

FILE CODE	2		
1-Div	2-Proj	3-City	4-Hwy
ORIGIN	Bridge	DATE	6-29-90
ITEM #			

MEMORANDUM

TO: ___ Construction Division
 ___ Bismarck District
 ___ Bridge Division
 ___ Design Division
 ___ City of Bismarck
 X City of Mandan
 ___ FHWA

FROM: Forest D. Durov
 Bridge Division

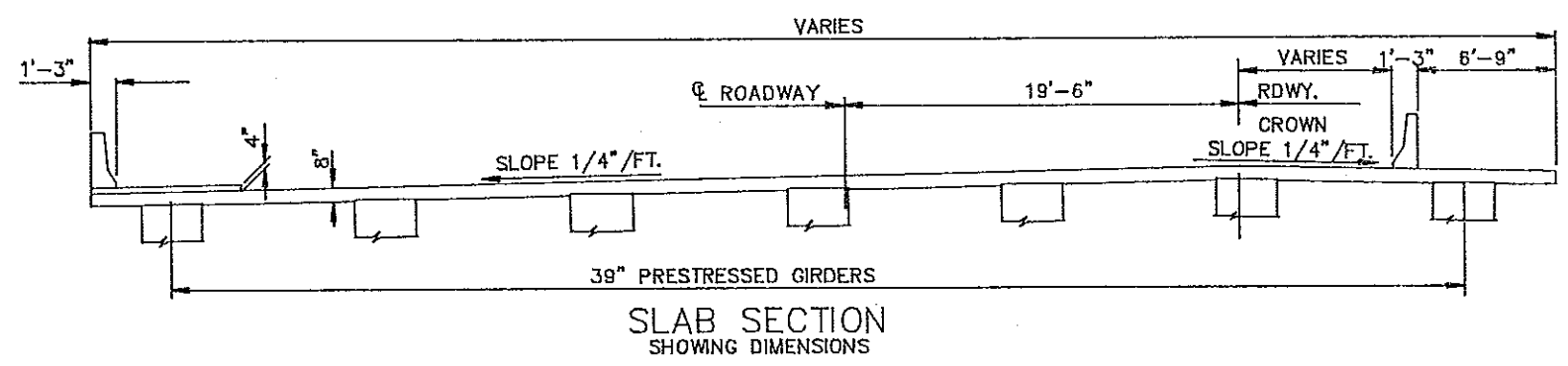
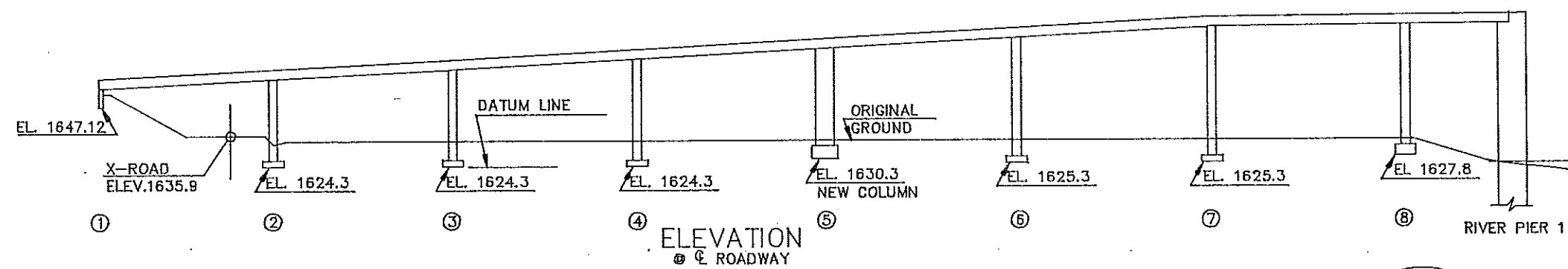
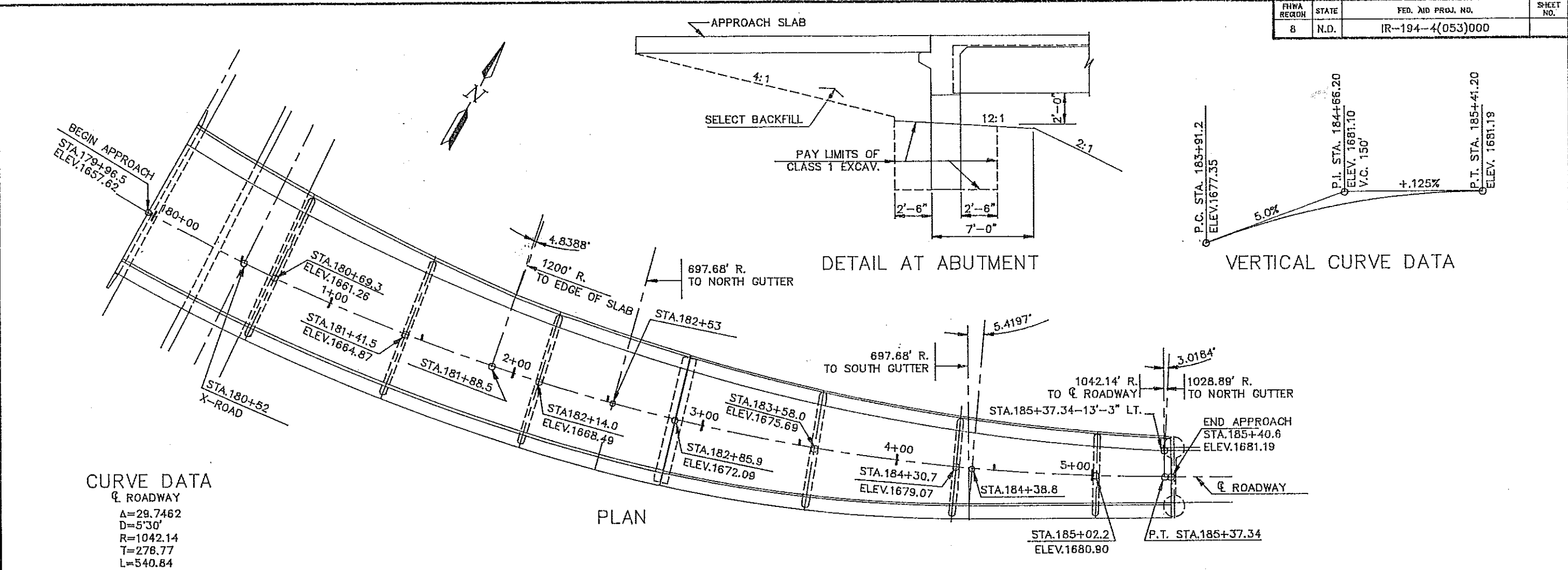
DATE: June 29, 1990

SUBJECT: PROJECTS IR-194-4(053) and
 F-1-094(007)920
 MEMORIAL BRIDGE

The PS&E for the Memorial Bridge project is scheduled for July 12, 1990, at 8:30 a.m., in room 330 of the ND Department of Transportation building.

Enclosed are preliminary plans for the bridge portion of the projects.

Enclosure

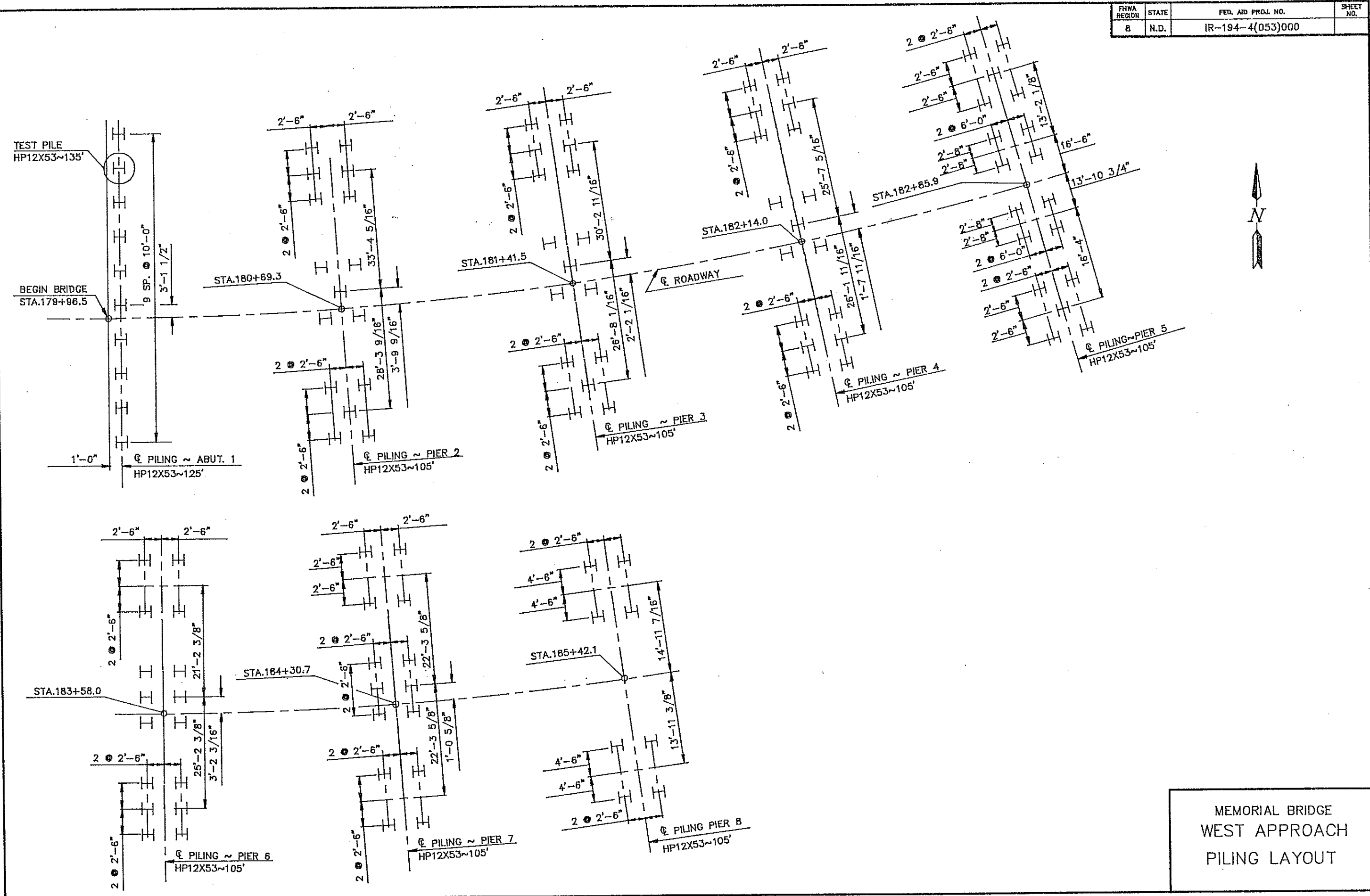


PRELIMINARY PLAN

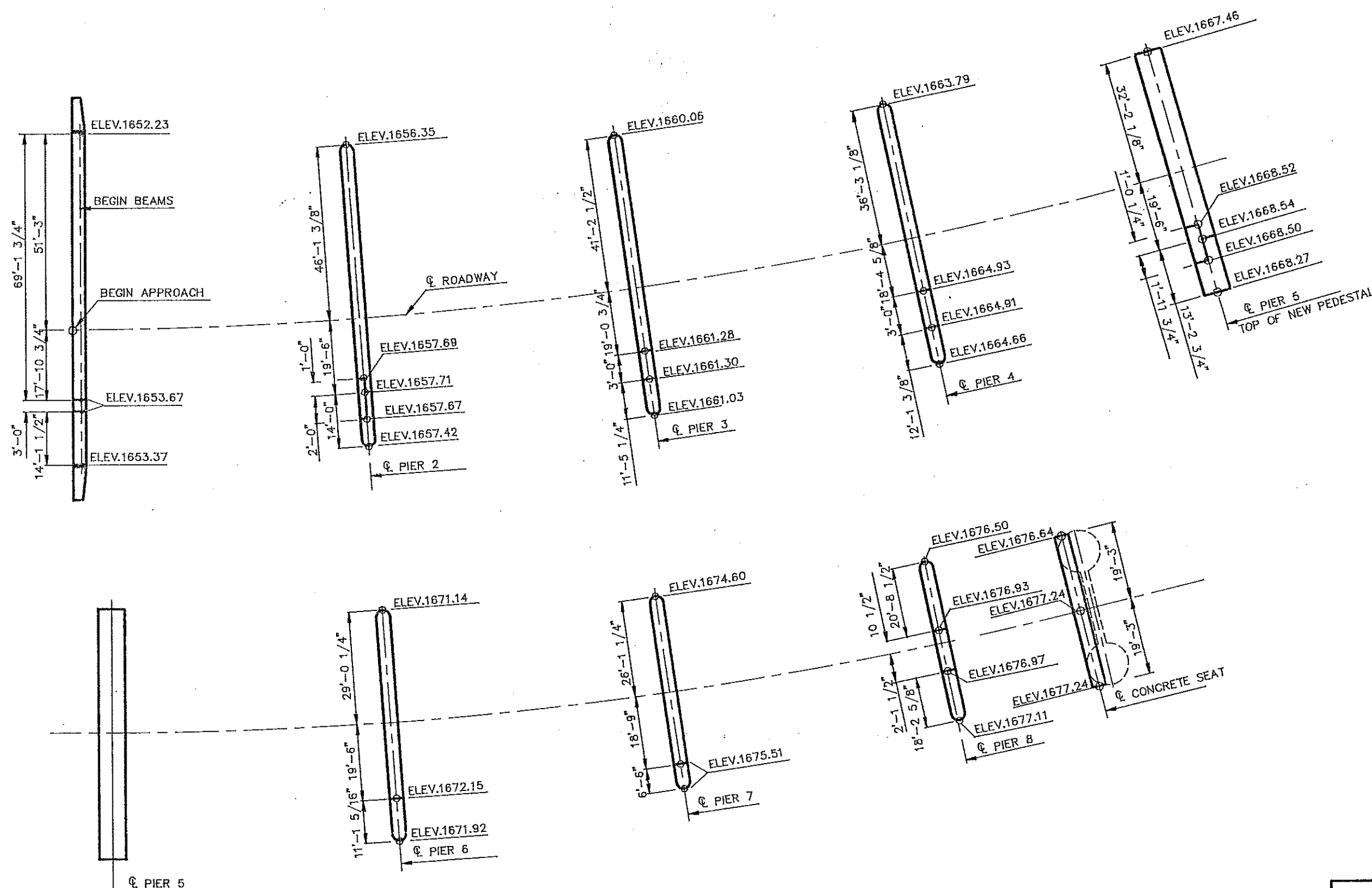
DESIGN LOADING	F.W.S.
HS20	15 PSF
MEMORIAL BRIDGE BISMARCK-MANDAN	
WEST APPROACH	
BURLEIGH & MORTON COUNTIES	

DATE: _____ BRIDGE ENGINEER

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



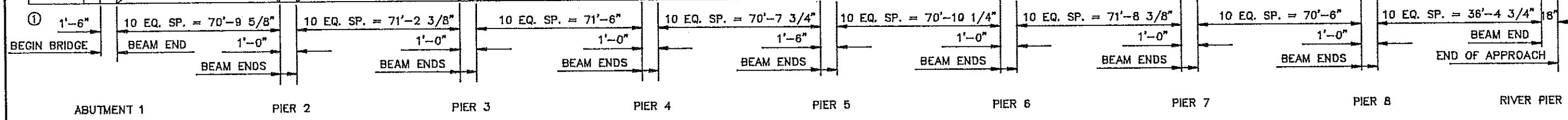
MEMORIAL BRIDGE
WEST APPROACH
PILING LAYOUT



BEARING ELEVATIONS
ELEVATIONS SHOWN ARE TO TOP OF FINISHED CONCRETE

MEMORIAL BRIDGE
WEST APPROACH
BEARING SEAT
ELEVATIONS

	SCREED ELEVATION 19'-6" RIGHT	SCREED ELEVATION 12'-0" RIGHT	SCREED ELEVATION @ C ROADWAY	SCREED ELEVATION 12'-0" LEFT
BEGIN BRIDGE	1658.02	1657.87	1657.62	1657.37
ABUTMENT 1	.10	.94	.59	.44
	.48	1658.33	1658.08	.83
	.87	.71	.46	1658.21
	1659.24	1659.09	.84	.59
	.61	.45	1659.20	.95
	.97	.81	.56	1659.31
	1660.32	1660.16	.91	.66
	.66	.50	1660.25	1660.00
	.99	.83	.58	.33
	1661.31	1661.16	.91	.66
	.64	.48	1661.23	.98
	.69	.53	.28	1661.03
	1662.08	.92	.67	.42
	.46	1662.31	1662.06	.81
	.84	.69	.44	1662.19
	1663.21	1663.06	.81	.56
	.57	.42	1663.17	.92
	.92	.77	.52	1663.27
	1664.27	1664.11	.86	.61
	.60	.44	1664.19	.94
	.92	.77	.52	1664.27
	1665.25	1665.09	.84	.59
	.30	.14	.89	.64
	.69	.53	1665.28	1665.03
	1666.07	.92	.67	.42
	.45	1666.30	1666.05	.80
	.82	.67	.42	1666.17
	1667.19	1667.03	.78	.53
	.54	.38	1667.13	.88
	.88	.73	.48	1667.23
	1668.22	1668.06	.81	.56
	.55	.39	1668.14	.89
	.87	.72	.47	1668.21
	.92	.77	.52	.27
	1669.30	1669.15	.90	.65
	.68	.53	1669.28	1669.03
	1670.06	.90	.65	.40
	.42	1670.27	1670.02	.77
	.78	.62	.37	1670.13
	1671.13	.97	.72	.47
	.47	1671.31	1671.06	.81
	.80	.65	.40	1671.15
	1672.13	.97	.72	.47
	.45	1672.30	1672.05	.80
	.53	.37	.12	.87
	.92	.76	.51	1672.26
	1673.30	1673.15	.90	.65
	.68	.52	1673.27	1673.02
	1674.05	.89	.64	.39
	.41	1674.25	1674.00	.75
	.76	.60	.35	1674.10
	1675.10	.94	.69	.44
	.43	1675.27	1675.02	.77
	.75	.59	.35	1675.10
	1676.07	.92	.67	.42
	.12	.97	.72	.47
	.51	1676.35	1676.10	.85
	.89	.74	.49	1676.24
	1677.27	1677.12	.87	.62
	.64	.49	1677.24	.99
	1678.00	.85	.60	1677.35
	.34	1678.19	.94	.69
	.66	.50	1678.25	1678.00
	.95	.79	.54	.29
	1679.21	1679.06	.81	.56
	.46	.30	1679.05	.80
		.34	.09	.84
		.62	.37	1679.12
		.87	.63	.39
		1680.10	.88	.63
		.30	1680.09	.84
		.47	.29	1680.04
		.62	.45	.20
		.75	.60	.35
		.85	.72	.47
		.93	.81	.56
		.99	.89	.64
		1681.00	.91	.66
		.04	.96	.69
		.08	1681.00	.73
		.11	.04	.76
		.14	.08	.78
		.16	.11	.80
		.18	.14	.81
		.19	.16	.82
		.19	.17	.82
		.20	.18	.82
		.19	.19	.82
		.19	1681.19	.82



SCREED ELEVATIONS
ELEVATIONS ARE TO TOP OF FINISHED ROADWAY

① DISTANCE GIVEN ON C ROADWAY

STANDARDS	
D-604-4	PRESTRESSED BOX GIRDER
D-622-1	PILE SPLICE DETAILS
D-770-3	PULL BOX DETAILS

MEMORIAL BRIDGE
WEST APPROACH
SCREED ELEVATIONS
STANDARDS

NOTES--MEMORIAL BRIDGE

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	ND.	R-194-4(053)000	

100 SCOPE OF WORK: WEST APPROACH--The existing concrete deck and beams will be replaced with a new concrete slab and prestressed concrete beam superstructure. The approach will be about 80 feet shorter and every other pier will be eliminated. Additional columns will be added to those pier columns that will be used for the new approach.

MAIN TRUSS SPANS--The existing steel grid deck will be replaced with a reinforced concrete deck. The concrete sidewalks will be replaced with new concrete. A half dozen stringers will be replaced on east end of east truss span. Pier repair work will be required at river piers 2 and 3. The stringers, floor beams, and pier caps shall be cleaned with water washing equipment in accordance with Section 602.03J.2 of the Standard Specifications.

EAST APPROACH--The approach will be widened on the south side to provide a right-turn lane. The asphalt overlay will be milled off and replaced with concrete. A Jersey Barrier will be added on the north side of the approach. A retaining wall on the south end of the approach will be replaced with a new 65 foot retaining wall.

100 GENERAL: The cost of furnishing and placing preformed expansion joint filler, concrete inserts, tie wire, bar spacers, bar supports, deck drains, conduit, junction box, and other miscellaneous items shall be included in the price bid for Class AE-3 and AAE-3 concrete.

202 REMOVAL OF STRUCTURE: The superstructure of the west approach shall be removed. The abutment, and alternate pier columns shall be removed to one foot below natural ground surface. The truss spans' steel grid deck and the north and south sidewalk concrete shall be removed. When removing the steel grid, 1/4 to 3/8 inch of metal shall be allowed to remain on top of the stringers so no damage will result to the stringer flange. The asphalt overlay and the south sidewalk of the east approach shall be removed. All materials removed shall become the property of the contractor and shall be disposed of properly.

203 EMBANKMENT: The embankment at the abutment shall be in place for a minimum of 30 days before piling are driven.

The contractor will be required to bore through the fill at the abutments before driving piling. All pilot holes not completely filled by the piles shall be backfilled with sand or fine gravel before the substructure is placed.

In lieu of the above waiting period, the contractor may begin pile driving operations as soon as the embankment is in place, but all pilot holes shall be extended to a depth of 15 feet into the original ground.

210 EXCAVATION: Class 1 excavation, at the west abutment, the new columns and the retaining wall for the east approach, shall extend from the bottom of the footing to the upper limits as shown on the bridge drawings.

210 SELECT BACKFILL: Select backfill shall meet the requirements of Section 816.03, Class 5, except maximum size shall be 3".

550 BRIDGE APPROACH SLAB: Mechanical finishing of the approach slab shall be required. A mechanical or hand-held transverse metal tine finish shall be applied. A surface tolerance of 3/16" in 10 feet is also required.

Contractor has the option of placing the concrete in one continuous operation or two pours with the split determined by a centerline joint.

602 DIAPHRAGMS: If the diaphragm concrete is placed before the deck concrete, the concrete shall cure for at least 72 hours before deck placement.

602 SURFACE FINISH "D": Surface Finish "D" shall be required for all surfaces of the barriers.

602 DECK CONCRETE: Beams and girders have slight variations in the anticipated camber. To build the deck to the designated thickness will require slight adjustments in deck elevation and/or riser dimensions. These adjustments result in minor concrete quantity discrepancies. The contractor shall consider this quantity discrepancy when he bids the unit price for Class AAE-3 Concrete. The Department will only pay for the plan quantity of Class AAE-3 Concrete.

602 Deflection of the deck shoring shall be computed using the total dead load plus the weight of the finishing machine. The forming shall be adjusted properly to accommodate the deflection and thereby maintain the total slab thickness specified in the plans.

602 PENETRATING WATER REPELLENT TREATMENT: Penetrating water repellent shall be applied to the driving surface of the concrete deck.

602 BARRIERS: Barriers shall be constructed according to the provisions of Section 602.03 B.4 except that there shall be no expansion or deflection joints. Make 3/4" V-grooves in all faces of the barriers at each pier and at equal spaces between substructures at approximately 10-foot spacing.

NOTES--MEMORIAL BRIDGE

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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612 REINFORCING STEEL: Dimensions for bent bars are given out to out and to tangent intersections unless otherwise noted.

612 The bar fabricator shall add a prefix to all bar designations to differentiate between the several parts of the structure.

612 All reinforcing steel shall be Grade 60.

616 STRUCTURAL STEEL: Structural steel shall be AASHTO M 270, Grade 36T2, except the requirement for Charpy V-Notch test is waived for the bearings, expansion joints, railings, diaphragms, and diaphragm connection material.

616 Field connections shall be made with 7/8 inch diameter, AASHTO M 164 high-strength bolts unless otherwise shown.

616 Temporary or permanent attachments or devices that are not shown on the plans as part of the structure shall not be welded to the structural steel members during the fabrication and construction process.

616 The cost of swedge bolts shall be included in the total cost of structural steel.

622 PILING: Piling shall be driven with a steam, air, or diesel hammer with a rated energy and ram weight not less than 53.692 foot-pound-tons, as computed by the formula $W(E-11,025) + 0.974E$, where W is the weight of the ram in tons and E is the rated hammer energy. In no case shall the ram weight be less than 3,300 pounds.

Piling shall be driven to the minimum design bearing of:
55 tons for HP 10x42 and 70 tons for HP 12x53.

622 PILING: The abutment pile shall be paid for as "Bitumen Coated Steel Piling HP 12x53." The pier pile shall be paid for as "Steel Piling HP 12x53." A pile collar shall be field welded to each abutment pile. The purpose of the pile collar is to minimize the scraping off of the bitumen coating during pile driving. The pile collar also marks the location above which the pile shall be bitumen coated and below which shall be uncoated. The test pile in Abutment #1 shall have its pile collar located 40 feet from the top. On the remaining abutment piling, the collar should be placed in a location that will result in it being at elevation 1,617 once it is driven. The minimum penetration would thus be the length it takes to place the collar at elevation 1,617. All pile shall be driven to a 70 ton capacity. The materials and labor to attach the pile collar shall be incidental to the bid item "Bitumen Coated Steel Piling HP 12x53."

622 BITUMEN COATED PILING: The bituminous coating shall be applied on the steel piling prior to driving. Material for the prime coat shall conform to AASHTO Specification M116. The asphaltic material for the slip layer shall conform to AASHTO Specification M115-81, Type II.

The piling shall be completely coated between the collar and the bottom of concrete with the exception of the splice area. The pile shall be brushed free of dirt, loose rust, and loose scale before priming. Application of the prime coat shall be with a brush or other means to thoroughly coat the surface within the designated length with a uniform continuous film of primer. The primer may be applied without heating and, when necessary to obtain a brushing consistency, may be thinned with a volatile solvent. Primer shall be permitted to set before the slip layer is applied. The asphaltic material shall not separate from the piles prior to placement.

The asphalt for the slip layer shall be heated to between 300 and 400 degrees F. and applied by mopping or other means with sufficient coats to obtain a minimum coating thickness of 1/8 inch. Whitewashing of the coating may be necessary during hot weather to prevent running and sagging of the slip layer prior to driving the pile. That portion of the piles to be embedded in concrete shall be cleaned of asphaltic material and primer before the concrete is placed.

630 PAINT AND PAINTING: The structural steel shall be painted according to the supplemental specifications. The finish coat color shall be aluminum. The aluminum filled epoxy mastic primer shall be tinted to differentiate the color from the finish coat.

SHOP DRAWINGS: The contractor shall submit the following shop drawings to the Construction office for approval;

1. Prestressed Box Girders.
2. Elastomeric Bearing Pads
3. Structural Steel
4. Pedestrian Railing
5. Expansion Joint Strip Seal

DESIGN STRENGTH: F'C 3,000 PSI Cl. AE-3
F'C 4,000 PSI Cl. AAE-3
FY 60,000 PSI Gr. 60 reinforced steel
F'C 5,500 PSI prestressed girder concrete
FY 36,000 PSI Structural Steel M270 Grade 36

NOTES--MEMORIAL BRIDGE

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	

772 LOOP DETECTORS: The materials and labor used to install the loop detectors on the east approach including the required conduit and junction box shall be incidental to the bid item "Preformed Loop Detector."

ELASTOMERIC BEARING PAD: Elastomeric bearing pad material and fabrication shall be in accordance with AASHTO M251 specification with additional suffix requirements F17, Z22, and Z31. Bearing acceptance will be by certification in accordance with Section 106 of the Standard Specifications. The elastomeric material shall have a hardness of 60 durometers.

EXPANSION JOINT STRIP SEAL: The 6 inch neoprene strip seal shall be capable of providing 4 inches of movement. Vent holes shall be spaced at 2 feet in the horizontal leg of the angles. The steel AASHTO M270, Grade 36, shall be galvanized.

PIER REPAIR: This work consists of cleaning the column caps of piers 2 and 3 with water washing equipment in accordance with Section 602.03J.2 of the Standard Specifications. Concrete removal should include 6 inches from the top and 3 inches from around the south column. The intent is to remove all deteriorated material to sound concrete. All cracks shall be pressure filled with epoxy material after the anchor units have been placed. A clear weatherproofing epoxy resin shall be applied to all the pier caps when the repairs are complete. The cost of cleaning the pier caps, removing the concrete, furnishing and placing the anchor units, injecting the epoxy material, placing the AE-3 concrete, and applying the protective epoxy resin coating shall be included in the price bid for "Pier Repair."

At pier 4 the spandrel below the deck has some deteriorated concrete that shall be repaired. The repair work shall be incidental to the unit price bid for "Pier Repair."

Details of the pier repair work is shown on sheet 94-920.914.5T.

PRESTRESSED BEAMS: The loop reinforcing steel at the end of the beams shall not be used at pier 5.

STAY-IN-PLACE FORMS: Stay-in-place forms will be allowed for the truss deck and sidewalks.

SIDEWALK REPAIR: The north sidewalk of the east approach shall be repaired at Stations 0+54 to 0+94, 1+66 to 2+18 and 2+45 to 2+78. The intent of the repair is to overlay these spalled sections of the sidewalk. Repair of the sidewalk shall be incidental to the price bid for Class AAE-3 concrete.

MONTANA-DAKOTA UTILITIES: The structure across the Missouri River has four (4) electric transmission lines attached to it on brackets. There are two lines on each side of the structure. Two lines on the same side may be de-energized during the contractor's working hours. The contractor shall notify Montana-Dakota Utilities Company (222-7710) a minimum of 48 hours prior to de-energizing the lines. Should it become necessary to re-energize the lines during the contractor's working hours because of emergencies or load demands, the contractor will be notified and any equipment, materials, and personnel working close to the conductors will have to be cleared until the lines are de-energized.

ROADWAY CANOPY (EAST APPROACH): The structural contractor shall construct a canopy above the existing roadway under the structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the contractor of any responsibility for the safety of the public.

The canopy shall be erected prior to the removal of any deck concrete, supporting them from the ground, or suspended from the existing girders.

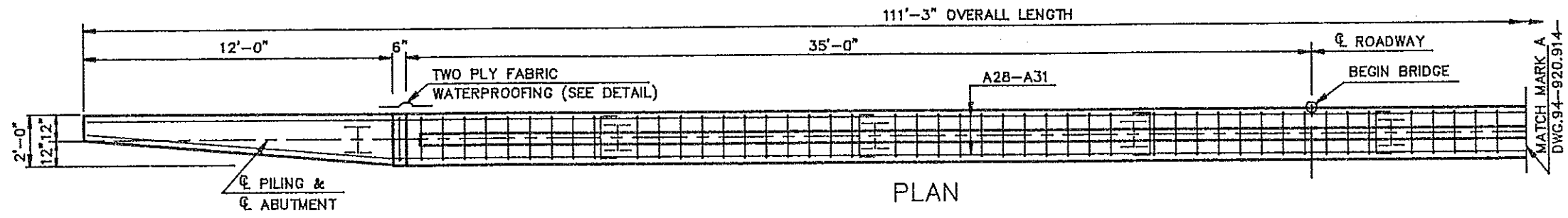
The erection of the canopy shall be completed in a minimum amount of time and with the least inconvenience to the public.

The canopy shall be of a design and material selected by the contractor and approved by the engineer. The minimum vertical clearance from the traveled roadway to the bottom of the canopy shall be 13'-6". The canopy shall project a minimum distance of 5'-0" beyond the outside edge of the curb and shall extend out to the shoulders of the traveled roadway below.

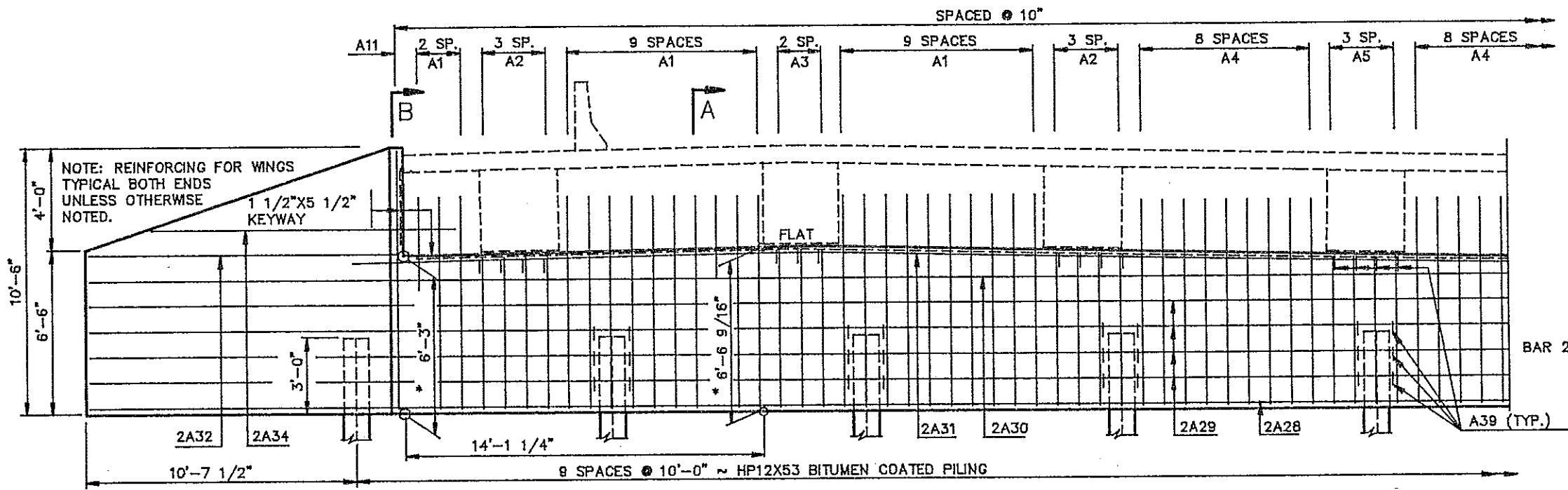
After completion of the structure, the canopy shall be removed and shall remain the property of the contractor.

The roadway canopy shall be paid for at the contract lump sum unit price for "Roadway Canopy." The intent of the bid item, Roadway Canopy, is to provide protection for the roadways under the bridge during all stages of construction. The Department shall pay only one lump sum payment for this protection. This lump sum shall include construction, maintenance, and removal of any or all canopies required.

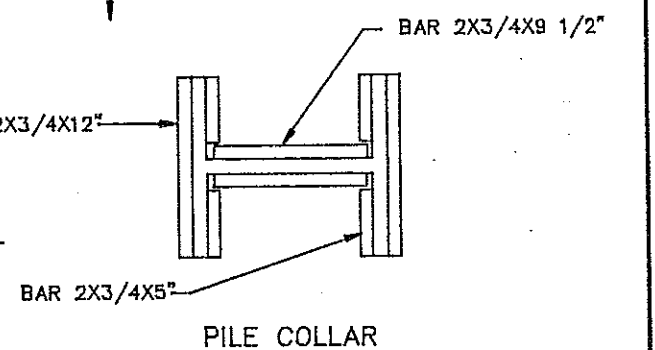
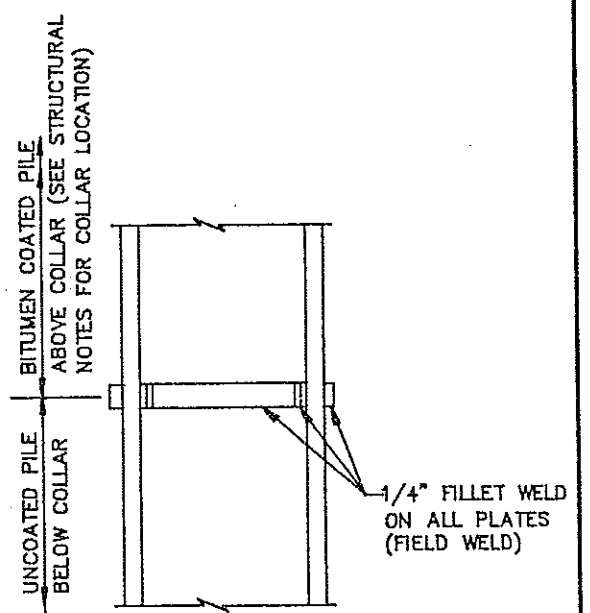
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	IR-194-4(053)000	



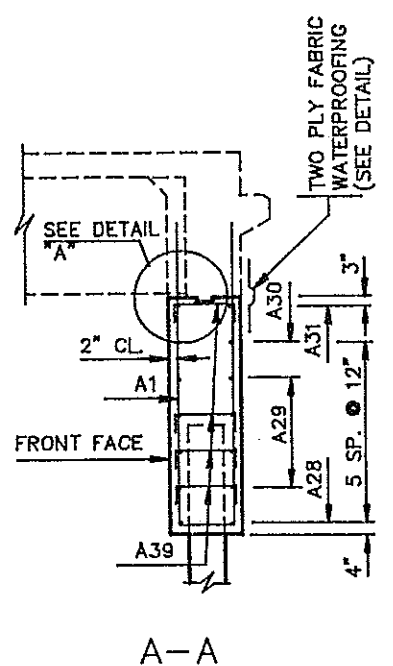
PLAN



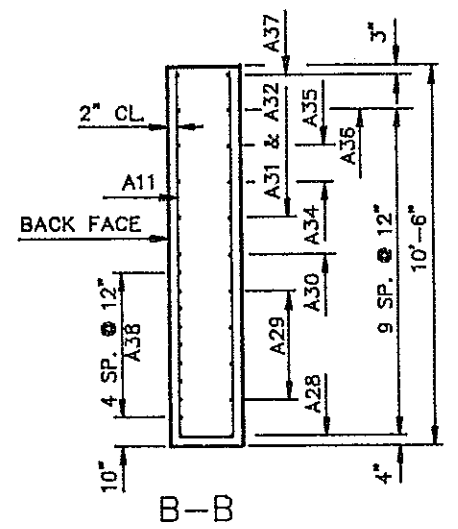
ELEVATION
LOOKING WEST



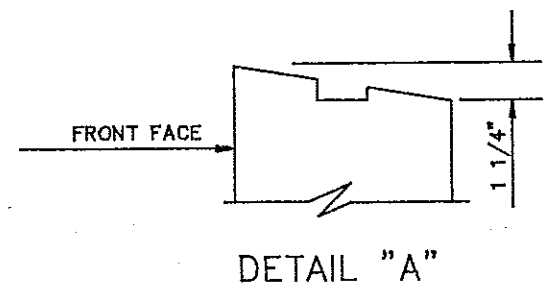
PILE COLLAR



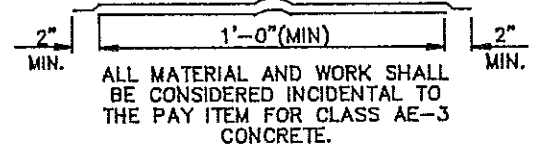
A-A



B-B



DETAIL "A"



TWO-PLY FABRIC
WATERPROOFING DETAIL

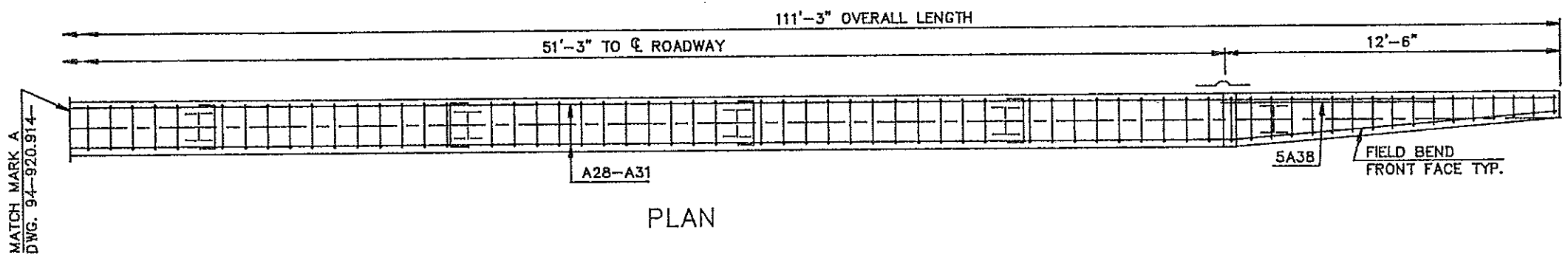
ALL MATERIAL AND WORK SHALL BE CONSIDERED INCIDENTAL TO THE PAY ITEM FOR CLASS AE-3 CONCRETE.

QUANTITIES	
SEE DWG. 94-920.914-9	
MEMORIAL BRIDGE ABUTMENT DETAIL	
STA. 179+96.5	

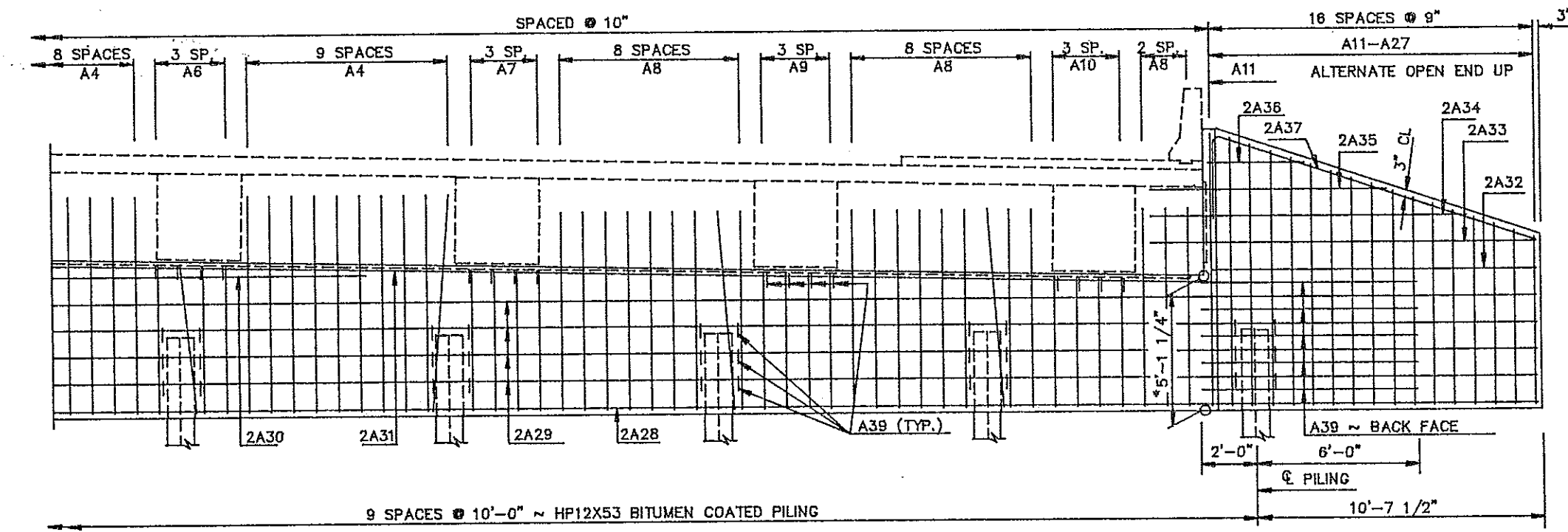
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
A1	23	5	18'-4"	BENT
A2	8	5	15'-11"	BENT
A3	3	5	16'-2"	BENT
A4	28	5	17'-10"	BENT
A5	4	5	15'-6"	BENT
A6	4	5	15'-3"	BENT
A7	4	5	14'-4"	BENT
A8	21	5	16'-6"	BENT
A9	4	5	14'-1"	BENT
A10	4	5	13'-11"	BENT
A11	2	5	21'-10"	BENT
A12	2	5	21'-8"	BENT
A13	2	5	21'-1"	BENT
A14	2	5	20'-6"	BENT
A15	2	5	19'-11"	BENT
A16	2	5	19'-4"	BENT
A17	2	5	18'-10"	BENT
A18	2	5	18'-3"	BENT
A19	2	5	17'-8"	BENT
A20	2	5	17'-2"	BENT
A21	2	5	16'-7"	BENT
A22	2	5	16'-0"	BENT
A23	2	5	15'-5"	BENT
A24	2	5	14'-11"	BENT
A25	2	5	14'-4"	BENT
A26	2	5	13'-9"	BENT
A27	2	5	13'-2"	BENT
A28	6	6	38'-3"	STR.
A29	16	5	58'-5"	STR.
A30	4	5	34'-8"	STR.
A31	4	6	45'-3"	STR.
A32	4	5	12'-0"	STR.
A33	2	5	14'-4"	STR.
A34	4	5	11'-9"	STR.
A35	4	5	8'-9"	STR.
A36	4	5	3'-7"	STR.
A37	4	6	15'-3"	BENT
A38	10	5	8'-0"	STR.
A39	91	4	2'-8"	BENT

QUANTITIES		
CLASS AE-3 CONC.	00	C.Y.
REINFORCING STEEL	00	LBS.
BITUMEN COATED PILING & EXCAV. (SEE ESTIMATE OF QUANTITIES)		

MEMORIAL BRIDGE
 ABUTMENT
 DETAIL
 STA. 179+96.5



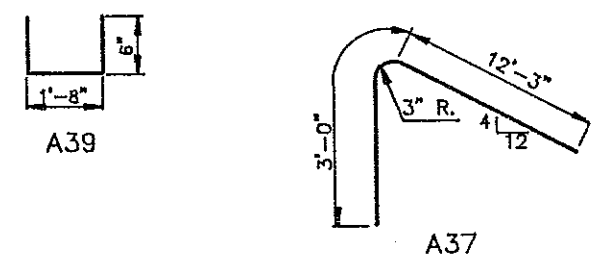
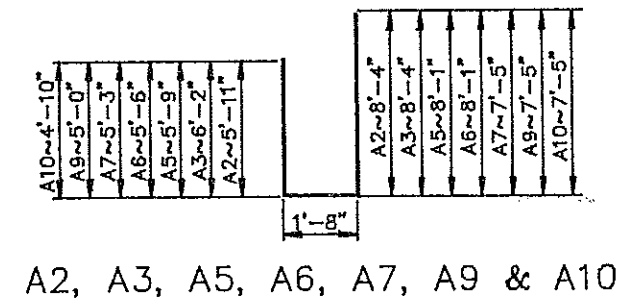
PLAN



ELEVATION
 LOOKING WEST

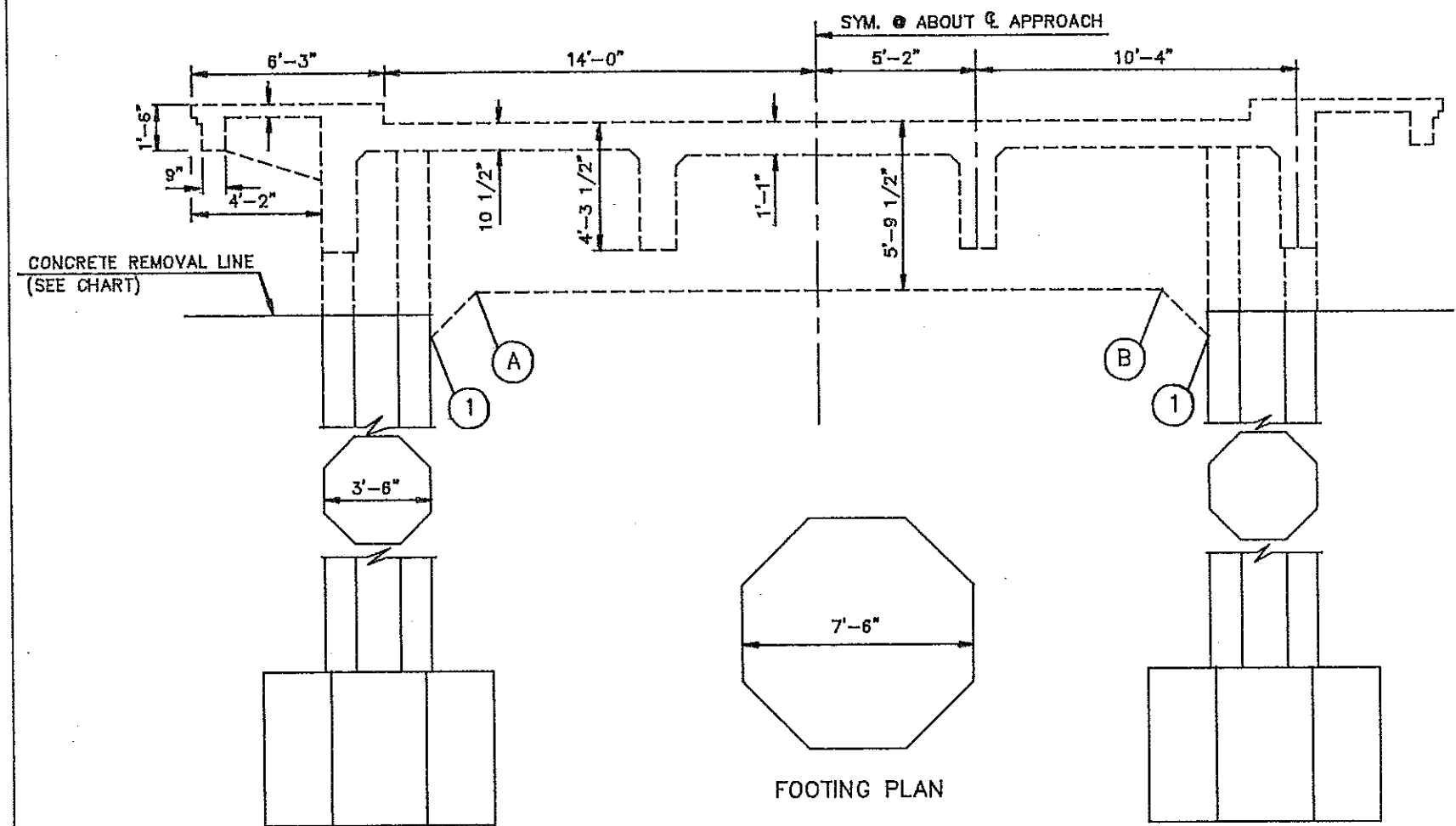
1'-8"	A1, A4, A8, A11, A12
1'-7"	A13
1'-6"	A14
1'-5"	A15
1'-4"	A16, A17
1'-3"	A18
1'-2"	A19, A20
1'-1"	A21
1'-0"	A22
11"	A23, A24
10"	A25
9"	A26
8"	A27

