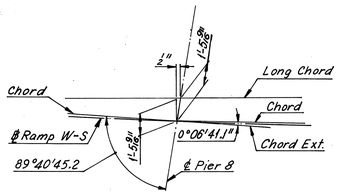
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
GENERAL PLAN AND ELEVATION

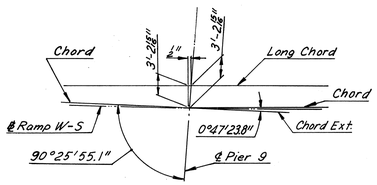
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: 1"=30'
CONTRACT NO. 11
SHEET NO. 2 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	66	97



DETAIL B
No Scale



DETAIL C
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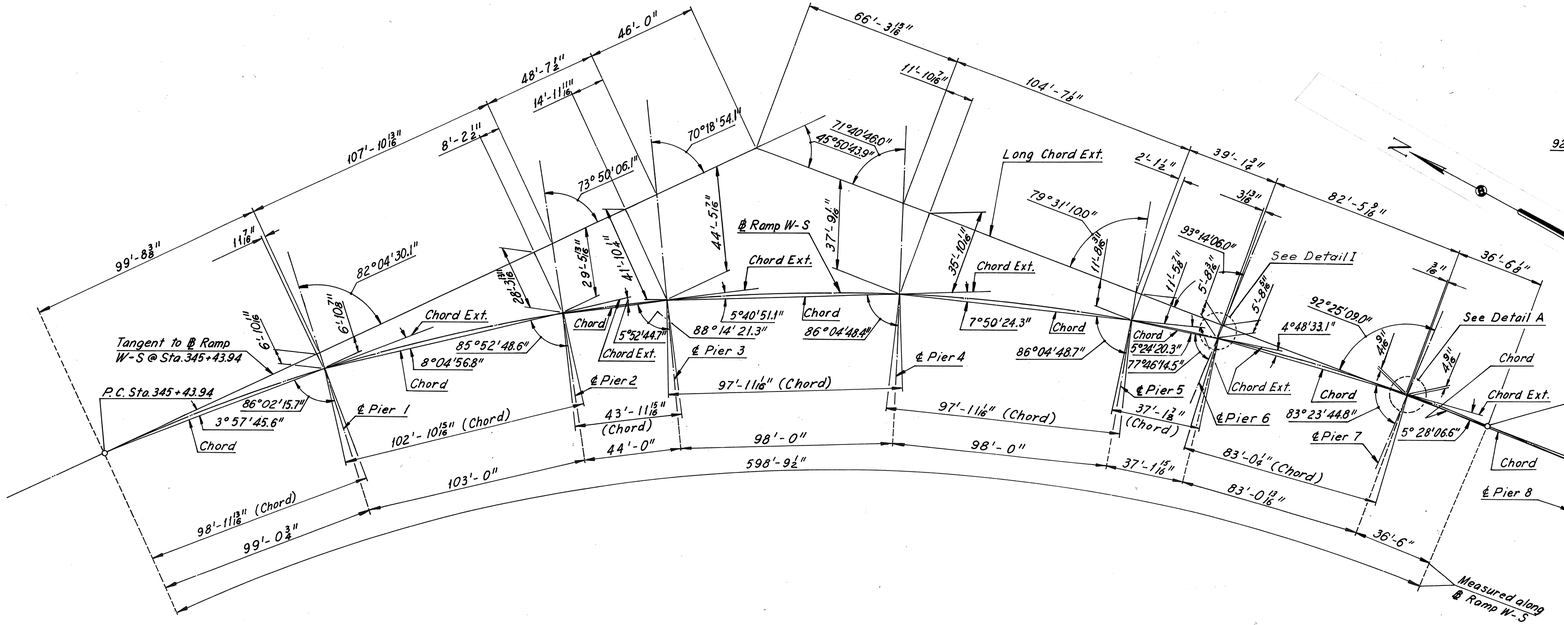

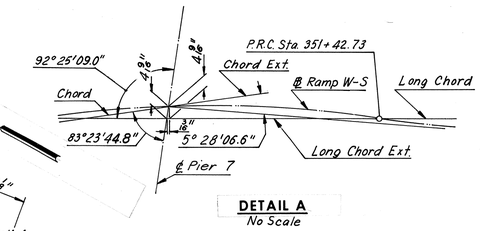

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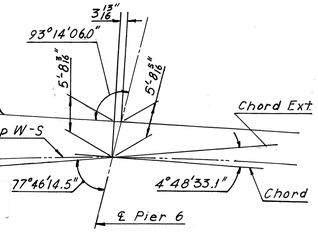

DETAIL I
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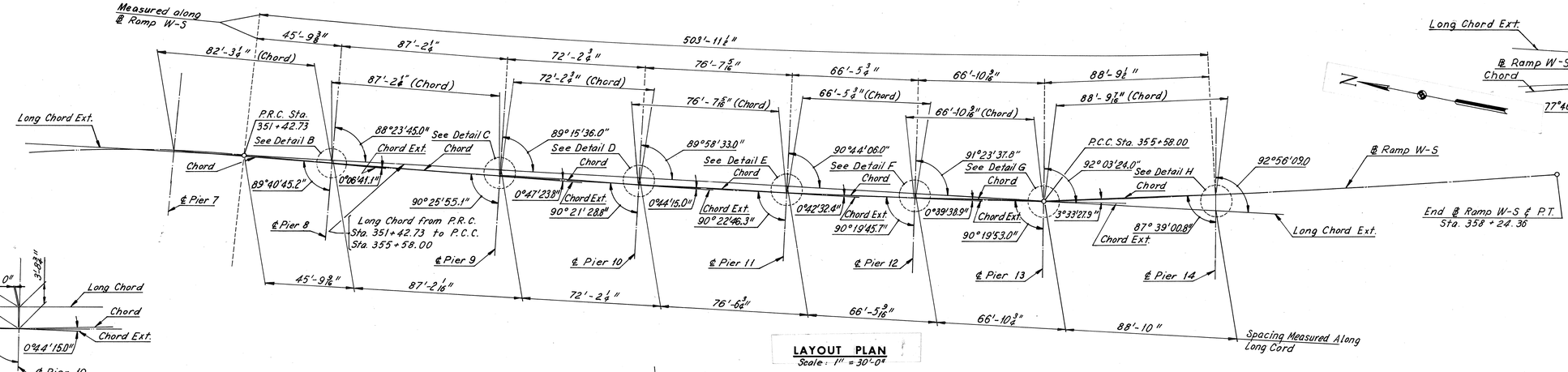
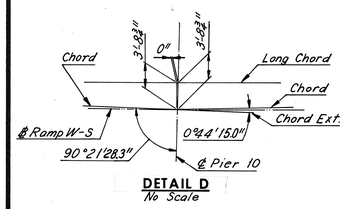
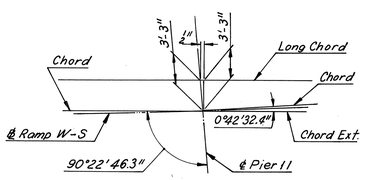


LAYOUT PLAN
Scale: 1" = 30'-0"



DETAIL D
No Scale



DETAIL E
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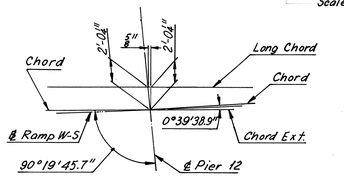

DETAIL F
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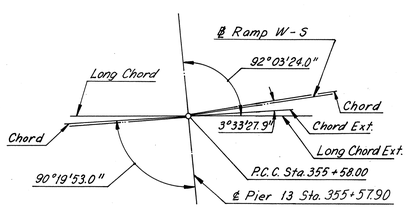

DETAIL G
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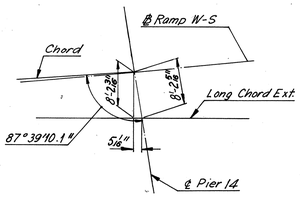


DETAIL H
No Scale

	BY	DATE	NO.	REVISION	BY	DATE
MADE	PTA	3-24-69				
CHECKED	JD	4-22-69				
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

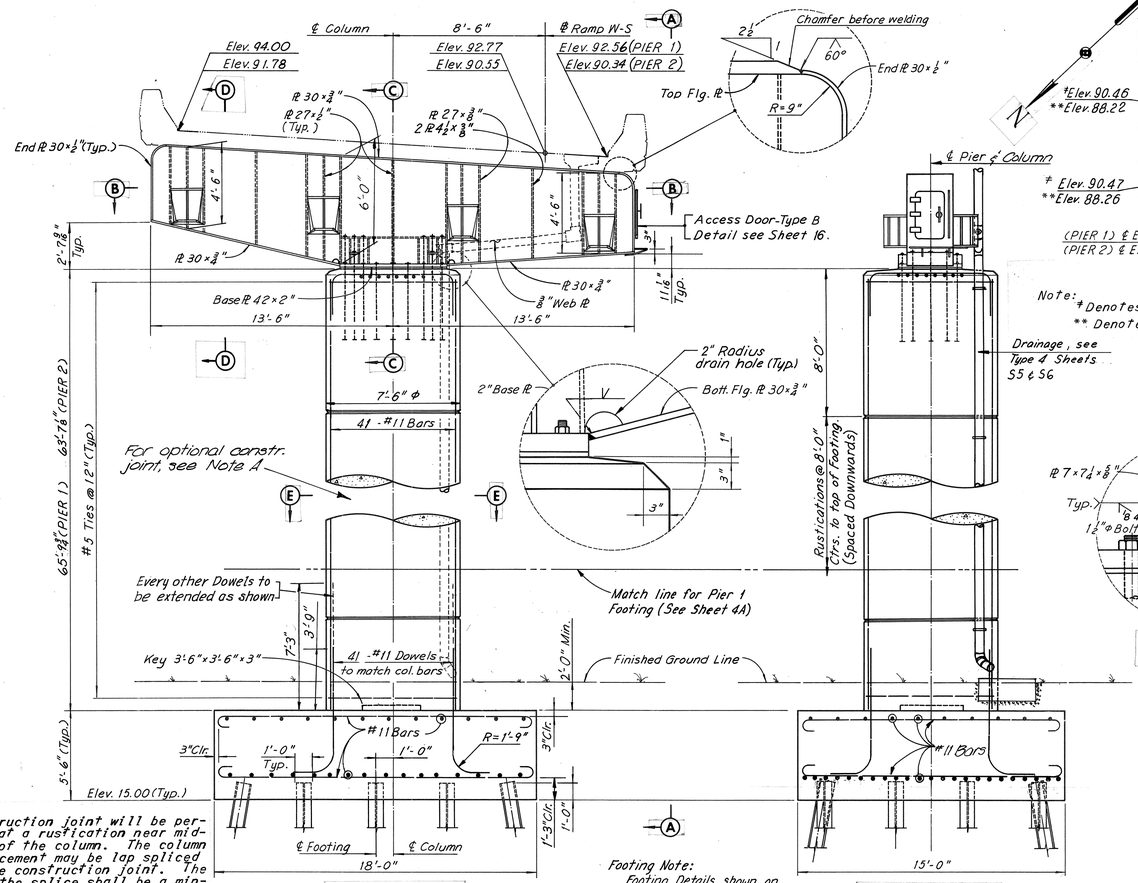
LAYOUT

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

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 3 OF 28

66

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	67	97

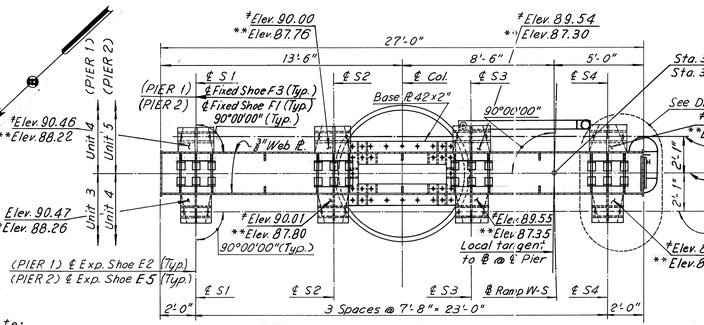


ELEVATION
Scale: ¼" = 1'-0"

VIEW A-A
Scale: ¼" = 1'-0"

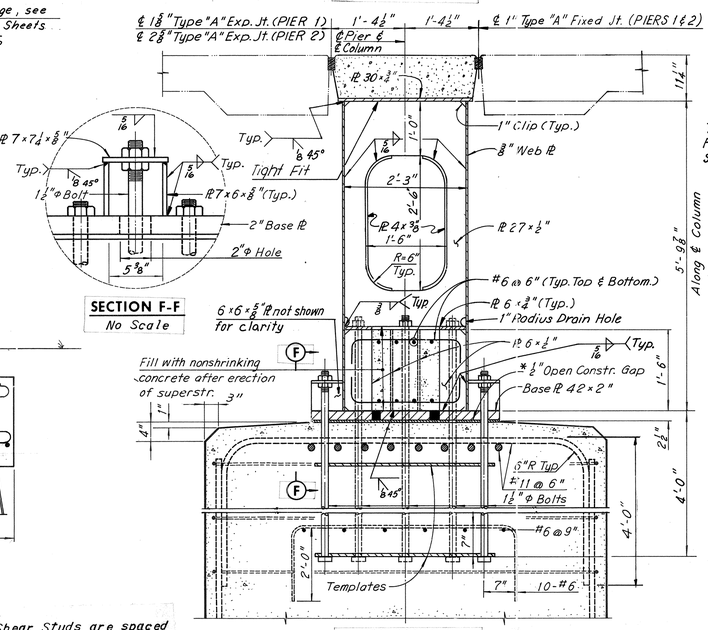
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

Footing Note:
Footing Details shown on this sheet are for Pier 2 Only. For Pier 1 see Sheet 4A.

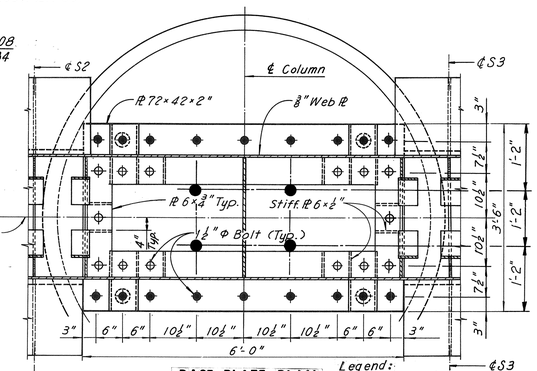


Note:
* Denotes Base PL Elevation on Pier 1.
** Denotes Base PL Elevation on Pier 2.

SECTION B-B
Scale: ¼" = 1'-0"

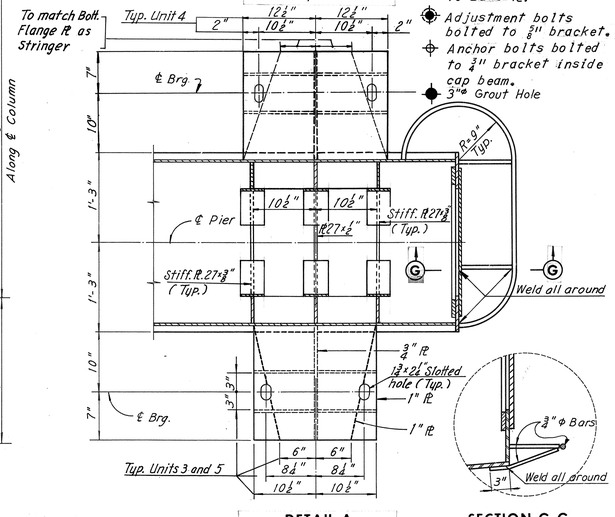


SECTION C-C
Scale: ¾" = 1'-0"



BASE PLATE PLAN
Scale: ¾" = 1'-0"

Legend:
- Anchor bolts bolted to Base PL.
- Adjustment bolts bolted to ⅜" bracket.
- Anchor bolts bolted to ¾" bracket inside cap beam.
- 3" Φ Grout Hole



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

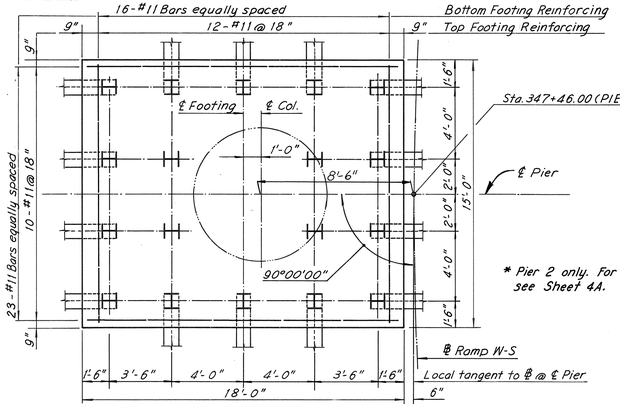
SECTION G-G

Note:
All holes in base PL and bracket PL's for 1½" dia. anchor bolts shall be 2" in dia.

Notes:
For Framing Plan, see Sheet 13.
For Joint Details, see Sheet 25.
For Shear Stud Details, see Sheet 12.
For Shoe Details, see Sheets S1 and S2.
For Bearing pile Details, see Sheet 9.
Estimated pile tip elevation -10.00 for Pier 1 and -11.00 for Pier 2.

Note:
All anchor bolts connecting cap beam to column shall be 1¼" dia., and each nut shall have washer (not shown on details).

For Rustication Detail, see Sheet 5.

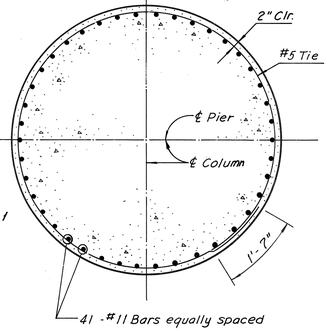


FOOTING PLAN *
Scale: ¼" = 1'-0"

* Pier 2 only. For Pier 1 see Sheet 4A.

FOOTINGS FOR PIERS 1 AND 2 ARE ECCENTRIC AS SHOWN ON FOOTING PLAN

Note:
Shear Studs are spaced @ 24" along ℄ Cap beam.

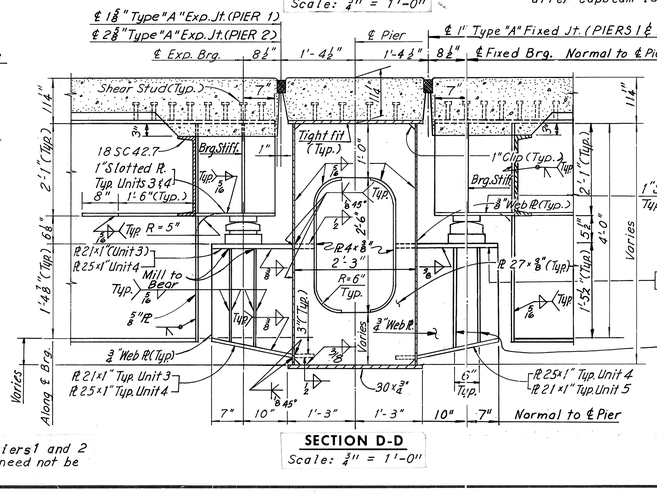


SECTION E-E
Scale: ¼" = 1'-0"

Note: Batter piles 3" per ft. as shown. All piles are 12 BP53 steel piles (Design Capacity=57 Tons

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

Note:
All Structural Steel for Piers 1 and 2 shall be A36. Steel Cap Beams need not be cambered.



SECTION D-D
Scale: ¾" = 1'-0"

* Fill with nonshrinking Grout after Capbeam is in final position.

AS BUILT

	BY	DATE				
MADE	MHH	1-17-69	2	PL Deleted and Dim. added Sect D-D	TEM	8-76
CHECKED	JD	2-13-69	1	Footing Details Pier 1 Deleted	MSD	3-13-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

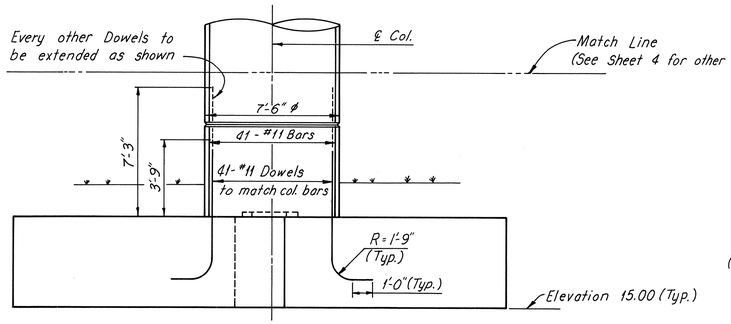
PIERS 1 AND 2

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

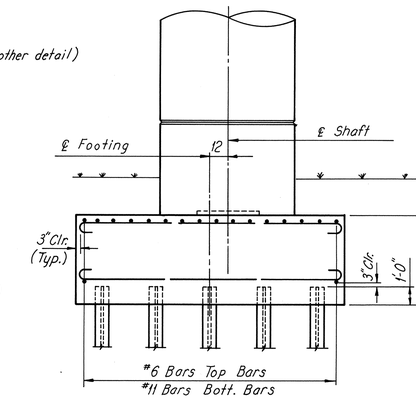
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 4 OF 28

67

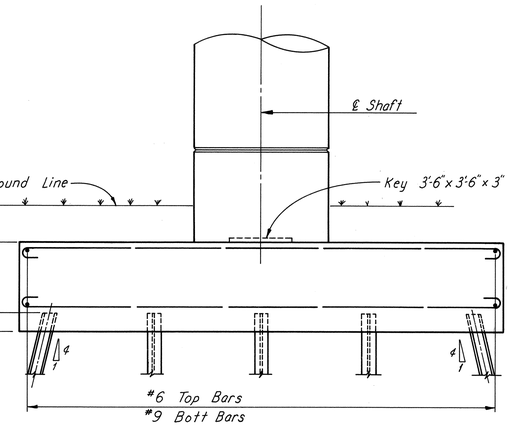
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	67A	97



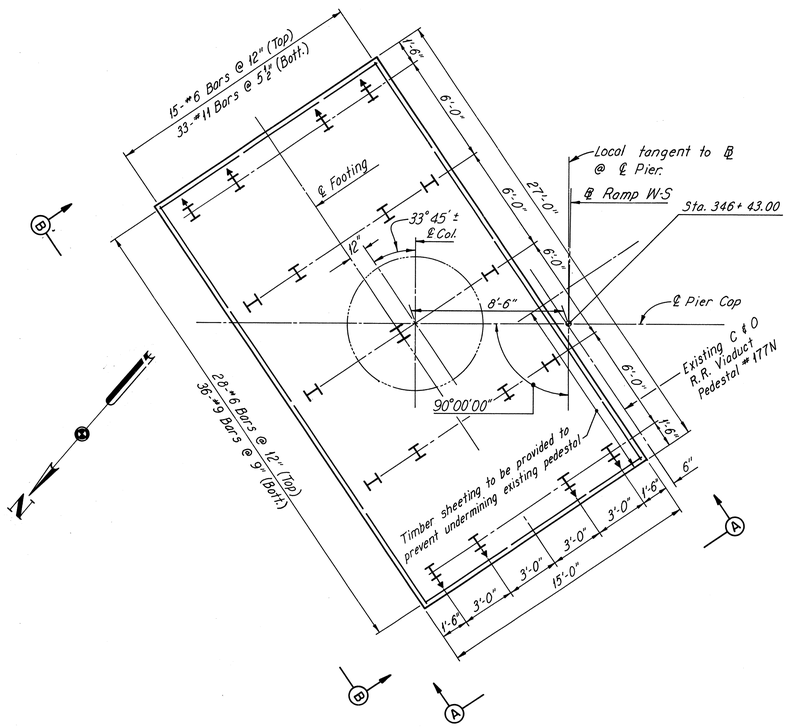
ELEVATION
Scale: 1/4" = 1'-0"



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



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



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

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

Note:
Batter Piles 3" per foot as shown. All piles are 12BP53 steel piles (Pile design capacity = 57 Tons).

FOOTING FOR PIER 1 IS ECCENTRIC AS SHOWN ON FOOTING PLAN & VIEW A-A.

	BY	DATE				
MADE	JLK	7-17-75				
CHECKED	DNB.	7-21-75	1	Pile Added	TEM	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

PIER 1 FOOTING

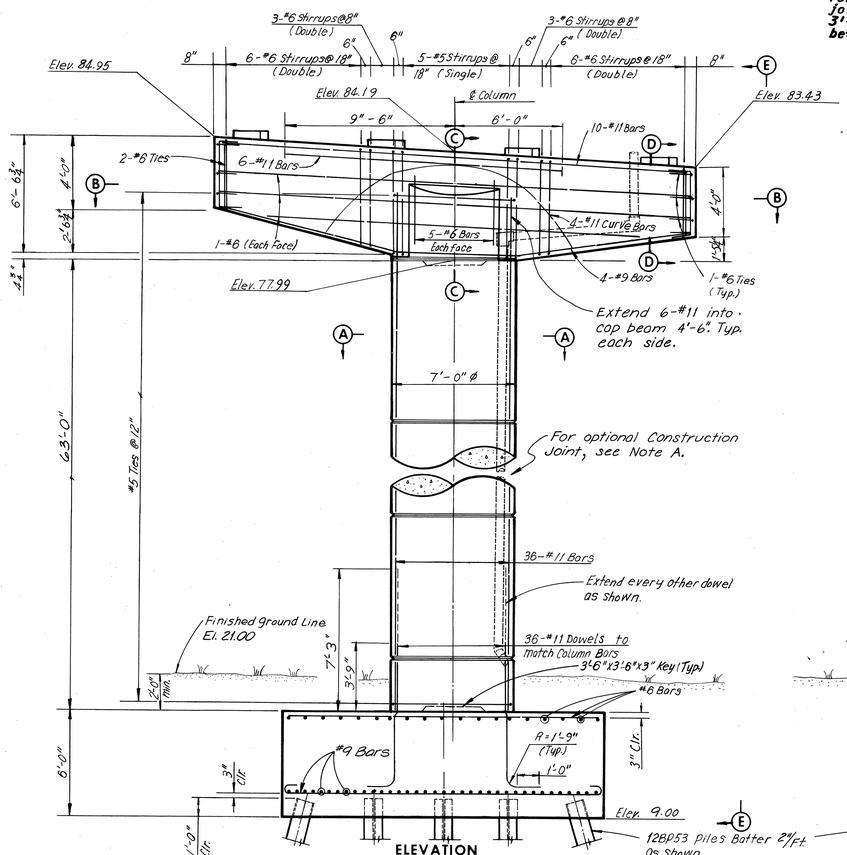
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 4A OF 28

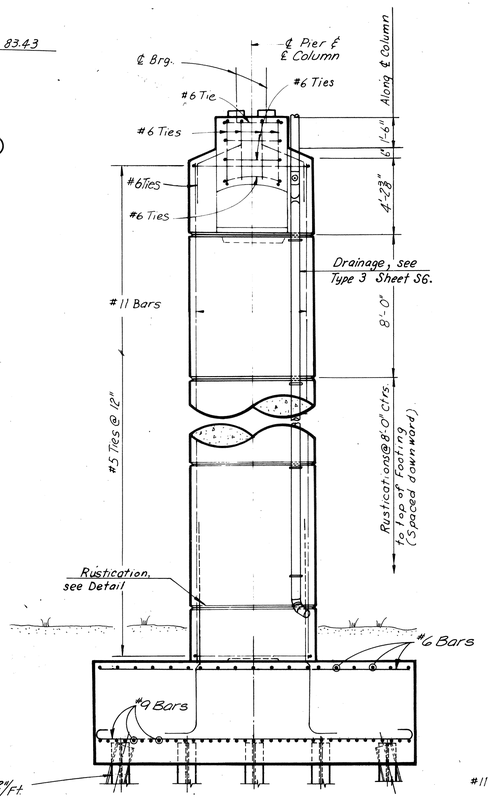
67A

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	68	97

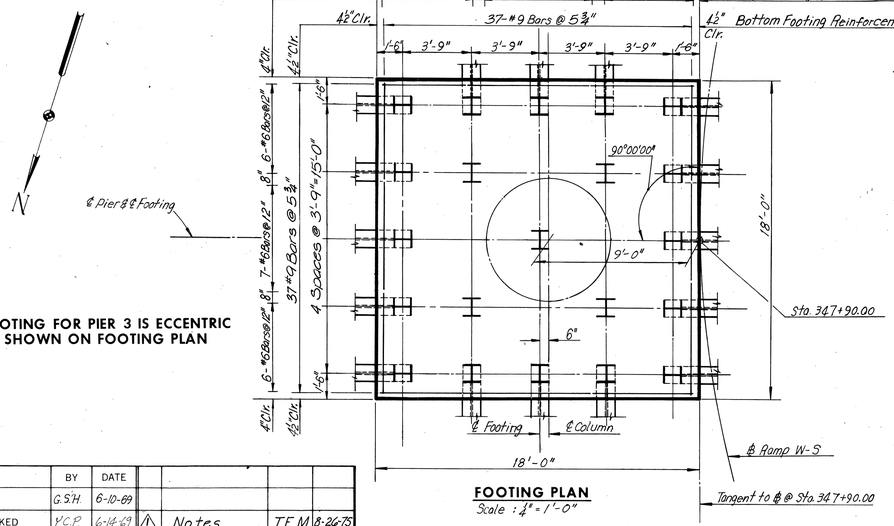
NOTE: A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



ELEVATION
Scale : 1" = 1'-0"

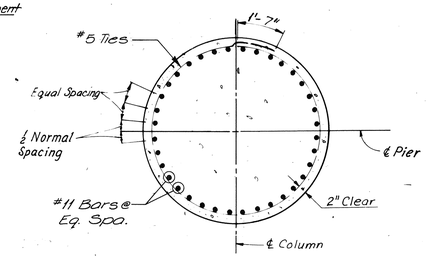


VIEW E-E
Scale: 1"=1'-0"

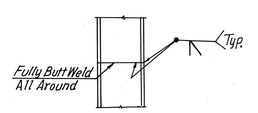


FOOTING PLAN
Scale : 1" = 1'-0"

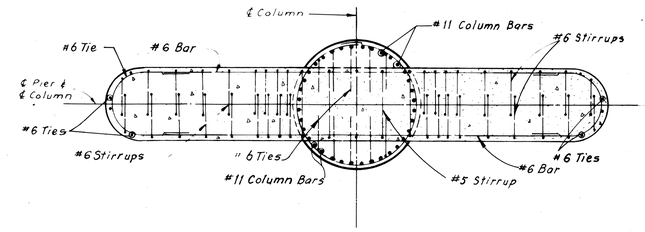
FOOTING FOR PIER 3 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



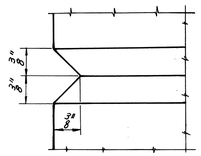
SECTION A-A
Scale: ⅜"=1'-0"



PILE SPLICE DETAIL
No Scale

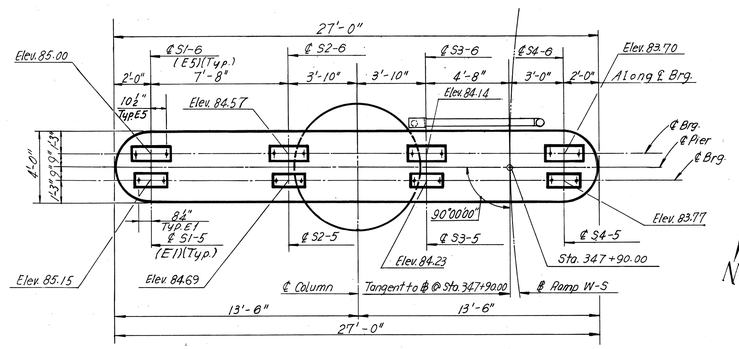


SECTION B-B
Scale: 1"= 1'-0"



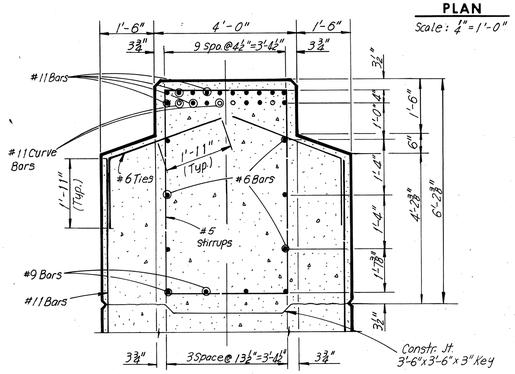
RUSTICATION DETAIL
Full Scale

Note:
Typical dimensions of concrete pad for E1 shoe is 2'-0½"x1'-0" and for E5 shoe is 2'-5"x1'-1½".

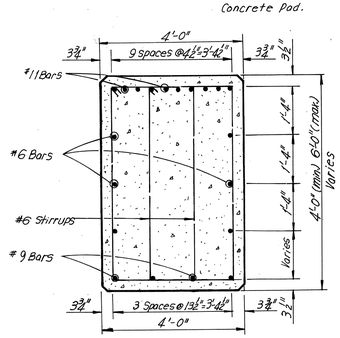


PLAN
Scale: 1"=1'-0"

Note:
All elevations are @ top of Concrete Pad.



SECTION C-C
Scale : ½ = 1'-0"



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

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

Notes:
All piles shall be 12BP53 Steel Piles (design capacity =57tons)

For Standard Shoe Detail, see sheets S1 and S2.
For Framing Plan, see Sheet 13.
For Quantities of concrete and Steel see Sheet 2.
Estimated pile tip elevation is -10.0.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	6-10-69				
CHECKED	Y.C.P.	6-14-69	1	Notes	T.E.M	8-26-75
IN CHARGE						

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

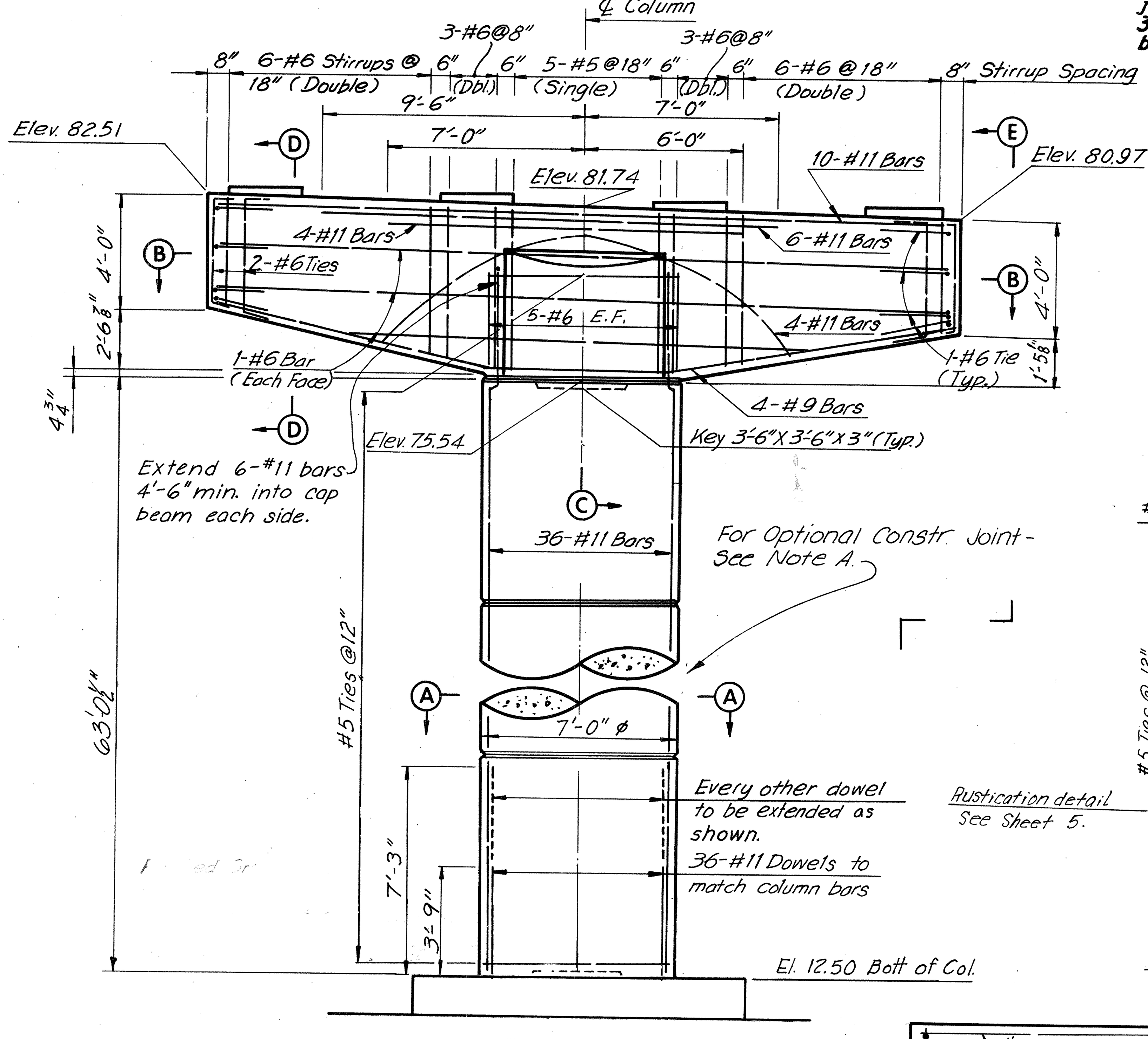
BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIER 3

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

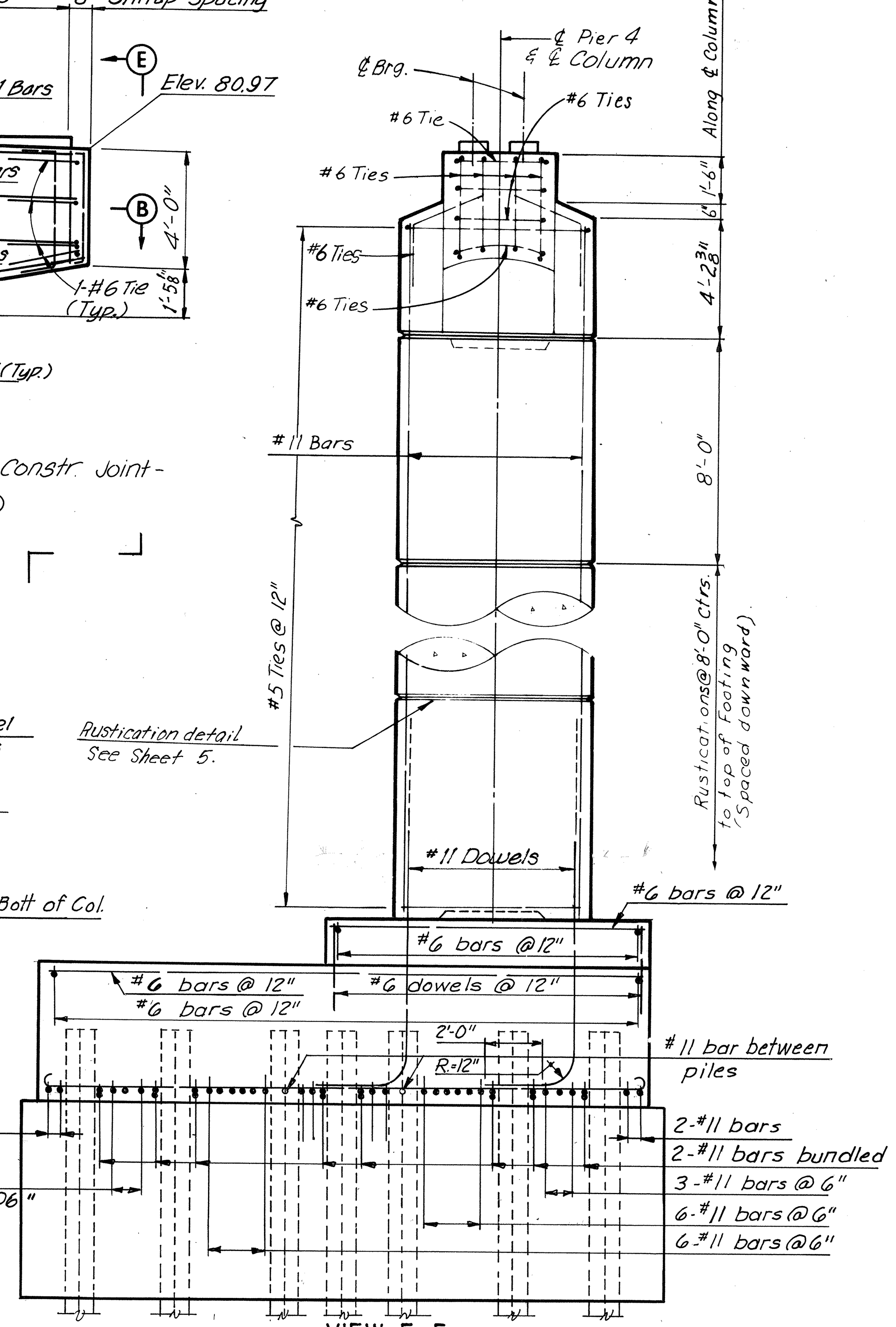
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 5 OF 28

68

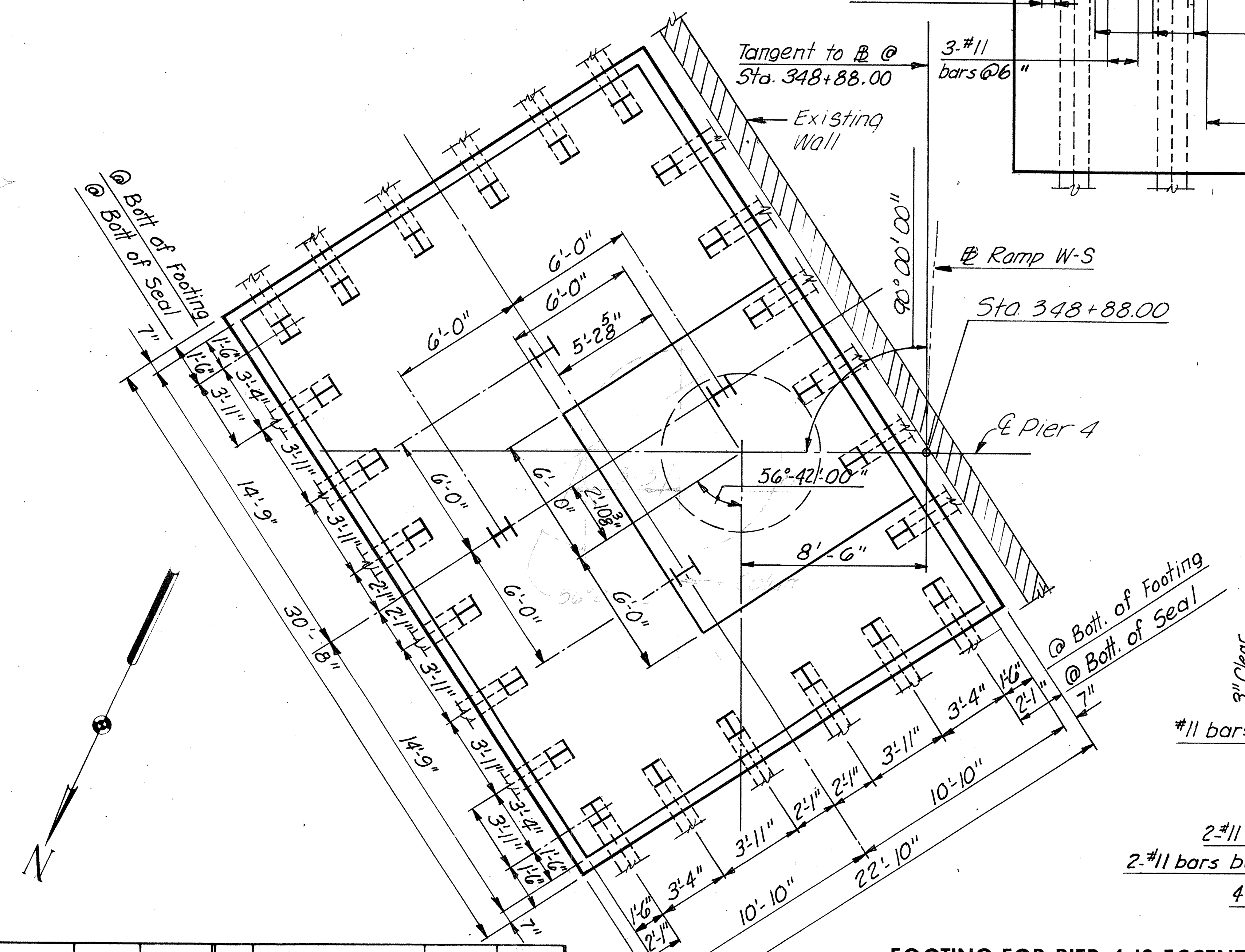
NOTE A:
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



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

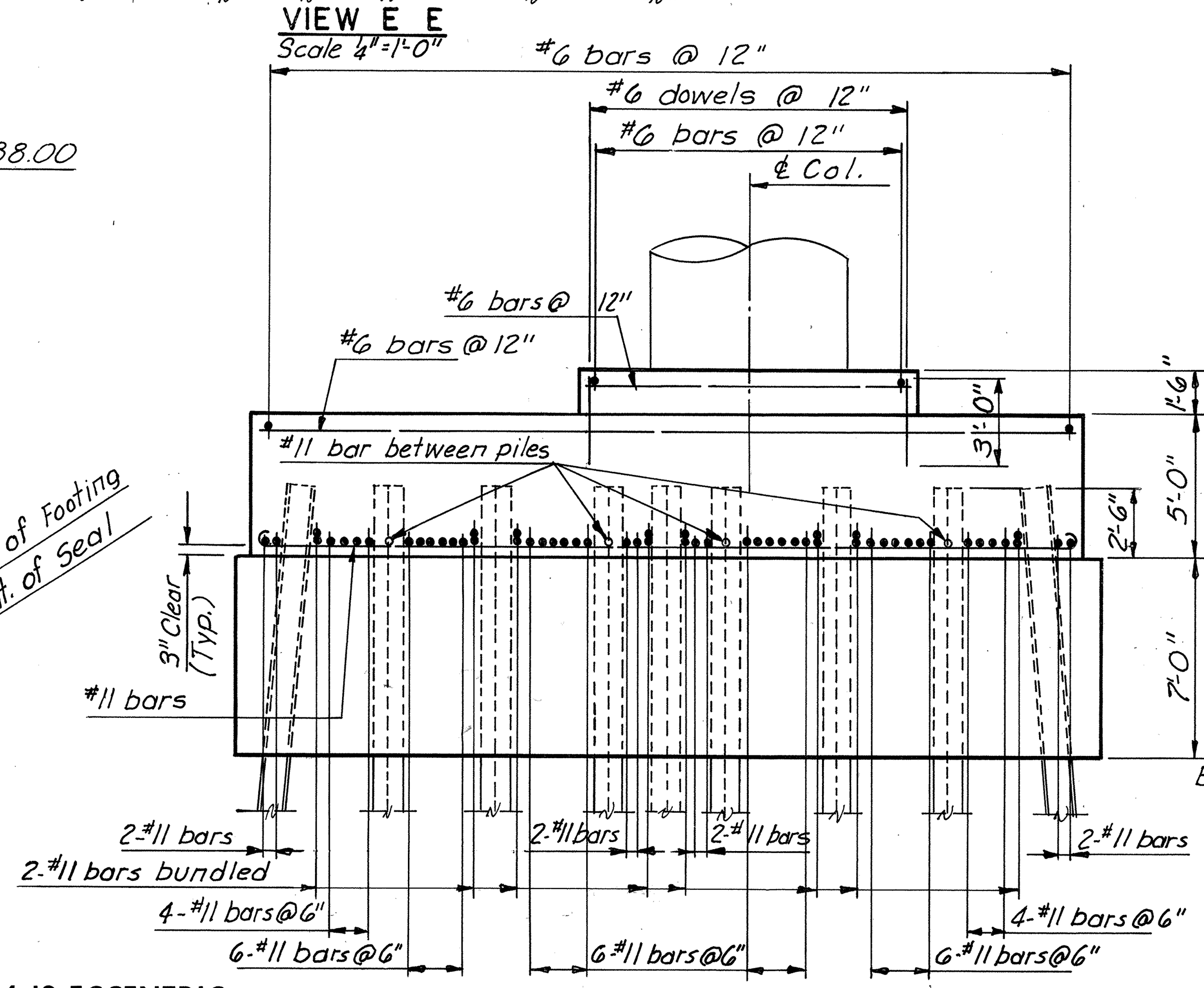


VIEW E E
Scale 1/4"=1'-0"

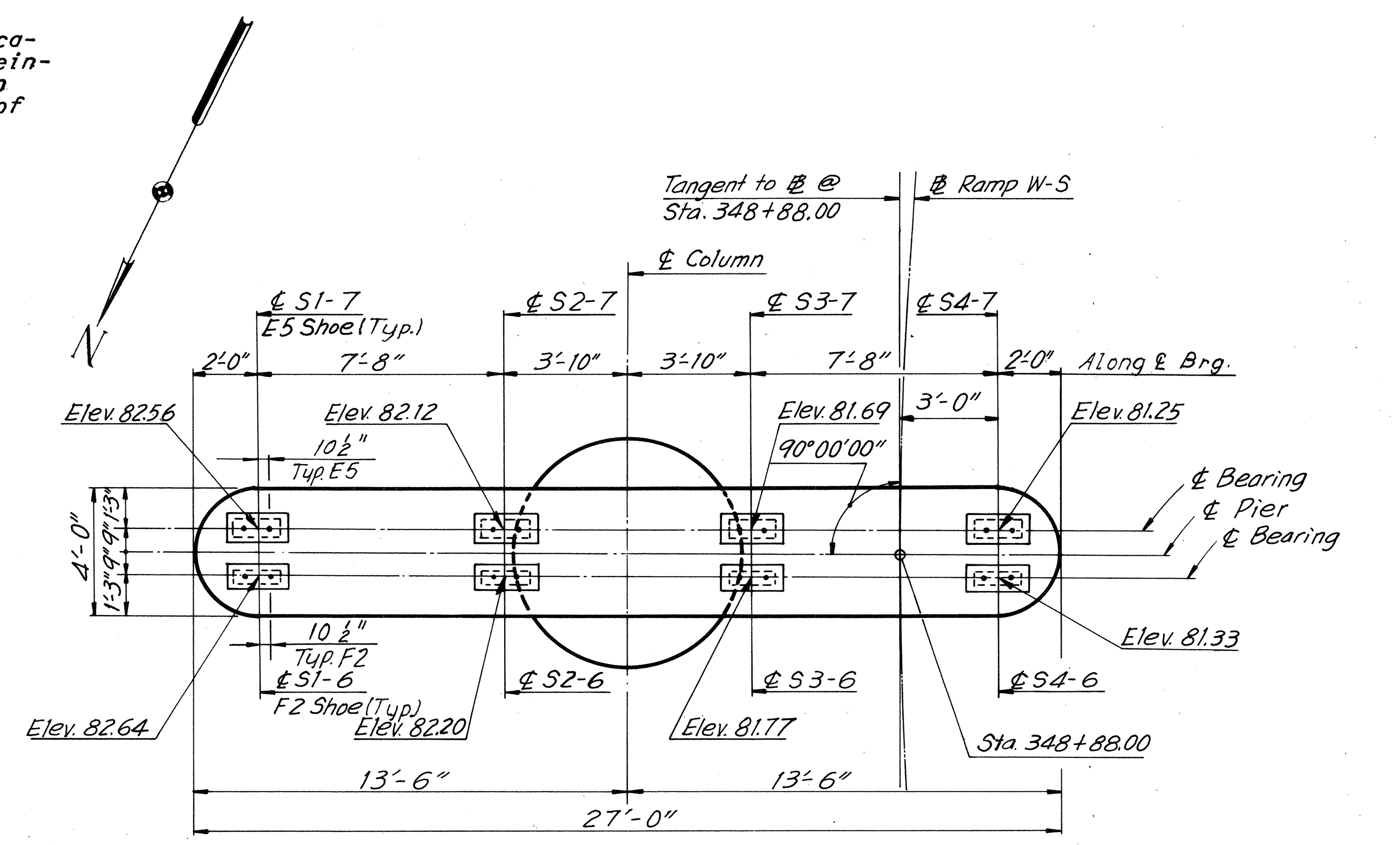


FOOTING PLAN
Scale: 3/16"=1'-0"

FOOTING FOR PIER 4 IS ECCENTRIC AS SHOWN ON FOOTING PLAN



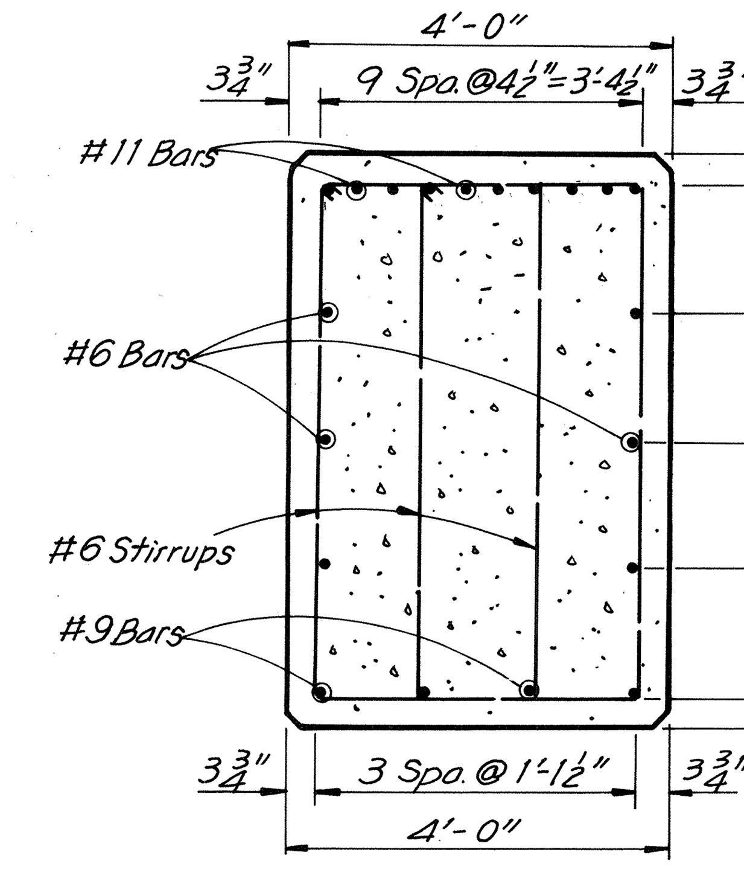
VIEW F-F
Scale: 3/16"=1'-0"



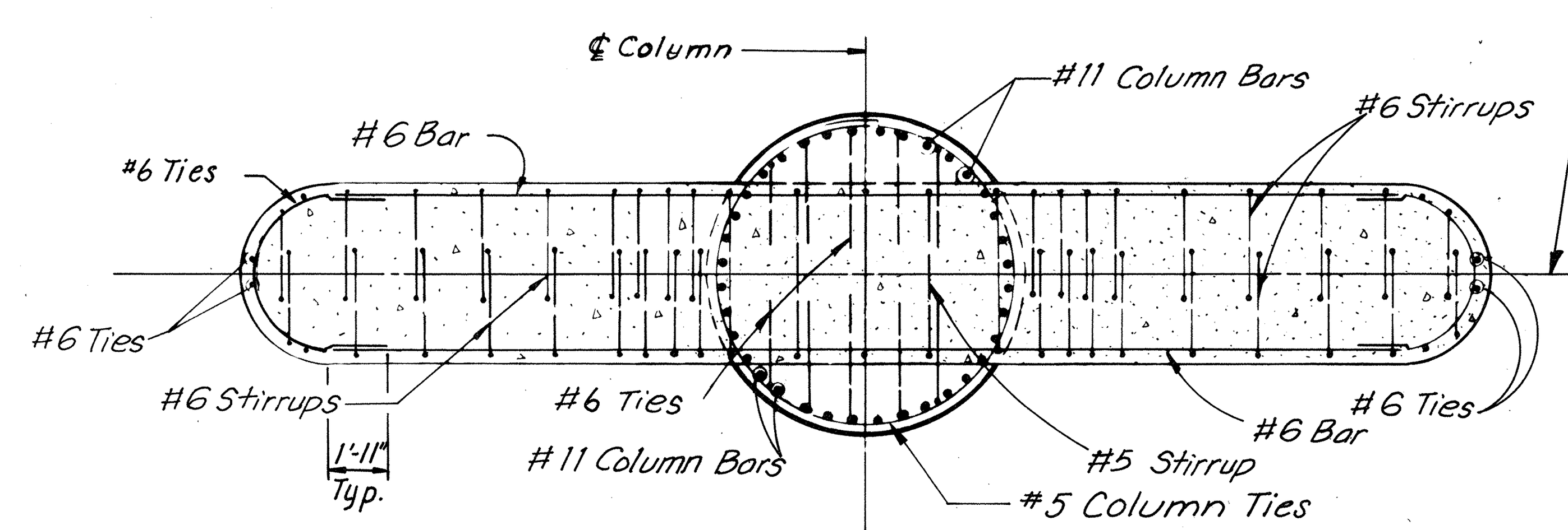
PLAN
Scale: 1/4"=1'-0"

Note:
Typical dimensions of concrete pad for E5 shoe is 2'-5"x1'-1½" and for F2 shoe is 2'-6"x11".

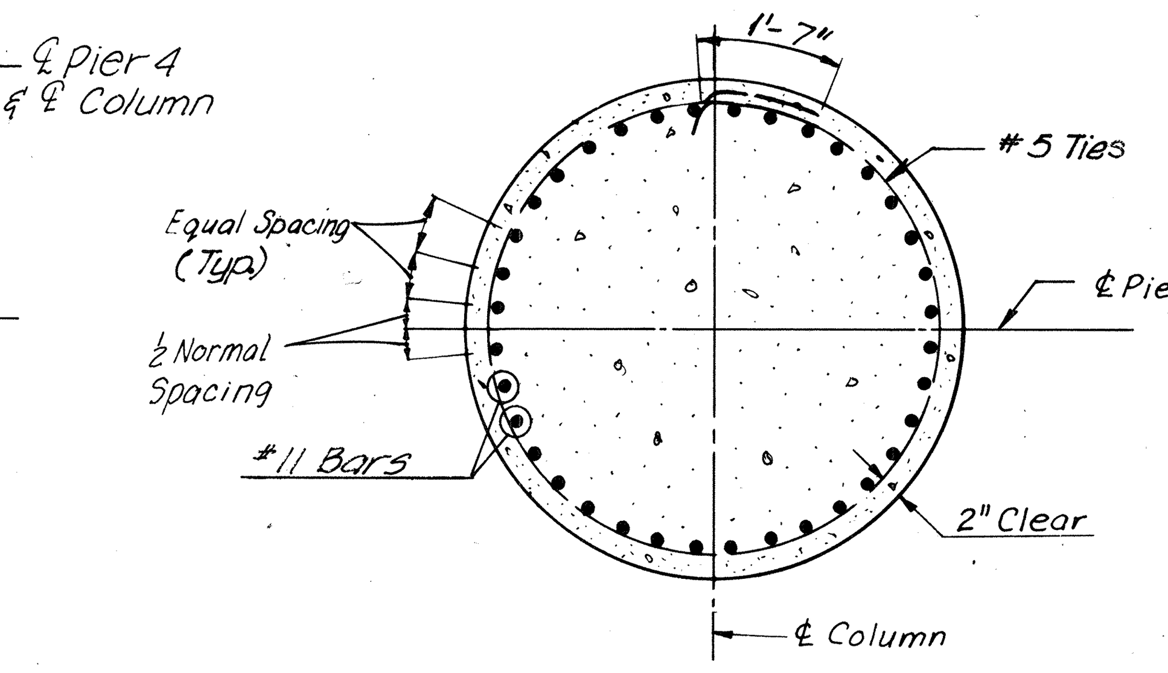
Note:
All elevations are @ top of Concrete pad at ℄ Bearing.



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



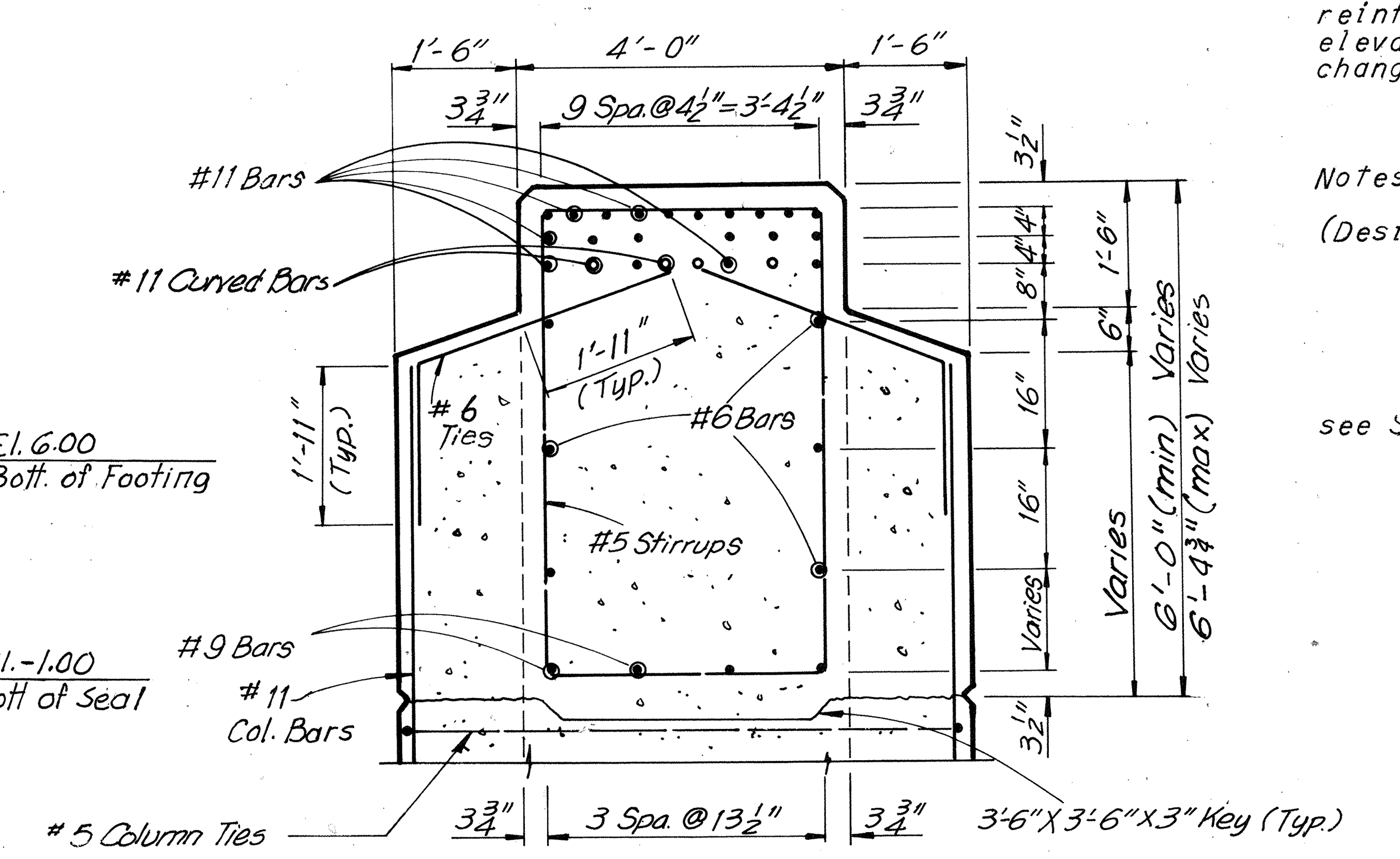
SECTION B-B
Scale: 1/4"= 1'- 0"



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

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

Notes:
All piles shall be 12BP53 steel piles (Design Capacity = 57 Tons)
Batter piles 1" per foot where shown.
For Standard Shoe Detail, see Sheets S1 and S2.
For Framing Plan, see Sheets 13 and 14.
For Rustication Detail, see, Sheet 5.
For 12BP53 Steel Pile Details, see Sheet 5.
For Quantities of concrete and steel, see Sheet 2.
Estimated pile Tip Elevation is - 15.0.



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

	BY	DATE				
MADE	SCC	6-10-69				
CHECKED	G.S.H	6-14-69	⚠	Note deleted	T.E.M.	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

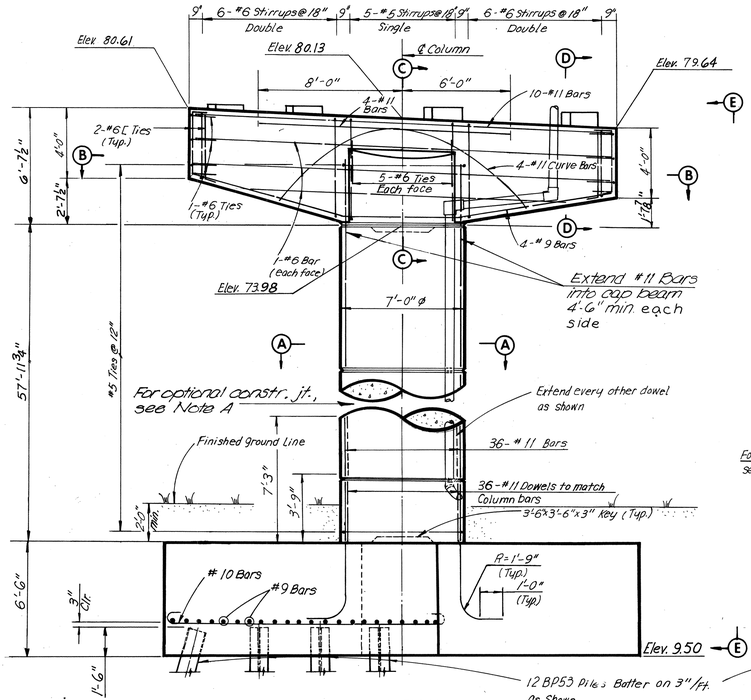
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
PIER 4

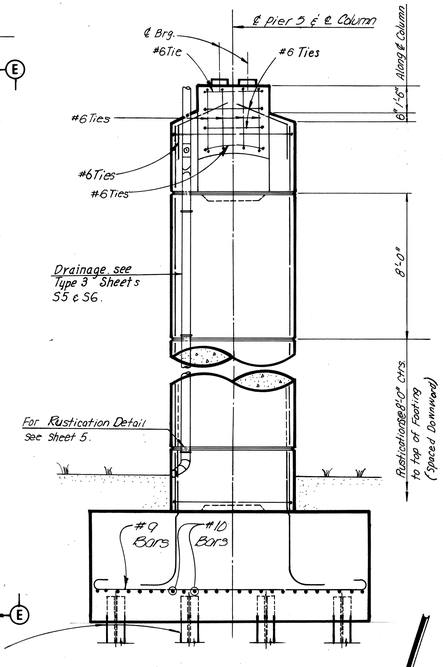
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 6 OF 28

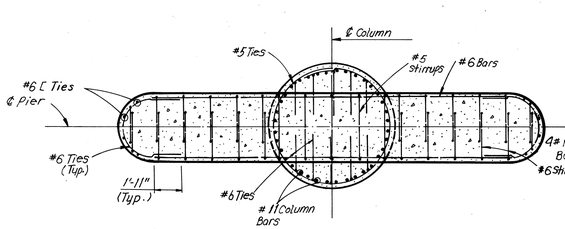
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	70	97



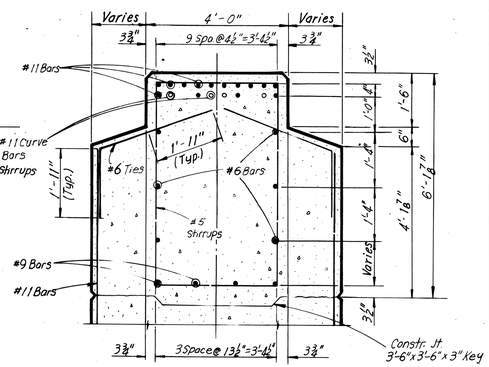
ELEVATION
Scale : 4" = 1'-0"



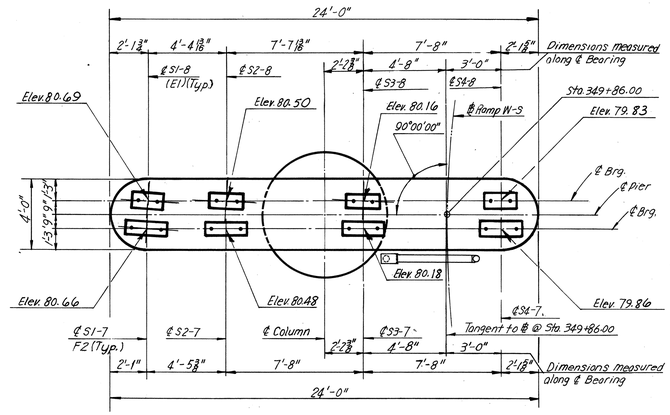
VIEW E-E
Scale : 4" = 1'-0"



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

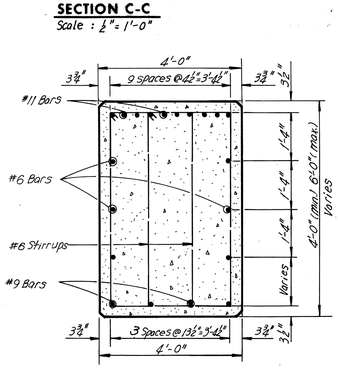


SECTION C-C
Scale : ½" = 1'-0"

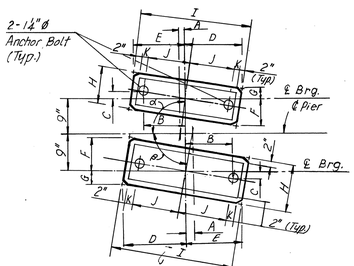


PLAN
Scale : 4" = 1'-0"

Note: All elevations are @ top of Concrete Pad.



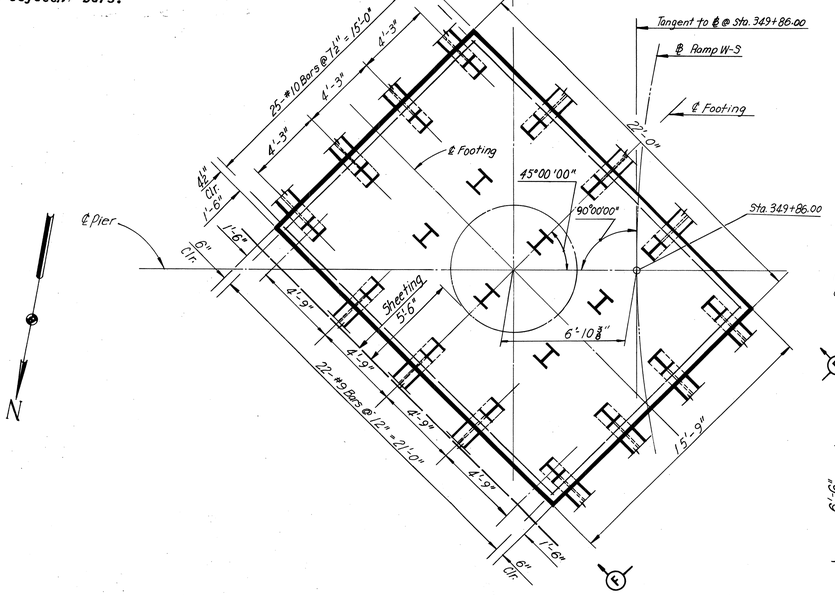
SECTION D-D
Scale : 4" = 1'-0"



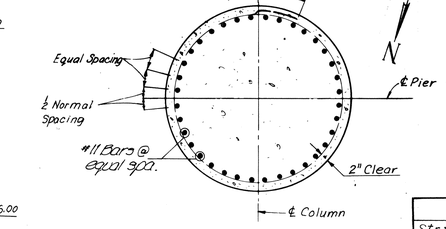
PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

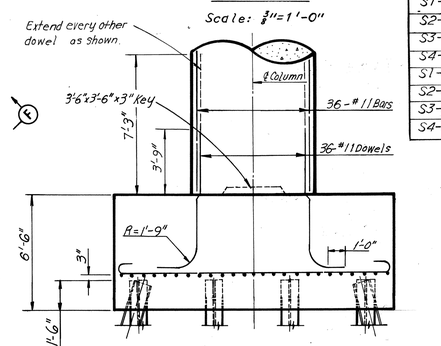
Stringers	α	β	A	B	C	D	E	F	G	H	I	J	K
S1-7	—	87°45'28"	5/16"	10½"	3/8"	15⅜"	14¾"	6/16"	4/16"	11"	2'-6"	10½"	2½"
S2-7	—	90°00'00"	0"	10½"	0"	15 "	15 "	5½"	5½"	11"	2'-6"	10½"	2½"
S3-7	—	90°00'00"	0"	10½"	0"	15"	15"	5½"	5½"	11"	2'-6"	10½"	2½"
S4-7	—	90°00'00"	0"	10½"	0"	15"	15"	5½"	5½"	11"	2'-6"	10½"	2½"
S1-8	93°50'24"	—	5/16"	8¼"	7/16"	12⅝"	11⅞"	6/16"	5/16"	1'-0"	2'-0½"	8¼"	2"
S2-8	92°38'34"	—	5/16"	8¼"	7/16"	12¼"	12"	6½"	5½"	1'-0"	2'-0½"	8¼"	2"
S3-8	91°27'44"	—	4/16"	8¼"	7/16"	12⅜"	12¼"	6/16"	5/16"	1'-0"	2'-0½"	8¼"	2"
S4-8	91°27'44"	—	4/16"	8¼"	7/16"	12⅜"	12⅜"	6/16"	5/16"	1'-0"	2'-0½"	8¼"	2"



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



SECTION A-A
Scale: 4"=1'-0"



VIEW F-F
Scale : 4" = 1'-0"

NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.

Note:
Footing Elevations are approximate only and maybe varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft., redesign will be required.

Notes:
All piles shall be 12BP53 steel piles(Design Capacity = 57 tons).
Batter all piles 3" per foot where shown.
For Standard Shoe Detail, see Sheets S1 and S2.
For Framing Plan, see Sheet 14.
For Rustication Detail, see Sheet 5.
For 12BP53 Steel Pile Detail, see Sheet 5.
For Quantities of concrete and steel, see Sheet 2.
Estimated Pile tip elevations are -15.0

	BY	DATE				
MADE	G.S.H.	6-10-69				
CHECKED	SCC	6-17-69	1	Pad Elevations	TEM	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
PIER 5

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 7 OF 28

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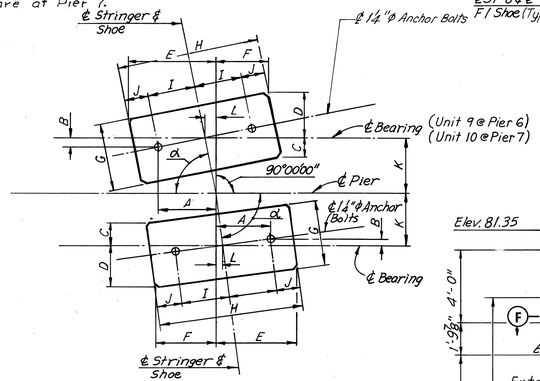
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	71	97

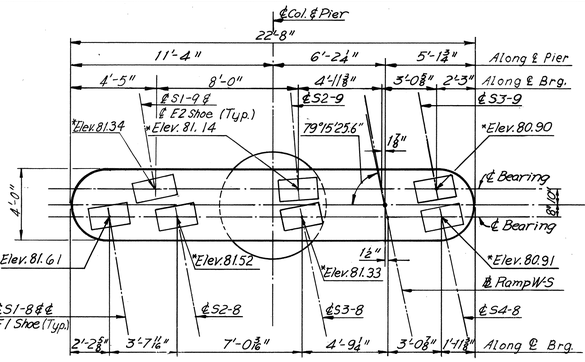
DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Stringer	α	A	B	C	D	E	F	G	H	I	J	K	L
*S1-9	88°31'17"	8½	1⅜	7⅛	7⅛	13⅜	12⅝	15	2'-2½"	8¼	5	10	¼
*S2-9	85°33'46"	9	⅜	6½	8½	13½	13⅜	15	2'-2½"	8¼	5	10	⅜
*S3-9	79°16'37"	10	1⅜	4⅞	9⅜	16¼	9¼	15	2'-2½"	8¼	5	10	1⅞
S1-10	89°35'33"	8¼	⅛	5⅛	5⅛	12⅜	11⅝	15	2'-1"	8	4½	9	⅛
S2-10	88°51'44"	8⅜	⅜	5½	6	12⅝	12⅜	11½	2'-1"	8	4½	9"	⅜
S1-8	90°07'28"	9¼	1⅜	4⅞	8⅝	15⅞	10¾	13½	2'-3"	8	5½	8	1⅜
S2-8	78°55'37"	9⅝	1⅛	4	9⅛	16¼	10⅛	13½	2'-3"	8	5½	8	1⅛
S3, 4-8	77°44'47"	9⅝	1⅛	3⅞	9⅜	16½	10⅛	13½	2'-3"	8	5½	8	1¾
** S1-9	89°20'16"	8¼	1/16	5⅜	5⅜	12⅝	12⅜	11½	2'-1"	8	4½	9	1/16
** S2-9	86°22'45"	8⅜	3/16	4⅝	6½	13⅜	11⅛	11½	2'-1"	8	4½	9	3/16
** S3-9	86°38'50"	8½	1/16	5	6½	13⅜	11⅝	11½	2'-1"	8	4½	9	½

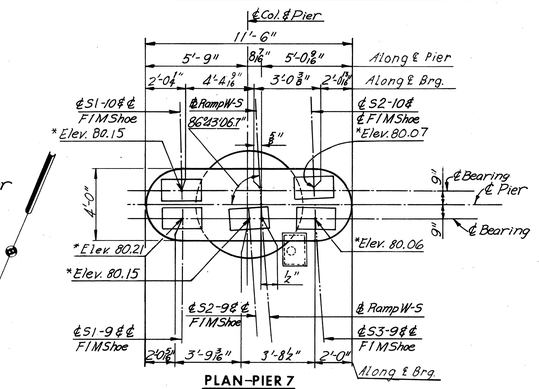
NOTE: Dimensions are in inches unless shown otherwise. Stringers denoted with * are at Pier 6 and with ** are at Pier 7.



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

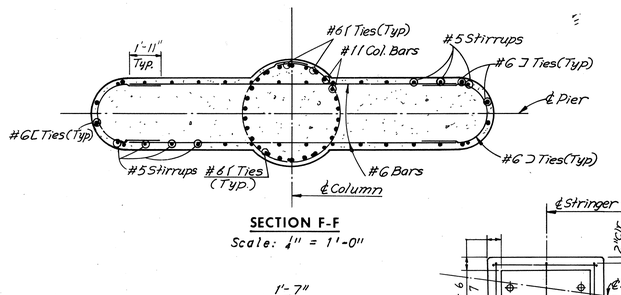


PLAN–PIER 6
Scale: ¼" = 1'-0"

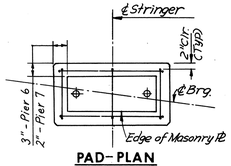


PLAN–PIER 7
Scale: ¼" = 1'-0"

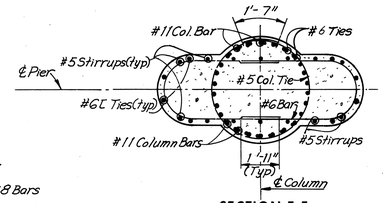
NOTE A
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



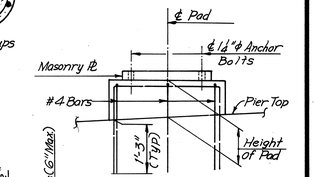
SECTION F-F
Scale: ¼" = 1'-0"



PAD-PLAN

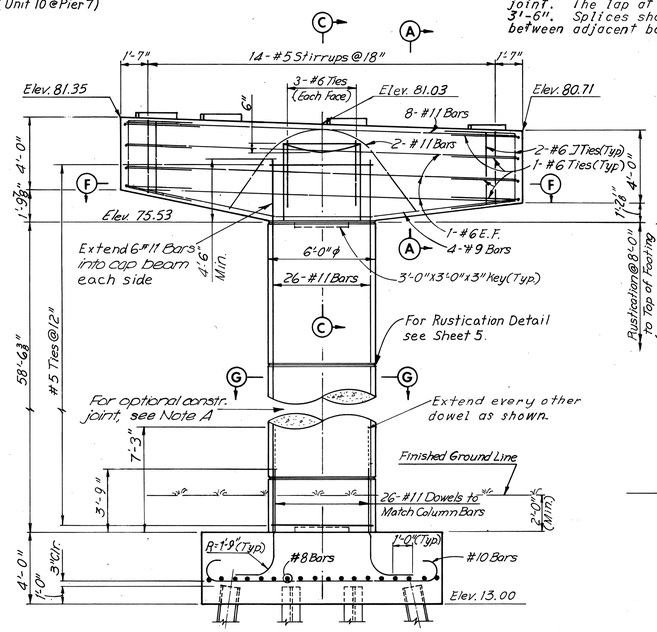


SECTION E-E
Scale: ¼" = 1'-0"

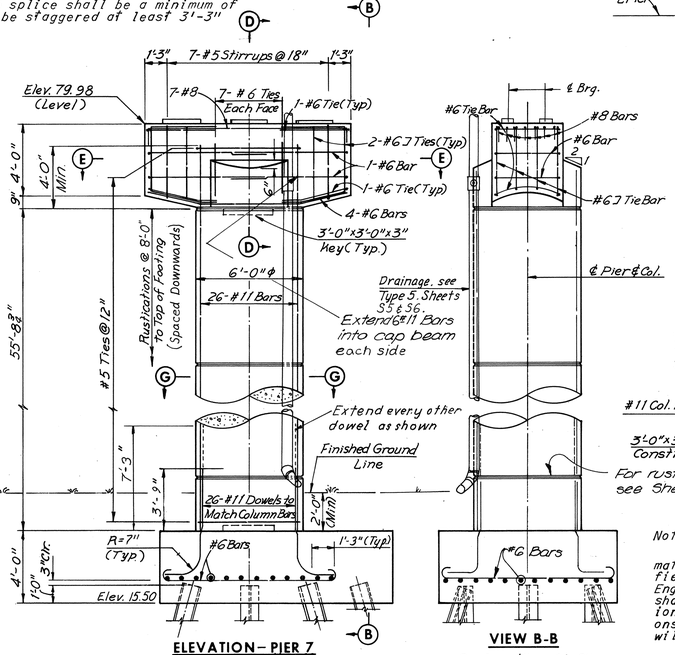


PAD-ELEVATION
No Scale

Notes:
Pads with heights of 4" or less shall not be reinforced. Pads with heights between 4" and 8" use #4 bars.
For Standard Shoe Details see Sheets 51 & 52.
For Framing Plans, see Sheets 14 & 15.
For Quantities of Concrete & Steel, see Sheet 2.