A1, A4, A8, A11-A27



BENT BAR DETAILS
 DIMENSIONS SHOWN ARE OUT TO OUT

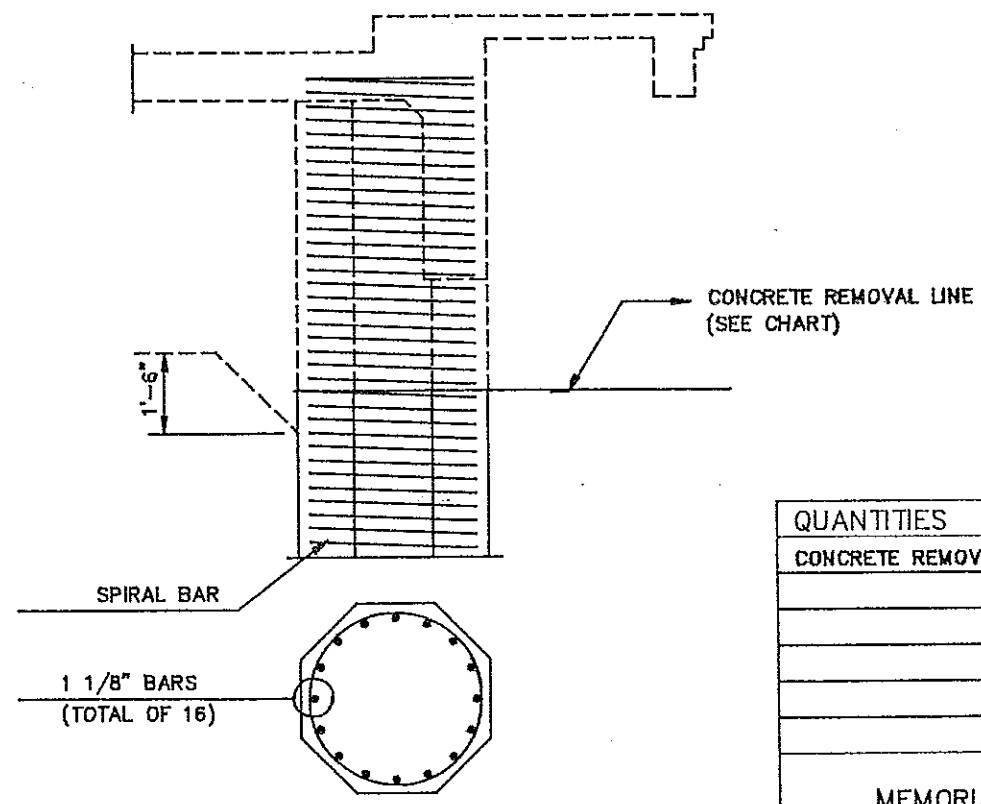
* FRONT FACE



EXISTING APPROACH PIER
DASHED AREA TO BE REMOVED

ELEVATION CHART			
PIER NO.	ELEVATION AT POINT "A"	ELEVATION AT POINT "B"	ELEVATION AT BOTTOM OF NEW CAP
2	1652.1	1652.4	1652.35
3	1655.9	1656.2	1656.06
4	1659.8	1660.1	1659.79
6	1667.5	1667.8	1667.14
7	1671.3	1671.6	1670.59
8	1674.3	1674.6	1672.00

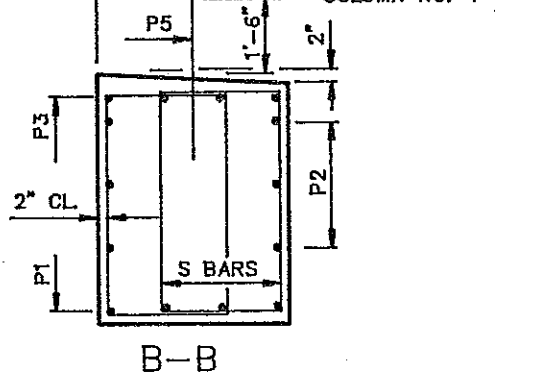
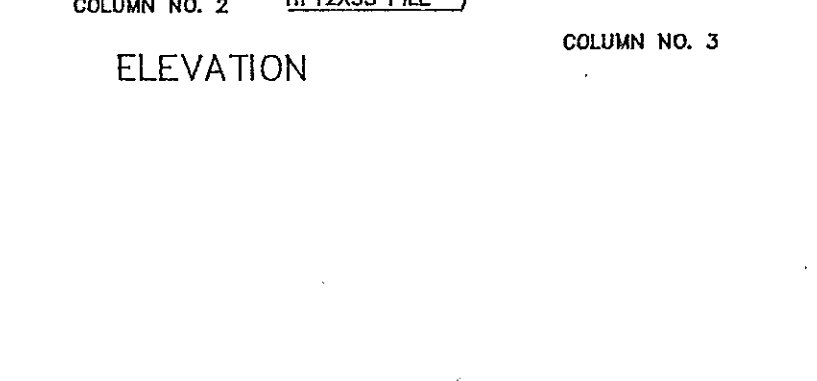
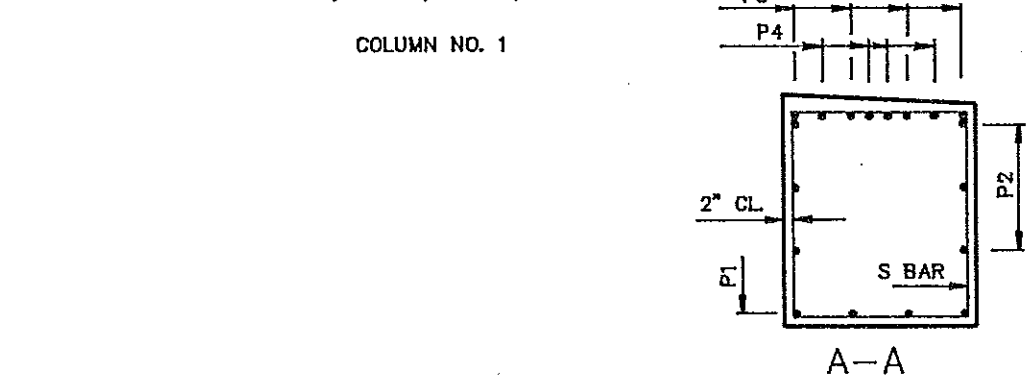
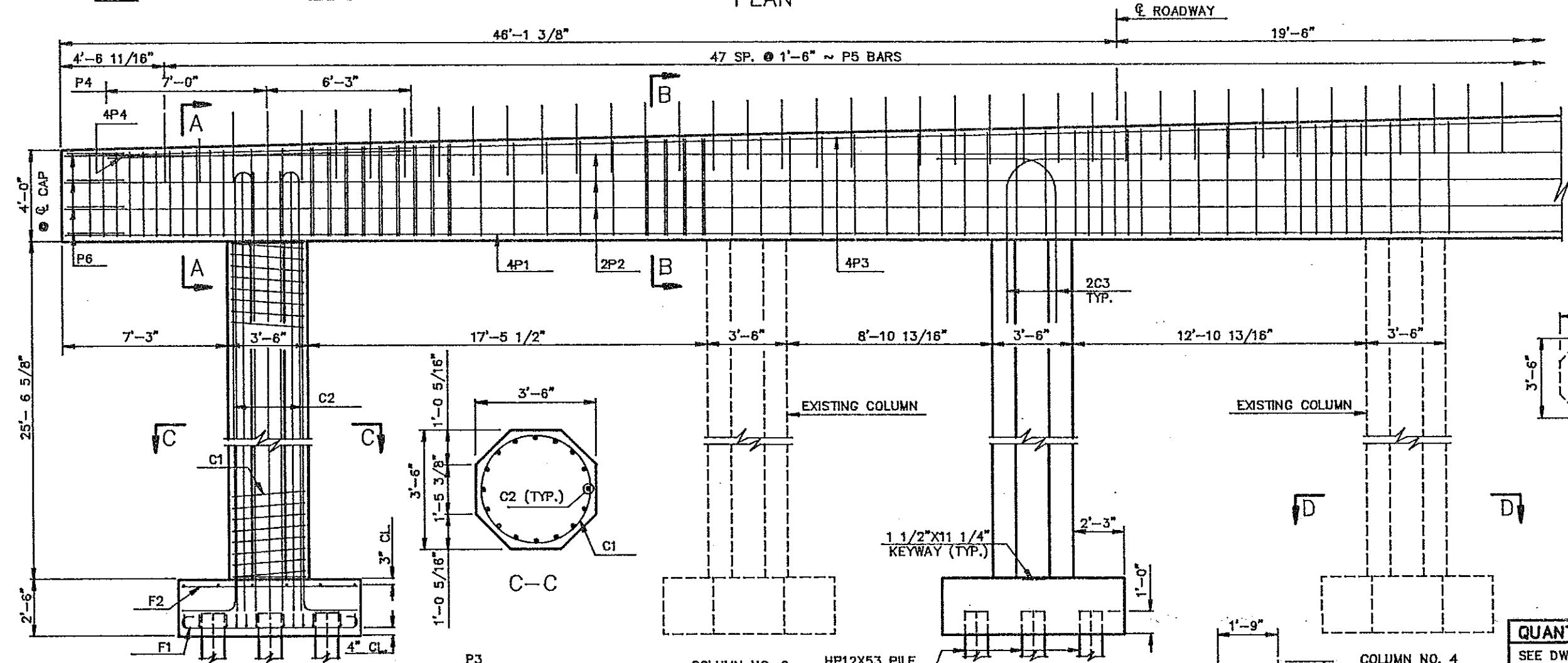
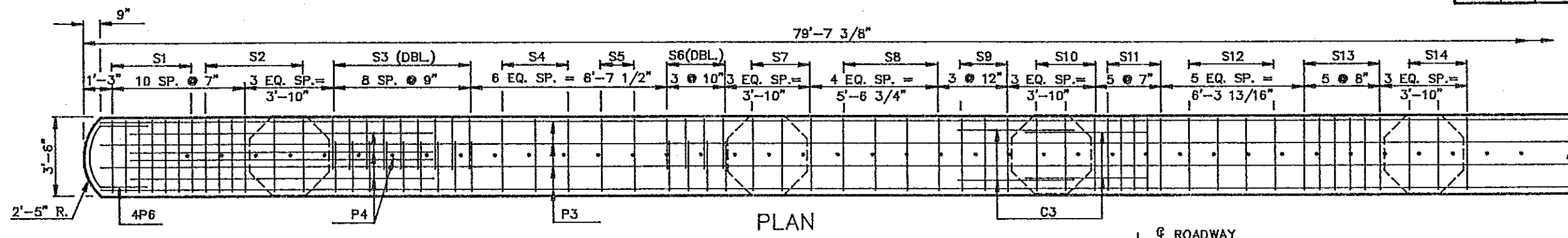
①
DAMAGED AREAS BELOW NEW PIER LAPS SHALL BE REPAIRED.



SHOWING EXISTING BARS
REINFORCING STEEL TO REMAIN IN PLACE
CUT TO WITHIN 6" OF NEW SLAB

QUANTITIES	
CONCRETE REMOVAL	000 C.Y.

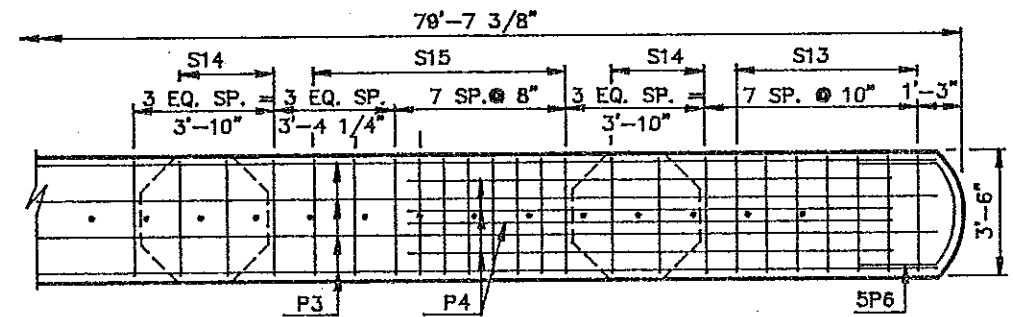
MEMORIAL BRIDGE
WEST APPROACH
CONCRETE REMOVAL
PIERS 2,3,4,6,7 & 8



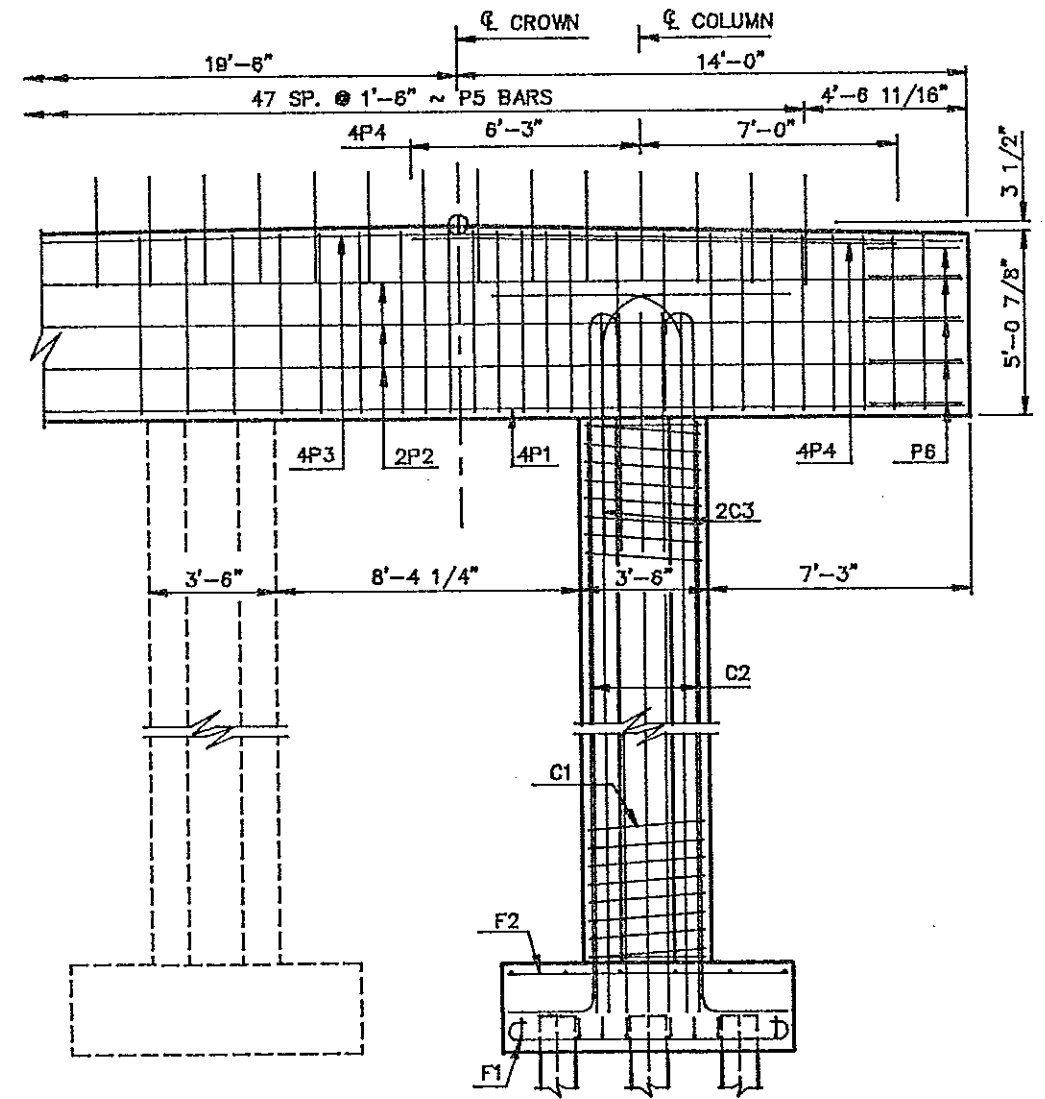
QUANTITIES	
SEE DWG. 94-920.914-13	

MEMORIAL BRIDGE
PIER NO. 2

PHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	

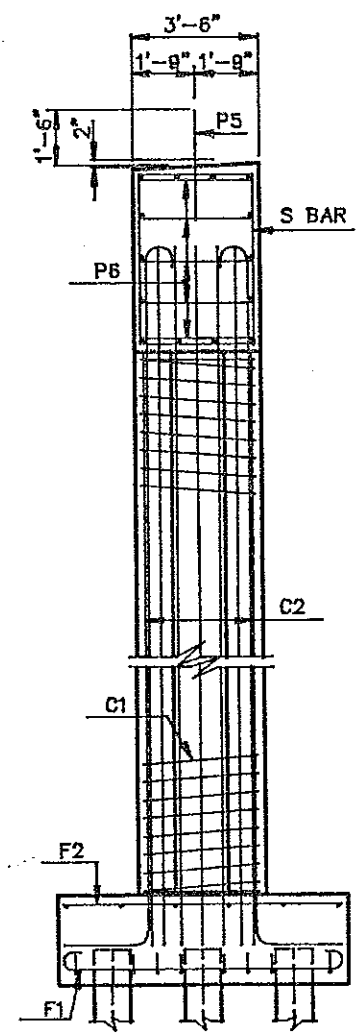


PLAN

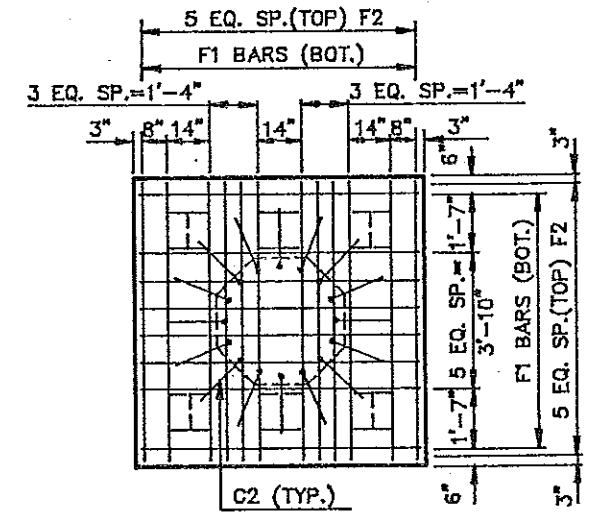


ELEVATION

COLUMN NO. 5

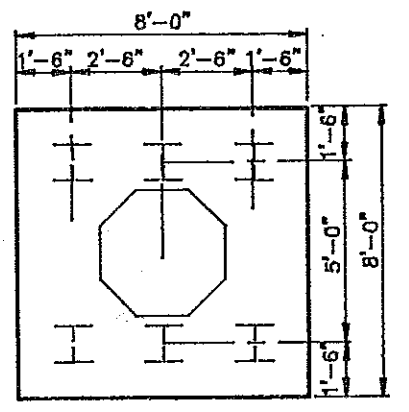


END VIEW

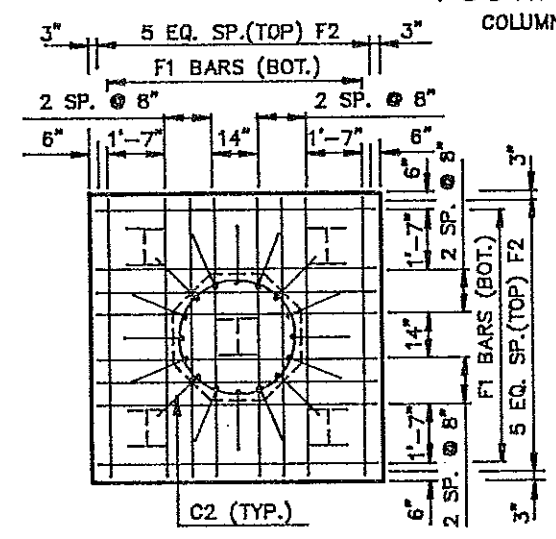


SHOWING REINFORCING

FOOTING PLAN
COLUMN NO. 1

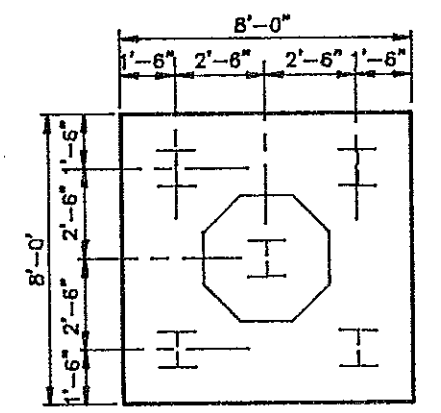


SHOWING PILE SPACING

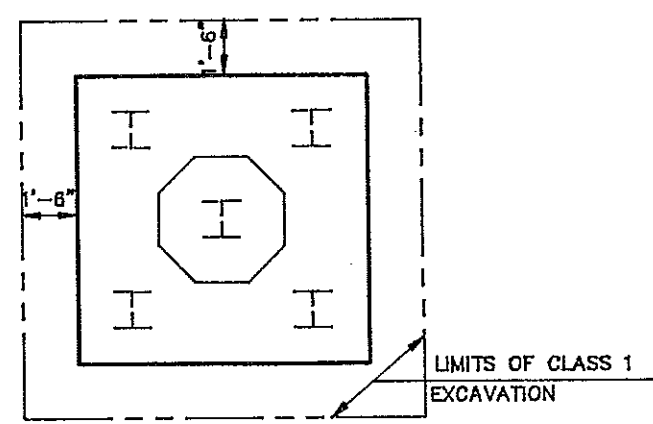


SHOWING REINFORCING

FOOTING PLAN
COLUMN NOS. 3 & 5

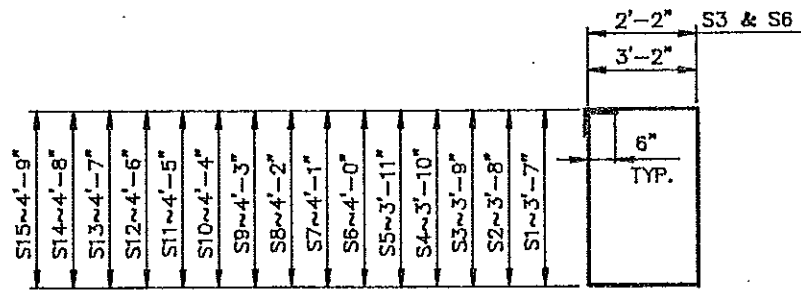


SHOWING PILE SPACING

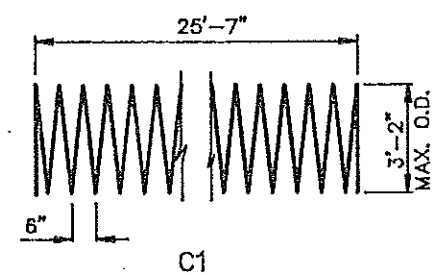


FOOTING PLAN
SHOWING EXCAVATION LIMITS

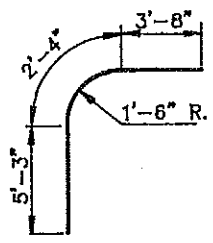
QUANTITIES	
SEE DWG. 94-920.914-13	
MEMORIAL BRIDGE	
PIER NO. 2	



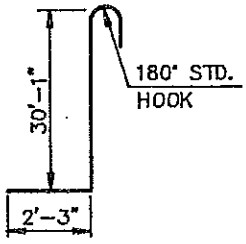
S1-S15



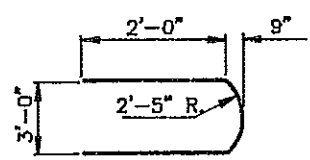
C1



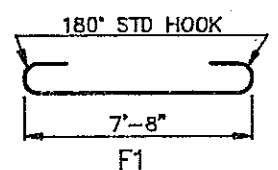
C3



C2



P6



F1

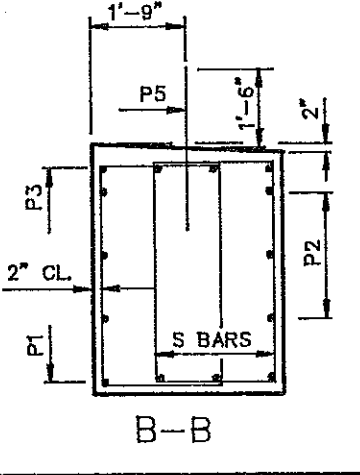
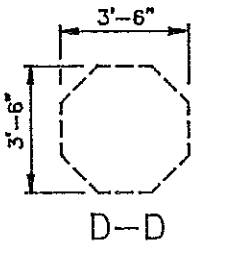
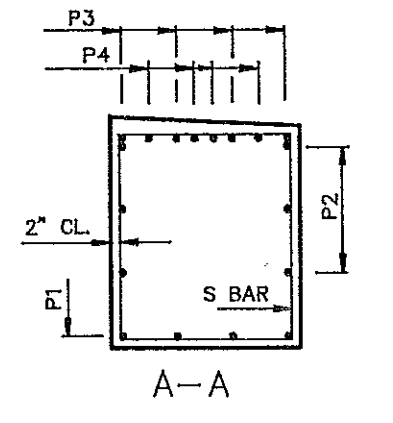
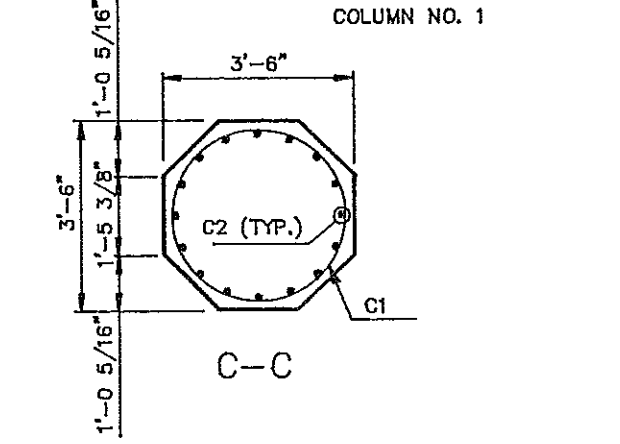
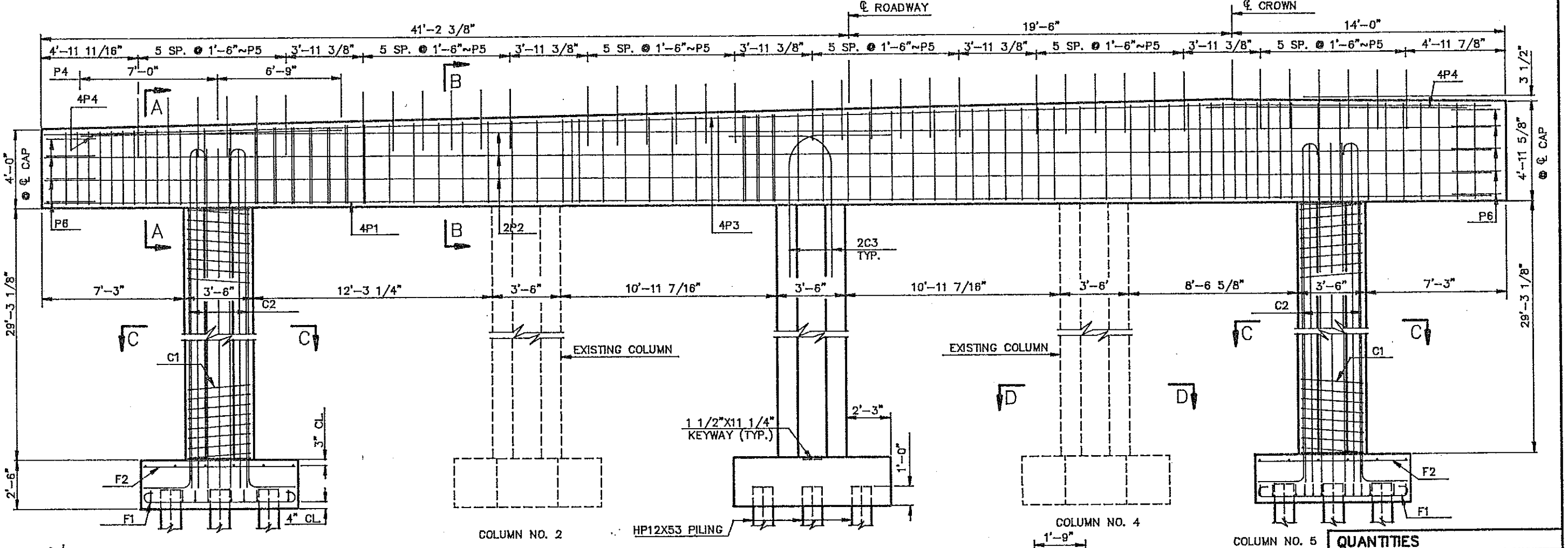
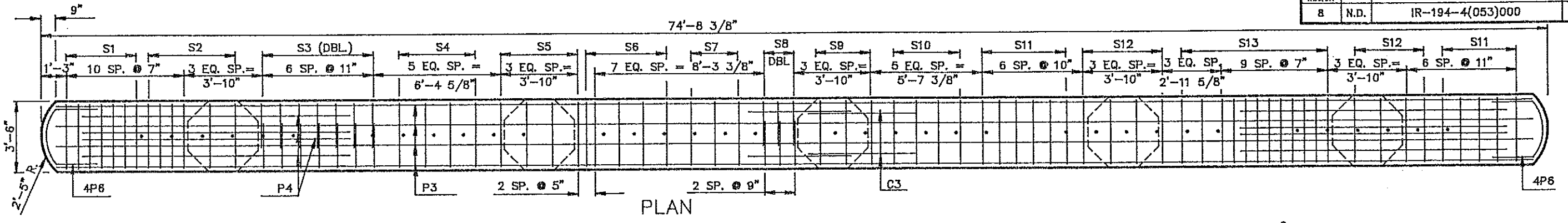
BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
C1	3	4	531'-9"	SPIRAL
C2	48	9	33'-7"	BENT
C3	12	9	11'-3"	BENT
F1	52	6	9'-0"	BENT
F2	36	5	7'-8"	STR.
S1	7	5	14'-6"	BENT
S2	6	5	14'-8"	BENT
S3	18	5	12'-10"	BENT
S4	3	5	15'-0"	BENT
S5	2	5	15'-2"	BENT
S6	8	5	13'-4"	BENT
S7	3	5	15'-6"	BENT
S8	4	5	15'-8"	BENT
S9	3	5	15'-10"	BENT
S10	3	5	16'-0"	BENT
S11	5	5	16'-2"	BENT
S12	4	5	16'-4"	BENT
S13	13	5	16'-6"	BENT
S14	6	5	16'-8"	BENT
S15	10	5	16'-10"	BENT
P1	8	8	40'-6"	STR.
P2	12	5	39'-8"	STR.
P3	8	10	42'-6"	STR.
P4	8	8	13'-3"	STR.
P5	48	8	3'-0"	STR.
P6	9	6	7'-11"	BENT

① P5 BARS SHALL BE PLAIN ROUND MILD STEEL THE UPPER HALF OF THIS BAR SHALL BE GREASED BEFORE PLACING THE DIAPHRAGMS.

QUANTITIES	
CLASS AE-3 CONC.	00 C.Y.
REINFORCING STEEL	00 LBS.
EXCAVATION & PILING (SEE QUANTITY SHEET)	

MEMORIAL BRIDGE
PIER NO. 2



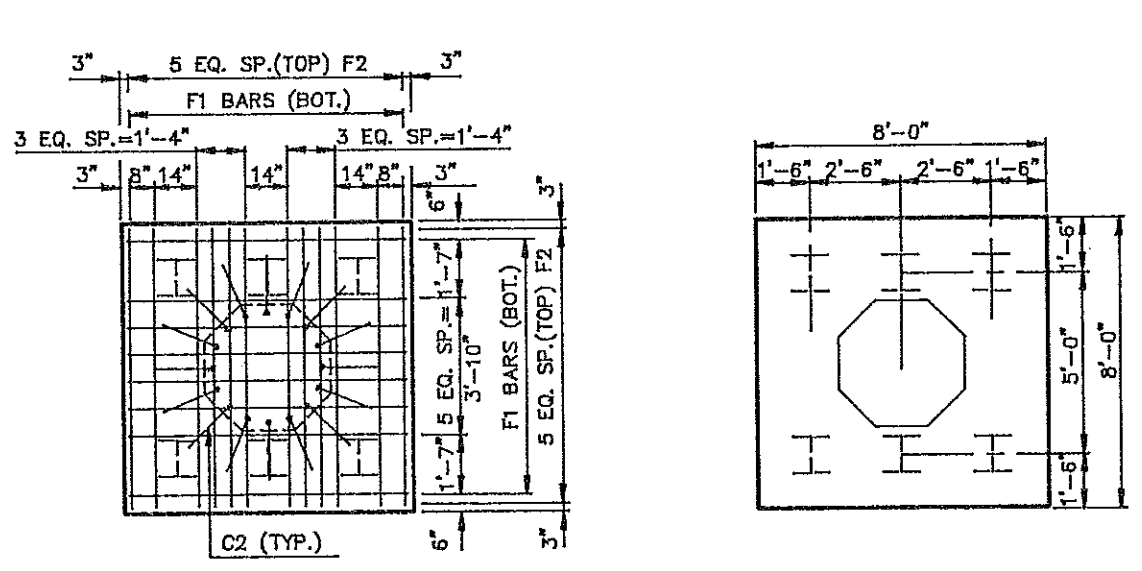
QUANTITIES	
SEE DWG. 94-920.914-15	
MEMORIAL BRIDGE	
PIER NO. 3	

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
C1	3	4	605'-5"	SPIRAL
C2	48	9	37'-4"	BENT
C3	4	9	11'-3"	BENT
F1	52	6	9'-0"	BENT
F2	36	5	7'-8"	STR.
S1	7	5	14'-6"	BENT
S2	6	5	14'-8"	BENT
S3	14	5	13'-0"	BENT
S4	4	5	15'-2"	BENT
S5	4	5	15'-4"	BENT
S6	5	5	15'-6"	BENT
S7	3	5	15'-8"	BENT
S8	6	5	13'-10"	BENT
S9	3	5	16'-0"	BENT
S10	4	5	16'-2"	BENT
S11	11	5	18'-4"	BENT
S12	8	5	16'-8"	BENT
S13	12	5	16'-10"	BENT
P1	8	9	38'-0"	STR.
P2	12	5	37'-2"	STR.
P3	8	10	39'-10"	STR.
P4	8	9	13'-9"	STR.
P5	36	8	3'-0"	STR.
P6	9	6	7'-11"	BENT

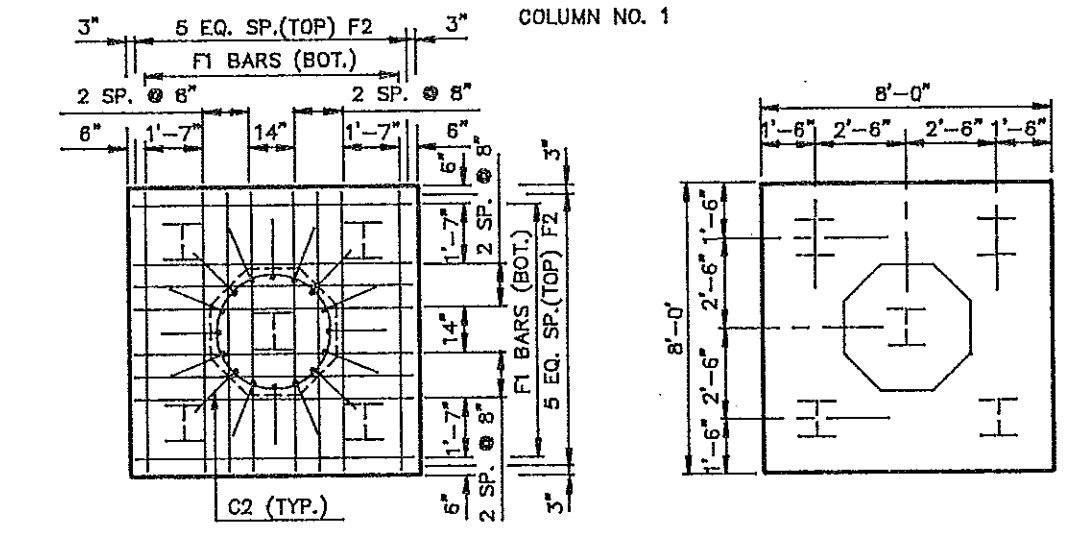
① P5 BARS SHALL BE PLAIN ROUND MILD STEEL THE UPPER HALF OF THIS BAR SHALL BE GREASED BEFORE PLACING THE DIAPHRAGMS.

QUANTITIES	
CLASS AE-3 CONC.	00 C.Y.
REINFORCING STEEL	00 LBS.
EXCAVATION & PILING (SEE QUANTITY SHEET)	

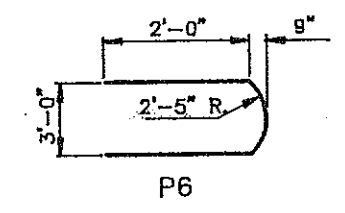
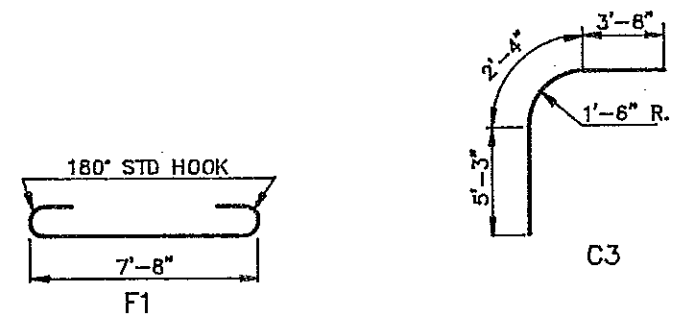
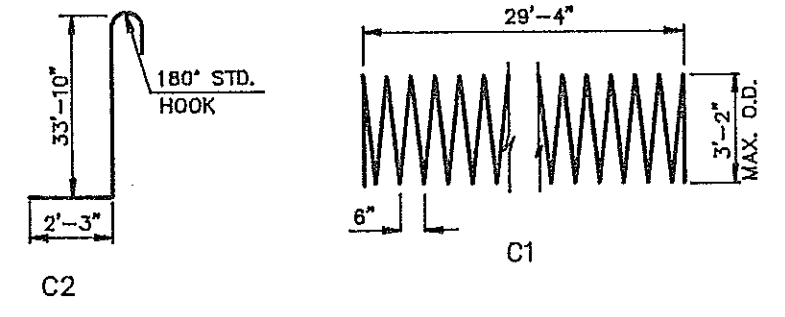
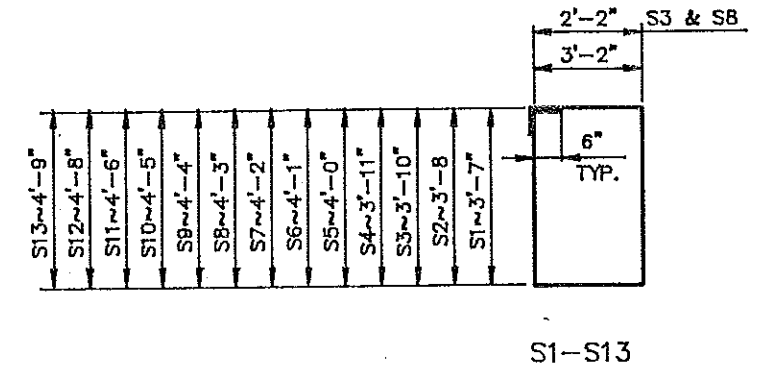
MEMORIAL BRIDGE
PIER NO. 3



FOOTING PLAN
COLUMN NO. 1

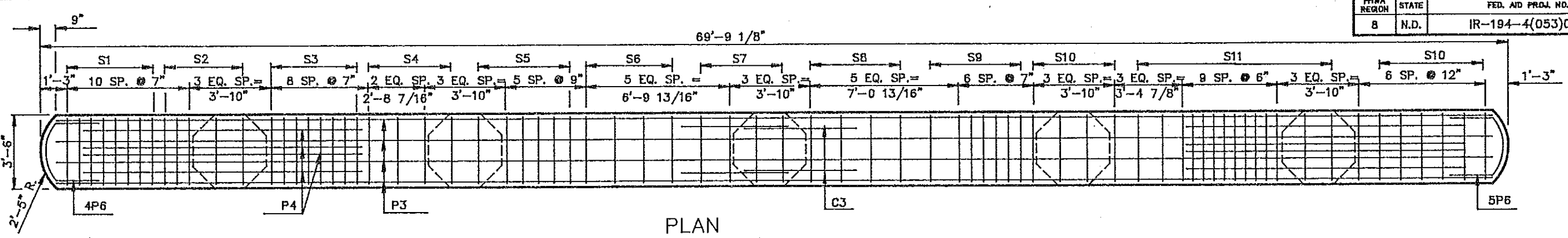


FOOTING PLAN
COLUMN NOS. 3 & 5

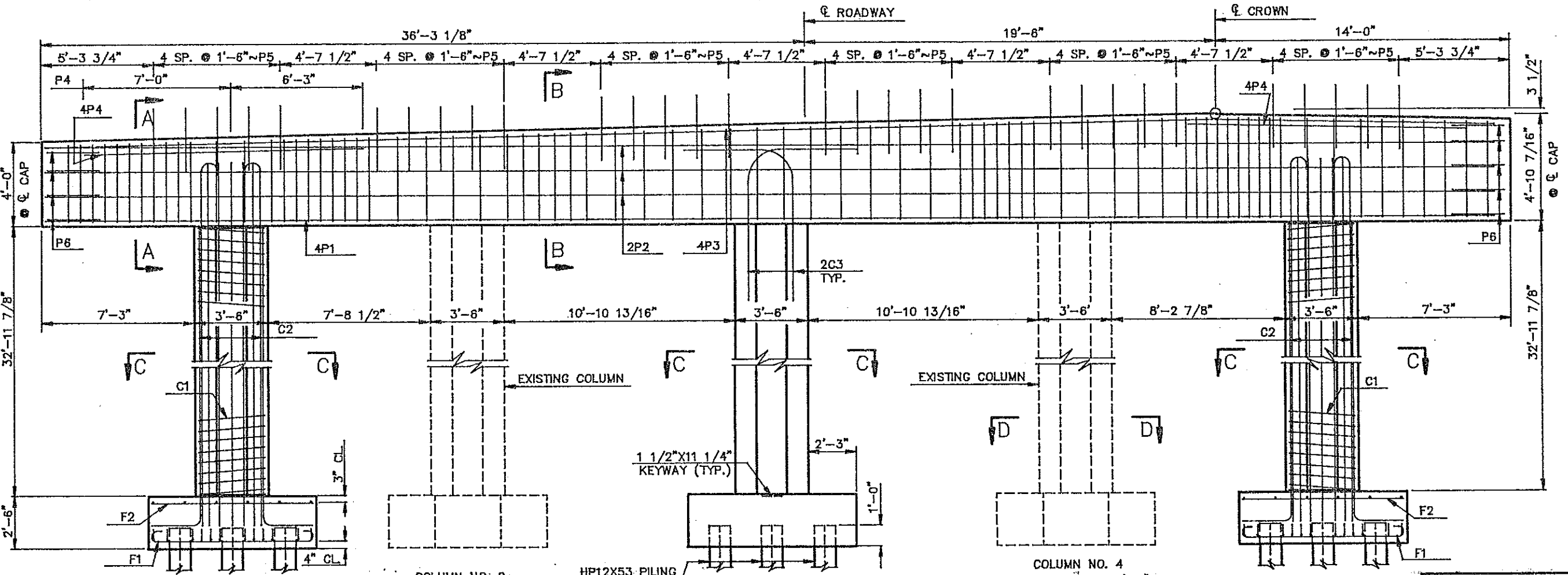


BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

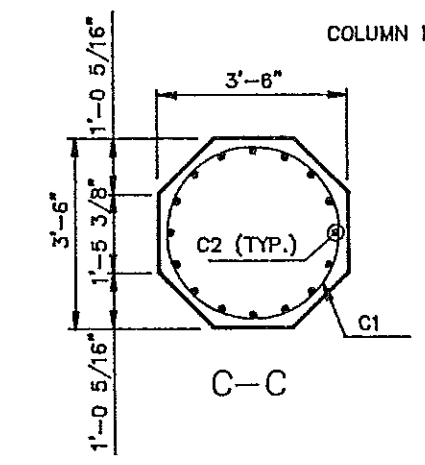
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



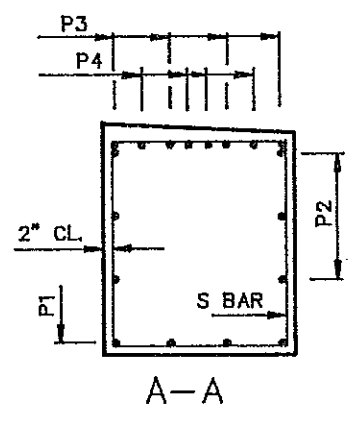
PLAN



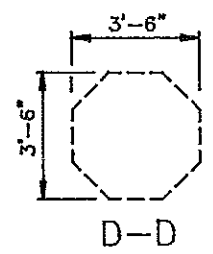
ELEVATION



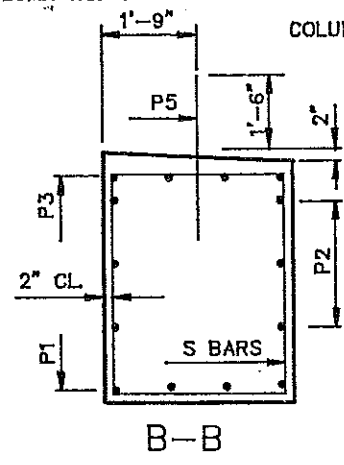
COLUMN NO. 1



COLUMN NO. 2

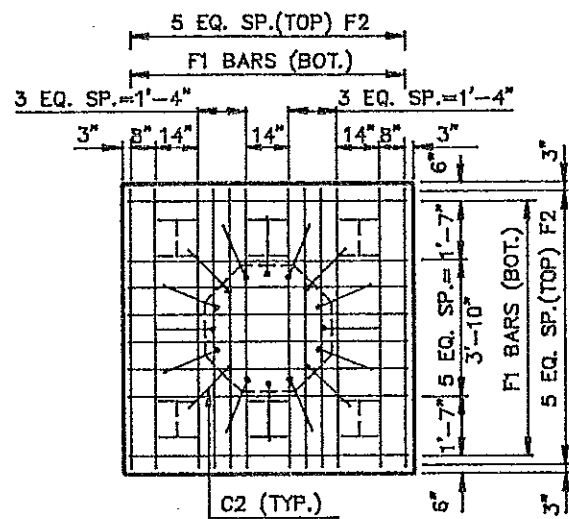


COLUMN NO. 3

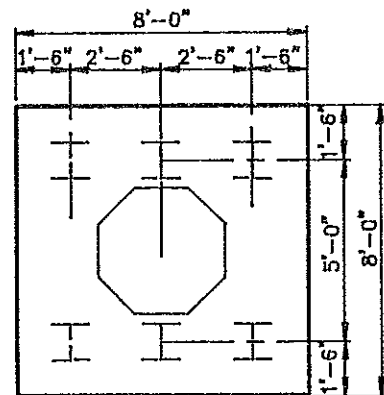


COLUMN NO. 5

QUANTITIES	
SEE DWG. 94-920.915-17	
MEMORIAL BRIDGE	
PIER NO. 4	



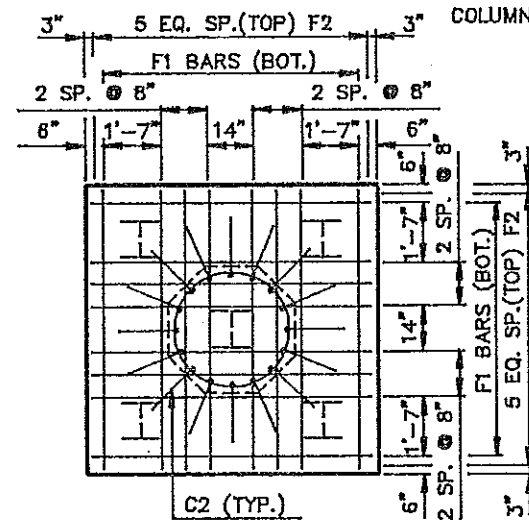
SHOWING REINFORCING



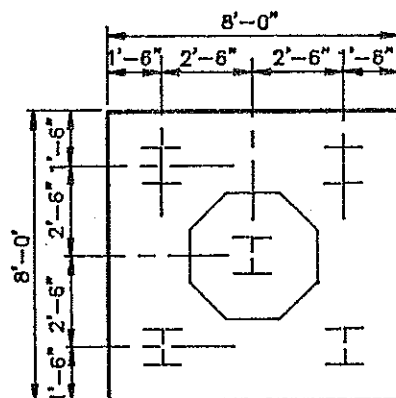
SHOWING PILE SPACING

FOOTING PLAN

COLUMN NO. 1 & 5



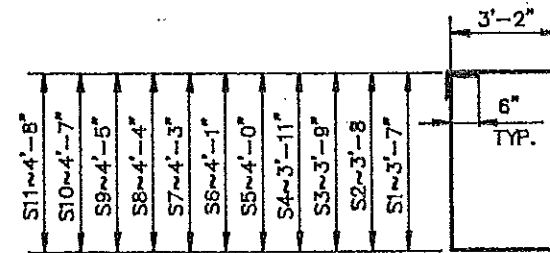
SHOWING REINFORCING



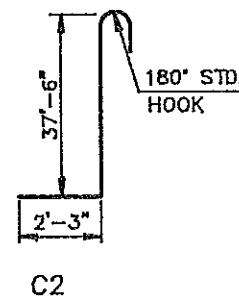
SHOWING PILE SPACING

FOOTING PLAN

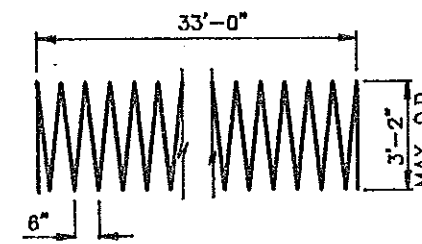
COLUMN NO. 3



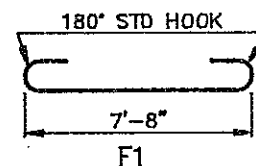
S1-S11



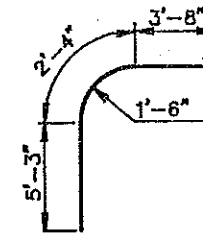
C2



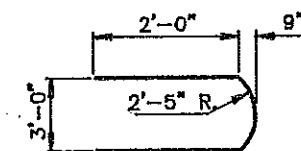
C1



F1



C3



P6

BENT BAR DETAILS

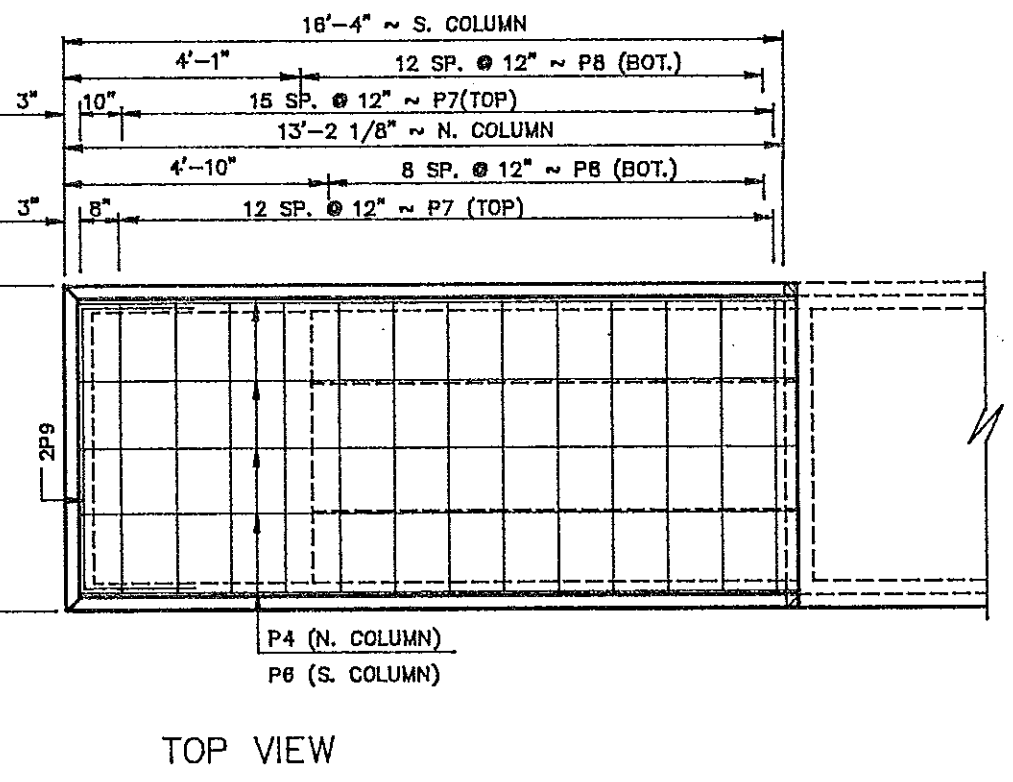
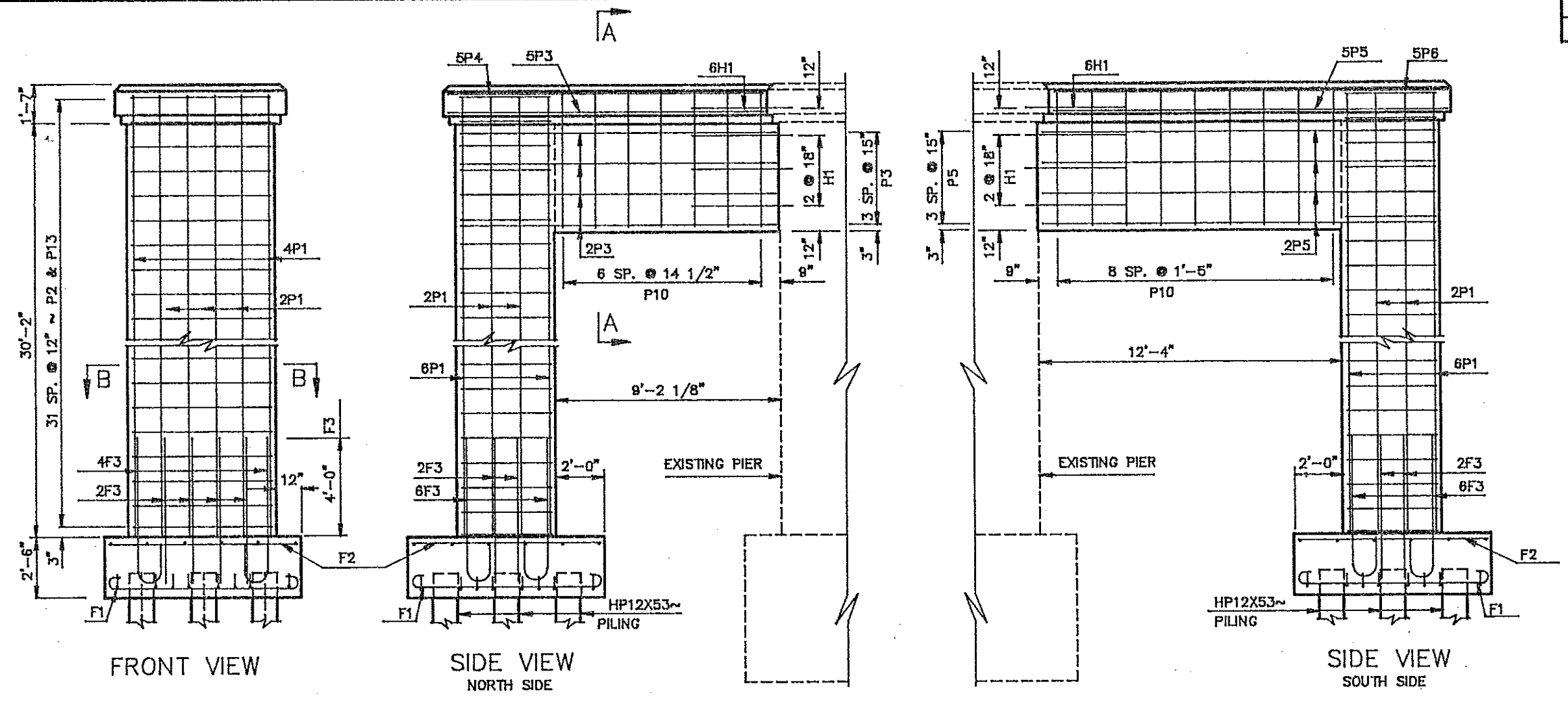
DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
C1	3	4	677'-5"	SPIRAL
C2	48	9	41'-0"	BENT
C3	4	9	11'-3"	BENT
F1	58	6	9'-0"	BENT
F2	36	5	7'-8"	STR.
S1	8	5	14'-6"	BENT
S2	5	5	14'-8"	BENT
S3	8	5	14'-10"	BENT
S4	4	5	15'-2"	BENT
S5	6	5	15'-4"	BENT
S6	4	5	15'-6"	BENT
S7	4	5	15'-10"	BENT
S8	4	5	16'-0"	BENT
S9	7	5	16'-2"	BENT
S10	10	5	16'-6"	BENT
S11	14	5	16'-8"	BENT
P1	8	9	35'-7"	STR.
P2	12	5	34'-8"	STR.
P3	8	10	37'-4"	STR.
P4	8	9	13'-3"	STR.
P5	30	8	3'-0"	STR.
P6	9	6	7'-11"	BENT

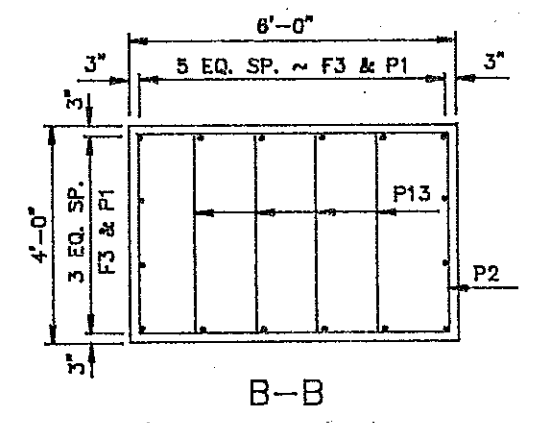
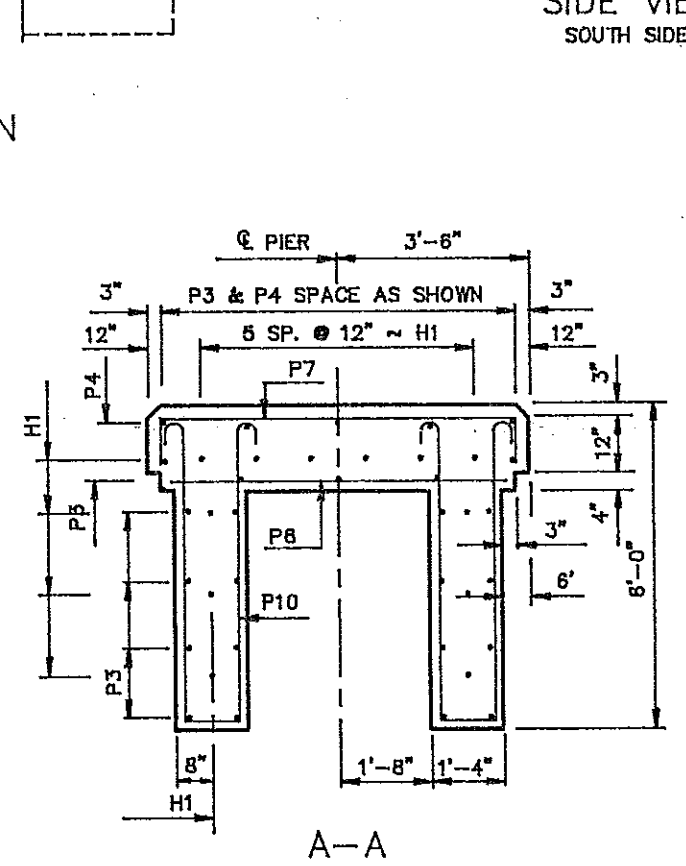
① P5 BARS SHALL BE PLAIN ROUND MILD STEEL THE UPPER HALF OF THIS BAR SHALL BE GREASED BEFORE PLACING THE DIAPHRAGMS.