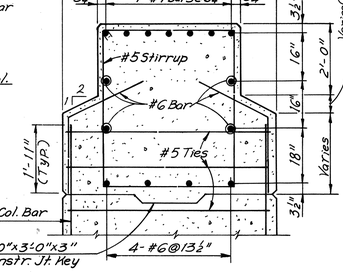


ELEVATION – PIER 6
Scale: ¼" = 1'-0"



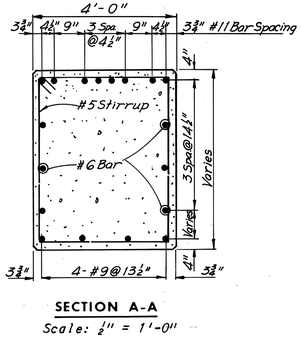
ELEVATION – PIER 7
Scale: ¼" = 1'-0"

VIEW B-B
Scale: ¼" = 1'-0"

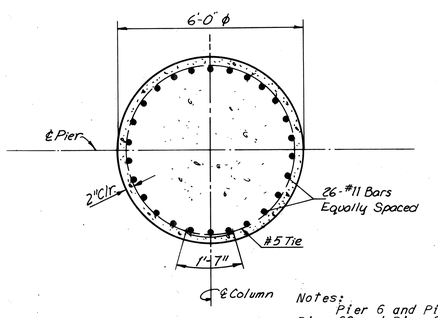


SECTION D-D
Scale: ¼" = 1'-0"

Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

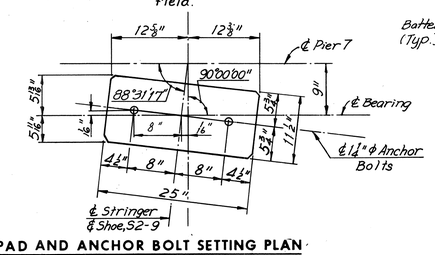


SECTION A-A
Scale: ¼" = 1'-0"

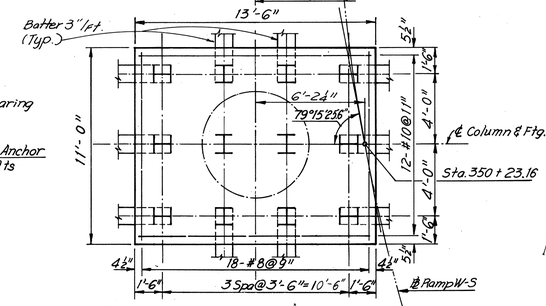


SECTION G-G
No Scale

Notes:
Pier 6 and Pier 7 are to match existing Pier 62 and Pier 60 respectively. The stations shown on the plans shall be verified by the contractor in the field.

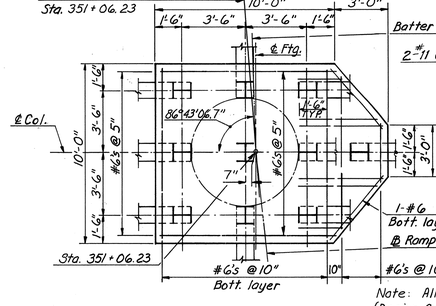


PAD AND ANCHOR BOLT SETTING PLAN
No Scale (S2-9 Only)



FOOTING PLAN – PIER 6
Scale: ¼" = 1'-0"

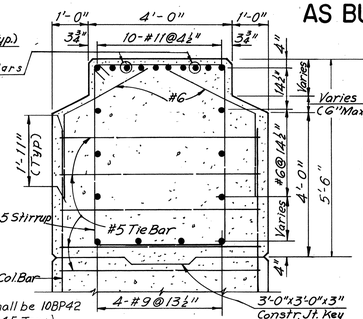
Note: Estimated Pile tip Elevations: -15.0



FOOTING-PLAN PIER 7
Scale: ¼" = 1'-0"

Note: All piles shall be 10BP42 (Design Capacity = 45 Tons)
Batter piles 3" per ft. where shown.

AS BUILT



SECTION C-C
Scale: ¼" = 1'-0"

	BY	DATE				
MADE	AHH	01-27-69	2	Footing Dowel Pier 7	TEM	8-26-75
CHECKED	YCP	2-5-69	1	Pad Elevations	TEM	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
PIERS 6 AND 7

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 8 OF 28

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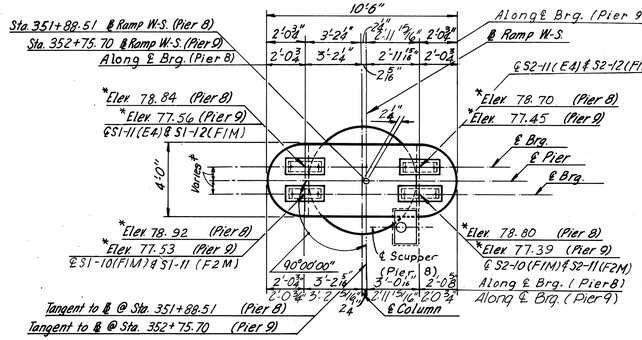
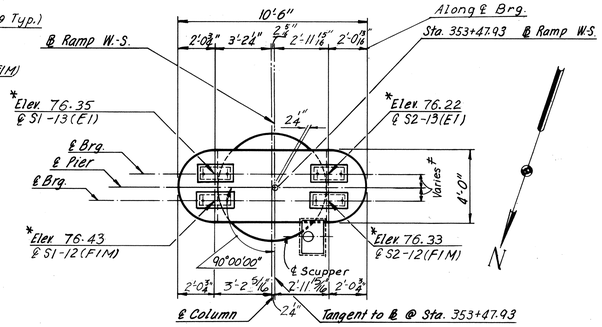
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	72	97



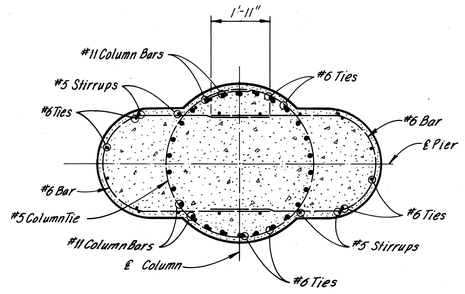
PIER CAP PLAN-PIERS 8 AND 9
Scale: $\frac{1}{4}$"= 1'-0"



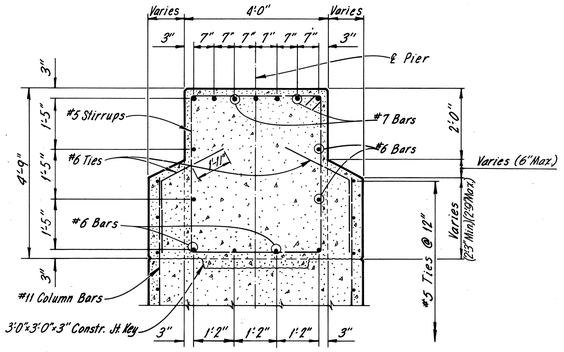
PIER CAP PLAN-PIER 10
Scale: $\frac{1}{4}$"= 1'-0"

* Denotes top elevations of pad.

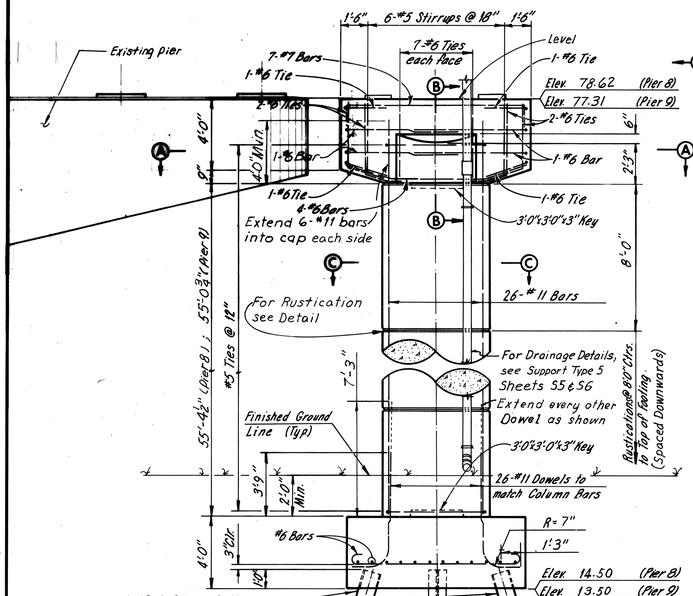
‡ The distances from ℄ Brg. to ℄ Pier are shown on the Table "Dimensions for pad and anchor bolt setting plan".



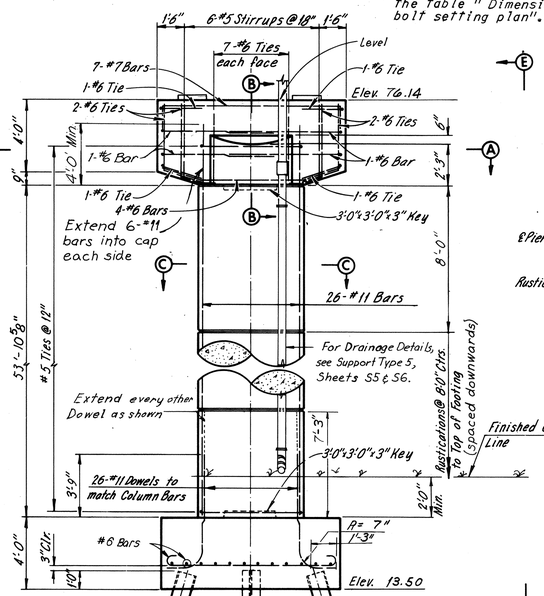
SECTION A-A
Scale: $\frac{3}{8}$" = 1'-0"



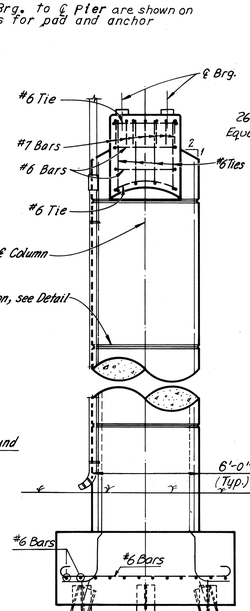
SECTION B-B
Scale: $\frac{1}{2}$" = 1'-0"



ELEVATION- PIERS 8 AND 9
Scale: $\frac{1}{4}$"= 1'-0"

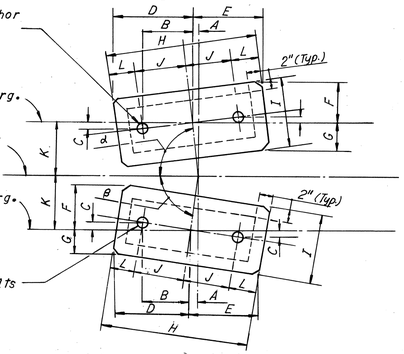


ELEVATION- PIER 10
Scale: $\frac{1}{4}$"= 1'-0"



VIEW E-E
Scale: $\frac{1}{4}$" = 1'-0"

SECTION C-C
Scale: $\frac{3}{8}$" = 1'-0"



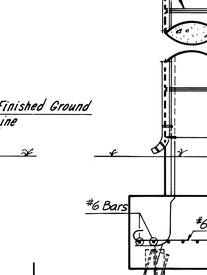
PAD AND ANCHOR BOLT SETTING PLAN
NO Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

Pier	Stringer	α	β	A	B	C	D	E	F	G	H	I	J	K	L
8	S1-10	–	89°36'33"	1/16"	8¼"	1/16"	1'-0 2/16"	1'-0 2/16"	5 7/8"	5 5/8"	2'-1"	11½"	8"	9"	4 4/16"
	S2-10	–	90°19'22"	3/16"	8¼"	1/16"	1'-0 2/16"	1'-0 2/16"	5 7/8"	5 5/8"	2'-1"	11½"	8"	9"	4 4/16"
	S1-11	90°25'55"	–	1/16"	10 2/16"	1/16"	1'-2 1/16"	1'-2 1/16"	6 3/8"	6 1/8"	2'-5"	1'-0 1/16"	10 1/16"	9"	4"
	S2-11	90°25'55"	–	1/16"	10 2/16"	1/16"	1'-2 1/16"	1'-2 1/16"	6 3/8"	6 1/8"	2'-5"	1'-0 1/16"	10 1/16"	9"	4"
9	S1-11	–	89°34'05"	16"	10 2/16"	16"	1'-3"	1'-3"	5 7/8"	5 5/8"	2'-6"	11"	10 2/16"	8"	4 2/16"
	S2-11	–	89°34'05"	16"	10 2/16"	16"	1'-3"	1'-3"	5 7/8"	5 5/8"	2'-6"	11"	10 2/16"	8"	4 2/16"
	S1-12	90°21'29"	–	1/16"	8¼"	1/16"	1'-0 2/16"	1'-0 2/16"	5 7/8"	5 5/8"	2'-1"	11½"	8"	10"	4 2/16"
	S2-12	90°21'29"	–	1/16"	8¼"	1/16"	1'-0 2/16"	1'-0 2/16"	5 7/8"	5 5/8"	2'-1"	11½"	8"	10"	4 2/16"
10	S1-12	–	90°21'29"	1/16"	8¼"	1/16"	1'-0 2/16"	1'-0 2/16"	5 7/8"	5 5/8"	2'-1"	11½"	8"	9"	4 2/16"
	S2-12	–	90°21'29"	1/16"	8¼"	1/16"	1'-0 2/16"	1'-0 2/16"	5 7/8"	5 5/8"	2'-1"	11½"	8"	9"	4 2/16"
	S1-13	89°38'31"	–	16"	8 4/16"	16"	1'-0 4/16"	1'-0 4/16"	6 3/8"	5 7/8"	2'-0 2/16"	11'-0"	8 4/16"	9"	4"
	S2-13	89°38'31"	–	16"	8 4/16"	16"	1'-0 4/16"	1'-0 4/16"	6 3/8"	5 7/8"	2'-0 2/16"	11'-0"	8 4/16"	9"	4"

FOOTING PLAN- PIERS 8 AND 9
Scale: $\frac{1}{4}$"= 1'-0"

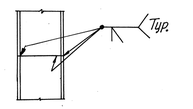
FOOTING PLAN-PIER 10
Scale: $\frac{1}{4}$"= 1'-0"



RUSTICATION DETAIL
Full Scale

Note:
Overexcavation will not be permitted between existing pier and newpier. Piers 8, 9 and 10 are to match existing piers 58, 56 and 54 respectively. The contractor shall verify the stations in the field.

Notes:
Footing elevations are approximate only and may be varied to suit field conditions as directed by Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.
All piles shall be 10BP42 Steel Piles.
(Design capacity = 45 Tons.)
For Standard Shoe Details, see Sheets S1 & S2.
For Framing Plans, see Sheets 15 and 16.
For quantities of concrete and steel, see Sheet 2.



PILE SPLICE DETAIL
No Scale

	BY	DATE				
MADE	DES. G.S.H	1-28-69	2	Footing Dowels	TEM	8-26-76
CHECKED	K.C.T.	2-4-69	1	Pad Elevations	TEM	8-24-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
PIERS 8, 9 AND 10

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 9 OF 28

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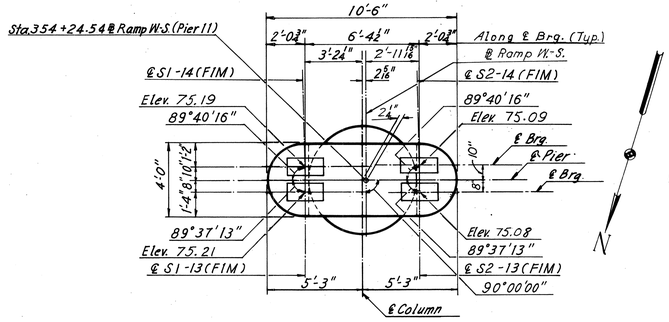
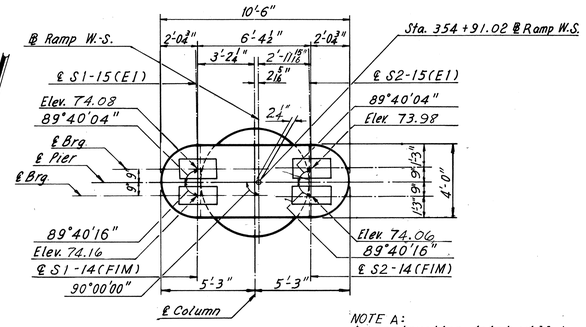
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	73	97

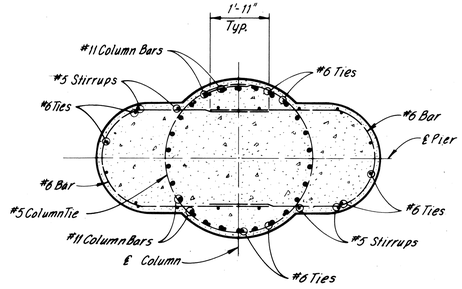


PIER CAP PLAN-PIER 11
Scale: ¼"= 1'-0"

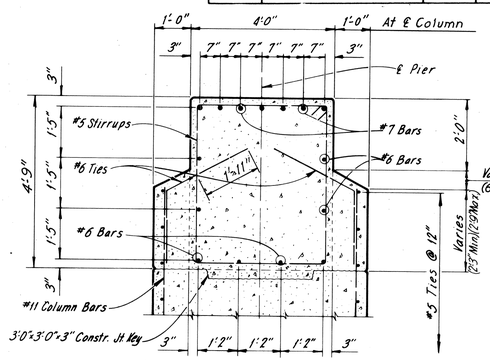


PIER CAP PLAN- PIER 12
Scale: ¼"= 1'-0"

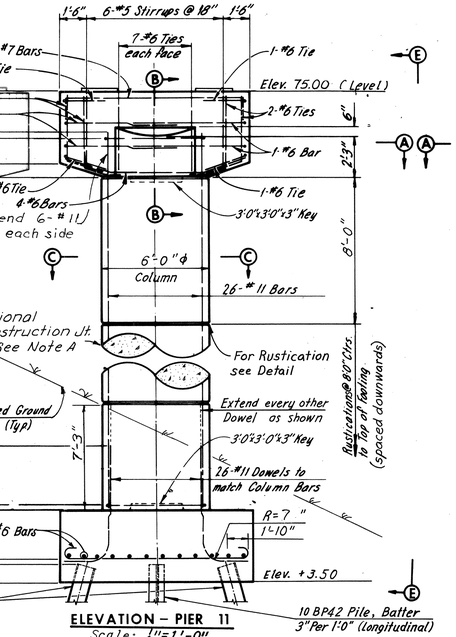
NOTE A:
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be staggered at least 3'-3" between adjacent bars.



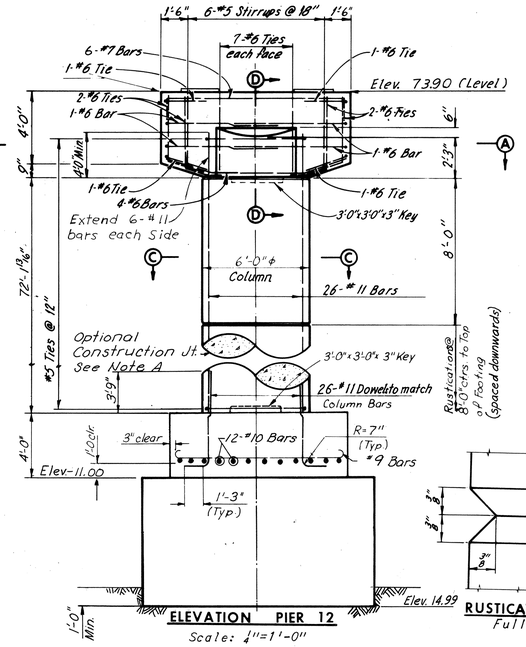
SECTION A-A
Scale: ⅜" = 1'-0"



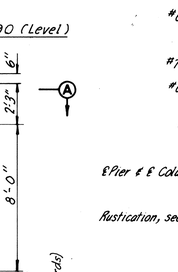
SECTION B-B
Scale: ½" = 1'-0"



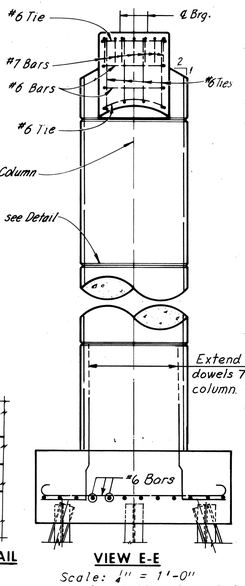
ELEVATION – PIER 11
Scale: ¼"=1'-0"



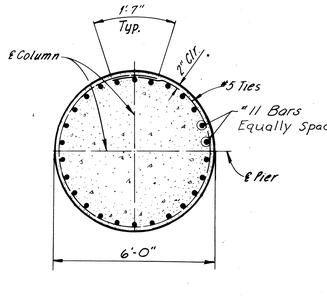
ELEVATION PIER 12
Scale: ¼"=1'-0"



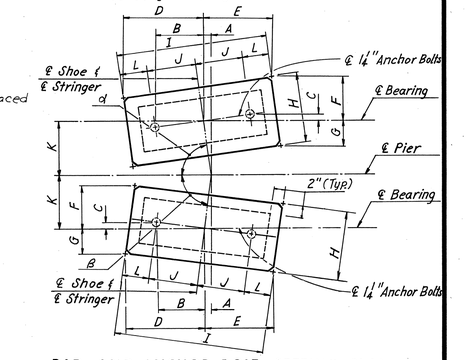
RUSTICATION DETAIL
Full Scale



VIEW E-E
Scale: ¼" = 1'-0"
(Pier 11 shown, Pier 12 similar except for Footing.)



SECTION C-C
Scale: ⅜" = 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN
No Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN													
Pier	Stringer	α	β	A	B	C	D	E	F	G	H	I	J	K	L
11	S1-13	——	89° 37'13"	16"	8"	16"	12½"	12½"	5⅝"	5⅝"	11½"	2'-1"	8"	8"	4½"
	S2-13	——	89° 37'13"	16"	8"	16"	12½"	12½"	5⅝"	5⅝"	11½"	2'-1"	8"	8"	4½"
	S1-14	89° 40'16"	——	16"	8"	16"	12½"	12½"	5⅝"	5⅝"	11½"	2'-1"	8"	10"	4½"
	S2-14	89° 40'16"	——	16"	8"	16"	12½"	12½"	5⅝"	5⅝"	11½"	2'-1"	8"	10"	4½"
12	S1-14	——	89° 40'16"	16"	8"	16"	12½"	12½"	5⅝"	5⅝"	11½"	2'-1"	8"	9"	4½"
	S2-14	——	89° 40'16"	16"	8"	16"	12½"	12½"	5⅝"	5⅝"	11½"	2'-1"	8"	9"	4½"
	S1-15	89° 40'04"	——	16"	8¼"	16"	12¼"	12¼"	6⅛"	5⅞"	12"	2'-0½"	8¼"	9"	4"
	S2-15	89° 40'04"	——	16"	8¼"	16"	12¼"	12¼"	6⅛"	5⅞"	12"	2'-0½"	8¼"	9"	4"

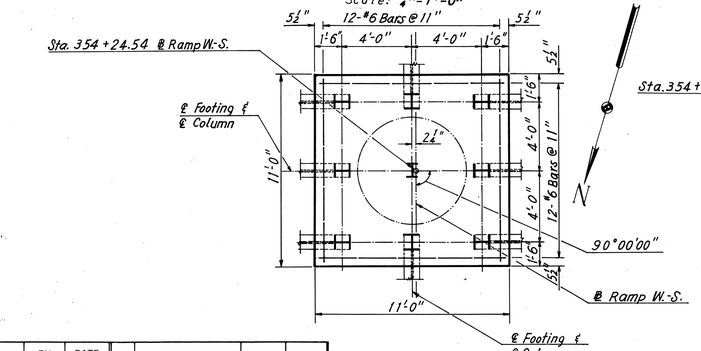
Note:
Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

Overexcavation will not be permitted between existing pier and new pier.

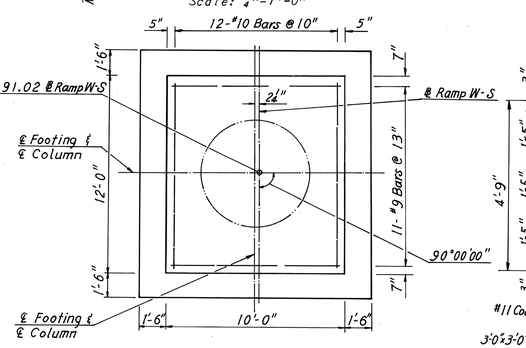
Pier 11 and pier 12 are to match existing pier 52 and pier 50 respectively, the Contractor shall verify the stations in the field.

All piles shall be 10BP42 Steel Piles.
(Design capacity = 45 Tons.)

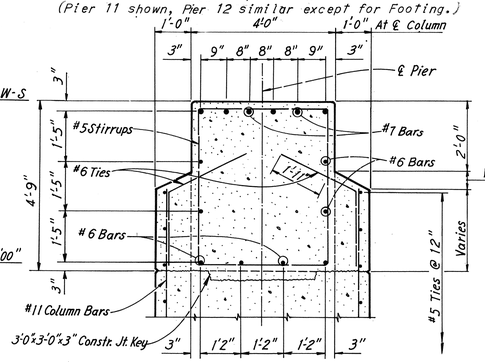
For Steel and Concrete quantities, see Sheet 2.



FOOTING PLAN
PIER 11
Scale: ¼"=1'-0"



FOOTING PLAN – PIER 12
Scale: ¼"=1'-0"



SECTION D-D
Scale: 1" = 1'-0"

Note
For Standard Shoe Details see Sheets S1 and S2
For Framing Plans see Sheet 16.
Estimated Pile Tip Elevation -18.00 for Pier 11.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	K C T	1-22-69	2	Footing Dowels	TEM	8-26-76
CHECKED	R C	2-1-69	1	Pad Elevations	TEM	8-26-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

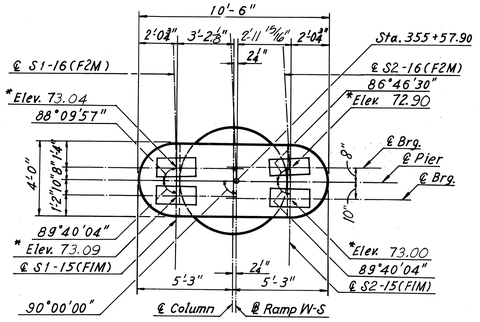
PIERS 11 AND 12

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE As Noted
CONTRACT NO. 11
SHEET NO. 10 OF 28

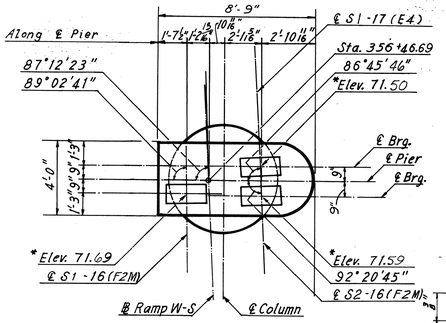
73

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	74	97



PIER CAP PLAN - PIER 13

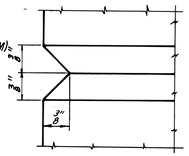
Scale: 1/4"=1'-0"



PIER CAP PLAN-PIER 14

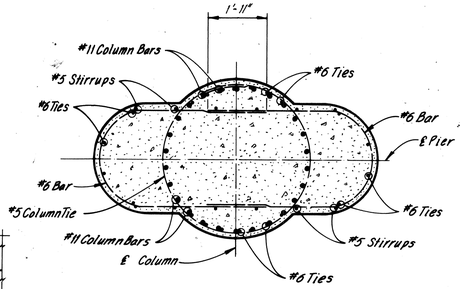
Scale: 1/4"= 1'-0"

* Denotes top elevation of pad.



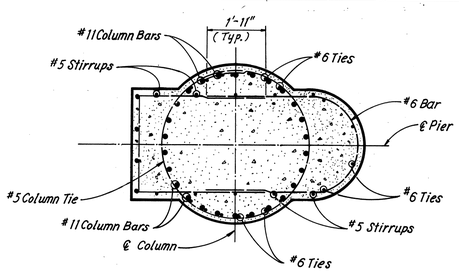
RUSTICATION DETAIL

Full Scale



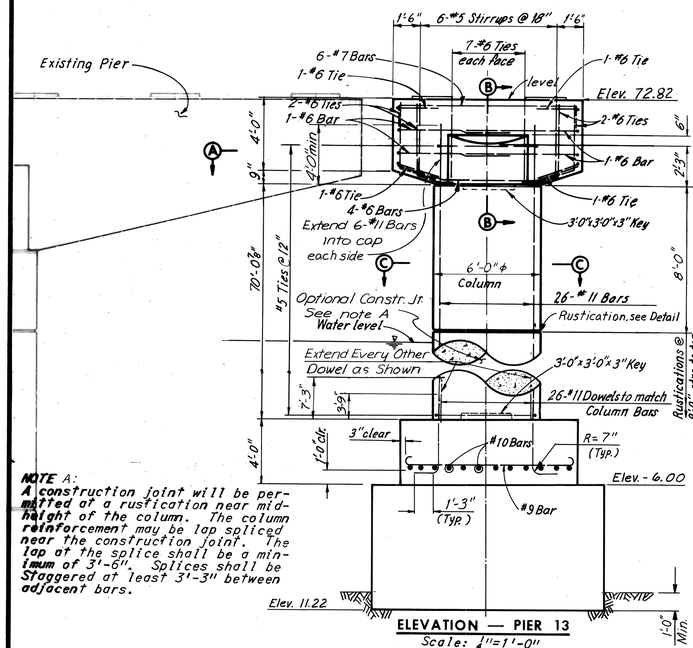
SECTION A-A

Scale: 3/8" = 1'-0"



SECTION D-D

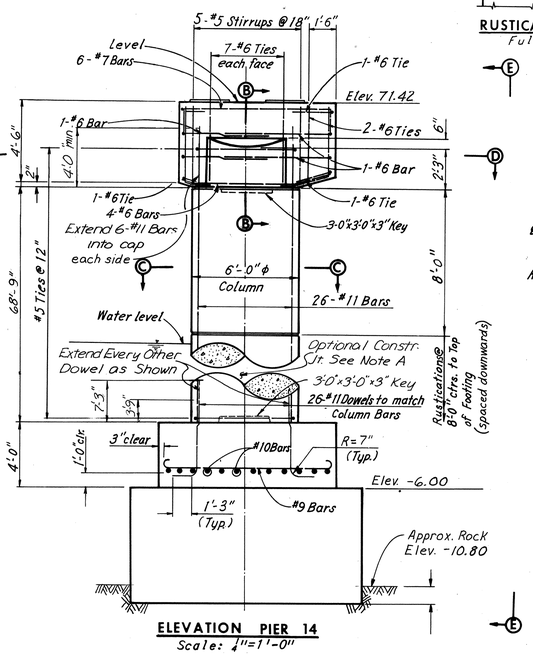
Scale: 3/8"=1'-0"



ELEVATION — PIER 13

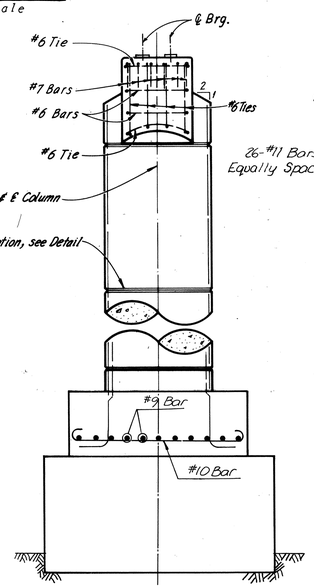
Scale: 1/4"=1'-0"

NOTE A:
A construction joint will be permitted at a rustication near mid-height of the column. The column reinforcement may be lap spliced near the construction joint. The lap at the splice shall be a minimum of 3'-6". Splices shall be Staggered at least 3'-3" between adjacent bars.



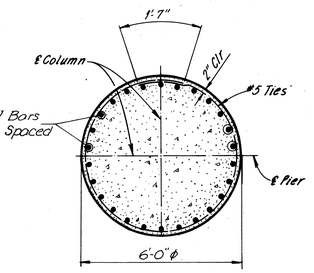
ELEVATION PIER 14

Scale: 1/4"=1'-0"



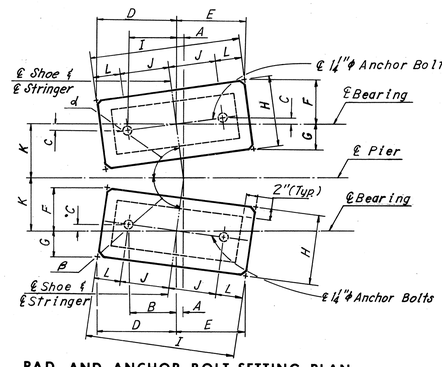
VIEW E-E

Scale: 1/4"=1'-0"



SECTION C-C

Scale: 3/8" = 1'-0"



PAD AND ANCHOR BOLT SETTING PLAN

NO Scale

DIMENSIONS FOR PAD AND ANCHOR BOLT SETTING PLAN

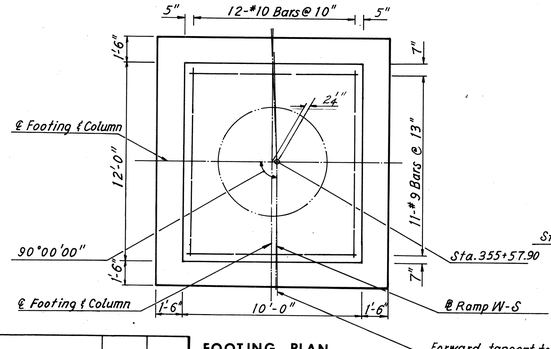
Pier	Stringer	d	B	A	B	C	D	E	F	G	H	I	J	K	L
13	S1-15	—	89°40'04"	15/16"	8"	1/16"	12 3/16"	12 1/2"	5 7/16"	5 3/8"	11 1/16"	2'-1"	8"	10"	4 1/2"
	S2-15	—	89°40'04"	1 1/16"	8"	1/16"	12 3/16"	12 1/2"	5 7/16"	5 3/8"	11 1/2"	2'-1 1/2"	8"	10"	4 1/2"
	S1-16	88°09'57"	—	1 1/16"	10 1/16"	3/16"	15 1/16"	14 3/8"	6"	5"	11"	2'-6"	10 1/2"	8"	4 1/2"
	S2-16	86°46'30"	—	1/16"	10 1/16"	3/16"	15 1/16"	14 1/2"	6 3/16"	4 3/8"	11"	2'-6"	10 1/2"	8"	4 1/2"
14	S1-16	—	90°57'19"	1 1/16"	10 1/16"	3/16"	15 1/16"	14 1/2"	5 3/16"	5 1/4"	11"	2'-6"	10 1/2"	9"	4 1/2"
	S2-16	—	92°20'45"	1 3/16"	10 1/16"	1/16"	15 1/16"	14 3/16"	6 1/16"	4 7/8"	11"	2'-6"	10 1/2"	9"	4 1/2"
	S1-17	86°45'29"	—	1 1/16"	10 1/16"	5/16"	15 1/16"	13 7/16"	7"	5 1/16"	12 1/2"	2'-5"	10 1/2"	9"	4"

Note:

Footing elevations are approximate only and may be varied to suit field conditions as directed by the Engineer. Vertical shaft reinforcing shall not be cut until these elevations are established. Where elevations change more than 2 ft. redesign will be required.

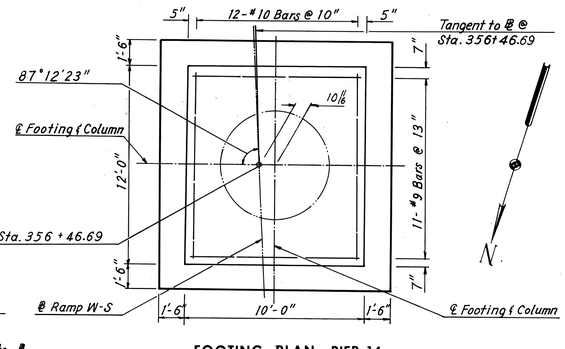
Overexcavation will not be permitted between existing pier and new pier.

Pier 13 and pier 14 are to match existing pier 48 and pier 46 respectively, The Contractor shall verify the stations in the Field.



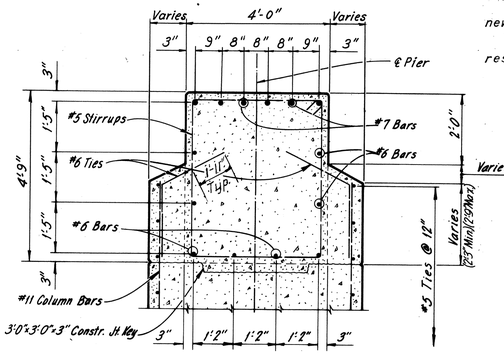
FOOTING PLAN PIER 13

Scale: 1/4"=1'-0"



FOOTING PLAN PIER 14

Scale: 1/4"=1'-0"



SECTION B-B

Scale: 1/2" = 1'-0"

For Standard Shoe Details, see Sheets S1 and S2.
For Framing Plans, see Sheet 16.
For Steel and Concrete quantities, see Sheet 2.

	BY	DATE				
MADE	KCT	1-28-69				
CHECKED	GSH	2-3-69	1	Pad Elevations Angle @ S1-17	T.E.M.	8-26-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

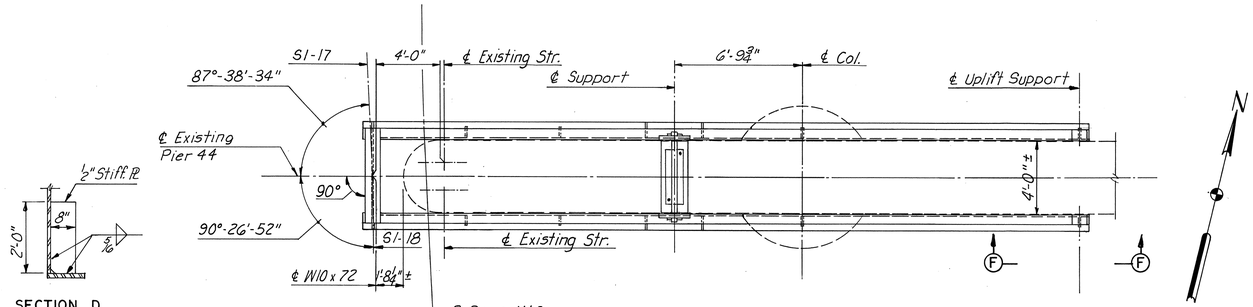
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

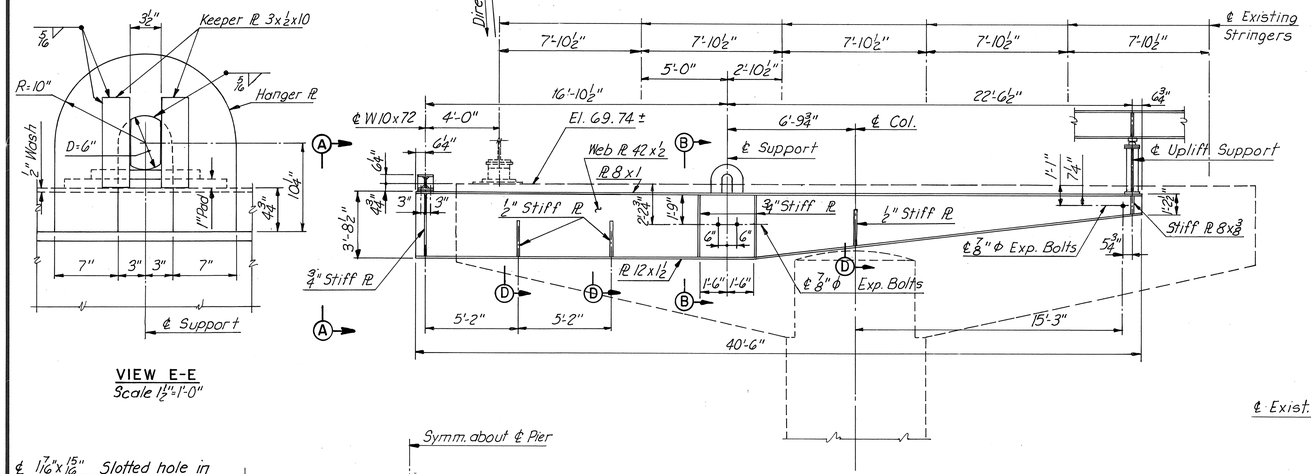
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
PIERS — 13 AND 14

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 11 OF 28

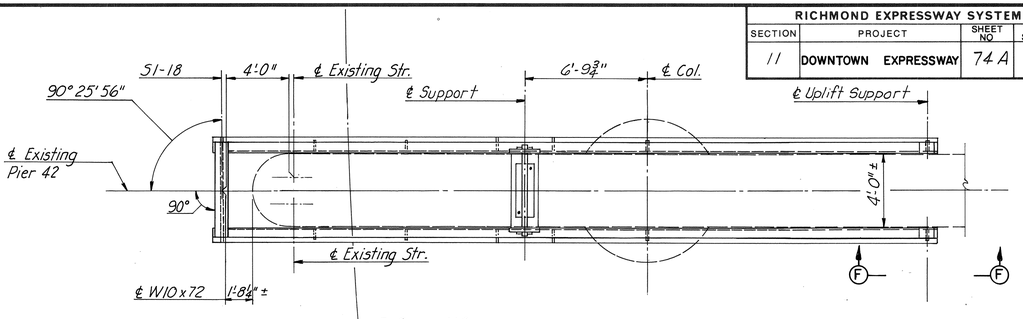
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	74A	97

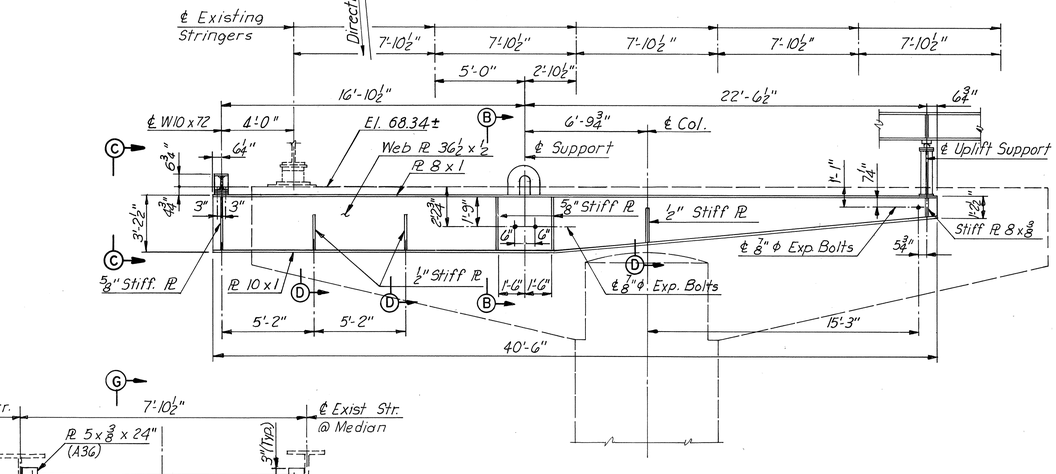




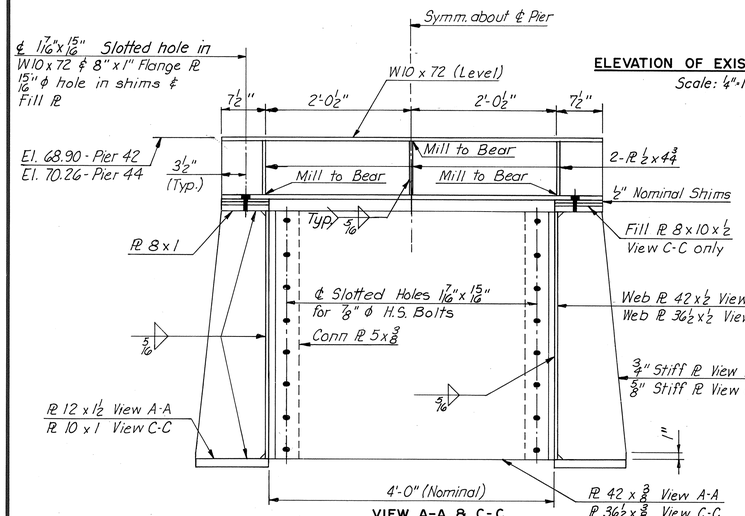
VIEW E-E
Scale 1½"=1'-0"

PLAN OF EXISTING PIER 44
Scale: ¼"=1'-0"



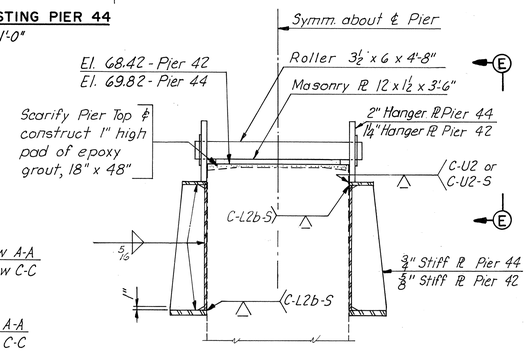


PLAN OF EXISTING PIER 42
Scale: ¼"=1'-0"

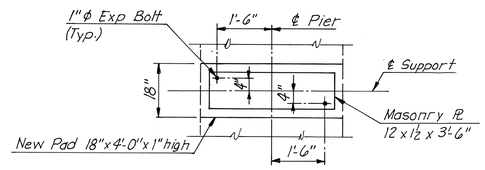


VIEW A-A & C-C
Scale: 1"=1'-0"

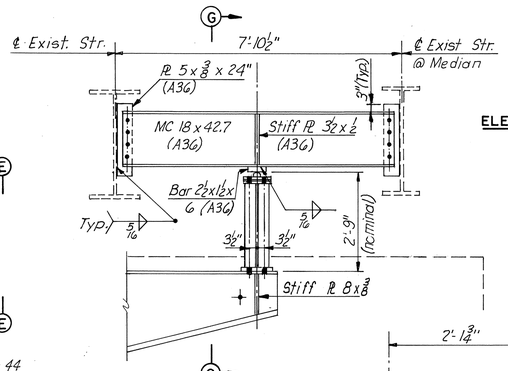
ELEVATION OF EXISTING PIER 44
Scale: ¼"=1'-0"



SECTION B-B
Scale: ½"=1'-0"

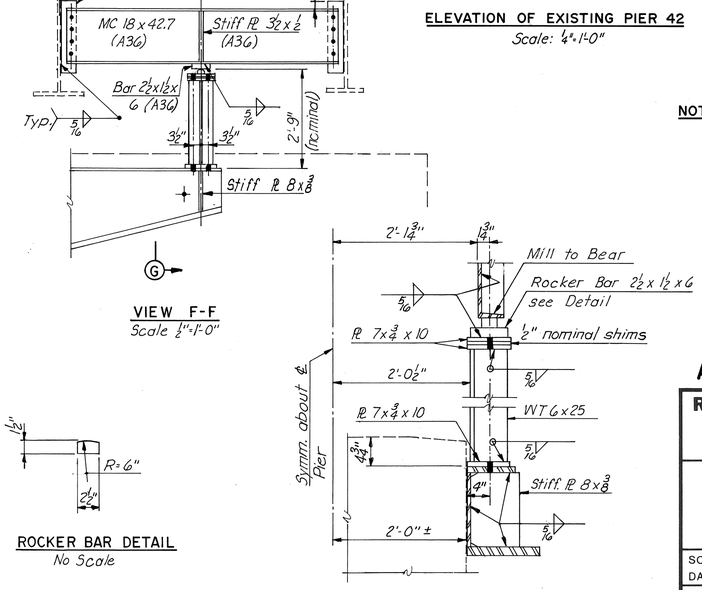


PAD PLAN
Scale ½":1'-0"



VIEW F-F
Scale ½"=1'-0"

ELEVATION OF EXISTING PIER 42
Scale: ¼"=1'-0"



SECTION G-G
Scale 1"=1'-0"

½"
R=6"
2½"

ROCKER BAR DETAIL
No Scale

NOTES:

Structural steel shall be A588 except as noted.

AS BUILT

DESIGNED						
DRAWN	TEM/dBP	8-11-75	2	Entire Sheet	TEM	10-76
CHECKED	PRY	10-15-76	1	New Sheet added	R.B.P.	
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

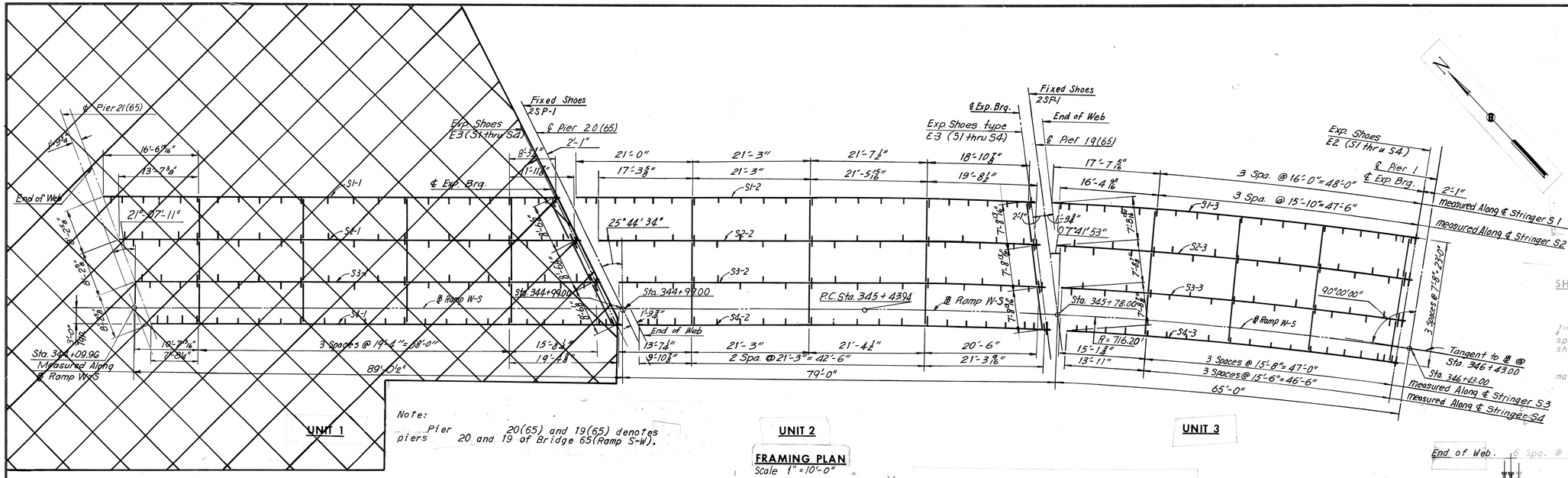
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND - PETERSBURG TURNPIKE
EXISTING PIERS 42 & 44 MODIFICATIONS

SCALE As Noted
DATE
SHEET 11A OF 28

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

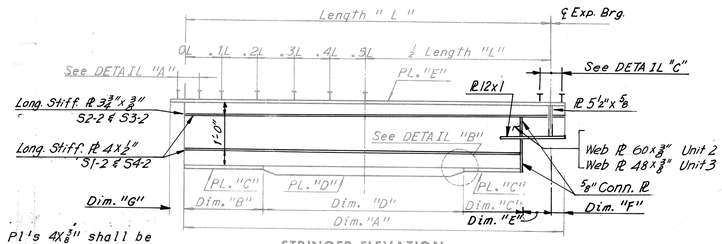
74A

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	75	97



Note:
Pier piers 20(65) and 19(65) denotes 20 and 19 of Bridge 65(Ramp S-W).

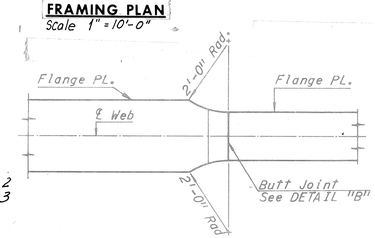
FRAMING PLAN
Scale 1" = 10'-0"



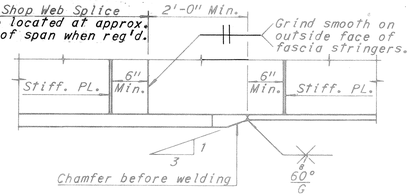
STRINGER ELEVATION
No Scale

Note: All horizontal dimensions are measured along ℄ Web.

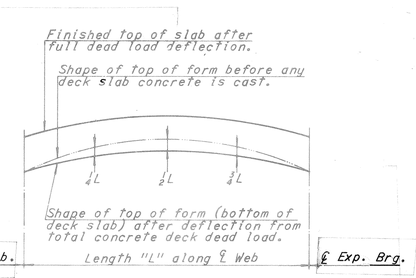
Note :
Intermediate stiffener Pl's 4X3/8" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the ends of stringers shall be one-half the normal spacing within the panel.



FLANGE PLATE SPLICE DETAIL
No Scale



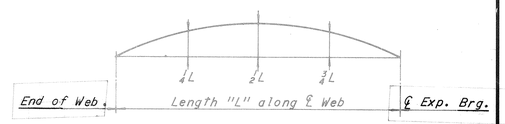
DETAIL "B"
No Scale



DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

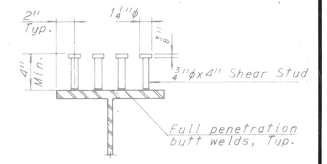
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.
Dimensions are in inches.

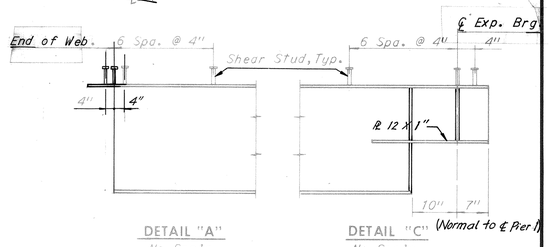


SHEAR STUD DETAIL
No Scale

SHEAR STUD NOTE

Contractor may, if he elects, use three 3/4" diameter studs at the same longitudinal spacing in lieu of the four 3/4" diameter studs shown.

Stud rows shall be placed parallel to the main deck reinforcement.



DETAIL "A"
No Scale

DETAIL "C" (Normal to ℄ Pier)
No Scale

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E2	4	Sp-1	4
E3	4		

Notes:
For Framing Details @ piers 20(65), 19(65) and 1, see Sheet 17.
For Diaphragm connections see Sheet 19.
For Shoe Details, see Sheet S1 and S2
For superstructure steel quantities, see sheet 2.
For joint details, see Sheet 25.
Exterior stringer longitudional stiffeners shall be located on the exterior face of the stringer.
Longitudional stiffeners not to be used in Unit 3.

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C"	PL. "D"	PL. "E"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE 1/4L	1/2L	3/4L	CAMBER SCHEDULE 1/4L	1/2L	3/4L
1	S1 - 1	83'-6 3/16"	82'-10 7/16"	9'-5 1/4"	8'-6 1/16"	64'-0"	11 1/8"	7 3/16"	6 11/16"	12 x 3/4"‡	12 x 1 1/8"	12 x 3/4"‡	11 1/2"	13 1/2"	17"	20 1/2"	24"	1"	1 3/8"	1"	1 3/8"	1 3/8"	1 3/8"
	S2 - 1	84'-3"	83'-7 1/4"	11'-3 5/8"	10'-4 5/8"	61'-0"	11 1/8"	7 3/16"	6 11/16"	12 x 3/4"‡	12 x 1 1/4"	12 x 3/4"‡	11 1/2"	14 1/2"	17 1/2"	20 1/2"	24"	11/16"	1 1/16"	11/16"	1 3/16"	1 3/16"	1 3/16"
	S3 - 1	84'-11 13/16"	84'-4 1/16"	11'-8 1/16"	10'-8 5/8"	61'-0"	11 1/8"	7 3/16"	6 11/16"	12 x 3/4"‡	12 x 1 1/4"	12 x 3/4"‡	11 1/2"	14 1/2"	17 1/2"	20 1/2"	24"	1 1/16"	1 1/16"	11/16"	1 3/16"	1 3/16"	1 3/16"
	S4 - 1	85'-8 3/8"	85'-0 7/8"	10'-6 7/16"	9'-7 5/16"	64'-0"	11 1/8"	7 3/16"	6 11/16"	12 x 3/4"‡	12 x 1 3/4"	12 x 3/4"‡	11 1/2"	13 1/2"	17"	20 1/2"	24"	1 1/8"	1 9/16"	1 1/8"	1 1/2"	2 1/16"	1 1/2"
2	S1 - 2	83'-4 1/8"	82'-9 3/8"	12'-10 11/16"	12'-0 13/16"	57'-0"	10 1/8"	7 1/16"	6 11/16"	12 x 3/4"	12 x 1 1/4"	12 x 3/4"	12 1/2"	14 1/2"	17 1/2"	21 1/2"	24"	3/4"	1 1/16"	3/4"	1 5/16"	2 1/16"	1 1/16"
	S2 - 2	80'-4 1/8"	79'-9 1/16"	14'-4 1/2"	13'-6 3/16"	51'-0"	10 1/8"	7 1/16"	6 11/16"	12 x 3/4"	12 x 1 1/4"	12 x 3/4"	13"	14 1/2"	18"	21 1/2"	24"	11/16"	1"	11/16"	1 1/4"	1 5/16"	1 7/16"
	S3 - 2	77'-3 15/16"	76'-8 3/4"	—	—	75'-10 5/8"	10 1/8"	7 1/16"	6 11/16"	—	12 x 1 1/4"	12 x 3/4"	13 1/2"	15 1/2"	17 1/2"	20 1/2"	24"	5/8"	7/8"	5/8"	1 1/8"	1 3/16"	1 3/8"
	S4 - 2	74'-3 1/2"	73'-8 1/16"	—	—	72'-10 5/8"	10 1/8"	7 1/16"	6 11/16"	—	12 x 1 3/8"	12 x 3/4"	13"	15"	17 1/2"	21"	24"	1/2"	11/16"	1/2"	1 1/16"	1 9/16"	1 3/16"
3	S1 - 3	66'-2 3/8"	65'-7 5/8"	10'-3 3/8"	9'-5 7/16"	45'-0"	10"	7"	6 1/16"	12 x 1"	16 x 1 1/4"	12 x 3/4"	10"	11 1/2"	14"	17"	22"	1/2"	11/16"	1/2"	1 3/8"	2 3/8"	1 5/8"
	S2 - 3	64'-5 5/8"	63'-10 3/8"	9'-11 1/4"	9'-1 5/16"	44'-0"	10"	7"	6 1/16"	12 x 1"	16 x 1 1/4"	12 x 3/4"	10 1/2"	12"	14"	16"	19 1/4"	7/16"	5/8"	7/16"	1 9/16"	2 1/16"	1 7/16"
	S3 - 3	62'-8 3/4"	62'-1 3/4"	11'-0 7/8"	10'-2 7/16"	40'-0"	10"	7"	6 1/16"	12 x 1"	16 x 1 1/8"	12 x 3/4"	12"	13 1/2"	16"	18 1/4"	22"	3/8"	9/16"	3/8"	1 1/16"	1 1/2"	1 1/16"
	S4 - 3	61'-0"	60'-5"	—	—	59'-7"	10"	7"	6 1/16"	—	12 x 1 1/4"	12 x 3/4"	12"	14"	16"	19 1/2"	24"	5/16"	7/16"	5/16"	3/4"	1"	3/4"

Note : All steel shall be A36 unless shown otherwise.

* Spacing begins at termination of 6 spaces @ 4"
‡ Denotes A572-Grade 50 Steel for thickness of 3/4" and under and A588 Steel for thickness over 3/4".

Note: For web to flange weld sizes and horizontal plate stiffener details see Sheet 13.

	BY	DATE
MADE	GSH	12-1068
CHECKED	JD	4-28-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Stringer Elev. Diaph. locat. Unit 3	T.E.M.	8-26-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

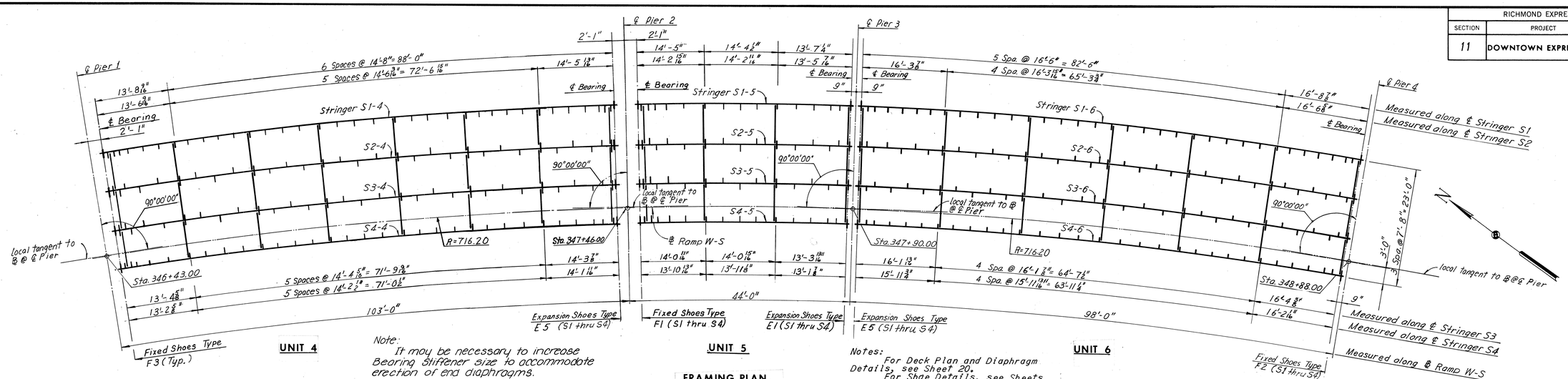
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN UNITS 1,2 AND 3

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 12 OF 28

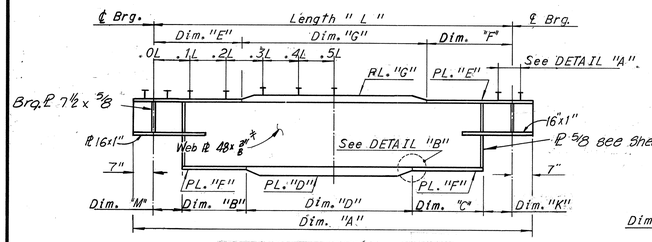
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	76	97



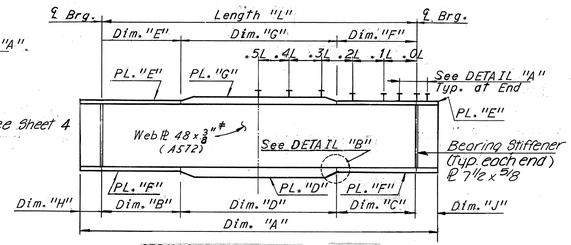
Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

FRAMING PLAN
Scale: 1" = 10'-0"

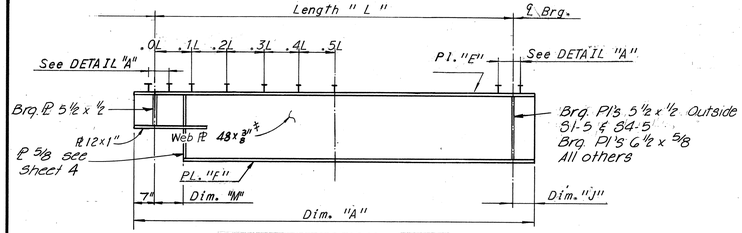
Notes:
For Deck Plan and Diaphragm Details, see Sheet 20.
For Shoe Details, see Sheets S1 and S2.
For Superstructure Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 25.



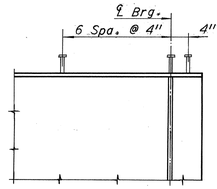
STRINGER ELEVATION - UNIT 4
No Scale



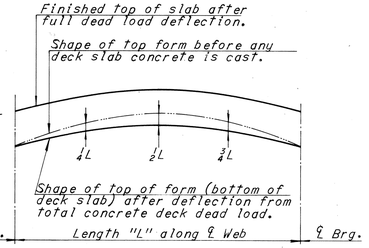
STRINGER ELEVATION UNIT 6
No Scale



STRINGER ELEVATION - UNIT 5
No Scale



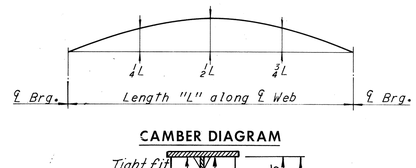
DETAIL "A"
No Scale



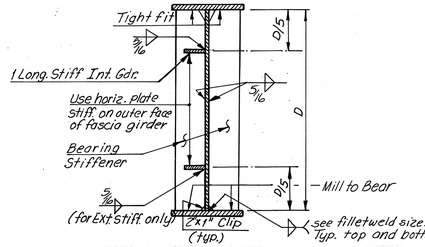
DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.
In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.
Note:
For "Note to Fabricator" see Sheet 12.

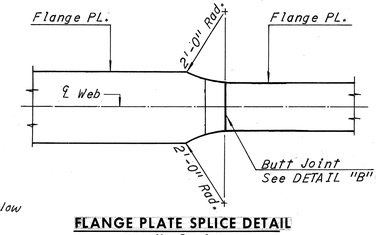


CAMBER DIAGRAM

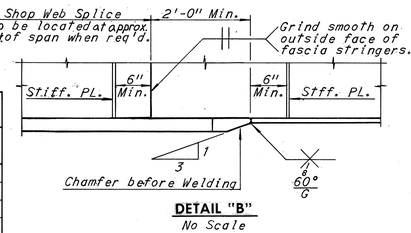


WEB TO FLANGE WELDS AND LONGITUDINAL STIFFENER WELD DETAILS
(No scale)

Note:
Web to flange weld size shall be determined by flange thickness as follows:
To 1½" ..... 5/16 weld
over 1½ to 2½" ..... 3/8 weld
over 2½" ..... ½ weld



FLANGE PLATE SPLICE DETAIL
No Scale



DETAIL "B"
No Scale

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
	4		4
	8		4
–	–	F3	4
–	–	–	–

STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	Dim. "H"	Dim. "J"	Dim. "K"	Dim. "M"	PL. "D"‡	PL. "E"‡	PL. "F"‡	PL. "G"‡	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	DEAD LOAD DEFLECTION SCHEDULE ¼L	½L	¾L	CAMBER SCHEDULE ¼L	½L	¾L
4	S1 - 4	102'-10 13/16"	101'- 8 9/16"	19'- 0 1/4"	19'- 0 5/8"	62'-0"	19'- 10 1/4"	19'-10 5/8"	62'-0"	—	—	10"	10"	24 x 1 1/2"	16 x 7/8"	20 x 1 3/8"	16 x 1 1/4"	9 1/2"	11"	13 1/2"	17"	22"	1 3/4"	2 7/16"	1 3/4"	3 7/16"	4 11/16"	3 5/16"
	S2 - 4	101'- 9 3/8"	100'- 7 5/16"	18'- 5 11/16"	18'- 5 5/16"	62'-0"	19'- 3 5/16"	19'- 3 5/8"	62'-0"	—	—	10"	10"	20 x 1 1/4"	12 x 3/4"	16 x 1 3/8"	16 x 7/8"	10"	11 1/4"	14"	17"	21"	2 1/16"	2 7/8"	2 1/16"	3 13/16"	5 3/16"	3 11/16"
	S3 - 4	100'- 8 5/8"	99'- 6 11/16"	18'- 11 1/4"	18'- 11"	60'-0"	49'- 9 11/16"	49'- 0"	–	–	–	10"	10"	16 x 1 5/8"	12 x 3/4"	16 x 1 1/4"	–	11"	12 1/4"	15 1/2"	18 1/2"	22 1/2"	2 1/8"	3"	2 1/8"	3 7/8"	5 1/16"	3 3/4"
	S4 - 4	99'- 6 15/16"	98'- 4 13/16"	20'- 4 7/16"	20'- 4 3/8"	56'-0"	49'- 2 7/16"	49'- 2 3/8"	–	–	–	–	10"	16 x 1 1/8"	12 x 3/4"	12 x 1"	–	10"	13"	16 1/2"	19 1/2"	24"	1 15/16"	2 11/16"	1 15/16"	3 7/16"	4 11/16"	3 3/8"
5	S1 - 5	43'- 7 3/4"	42'- 4 3/4"	—	—	—	—	—	—	—	8"	—	10"	—	12 x 3/4"	12 x 3/4"	—	24"	24"	24"	24"	24"	1 8"	3/4"	1 8"	1 8"	3/4"	1 8"
	S2 - 5	43'- 1 3/4"	41'- 11 1/4"	—	—	—	—	—	—	—	7"	—	10"	—	12 x 3/4"	12 x 3/4"	—	24"	24"	24"	24"	24"	1 8"	1 8"	1 8"	1 8"	3/16"	1 8"
	S3 - 5	42'- 7 7/16"	41'- 5 7/16"	—	—	—	—	—	—	—	7"	—	10"	—	12 x 3/4"	12 x 3/4"	—	24"	24"	24"	24"	24"	1 8"	1 8"	1 8"	1 8"	3/16"	1 8"
	S4 - 5	42'- 2 15/16"	40'-11 15/16"	—	—	—	—	—	—	—	8"	—	10"	—	12 x 3/4"	12 x 3/4"	—	24"	24"	24"	24"	24"	1 16"	1 8"	1 16"	1 8"	1 8"	1 8"
6	S1 - 6	100'-6 3/4"	99'-2 3/4"	22'-7 1/16"	22'-7 1/16"	54'-0"	18'-1 7/16"	18'-1 7/16"	63'-0"	8"	8"	—	—	16 x 2 5/8"	12 x 1 1/4"	16 x 2"	12 x 1 5/8"	7 1/2"	9"	12"	16"	21 1/2"	1 1/2"	2 1/8"	1 1/2"	2"	2 3/4"	2"
	S2 - 6	99'-4 1/4"	98'-2 1/4"	24'-1 1/16"	24'-1 1/16"	50'-0"	22'-1 1/16"	22'-1 1/16"	54'-0"	7"	7"	—	—	16 x 1 1/8"	12 x 1 1/4"	16 x 1 3/4"	12 x 1 5/8"	9"	10"	13 1/2"	17"	22"	1 1/2"	2 1/8"	1 1/2"	1 15/16"	2 3/4"	1 15/16"
	S3 - 6	98'-3 7/16"	97'-1 7/16"	20'-10 3/8"	20'-0 7/8"	57'-0"	48'-6 5/16"	48'-6 1/4"	—	7"	7"	—	—	16 x 1 1/8"	12 x 1 1/4"	16 x 1 3/4"	—	9 1/2"	11"	14 1/2"	18"	23"	1 1/2"	2 1/16"	1 1/2"	1 7/8"	2 7/8"	1 7/8"
	S4 - 6	97'-5 7/16"	96'-1 7/16"	22'-0 7/8"	22'-0 7/8"	52'-0"	48'-0 9/16"	48'-0 1/2"	—	8"	8"	—	—	16 x 1 5/8"	12 x 3/4"	16 x 1 1/8"	—	9 1/2"	11 1/2"	14 1/2"	19"	24"	1 3/8"	2 1/4"	1 3/8"	1 15/16"	2 11/16"	1 15/16"

* Spacing begins at termination of 6 spaces @ 4".
‡ Denotes A572-Grade 50 steel for thickness of ¾" and under and A588 steel for thickness over ¾".

Notes:
All horizontal dimensions are measured along ℄ of web.
All steel shall be A36 unless otherwise shown.
All intermediate stiffeners shall be 4x3/8" unless where the width of top flange plate is 20" or over, Pls 5x5/8" shall be used.

The intermediate stiffeners shall be equally spaced between diaphrams as shown. The first two intermediate stiffener spaces at the ends of stringers shall be one-half the normal spacing whthin the panel.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	GSH	12-09-68				
CHECKED	PTA	4-29-69	1	Diaph. locat. Unit 4 & 5	TEM	8-26-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

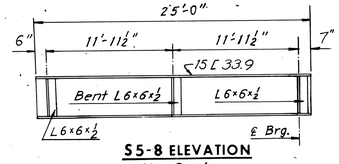
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN - UNITS 4, 5 AND 6

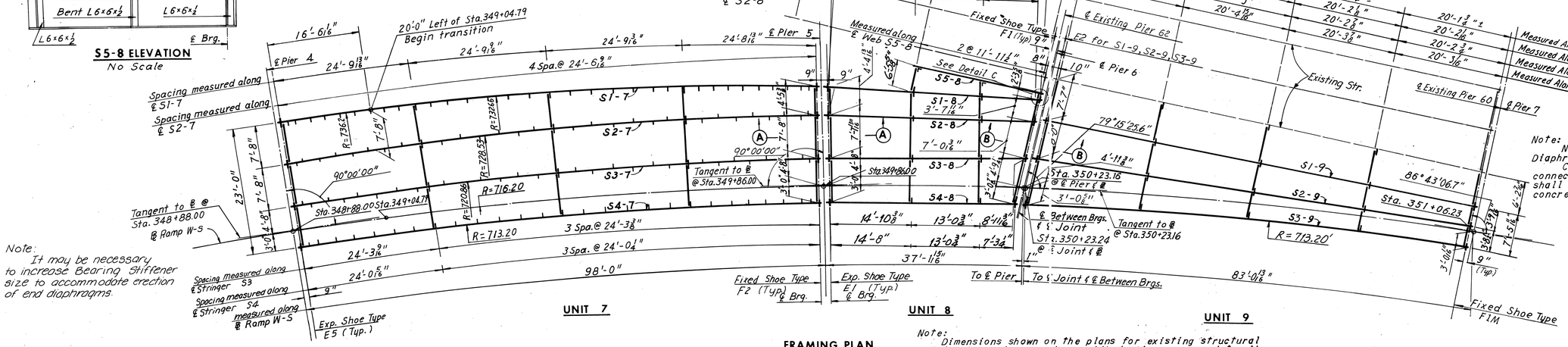
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 13 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	77	97



S5-8 ELEVATION
No Scale



UNIT 7 | UNIT 8 | UNIT 9

FRAMING PLAN
Scale: 1"=10'-0"

Note:
It may be necessary to increase Bearing Stiffener size to accommodate erection of end diaphragms.

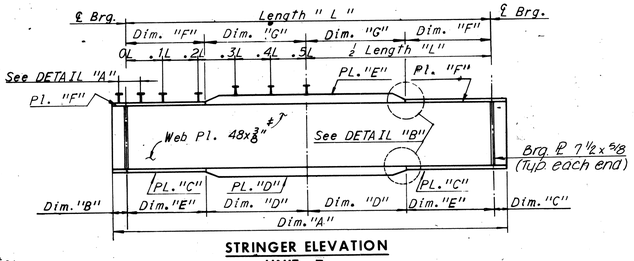
Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

UNIT 9

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure. Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.

SHOE SCHEDULE

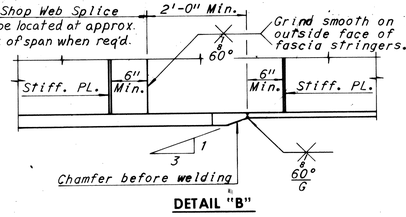
EXPANSION SHOE		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	4	F1	4
E2	3	F2	4
E5	4	F1M	3



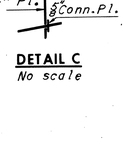
STRINGER ELEVATION
UNIT 7
No Scale

Note:
Detail " A " see Sheet 13.

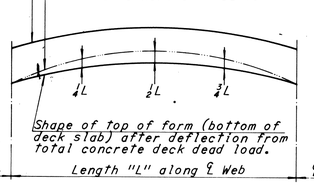
Note:
All horizontal dimensions are measured along ℄ Web.



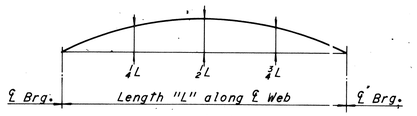
DETAIL "B"



DETAIL C
No scale



DEAD LOAD DEFLECTION DIAGRAM



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Dimensions are in inches.

NOTE TO CONTRACTOR

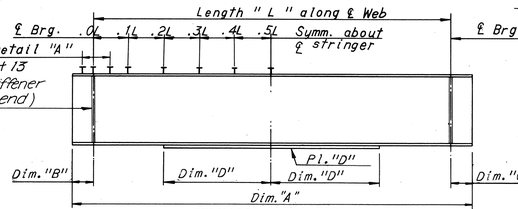
Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.

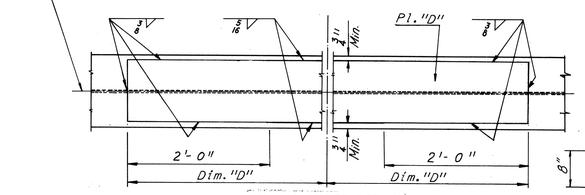
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 21.

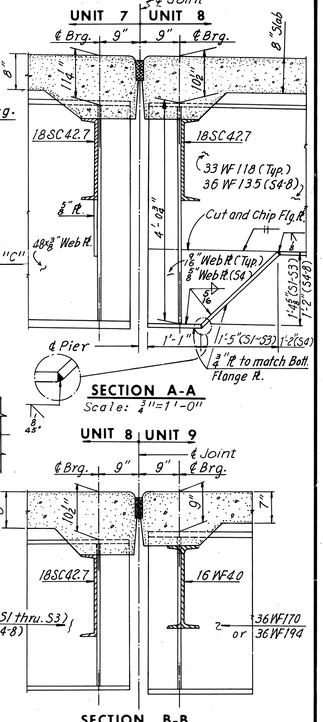
Note:
For web to flange weld sizes and horizontal plate stiffener details see Sheet 13.



STRINGER ELEVATION
UNIT 8 AND 9
No Scale



COVER PLATE DETAIL
No Scale



STRINGER SCHEDULE

UNIT	STRINGER	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	Dim. "F"	Dim. "G"	PL. "C" or Rolled sect.	PL. "D"	PL. "E"	PL. "F"	MAX. SHEAR STUD SPACING 0.0L-0.1L	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
7	S1-7	100'-5 13/16"	99'-1 13/16"	8"	8"	27'-0"	22'-6 11/16"	18'-0 15/16"#	31'-6"	16x2" #	16x2 25/32"#	12x1 3/32"#	12x1 1/4"#	7½"	9"	12"	16"	21½"
	S2-7	99'-4½"	98'-2½"	7"	7"	25'-0"	24'-1½"	22'-1 7/8"#	27'-0"	16x1 31/32"#	16x2 11/16"#	12x1 5/16"#	12x1 1/8"#	9"	10"	13½"	17"	22"
	S3-7	98'-3 11/16"	97'-1 11/16"	7"	7"	28'-6"	20'-0 15/16"	48'-6 15/16"	—	16x1 31/32"#	16x1 7/8"#	—	12x1 1/4"#	9½"	11"	14½"	18"	23"
	S4-7	97'-5 5/16"	96'-1 5/8"	8"	8"	26'-0"	22'-0½"	48'-0½"	—	16x1 7/8"#	16x1 7/8"#	—	12x 3/4"#	9½"	11½"	14½"	19"	24"
8	S1-8	40'-9 11/16"	39'-5 7/8"	8"	8 1/8"	—	—	—	—	33WF118	—	—	—	24"	24"	24"	24"	24"
	S2-8	39'-8 3/4"	38'-6 3/8"	7"	7 1/8"	—	—	—	—	33WF118	—	—	—	24"	24"	24"	24"	24"
	S3-8	38'-0 7/16"	36'-10 5/16"	7"	7 1/8"	—	—	—	—	33WF118	—	—	—	24"	24"	24"	24"	24"
	S4-8	36'-4 3/16"	35'-0"	8"	8 3/16"	—	—	—	—	36WF135	—	—	—	24"	24"	24"	24"	24"
	S5-8	25'-0"	—	—	—	—	—	—	—	15 L 33.9	—	—	—	—	—	—	—	—
9	S1-9	81'-10½"	80'-8½"	7"	7"	32'-0"	—	—	—	36WF170	10½x 1"	—	—	10"	11½"	13½"	16"	19"
	S2-9	82'- 1½"	80'-11½"	7"	7"	32'-0"	—	—	—	36WF170	10½x 1"	—	—	10"	11½"	13½"	16"	19"
	S3-9	82'-10 3/16"	81'-6¼"	8"	8"	32'-0"	—	—	—	36WF194	10½x 1½"	—	—	12"	13½"	16"	19½"	24"

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
¼L	½L	¾L	¼L	½L	¾L
1 3/8"	1 7/8"	1 5/16"	1 7/16"	2 1/16"	1 7/16"
1 7/16"	2"	1 3/8"	1"	1 5/8"	1 1/8"
1 1/2"	2 1/16"	1 1/8"	11/16"	1 1/16"	3/4"
1 3/8"	2 1/8"	1 5/8"	9/16"	5/8"	1/2"
3/16"	5/16"	3/16"	1/8"	3/8"	1/4"
1/8"	3/16"	1/8"	5/16"	1/4"	3/16"
1/8"	3/16"	1/8"	5/16"	1/4"	3/16"
1/16"	1/8"	1/16"	1/8"	1/8"	1/8"
—	—	—	1/16"	1/8"	3/16"

Note:
All Steel shall be A-36 unless denoted otherwise.

Note:
Intermediate stiffener Pls. 4x⅜" shall be equally spaced between diaphragms as shown. The first two stiffener spaces at the end of stringers shall be one-half the normal spacing within the panel.

* Spacing begins at termination of 6 spaces @ 4".
# Denotes A572-Grade 50 steel for thicknesses of ¾" and under and A588 Steel for thicknesses over ¾".

Notes:
For Superstructure Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 25.
For Shoe Details, see Sheet S1 and S2.
For Diaphragm Details, see Sheet 21.
For Shear Stud Details, see Sheet 12

AS BUILT

	BY	DATE
MADE	K.C.T	11-12-68
CHECKED	D.E.S.	1-1369
IN CHARGE		

NO.	REVISION	BY	DATE
1	Deleted end diaph. conn to ℄ shoe rate U.S	T.E.M.	8-26-75

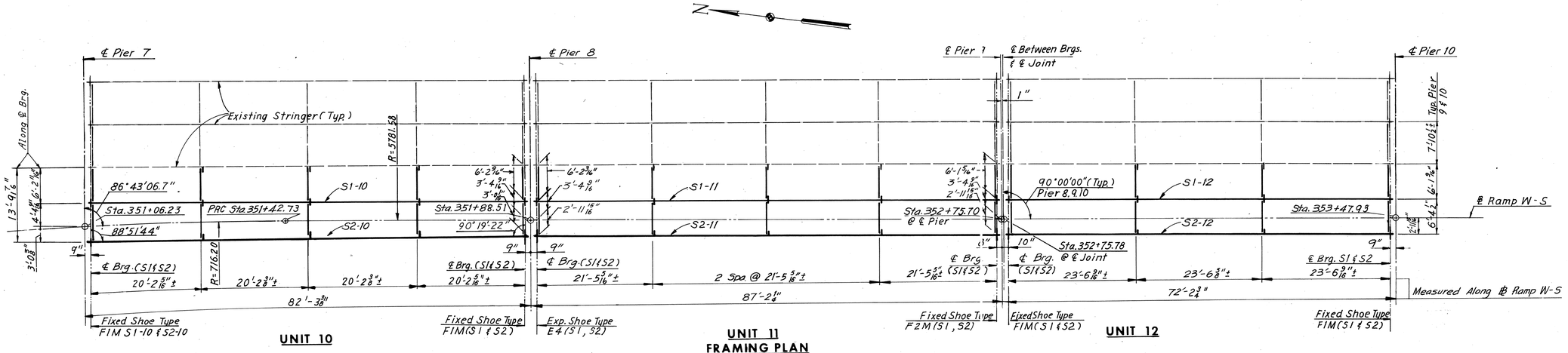
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 7, 8 AND 9

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

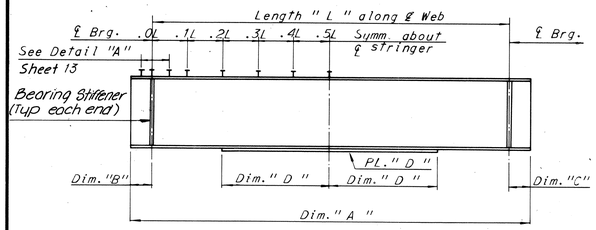
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 14 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	78	97

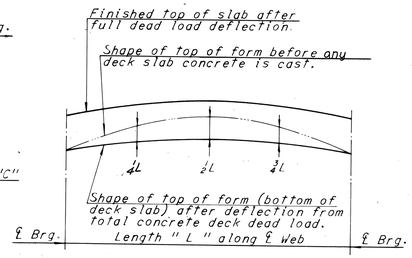


UNIT 10 **UNIT 11** **UNIT 12**

FRAMING PLAN
Scale : 1" = 10'-0"



STRINGER ELEVATION
No Scale

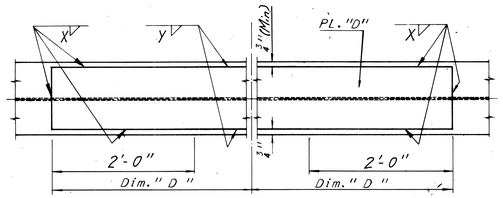


DEAD LOAD DEFLECTION DIAGRAM

NOTE TO CONTRACTOR

Deflections given are those anticipated to occur in the stringer upon placement of the total concrete deck dead load.