QUANTITIES		
CLASS AE-3 CONC.	00	C.Y.
REINFORCING STEEL	00	LBS.
EXCAVATION & PILING (SEE QUANTITY SHEET)		

MEMORIAL BRIDGE
PIER NO. 4

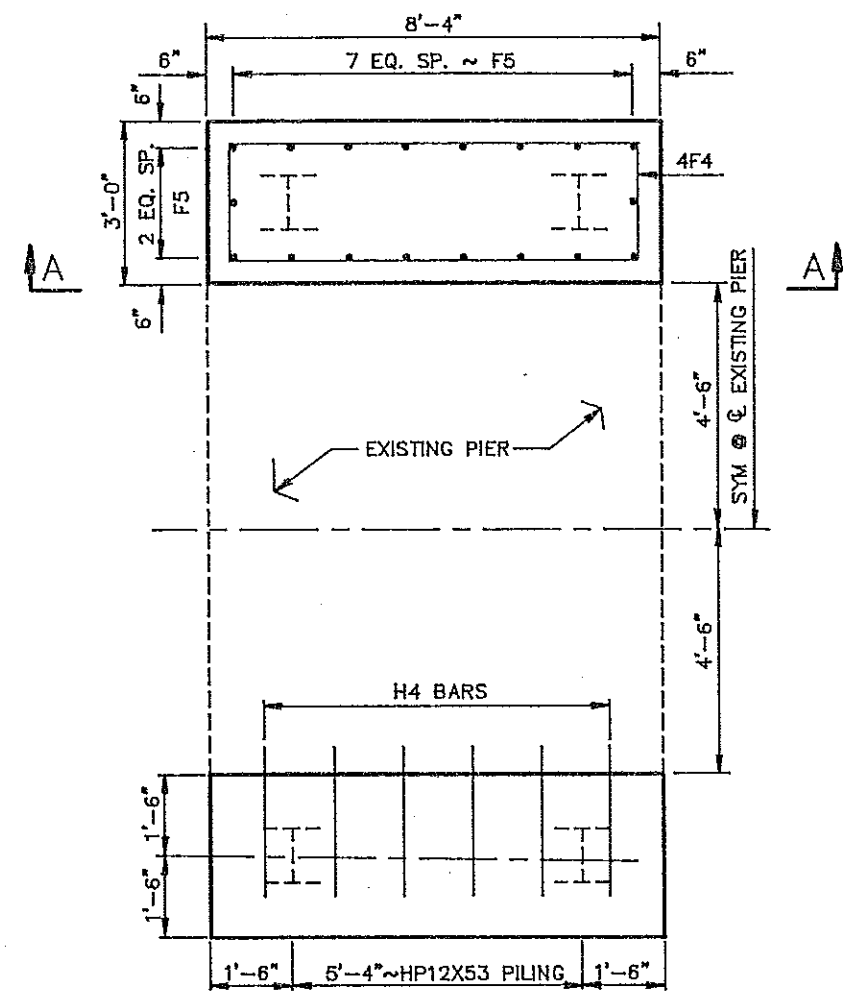


ELEVATION

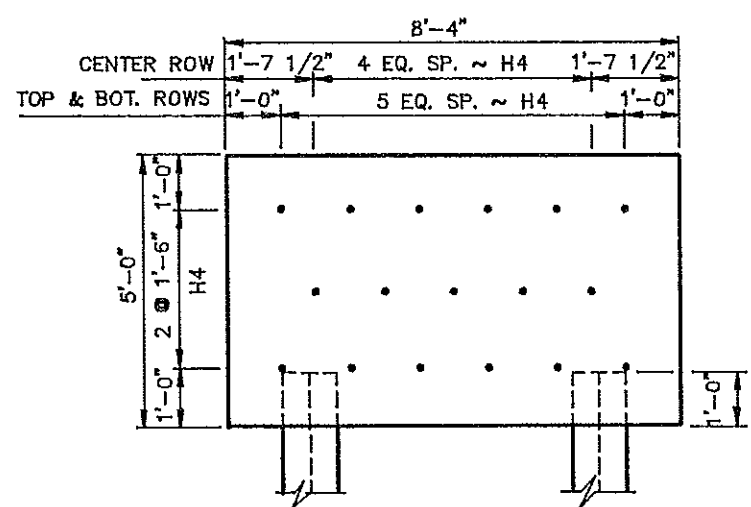


QUANTITIES	
SEE DWG. 94-920.914-20	
MEMORIAL BRIDGE	
WEST APPROACH	
PIER 5 WIDENING	

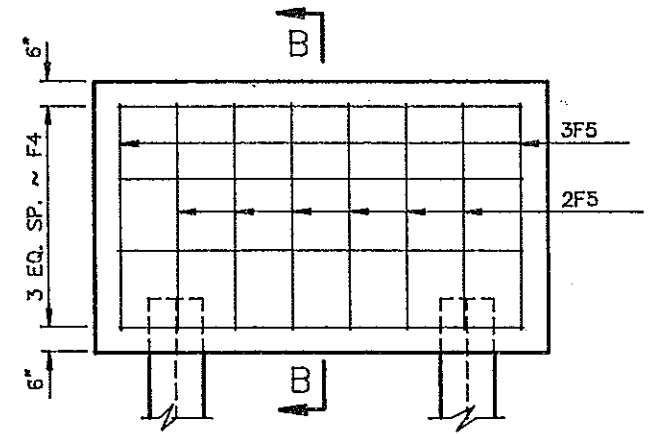
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



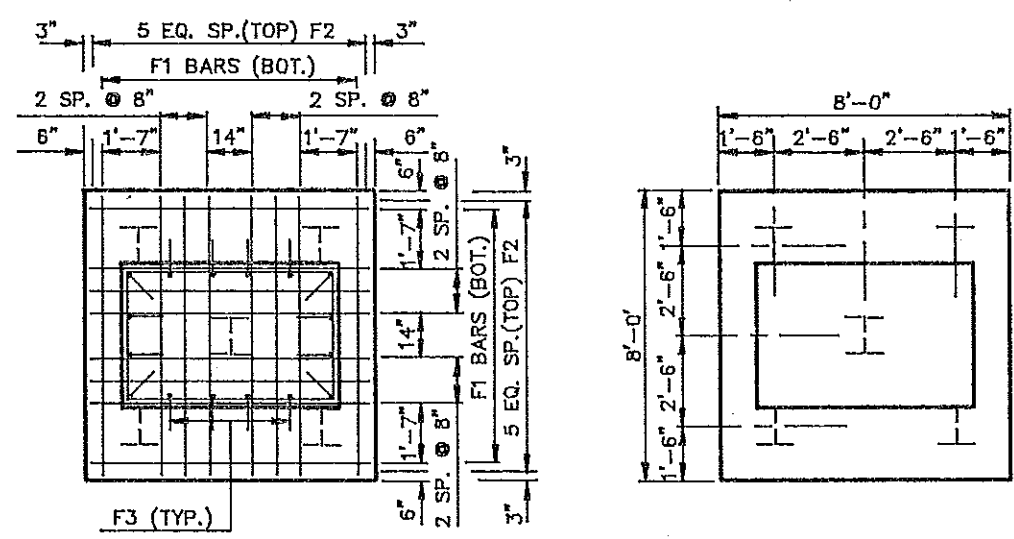
FOOTING PLAN
FOR EXISTING COLUMN



A-A
SHOWING H BAR SPACING



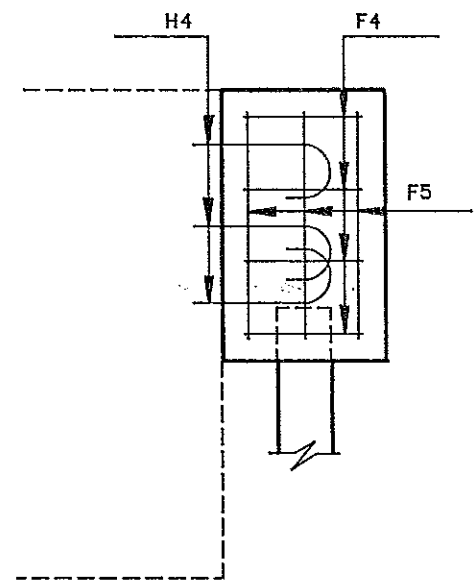
A-A
SHOWING REINFORCING



SHOWING REINFORCING

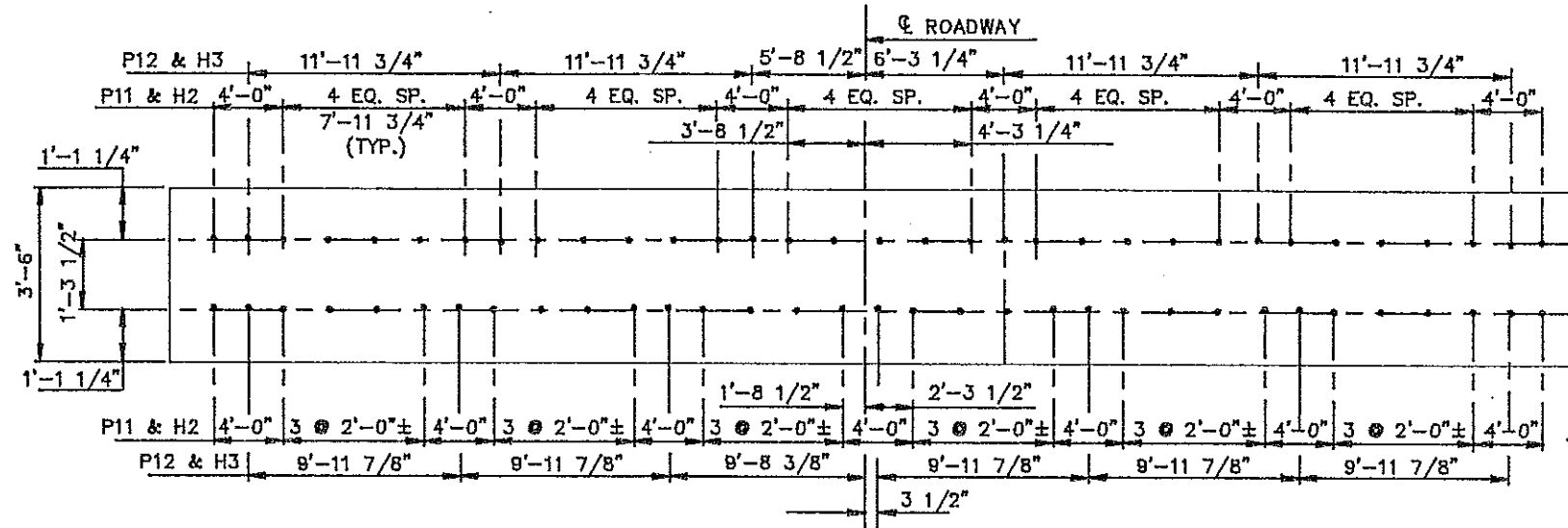
FOOTING PLAN
FOR NEW COLUMN

SHOWING PILE SPACING



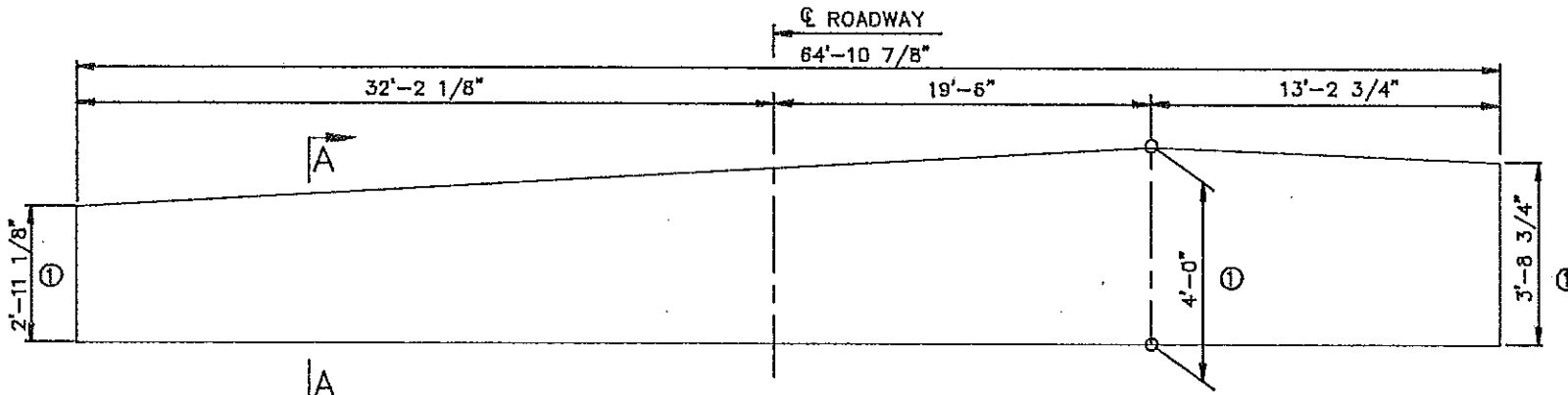
B-B

QUANTITIES	
SEE DWG. 94-920.914-20	
MEMORIAL BRIDGE WEST APPROACH PIER 5 FOOTING	



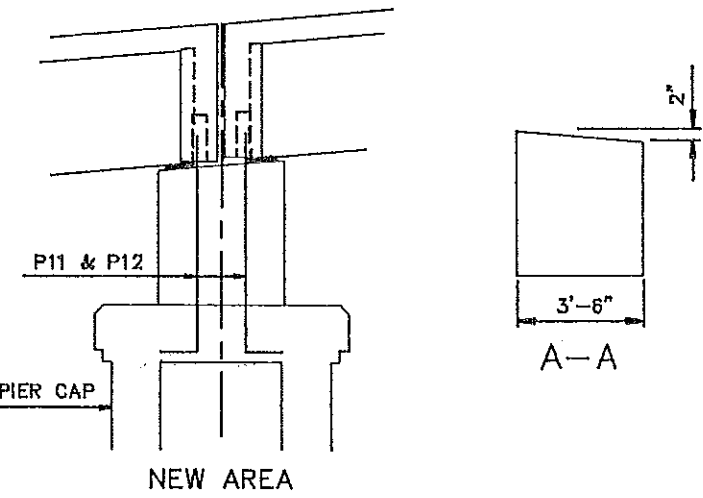
NOTE: P11 & H2 BAR SPACING TO BE USED AS A GUIDE FOR THE SLOTTED HOLES IN THE ENDWALL

PEDESTAL PLAN

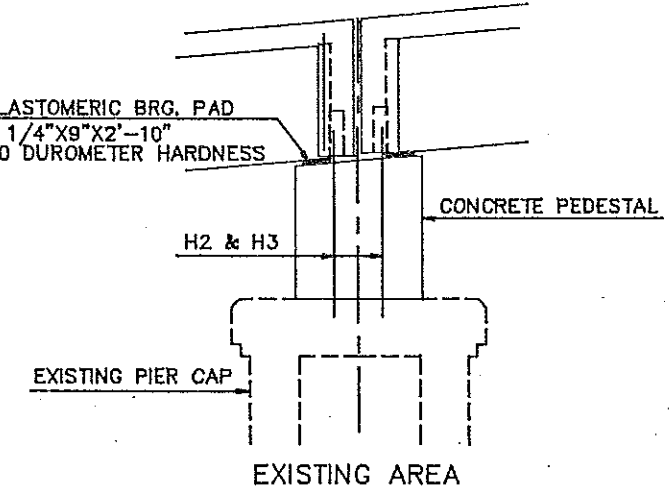


ⓐ DIMENSION AT \bar{C} PEDESTAL

PEDESTAL ELEVATION



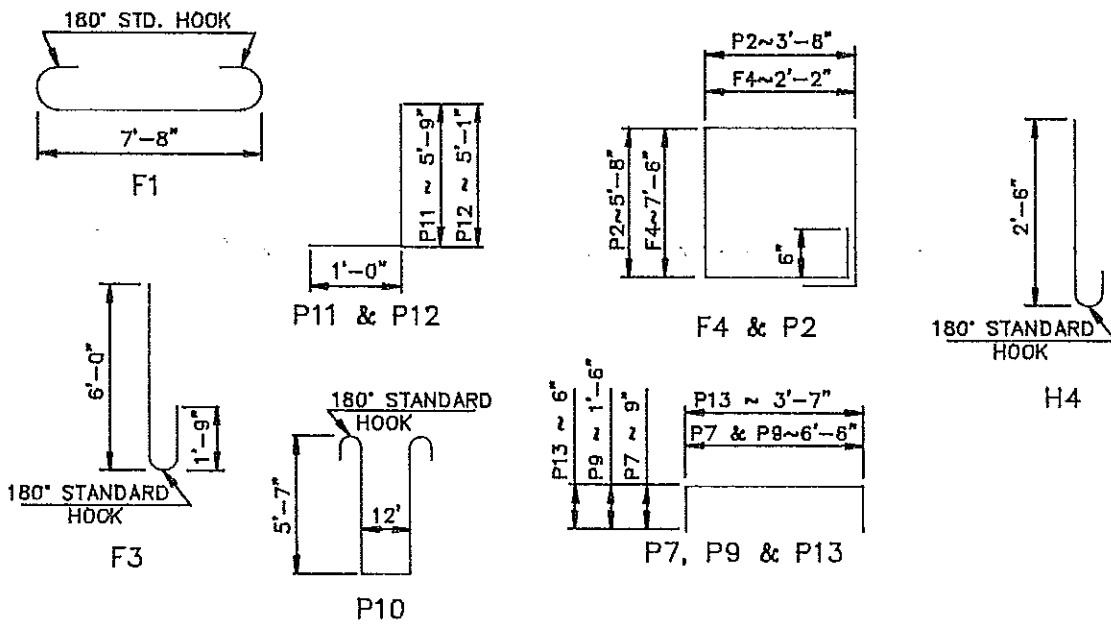
ELASTOMERIC BRG. PAD
1 1/4" X 9" X 2'-10"
60 DUROMETER HARDNESS



TYPICAL ENDWALL SECTION

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
F1	32	6	9'-0"	BENT
F2	24	5	7'-8"	STR.
F3	32	9	8'-6"	BENT
F4	16	6	20'-4"	BENT
F5	72	6	4'-2"	STR.
P1	32	9	31'-3"	STR.
P2	64	5	18'-8"	BENT
P3	21	4	12'-9"	STR.
P4	5	6	12'-9"	STR.
P5	21	4	15'-11"	STR.
P6	5	6	15'-11"	STR.
P7	29	4	8'-0"	BENT
P8	22	4	6'-0"	STR.
P9	4	4	9'-6"	BENT
P10	32	4	13'-6"	BENT
P11	25	8	6'-9"	BENT
P12	7	6	6'-1"	BENT
P13	256	4	4'-7"	BENT
H1	24	6	2'-6"	STR.
H2	29	6	5'-0"	STR.
H3	6	6	4'-4"	STR.
H4	68	8	3'-5"	BENT

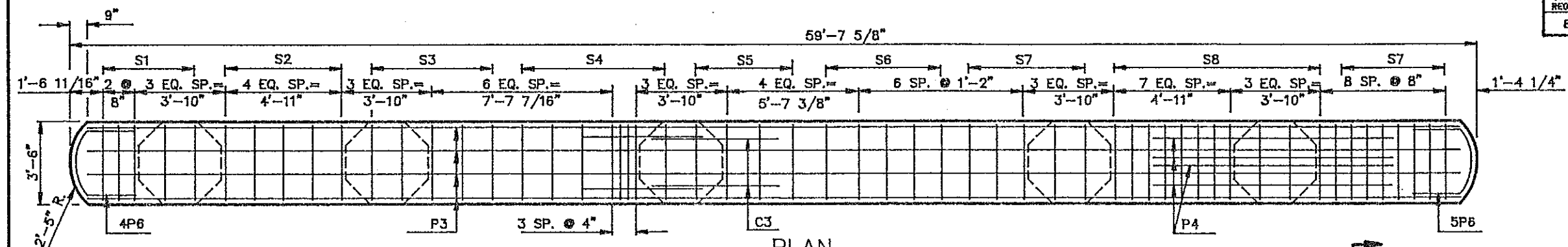
H BARS SHALL BE INSTALLED WITH A HIGH STRENGTH ADHESIVE SPECIFICALLY INTENDED FOR CONCRETE ANCHORAGE (HILTI, HBR OR APPROVED EQUAL).



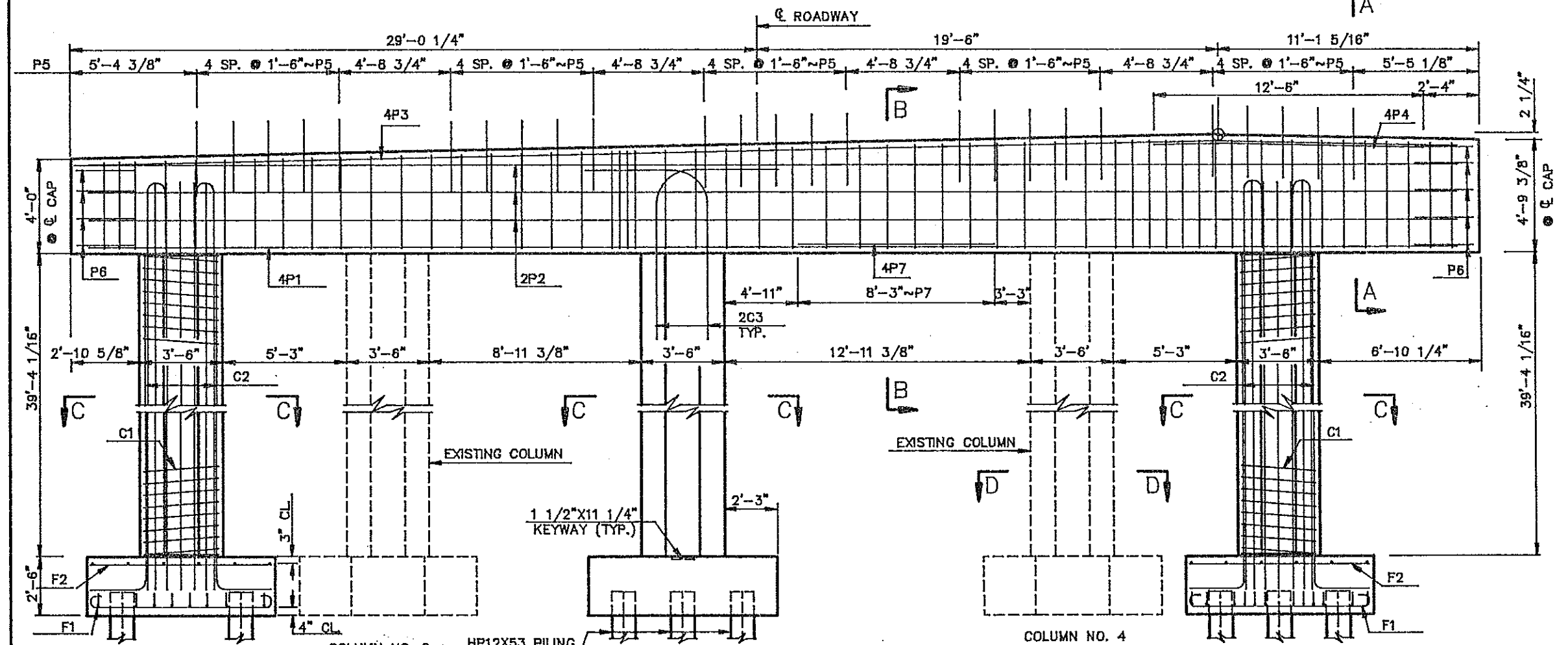
BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

QUANTITIES	
CLASS AE-3 CONC.	C.Y.
REINFORCING STEEL	LBS.
EXCAVATION & STEEL (SEE QUANTITY SHEET)	

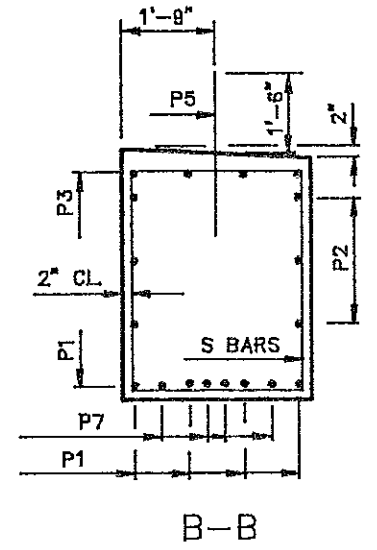
MEMORIAL BRIDGE
WEST APPROACH
PIER 5 DETAILS



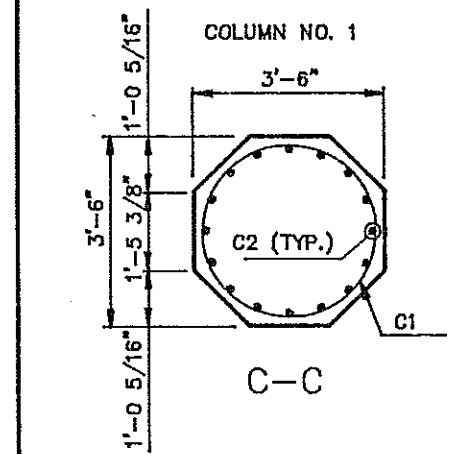
PLAN



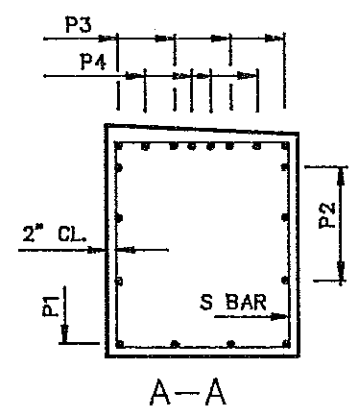
ELEVATION



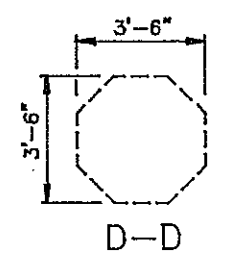
B-B



C-C



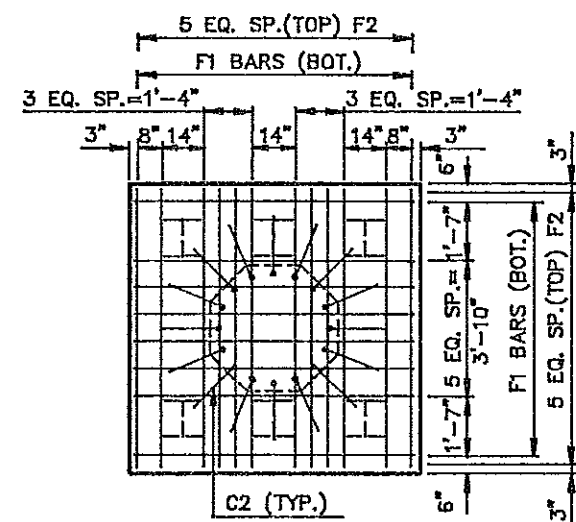
A-A



D-D

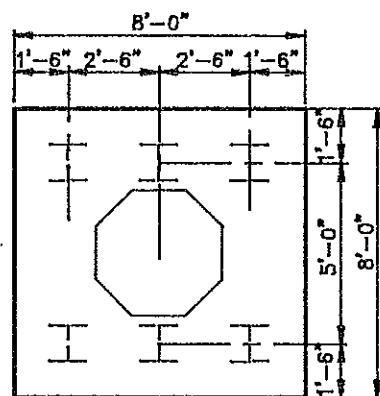
QUANTITIES
SEE DWG. 84-920.914-22

MEMORIAL BRIDGE
PIER NO. 6

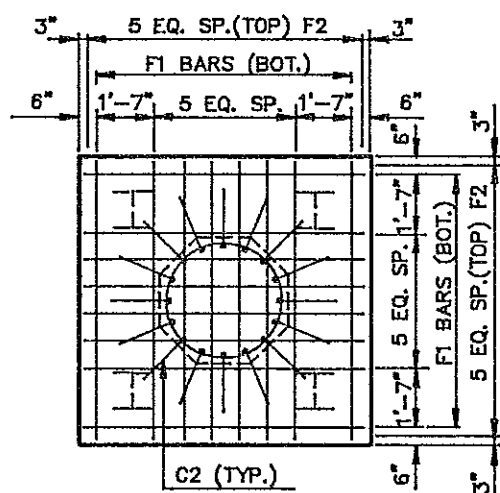


SHOWING REINFORCING

FOOTING PLAN
COLUMN NO. 3 & 5

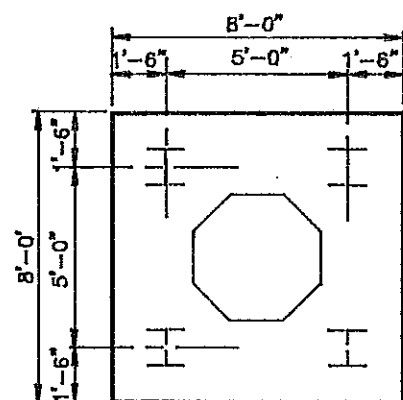


SHOWING PILE SPACING

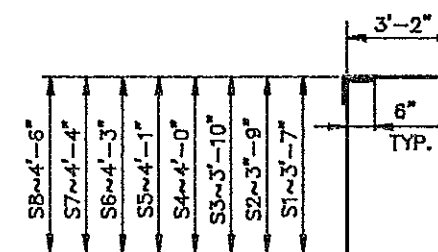


SHOWING REINFORCING

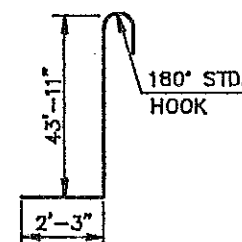
FOOTING PLAN
COLUMN NO. 1



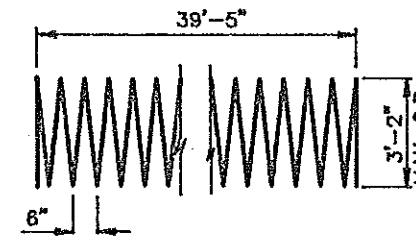
SHOWING PILE SPACING



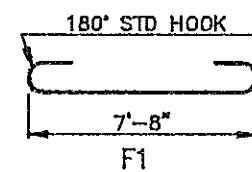
S1-S8



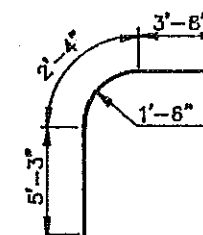
C2



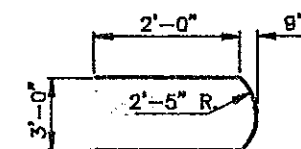
C1



F1



C3



P6

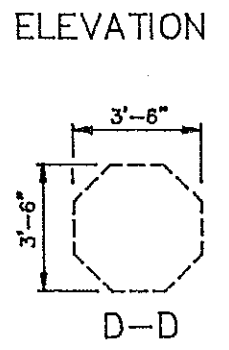
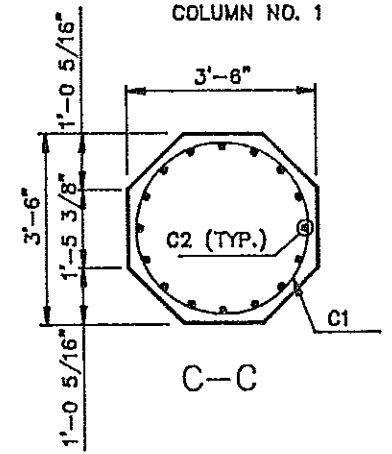
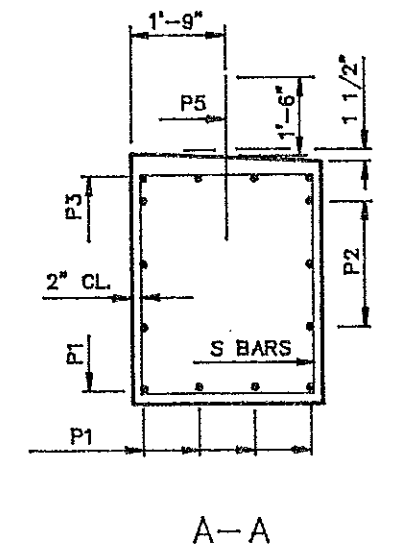
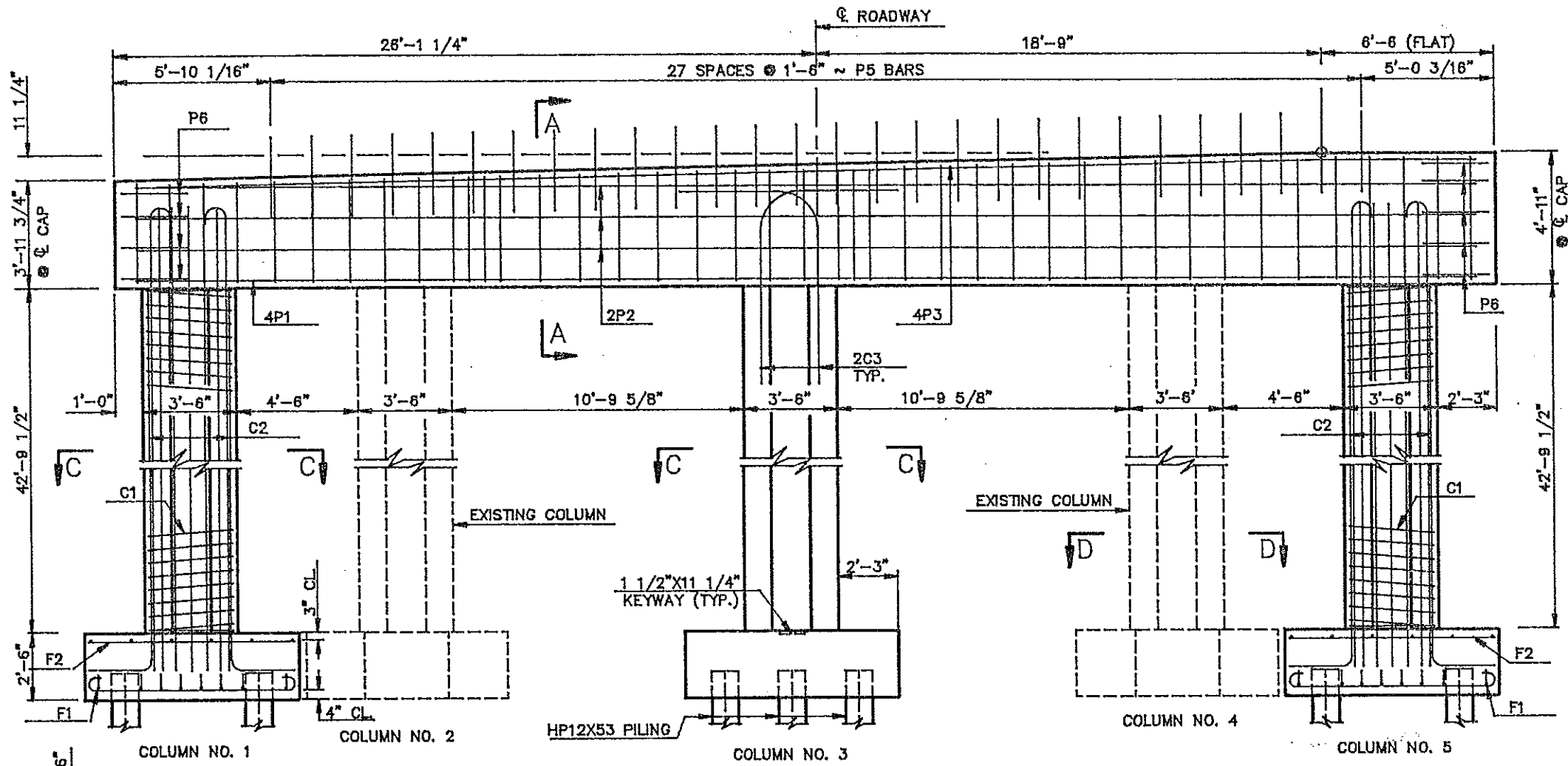
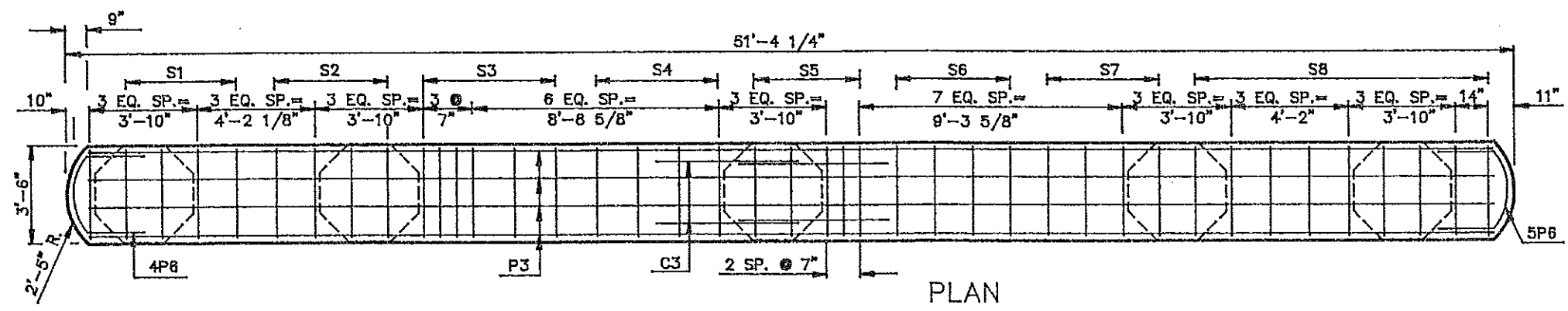
BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
C1	3	4	805'-0"	SPIRAL
C2	48	9	47'-5"	BENT
C3	4	9	11'-3"	BENT
F1	56	6	9'-0"	BENT
F2	36	5	7'-8"	STR.
S1	5	5	14'-6"	BENT
S2	5	5	14'-10"	BENT
S3	5	5	15'-0"	BENT
S4	8	5	15'-4"	BENT
S5	4	5	15'-6"	BENT
S6	5	5	15'-10"	BENT
S7	13	5	16'-0"	BENT
S8	11	5	16'-4"	BENT
P1	4	8	58'-0"	STR.
P2	6	5	58'-0"	STR.
P3	4	9	58'-0"	STR.
P4	4	8	12'-6"	STR.
P5	25	8	3'-0"	STR.
P6	9	6	7'-11"	BENT
P7	4	6	8'-3"	STR.

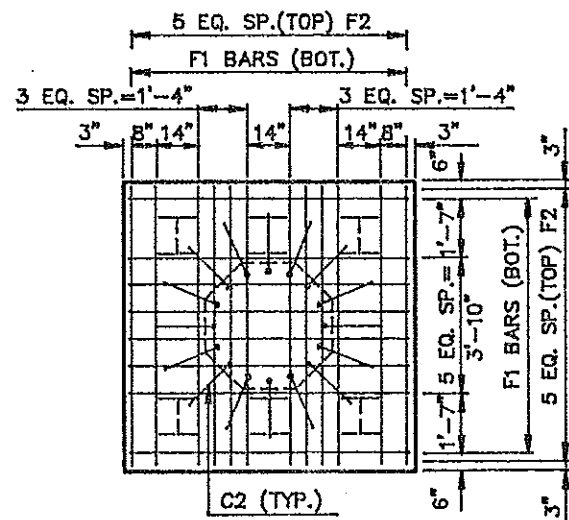
① P5 BARS SHALL BE PLAIN ROUND MILD STEEL THE UPPER HALF OF THIS BAR SHALL BE GREASED BEFORE PLACING THE DIAPHRAGMS.

QUANTITIES	
CLASS AE-3 CONC.	00 C.Y.
REINFORCING STEEL	00 LBS.
EXCAVATION & PILING (SEE QUANTITY SHEET)	

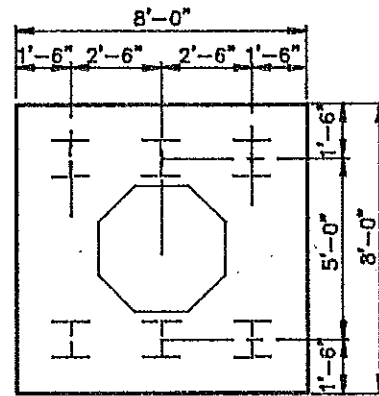
MEMORIAL BRIDGE
PIER NO. 6



QUANTITIES	
SEE DWG. 94-920.914-24	
MEMORIAL BRIDGE	
PIER NO. 7	

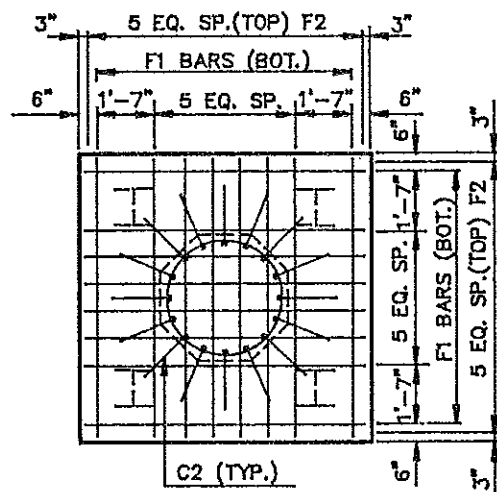


SHOWING REINFORCING

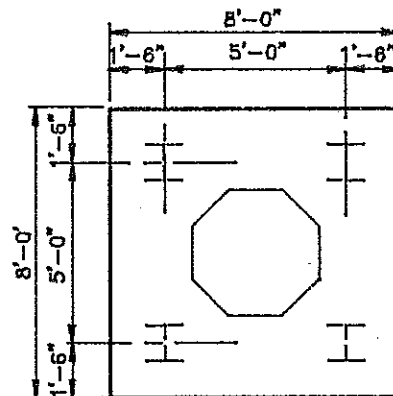


SHOWING PILE SPACING

FOOTING PLAN
COLUMN NO. 3

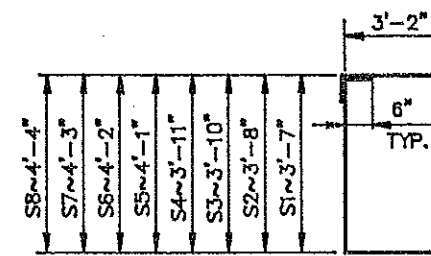


SHOWING REINFORCING

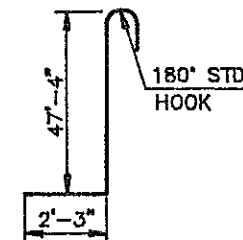


SHOWING PILE SPACING

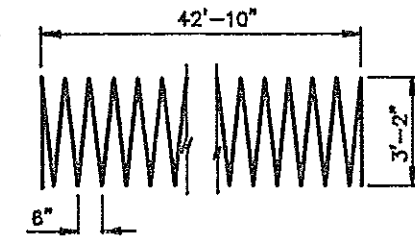
FOOTING PLAN
COLUMN NO. 1 & 5



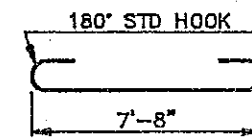
S1-S8



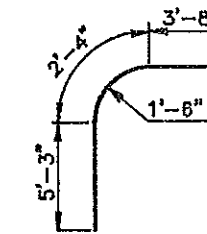
C2



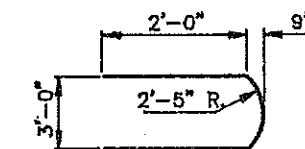
C1



F1



C3



P6

BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
C1	3	4	870'-6"	SPIRAL
C2	48	9	50'-10"	BENT
C3	4	9	11'-3"	BENT
F1	52	6	8'-10"	BENT
F2	36	5	7'-8"	STR.
S1	5	5	14'-6"	BENT
S2	4	5	14'-8"	BENT
S3	6	5	15'-0"	BENT
S4	4	5	15'-2"	BENT
S5	5	5	15'-6"	BENT
S6	4	5	15'-8"	BENT
S7	4	5	15'-10"	BENT
S8	9	5	16'-0"	BENT
P1	4	8	49'-9"	STR.
P2	6	5	49'-8"	STR.
P3	4	9	49'-8"	STR.
P5	28	8	3'-0"	STR.
P6	9	6	7'-11"	BENT

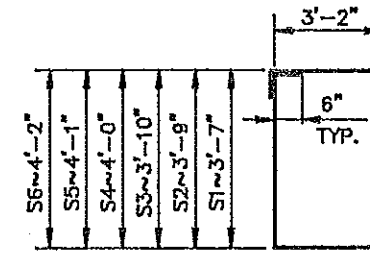
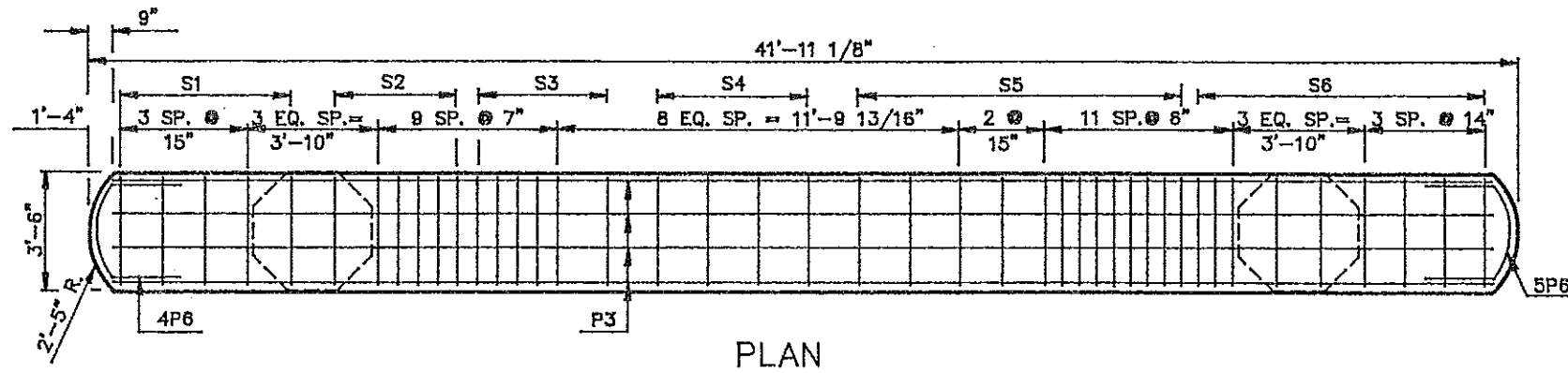
①

① P5 BARS SHALL BE PLAIN ROUND MILD STEEL THE UPPER HALF OF THIS BAR SHALL BE GREASED BEFORE PLACING THE DIAPHRAGMS.

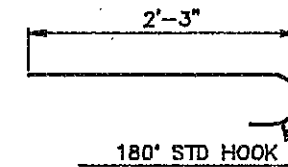
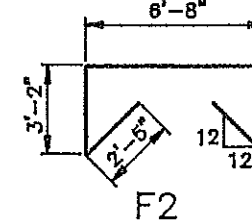
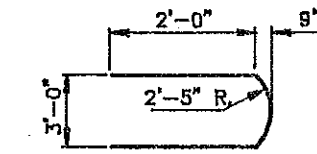
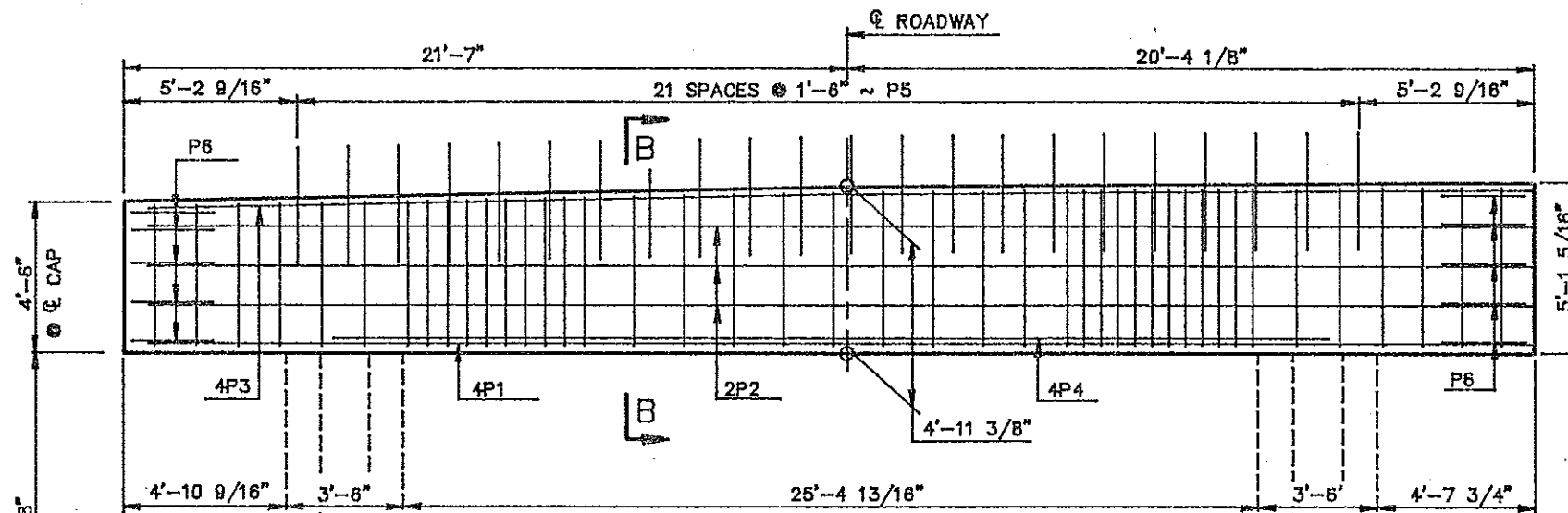
QUANTITIES	
CLASS AE-3 CONC.	00 C.Y.
REINFORCING STEEL	00 LBS.
EXCAVATION & PILING (SEE QUANTITY SHEET)	

MEMORIAL BRIDGE

PIER NO. 7

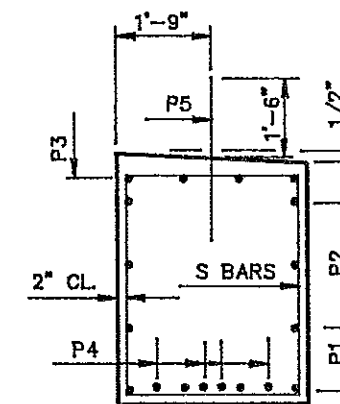
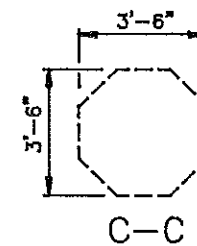
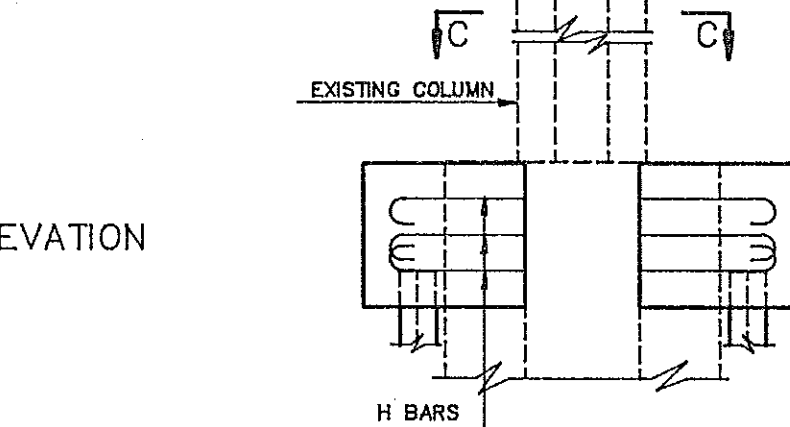
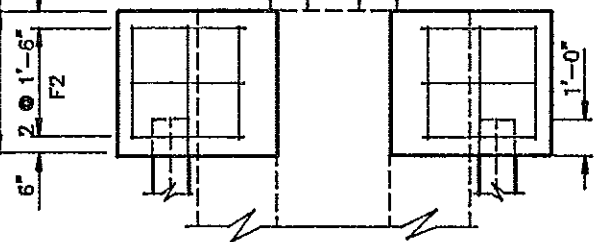


BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
F1	40	6	3'-2"	STR.
F2	12	6	17'-10"	BENT
S1	5	5	14'-6"	BENT
S2	8	5	14'-10"	BENT
S3	6	5	15'-0"	BENT
S4	4	5	15'-4"	BENT
S5	13	5	15'-6"	BENT
S6	9	5	15'-8"	BENT
P1	4	11	40'-4"	STR.
P2	6	5	40'-4"	STR.
P3	4	10	40'-4"	STR.
P4	4	11	29'-6"	STR.
① P5	22	8	3'-0"	STR.
P6	10	6	7'-11"	BENT
② H	80	8	3'-2"	BENT



BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

- ① P5 BARS SHALL BE PLAIN ROUND MILD STEEL THE UPPER HALF OF THIS BAR SHALL BE GREASED BEFORE PLACING THE DIAPHRAGMS.
- ② H BARS SHALL BE INSTALLED WITH A HIGH STRENGTH ADHESIVE SPECIFICALLY INTENDED TO DEVELOP THE FULL STRENGTH OF THE H BAR.



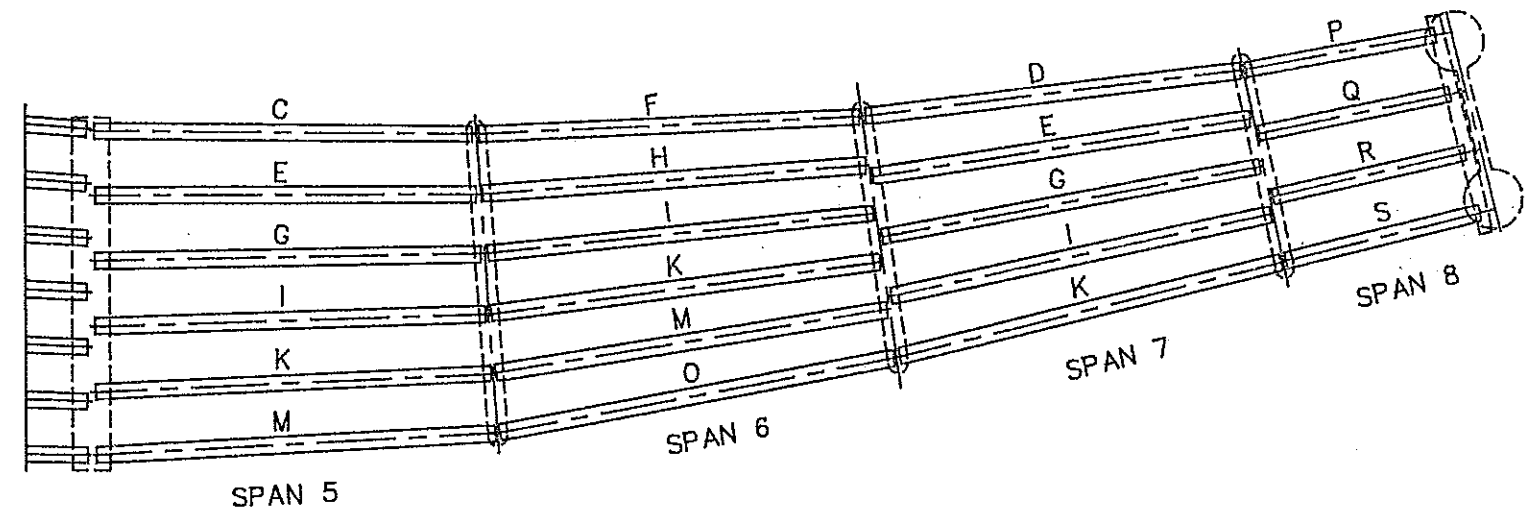
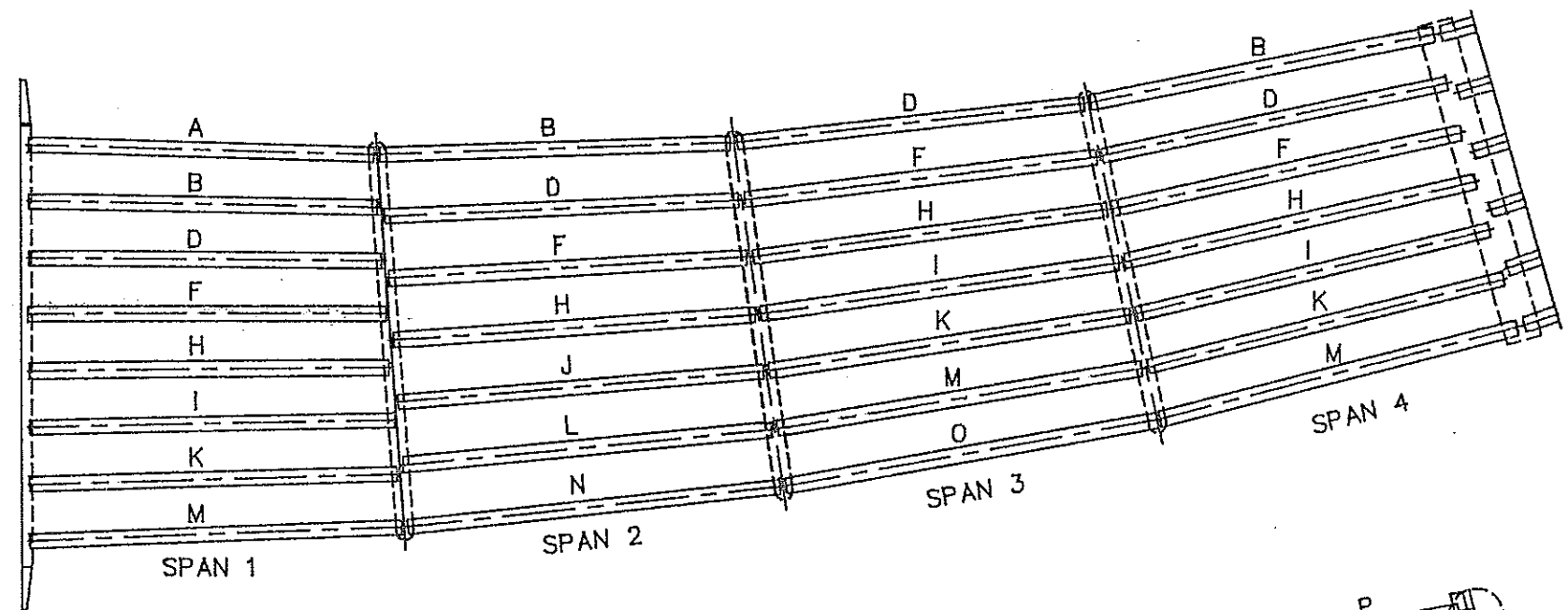
QUANTITIES	
CLASS AE-3 CONC.	00 C.Y.
REINFORCING STEEL	00 LBS.
EXCAVATION & PILING (SEE QUANTITY SHEET)	

MEMORIAL BRIDGE

PIER NO. 8

PRESTRESSING DATA

GIRDER	NO.	LENGTH	WEIGHT TONS	C.G. IN.	FINAL FORCE KIPS	DETENSION STRENGTH PSI	ACCEPTANCE STRENGTH PSI
A	1	67'-10"	23.3	2.75 3.00	696.5 703.4	4200	5000
B	3	68'-8"	23.6	2.75 3.00	765.0 772.6	4800	5000
C	1	69'-1"	23.7	2.75 3.00	757.1 764.6	4800	5000
D	5	69'-4"	23.8	2.75 3.00	778.9 786.7	5000	5000
E	2	69'-10"	24.0	2.75 3.00	772.6 780.3	4900	5000
F	5	70'-1"	24.1	2.75 3.00	794.8 802.7	5100	5100
G	2	70'-6"	24.2	2.75 3.00	786.6 794.5	5100	5100
H	5	70'-10"	24.3	3.00 3.25	818.9 827.1	5200	5200
I	6	71'-5"	24.5	3.00 3.25	814.0 822.2	5200	5200
J	1	71'-10"	24.6	3.00 3.25	828.0 836.3	5300	5300
K	6	72'-2"	24.7	3.00 3.25	830.1 838.5	5300	5300
L	1	72'-7"	24.9	3.00 3.25	844.2 852.7	5500	5500
M	5	72'-11"	25.0	3.00 3.25	834.5 842.9	5300	5300
N	1	73'-5"	25.1	3.00 3.25	862.5 871.1	5500	5500
O	2	73'-9"	25.2	3.00 3.25	848.6 857.1	5400	5400
P	1	36'-10"	13.0	2.00 2.25	257.4 259.3	4000	5000
Q	1	36'-2"	13.1	2.00 2.25	257.4 259.3	4000	5000
R	1	36'-7"	13.3	2.00 2.25	257.4 259.3	4000	5000
S	1	37'-0"	13.4	2.00 2.25	257.4 259.3	4000	5000

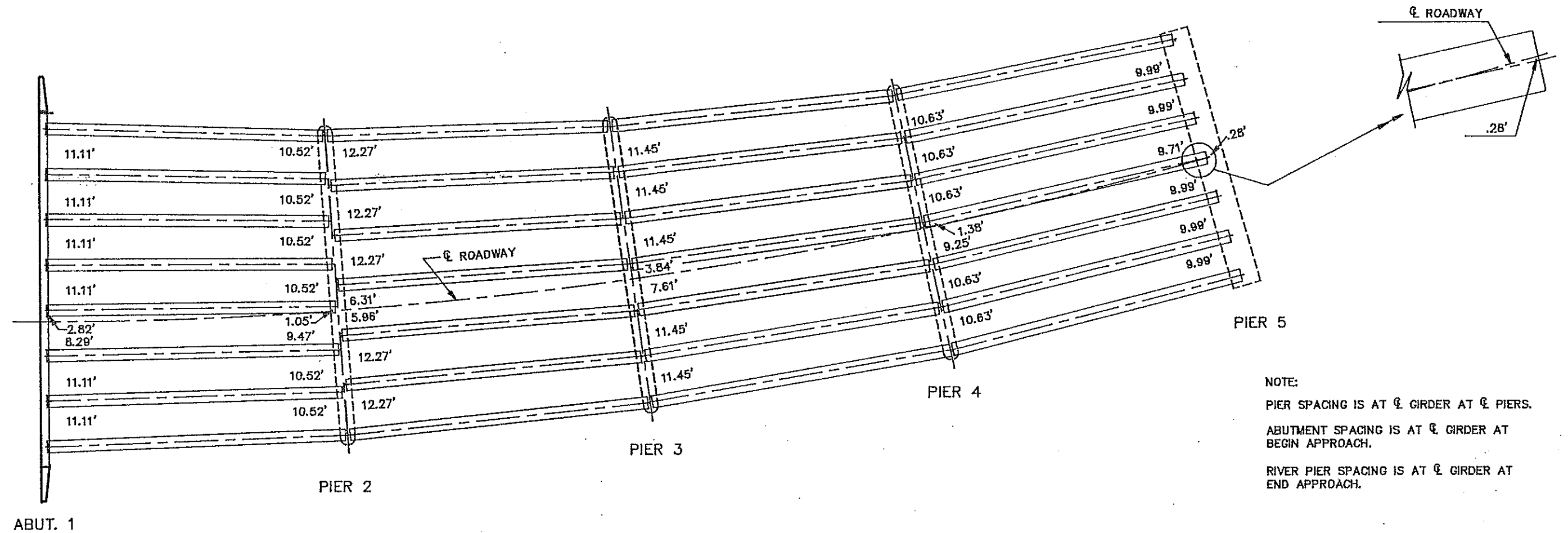


GIRDER LAYOUT

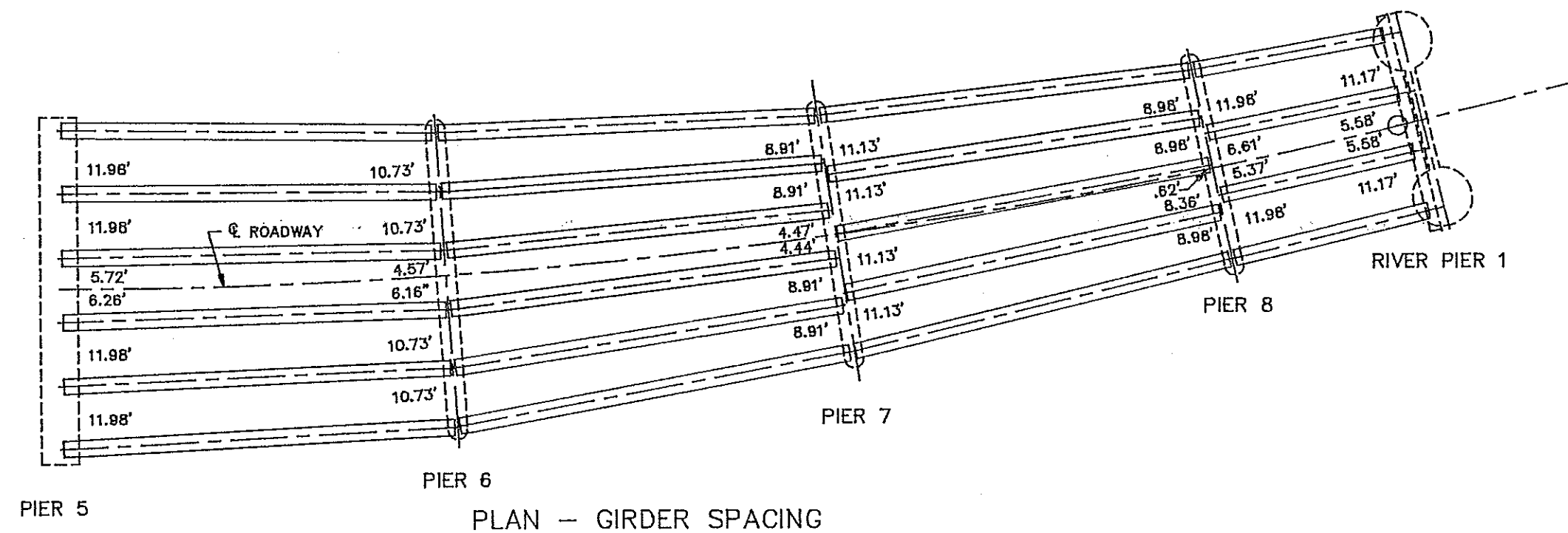
QUANTITIES		
GIRDER 39X36	3411.83	L.F.

MEMORIAL BRIDGE
WEST APPROACH
GIRDER LAYOUT

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	

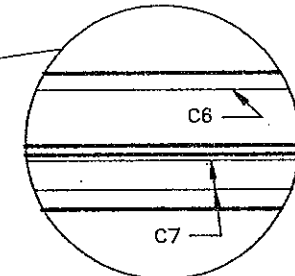
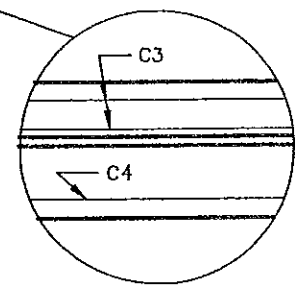
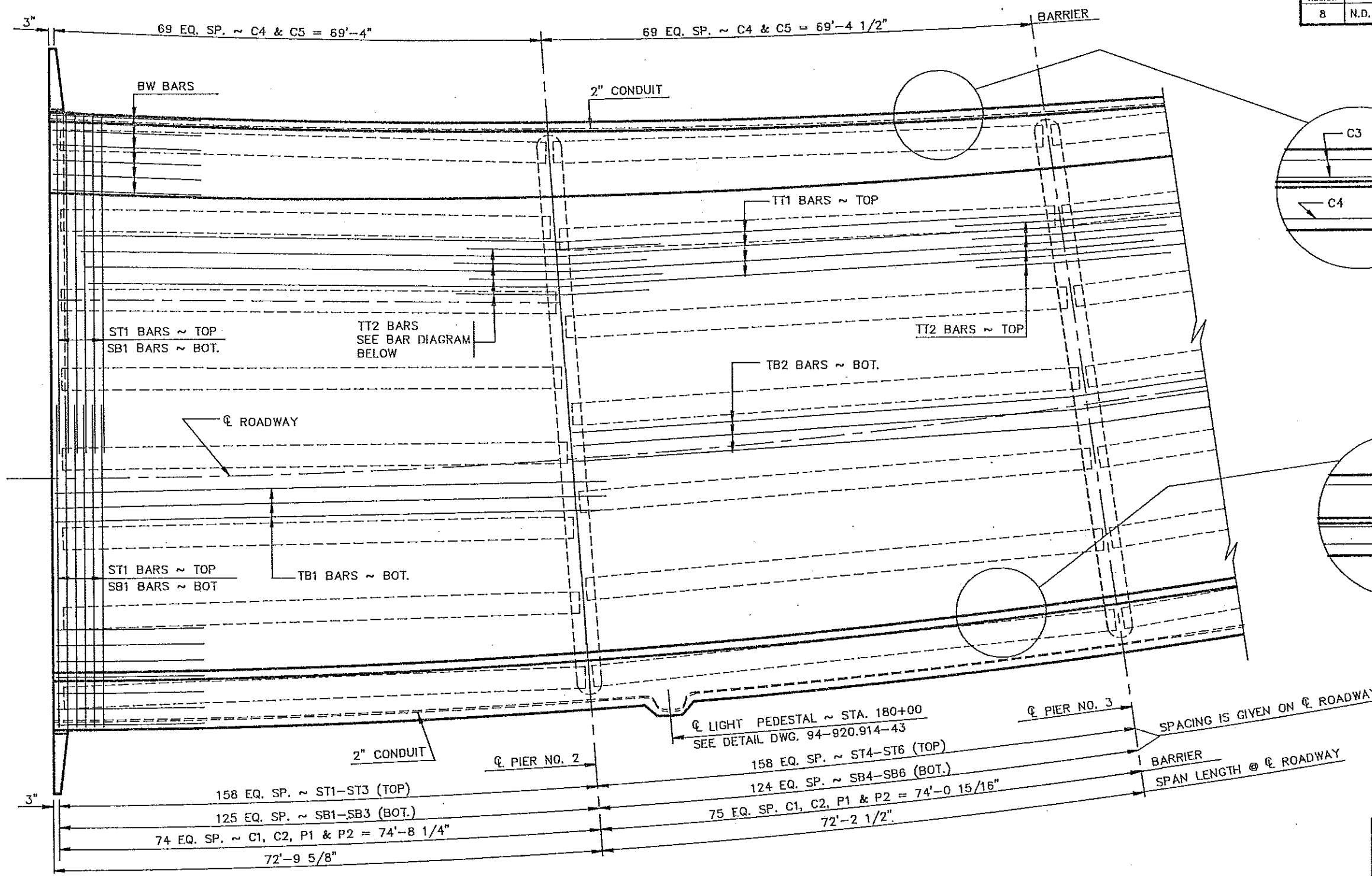


NOTE:
 PIER SPACING IS AT ϕ GIRDER AT ϕ PIERS.
 ABUTMENT SPACING IS AT ϕ GIRDER AT BEGIN APPROACH.
 RIVER PIER SPACING IS AT ϕ GIRDER AT END APPROACH.

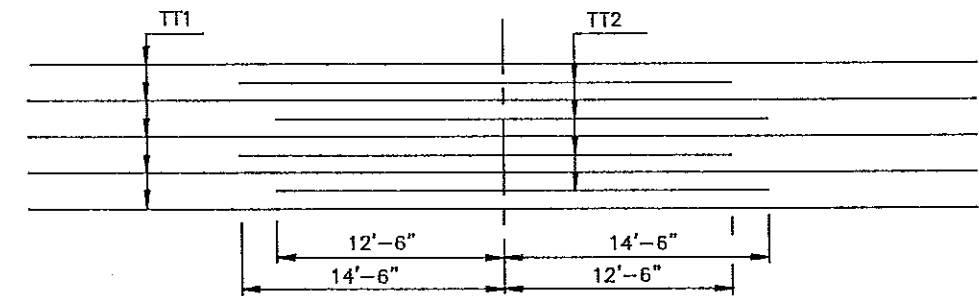


PLAN - GIRDER SPACING

MEMORIAL BRIDGE
 WEST APPROACH
 GIRDER SPACING
 LAYOUT



SLAB PLAN



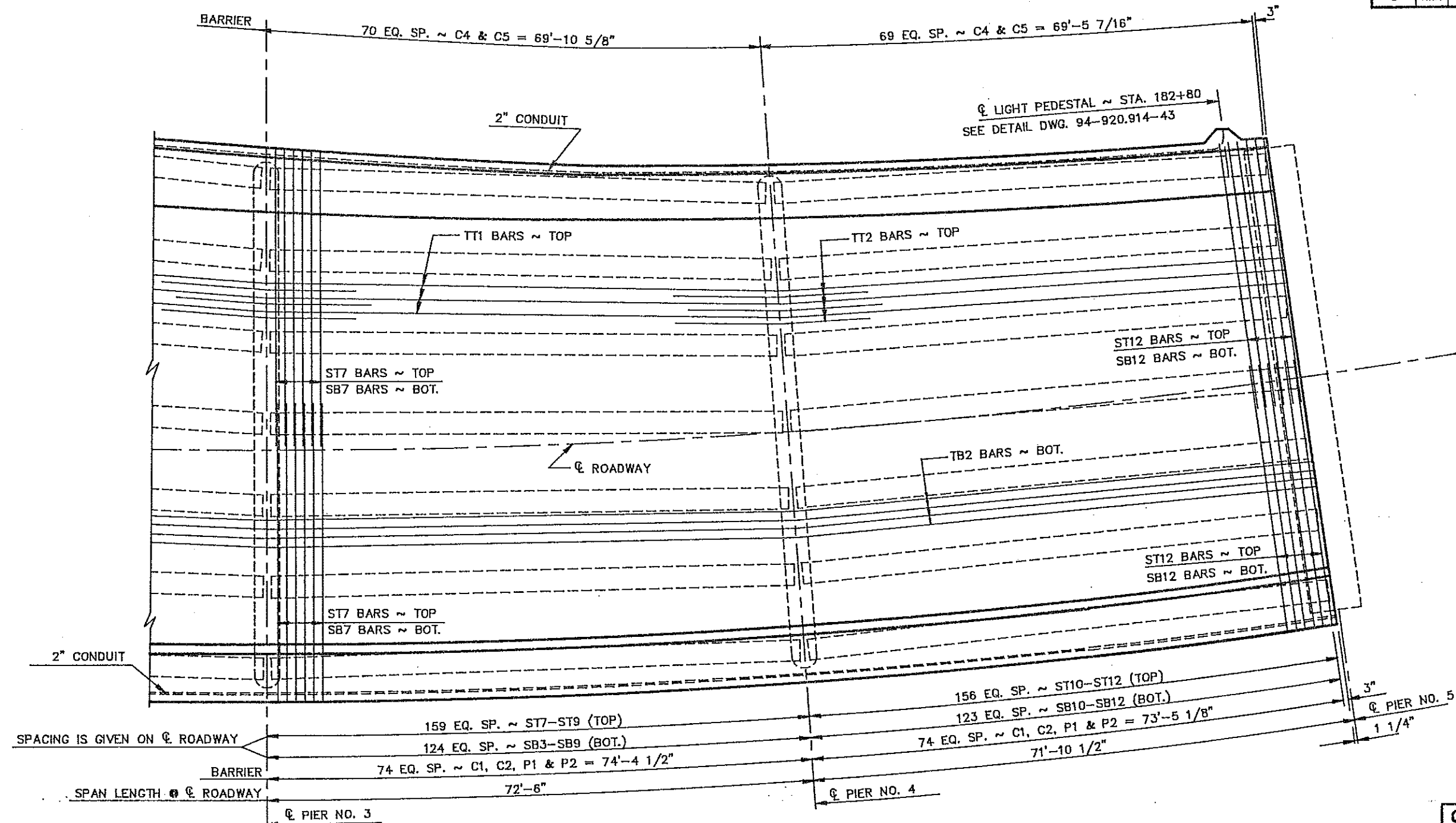
BAR DIAGRAM

QUANTITIES

SEE DWG. 94-920.914-47

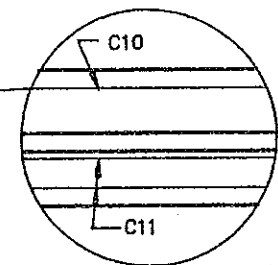
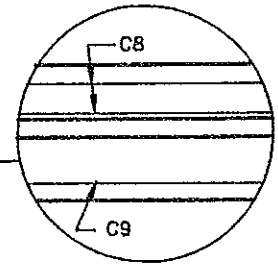
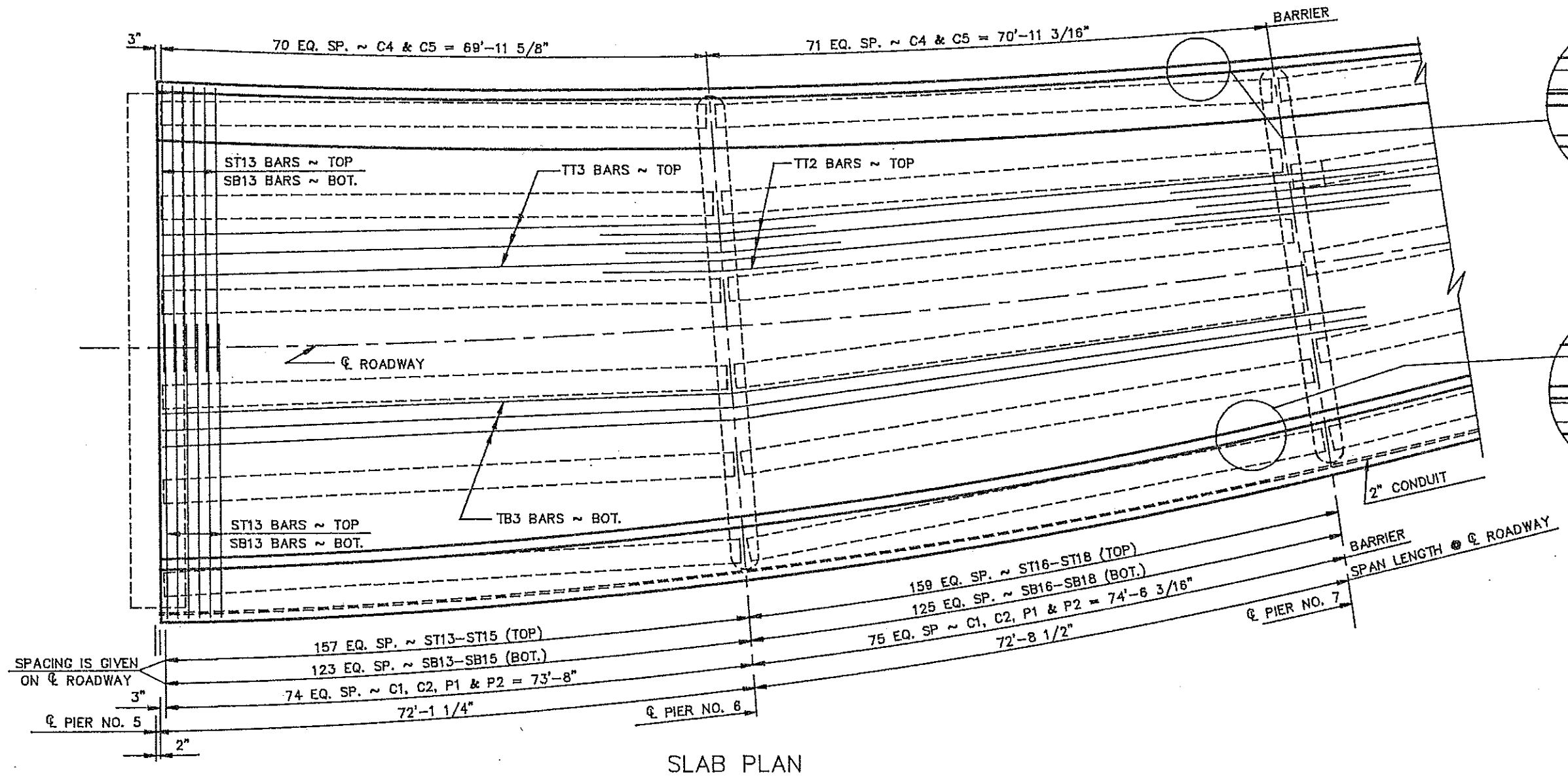
MEMORIAL BRIDGE
SLAB PLAN
WEST APPROACH

STA.179+96.5 TO STA. 181+41.5

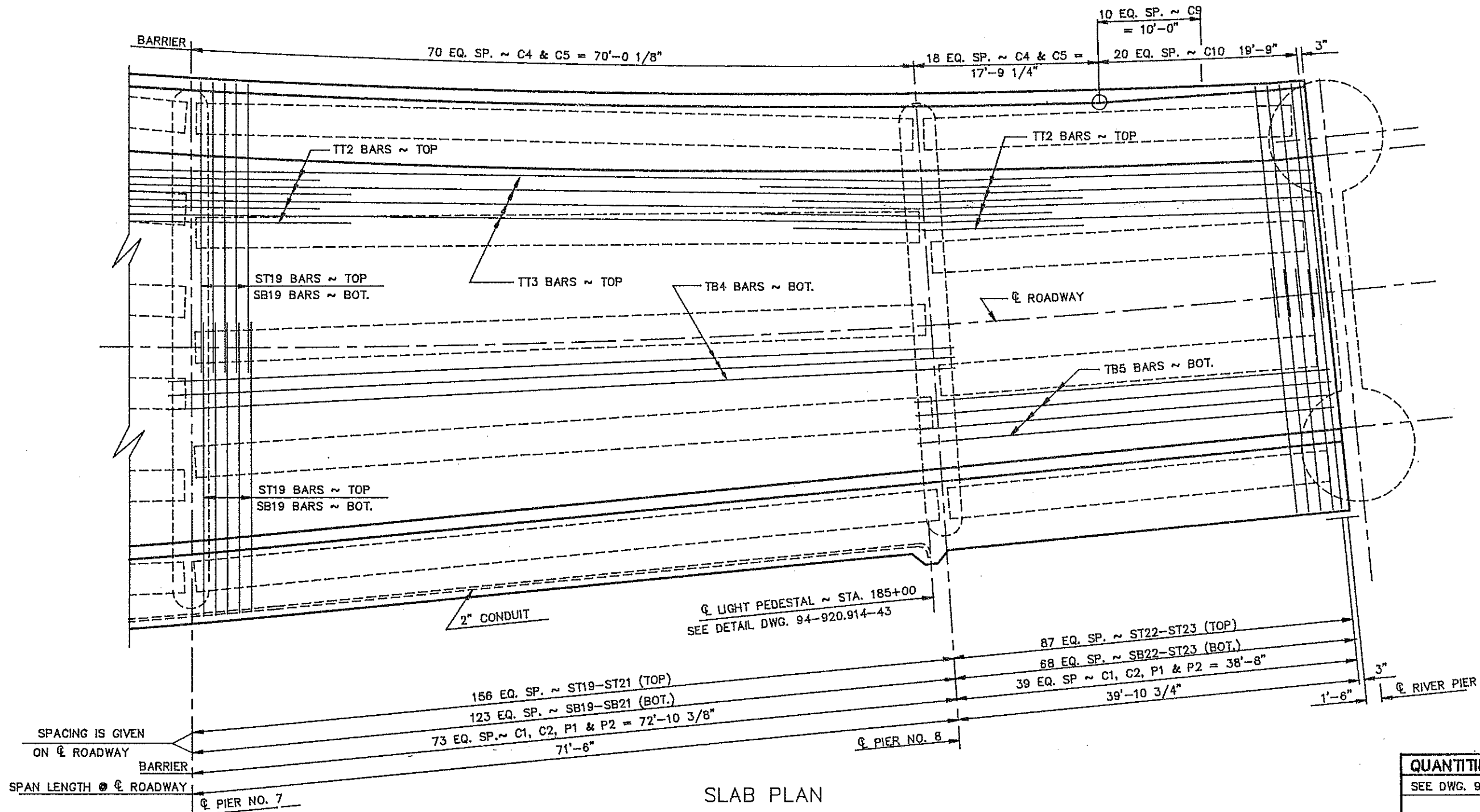


SLAB PLAN

QUANTITIES	
SEE DWG. 94-920.914-47	
MEMORIAL BRIDGE SLAB PLAN WEST APPROACH	
STA.181+41.5 TO STA.182+42.1	

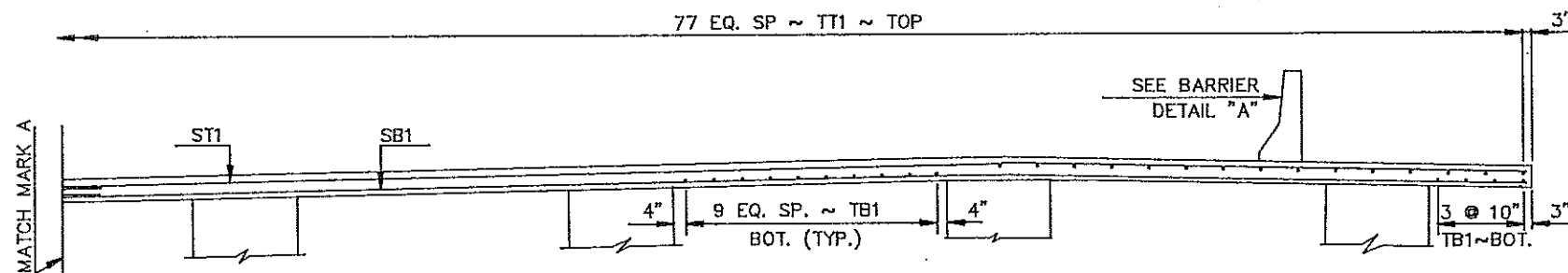
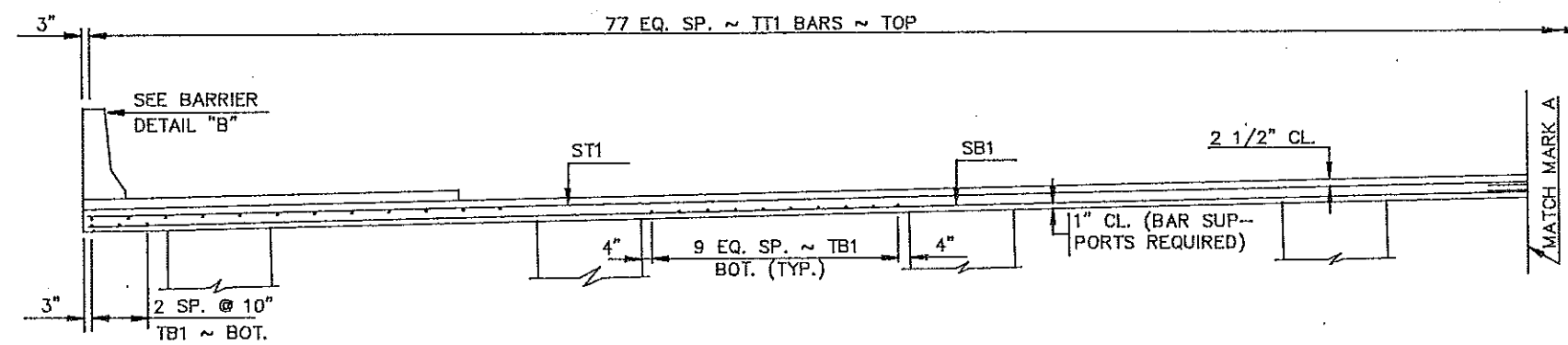
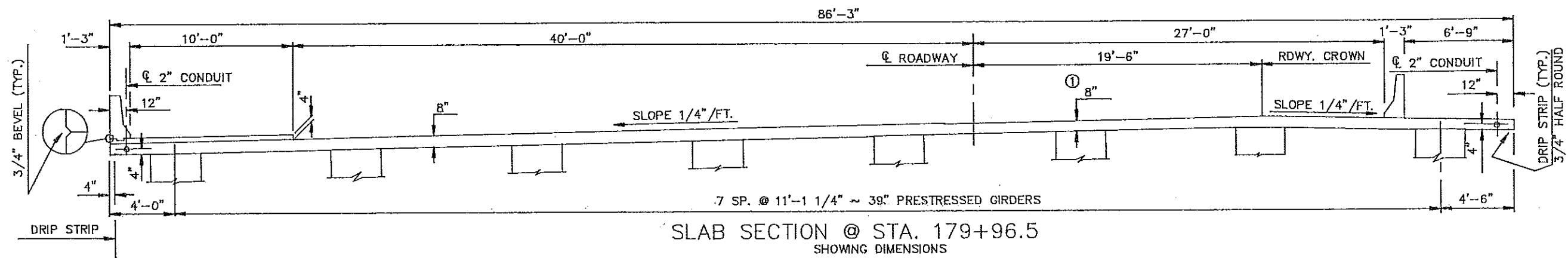


QUANTITIES	
SEE DWG. 94-920.914-47	
MEMORIAL BRIDGE SLAB PLAN WEST APPROACH	
STA. 182+85.9 TO STA. 183+58.0	

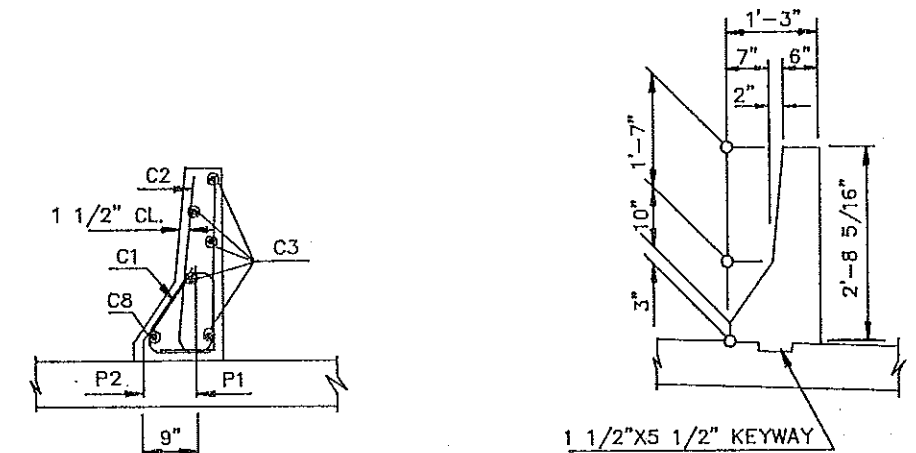


SLAB PLAN

QUANTITIES	
SEE DWG. 94-920.914-47	
MEMORIAL BRIDGE SLAB PLAN WEST APPROACH STA. 184+30.7 TO STA. 185+42.1	

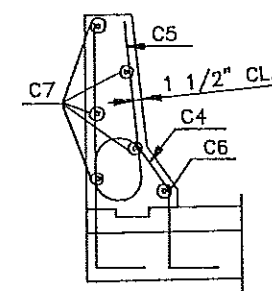


SLAB SECTION @ STA. 179+96.5
SHOWING REINFORCING



BARRIER DETAIL "A"

① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKNESS.



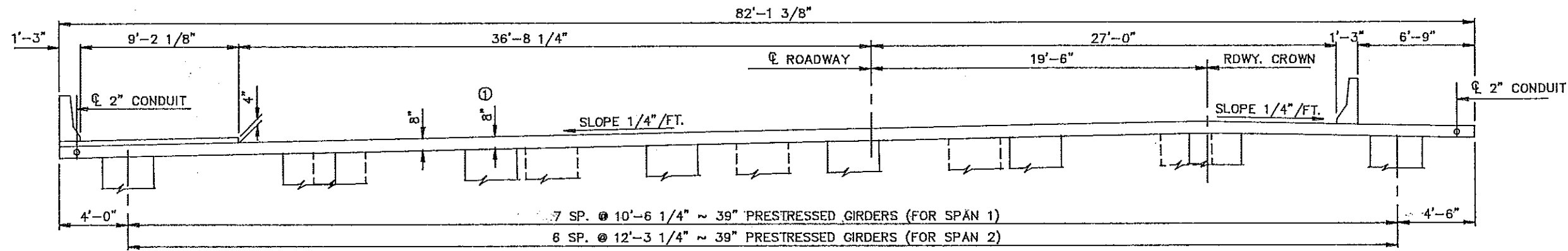
BARRIER DETAIL "B"

QUANTITIES

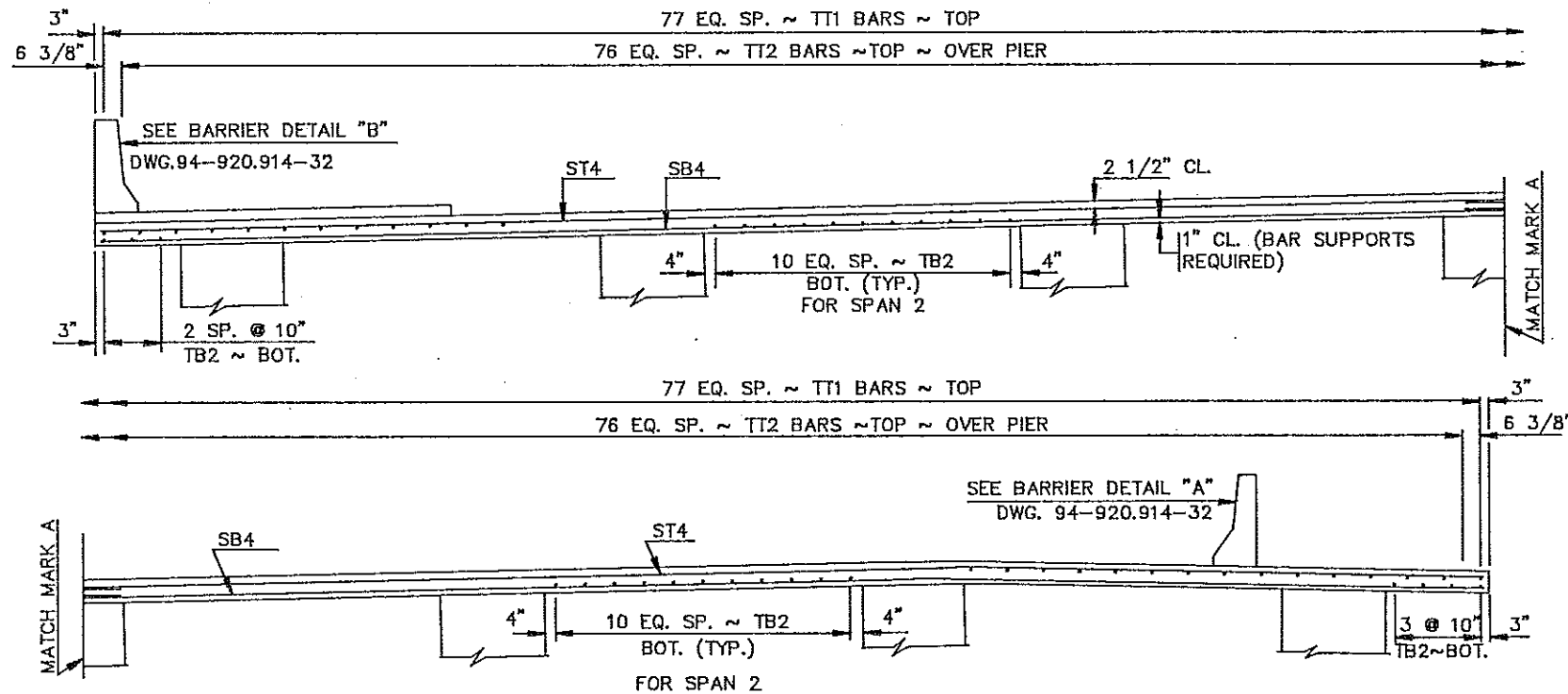
SEE DWG. 94-920.914-47

MEMORIAL BRIDGE
SLAB SECTION
WEST APPROACH
STA. 179+96.5
ABUTMENT NO. 1

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



SLAB SECTION @ STA. 180+69.3
SHOWING DIMENSIONS

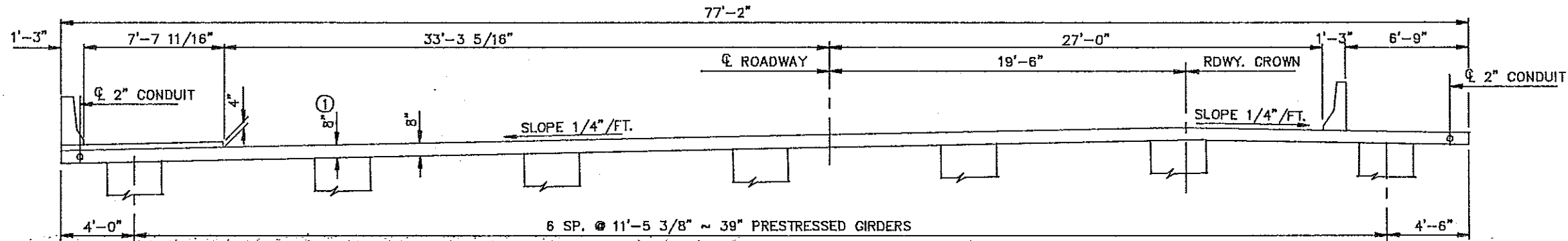


SLAB SECTION @ STA. 180+69.3
SHOWING REINFORCING

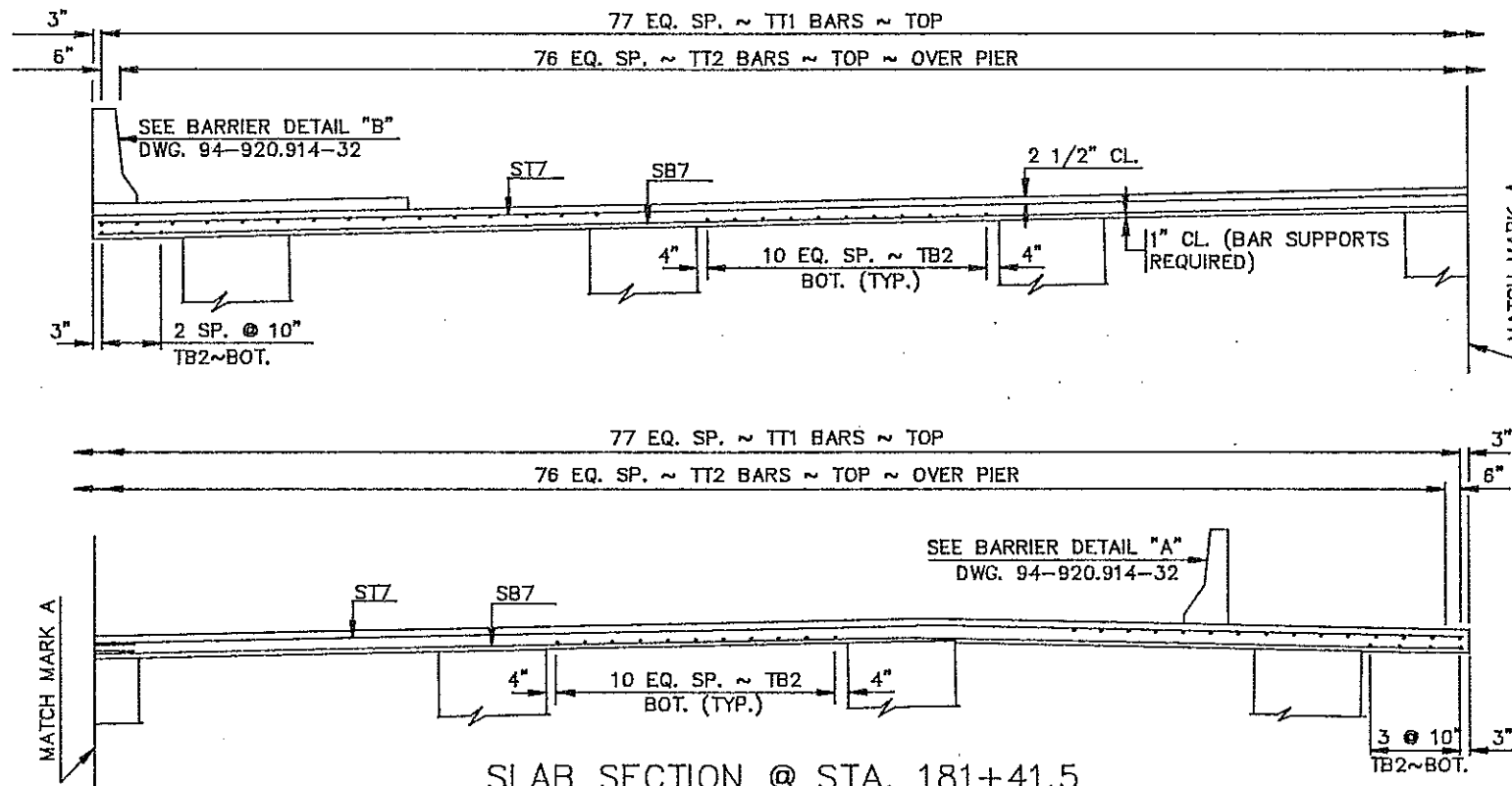
① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKENSS.