In practice, the stringers in place are not likely to have the exact camber to compensate for these deflections during construction. The residual amounts shall be provided by adjusting forms to vary the thickness of the concrete haunch between the bottom of the slab and the top of stringer without altering the slab thickness.



COVER PLATE DETAIL
No Scale

Unit	Stringer	X	Y
10	S1-10	1/2	3/16
	S2-10	5/8	3/8
11	S1-11	5/8	3/16
	S2-11	5/8	3/8
12	S1-12	3/8	5/16
	S2-12	7/16	3/16

STRINGER SCHEDULE

UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	PL."D"	MAX. SHEAR STUD SPACING 0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L
10	S1-10	36 WF 150	81'-10 1/2"	80'-8 1/2"	7"	7"	28'-9"	10 1/2 X 1 3/8"	19"	20"	24"	24"	24"
	S2-10	36 WF 170	81'-11 3/4"	80'-9 3/4"	7"	7"	28'-9"	10 1/2 X 1 5/8"	20"	21"	24"	24"	24"
11	S1-11	36 WF 160	86'-10 5/8"	85'-8 5/8"	7"	7"	30'-6"	10 1/2 X 1 1/2"	21"	22"	24"	24"	24"
	S2-11	36 WF 194	86'-11 3/4"	85'-9 3/4"	7"	7"	29'-0"	10 1/2 X 1 3/4"	23"	24"	24"	24"	24"
12	S1-12	36 WF 135	71'-9 1/4"	70'-7 1/4"	7"	7"	23'-6"	10 1/2 X 7/8"	20"	22"	23"	24"	24"
	S2-12	36 WF 135	71'-10 3/16"	70'-8 3/16"	7"	7"	24'-6"	10 1/2 X 1 1/8"	21"	22"	24"	24"	24"

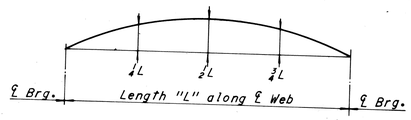
* Spacing begins at termination of 6 spaces @ 4".

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
1/4L	1/2L	3/4L	1/4L	1/2L	3/4L
1/4"	1 3/4"	1/4"	1 11/16"	2 5/16"	1 5/8"
1/4"	1 3/8"	1/4"	1 5/8"	2 3/8"	1 5/8"
1 7/16"	2"	1 7/16"	1 15/16"	2 3/4"	2"
1 5/16"	1 15/16"	1 5/16"	1 7/8"	2 5/8"	1 7/8"
7/8"	1 1/4"	7/8"	1 3/16"	1 5/8"	1 3/16"
1"	1 3/8"	1"	1 3/16"	1 11/16"	1 3/16"

Notes :
All steel shall be A-36 unless denoted otherwise.
For Superstructure Steel Quantities, see Sheet 2.
For Joint Details, see Sheet 25.
For New Shoe Details, see Sheet S1 and S2.
For Diaphragm Details, see Sheet 22.
For Shear Stud Detail, see Sheet 12.

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure. Connection bolts for the new Diaphragms connecting Bridge 68 to the existing structure, shall not be fully tightened before new concrete deck slab has been placed.



CAMBER DIAGRAM

NOTE TO FABRICATOR

The stringers shall be fabricated with an upward camber, amounting to the tabulated value. This will provide approximate compensation for deflection under full dead load and for comformity with finished grade.

Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.

If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in Cross-Section on Sheet 22.

SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E4	2	F1M	8
—	—	F2M	2

	BY	DATE
MADE	SCC	11-12-68
CHECKED	D.E.S.	1-15-69
IN CHARGE		

NO.	REVISION	BY	DATE
1	Deleted end diaph. conn. @ exist str.	TEM	8-26-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
FRAMING PLAN - UNITS 10, 11 AND 12

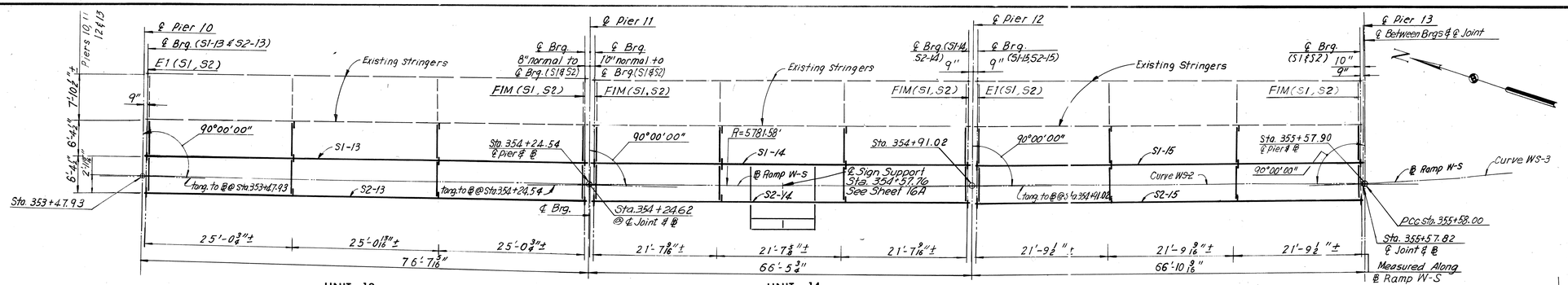
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 15 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	79	97

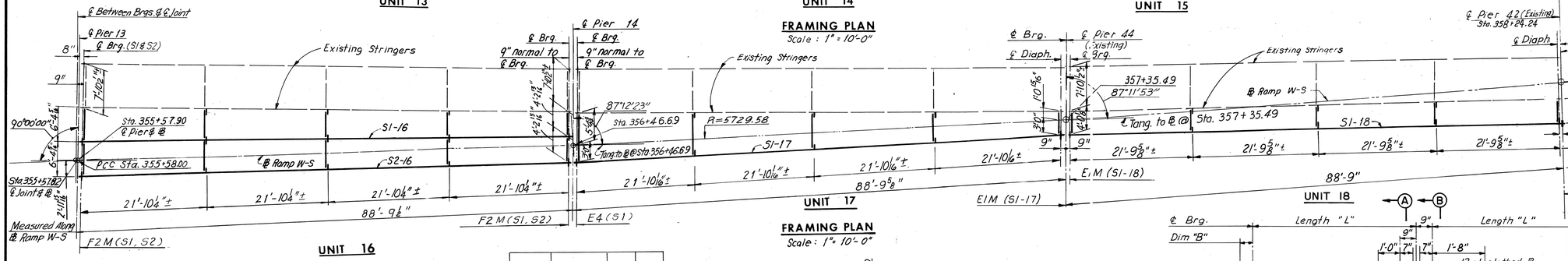
SHOE SCHEDULE

EXPANSION SHOES		FIXED SHOES	
TYPE	NO. REQD.	TYPE	NO. REQD.
E1	4	F1M	8
E4	1	F2M	4
E1M	3		

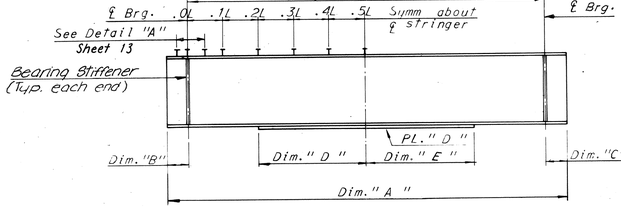


FRAMING PLAN
Scale : 1" = 10'-0"

Note:
New Diaphragms are to match the existing Diaphragms on R. F. Turnpike structure.
Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.

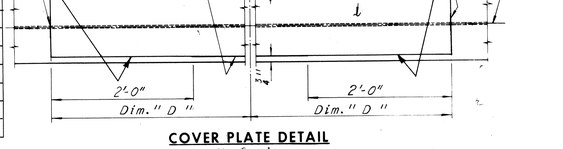


FRAMING PLAN
Scale : 1" = 10'-0"



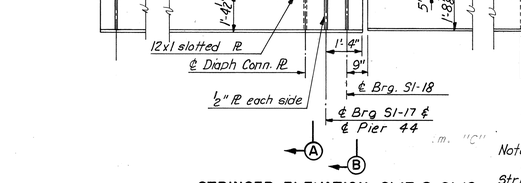
STRINGER ELEVATION UNITS 13 THRU 16
No Scale

Unit	Stringer	X	Y
13	S1-13	7/16	5/16
	S2-13	7/16	5/16
14	S1-14	5/16	5/16
	S2-14	5/16	5/16
15	S1-15	5/16	5/16
	S2-15	5/16	5/16
16	S1-16	½	5/16
	S2-16	⅝	⅜
17	S1-17	⅝	⅜
18	S1-18	⅜	5/16



COVER PLATE DETAIL
No Scale

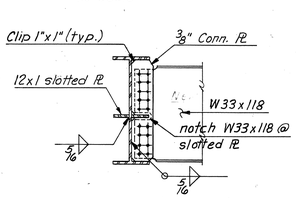
Note:
Stringers having a total camber of less than 1" are not required to be shop cambered, but should be turned so that any mill tolerance deviation from straightness will be in the direction shown by the Camber Diagram.
If stringers are not cambered, distance top of stringers to top of slab will vary along the stringer in accordance with the offset dimensions shown in the Camber Diagram, and with minimum distance as shown in cross-section on Sheet 23 .
(Typical all A36 WF except as shown otherwise.)



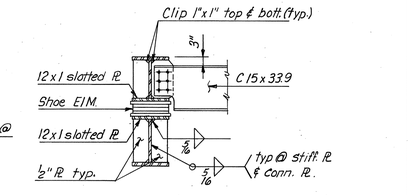
STRINGER ELEVATION S1-17 & S1-18
No Scale

Note:
For Details not shown see Stringer Elevation Unit 13 thru 16.

SECTION C-C
Scale ½"=1'-0"



SECTION A-A
Scale ½"=1'-0"



SECTION B-B
Scale ½"=1'-0"

STRINGER SCHEDULE											MAX. SHEAR STUD SPACING					DEAD LOAD DEFLECTION SCHEDULE			CAMBER SCHEDULE		
UNIT	STRINGER	STRINGER SIZE	Dim. "A"	LENGTH "L"	Dim. "B"	Dim. "C"	Dim. "D"	Dim. "E"	PL. "D"		0.0L-0.1L*	0.1L-0.2L	0.2L-0.3L	0.3L-0.4L	0.4L-0.5L	¼L	½L	¾L	¼L	½L	¾L
13	S1-13	36 WF 135	76'-3 13/16"	75'-11 13/16"	7"	7"	26'-3"	26'-3"	10½x1⅛"		20"	21"	24"	24"	24"	1 1/16"	1½"	1 1/16"	1 3/8"	1 15/16"	1 3/8"
	S2-13	36 WF 150	76'-4 13/16"	75'-2 13/16"	7"	7"	26'-0"	26'-0"	10½x1¼"		22"	23"	24"	24"	24"	1 1/16"	1½"	1 1/16"	1 3/8"	1 15/16"	1 3/8"
14	S1-14	36 WF 135	66'-0 5/16"	64'-10 5/16"	7"	7"	18'-6"	18'-6"	10½x⅞"		20"	22"	23"	24"	24"	¾"	1"	¾"	15/16"	1 5/16"	15/16"
	S2-14	36 WF 135	66'-1 9/16"	64'-11 7/16"	7"	7"	20'-6"	20'-6"	10½x⅞"		21"	22"	24"	24"	24"	¾"	1 1/16"	¾"	1"	1 3/8"	1"
15	S1-15	36 WF 135	66'-5⅛"	65'-3⅜"	7"	7"	18'-6"	18'-6"	10½x⅞"		20"	22"	23"	24"	24"	¾"	1"	¾"	15/16"	1¼"	15/16"
	S2-15	36 WF 135	66'-6"	65'-4"	7"	7"	20'-6"	20'-6"	10½x⅞"		21"	22"	24"	24"	24"	¾"	1 1/16"	¾"	15/16"	1 5/16"	15/16"
16	S1-16	36 WF 150	88'-5½"	87'-3⅝"	7"	7"	31'-3"	31'-3"	10½x1 3/16"		21"	23"	24"	24"	24"	1 7/16"	2"	1 7/16"	2"	2 3/8"	2"
	S2-16	36 WF 182	88'-7"	87'-5"	7"	7"	30'-6"	30'-6"	10½x1⅞"		23"	24"	24"	24"	24"	1½"	2 1/16"	1½"	2"	2 3/4"	2"
17	S1-17	36 WF 194	90'-0 3/16"	88'-1 3/16"	7"		31'-6"	31'-6"	10½ x1 3/4"		20"	21"	24"	24"	24"	1 1/2"	2 1/16"	1 1/2"	2"	2 3/4"	2"
18	S1-18	36 WF 150	89'-1 9/16"	87'-11 9/16"			28'-6"	28'-6"	10½ x1"		24"	24"	24"	24"	24"	1 1/2"	2 1/16"	1 1/2"	2 1/16"	2 7/8"	2 1/16"

Note:
Dimensions shown on the plans for existing structural metalwork are in accordance with drawings prepared for the original construction. The Contractor shall verify all necessary dimensions of existing structural metalwork prior to preparing shop drawings for new metalwork.

Note:
All Steel s ll be A-36 unless denoted otherwise.

#Denotes A572 - Grade 50 Steel for thickness of 3/4" and under and A588 Steel for thickness over 4"

* Spacing begins at termination of 6 spaces @ 4".

Notes :
For Camber Diagram and Dead Load Deflection Diagram see Sheet 12.

Note :
All ± Dimensions are calculated dimensions to be verified by contractor in the field.

	BY	DATE				
MADE	GSH	11-18-68	1	Deleted end diaph. conn. ℞ @ exist str.	T.E.M.	8-18-75
CHECKED	SCC	1-17-69	2	Diaph. spa Unit 16 Str. & Diaph Units 17&18.	T.E.M.	8-18-75
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

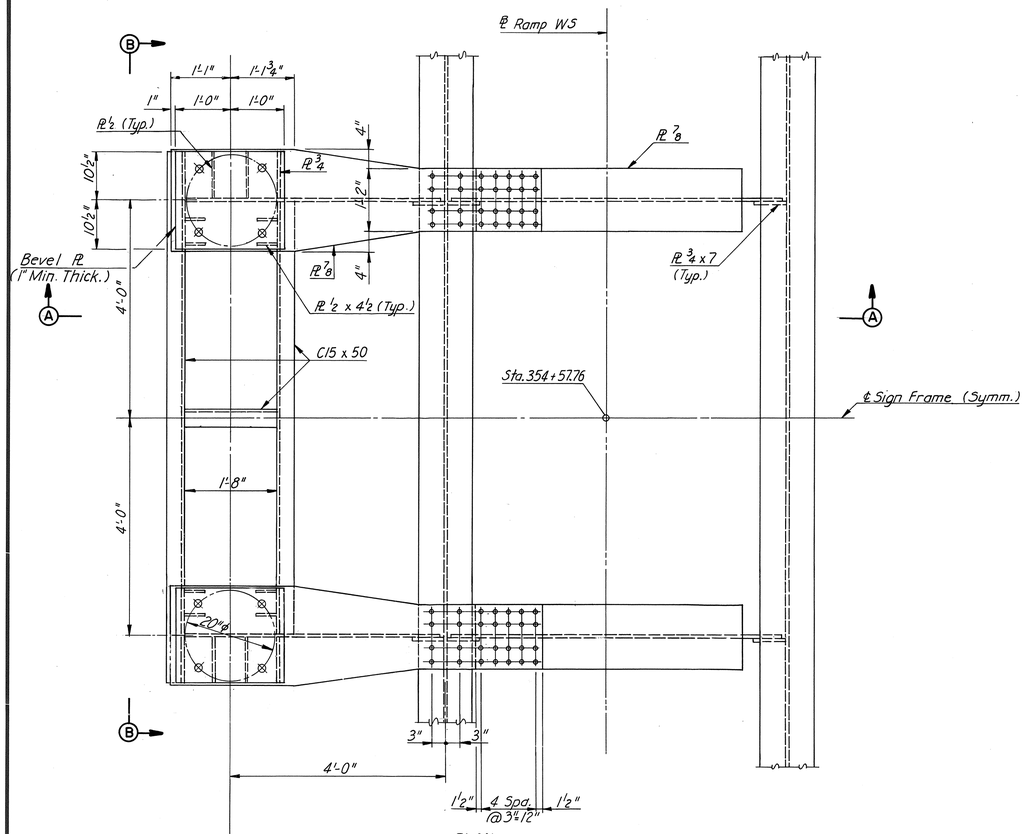
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

FRAMING PLAN — UNITS 13 THRU. 18

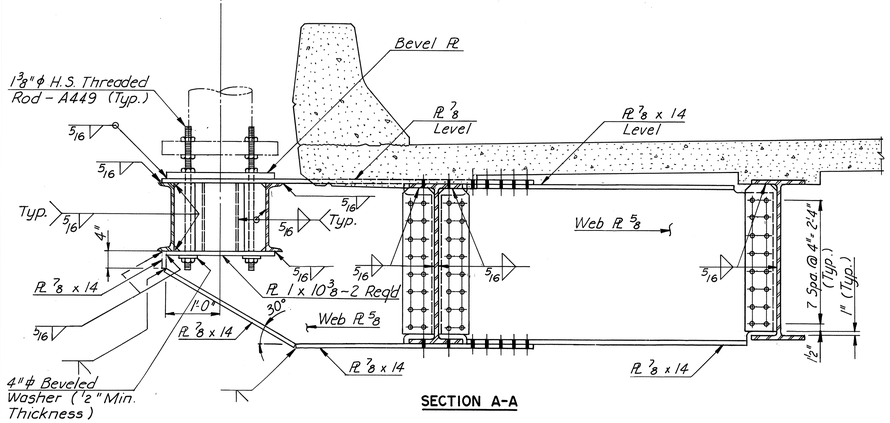
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 16 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	79A	97

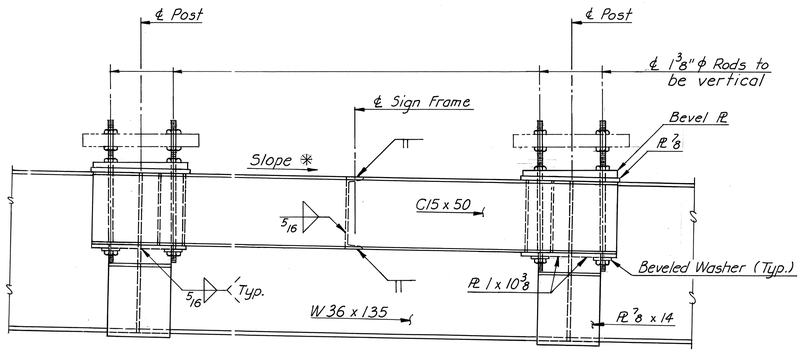


PLAN



SECTION A-A

* Slope of Sign Frame to match slope of exterior str.



VIEW B-B

Notes:
1. See Framing Plan Sheet 16 for location of sign support diaphragms.
2. All material shall be ASTM A36 steel, except anchor bolt assemblies.
3. Care shall be taken to ensure vertical alignment of the anchor rods.
4. For signing and sign pole details, see Roadway Plans.
5. All bolts to be ⅞"ϕ H.S. unless noted otherwise.

DESIGNED	T.E.M.	3-76				
DRAWN	A.B.P.	3-76				
CHECKED	T.E.M.	3-76	1	New Sheet added	A.B.P.	3-76
IN CHARGE			NO.	REVISION	BY	DATE

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

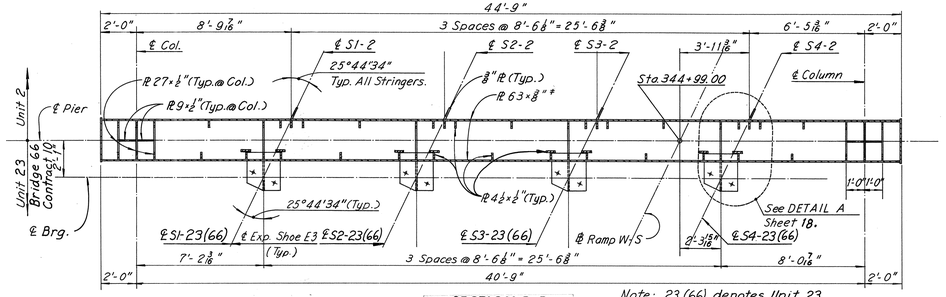
BRIDGE NO. 68
RAMP W-S CONNECTION FROM
RICHMOND-PETERSBURG TURNPIKE

SIGN SUPPORT BRACKET DETAILS-UNIT 14

SCALE 3/4"=1'-0"
DATE
CONTRACT NO. 11
SHEET 16A OF 28

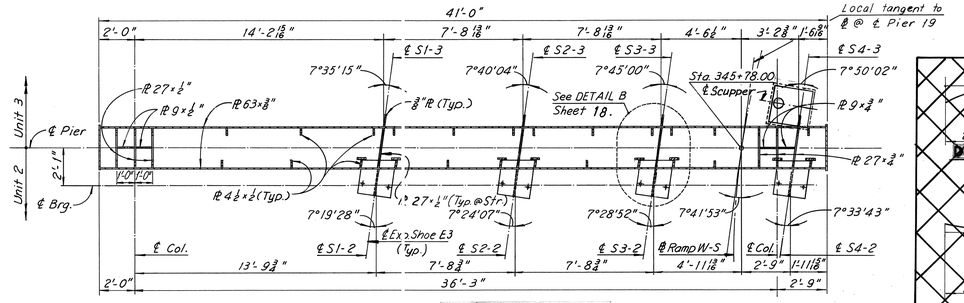
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	80	97

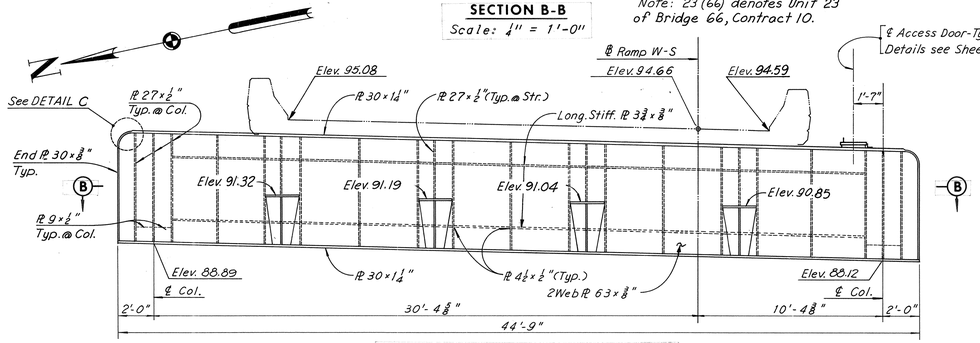


SECTION B-B
Scale: 1/4" = 1'-0"

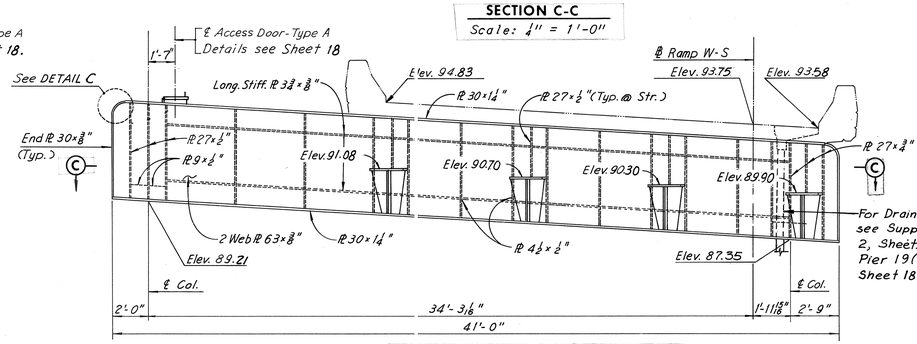
Note: 23(66) denotes Unit 23 of Bridge 66, Contract 10.



SECTION C-C
Scale: 1/4" = 1'-0"



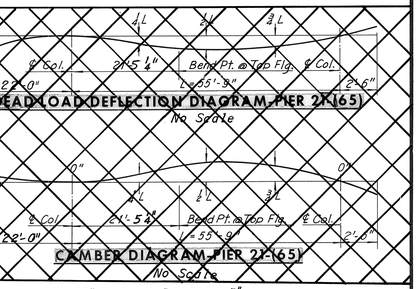
CAP BEAM ELEVATION - PIER 20-(65)
Scale: 1/4" = 1'-0"

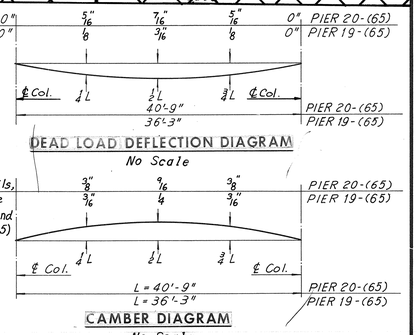


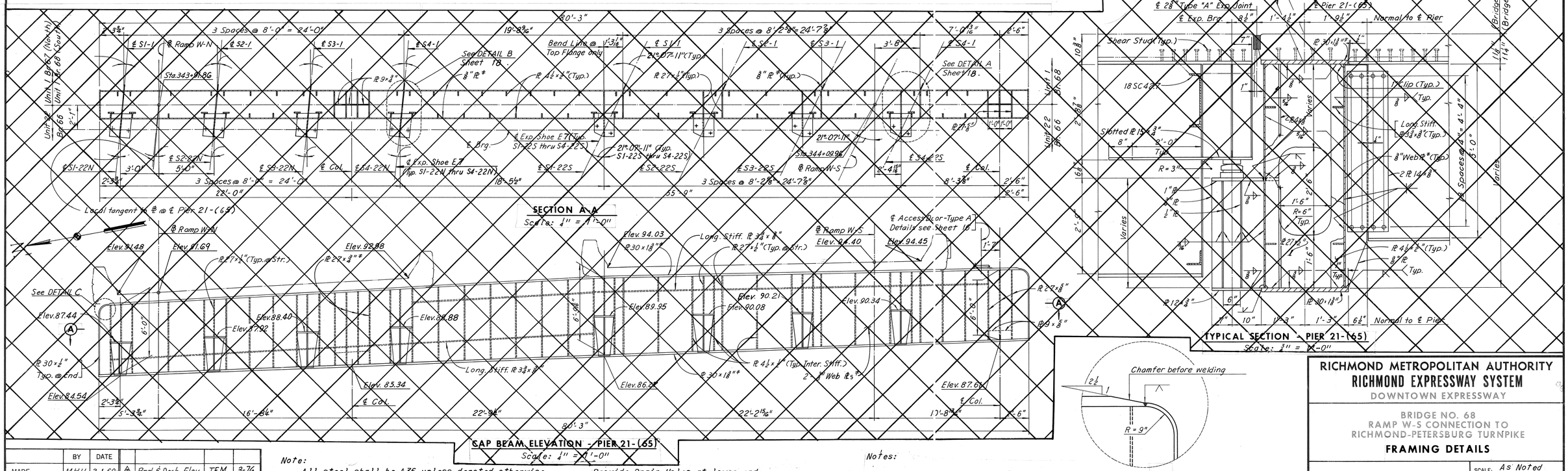
CAP BEAM ELEVATION - PIER 19-(65)
Scale: 1/4" = 1'-0"

For Drainage Details, see Support Type 2, Sheets S5 & S6 and Pier 19 (Bridge 65) Sheet 18.

Note: TYPICAL SECTION for PIER 20-(65) and PIER 19-(65) see TYPICAL SECTION Sheet 18.







CAP BEAM ELEVATION - PIER 21-(65)
Scale: 1/4" = 1'-0"

Note:
All steel shall be A36 unless denoted otherwise.
* Denotes A572-Grade 50 steel for thickness of 3/4" and under and A588 steel for thickness over 4".

Notes:
Provide Drain Holes at lower end.
All elevations shown are final elevations.

For Framing Plan, see Sheet 12.
For Joint Details, see Sheet 25.

DETAIL C
No Scale

AS BUILT

	BY	DATE				
MADE	MHH	2-1-69	2	Pad & Deck Elev.	TEM.	3-76
CHECKED	JD	6-6-69	1	Rev. Elevations	SSS	12-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

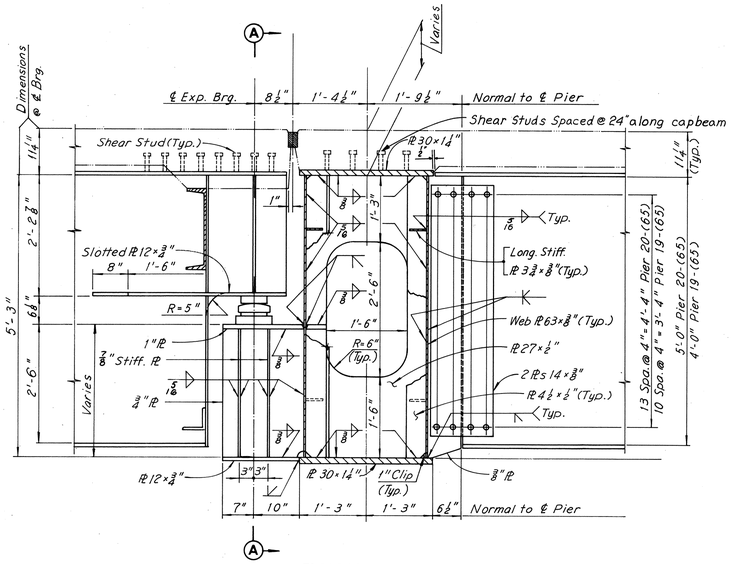
FRAMING DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

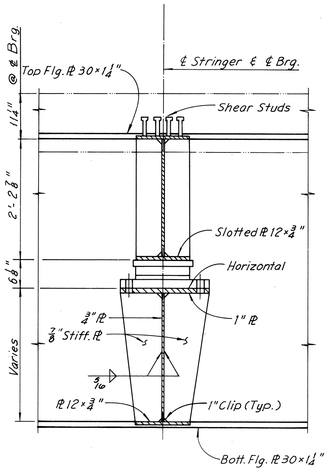
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 17 OF 28

90

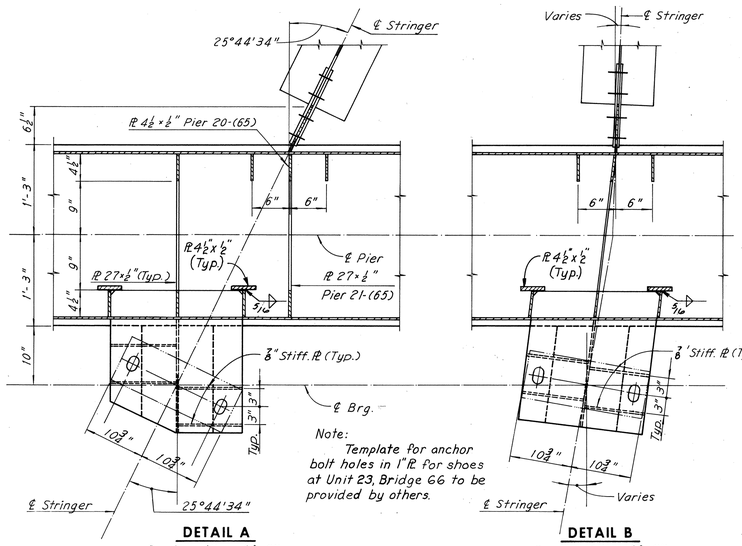
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	81	97



TYPICAL SECTION
Scale: ¾" = 1'-0"



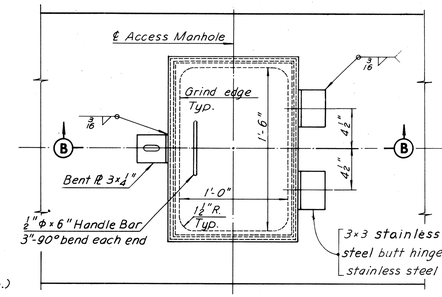
SECTION A-A
Scale: ¾" = 1'-0"



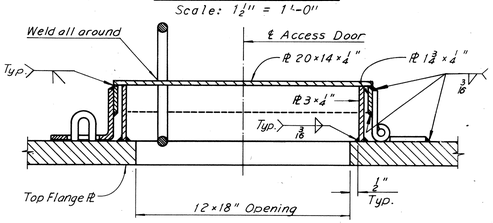
Note:
Template for anchor bolt holes in 1" PL for shoes at Unit 23, Bridge 66 to be provided by others.

DETAIL A
Scale: 1" = 1'-0"

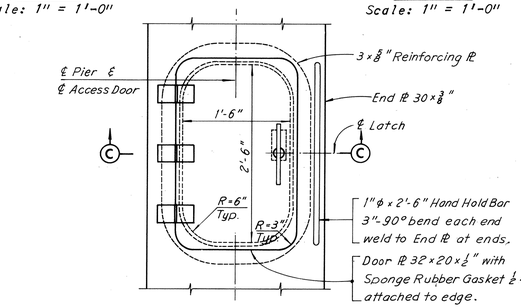
DETAIL B
Scale: 1" = 1'-0"



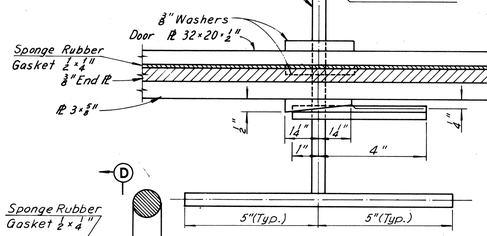
ACCESS DOOR - TYPE A
Scale: 1½" = 1'-0"



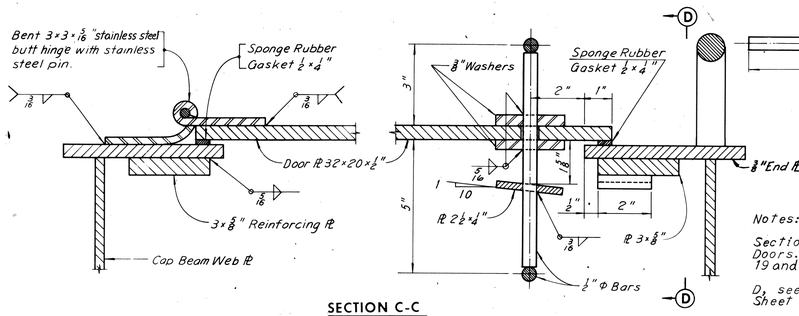
SECTION B-B
No Scale



ACCESS DOOR - TYPE B
Scale: 1" = 1'-0"



SECTION D-D
No Scale



SECTION C-C
No Scale

Notes:
For location of Typical Section, Details A and B, and Access Doors, see Framing Details for Piers 19 and 20, Sheet 17.
For location of Details C and D, see Framing Plan Units 17 and 18, Sheet 16.

AS BUILT

	BY	DATE				
MADE	MHH	1-31-69				
CHECKED	JD	5-2-69	1	Dim and weld size	TEM	9-30-76
IN CHARGE			NO.	REVISION	BY	DATE

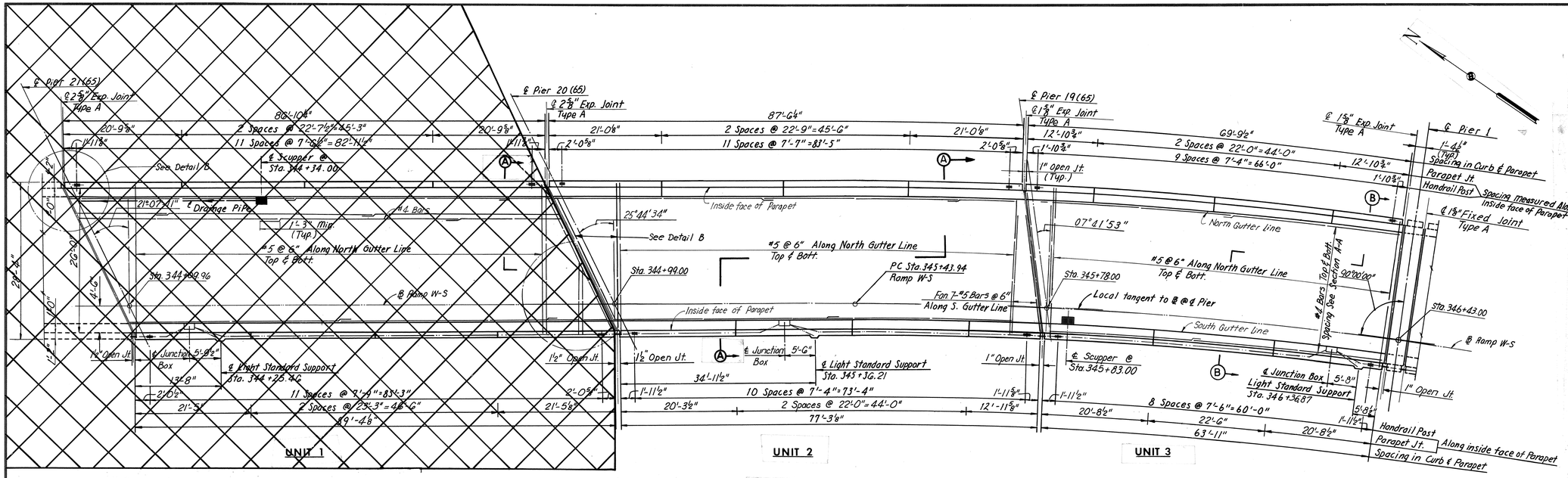
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
FRAMING DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO: 11
SHEET NO. 18 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	82	97



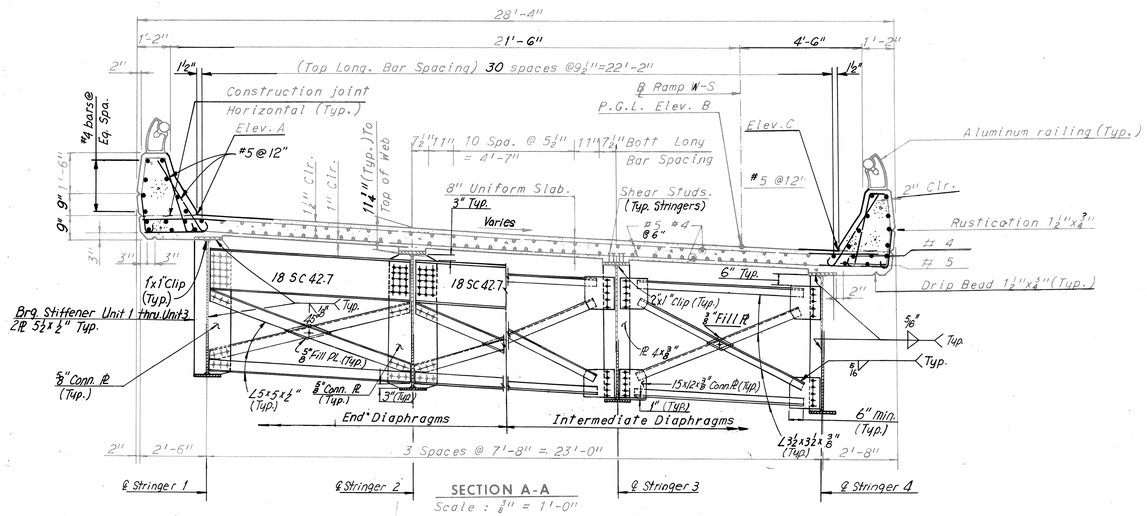
DECK PLAN
Scale: 1"=10'-0"

Note:
Pier 20(65) and Pier 19(65) denotes Piers 21, 20 and 19 of Bridge 65(Ramp S-W).

Note:
Section B-B, see Sheet 20.

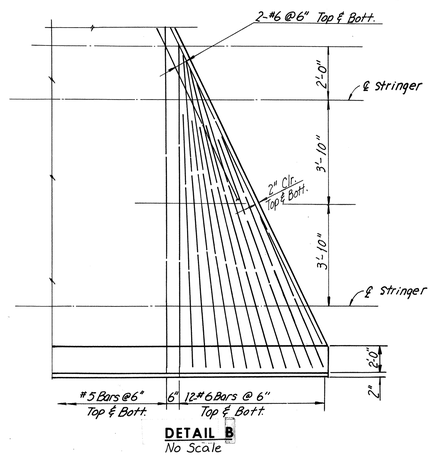
ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
344+00.57	94.89	------	------
344+00.00	94.89	95.16	95.21
+09.84	------	------	95.22
+09.96	------	95.18	------
+10.00	94.96	95.18	95.22
+20.00	95.02	95.18	95.21
+30.00	95.06	95.17	95.19
+40.00	95.08	95.13	95.14
+50.00	95.08	95.08	95.08
+60.00	95.10	95.02	95.01
+70.00	95.10	94.94	94.91
+80.00	95.10	94.85	94.81
+87.57	95.08	------	------
+90.00	95.08	94.75	94.69
+99.16	------	------	94.59
344+99.00	------	94.66	------
345+00.00	95.06	94.65	94.58
+10.00	95.03	94.54	94.46
+20.00	95.01	94.44	94.34
+30.00	94.99	94.33	94.22
+40.00	94.96	94.22	94.09
+50.00	94.92	94.10	93.96
+60.00	94.88	93.98	93.84
+70.00	94.84	93.86	93.69
+73.84	94.82	------	------
+77.08	------	------	93.58
+78.00	------	93.75	------
+80.00	94.79	93.72	93.54
345+90.00	94.74	93.59	93.39
346+00.00	94.67	93.44	93.23
+10.00	94.51	93.28	93.07
+20.00	94.35	93.12	92.91
+30.00	94.20	92.97	92.76
+40.00	94.05	92.82	92.61
+41.63	---	---	92.59
+41.66	94.02	---	---

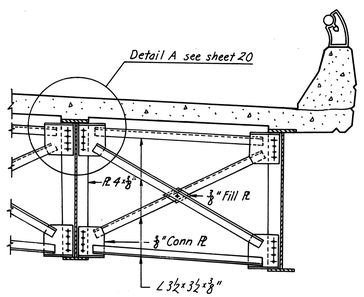


SECTION A-A
Scale: ⅜" = 1'-0"

Note:
End Diaphragm for Unit 3, see Sheet 20.



DETAIL B
No Scale



SECTION A-A
Scale: ⅜"=1'-0"
(Intermediate Diaphragm near Pier 19 Unit 2 only)

Notes
For Framing Plan, see Sheet 12.
For Standard Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 2 Sheets S5 and S6.
For Joint Details, see Sheet 25.
For Standard Handrail Details, see Sheet S3.