QUANTITIES
SEE DWG. 94-920.914-47
MEMORIAL BRIDGE SLAB SECTION WEST APPROACH STA. 180+69.3 AT PIER NO. 2

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



SLAB SECTION @ STA. 181+41.5
SHOWING DIMENSIONS

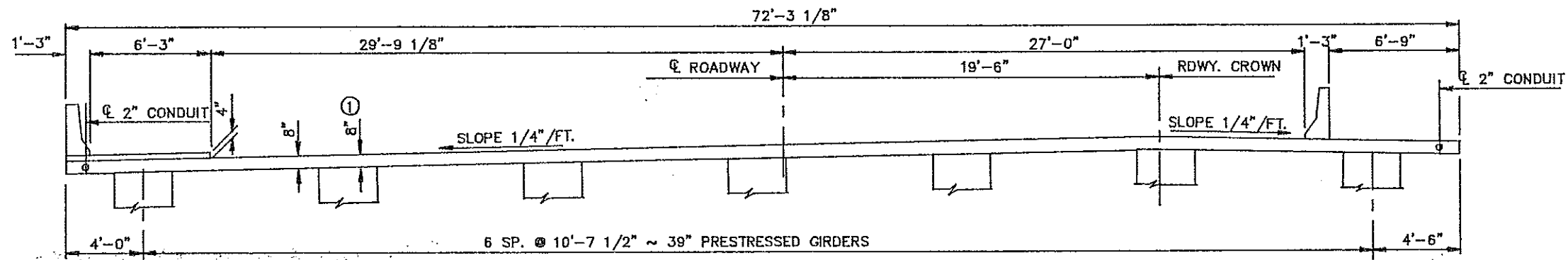


SLAB SECTION @ STA. 181+41.5
SHOWING REINFORCING

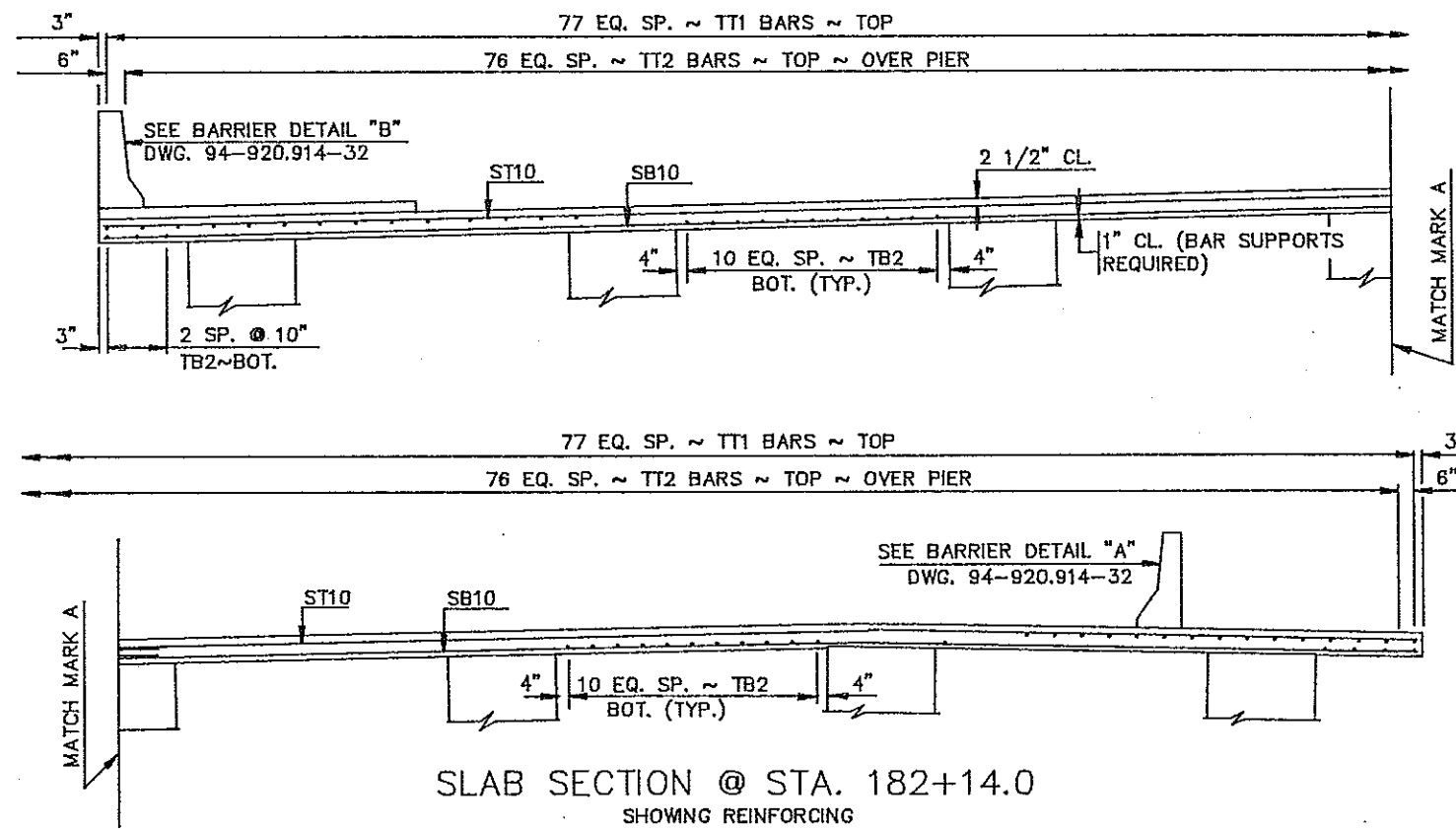
① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKNESS.

QUANTITIES
SEE DWG. 94-920.914-47

MEMORIAL BRIDGE
SLAB SECTION
WEST APPROACH
STA. 181+41.5
AT PIER NO. 3



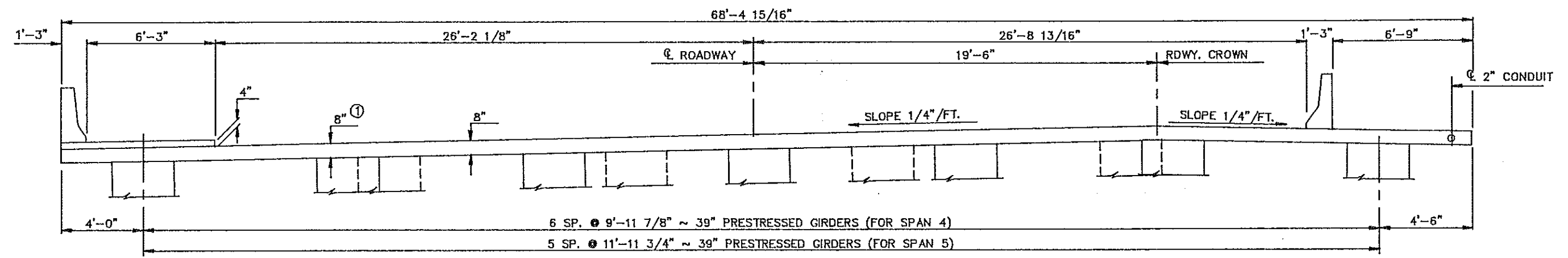
SLAB SECTION @ STA. 182+14.0
SHOWING DIMENSIONS



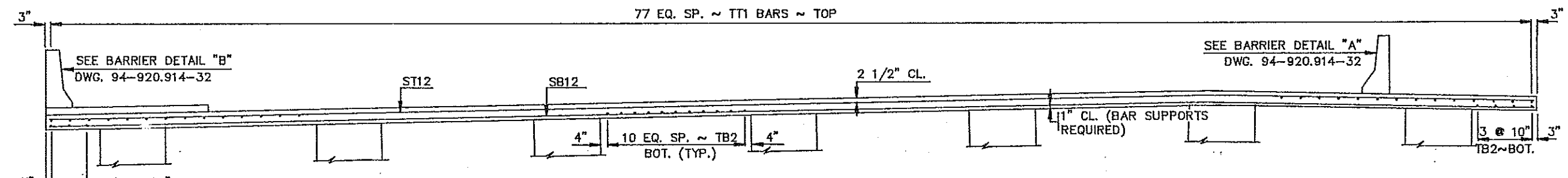
SLAB SECTION @ STA. 182+14.0
SHOWING REINFORCING

① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKNESS.

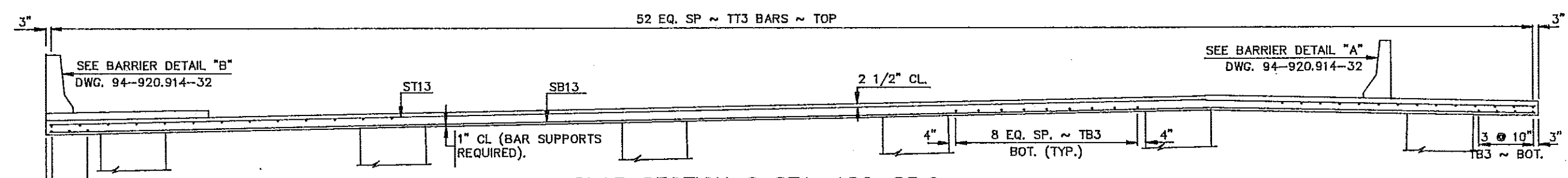
QUANTITIES
SEE DWG. 94-920.914-47
MEMORIAL BRIDGE SLAB SECTION WEST APPROACH STA. 182+14.0 AT PIER NO. 4



SLAB SECTION @ STA. 182+85.9
SHOWING DIMENSIONS



SLAB SECTION @ STA. 182+85.9
SHOWING REINFORCING FOR SPAN 4

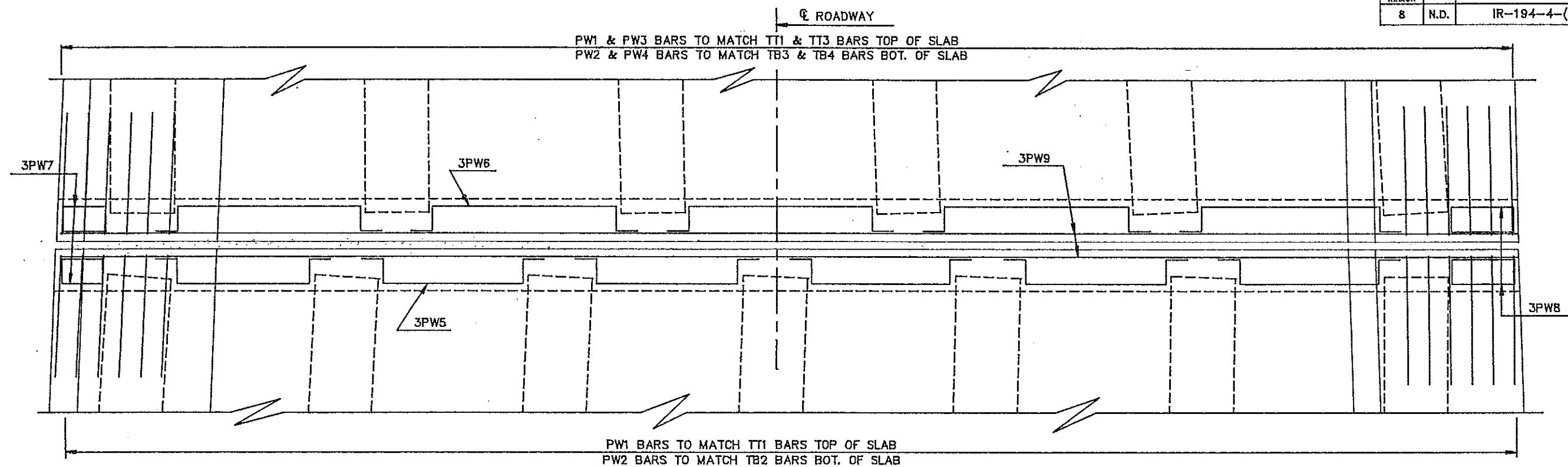


SLAB SECTION @ STA. 182+85.9
SHOWING REINFORCING FOR SPAN 5

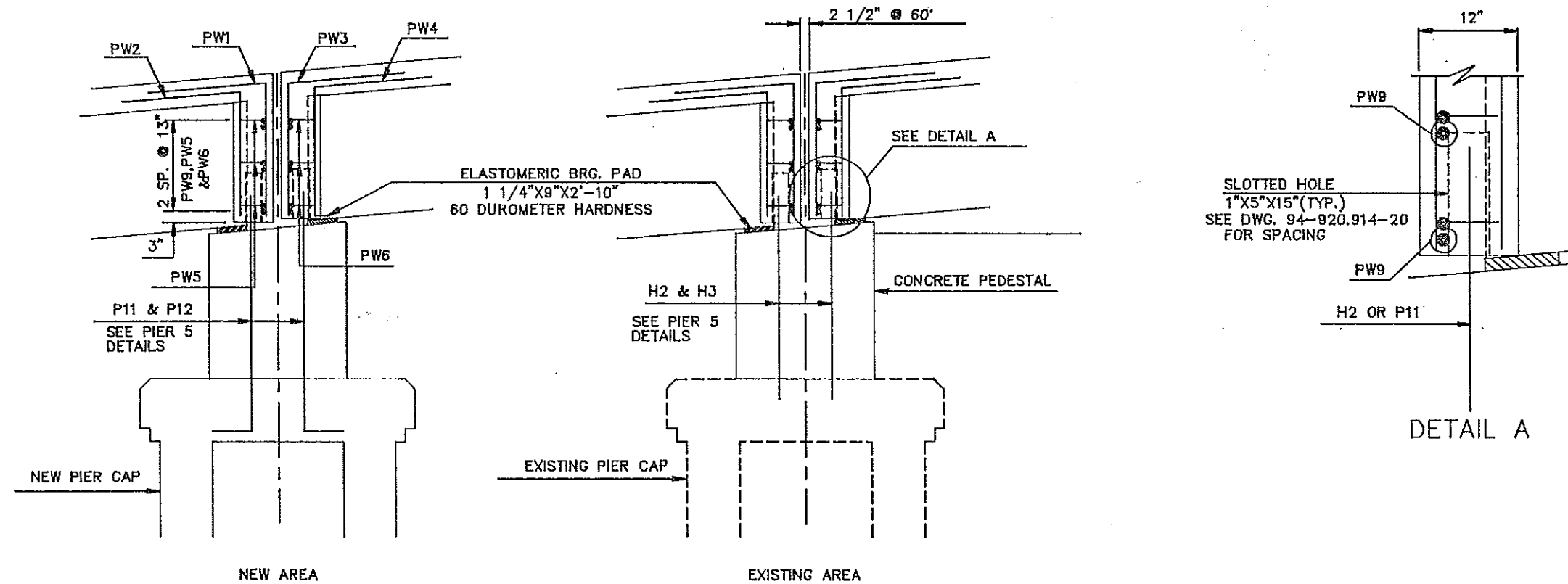
① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8\"/>

QUANTITIES
SEE DWG. 94-920.914-47

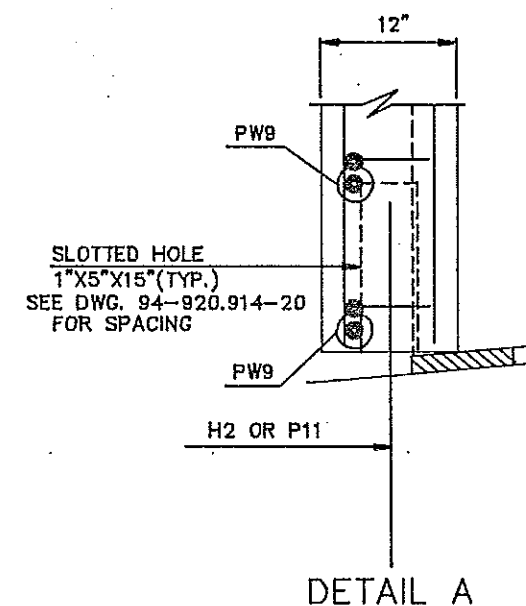
MEMORIAL BRIDGE
SLAB SECTION
WEST APPROACH
STA. 182+85.9
AT PIER NO. 5



ENDWALL PLAN @ PIER 5

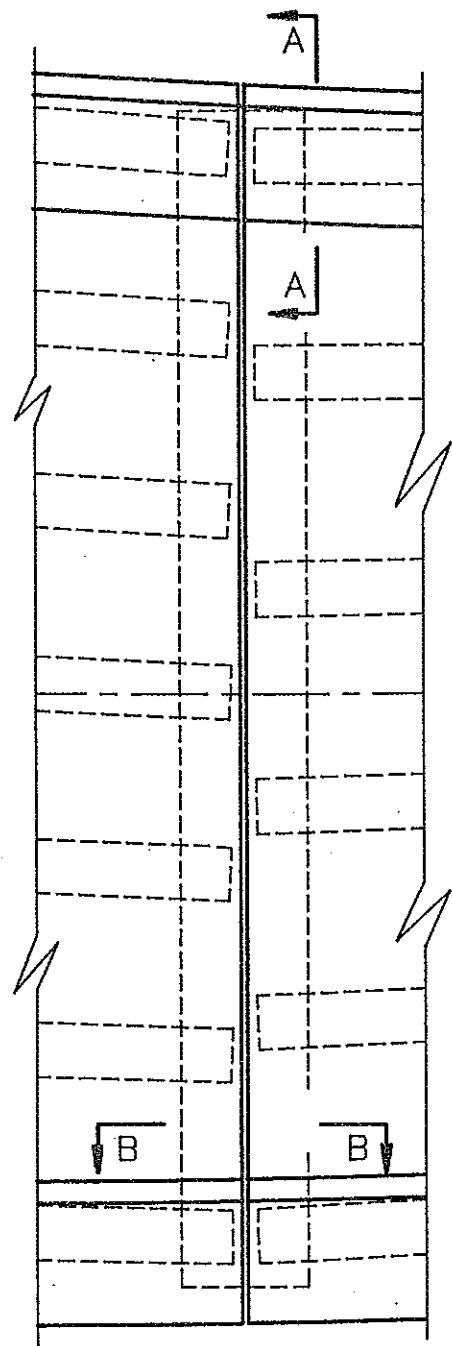


TYPICAL ENDWALL SECTION

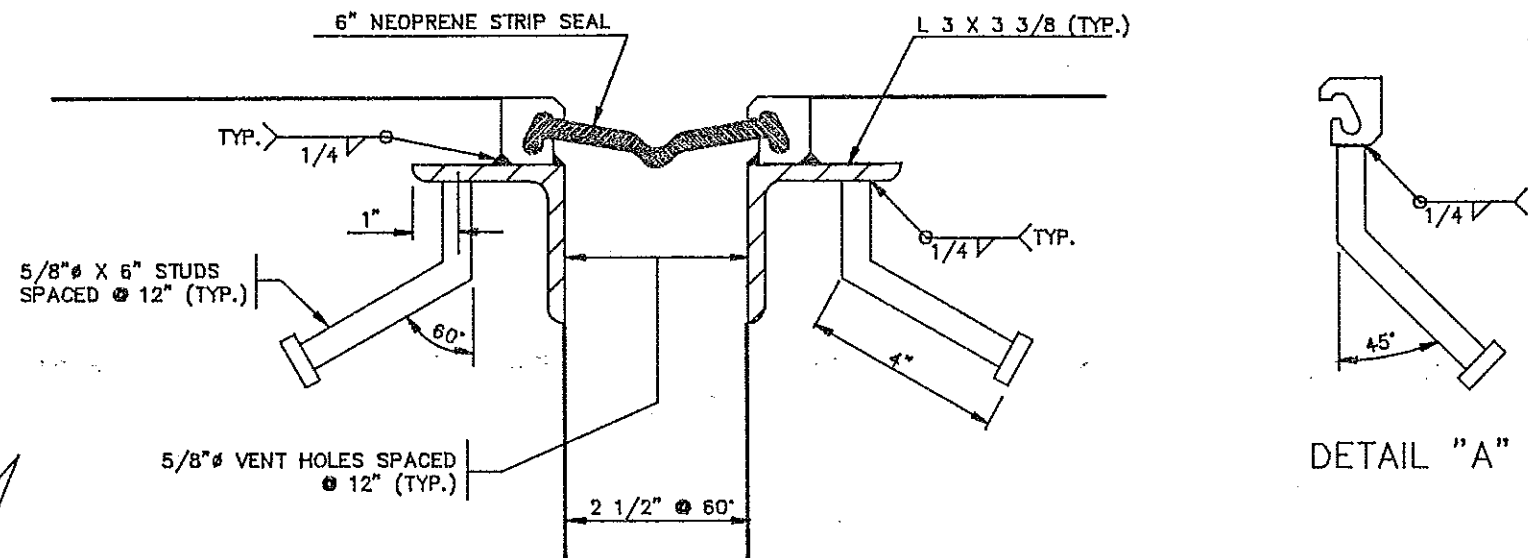


QUANTITIES
SEE DWG. 94-920.914-47

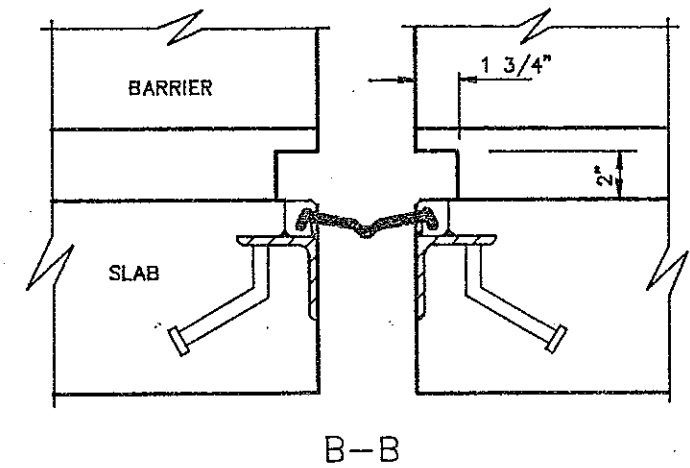
MEMORIAL BRIDGE
WEST APPROACH
PIER 5 ENDWALL



SLAB PLAN @ PIER NO. 5

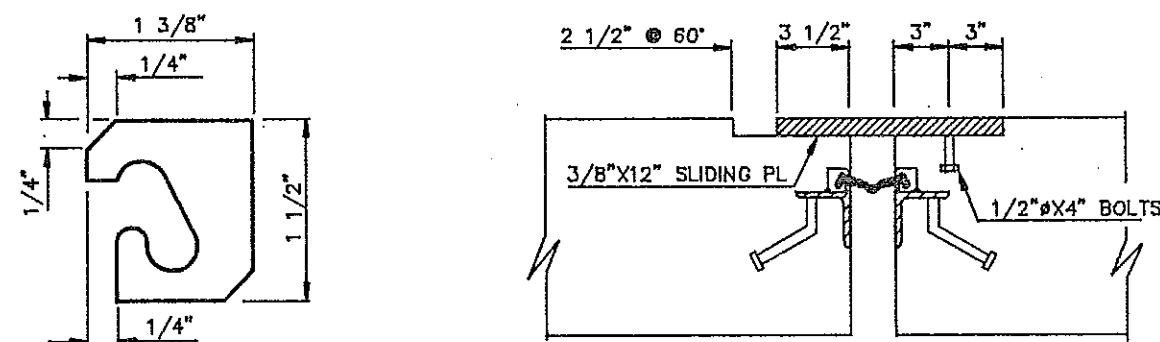


TYPICAL SECTION OF EXPANSION JOINT



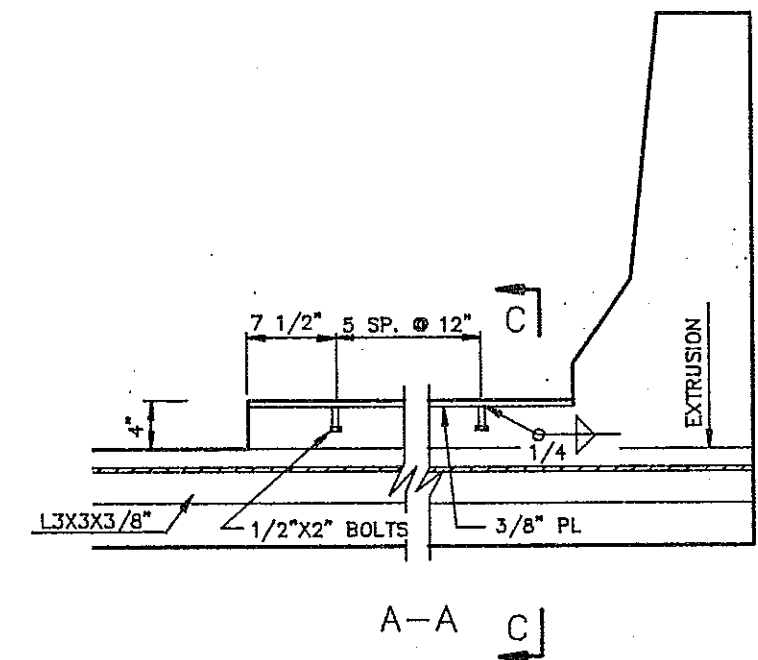
DETAIL "A"

B-B

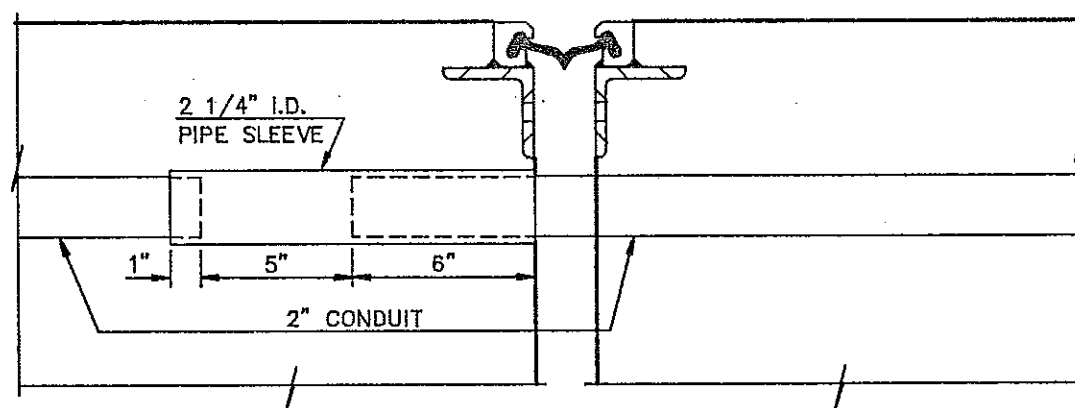


STEEL EXTRUSION DETAIL

C-C



A-A C

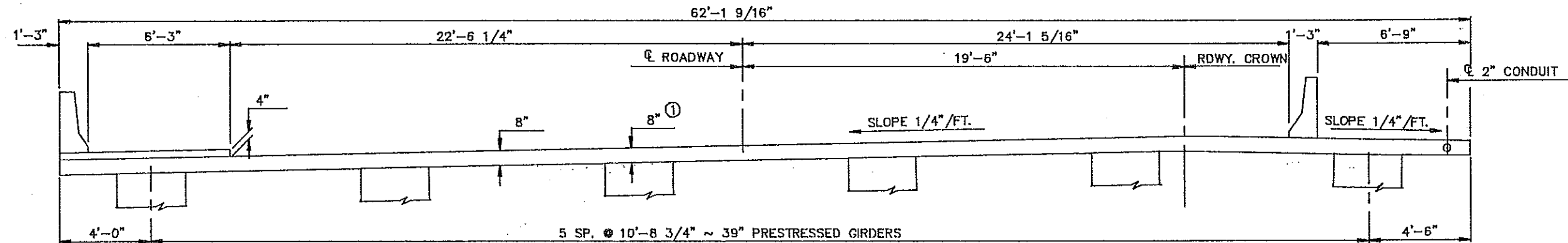


CONDUIT AT EXPANSION JOINT IN SLAB

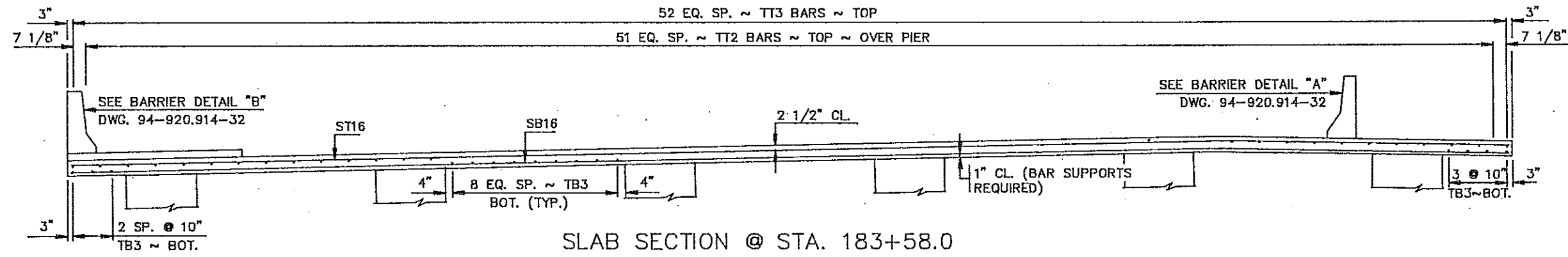
NOTE: STRUCTURAL STEEL AND BOLTS TO BE INCIDENTAL TO STRIP SEAL JOINT.

QUANTITIES	
EXPANSION JT. STRIP SEAL	DD L.F.
MEMORIAL BRIDGE WEST APPROACH EXPANSION JOINT	
PIER NO. 5	

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR--194-4(053)000	

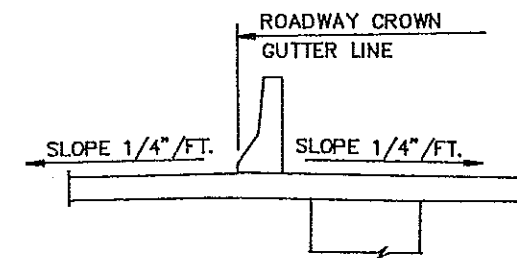


SLAB SECTION @ STA. 183+58.0
SHOWING DIMENSIONS



SLAB SECTION @ STA. 183+58.0
SHOWING REINFORCING

① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKENSS.

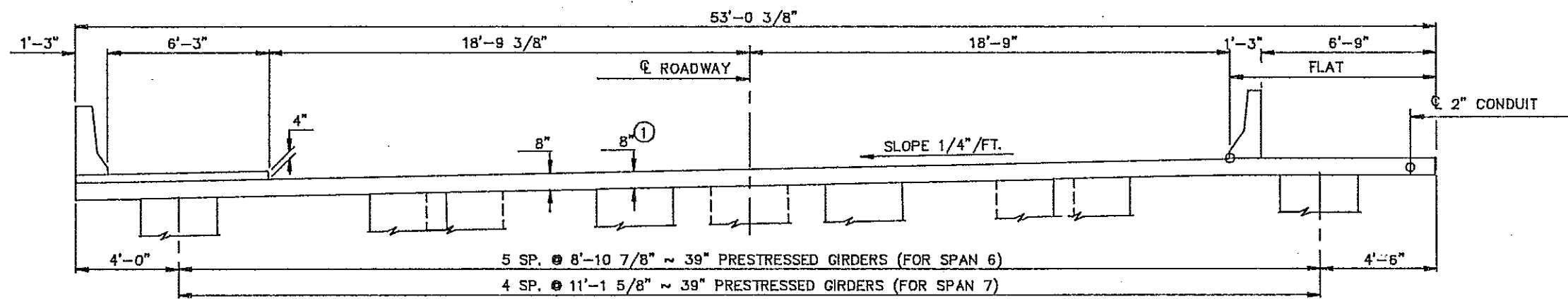


PARTIAL SECTION @ STA. 184+22.43
SHOWING CROWN LOCTION

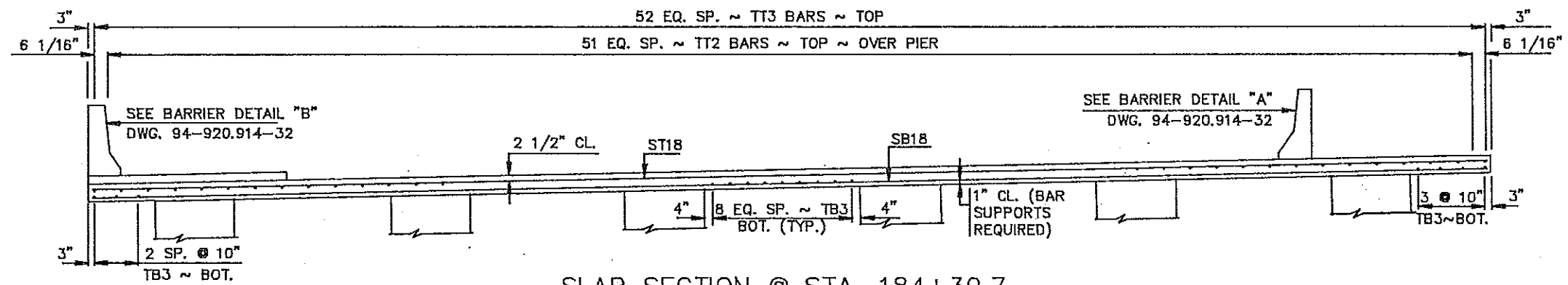
QUANTITIES
SEE DWG. 94-920.914-47

MEMORIAL BRIDGE
SLAB SECTION
WEST APPROACH
STA. 183+58.0
AT PIER NO. 6

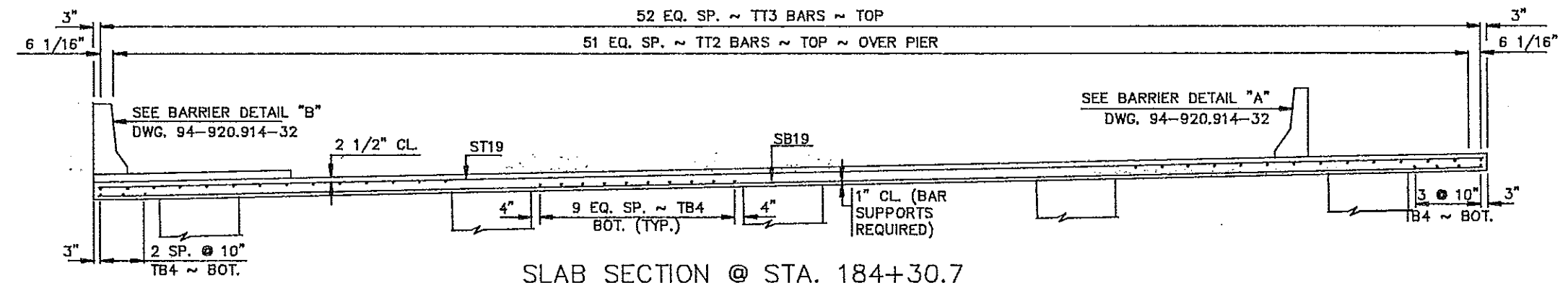
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



SLAB SECTION @ STA. 184+30.7
SHOWING DIMENSIONS



SLAB SECTION @ STA. 184+30.7
SHOWING REINFORCING FOR SPAN 6



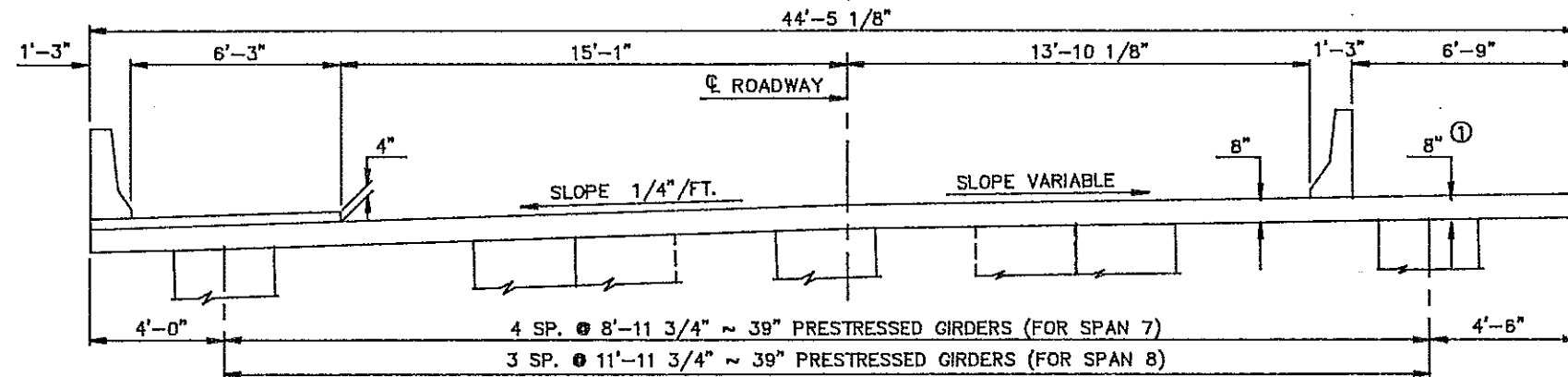
SLAB SECTION @ STA. 184+30.7
SHOWING REINFORCING FOR SPAN 7

① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKNESS.

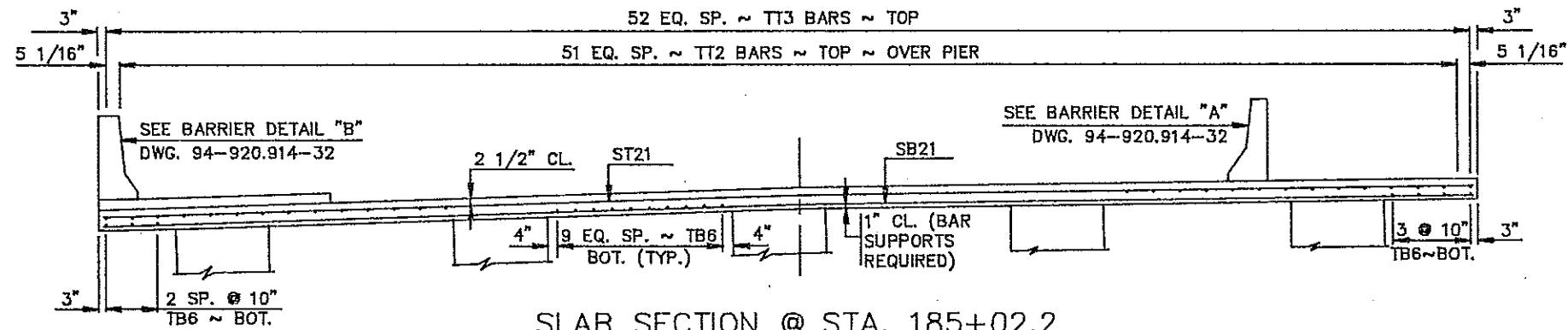
QUANTITIES
SEE DWG. 94-920.914-47

MEMORIAL BRIDGE
SLAB SECTION
WEST APPROACH
STA. 184+30.7
AT PIER NO. 7

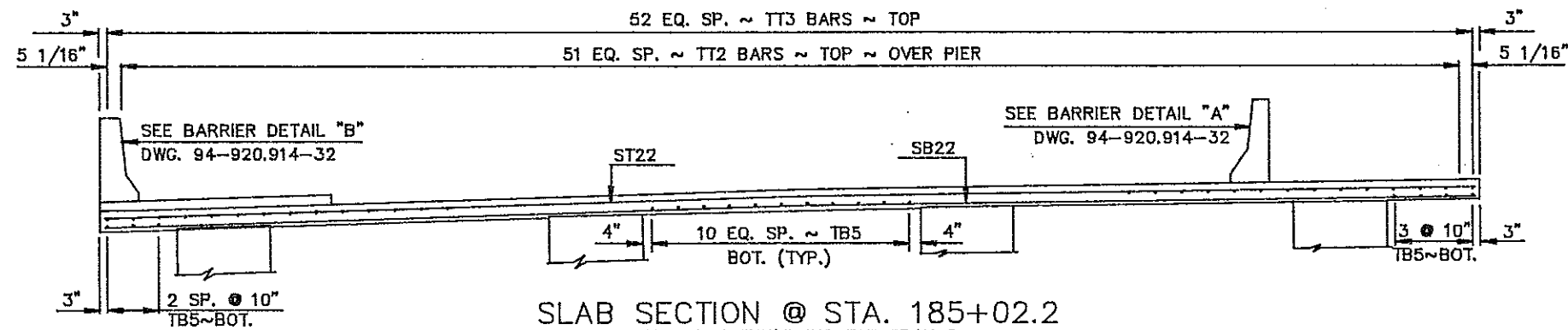
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



SLAB SECTION @ STA. 185+02.2
SHOWING DIMENSIONS



SLAB SECTION @ STA. 185+02.2
SHOWING REINFORCING FOR SPAN 7

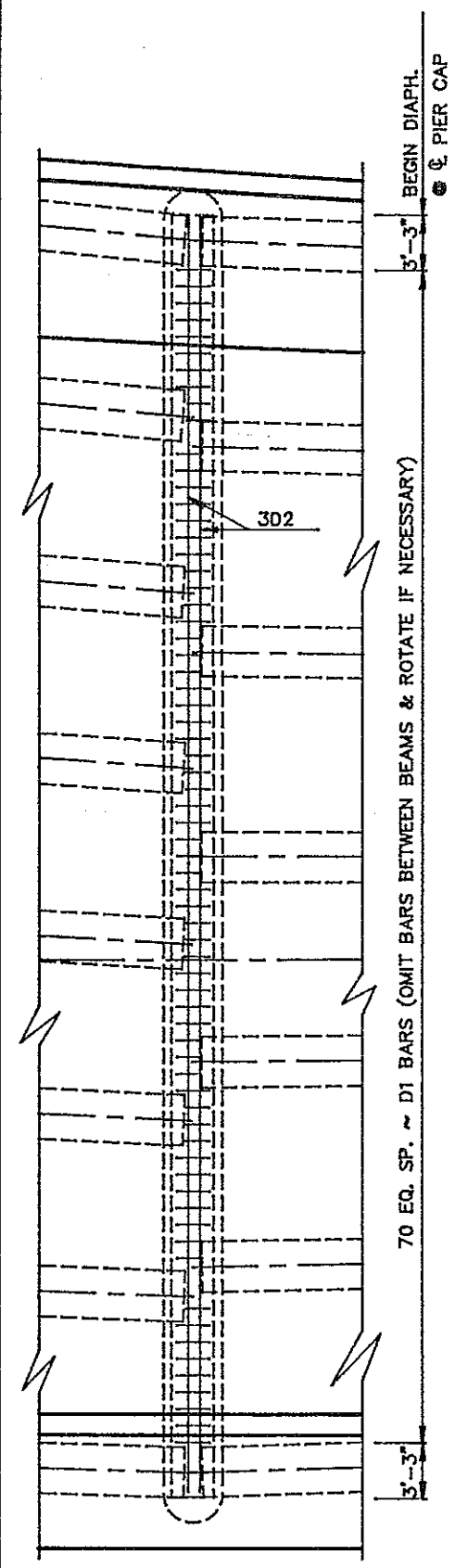


SLAB SECTION @ STA. 185+02.2
SHOWING REINFORCING FOR SPAN 8

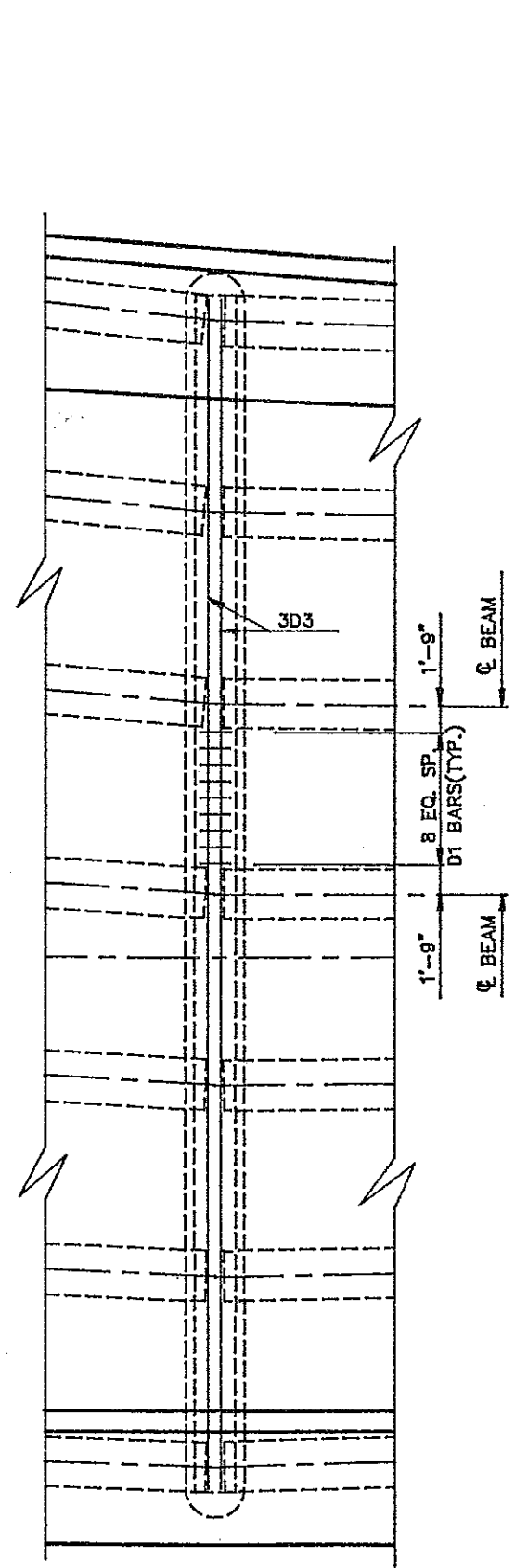
① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKENESS.

QUANTITIES
SEE DWG. 920.914-47

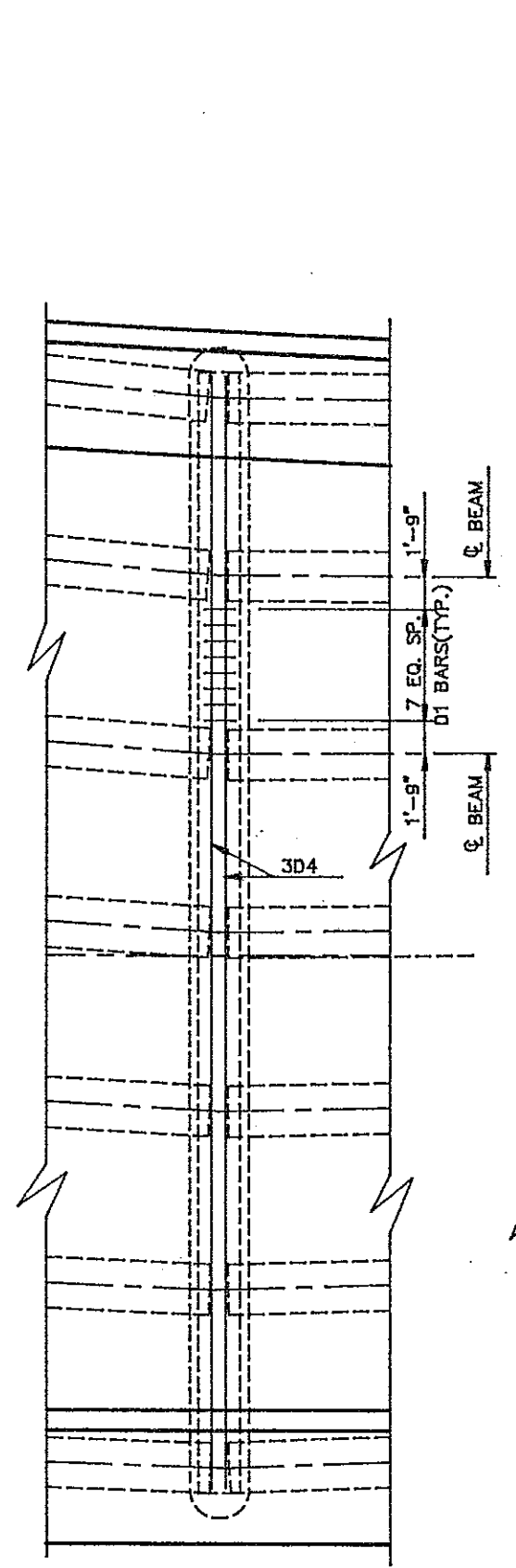
MEMORIAL BRIDGE
SLAB SECTION
WEST APPROACH
STA. 185+02.2
AT PIER NO. 8



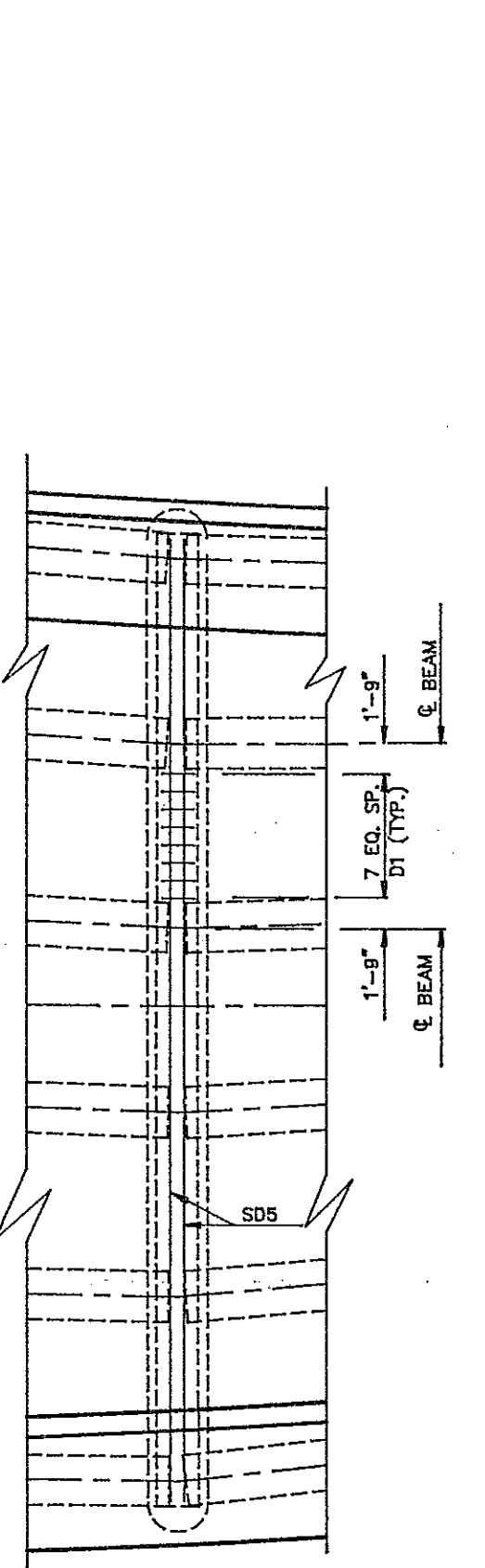
PIER NO. 2



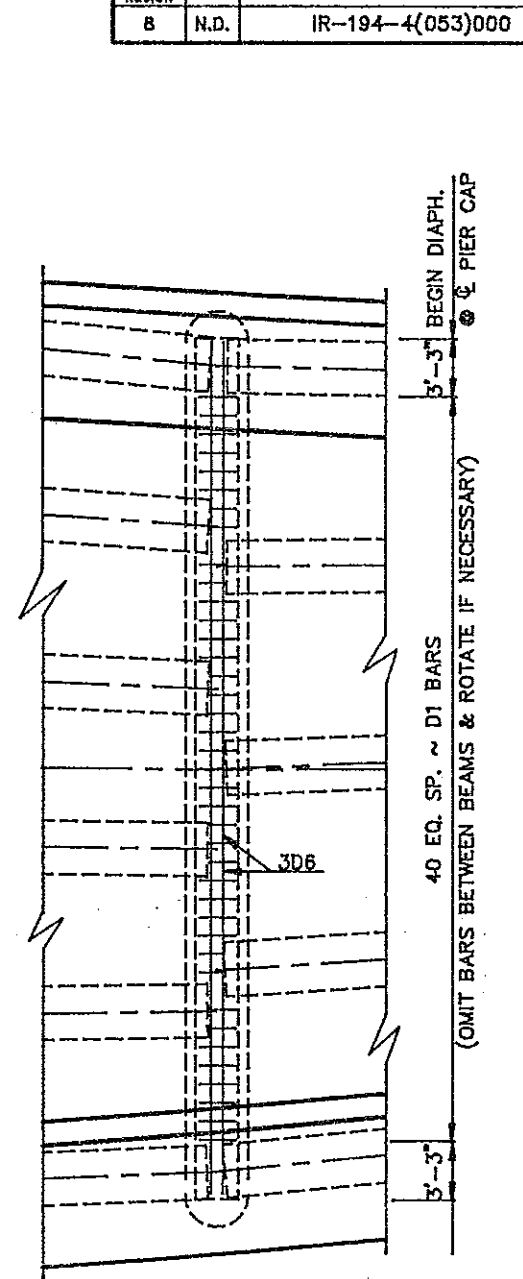
PIER NO. 3



PIER NO. 4



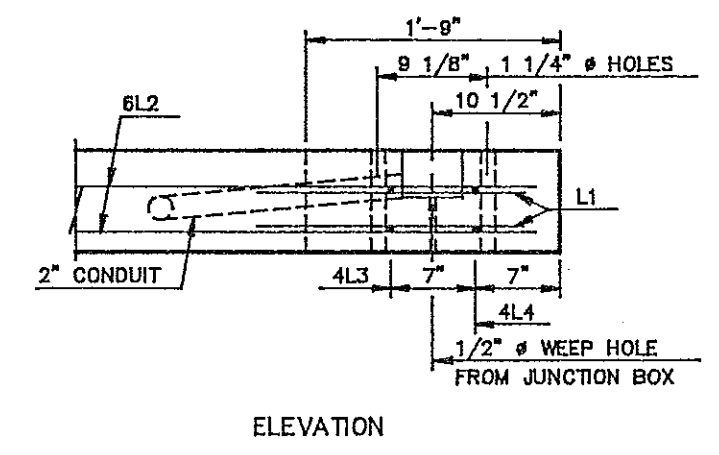
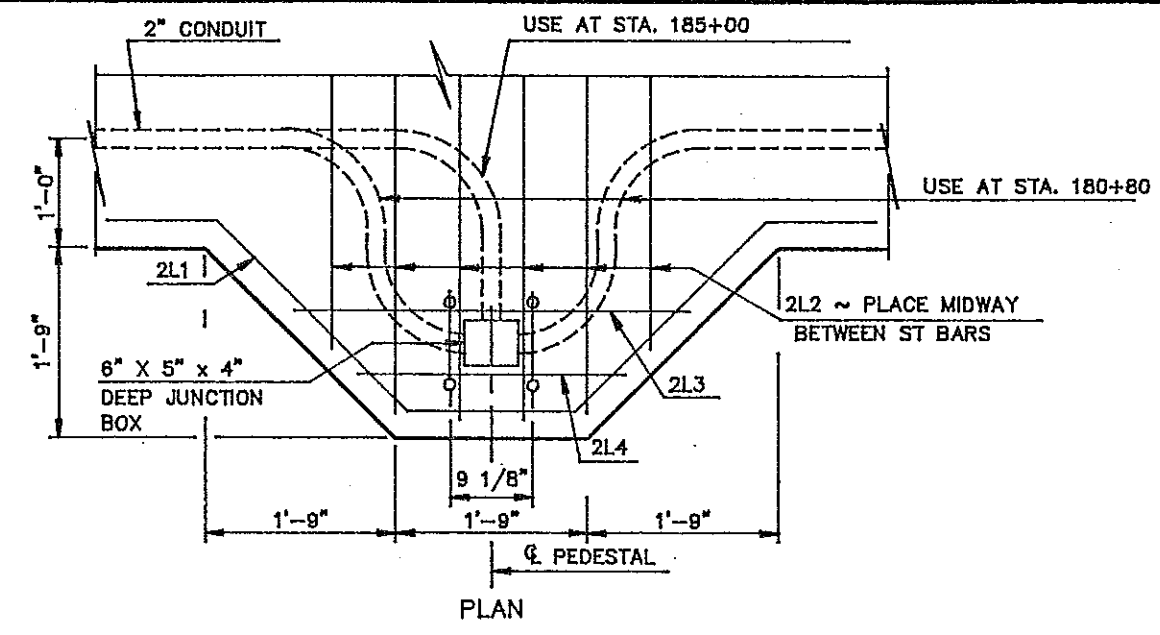
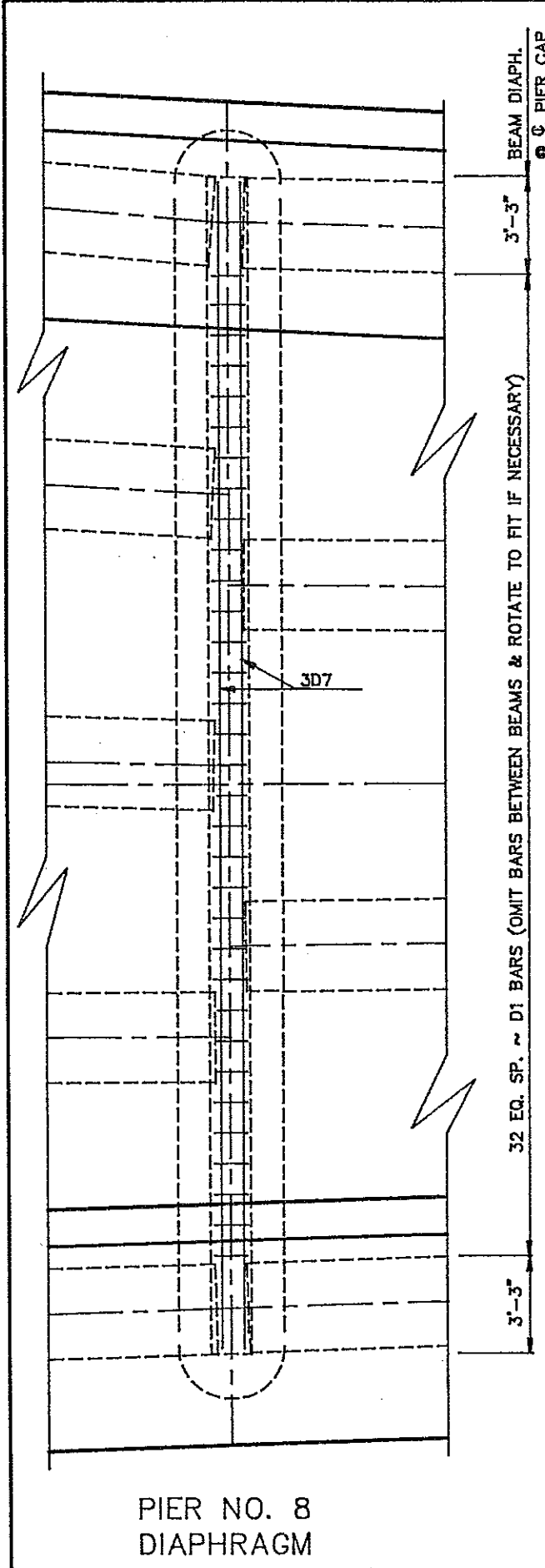
PIER NO. 6



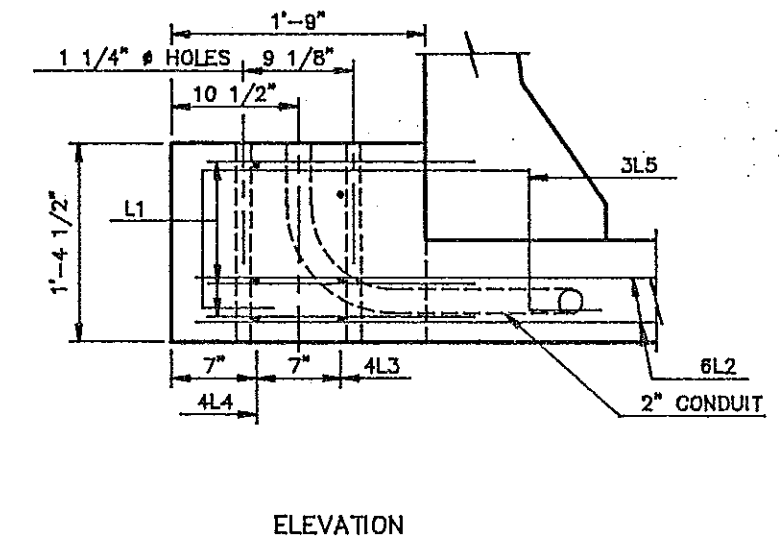
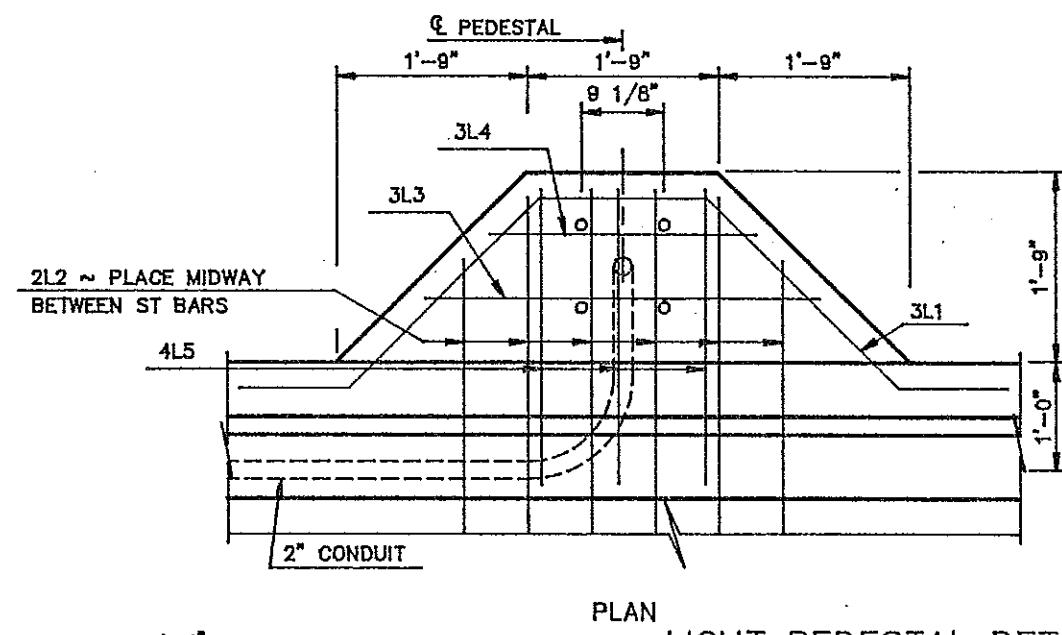
PIER NO. 7

QUANTITIES	
SEE DWG. 94-920.914-47	
MEMORIAL BRIDGE PIER DIAPHRAGMS WEST APPROACH	

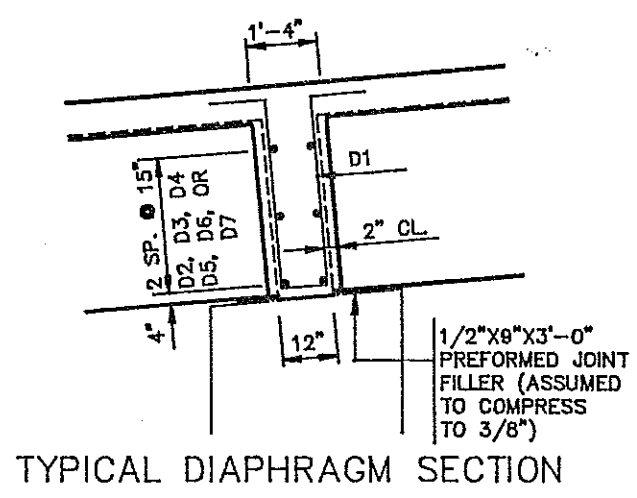
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR-194-4(053)000	



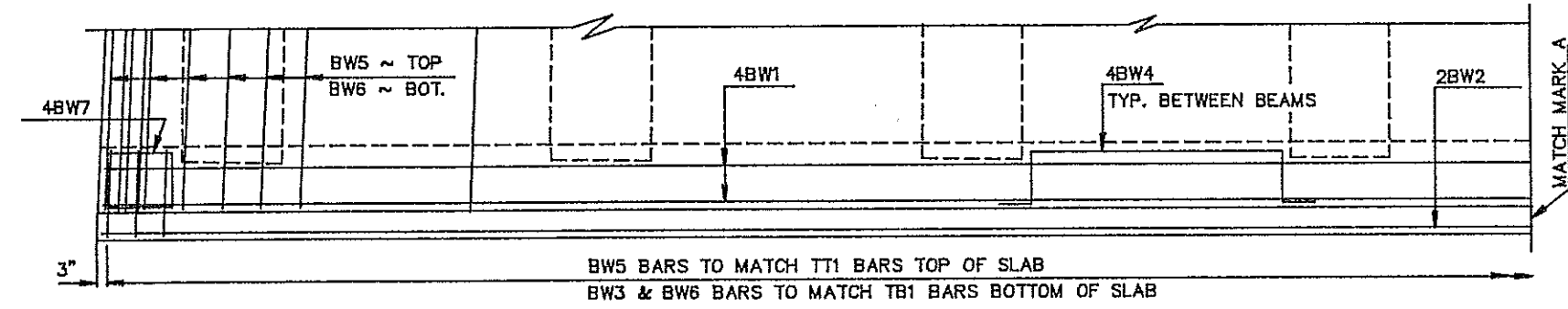
LIGHT PEDESTAL DETAILS @ STA. 180+80 RT. & STA. 185+00 RT.



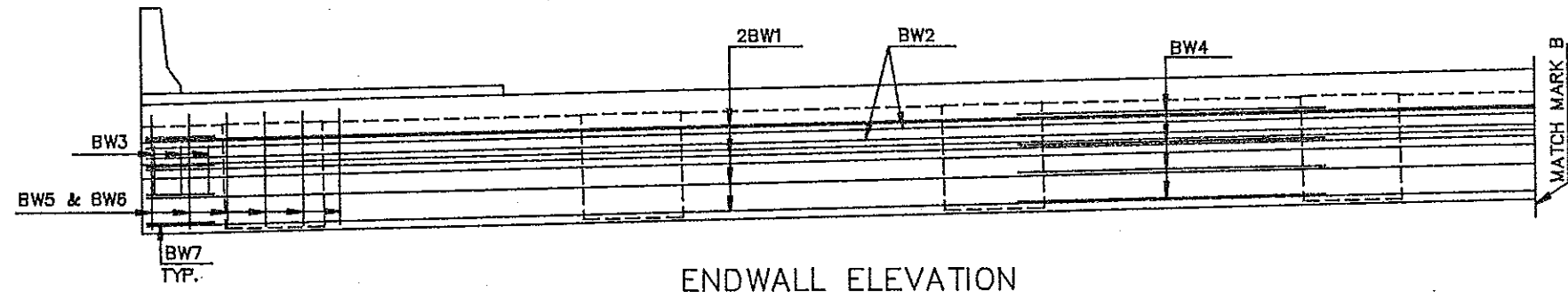
LIGHT PEDESTAL DETAILS @ STA. 182+80 LT.



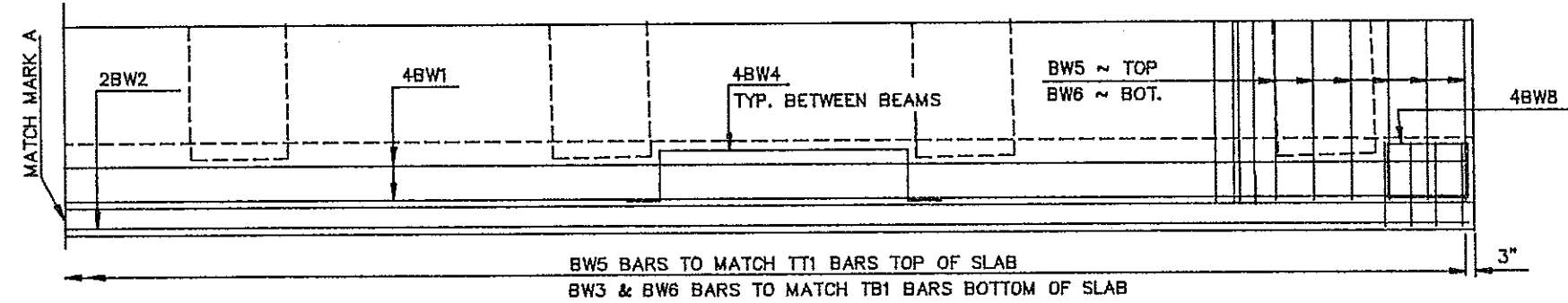
QUANTITIES
SEE DWG. 94-920.914-47
MEMORIAL BRIDGE WEST APPROACH SUPERSTRUCTURE LIGHT PEDESTALS



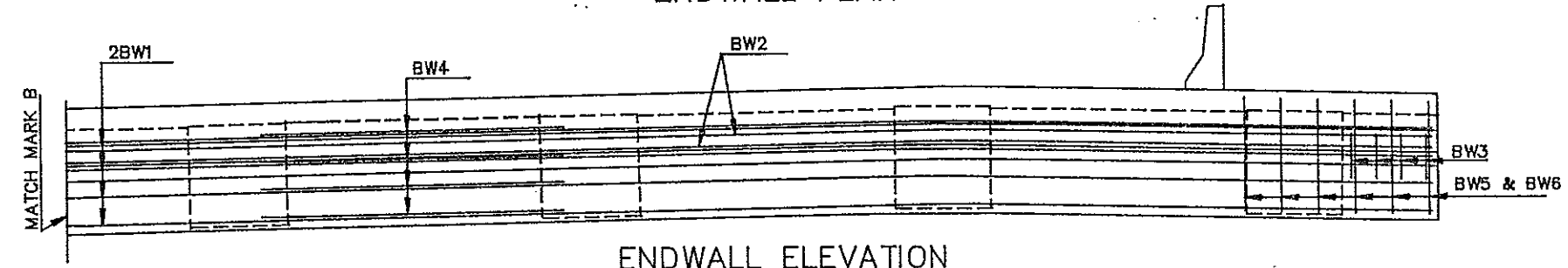
ENDWALL PLAN



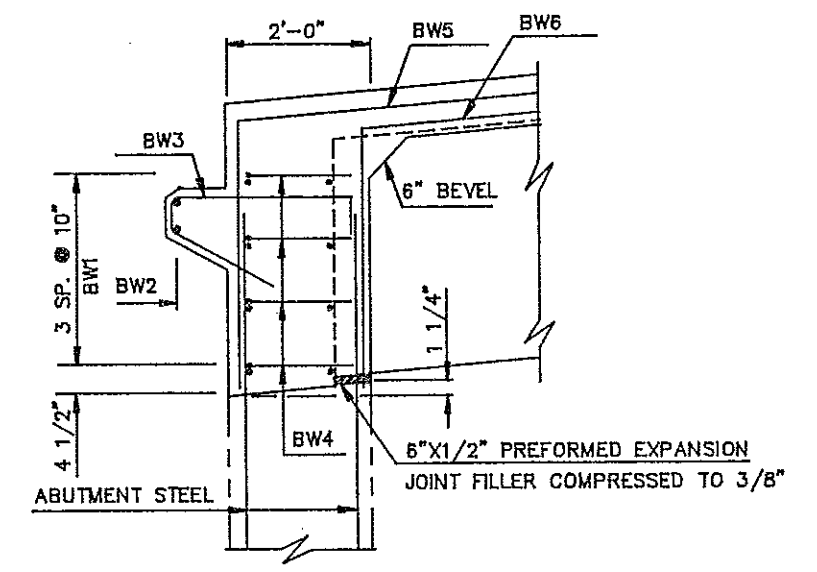
ENDWALL ELEVATION



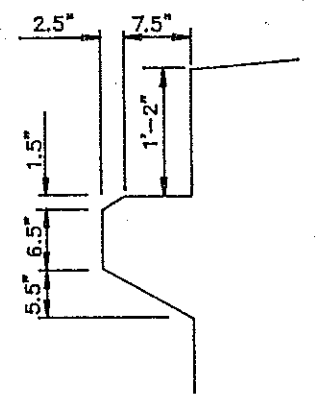
ENDWALL PLAN



ENDWALL ELEVATION



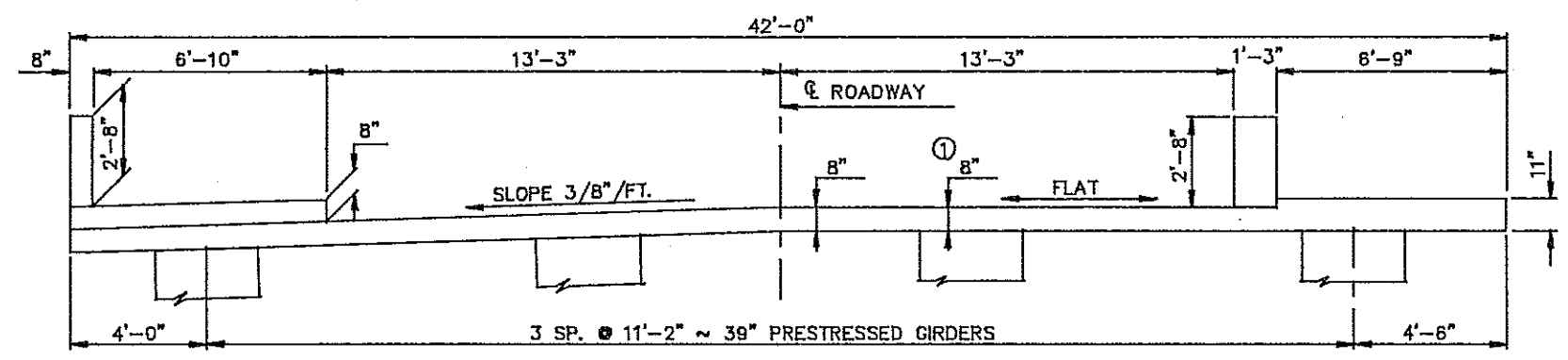
TYPICAL SECTION OF ENDWALL



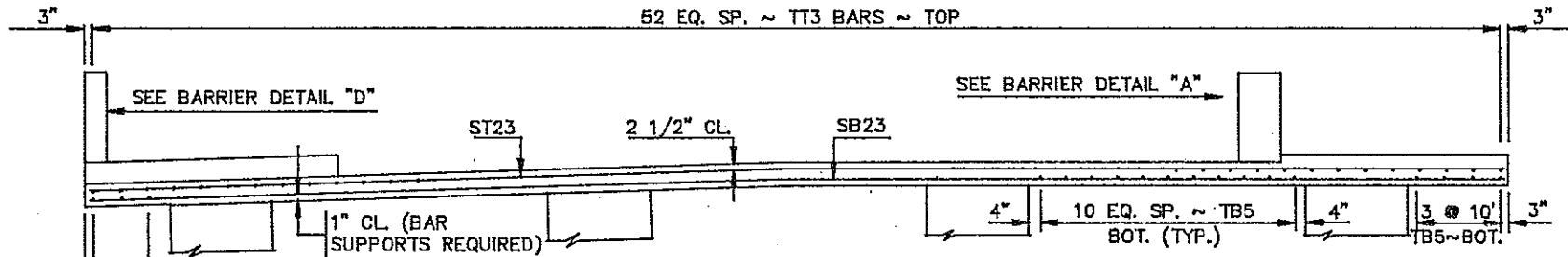
APPROACH SLAB LIP

QUANTITIES
SEE DWG. 94-920.914-47

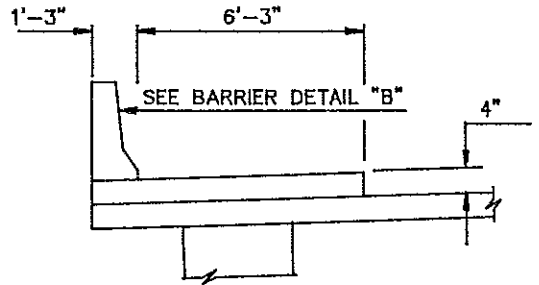
MEMORIAL BRIDGE
ENDWALL DETAIL
AT ABUTMENT NO. 1
STA. 179+96.5



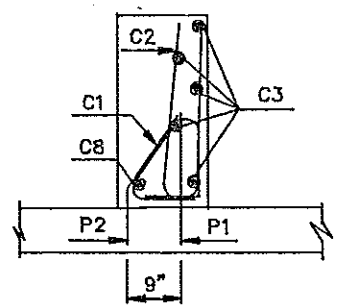
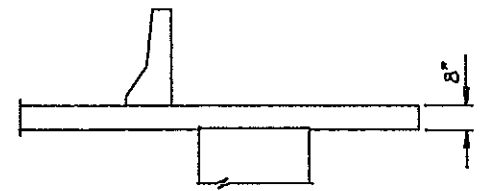
SLAB SECTION @ STA. 185+40.6
SHOWING DIMENSIONS



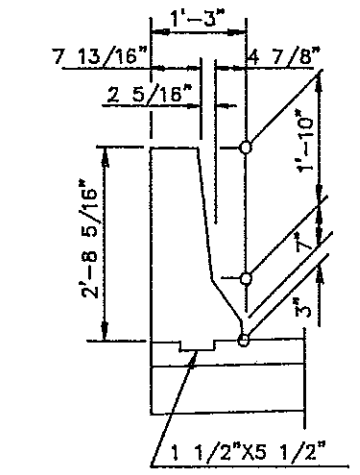
SLAB SECTION @ STA. 185+40.6
SHOWING REINFORCING



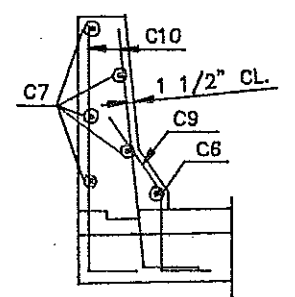
PARTIAL SLAB SECTION
STA. 185+20.6



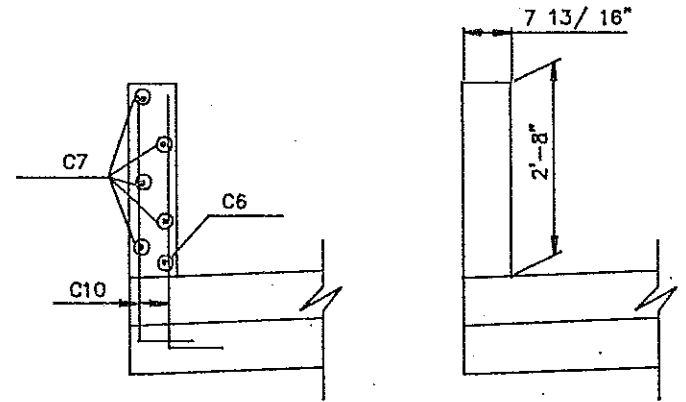
DETAIL "A"



KEYWAY

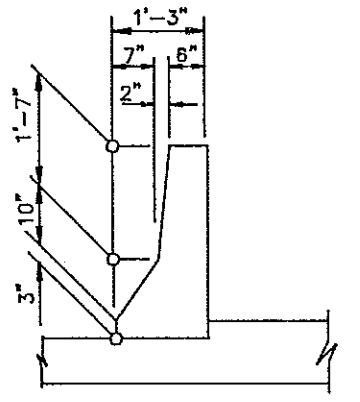


DETAIL "B"



DETAIL "D"

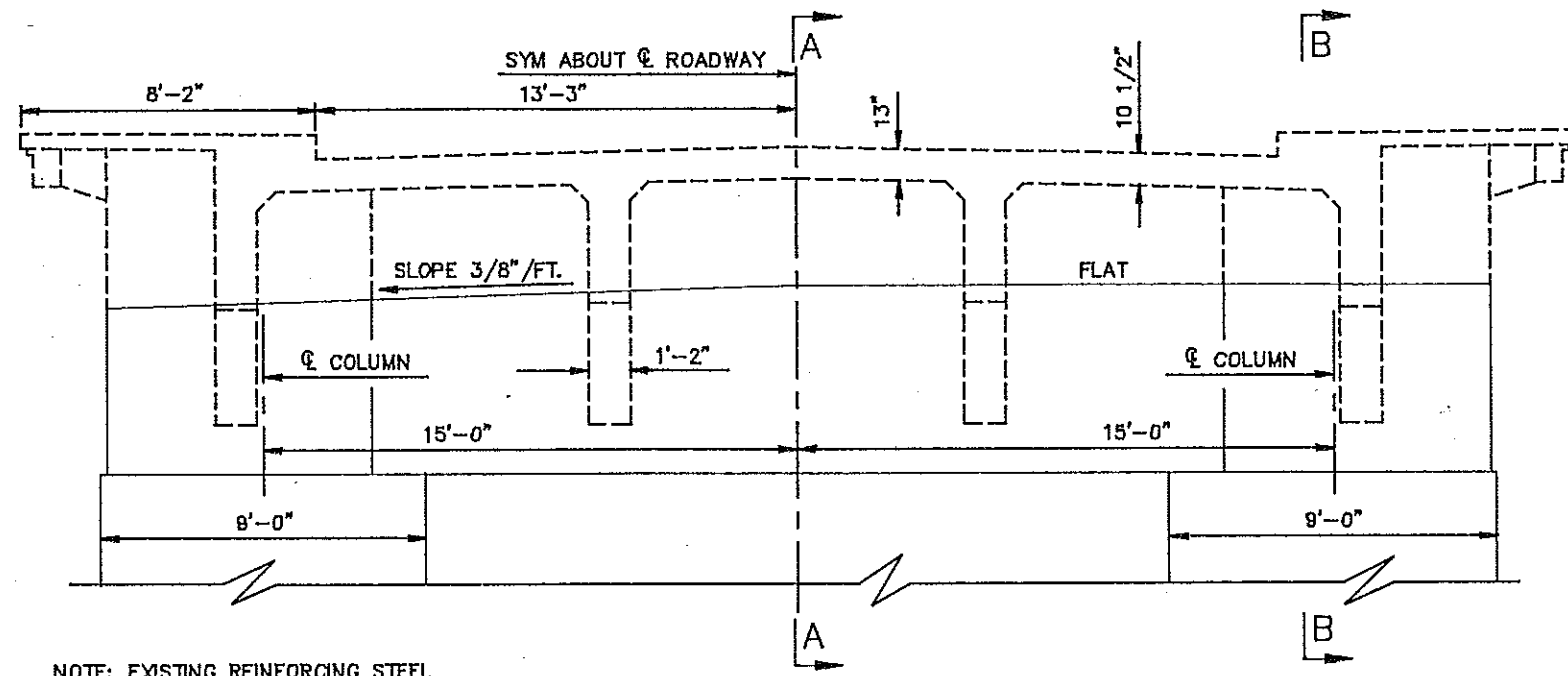
STA. 185+37.3 TO STA. 185+40.6
(CL. ROADWAY STA.)



SOUTH BARRIER
@ STA. 185+35.6

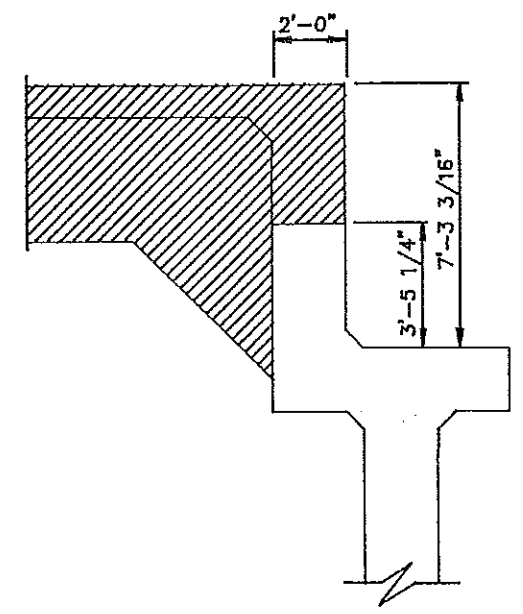
① RISER = 0 AT SUPPORTS. BETWEEN SUPPORTS THE RISER SHALL VARY AS NEEDED TO PROVIDE THE REQUIRED SCREED ELEVATION AND 8" DECK THICKNESS.

QUANTITIES
SEE DWG. 94-920.914-47
MEMORIAL BRIDGE SLAB SECTION WEST APPROACH STA. 185+40.6 AT RIVER PIER

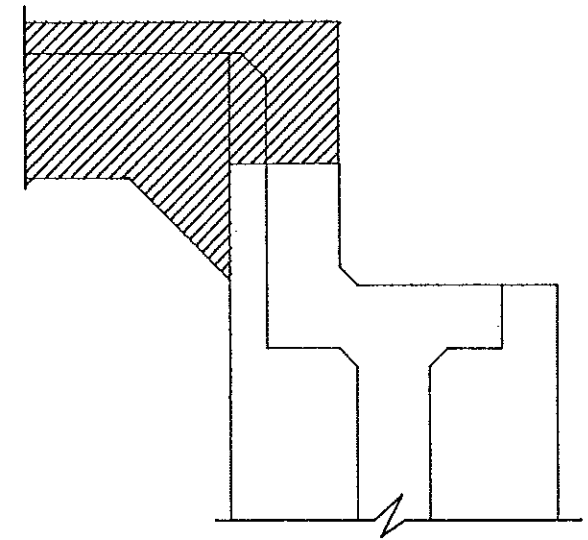


NOTE: EXISTING REINFORCING STEEL SHALL BE SALVAGED FOR USE IN NEW ENDWALL. STEEL MAY HAVE TO BE CUT OR REBENT TO FIT.

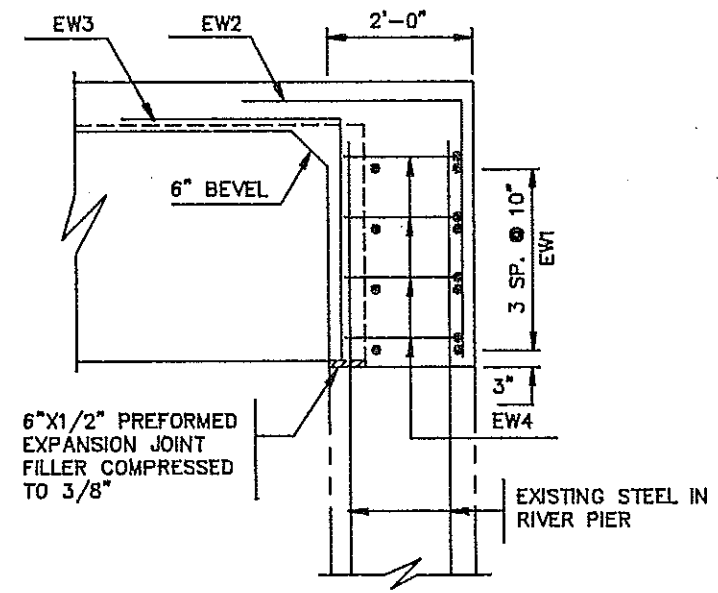
EXISTING RIVER PIER NO. 1
DASHED AREA TO BE REMOVED



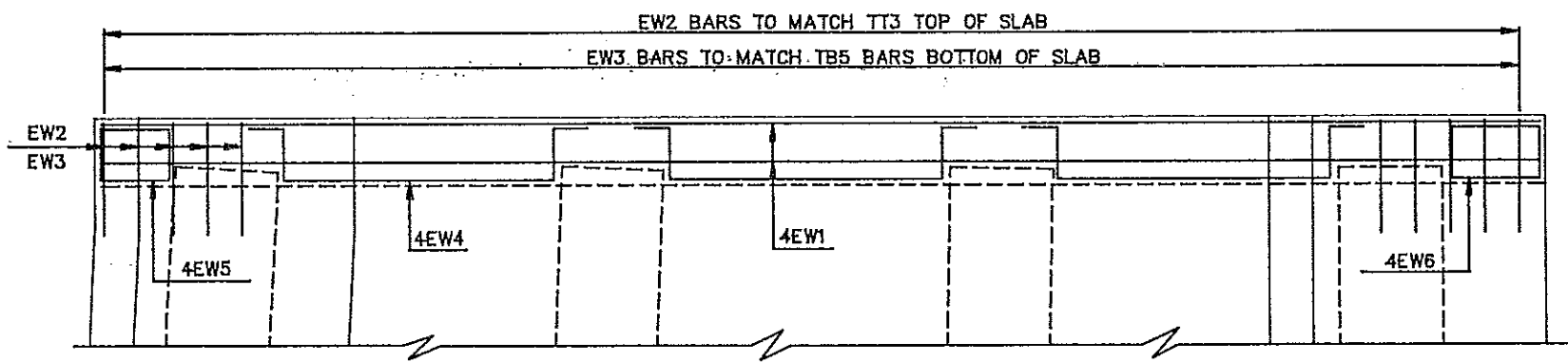
A-A
HATCH AREA TO BE REMOVED



B-B
HATCH AREA TO BE REMOVED



C-C

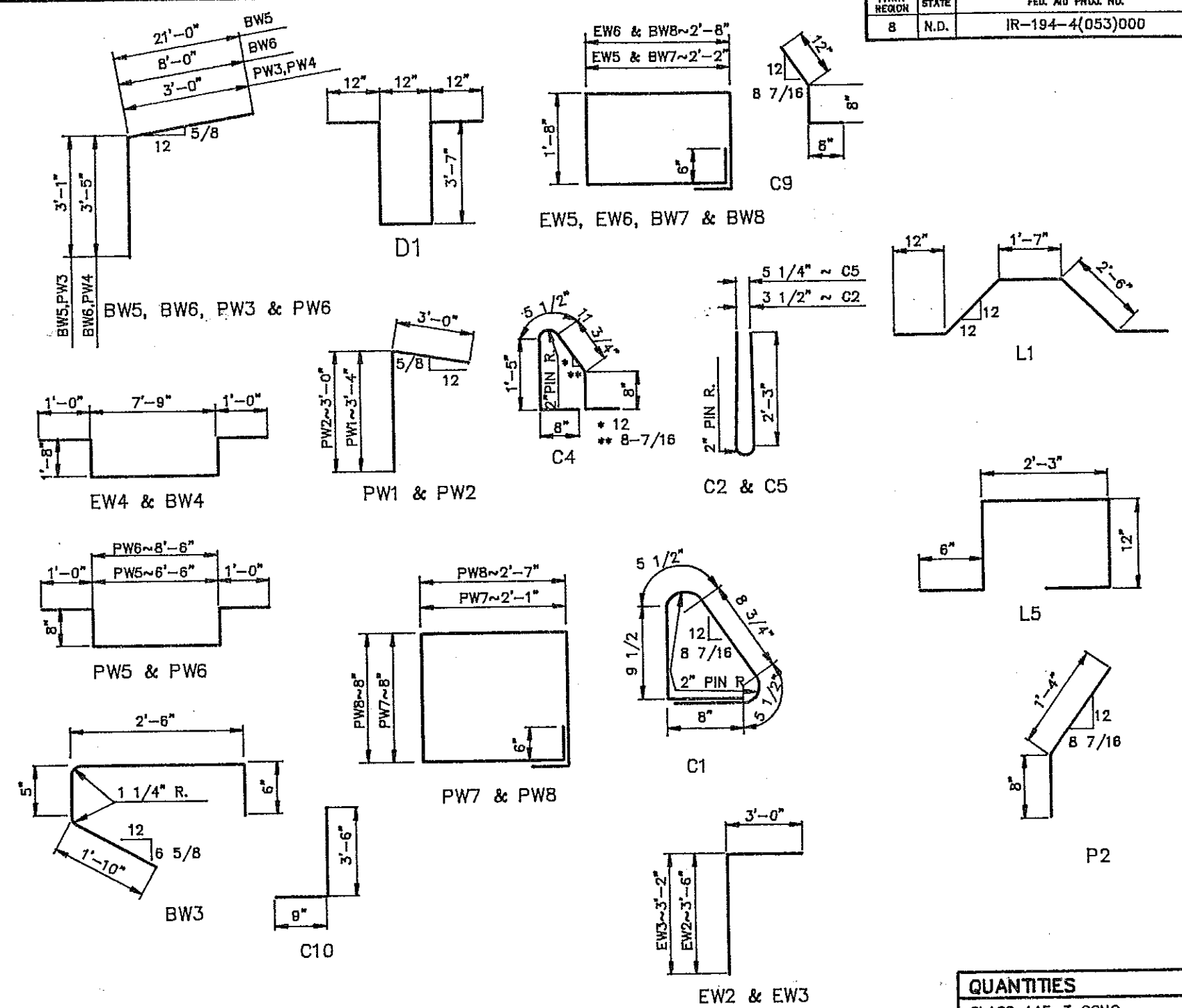


NEW ENDWALL PLAN

QUANTITIES	
SEE DWG. 94-920.914-47	
MEMORIAL BRIDGE WEST APPROACH ENDWALL AT RIVER PIER	

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
D1	283	4	10'-2"	BENT
D2	12	6	39'-2"	STR.
D3	12	6	36'-6"	STR.
D4	12	6	32'-9"	STR.
D5	6	6	53'-3"	STR.
D6	6	6	47'-2"	STR.
D7	6	6	38'-7"	STR.
BW1	16	5	44'-0"	STR.
BW2	4	5	44'-0"	STR.
BW3	77	5	5'-3"	BENT
BW4	28	5	13'-1"	BENT
BW5	78	5	24'-1"	BENT
BW6	77	5	11'-5"	BENT
BW7	4	5	8'-8"	BENT
BW8	4	5	9'-8"	BENT
C1	560	5	3'-9"	BENT
C2	560	5	5'-4"	BENT
C3	55	5	52'-3"	STR.
C4	508	5	5'-0"	BENT
C5	508	5	5'-4"	BENT
C6	11	5	51'-3"	STR.
C7	55	5	51'-3"	STR.
C8	11	5	52'-3"	STR.
C9	11	5	2'-5"	BENT
C10	21	5	4'-3"	BENT
ST1	108	5	44'-1"	STR.
ST2	108	5	43'-5"	STR.
ST3	106	5	42'-8"	STR.
ST4	106	5	42'-0"	STR.
ST5	106	5	41'-2"	STR.
ST6	106	5	40'-4"	STR.
ST7	108	5	39'-6"	STR.
ST8	106	5	38'-8"	STR.
ST9	106	5	37'-11"	STR.
ST10	104	5	37'-1"	STR.
ST11	104	5	36'-5"	STR.
ST12	104	5	35'-10"	STR.
ST13	106	5	35'-2"	STR.
ST14	106	5	34'-1"	STR.
ST15	106	5	33'-1"	STR.
ST16	106	5	32'-0"	STR.
ST17	106	5	30'-6"	STR.
ST18	106	5	29'-0"	STR.
ST19	104	5	27'-6"	STR.
ST20	104	5	26'-1"	STR.
ST21	104	5	24'-7"	STR.
ST22	88	5	23'-2"	STR.
ST23	88	5	22'-7"	STR.
SB1	84	5	44'-1"	STR.
SB2	84	5	43'-5"	STR.
SB3	84	5	42'-8"	STR.
SB4	82	5	42'-0"	STR.