AS BUILT

	BY	DATE				
MADE	G.S.H.	10-29-68	2	Elev. Table	T.E.M.	3-76
CHECKED	A.H.H.	12-13-68	1	Rev. Elev. Table	S.S.S.	12-75
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

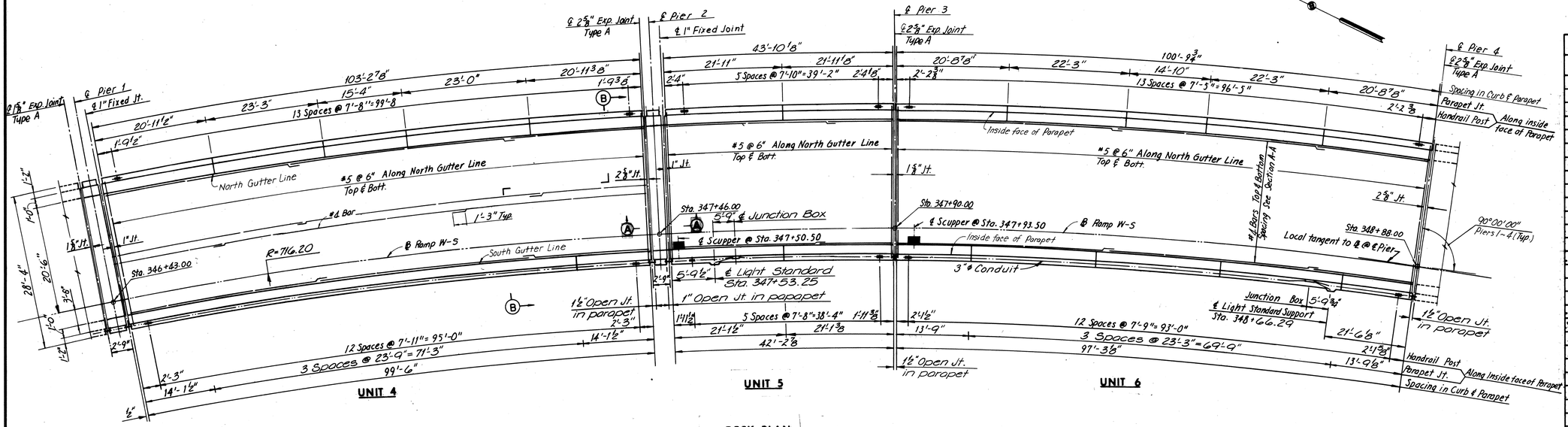
DECK PLAN — UNITS 1, 2 AND 3

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 19 OF 28

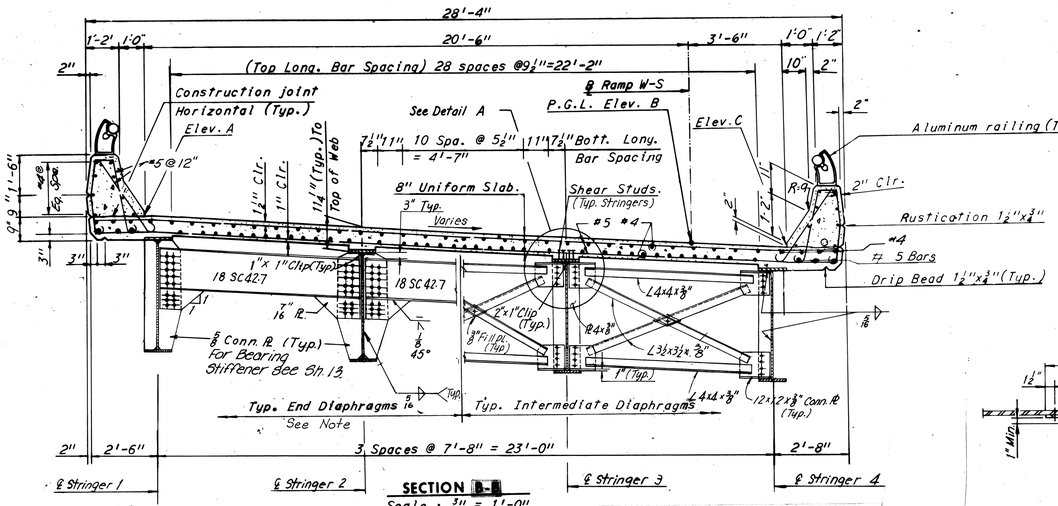
82

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	83	97



DECK PLAN
Scale : 1"=10'-0"

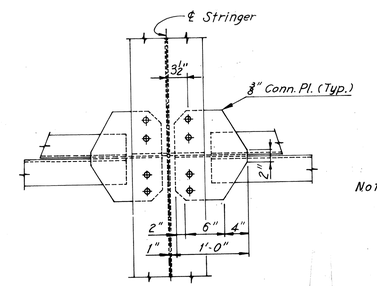
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
346+43.00	94.00	92.77	92.56
+50.00	93.88	92.65	92.44
+60.00	93.71	92.48	92.27
+70.00	93.32	92.29	92.08
+80.00	93.32	92.09	91.88
346+90.00	93.11	91.88	91.67
347+00.00	92.90	91.67	91.46
+10.00	92.67	91.44	91.23
+20.00	92.43	91.20	90.99
+30.00	92.18	90.95	90.74
+40.00	91.93	90.70	90.49
+44.62	---	---	90.37
+44.66	91.81	---	---
+46.00	91.78	90.55	90.34
+50.00	91.68	90.45	90.24
+60.00	91.42	90.19	89.98
+70.00	91.17	89.94	89.73
+80.00	90.92	89.69	89.48
347+90.00	90.67	89.44	89.23
348+00.00	90.42	89.19	88.98
+10.00	90.17	88.94	88.73
+20.00	89.92	88.69	88.48
+30.00	89.67	88.44	88.23
+40.00	89.42	88.19	87.98
+50.00	89.17	87.94	87.73
+60.00	88.92	87.69	87.48
+70.00	88.67	87.44	87.23
+80.00	88.42	87.19	86.98
348+88.00	88.23	87.00	86.79



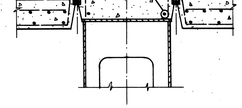
SECTION D-D
Scale : ⅜" = 1'-0"

Note: End Diaphragm shown at Piers 3,4 and 5. Piers 1 and 2 similar. 7/16" R. not required at Piers 1 and 2.

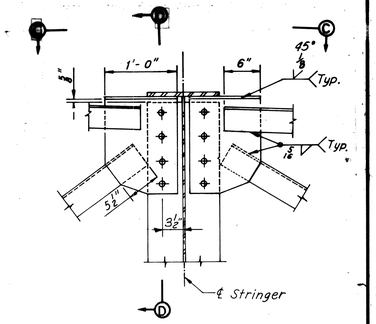
SECTION D-D
No Scale



VIEW C-C
No Scale



SECTION A-A
Scale: 1"=1'-0"



DETAIL A
No Scale

Notes
For Framing Plan see Sheet 13.
For Joint Details see Sheet 25.
For Standard Lighting Details see Sheet S4.
For Standard Handrail Details see Sheet S3.
For Standard Drainage Details see Support Type 4 Sheets S5 & S6.

AS BUILT

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	10-31-68	2	Dim. in Det A and view C-C	TEM	8-76
CHECKED	AHH	12-13-68	1	Corrected Dimension	SSS	12-75
IN CHARGE						

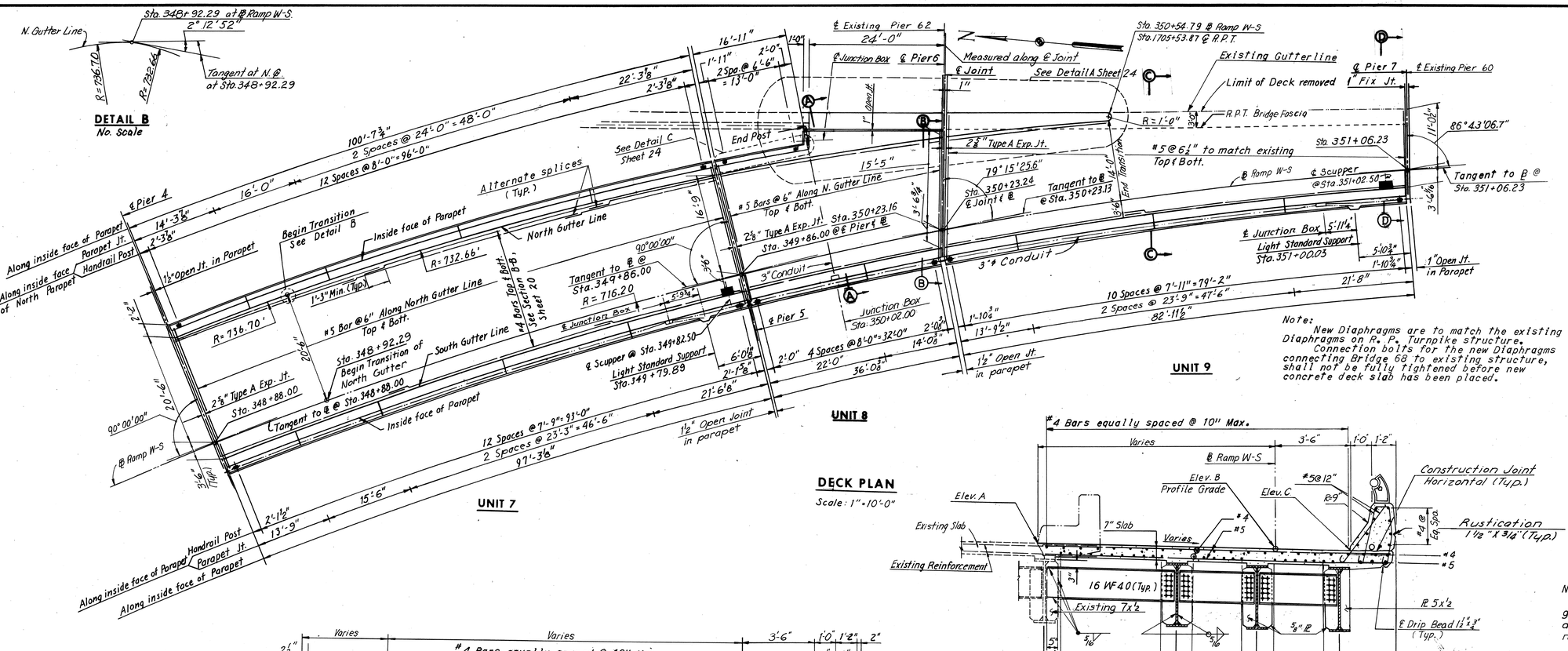
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN — UNITS 4,5 AND 6

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

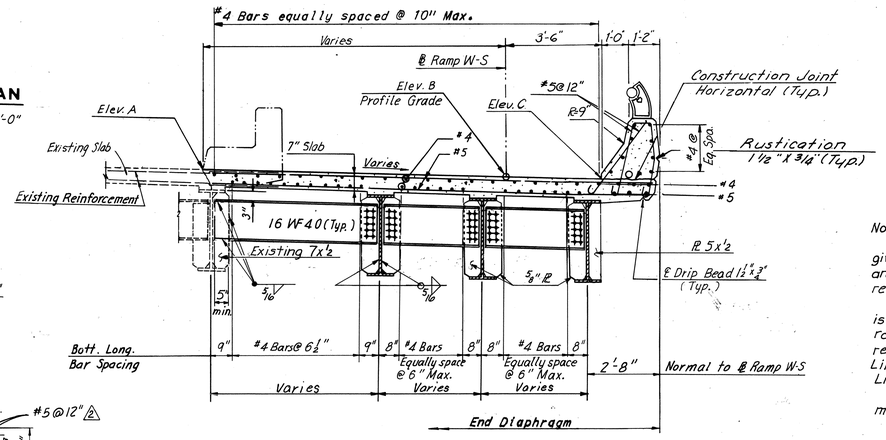
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 20 OF 28

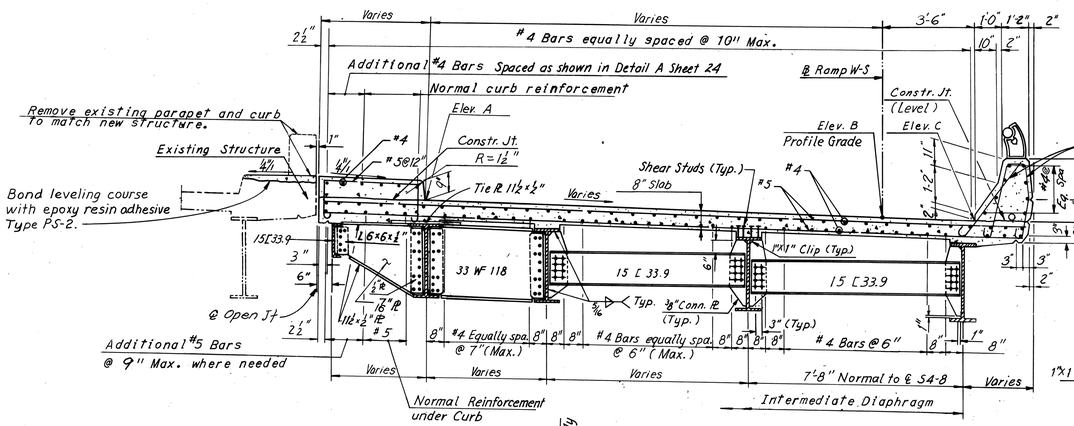
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	84	97



DECK PLAN

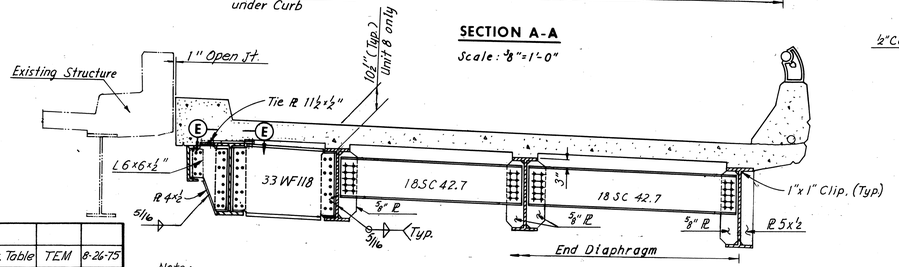
Scale: 1" = 10'-0"





SECTION A-A

Scale: ⅜" = 1'-0"



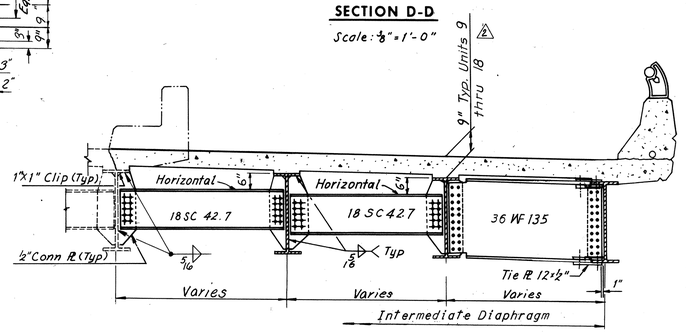
Note: Section E-E, See Section G-G on Sheet 24.

SECTION B-B

Scale: ½" = 1'-0"

SECTION D-D

Scale: ⅜" = 1'-0"



SECTION C-C

Scale: ⅜" = 1'-0"

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
348+88.00	88.20	87.00	86.79
+90	88.18	86.95	86.74
349+00.00	87.94	86.73	86.52
+10	87.72	86.53	86.32
+20	87.50	86.34	86.13
+30	87.30	86.16	85.95
+40	87.12	86.01	85.80
+50	86.95	85.86	85.65
+60	86.72	85.74	85.54
+70	86.51	85.62	85.44
+80	86.32	85.53	85.36
+86	86.21	85.48	85.32
+90	86.15	85.44	85.30
350+00.00	85.99	85.38	85.25
+10	85.85	85.33	85.21
+20	85.74	85.29	84.19
+22.57	—	—	85.18
+23.24	—	85.28	—
+26.05	85.76	—	—
+30	85.72	85.26	85.15
+40	85.49	85.18	85.10
+50	85.32	85.05	84.94
+54.79	85.25	85.03	84.94
+60	85.17	84.88	84.81
+70	84.99	84.71	84.64
+80	84.85	84.60	84.52
+90	84.69	84.45	84.37
351+00.00	84.51	84.29	84.21
—	—	—	—
+06.23	84.40	84.31	84.29
—	—	—	—

Note A:
Elev. A between Sta. 348+88 and 350+54.79 is given along the East Gutter Line Ramp W-S and are radial to the Base Line Ramp W-S at the respective stations
Elev. A from Sta. 350+54.79 to the End of Bridge is given along existing Gutter Line R.P.T. and are radial to the existing Base Line R.P.T. at the respective stations as given along the Base Line Ramp W-S. Cross Slope is radial to the Base Line R.P.T.
Elev. A is to be field verified. Minor adjustments may be required.

Note:
Existing No. 5 transverse steel top & bottom to remain in place and be cleaned of concrete. Existing steel shall extend a minimum of 2'-0" into new concrete. Bottom reinf. shall be straightened.

Notes:
For Framing Plan Details see Sheet 14.
For Intermediate Diaphragm Details, Conn. R Details and Reinforcement in Unit 7, see Section A-A of Sheet 20.
For Standard Handrail Details, see Sheet S3.
For Standard Lighting Details, see Sheet S4.
For Joint Details, see Sheet 25.
For Standard Drainage Details for Unit 7 see Support Type 3 and for Unit 9 see Support Type 5, both on Sheets S5 & S6.
End Diaphragms for Unit 7 @ pier 4 and-5 see Section A-A Sheet 20.

	BY	DATE
MADE	Y.C.P	11-8-68
CHECKED	D.E.S.	1-16-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Revised Elev. Table	TEM	8-26-75
1	End Diaph. Conn. at exist. String.	TEM	8-75

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE

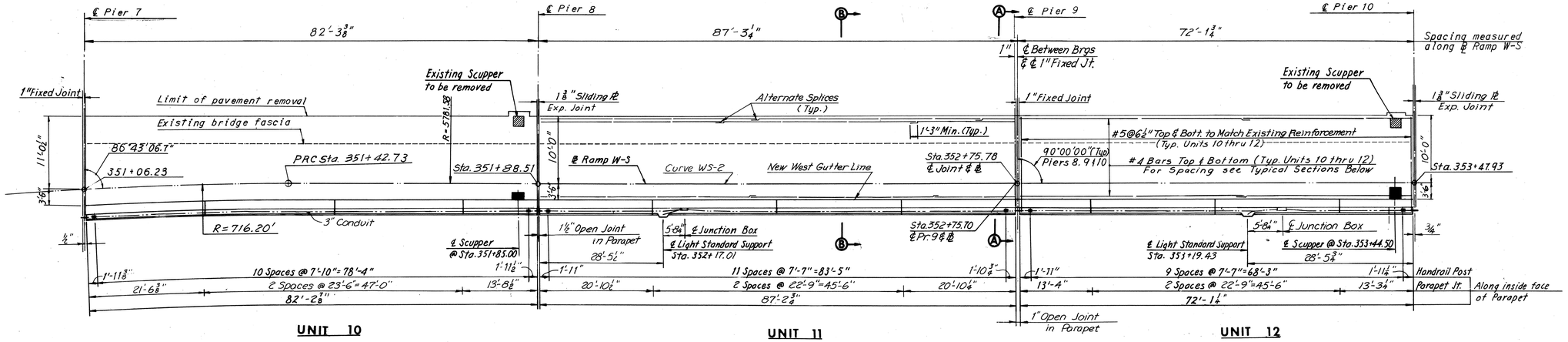
DECK PLAN-UNITS 7, 8 AND 9

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 21 OF 28

84

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	85	97



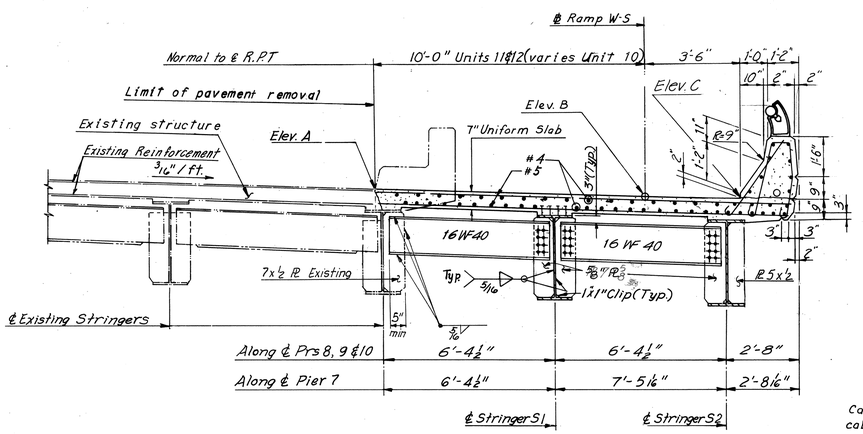
DECK PLAN

Scale: 1"=10'-0"

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure. Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.

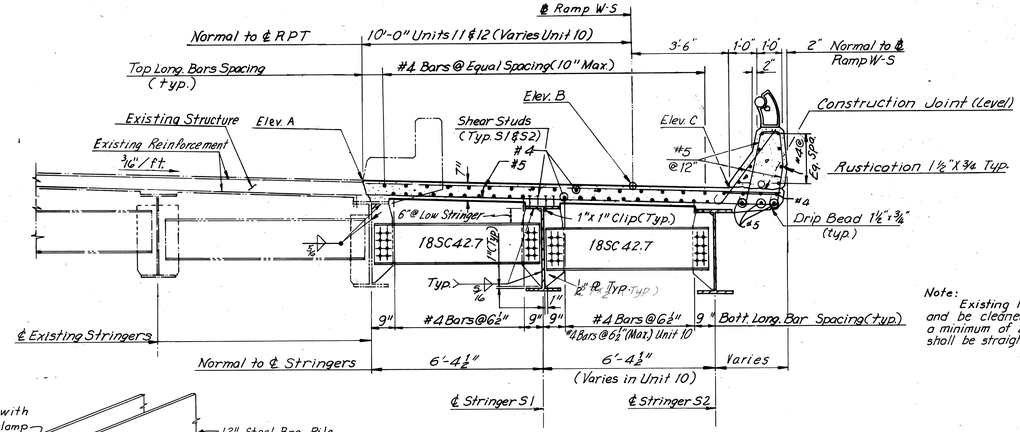
ELEVATION TABLE			
STATION	ELEV. A	ELEV. B	ELEV. C
+06.23	84.52	84.34	84.29
+ 10	84.39	84. 18	84. 10
+ 20	84. 23	84. 02	8 . 94
+ 30	84.07	83. 85	83. 78
+ 40	83. 90	83. 70	83. 62
+ 50	83. 77	83. 57	83. 49
+ 60	83. 56	83. 36	83. 28
+ 70	83. 42	83. 21	83. 15
+ 80	83. 26	83. 05	82. 99
+88.51	83. 13	83. 03	82. 99
+ 90	83. 12	83. 01	82. 98
352 + 00	82. 94	82. 85	82. 82
+ 10	82. 76	82. 69	82. 66
+ 20	82. 60	82. 53	82. 50
+ 30	82. 45	82. 37	82. 34
+ 40	82. 29	82. 21	82. 19
+ 50	82. 17	82. 06	8203
+ 60	82. 01	81. 90	81. 87
+ 70	81. 85	81. 74	81. 71
+75. 78	81. 81	81. 67	81. 62
+ 80	81. 73	81. 60	81. 55
+ 90	81. 56	81. 44	81. 39
353 + 00	81. 41	81. 28	81. 23
+ 10	81. 25	81. 12	81. 08
+ 20	81. 04	80. 95	80. 92
+ 30	80. 93	80. 80	80. 76
+ 40	80. 75	80. 64	80. 60
+47.93	80.65	80. 52	80.48

Note:
See Note A Sheet 21 ... for ... ...



END DIAPHRAGM
TYPICAL SECTION A-A

Scale: 3/8" = 1'-0"

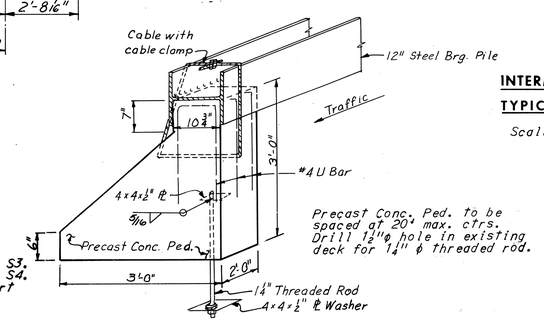


Note: Existing No. 5 transverse steel to remain in place and be cleaned of concrete. Existing steel shall extend a minimum of 2'-0" into new concrete. Bottom reinf. shall be straightened.

INTERMEDIATE DIAPHRAGM
TYPICAL SECTION B-B

Scale : 3/8" = 1'-0"

Notes
For Framing Plan Details see Sheet 15
For Joint Details see Sheet 25
For Quantities see Sheet 2.
For Standard Handrail Details, see Sheet S3.
For Standard Lighting Details, see Sheet S4.
For Standard Drainage Details, see Support Type 9 on Sheets S5 & S6.



Precast Conc. Ped. to be spaced at 20' max. ctrs. Drill 1 1/2" ϕ hole in existing deck for 1 1/4" ϕ threaded rod.

PROPOSED TEMPORARY FIXED TRAFFIC BARRICADE

Scale: 3/4" = 1'-0"

	BY	DATE	NO.	REVISION	BY	DATE
MADE	C.E.B.	12-3-68	1	Revised Elev. Table & Note Deleted	TEM	8-26-75
CHECKED	D.E.S.	1-15-69	2	End Diaph. Conn. at exist. String.	TEM	8-26-75
IN CHARGE						

AS BUILT

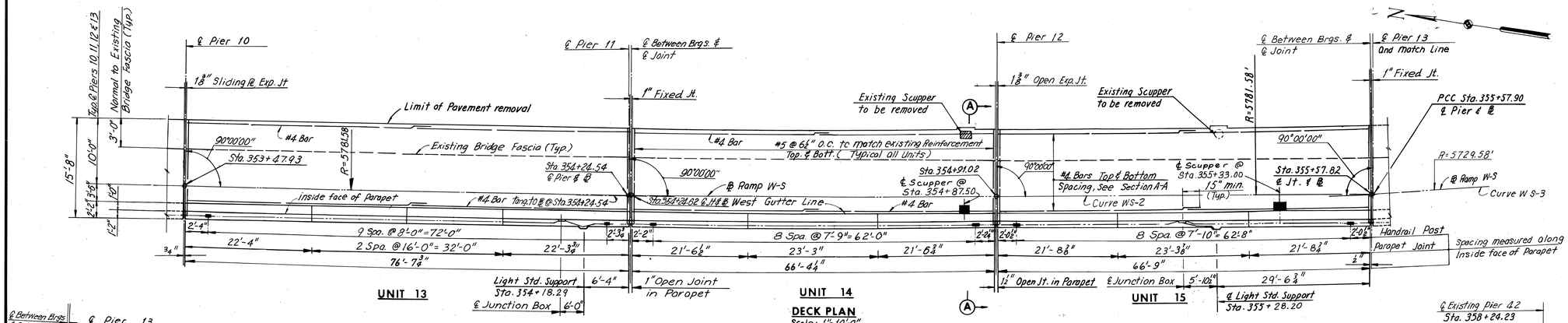
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

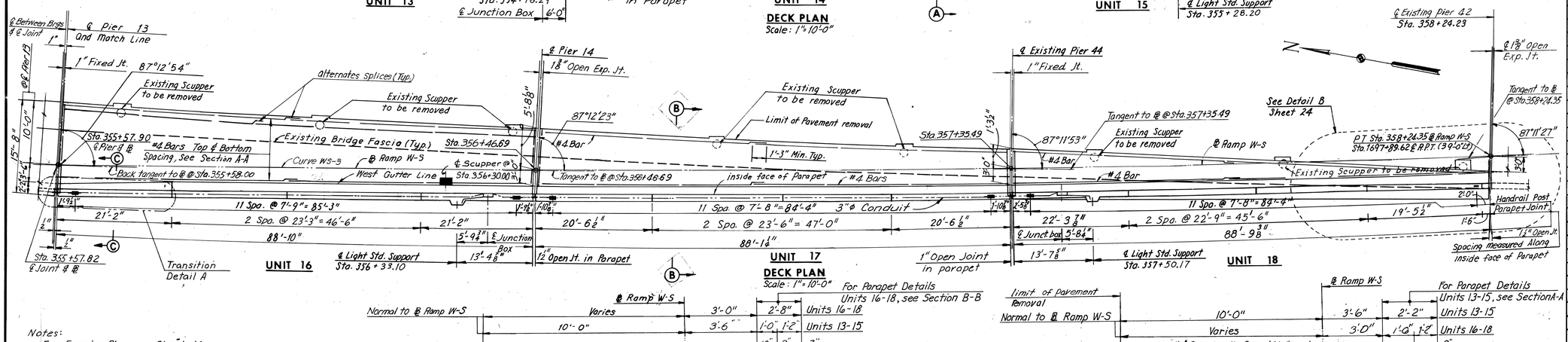
BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE
DECK PLAN – UNITS 10, 11 AND 12

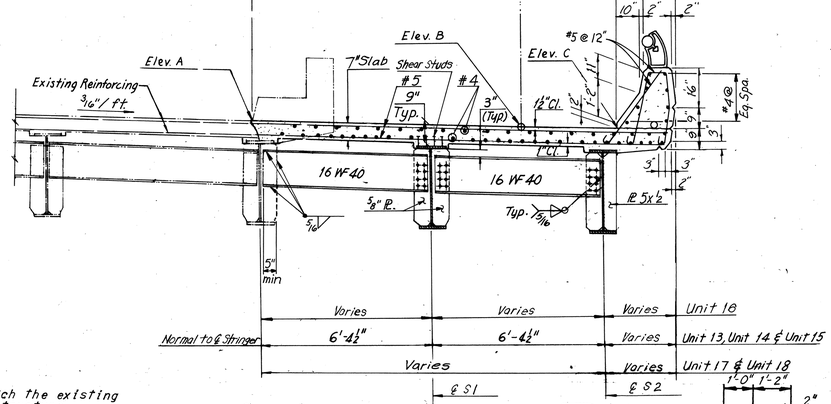
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

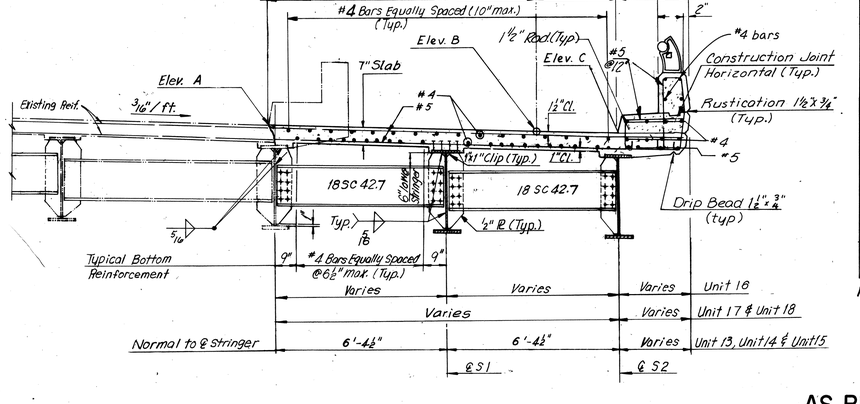
SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 22 OF 28

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	86	97







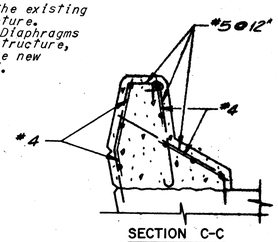


For Parapet Details Units 16-18, see Section B-B

For Parapet Details Units 13-15, see Section A-A

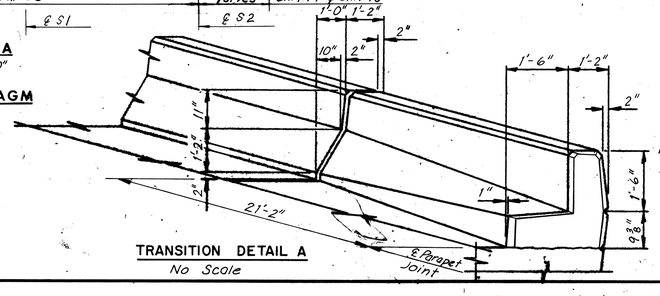
Notes:
- For Framing Plan, see Sheet 16.
- For Joint Details, see Sheet 25.
- For Standard Handrail Details, see Sheet S3.
- For Quantities, see Sheet 2.
- Elevation A at Existing Gutter Line is to be confirmed by contractor.
- For Standard Drainage Details see Support Type 6 Sheets S5 & S6.
- For Standard Lighting Details, see Sheet S4.

Note:
New Diaphragms are to match the existing Diaphragms on R. P. Turnpike structure.
Connection bolts for the new Diaphragms connecting Bridge 68 to existing structure, shall not be fully tightened before new concrete deck slab has been placed.



SECTION A-A
Scale: ⅜"=1'-0"
END DIAPHRAGM

SECTION C-C
No Scale



TRANSITION DETAIL A
No Scale

SECTION B-B
Scale: ⅜"=1'-0"

INTERMEDIATE DIAPHRAGM

Note:
Cross Slope in Units 16, 17 and 18 should be normal to ℄ R.P.T.

ELEVATION TABLE

STATION	ELEV. A	ELEV. B	ELEV. C
353 + 47.93	80.65	80.52	80.48
+ 50	80.63	80.49	80.44
+ 60	80.43	80.32	80.28
+ 70	80.29	80.17	80.12
+ 80	80.11	80.00	79.97
+ 90	79.97	79.85	79.81
354 + 00.00	79.82	79.69	79.65
+ 10	79.64	79.53	79.49
+ 20	79.48	79.37	79.33
+ 24.62	79.43	79.30	79.26
+ 30	79.33	79.22	79.17
+ 40	79.18	79.06	79.01
+ 50	79.00	78.89	78.86
+ 60	78.85	78.74	78.70
+ 70	78.69	78.58	78.54
+ 80	78.51	78.41	78.38
+ 90	78.35	78.25	78.22
+ 91.02	78.34	78.24	78.21
355 + 00.00	78.18	78.09	78.06
+ 10	78.06	77.95	77.90
+ 20	77.85	77.77	77.75
+ 30	77.67	77.61	77.59
+ 40	77.54	77.46	77.43
+ 50	77.36	77.29	77.27
+ 57.82	77.27	77.17	77.15
+ 60	77.22	77.14	77.11
+ 70	77.03	76.98	76.96
+ 80	76.85	76.82	76.81
+ 90	76.66	76.66	76.66
356 + 00.00	76.50	76.51	76.51
+ 10	76.34	76.35	76.36
+ 20	76.17	76.20	76.21
+ 30	76.03	76.05	76.06
+ 40	75.87	75.90	75.91
+ 46.69	75.80	75.80	75.81
+ 50	75.71	75.74	75.76
+ 60	75.73	75.66	75.60
+ 70	75.35	75.40	75.45
+ 80	75.24	75.27	75.30
+ 90	75.11	75.13	75.15
357 + 00.00	74.94	74.96	75.00
+ 10	74.78	74.81	74.85
+ 20	74.65	74.67	74.70
+ 30	74.52	74.53	74.55
+ 35.49	74.44	74.45	74.47
+ 40	74.35	74.36	74.40
+ 50	74.17	74.18	74.25
+ 60	74.01	74.01	74.10
+ 70	—	74.00	73.94
+ 80	—	73.85	73.79
+ 90	—	73.70	73.64
358 + 00.00	—	73.55	73.49
+ 10	—	73.39	73.33
+ 20	—	73.24	73.19
+ 24.24	—	73.18	73.13

Note:
See Note A Sheet 21.

	BY	DATE
MADE	GSH	11-12-68
CHECKED	D.E.S.	1-17-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Revised Elev. Table	TEM	8-26-75
1	End Diaph. Conn. at exist. String.	TEM	8-26-75

AS BUILT

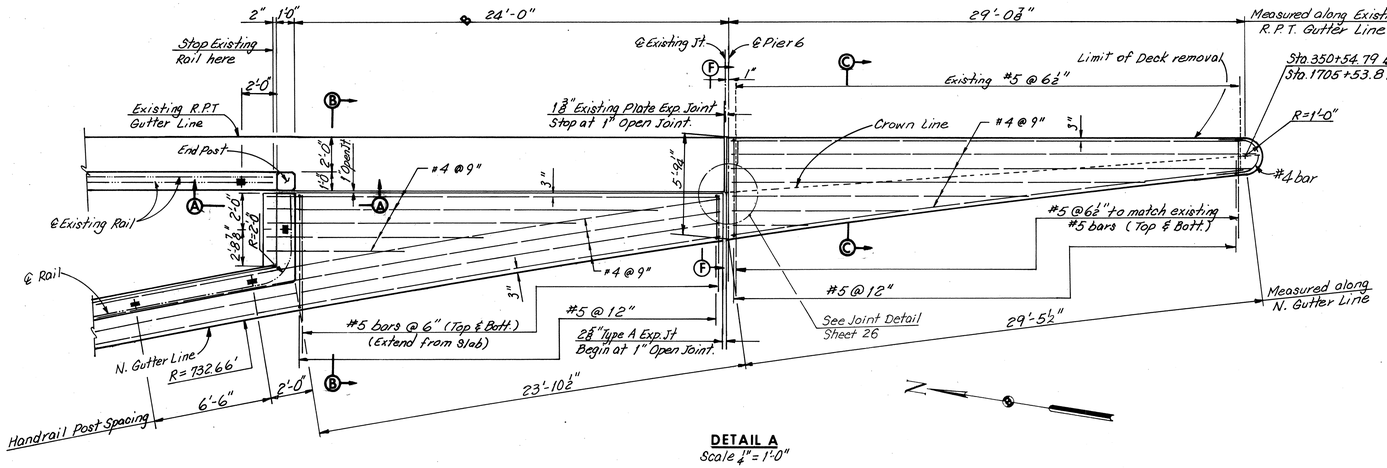
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
DECK PLAN — UNITS 13 THRU. 18

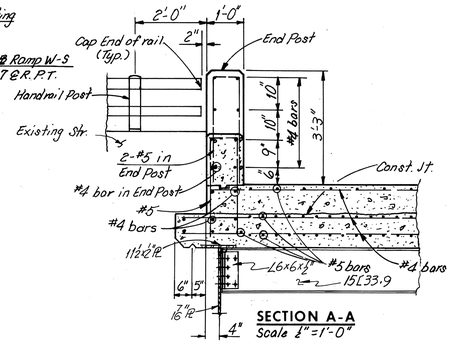
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 23 OF 28

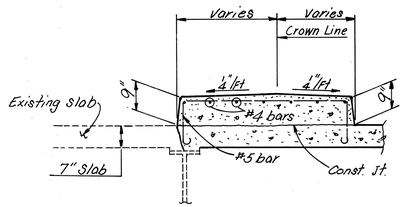
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	87	97



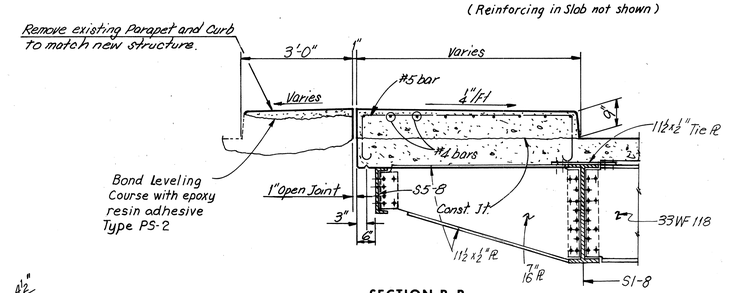
DETAIL A
Scale ¼"=1'-0"



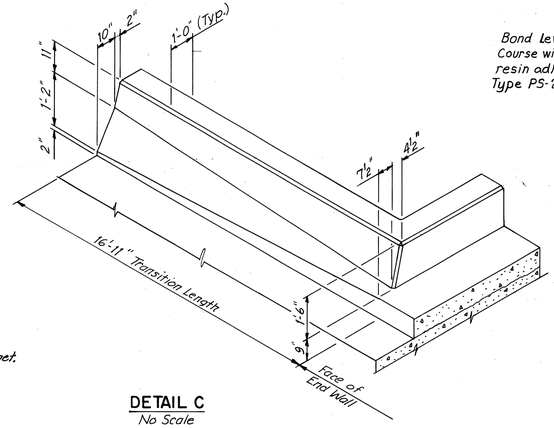
SECTION A-A
Scale ½"=1'-0"



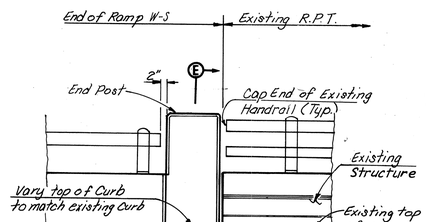
SECTION C-C
Scale ½"=1'-0"
(Reinforcing in Slab not shown)



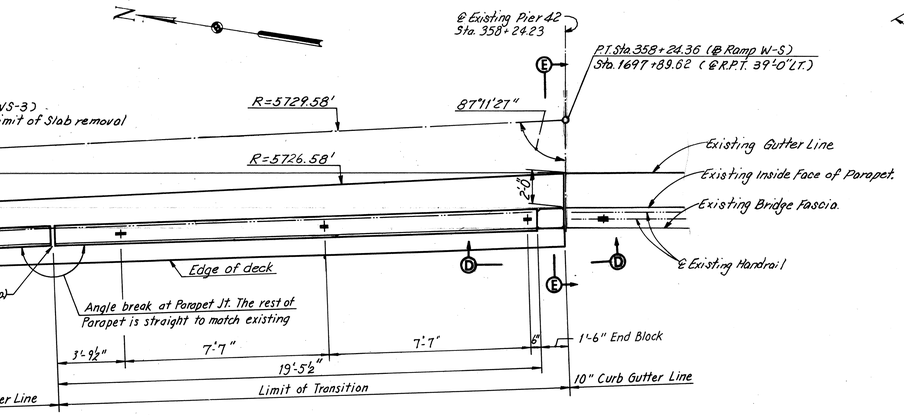
SECTION B-B
Scale ½"=1'-0"
(Reinforcing in Slab not shown)



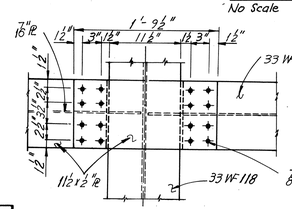
DETAIL C
No Scale



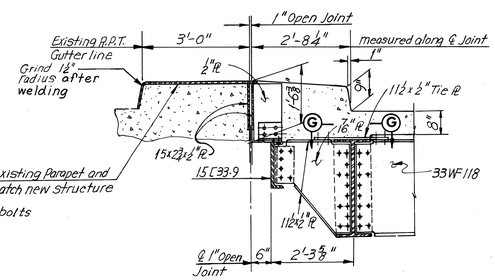
VIEW D-D
Scale ½"=1'-0"



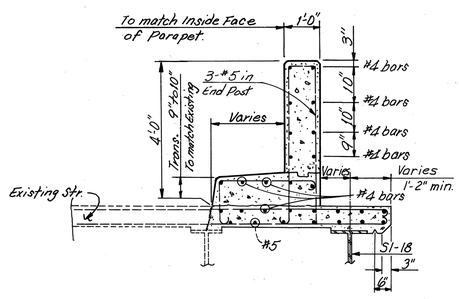
DETAIL B
No Scale



SECTION G-G
Scale : 1"=1'-0"



SECTION F-F
Scale : ½"=1'-0"



SECTION E-E
Scale ½"=1'-0"

Notes:
For location of Details A and C, see Sheet 21.
For location of Detail B, see Sheet 23.