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
SB5	82	5	41'-2"	STR.
SB6	84	5	40'-4"	STR.
SB7	82	5	39'-6"	STR.
SB8	82	5	38'-8"	STR.
SB9	84	5	37'-11"	STR.
SB10	82	5	37'-1"	STR.
SB11	82	5	36'-5"	STR.
SB12	82	5	35'-10"	STR.
SB13	82	5	35'-2"	STR.
SB14	82	5	34'-1"	STR.
SB15	82	5	33'-1"	STR.
SB16	84	5	32'-0"	STR.
SB17	84	5	30'-6"	STR.
SB18	84	5	29'-0"	STR.
SB19	82	5	27'-6"	STR.
SB20	82	5	26'-1"	STR.
SB21	84	5	24'-7"	STR.
SB22	68	5	23'-2"	STR.
SB23	70	5	22'-7"	STR.
TT1	380	5	59'-6"	STR.
TT2	412	5	27'-0"	STR.
TT3	265	5	53'-0"	STR.
TB1	154	5	36'-11"	STR.
TB2	292	5	55'-9"	STR.
TB3	156	5	50'-3"	STR.
TB4	94	5	38'-9"	STR.
TB5	40	5	41'-9"	STR.
EW1	8	5	41'-8"	STR.
EW2	53	5	6'-6"	BENT
EW3	40	5	6'-2"	BENT
EW4	12	5	13'-1"	BENT
EW5	4	5	8'-8"	BENT
EW6	4	5	9'-8"	BENT
L1	7	4	8'-7"	BENT
L2	36	6	7'-0"	STR.
L3	7	4	3'-7"	STR.
L4	7	4	2'-5"	STR.
L5	3	4	5'-3"	BENT
P1	560	5	2'-0"	STR.
P2	560	5	2'-0"	BENT
PW1	78	5	6'-4"	BENT
PW2	73	5	6'-0"	BENT
PW3	53	5	6'-1"	BENT
PW4	52	5	6'-5"	BENT
PW5	18	5	9'-10"	BENT
PW6	15	5	11'-10"	BENT
PW7	6	5	6'-6"	BENT
PW8	6	5	7'-6"	BENT
PW9	12	6	35'-0"	BENT



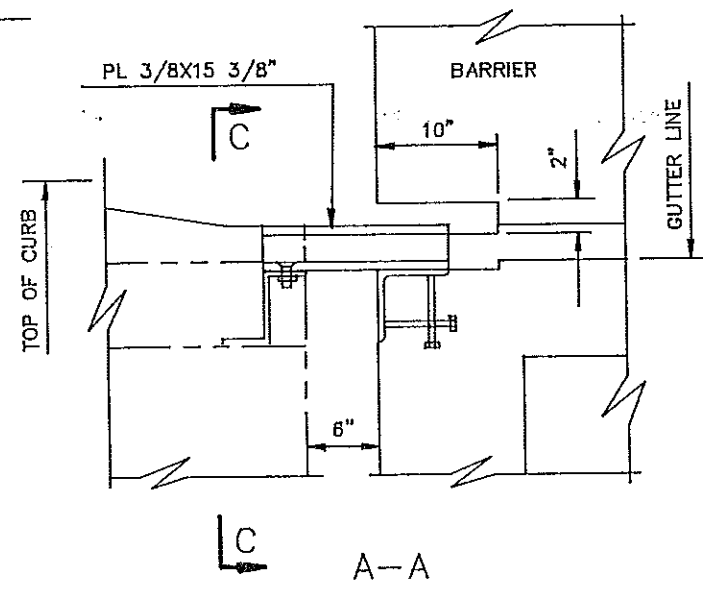
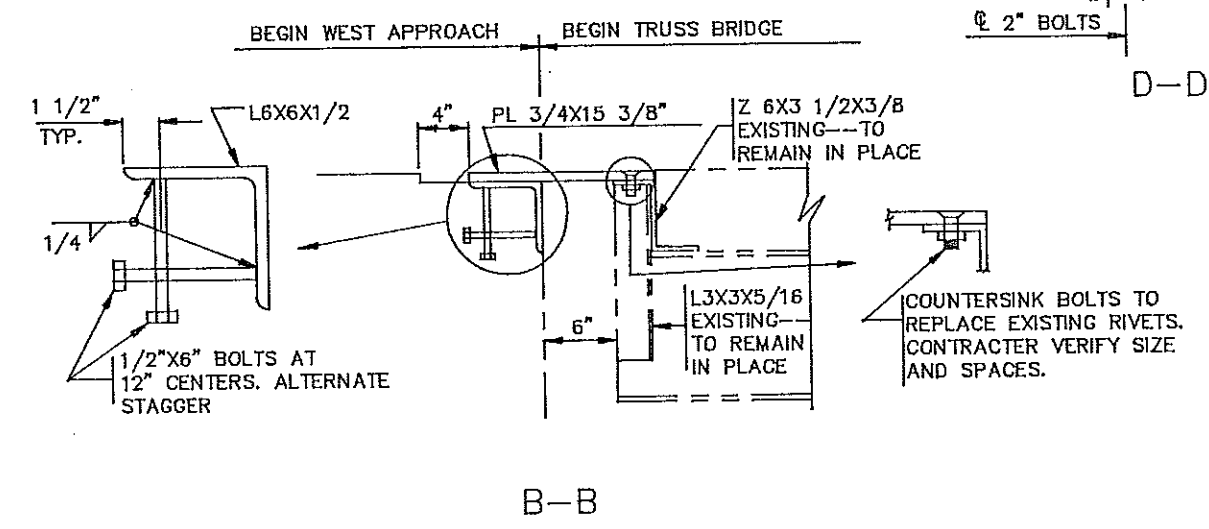
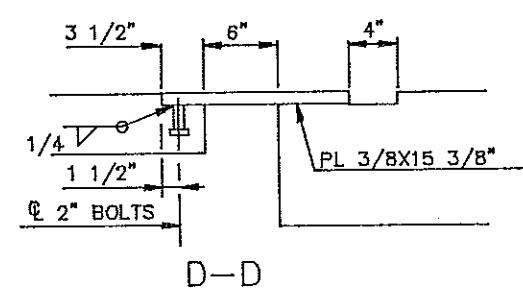
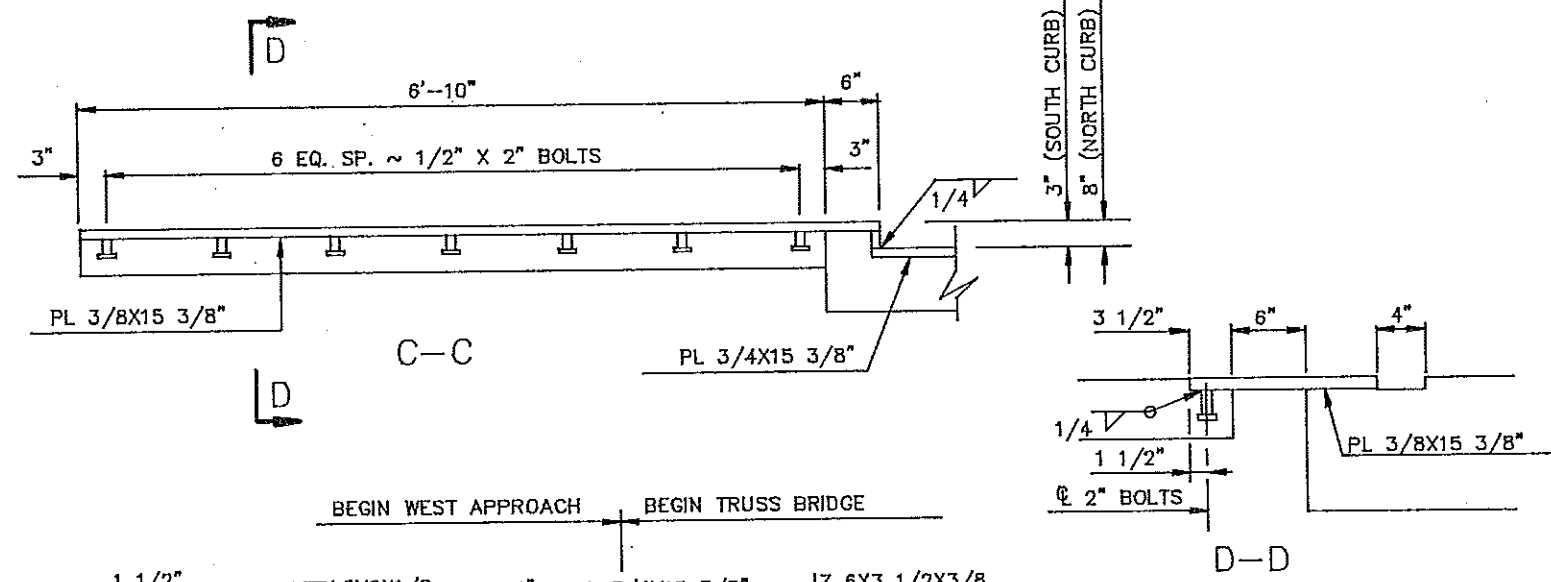
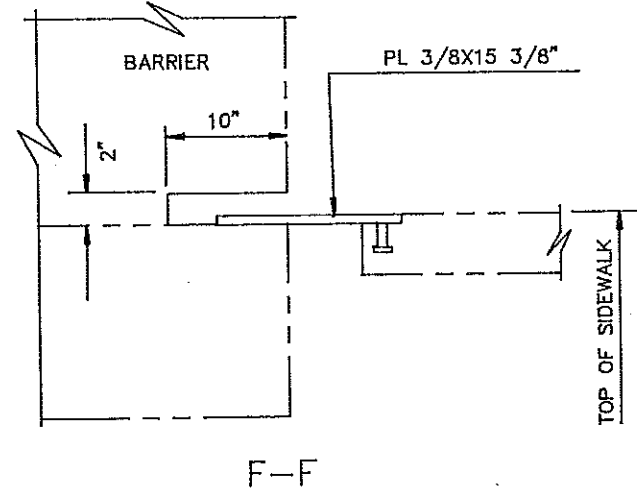
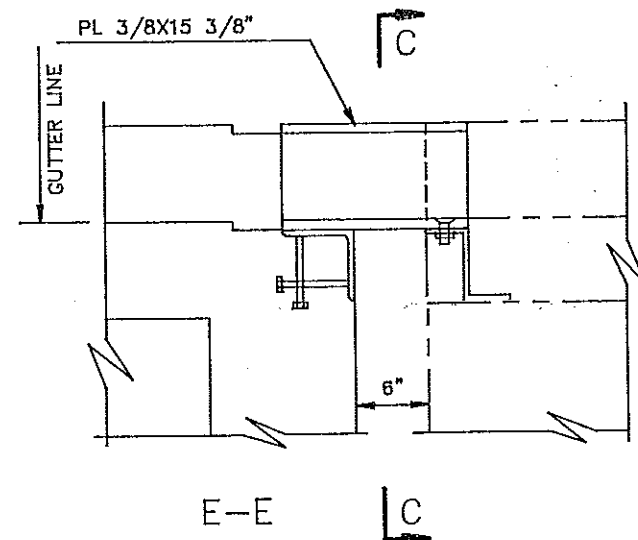
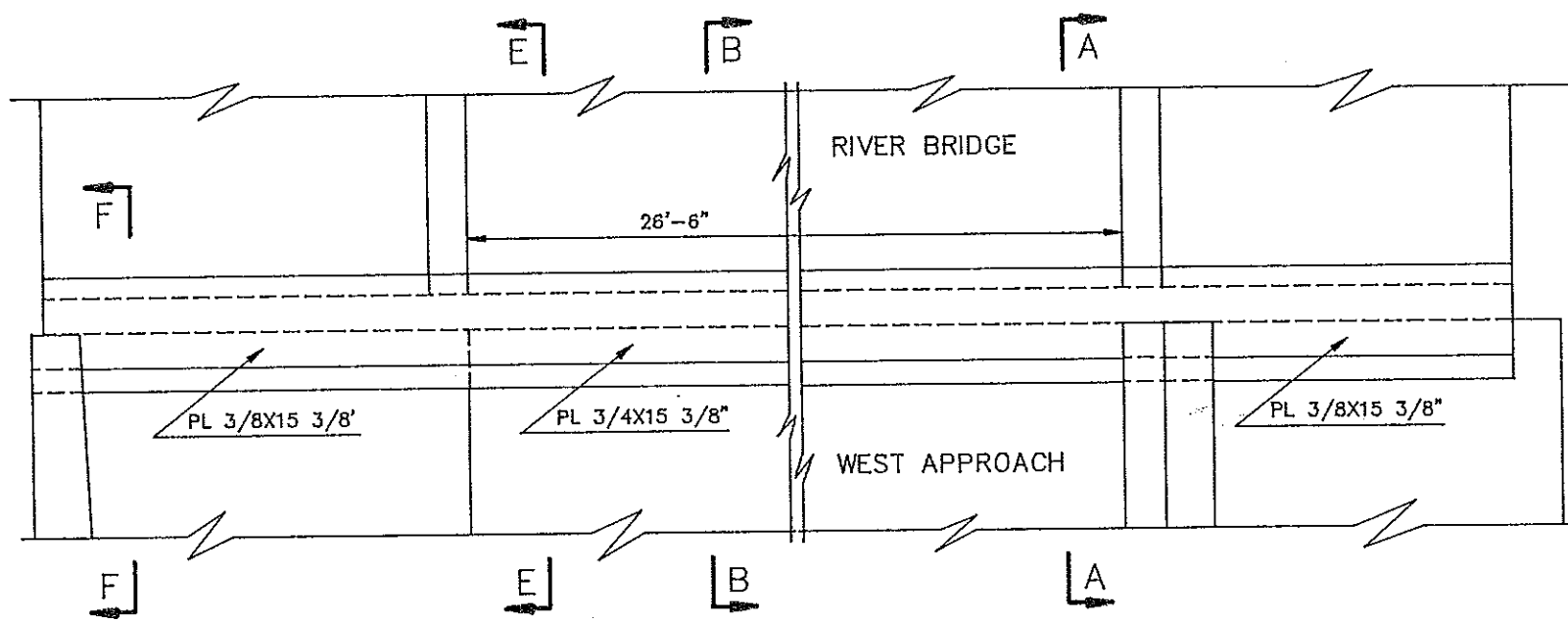
BENT BAR DETAIL
DIMENSIONS SHOWN ARE OUT TO OUT

① REINFORCING STEEL BARS SHALL BE EPOXY COATED.

P2 BAR SHALL BE INSTALLED WITH A HIGH STRENGTH ADHESIVE SPECIFICALLY INTENDED FOR CONCRETE ANCHORAGER (HILTI OR APPROVED EQUAL).

QUANTITIES	
CLASS AAE-3 CONC.	00 C.Y.
REINFORCING STEEL	00 LBS.
REINFORCING STEEL	00 LBS.

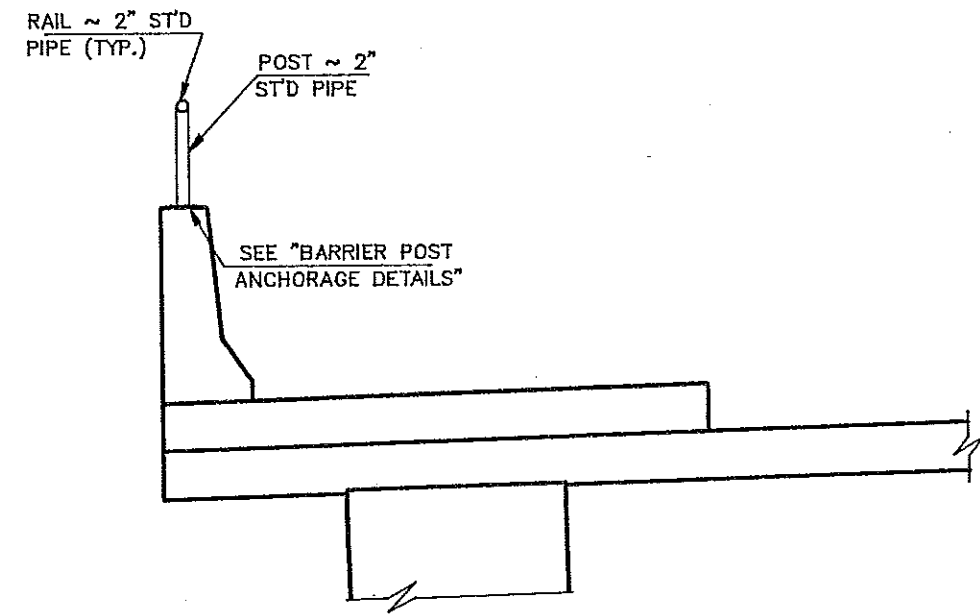
MEMORIAL BRIDGE
WEST APPROACH
SUPERSTRUCTURE
BAR LIST



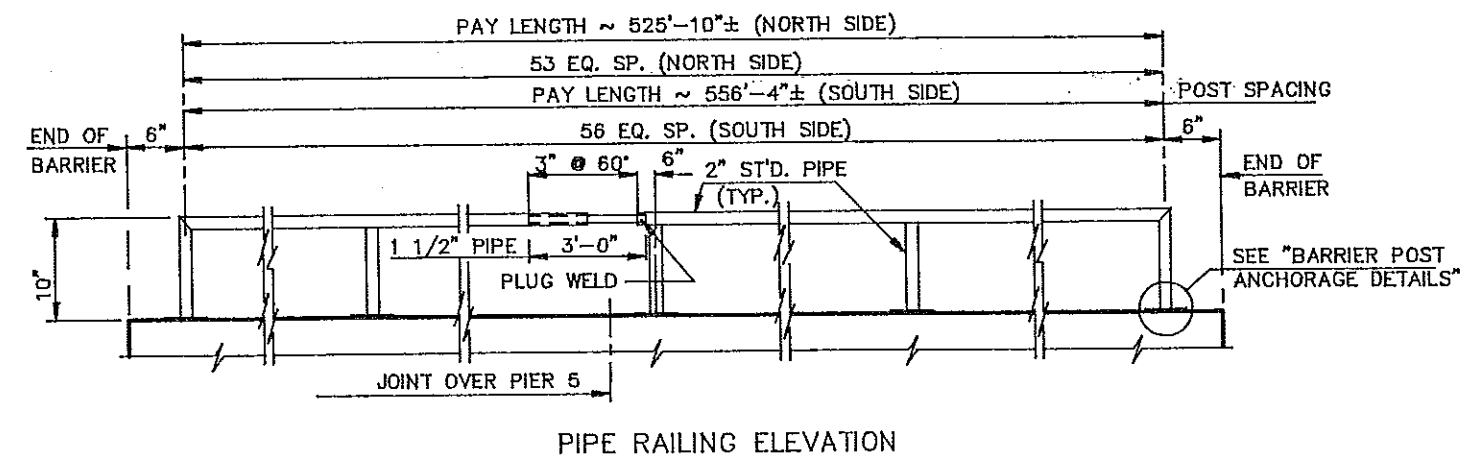
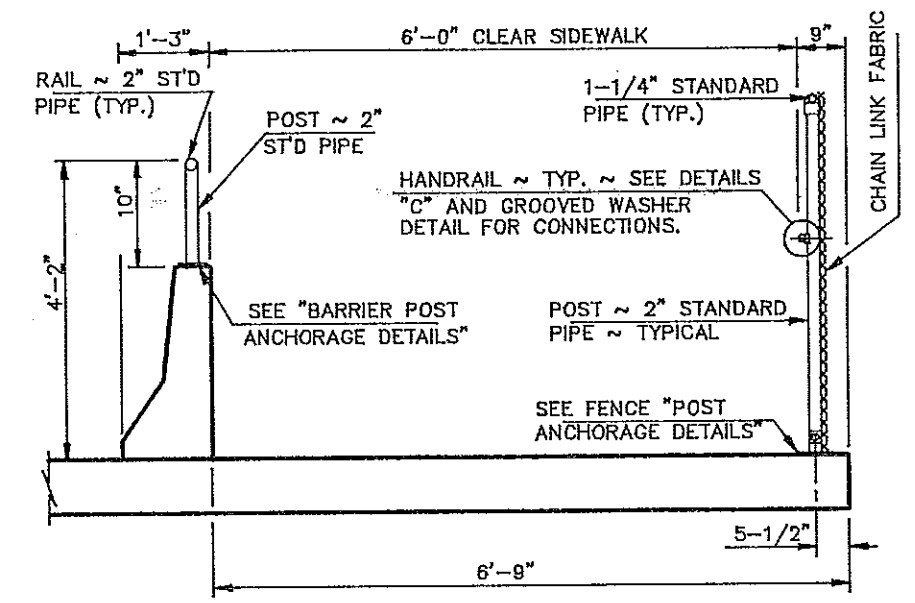
① M270 GRADE 36

QUANTITIES	
① STRUCTURAL STEEL	00 LBS.

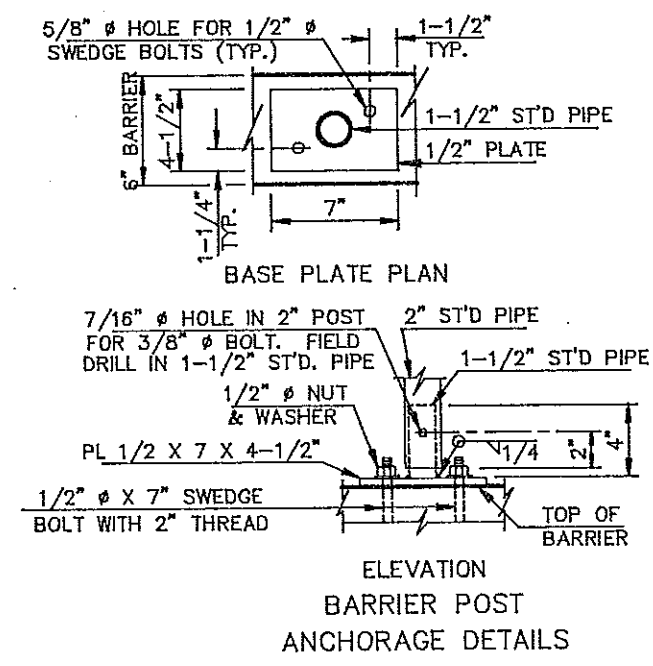
MEMORIAL BRIDGE
WEST APPROACH
EXPANSION JOINT
AT RIVER PIER



A-A
(SEE DWG. 94-920.914-50)

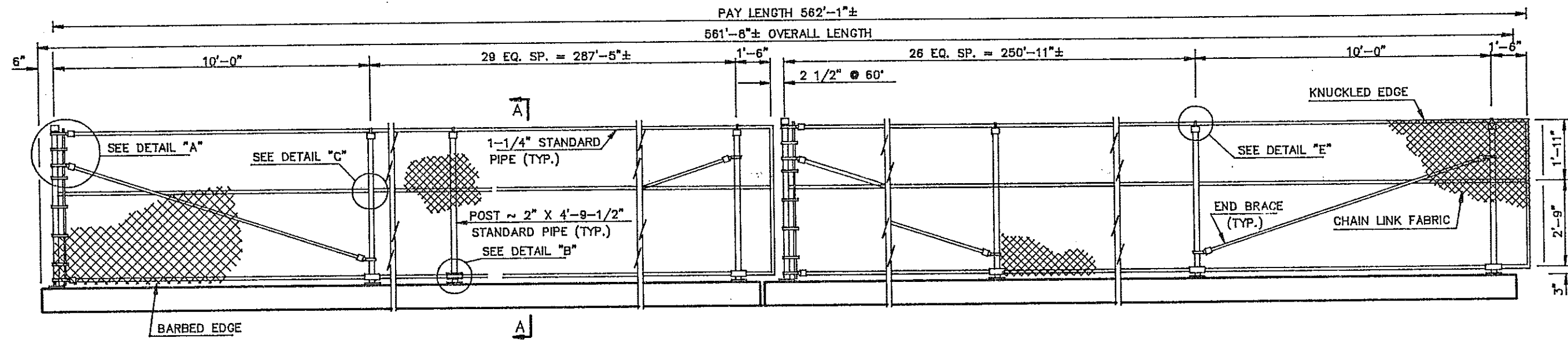


PIPE RAILING ELEVATION

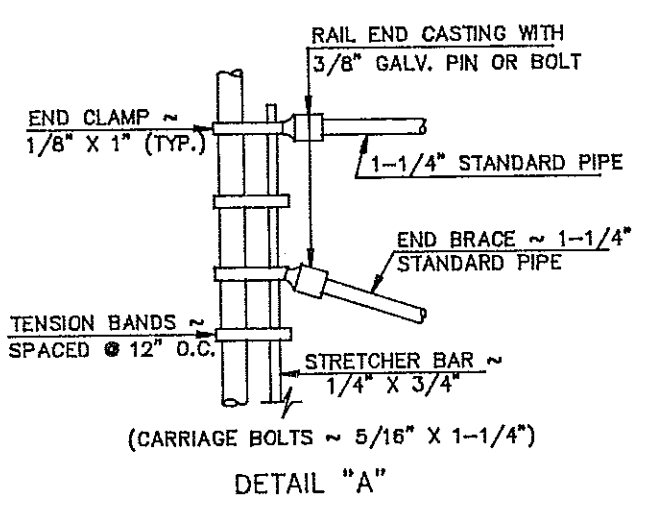


ELEVATION
BARRIER POST
ANCHORAGE DETAILS

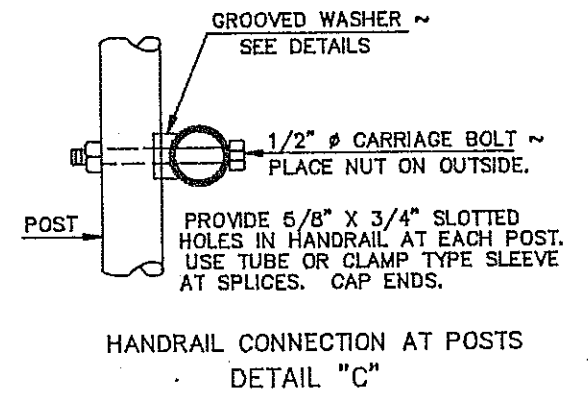
QUANTITIES
SEE DWG. 94-920.916-50
MEMORIAL BRIDGE WEST APPROACH PIPE RAILING



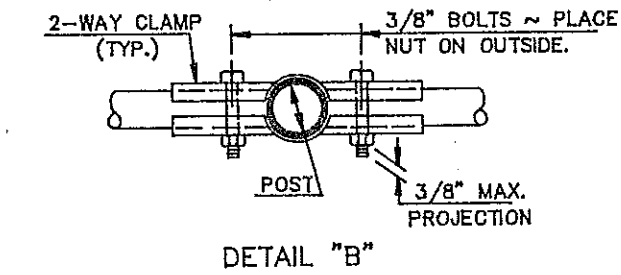
FENCE ELEVATION



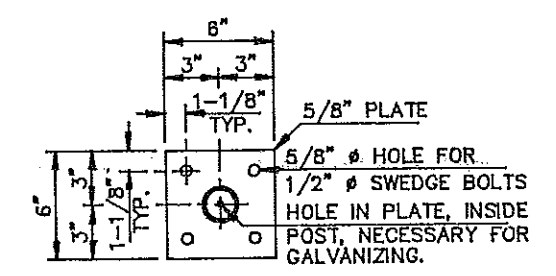
DETAIL "A"



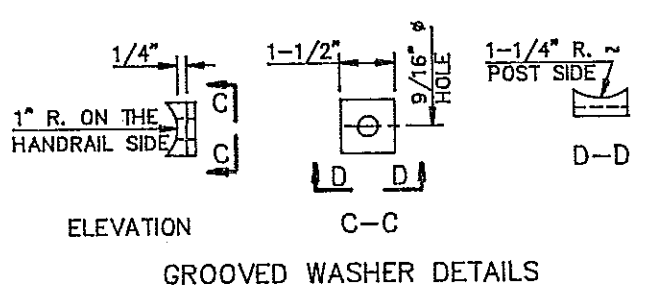
HANDRAIL CONNECTION AT POSTS
DETAIL "C"



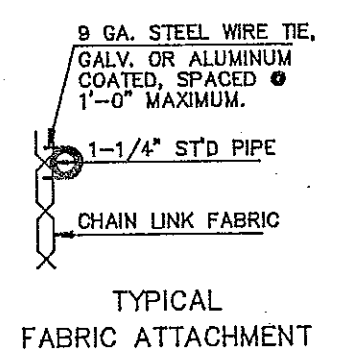
DETAIL "B"



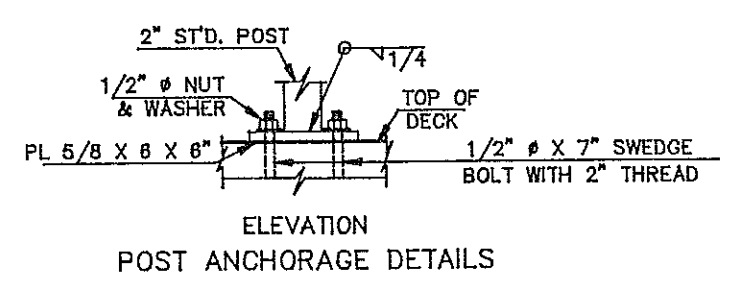
BASE PLATE PLAN



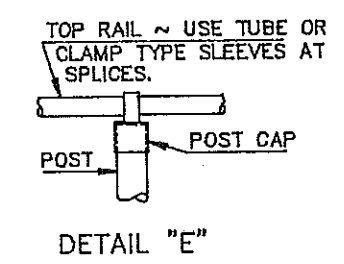
GROOVED WASHER DETAILS



TYPICAL
FABRIC ATTACHMENT



ELEVATION
POST ANCHORAGE DETAILS

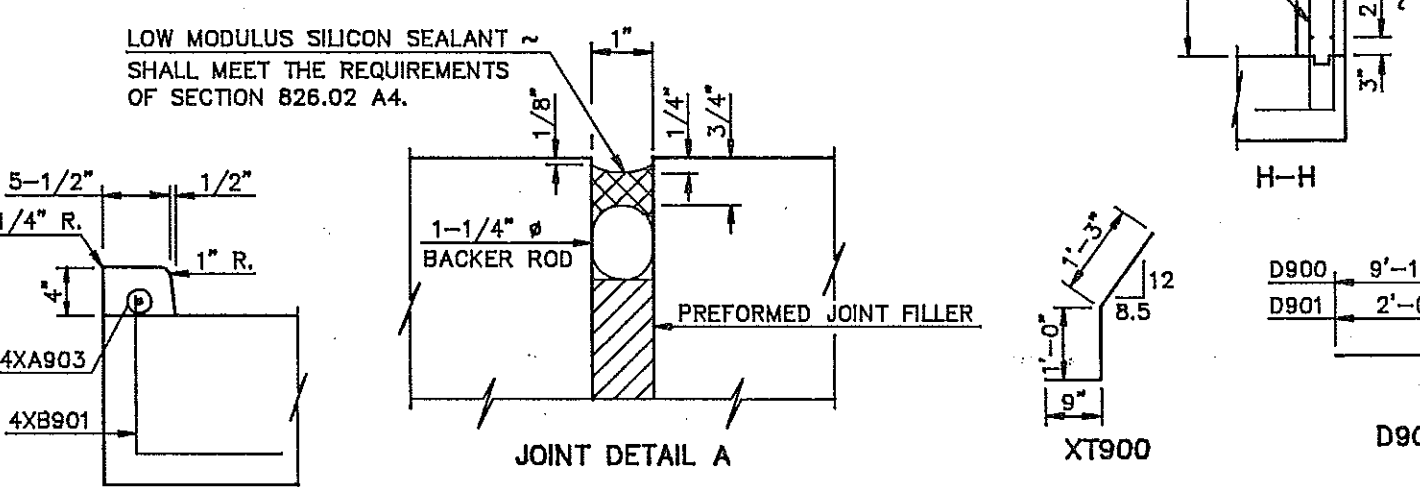
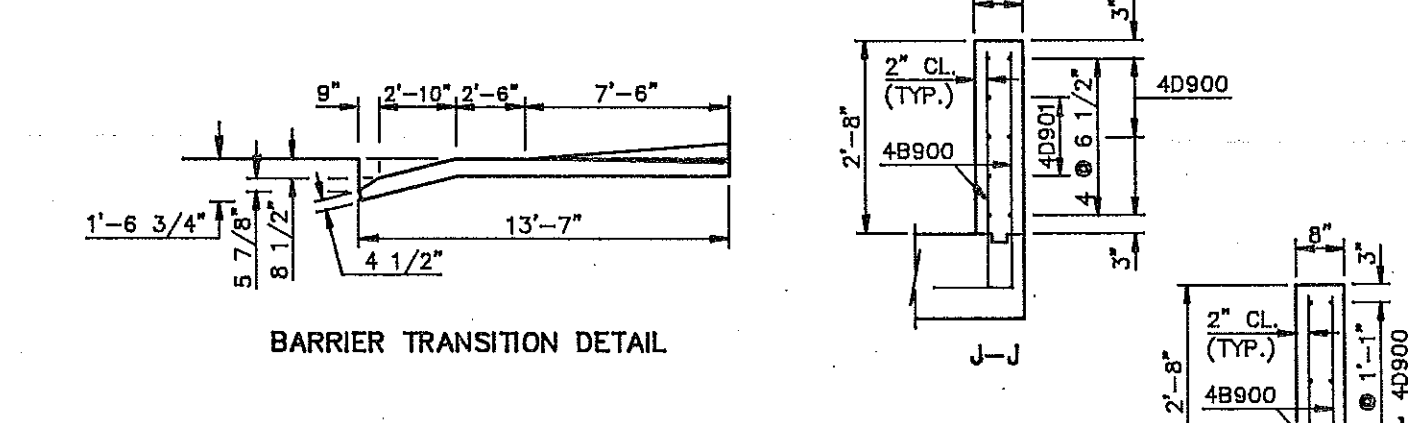
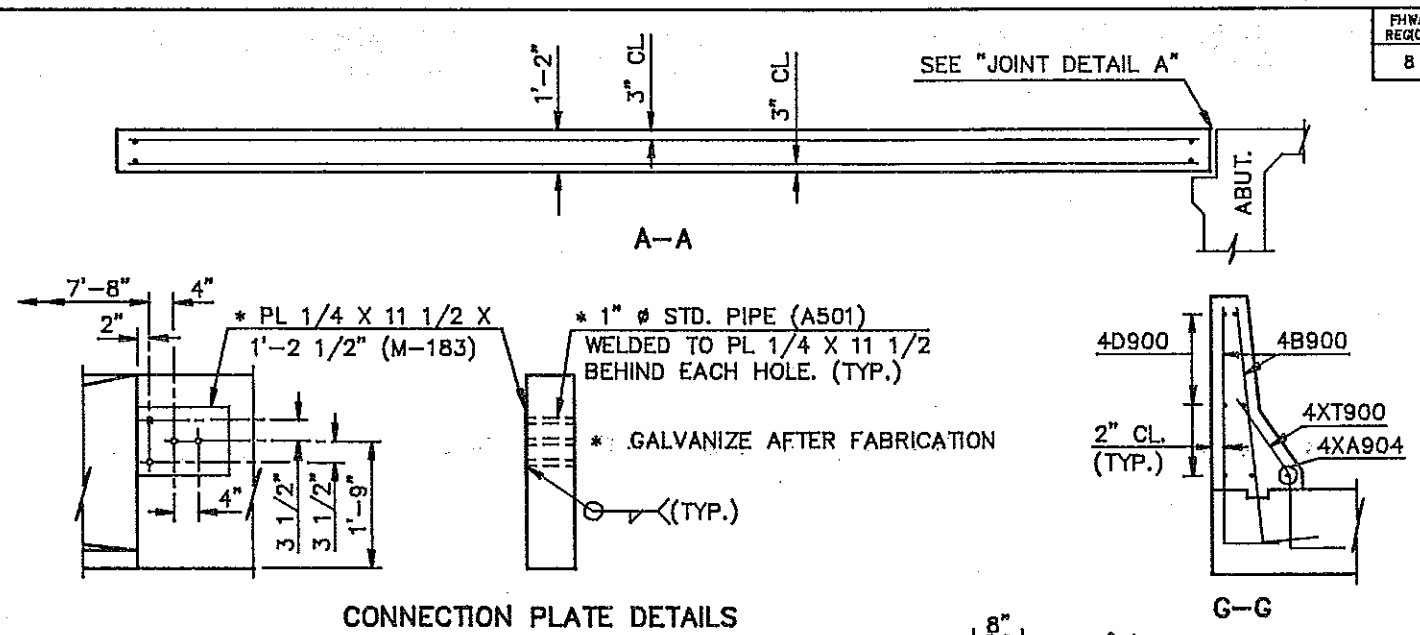
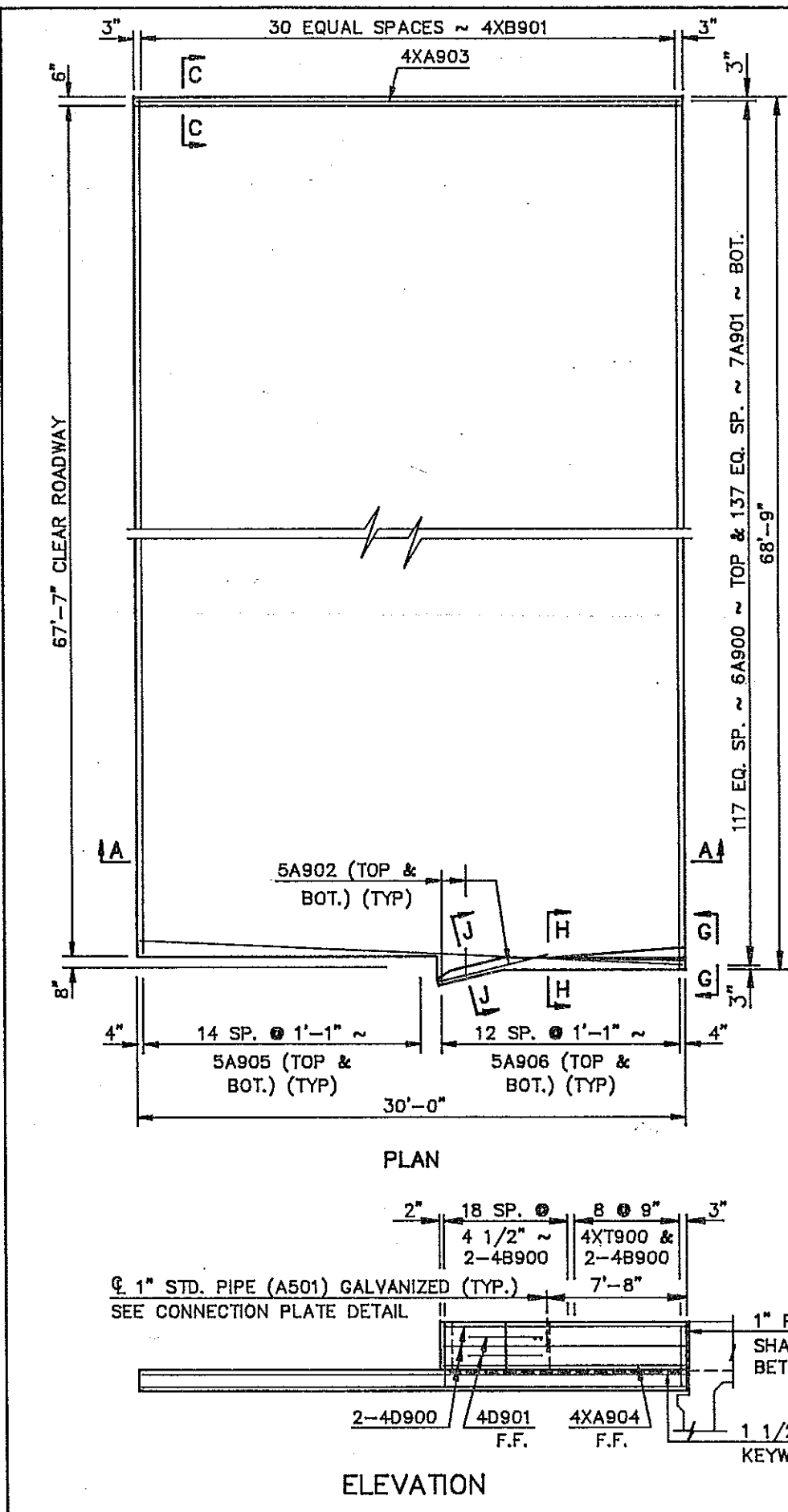


DETAIL "E"

NOTE:
 FABRIC SHALL BE AASHTO M181, TYPE 1 AND SHALL BE OF 9-GAGE WIRE, 2-INCH MESH, 60 INCHES HIGH, TOP SELVAGE KNUCKLED AND BOTTOM SELVAGE BARBED.
 POSTS AND FITTINGS SHALL BE AASHTO M181, CLASS I.
 ANCHORAGE PLATES SHALL BE AASHTO M183 AND SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M232.
 TO ANCHOR BASE PLATES, THE CONTRACTOR HAS THE OPTION TO EITHER DRILL IN 1/2" SWEDGE BOLTS OR PLACE THEM IN THE CONCRETE AT THE TIME OF POURING. IF THE CONTRACTOR ELECTS TO DRILL THE BOLT HOLES, EXTREME CAUTION SHALL BE EXERCISED NOT TO DAMAGE THE CONCRETE BARRIERS.

QUANTITIES	
PEDESTRIAN FENCE	562.0 LFT
PIPE RAIL	00 LFT

MEMORIAL BRIDGE
 WEST APPROACH
 PEDESTRIAN FENCE



WIDTH = 68'-9"			
SKEW ANGLE = 0°			
BAR LIST - ONE SLAB			
SIZE	MARK	NO.	LENGTH
6	A900	118	29'-7"
7	A901	138	29'-7"
5	A902	6	6'-1"
4	XA903	1	29'-7"
4	XA904	1	7'-6"
5	A905	30	67'-9"
5	A906	26	68'-5"
4	B900	56	4'-0"
4	XB901	31	1'-8"
4	D900	6	13'-3"
4	D901	2	4'-0"
4	XT900	9	3'-0"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS.)		CONCRETE (C.Y.)	
17,887		89.9	

NOTES:

THE ESTIMATED MATERIAL QUANTITIES ARE FOR INFORMATIONAL PURPOSES ONLY. ALL MATERIALS INCLUDING CONCRETE, REINFORCING BARS, BACKER ROD, ELASTIC JOINT SEALER, SILICON SEALANT, PREFORMED JOINT FILLER AND LABOR REQUIRED TO BUILD THE APPROACH SLABS AND APPROACH SLAB BARRIERS SHALL BE INCIDENTAL TO THE PAY ITEM, "CONCRETE BRIDGE APPROACH SLAB".

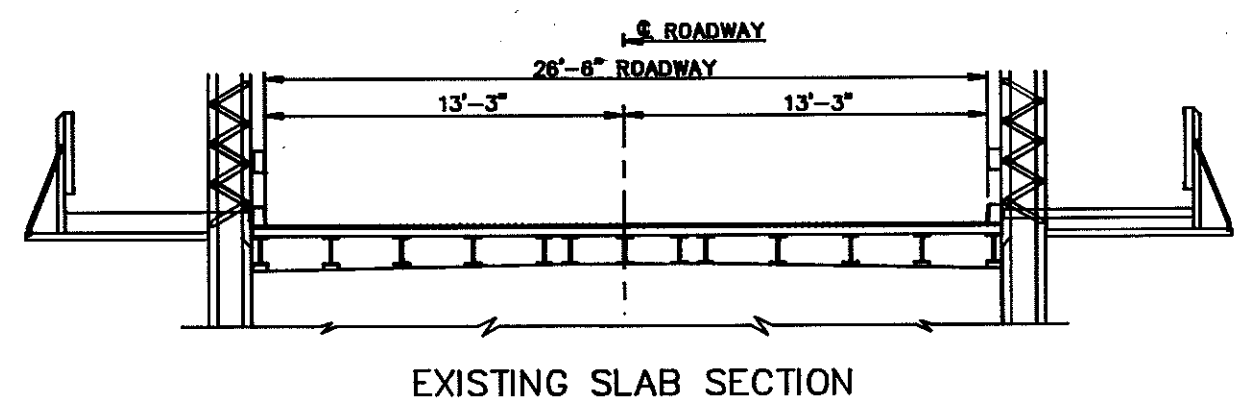
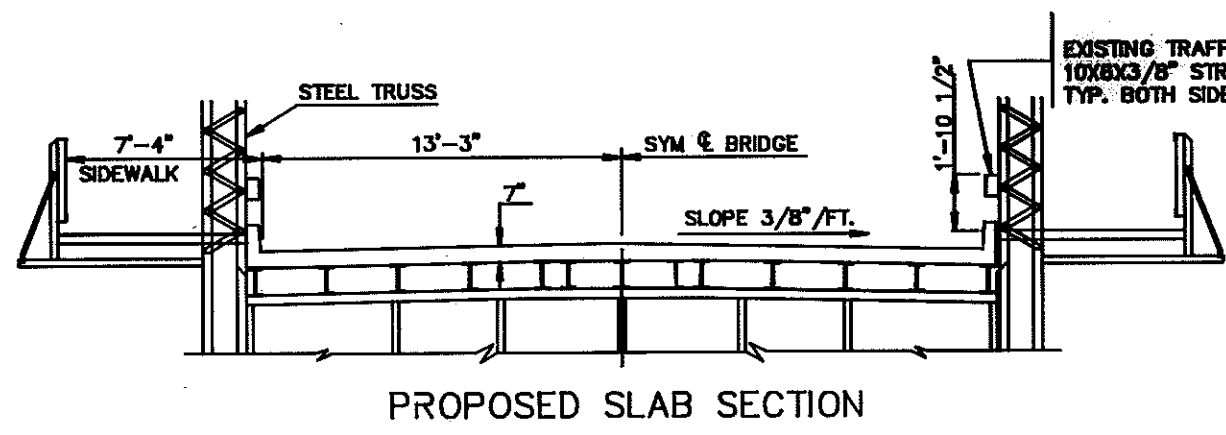
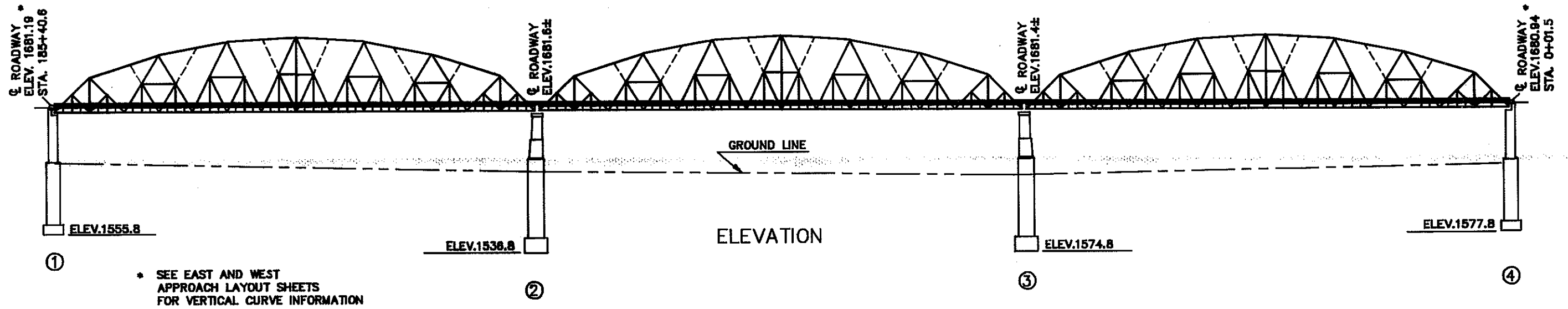
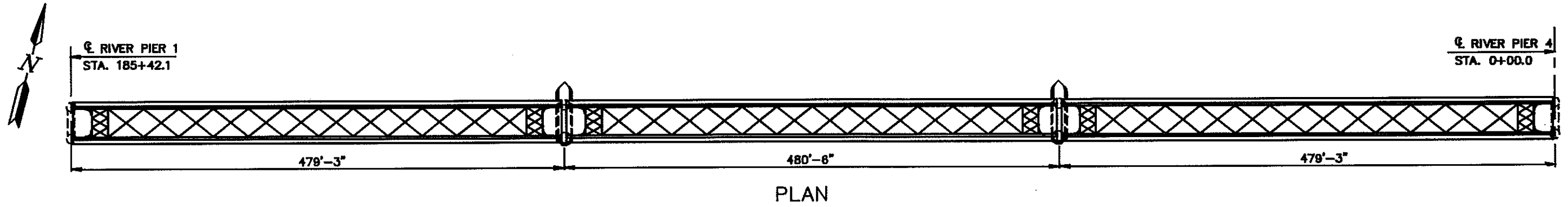
THE CONCRETE SHALL BE CLASS AE-3 AND THE REINFORCING STEEL SHALL BE GRADE 60.

THE BAR MARKS BEGINNING WITH AN "X", INDICATES AN EPOXY COATED BAR.

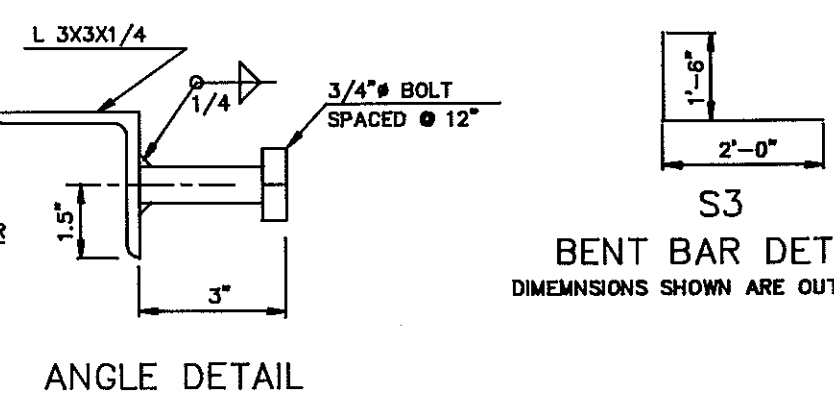
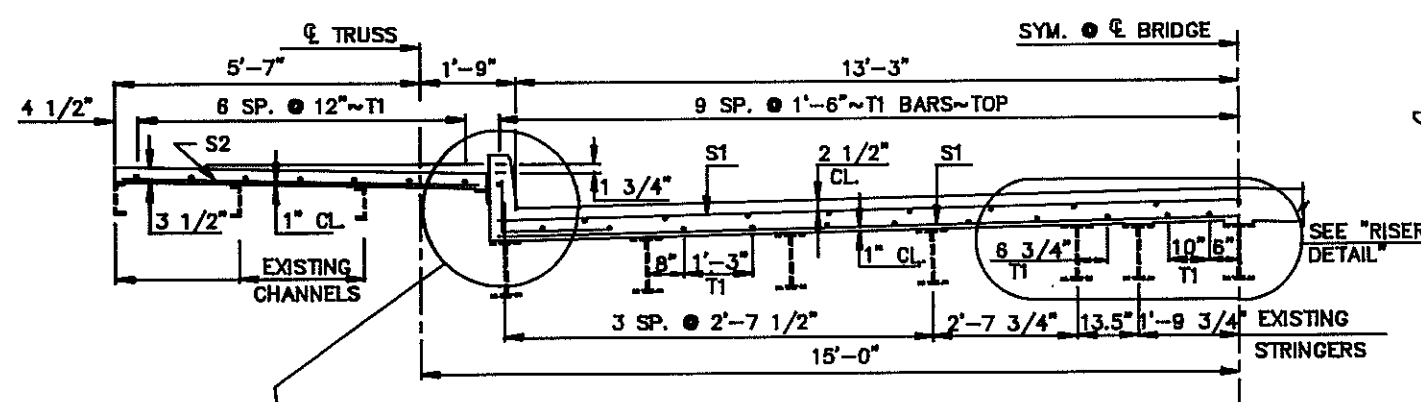
SURFACE FINISH "D" SHALL BE REQUIRED FOR THE INSIDE & TOP SURFACES OF THE CURB TRANSITIONS.