AS BUILT

	BY	DATE
MADE	G.C.C.	1-29-69
CHECKED	Y.C.P.	2-3-69
IN CHARGE		

NO.	REVISION	BY	DATE
2	Det. A & Sect. A-A	T.E.M.	4-76
1	Section E-E	T.E.M.	8-26-75

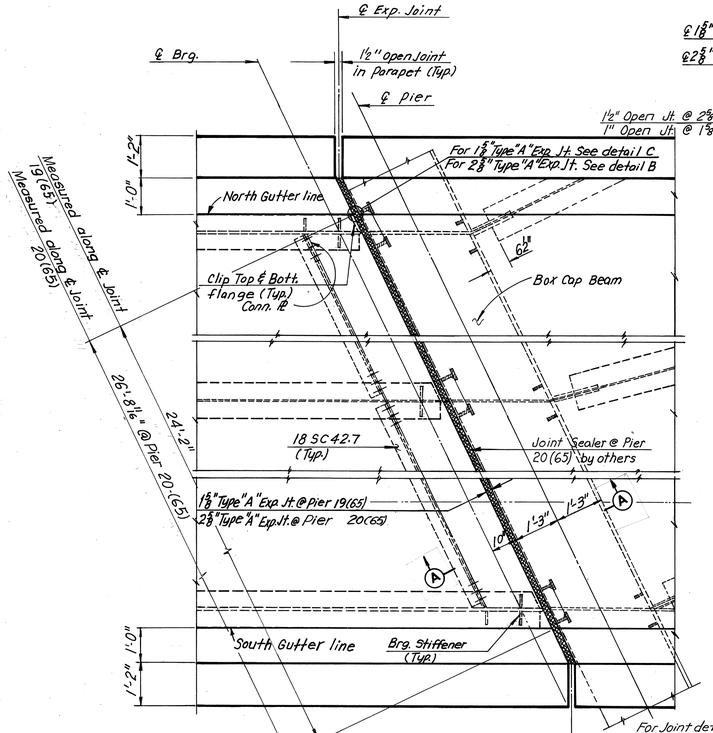
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO RICHMOND-PETERSBURG TURNPIKE
SUPERSTRUCTURE DETAILS

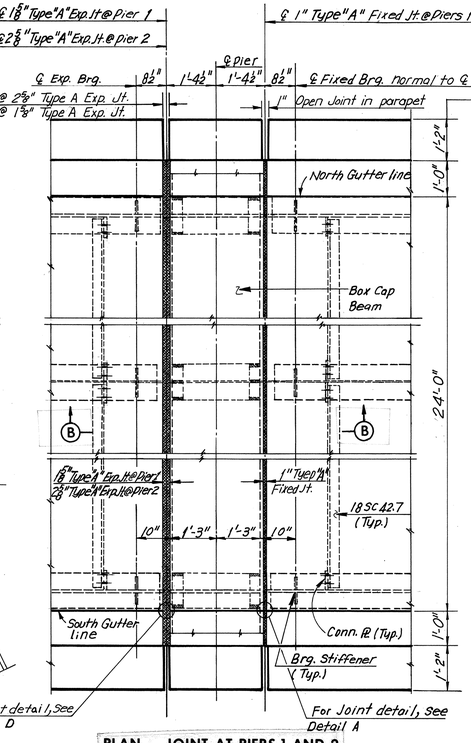
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO.: 11
SHEET NO. 24 OF 28

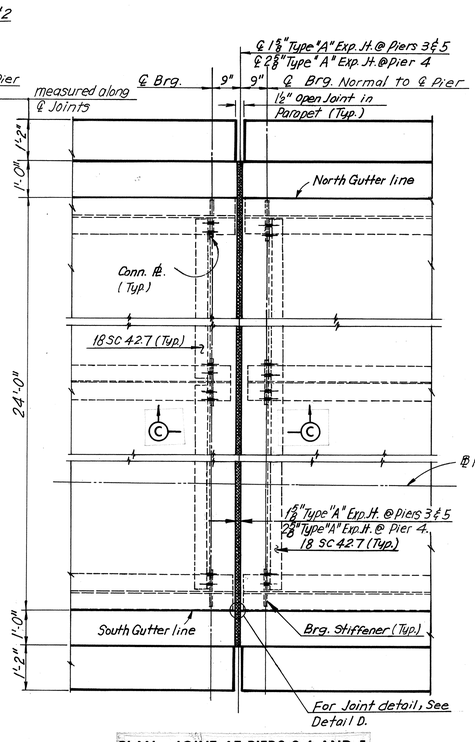
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	88	97



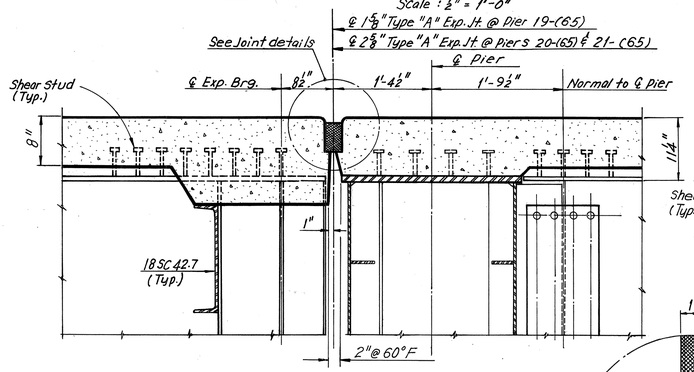
PLAN - JOINT AT PIERS 19 (65) AND 20(65)
Scale : ½" = 1'-0"



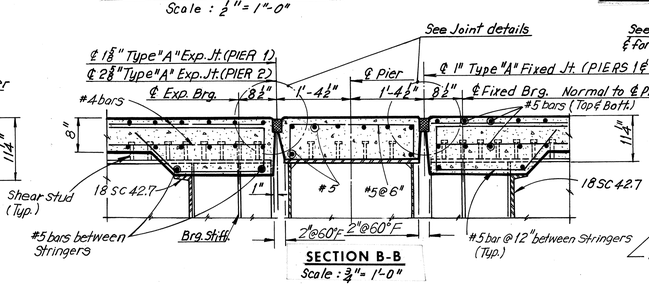
PLAN - JOINT AT PIERS 1 AND 2
Scale : ½" = 1'-0"



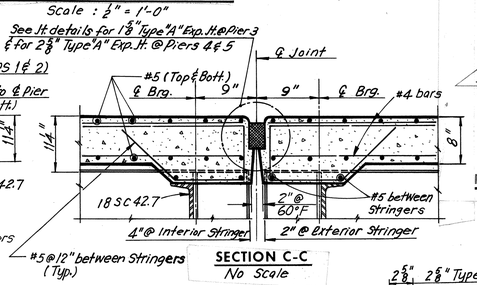
PLAN - JOINT AT PIERS 3,4 AND 5
Scale : ½" = 1'-0"



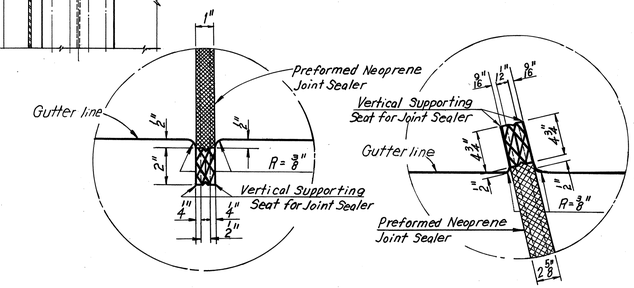
SECTION A-A
Scale : 1" = 1'-0"



SECTION B-B
Scale : ¾" = 1'-0"

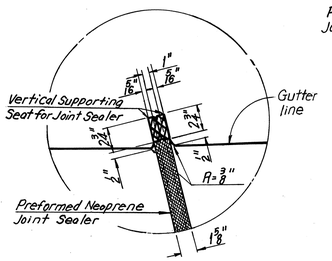


SECTION C-C
No Scale

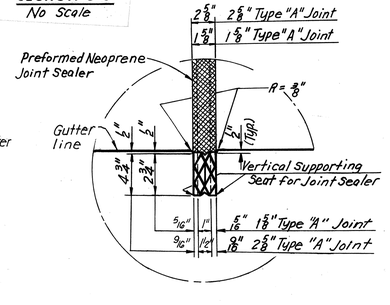


DETAIL A
Scale : 3" = 1'-0"

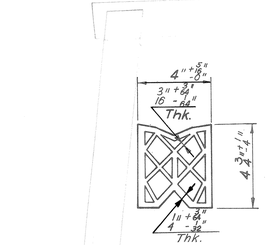
DETAIL B
Scale : 1½" = 1'-0"



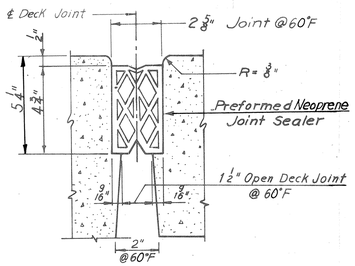
DETAIL C
Scale : 1½" = 1'-0"



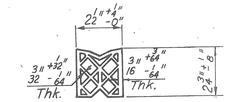
DETAIL D
No Scale



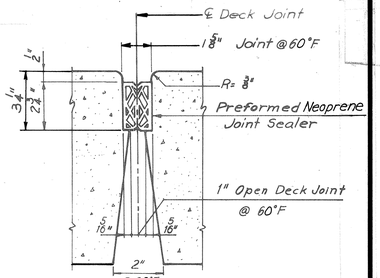
PREFORMED NEOPRENE JOINT SEALER FOR 2⅝" TYPE "A" JOINT



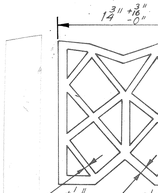
2⅝" TYPE "A" JOINT



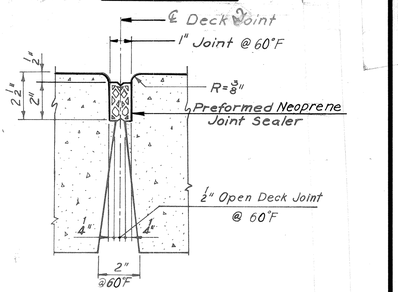
PREFORMED NEOPRENE JOINT SEALER FOR 1⅝" TYPE "A" JOINT



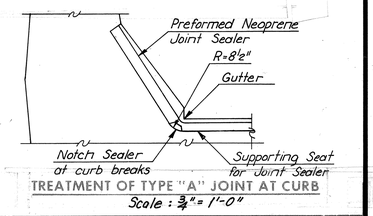
1⅝" TYPE "A" JOINT



PREFORMED NEOPRENE JOINT SEALER FOR 1" TYPE "A" JOINT



1" TYPE "A" JOINT



TREATMENT OF TYPE "A" JOINT AT CURB
Scale : ¾" = 1'-0"

Note:
Reinforcings of Section A-A are similar to Section B-B.

Note:
Horizontal dimensions as shown in the cross sections are normal to ℄ Joint.

	BY	DATE	NO.	REVISION	BY	DATE
MADE	G.S.H.	9-26-69				
CHECKED	V.C.P.	10-1-69	1	Diaph conn. ℙ @ Piers 3,4 & 5	T.E.M.	8-26-75
IN CHARGE						

AS BUILT

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

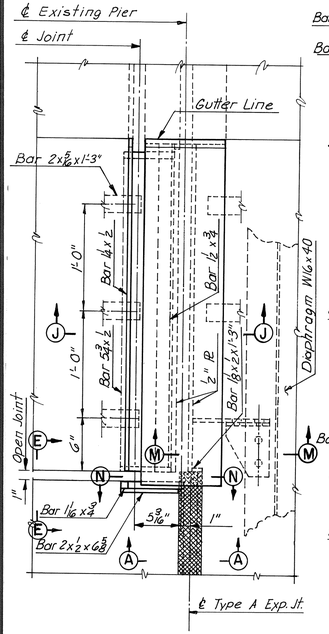
JOINT DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

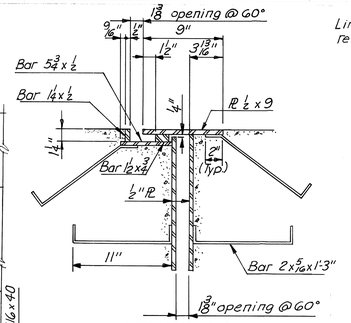
SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 25 OF 28

88

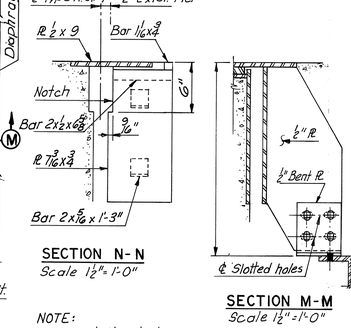
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	89	97



PLAN-JOINT AT PIER 6
Scale 1½"=1'-0"



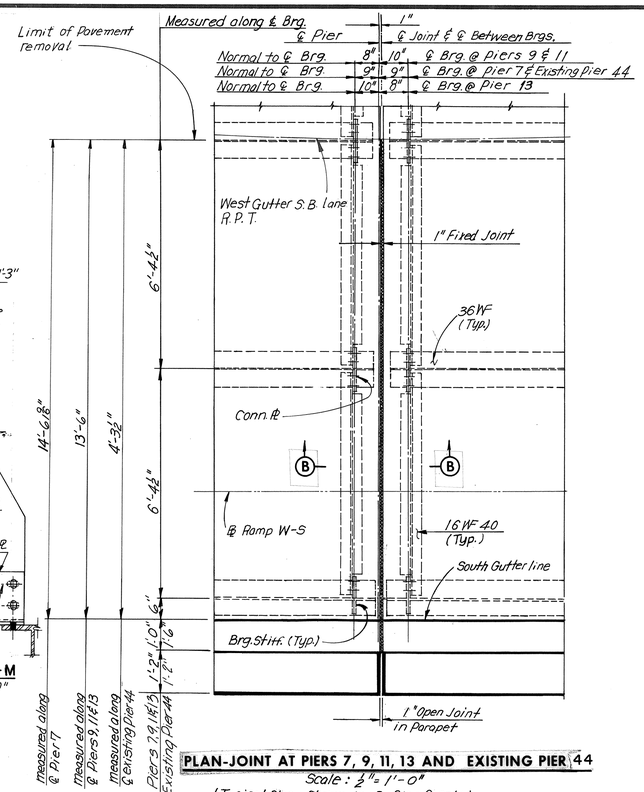
SECTION J-J
Scale 1½"=1'-0"



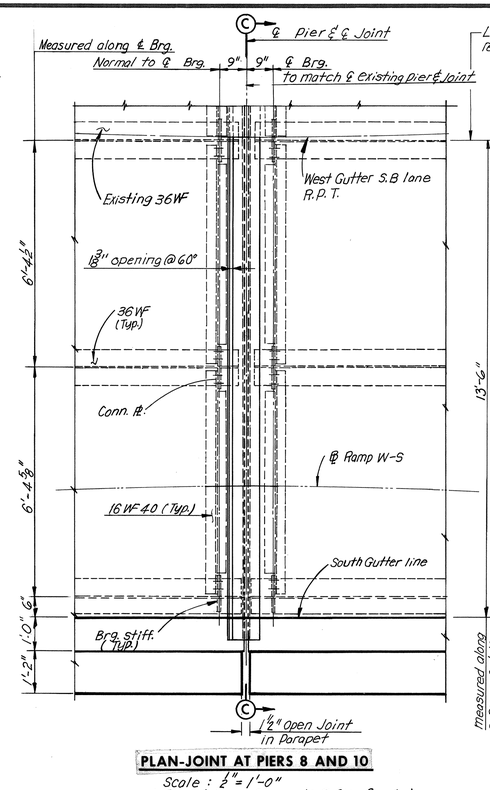
SECTION N-N
Scale 1½"=1'-0"

SECTION M-M
Scale 1½"=1'-0"

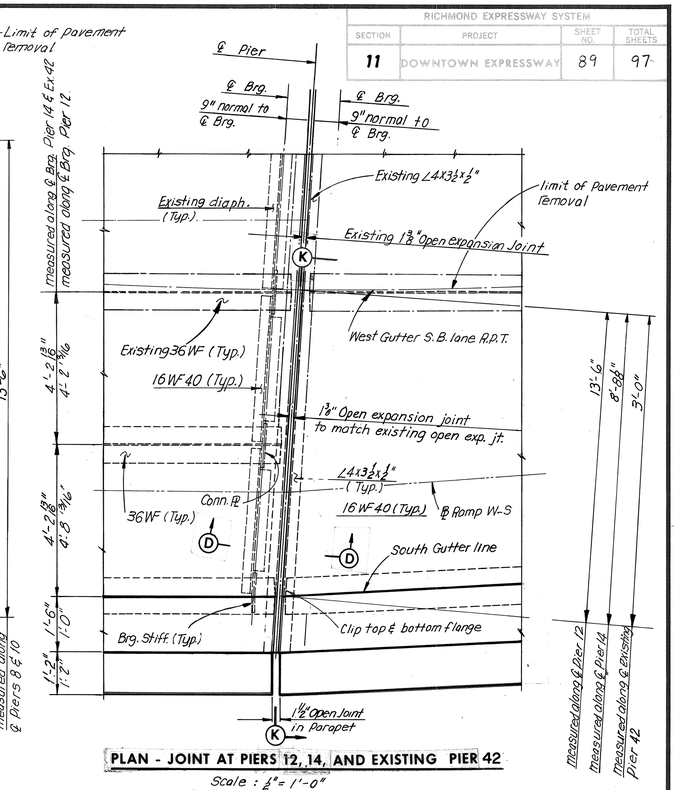
NOTE:
For detail not shown
see Section F-F.



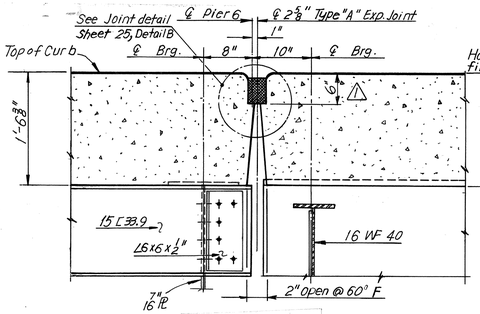
PLAN-JOINT AT PIERS 7, 9, 11, 13 AND EXISTING PIER 44
Scale : ½"= 1'-0"
(Typical Plan Shown is @ Pier 9 only)



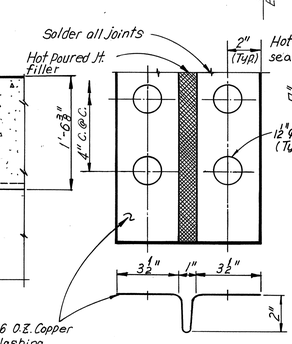
PLAN-JOINT AT PIERS 8 AND 10
Scale : ½"= 1'-0"
(Typical Plan Shown is @ Pier 8 only)



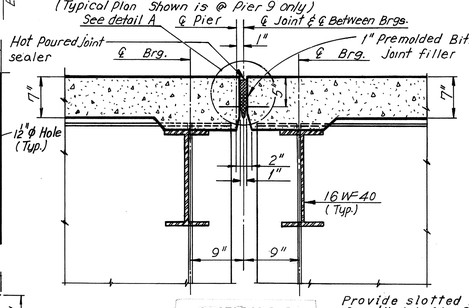
PLAN - JOINT AT PIERS 12, 14, AND EXISTING PIER 42
Scale : ½"= 1'-0"
(Typical Plan Shown is @ Pier 14 only)



SECTION A-A
Scale : 1" = 1'-0"

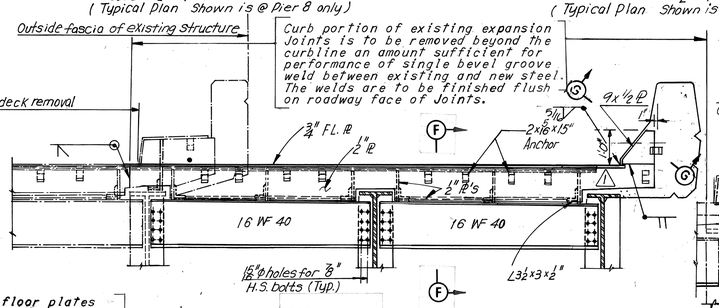


DETAIL A
Scale: 3" = 1'-0"

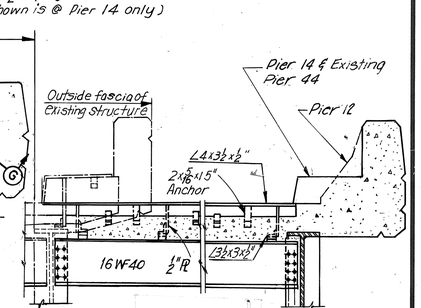


JOINT BETWEEN FIXED BEARINGS

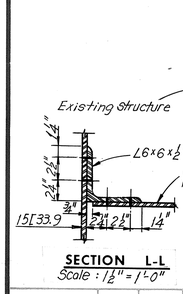
Provide slotted holes in floor plates for ¾" ø bolts @ 2'-0" a.c. for erection. Fill holes with hot poured joint sealer after bolts are removed.



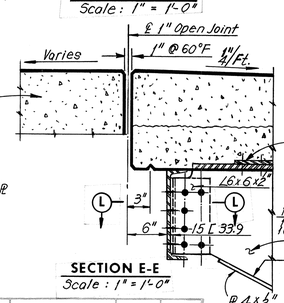
SECTION C-C
Scale : ½"= 1'-0"



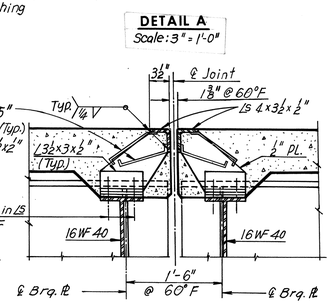
SECTION K-K
Scale : ½"= 1'-0"



SECTION L-L
Scale : 1½" = 1'-0"

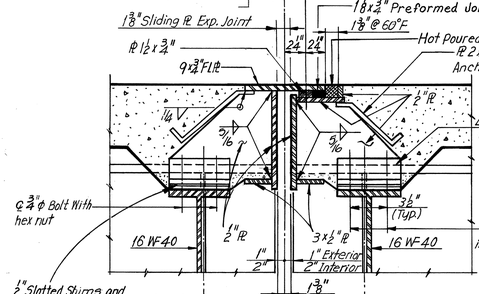


SECTION E-E
Scale : 1" = 1'-0"



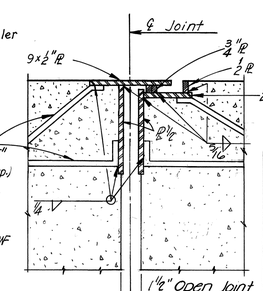
SECTION D-D
Scale : 1" = 1'-0"

Note:
Reinforcing of all Sections are not Shown.



SECTION F-F
Scale : 1½" = 1'-0"

Note:
All fillet welds are ¼" unless otherwise shown.



SECTION G-G
Scale : 1½" = 1'-0"

Note:
Horizontal dimensions as shown in the Cross sections are normal to ℄ joint.

Note:
Joints for piers 7 through 14 and existing piers 42 & 44 have to match existing joints.

AS BUILT

	BY	DATE				
MADE	G.S.H.	10-10-69				
CHECKED	V.C.P.	10-17-69	NO.	REVISION	BY	DATE
IN CHARGE			1	Joint Details @ Piers 6, 8 & 10	T.E.M.	12-8-76

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

BRIDGE NO. 68
RAMP W-S CONNECTION TO
RICHMOND-PETERSBURG TURNPIKE

JOINT DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. 26 OF 28

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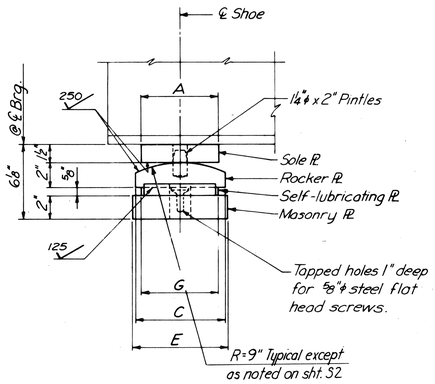
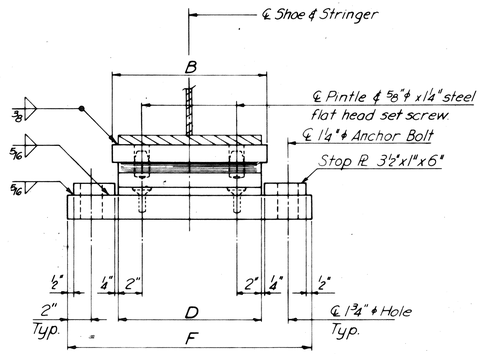
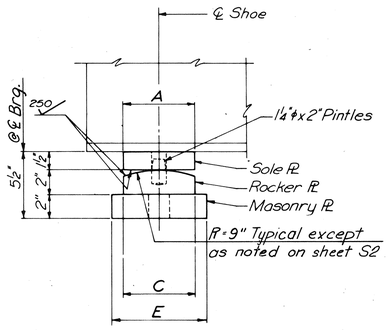
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	92	97



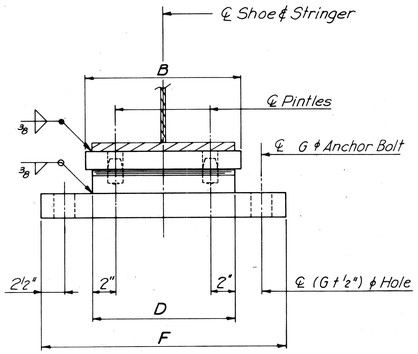
SIDE ELEVATION



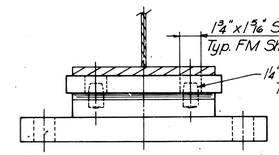
END ELEVATION



SIDE ELEVATION



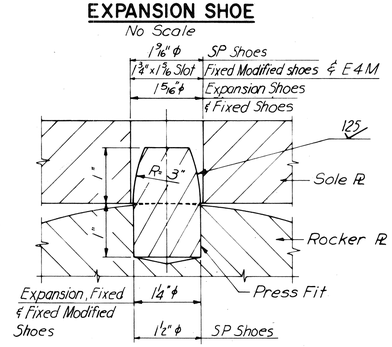
END ELEVATION

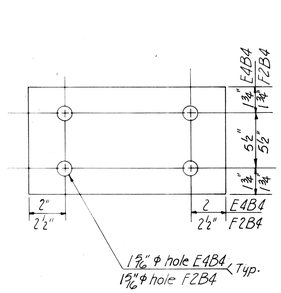


END ELEVATION

Note:
Fixed Modified Shoes same as Fixed Shoes except as shown.

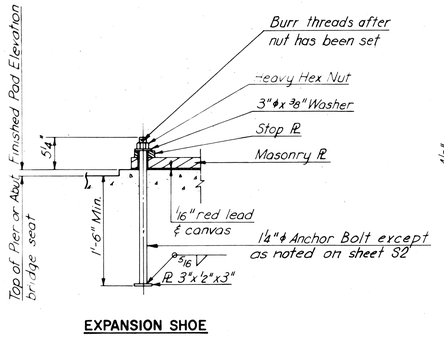
EXPANSION SHOE
No Scale



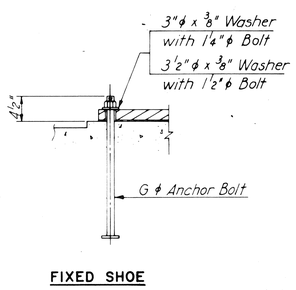


MASONRY PLATE DETAIL E4B4 & F2B4

PINTLE DETAIL
Scale: ¾"=1"

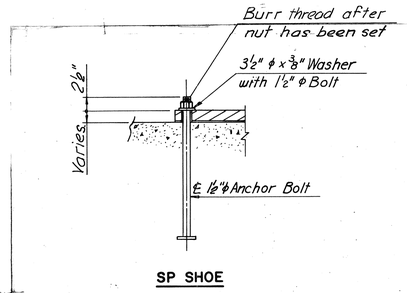


EXPANSION SHOE



FIXED SHOE

FIXED SHOE
No Scale

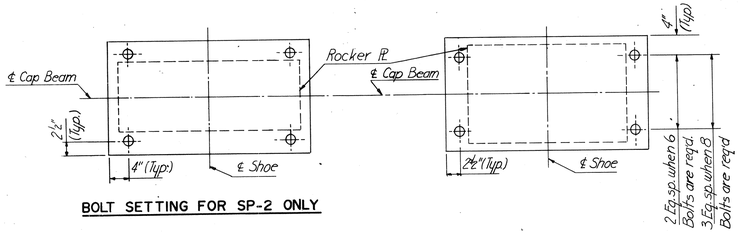


SP SHOE

FIXED MODIFIED SHOE
No Scale

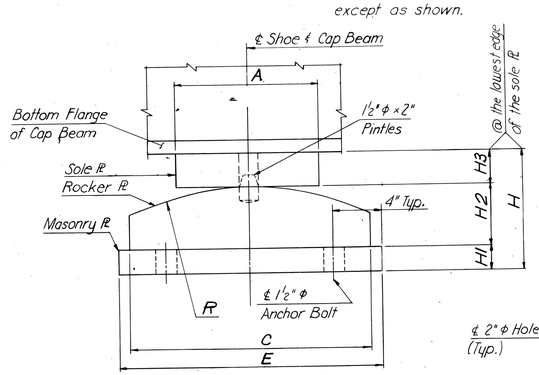
Note:
Anchor Bolt for Fixed Shoes & SP Shoes same as Anchor Bolt for Exp. Shoes except as shown.

ANCHOR BOLT DETAIL
No Scale

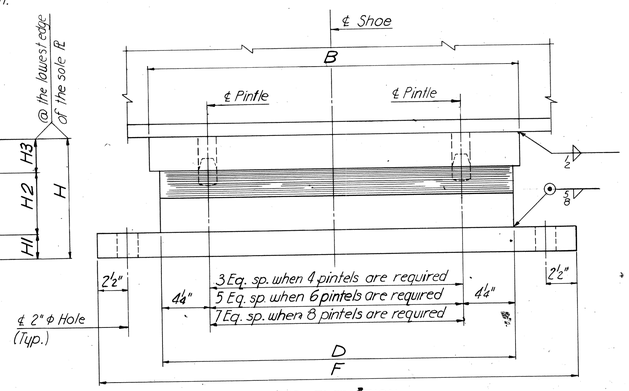


BOLT SETTING FOR SP-2 ONLY

MASONRY PLATE PLAN
SP SHOE



SIDE ELEVATION



END ELEVATION

SP SHOE

Note:
For shoe schedules, see sheet S2.
For shoe notes, see sheet S2.

	BY	DATE
MADE	HBW	7-68
CHECKED	FGC	7-68
IN CHARGE	FXH	

NO.	REVISION	BY	DATE
1	Dimension Changes	TEM	5/74

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

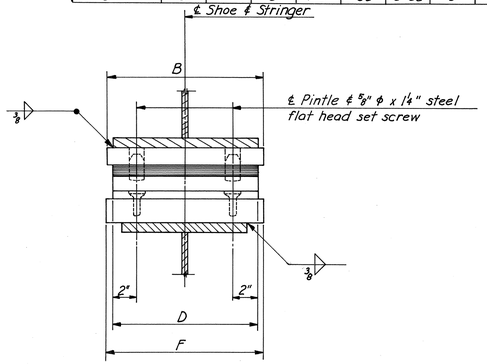
STANDARD SHOE DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

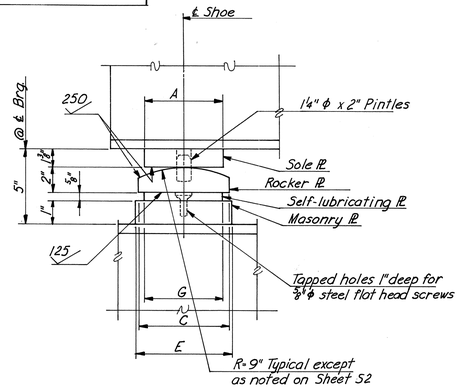
SCALE: AS NOTED
CONTRACT NO.: C-11
SHEET NO. 51 OF 6

RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	93	97

EXPANSION SHOE DIMENSIONS								
TYPE	A	B	C	D	E	F	G	REMARKS
E1	6"	1'-1"	7½"	1'-0"	8"	1'-8½"	6"	
E2	6"	1'-1"	8½"	1'-0"	9"	1'-8⅞"	6½"	
E3	6"	1'-1"	9"	1'-1"	9½"	1'-9½"	7"	
E4	6"	1'-5½"	8"	1'-4½"	8½"	2'-1"	6"	
E4B4	6"	1'-5½"	8"	1'-4½"	9"	2'-1"	6"	4 Bolts in Masonry ℄
E5	6"	1'-5½"	9"	1'-4½"	9½"	2'-1"	7"	
E9	6"	1'-9"	10"	1'-8"	11"	2'-4⅝"	7½"	
E15	6"	1'-5"	10"	1'-4"	11½"	2'-4⅛"	7½"	R = 12"
E1M	6"	1'-1"	7⅛"	1'-0"	8"	1'-1"	6"	
E1K	6"	1'-1"	7⅛"	1'-0"	8"	1'-8⅛"	6"	
E6	6"	1'-7"	8"	1'-6"	8½"	2'-2½"	6"	



END ELEVATION



SIDE ELEVATION

EXPANSION SHOE E1M

SHOE SCHEDULE							
EXPANSION SHOES				FIXED SHOES			
TYPE	BRIDGE B-65	BRIDGE B-68	TOTAL	TYPE	BRIDGE B-65	BRIDGE B-68	TOTAL
E1	10	12	22	F1		8	8
E2	2	7	9	F1M	16	19	35
E3		4	4	F2	32	8	40
E4	26	3	29	F2M	4	6	10
E4B4	6	12	18	F2B4	6		6
E5	12		12	F3	8	4	12
E9	8		8	F7	8		8
E15	4		4	SP-1		4	4
E1M	4	3	7				
E1K	1		1				
E6	1		1				

Shoe Notes:

Material for shoes (exclusive of self-lubricating plates) shall be high strength, low alloy structural steel conforming to ASTM specification A-588.

Top of masonry plates, bottom of rocker plates and top and bottom of sole plates shall be planed, straightened or otherwise treated to secure true level surfaces.

Contact surfaces noted on the plans with finish symbols shall be finished in accordance with the American Standards Association surface roughness requirement as defined in ASA B46.1-55, Surface Roughness, Waviness and Lay, Part I.

The plates comprising the expansion shoes shall be set so as to be truly centered under full dead load at a temperture of 60°F.

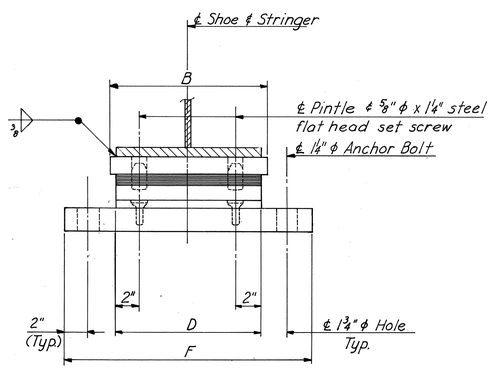
Concrete pads shall be formed integral with abutment or pier and not less than ⅛" or more than ¼" above finished elevation. Dress down pads by rubbing, grinding or as otherwise approved by the Engineer, to true level surfaces at the finished elevation.

Anchor bolt assemblies shall conform to A.S.T.M. A-307-66 and shall be hot-dip galvanized conforming to A.S.T.M. A-153-66.

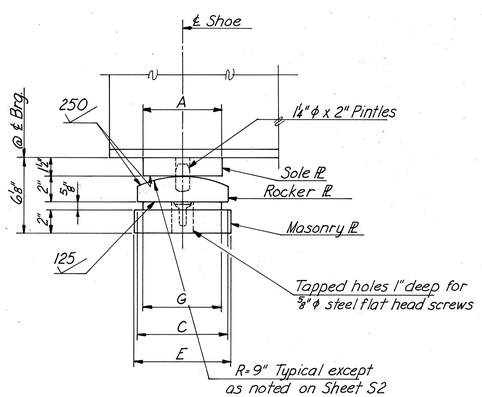
Templates shall be used to accurately set the anchor bolts.

FIXED SHOE DIMENSIONS								
TYPE	A	B	C	D	E	F	G	REMARKS
F1	6"	1'-1"	6"	1'-0"	7⅛"	1'-9"	1¼"	
F1M	6"	1'-1"	6"	1'-0"	7⅛"	1'-9"	1¼"	
F2	6"	1'-5½"	6"	1'-4½"	7"	2'-2"	1¼"	
F2M	6"	1'-5½"	6"	1'-4½"	7"	2'-2"	1¼"	
F2B4	6"	1'-5½"	6"	1'-4½"	9"	2'-2"	1¼"	
F3	6"	1'-5½"	6"	1'-4½"	8"	2'-2"	1¼"	
F7	6"	1'-9"	6"	1'-8"	8"	2'-6"	1½"	

SPECIAL SHOE DIMENSIONS												
TYPE	A	B	C	D	E	F	H1	H2	H3	H	R	NO. OF BOLTS OR PINTLES
SP-1	1'-0"	1'-11"	1'-6"	1'-11"	1'-8"	2'-8"	2"	4½"	3"	9½"	1'-6"	4

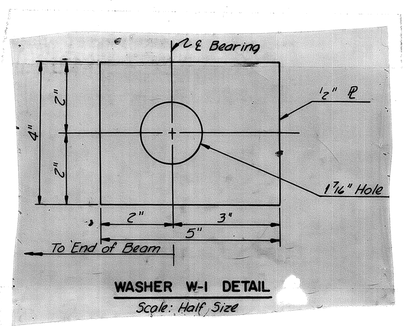


END ELEVATION



SIDE ELEVATION

EXPANSION SHOE E1K



WASHER W-1 DETAIL
Scale: Half Size

			NO.	REVISION	BY	DATE
			5	Shoe Type E6 added	T.E.M.	7-76
			4	Drwn. E. Shoes E4B4 & F2B4	T.E.M.	5-76
DESIGNED			3	Shoe Schedule B65	T.E.M.	4-76
DRAWN			2	Shoe SP-1	T.E.M.	3-76
CHECKED			1	Shoe Schedule rev.	T.E.M.	8-25-75
IN CHARGE						

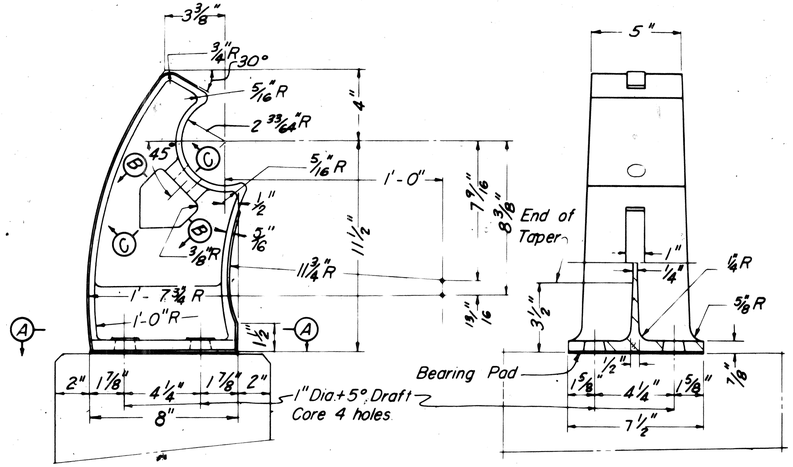
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD SHOE DETAILS

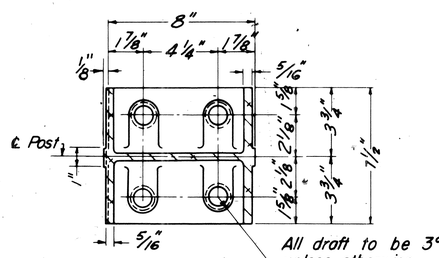
SCALE As shown
CONTRACT 11
SHEET S2 OF 6

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
CONSULTING ENGINEERS
Alexandria, Virginia
HNTB

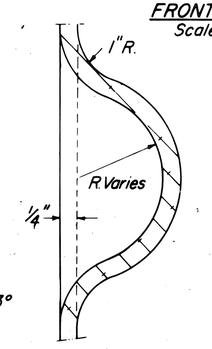
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	94	97



SIDE ELEVATION
Scale: 3"=1'-0"

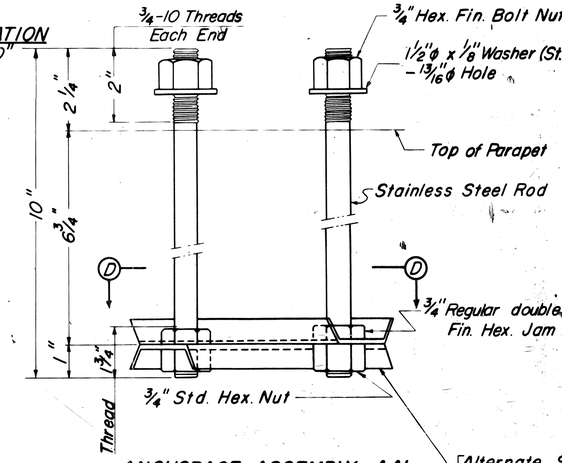


SECTION A-A
Scale: 3"=1'-0"

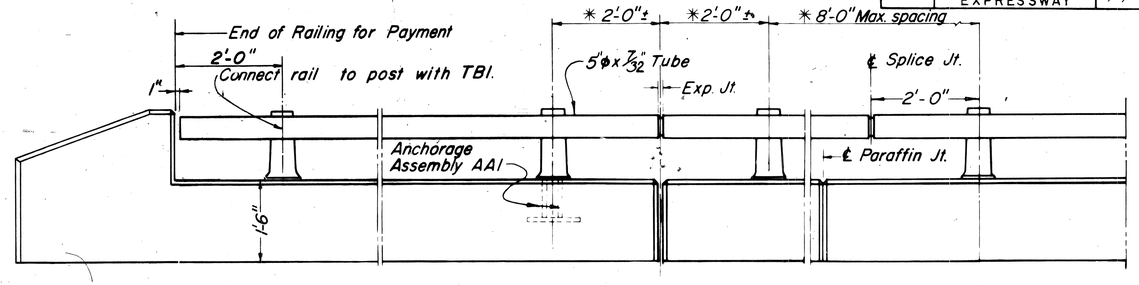


SECTION B-B

FRONT ELEVATION
Scale: 3"=1'-0"



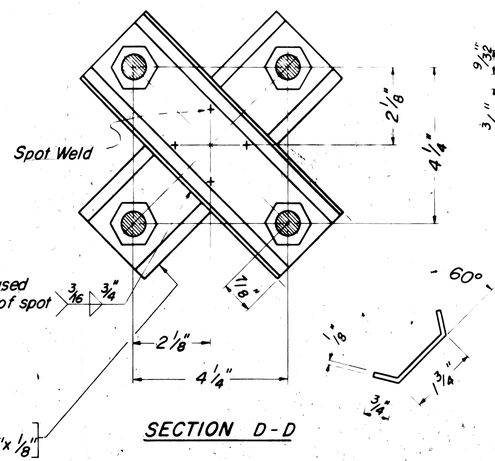
ANCHORAGE ASSEMBLY-AAI



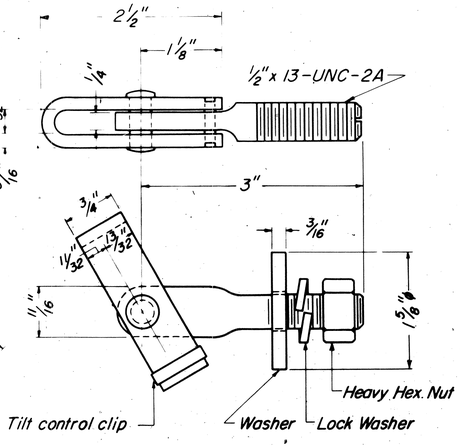
ELEVATION
Scale: 3/4"=1'-0"

℄ 2" Open joint in parapet @ ℄ Pier or front face of Abutment Backwall

NOTES:
Rail to be continuous over a minimum of 3 posts before splicing, unless otherwise shown.
✳ Post spacing to be measured along inside face of parapet. See plans each bridge.

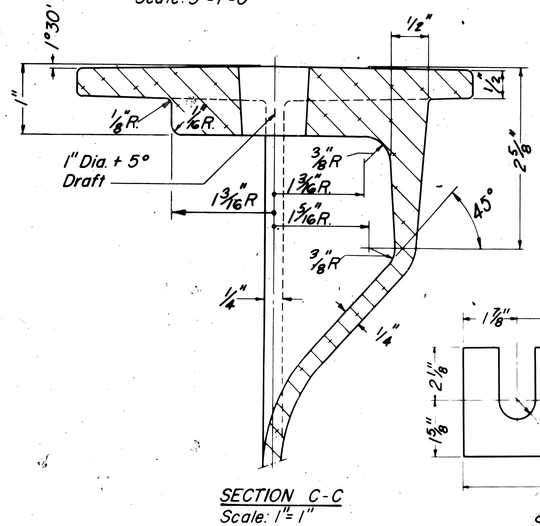


SECTION D-D



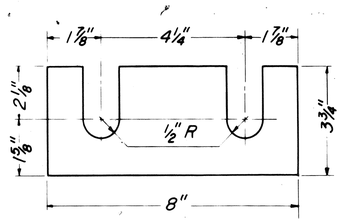
TOGGLE BOLT ASSEMBLY-TBI
TRAFFIC RAIL

Material for toggle bolt assembly TBI shall be carbon or stainless steel having a minimum elongation of 12%. Any non stainless component to be either galvanized to ASTM-A153 or cadmium plated to ASTM-A165, Type NS.
Required minimum tensile load to equal 9000 lbs. when in an open position and tested thru a 1"ϕ hole.



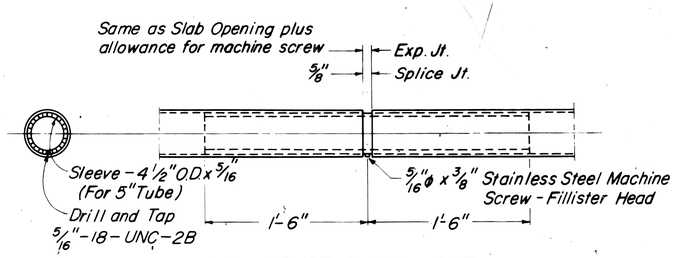
SECTION C-C
Scale: 1"=1"

AAI - Steel Spacer — ASTM A425, or A36 (As shown)
AAI { Nuts (Top) — ASTM A276, Type 304
Top Washers — Stainless Steel
Rods — ASTM A-276, Type 304 Annealed, Hot-finished
Nuts (Bottom) — ASTM A307
Threads on all rods may be rolled or cut.

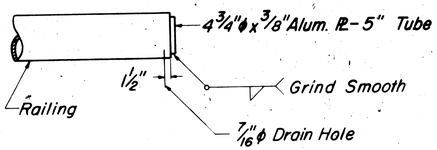


SHIM DETAIL

Shims to be made from 1/16" or 1/8" material. Shims shall not project outside of post base.



RAIL SPLICE & EXP. JOINT



RAIL END CAP

NOTES:
Posts shall be seated on neoprene bearing pads 1/16" minimum thickness, having a nominal durometer hardness of 70. Pads shall conform to post base dimensions.
Aluminum shims may be used for adjusting post alignment, maximum thickness of shim build-up not to exceed 1/8". Where more tilting of the post is required, the concrete area shall be ground down
Posts shall be cast aluminum.
Rail members shall be aluminum extruded tube.
Anchor bolts may be set normal to profile grade.
Bi-metallic anchor rods may be used as an alternate for the stainless steel rods. See Special Provisions.

	BY	DATE
MADE	A.B.P.	8-67
CHECKED	A.J.S	8-67
IN CHARGE	P.R.Y.	

NO.	REVISION	BY	DATE

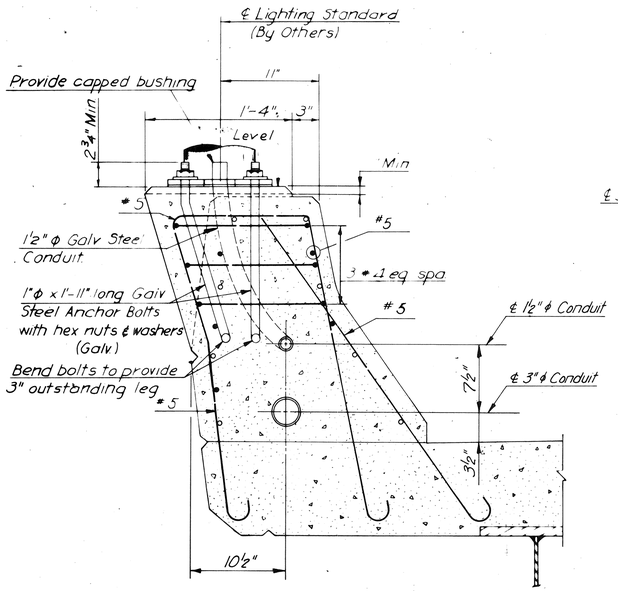
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD
ALUMINUM RAILING DETAILS
(1 RAIL)

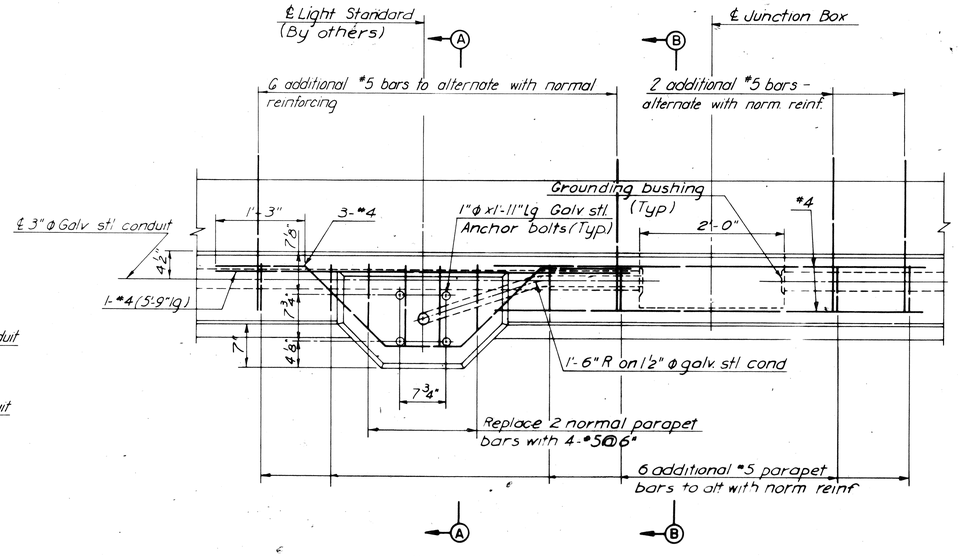
HOWARD NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE AS SHOWN
CONTRACT NO. 11
SHEET NO. 53 OF 6

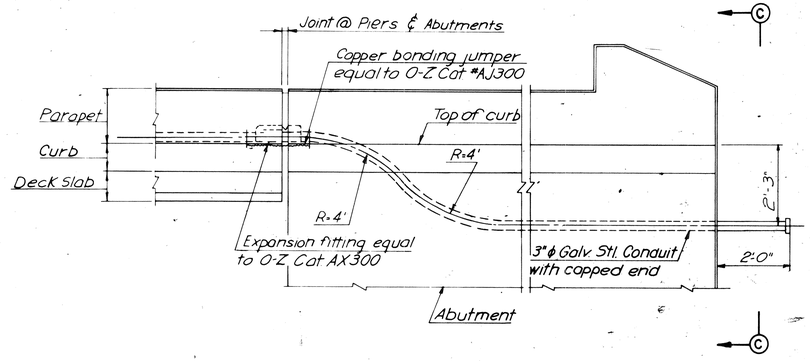
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	95	97



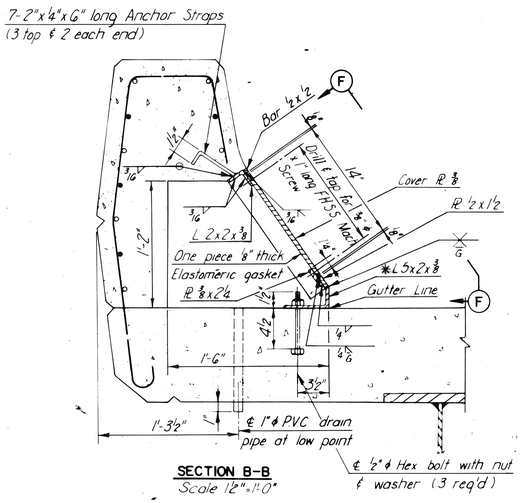
SECTION A-A
Scale 1½"=1'-0"



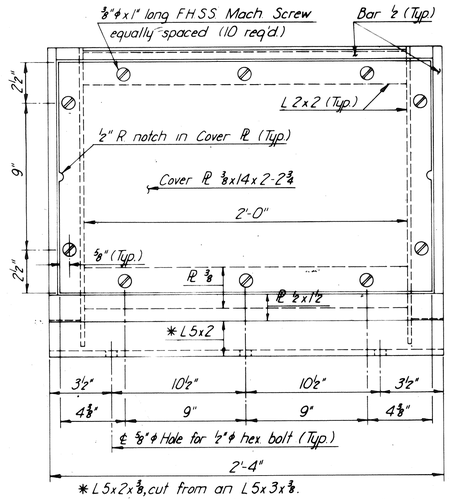
PLAN AT LIGHT STANDARD
Scale 1"=1'-0"



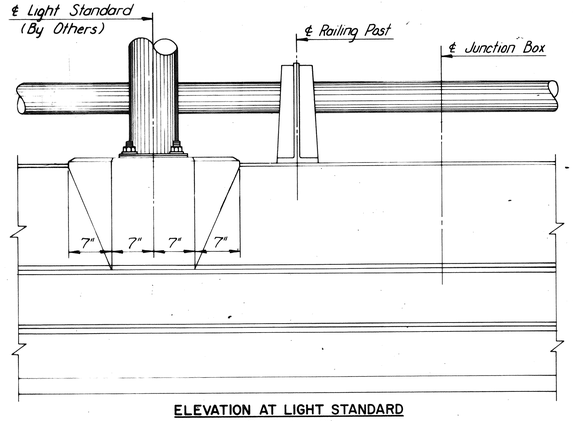
TYPICAL CONDUIT INSTALLATION DETAILS AT DECK JOINTS AND ABUTMENT WINGWALL
No Scale



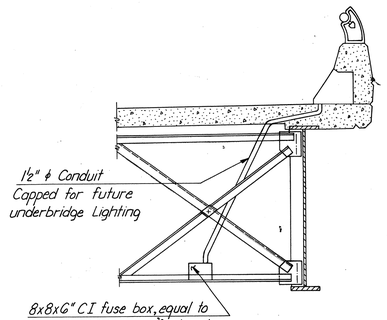
SECTION B-B
Scale 1½"=1'-0"



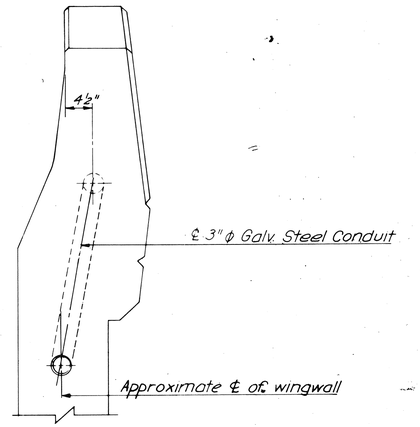
VIEW F-F
No Scale



ELEVATION AT LIGHT STANDARD
Scale: 1"=1'-0"



DETAIL FOR FUSE BOX FOR UNDERDECK LIGHTING
No Scale



VIEW C-C
No Scale

NOTES:

All conduits shall be terminated in Junction Boxes with grounding bushings equal to O-Z type IGB

Anchor bolt assemblies shall conform to ASTM A307 and shall be hot dip galv. after fabrication in accordance with ASTM A153.

Junction Box and cover shall be hot galvanized after fabrication in accord with ASTM A123.

Only additional or replacement reinf. is shown on this sheet For normal reinf. see individual bridge Cross Section and Deck Plan sheets

	BY	DATE	NO	REVISION	BY	DATE
MADE	D.L.A.	3-68				
CHECKED	P.R.Y.	3-68				
IN CHARGE P.R.Y.						

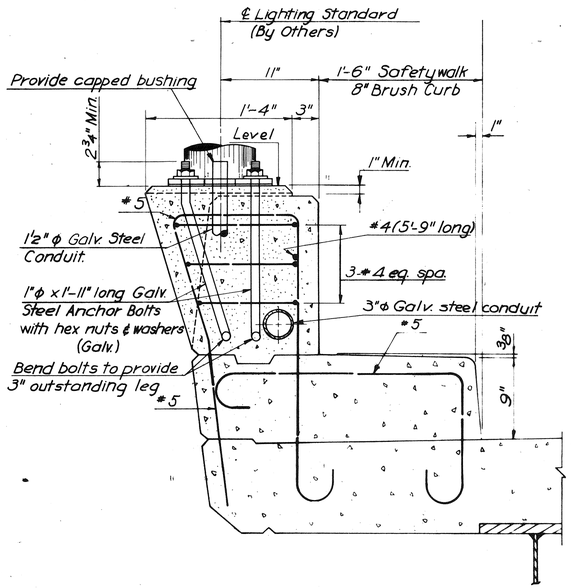
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM -
DOWNTOWN EXPRESSWAY

STANDARD ELECTRICAL DETAILS (BRIDGES CARRYING EXP. SYSTEM)

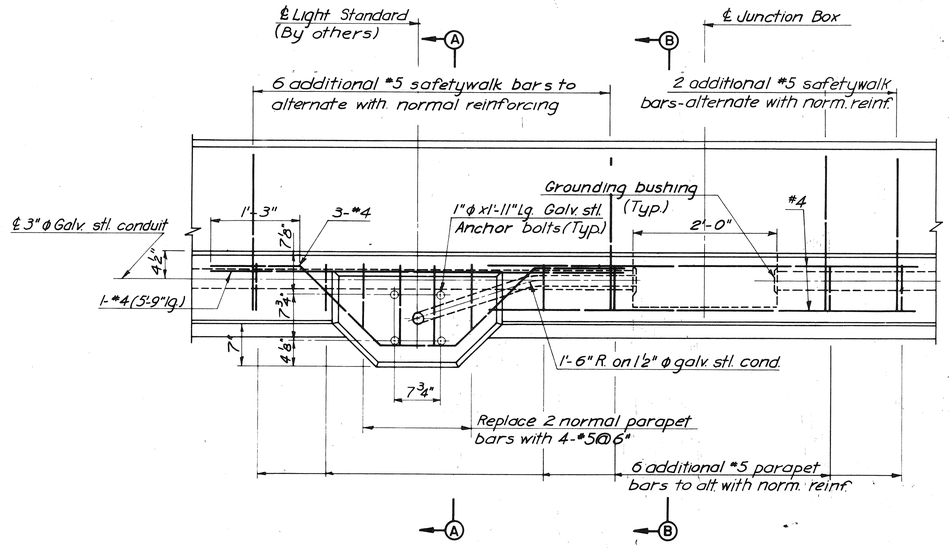
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE:
CONTRACT No.: 11
SHEET No. S4 OF 6

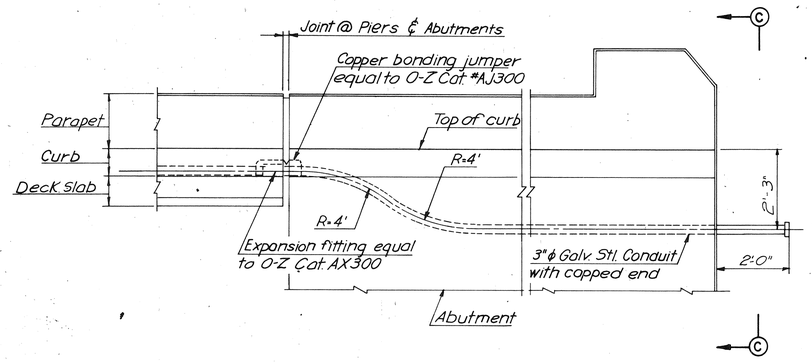
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11		95B	



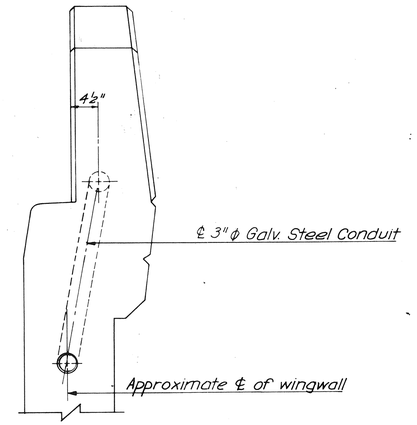
SECTION A-A
Scale: 1½" = 1'-0"



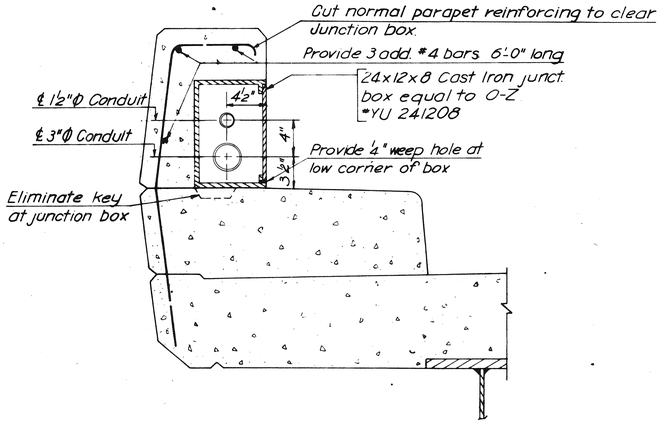
PLAN AT LIGHT STANDARD
Scale: 1" = 1'-0"



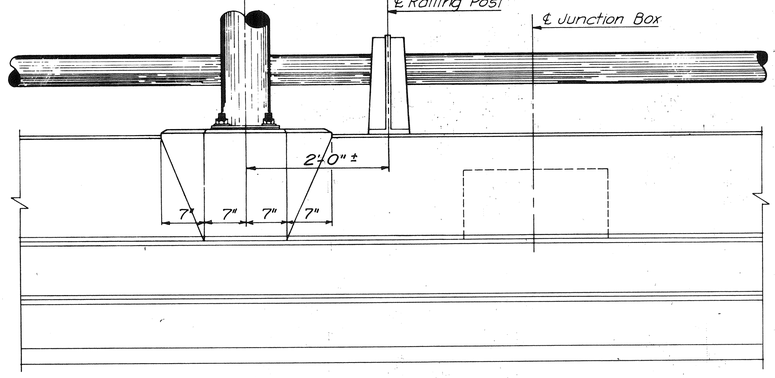
TYPICAL CONDUIT INSTALLATION DETAILS AT DECK JOINTS AND ABUTMENT WINGWALL
No Scale



VIEW C-C
Scale: 1½" = 1'-0"



SECTION B-B
Scale: 1½" = 1'-0"



ELEVATION AT LIGHT STANDARD
Scale: 1" = 1'-0"

NOTES:

All conduits shall be terminated in Junction Boxes with grounding bushings equal to O-Z type IGB.

Anchor bolt assemblies shall conform to ASTM A307 and shall be hot-dip galv. after fabrication in accordance with ASTM A153.

Junction Box and cover shall be hot-galvanized after fabrication in accord. with ASTM A123.

Only additional or replacement reinf. is shown on this sheet. For normal reinf. see individual bridge Cross Section and Deck Plan sheets.

Typical for Unit 12 BG5
Units 16 & 18 BG8

	BY	DATE				
MADE	D.L.A.	3-68				
CHECKED	P.R.Y.	3-68	1	New Sheet	TEM	9-29-76
IN CHARGE P.R.Y.			NO.	REVISION	BY	DATE

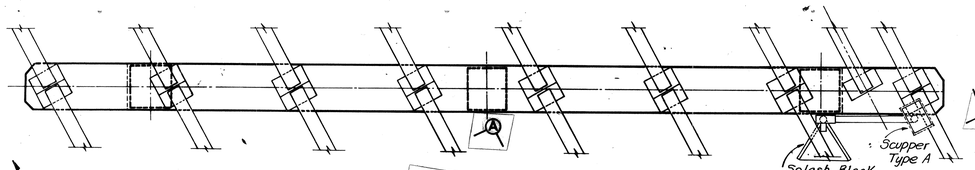
RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM

STANDARD ELECTRICAL DETAILS (BRIDGES CARRYING EXP. SYSTEM)

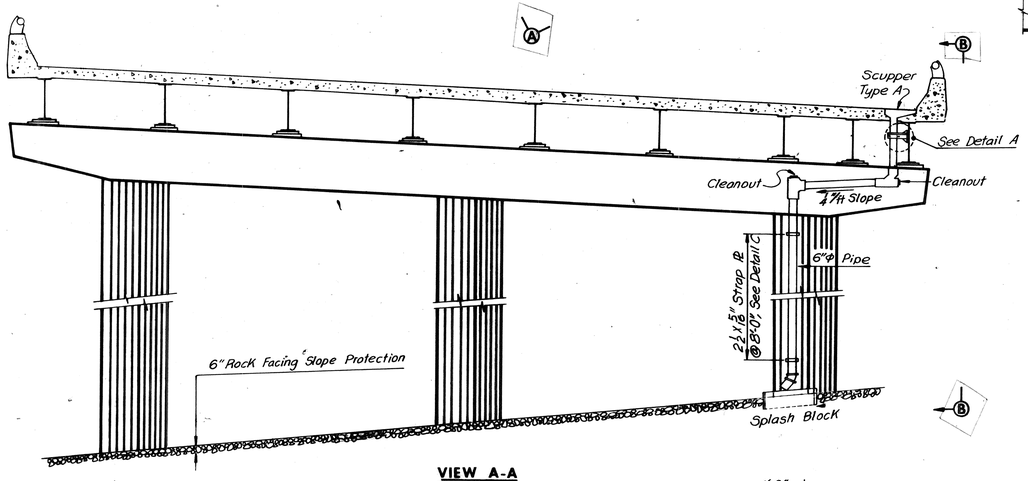
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: AS SHOWN
CONTRACT NO.:
SHEET NO. S4B OF

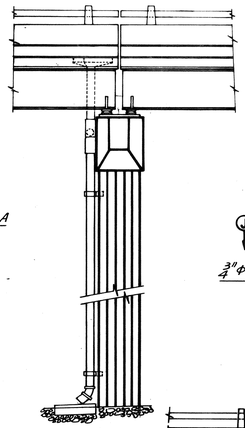
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
II	DOWNTOWN EXPRESSWAY	96	97



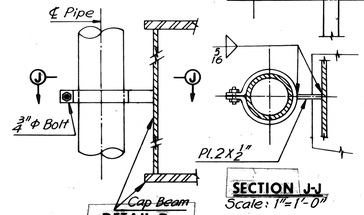
PLAN



VIEW A-A
ELEVATION
SUPPORT TYPE 1
Scale : 3/16"=1'-0"

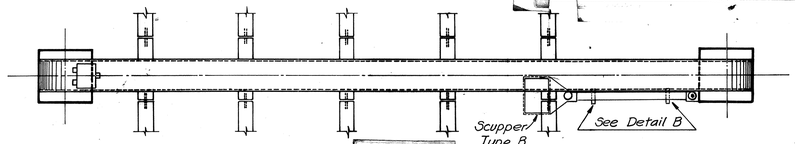


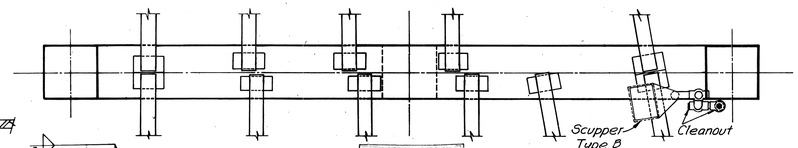
VIEW B-B
Scale : 3/16"=1'-0"



DETAIL D
Scale : 1"=1'-0"

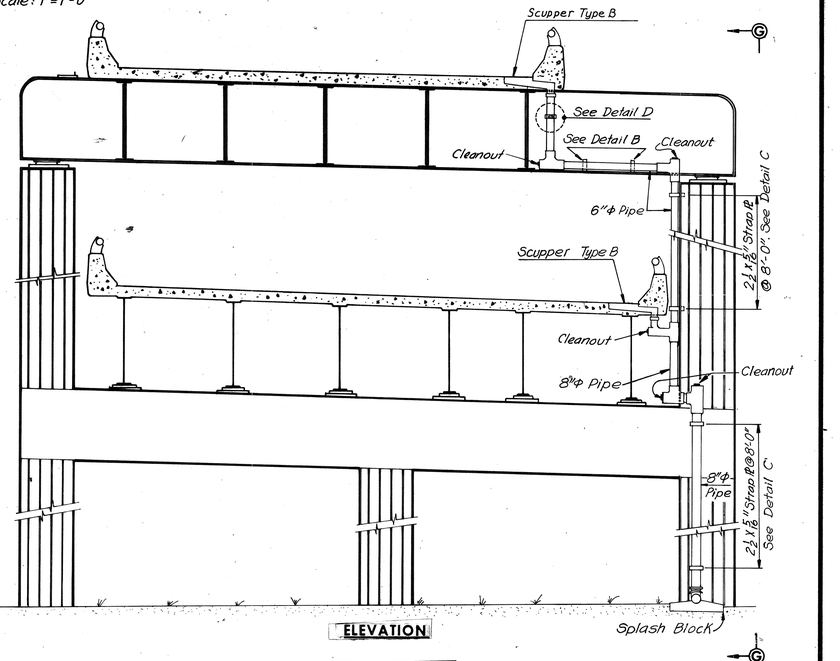
SECTION J-J
Scale : 1"=1'-0"





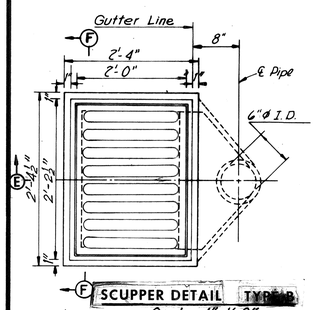
PLAN

Note: Remove existing scuppers at widening portions
Also remove enough concrete around these scuppers
to provide required bond length (about 2'-0").



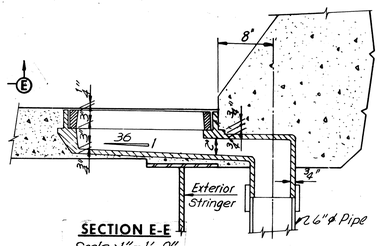
ELEVATION

SUPPORT TYPE 2
Scale : 3/16"=1'-0"

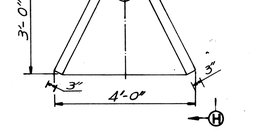


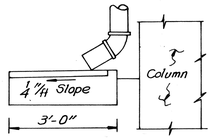
SCUPPER DETAIL TYPE B
Scale : 1"=1'-0"

Note: For dimensions not given,
see Scupper Detail, Type A.

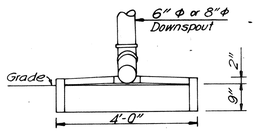


SECTION E-E
Scale : 1"=1'-0"

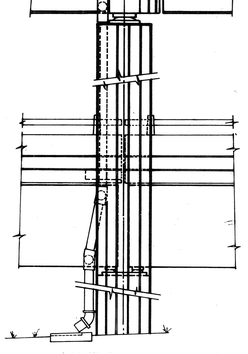




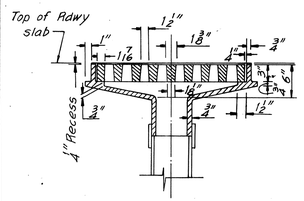
VIEW H-H
Scale : 1"=1'-0"



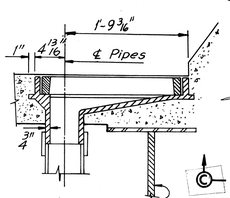
SPLASH BLOCK DETAIL
Scale : 1"=1'-0"



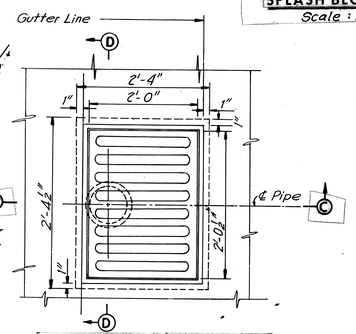
VIEW G-G
Scale : 3/16"=1'-0"



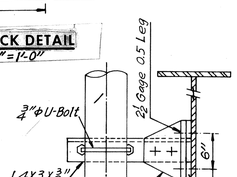
SECTION D-D
Scale : 1"=1'-0"

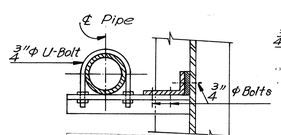


SECTION C-C
Scale : 1"=1'-0"

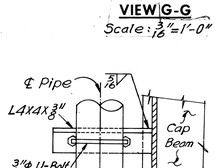


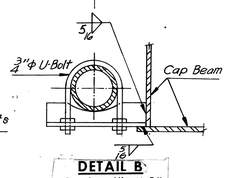
SCUPPER DETAIL TYPE A
Scale : 1"=1'-0"



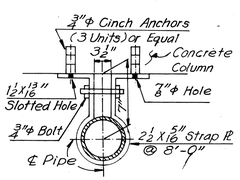


DETAIL A
Scale : 1"=1'-0"





DETAIL B
Scale : 1"=1'-0"



DETAIL C
Scale : 1"=1'-0"

Note: Where existing scuppers are to be removed, concrete shall be removed 2'-0" minimum from the edges of scuppers.

	BY	DATE			
MADE	G.S.H.	10-10-69	A	Parapet Changed PRMS	4-19-71
CHECKED					
IN CHARGE			NO.	REVISION	BY DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD DRAINAGE DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. S5 OF 6

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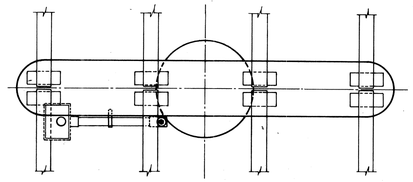
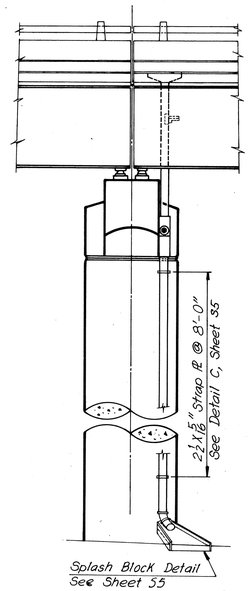
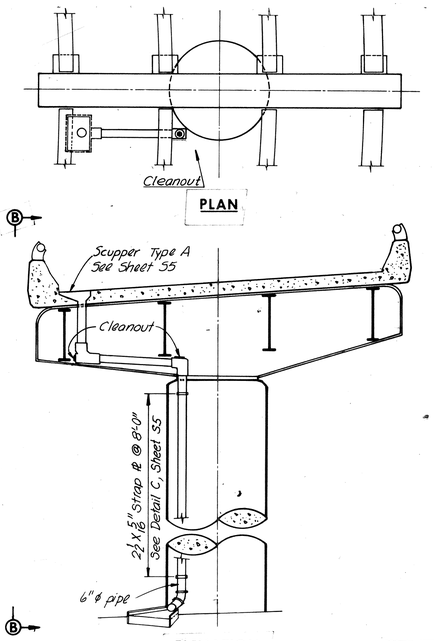
RICHMOND EXPRESSWAY SYSTEM			
SECTION	PROJECT	SHEET NO.	TOTAL SHEETS
11	DOWNTOWN EXPRESSWAY	97	97



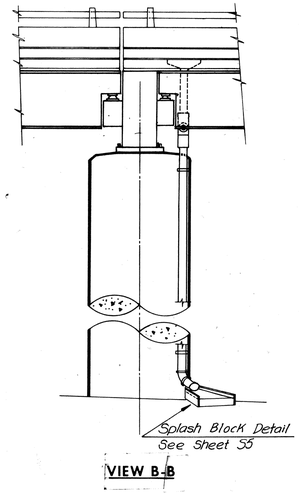
ELEVATION



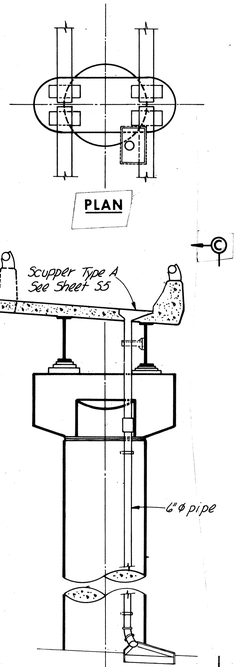
VIEW A-A



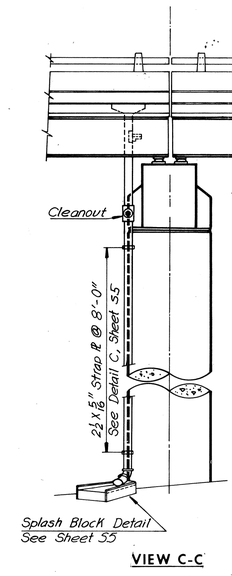
ELEVATION



VIEW B-B



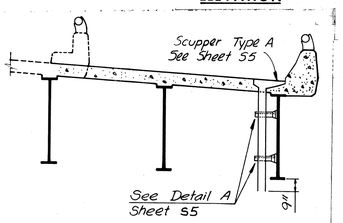
ELEVATION



VIEW C-C

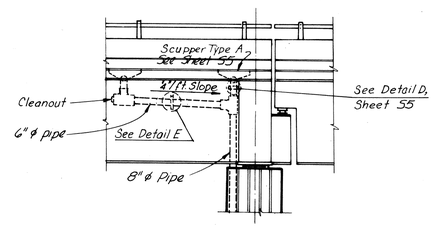
SUPPORT TYPE 4
Scale: $\frac{3}{16}$"=1'-0"

SUPPORT TYPE 5
Scale: $\frac{3}{16}$"=1'-0"

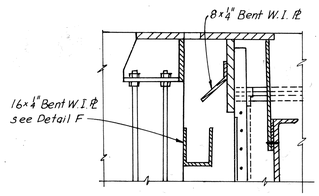


SUPPORT TYPE 6
Scale: $\frac{3}{16}$"=1'-0"

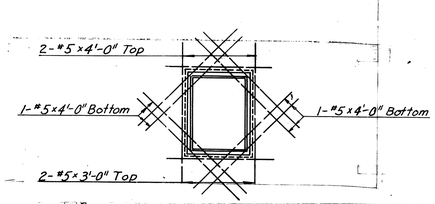
SUPPORT TYPE 3
Scale: $\frac{3}{16}$"=1'-0"



SUPPORT TYPE 7
Scale: $\frac{3}{16}$"=1'-0"

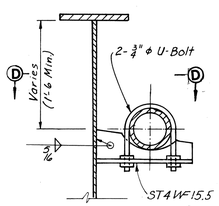


SECTION F-F
Scale: 1"=1'-0"

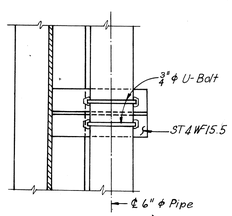


DETAIL OF REINFORCING STEEL AT CAST SCUPPER
No Scale

Note:
Bend bottom and top slab bars at Cast Scuppers where interference occurs.
Weight of Reinforcing Bars at Scupper: 48 lbs.

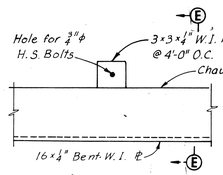


DETAIL E
Scale: 1"=1'-0"

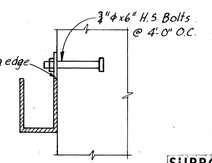


SECTION D-D
Scale: 1"=1'-0"

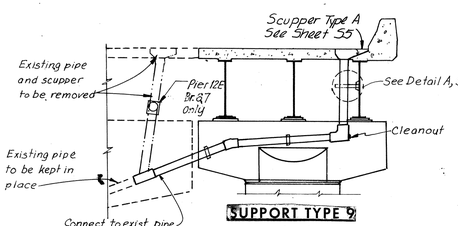
Note:
For Details below top of upper column, see Support Type 2, Sheet S5.



DETAIL F
Scale: 1½"=1'-0"

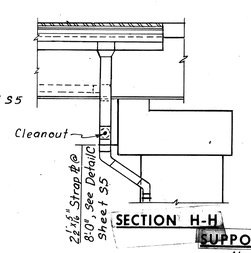


SECTION E-E
Scale: 1½"=1'-0"

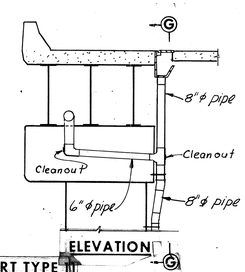


SUPPORT TYPE 9
No Scale

SUPPORT TYPE 8

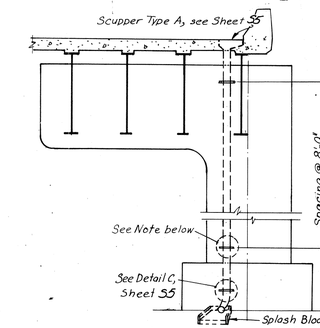


SECTION H-H



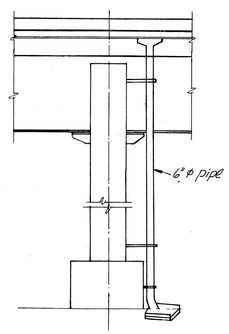
ELEVATION

SUPPORT TYPE 11
No Scale



ELEVATION

Note:
Same Connection Detail used as shown in Detail E, except that ST4WF15.5 is turned 90°.



VIEW G-G

SUPPORT TYPE 10
Scale: 1" =1'-0"

	BY	DATE	⚠	Parapet Changed	P.R.M.	4-19-71
MADE	SCC	1.29.69				
CHECKED	G.S.H.	2.13.69				
IN CHARGE			NO.	REVISION	BY	DATE

RICHMOND METROPOLITAN AUTHORITY
RICHMOND EXPRESSWAY SYSTEM
DOWNTOWN EXPRESSWAY

STANDARD DRAINAGE DETAILS

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
NEW YORK ALEXANDRIA KANSAS CITY

SCALE: As Noted
CONTRACT NO. 11
SHEET NO. S6 OF 6

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