QUANTITIES	(ONE SLAB)
APPROACH SLAB	228.3 S.Y.
MEMORIAL BRIDGE WEST APPROACH BISMARCK - MANDAN	
APPROACH SLAB	

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	F-1-094(007)920	

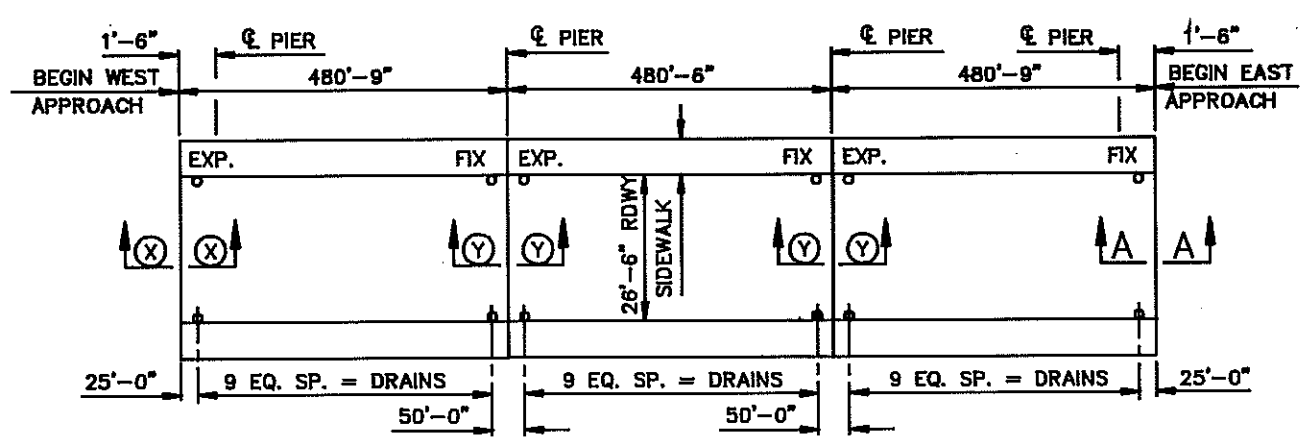
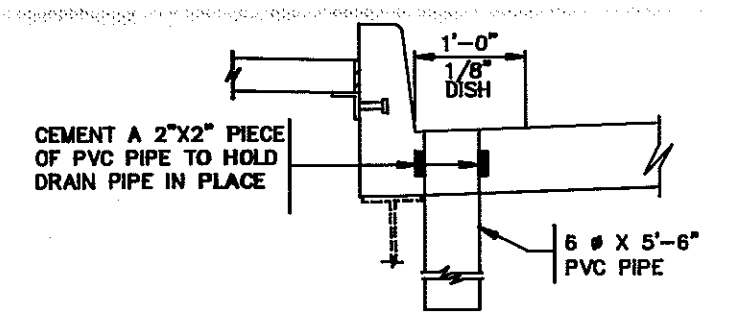
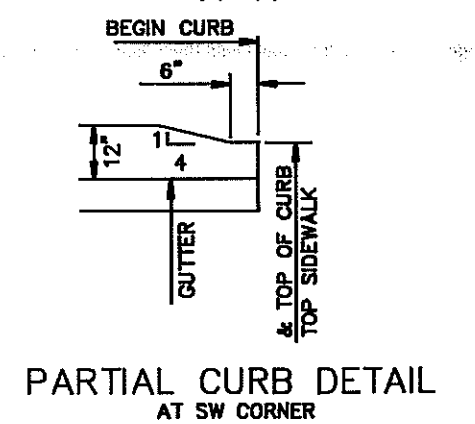
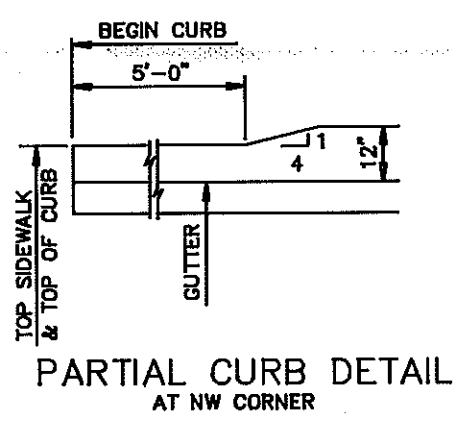
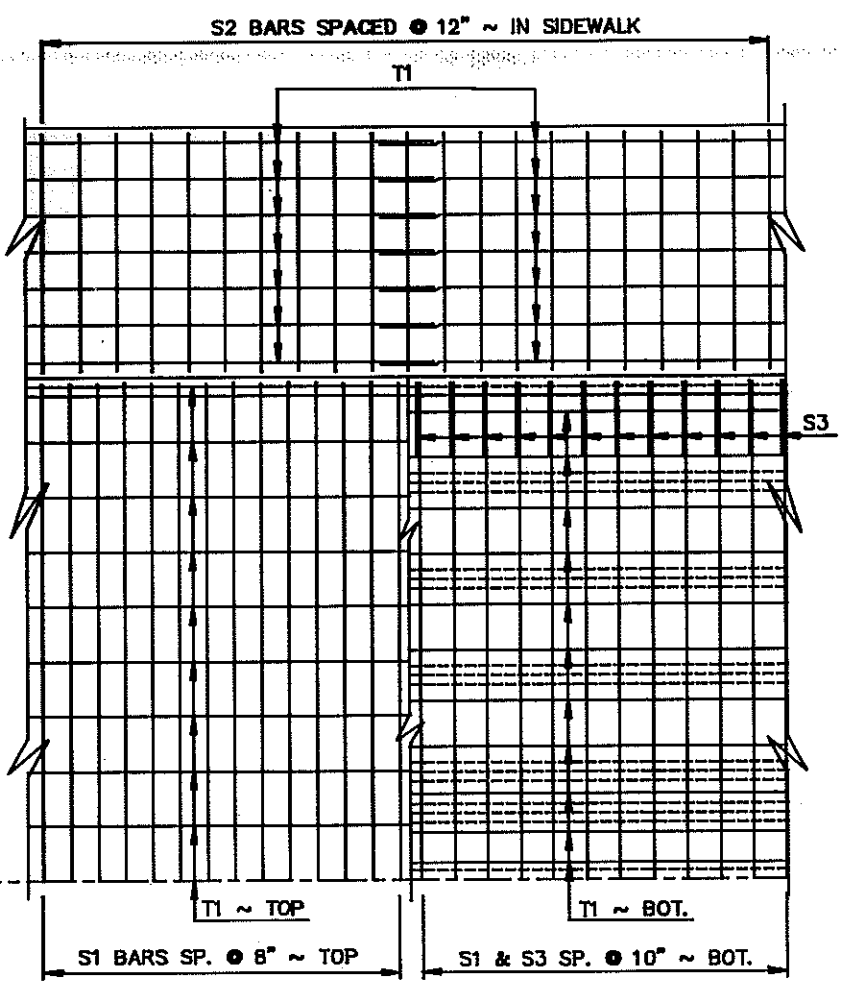
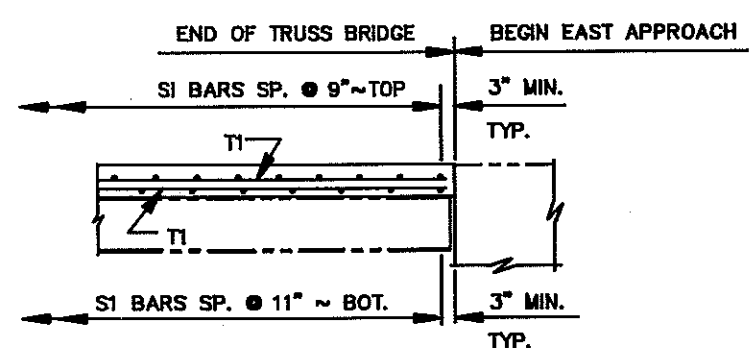
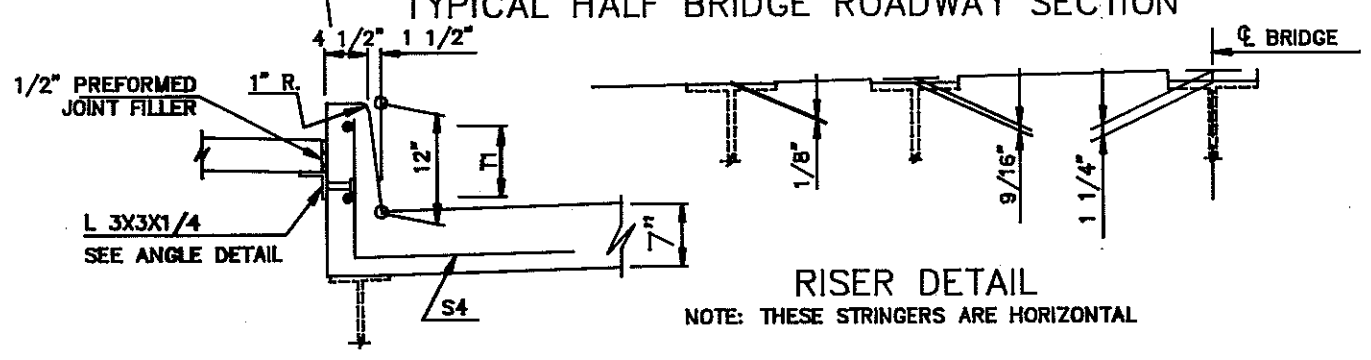


MEMORIAL BRIDGE
RIVER TRUSS BRIDGE
BURLEIGH-MORTON COUNTIES



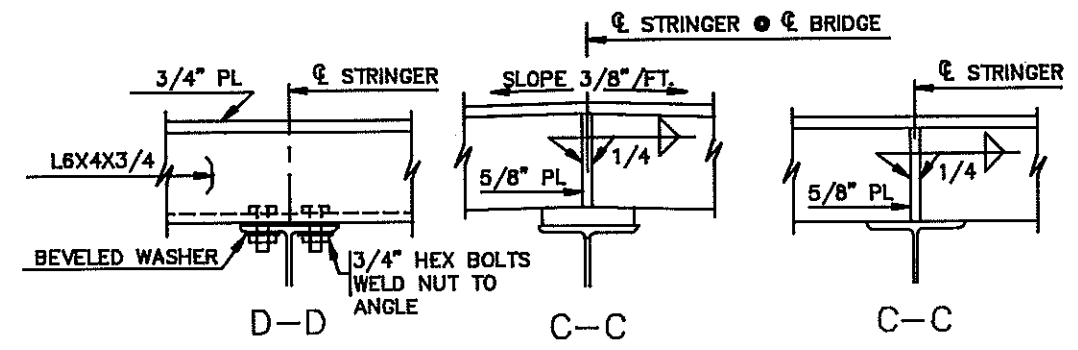
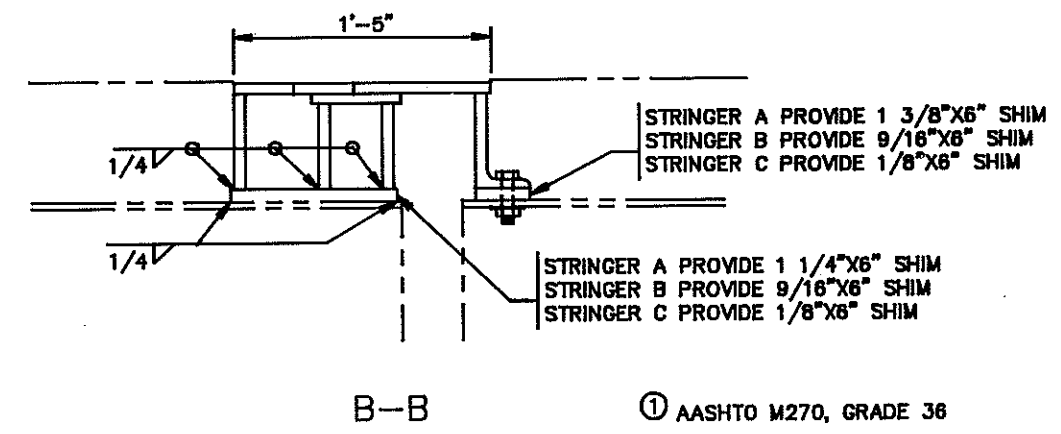
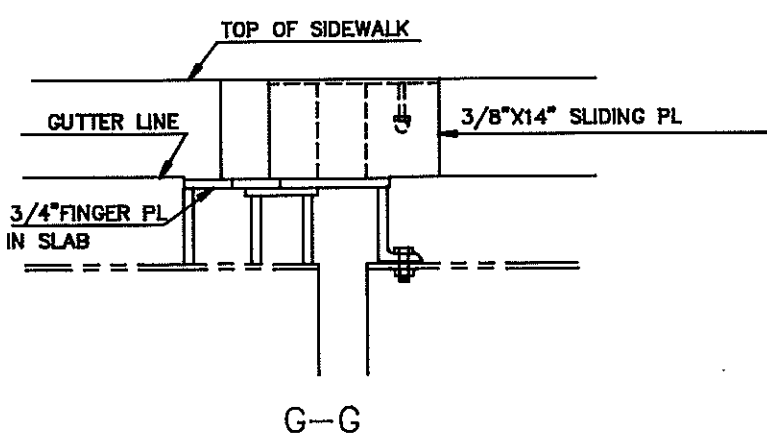
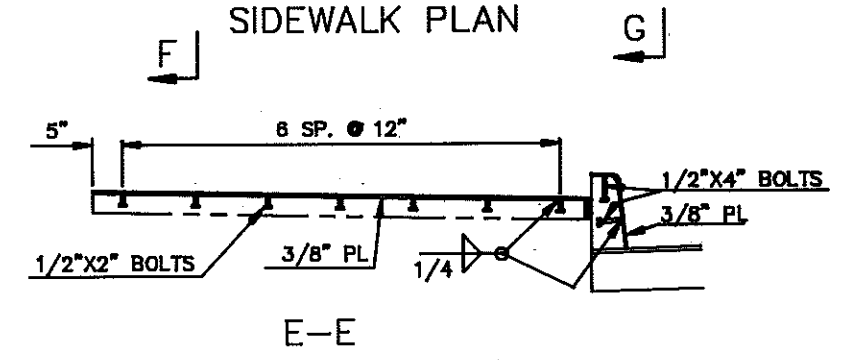
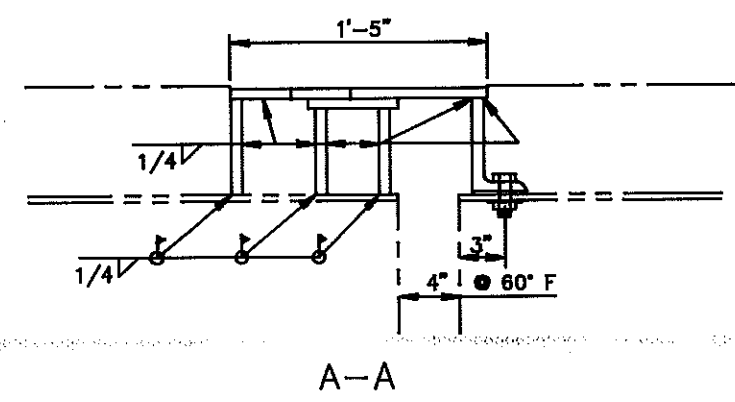
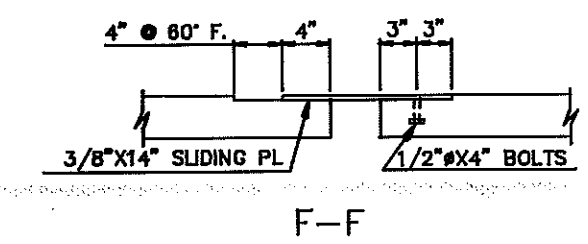
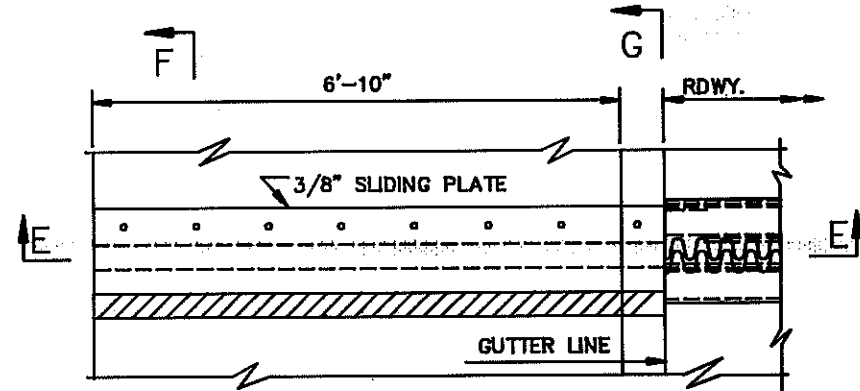
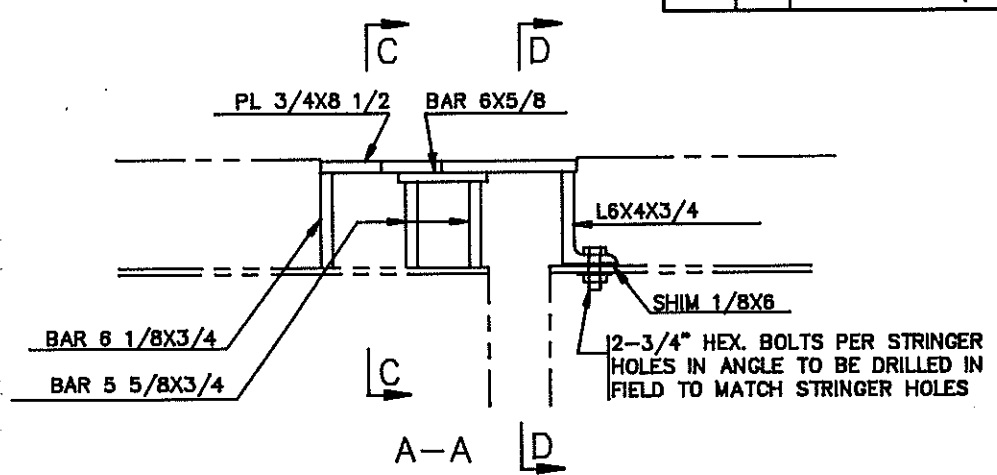
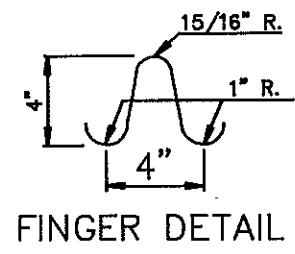
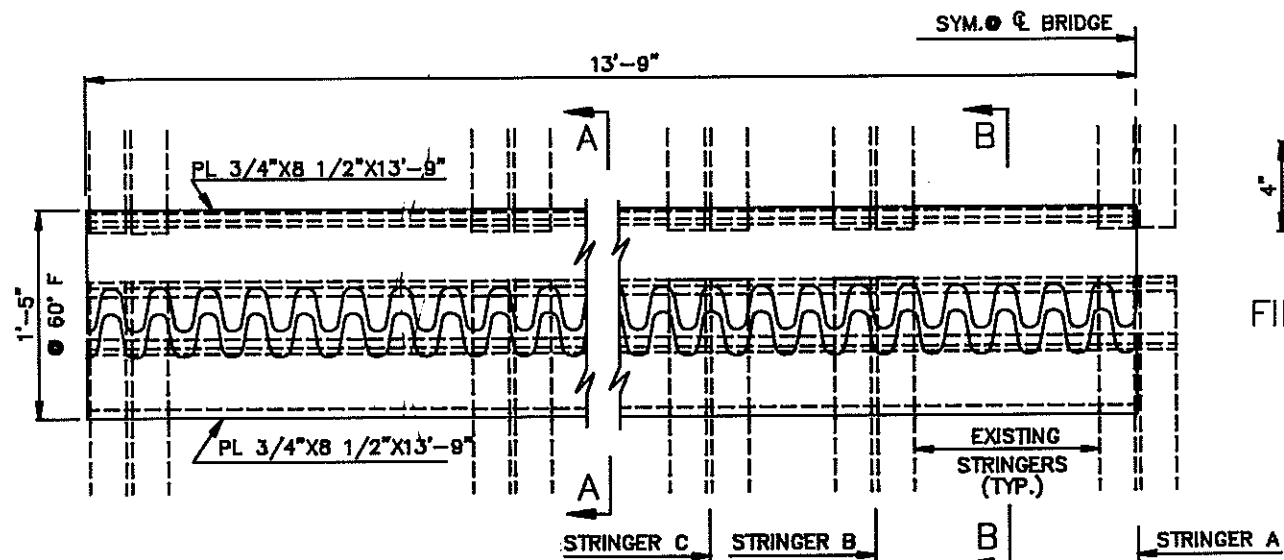
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
①	S1	38B4	4	27'-2" STR.
①	S2	1441	4	6'-5" STR.
①	S3	3148	4	3'-6" BENT
①	T1	1770	4	49'-9" STR.

- ① REINFORCING STEEL BARS SHALL BE EPOXY COATED.
- ⓧ SEE DETAIL "EXPANSION AT WEST APPROACH" DWG. 94-920.914-3T.
- Ⓨ SEE SECTION A-A DWG. 94-920.914-3T.



QUANTITIES		
CLASS AAE-3 CONC.	1119.7	C.Y.
REINF. STEEL(EPOXY)	142849	LBS.
6" PVC DRAIN PIPE	330	L. FT.

MEMORIAL BRIDGE
BRIDGE SLAB
BURLEIGH-MORTON COUNTIES



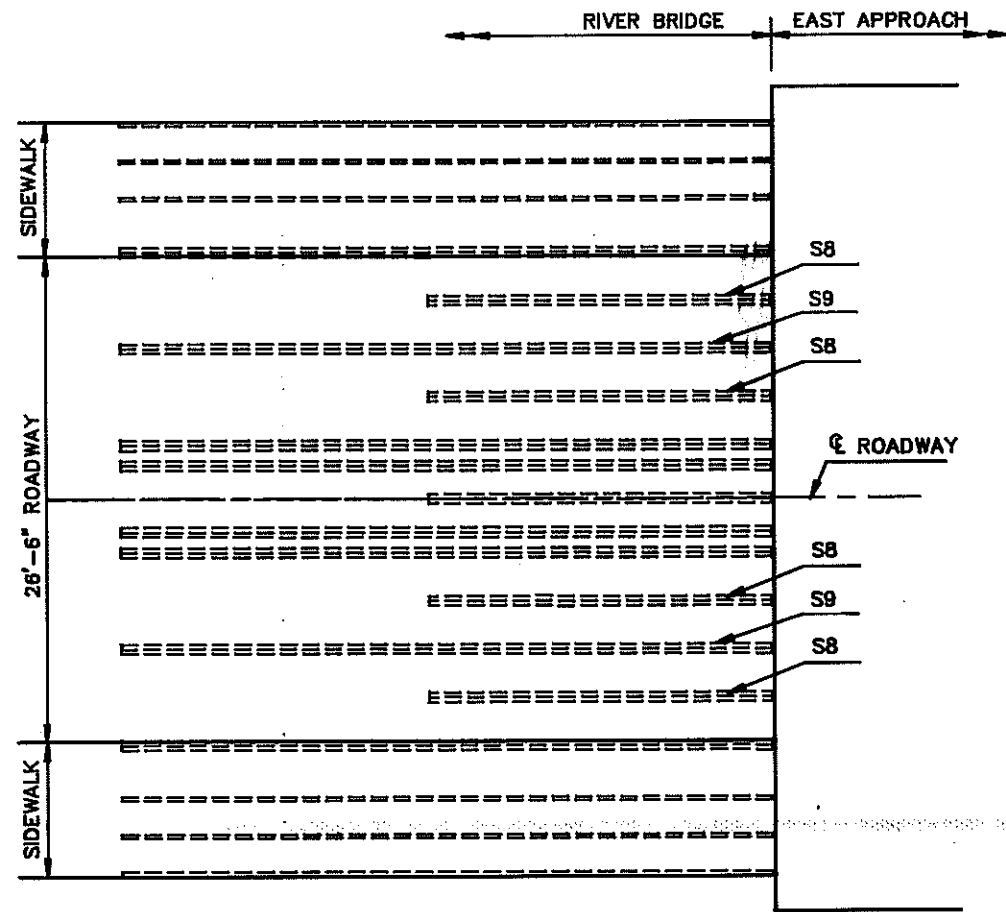
① AASHTO M270, GRADE 36

QUANTITIES		
① STRUCTURAL STEEL	29870	LBS.

MEMORIAL BRIDGE
EXPANSION JOINT
REPLACEMENT

TRUSS BRIDGE

94-920.914-3T.



PARTIAL BRIDGE DECK PLAN

NOTES:

THE FABRICATED STRINGERS SHALL REPLACE THE EXISTING MEMBERS. DECISION TO REPLACE ADDITIONAL MEMBERS SHALL BE MADE BY THE ENGINEER.

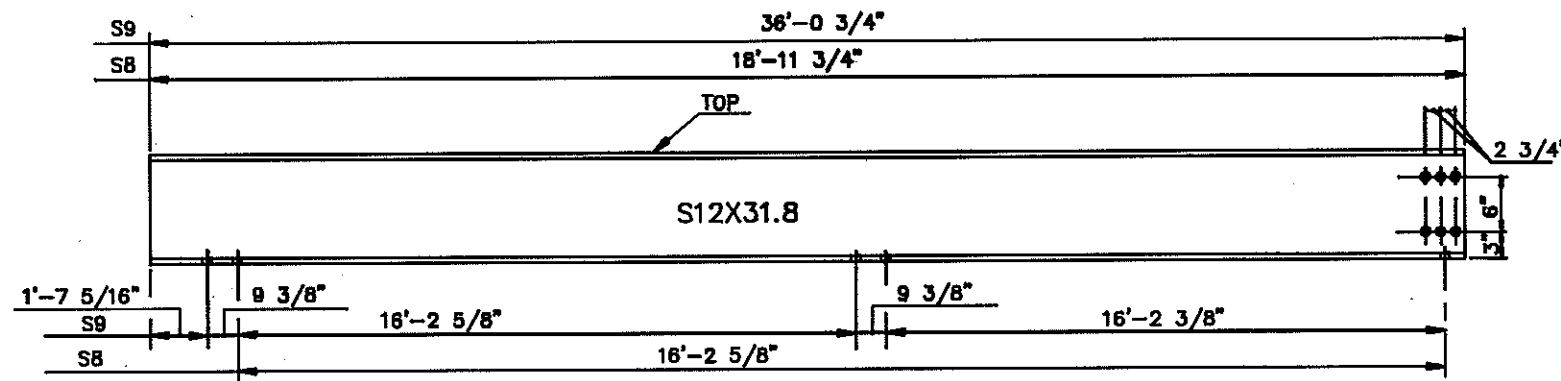
ALL STRINGER MATERIAL SHALL REMAIN THE PROPERTY OF THE CONTRACTOR.

THE COST OF FURNISHING, REMOVING THE EXISTING STRINGER AND PLACING THE NEW STRINGERS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "STRUCTURAL STEEL".

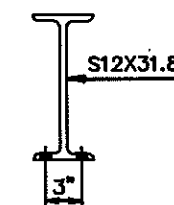
STRUCTURAL STEEL SHALL BE AASHTO M270, GRADE 36T2 (4 EACH S8 AND 2 EACH S9 STRINGERS).

NOTE:

HOLES 15/16"Ø

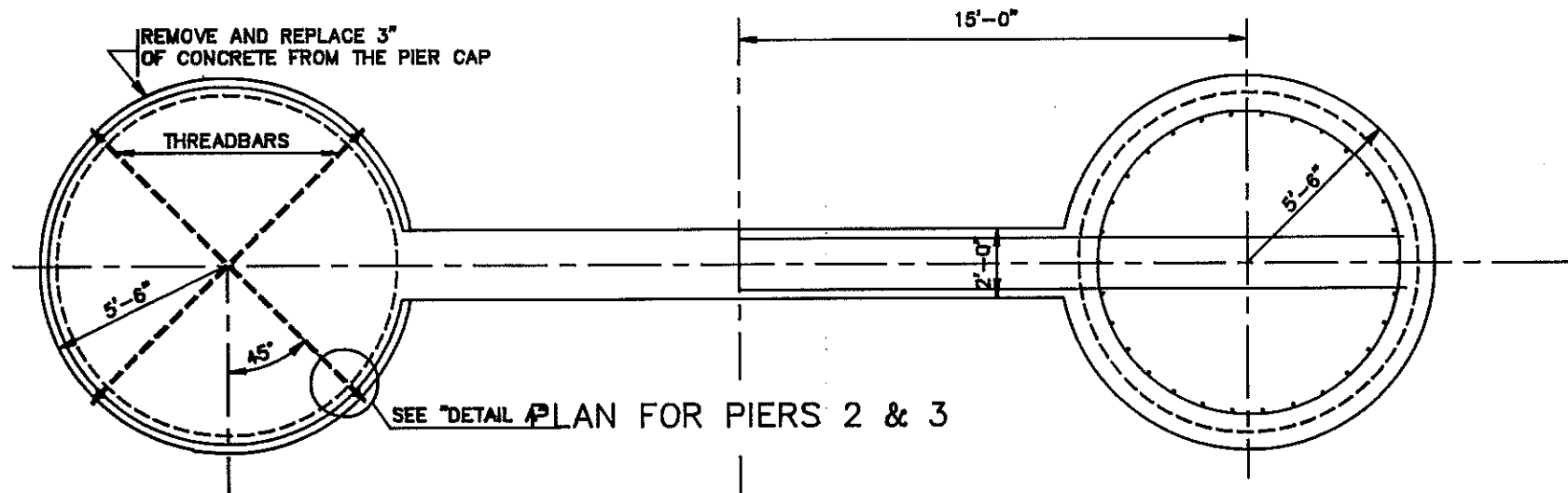


STRINGER ELEVATION



STRINGER SECTION

QUANTITIES	
SEE DWG.	94-920.914-3T
MEMORIAL BRIDGE	
STRINGER REPLACEMENT	



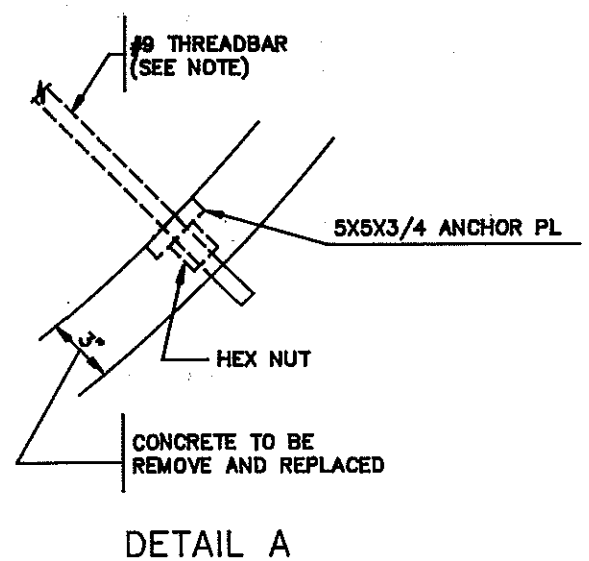
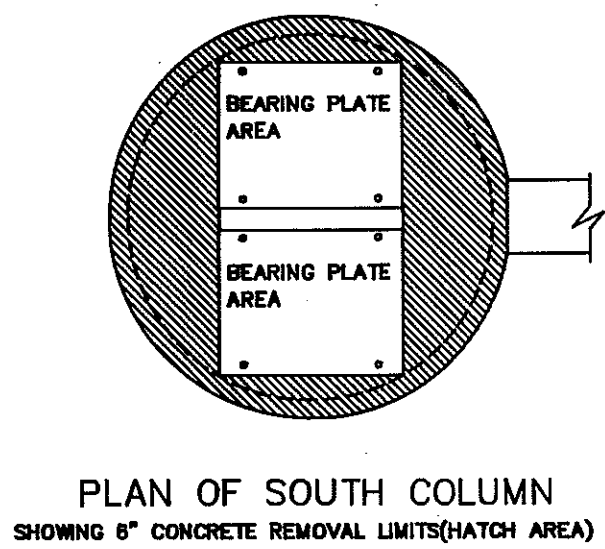
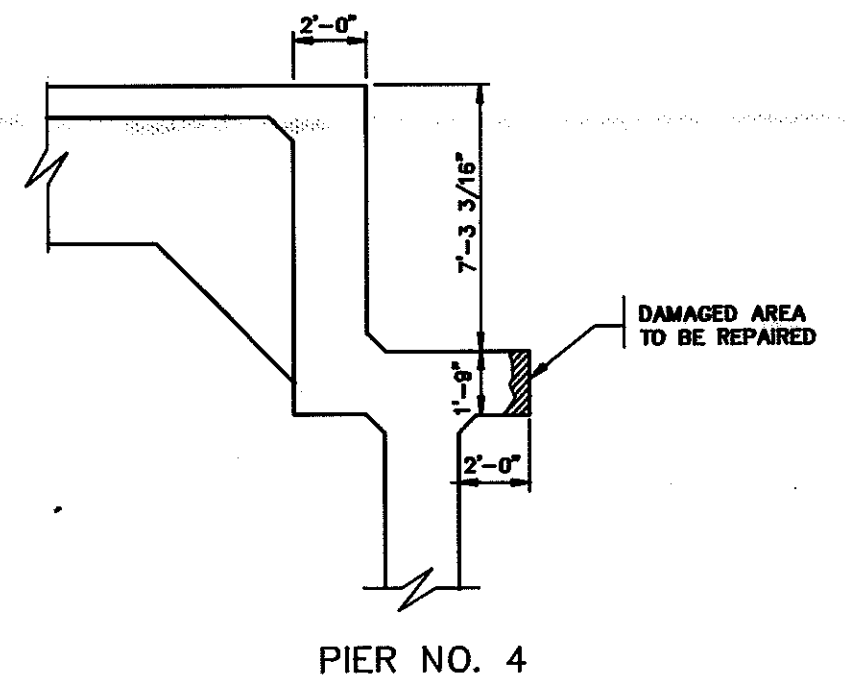
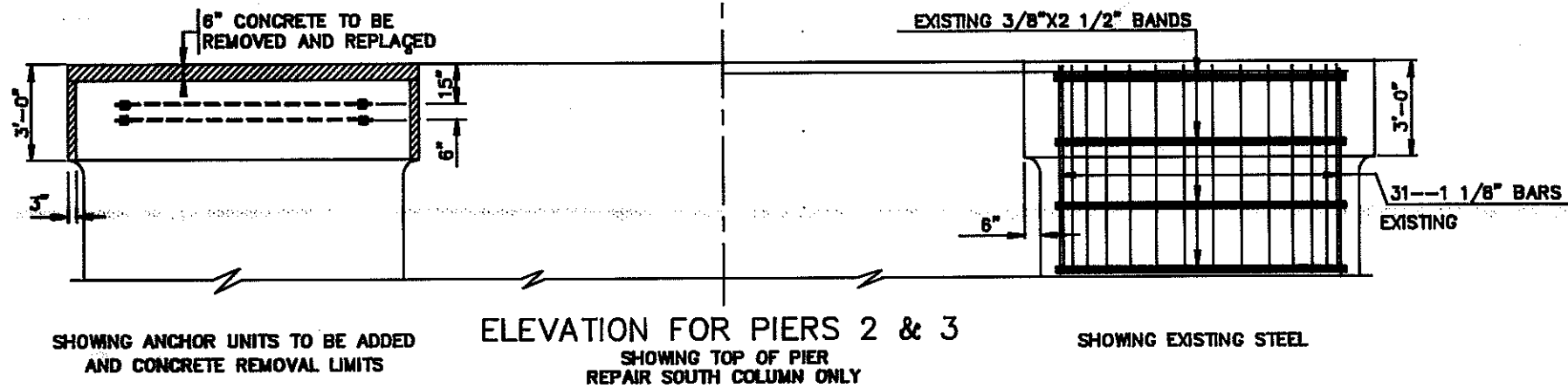
NOTES:

ANCHOR UNITS SHALL BE DYWDAG THREADBAR REINFORCING SYSTEM OR EQUAL.

AFTER THE UNSOUND CONCRETE HAS BEEN REMOVED AND THE ANCHOR UNITS ARE IN PLACE, EPOXY INJECT ALL REMAINING CRACKS.

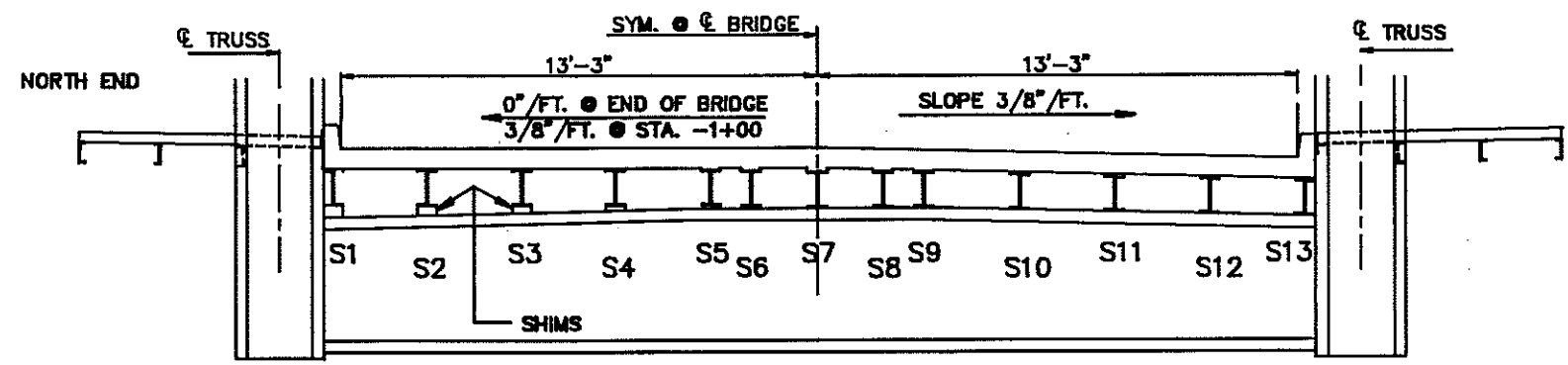
PLACE THE COVER CONCRETE AND COAT THE TOP OF THE COLUMN WITH A CLEAR WEATHERPROOFING EPOXY RESIN.

THE COST OF FURNISHING AND PLACING THE ANCHOR UNITS, THE EPOXY, THE CONCRETE AND THE PROTECTIVE COATING SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "PIER REPAIR".

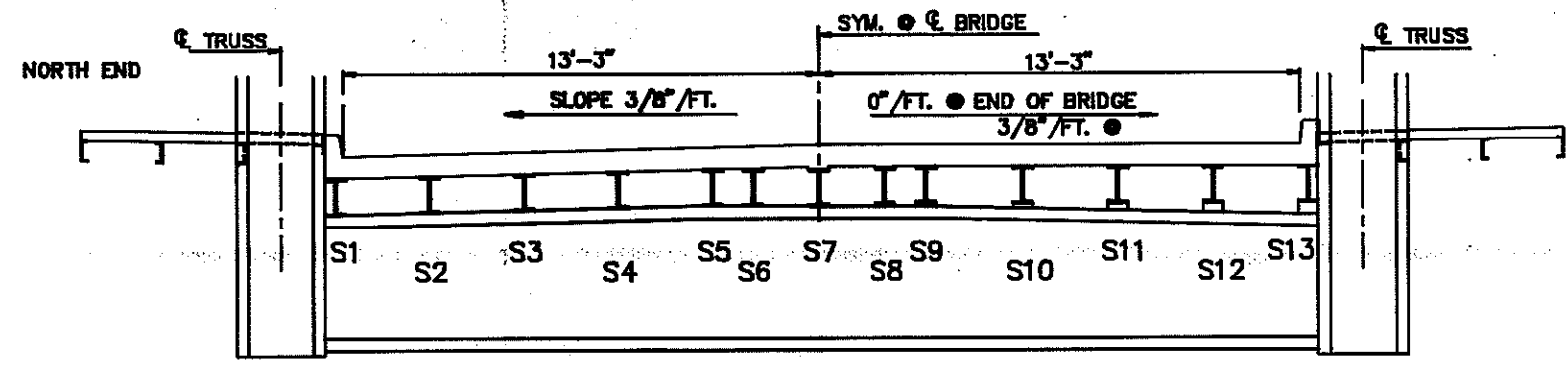


MEMORIAL BRIDGE

RIVER PIER REPAIRS



SECTION @ EAST END



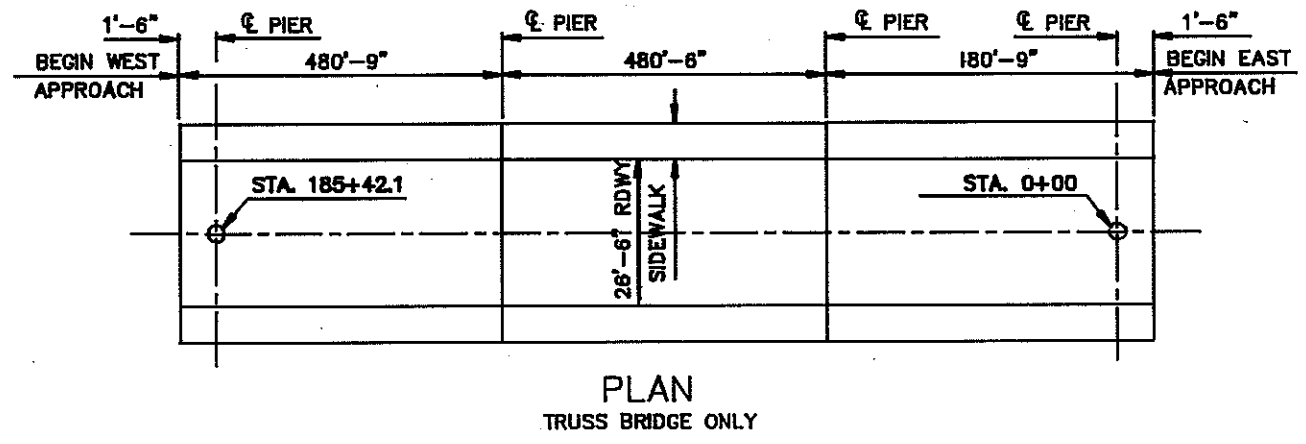
SECTION @ WEST END

STA.	S1	S2	S3	S4	S5*	S6*	S7
-0+01	5"	4"	3"	2 1/16"	1 1/8"	11/16"	0
-0+18	4 3/16"	3 3/8"	2 1/2"	1 11/16"	15/16"	9/16"	0
-0+35	3 5/16"	2 11/16"	2"	1 3/8"	3/4"	7/16"	0
-0+52	2 1/2"	2"	1 1/2"	1"	9/16"	5/16"	0
-0+69	1 11/16"	1 3/8"	1"	11/16"	3/8"	3/16"	0
-0+86	13/16"	11/16"	1/2"	5/16"	3/16"	1/16"	0
-1+03	0	0	0	0	0	0	0

STA.	S13	S12*	S11*	S10	S9	S8	S7
185+43.1	5"	4"	3"	2 1/16"	1 1/8"	11/16"	0
185+60.1	4 3/16"	3 3/8"	2 1/2"	1 11/16"	15/16"	9/16"	0
185+77.1	3 5/16"	2 11/16"	2"	1 3/8"	3/4"	7/16"	0
185+94.1	2 1/2"	2"	1 1/2"	1"	9/16"	5/16"	0
186+11.1	1 11/16"	1 3/8"	1"	11/16"	3/8"	3/16"	0
186+28.1	13/16"	11/16"	1/2"	5/16"	3/16"	1/16"	0
186+45.1	0	0	0	0	0	0	0

* CONTRACTOR MAY USE CONCRETE RISERS IN PLACE OF SHIMS.

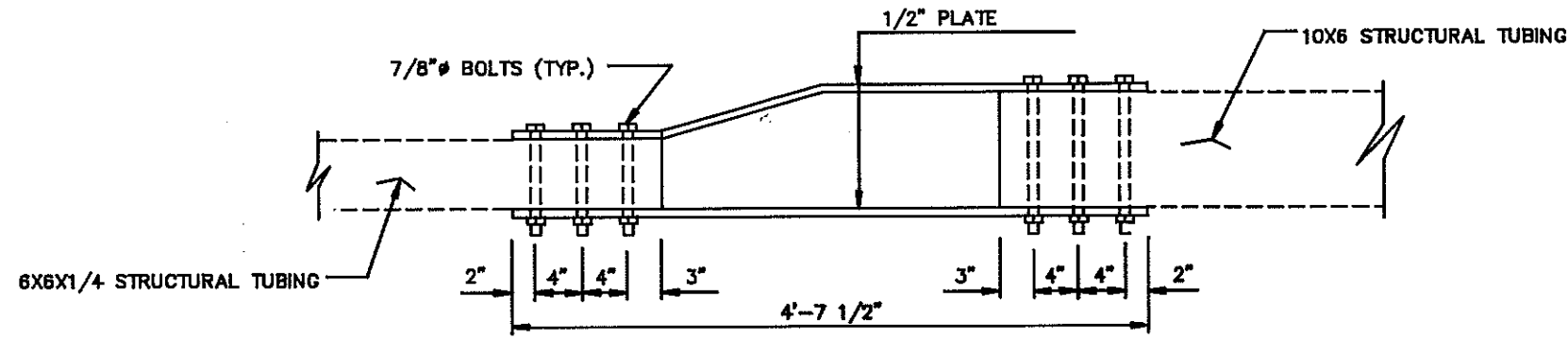
SHIMS SHALL BE INCIDENTAL TO NEW STRINGERS.



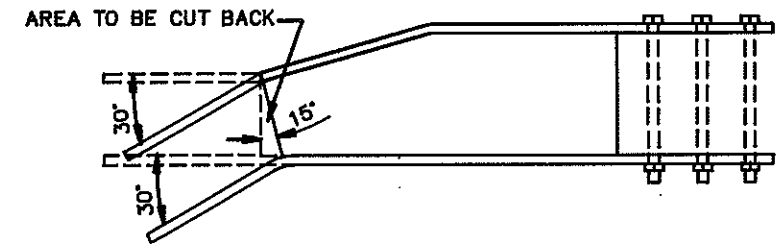
PLAN TRUSS BRIDGE ONLY

MEMORIAL BRIDGE
SHIM PLACEMENT
BURLEIGH-MORTON COUNTIES

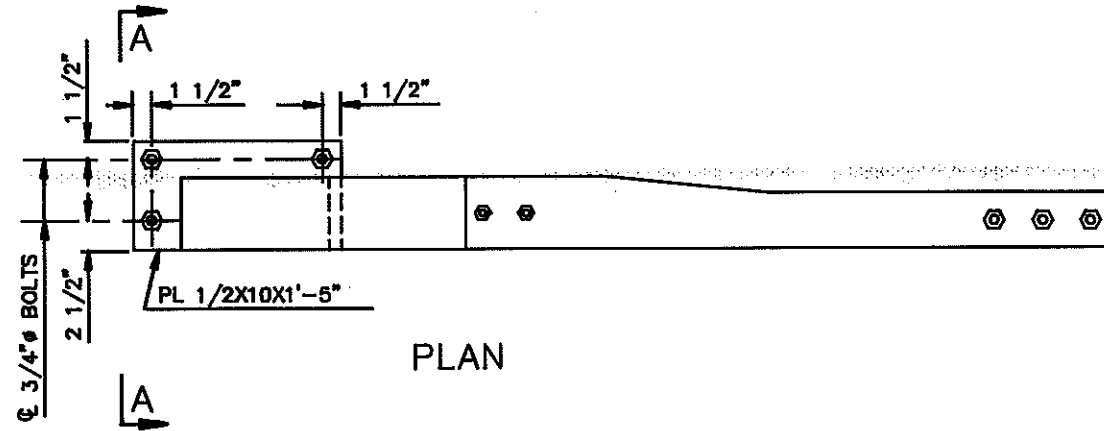
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	IR--194-4(053)000	



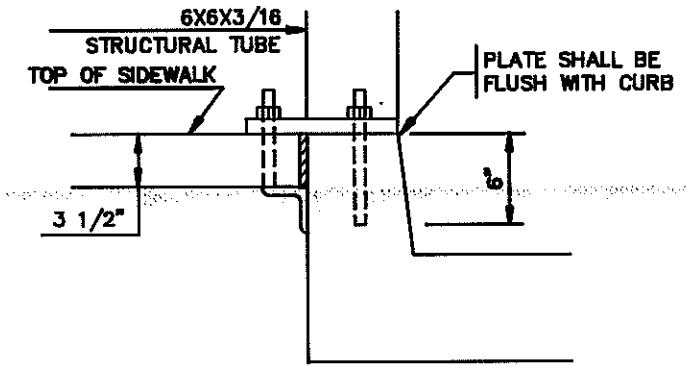
EXISTING END CONNECTION



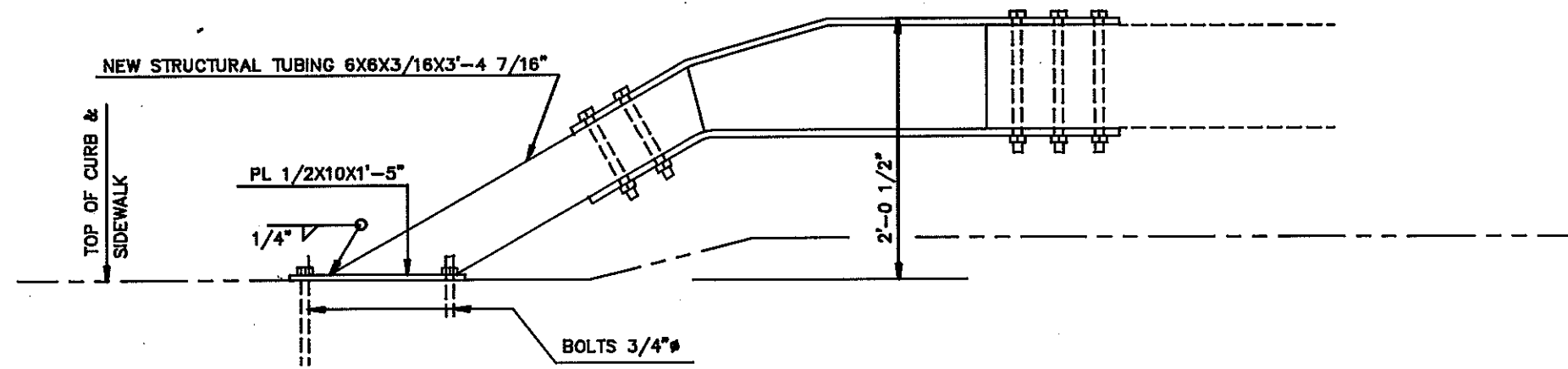
MODIFIED EXISTING END CONNECTION



PLAN



A-A

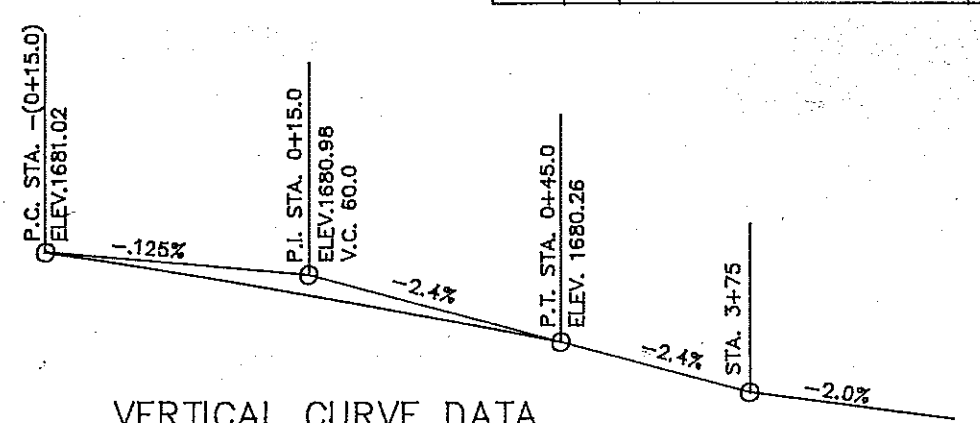
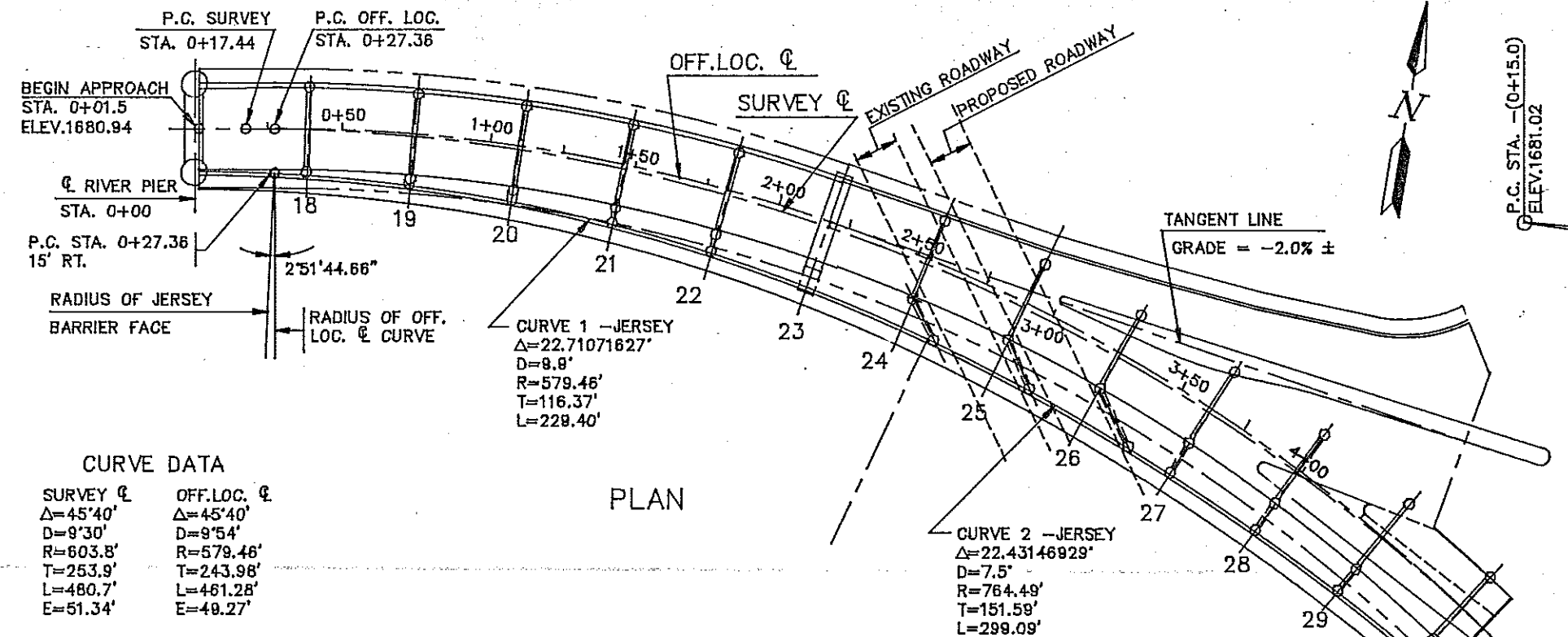


ELEVATION

NEW END CONNECTION

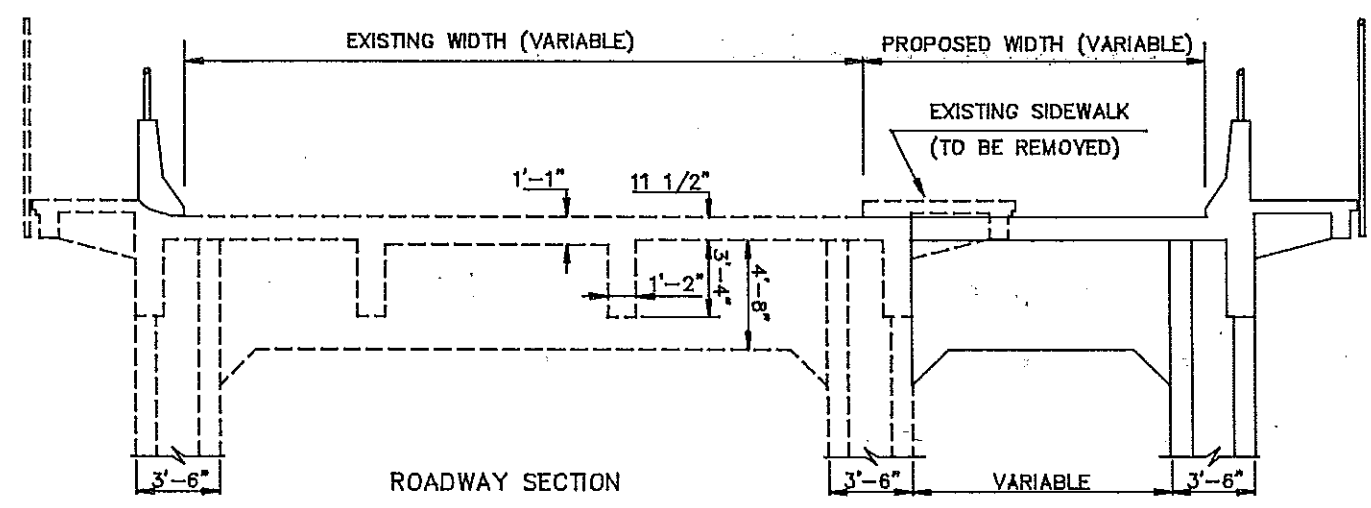
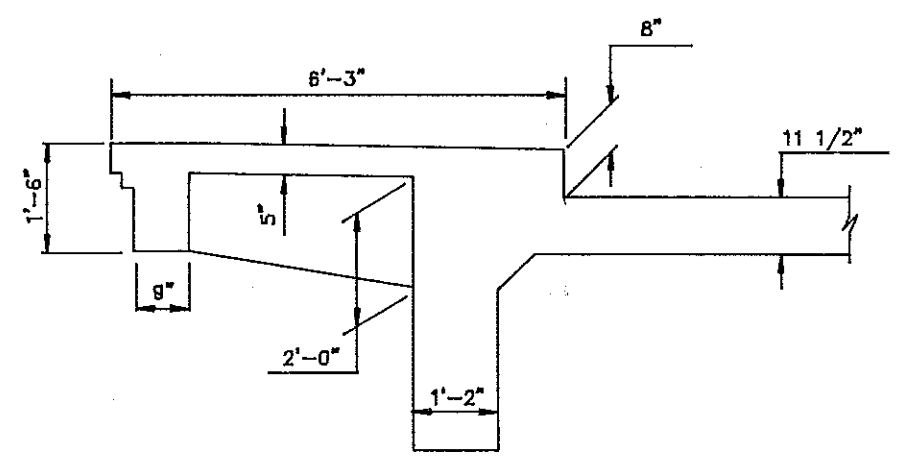
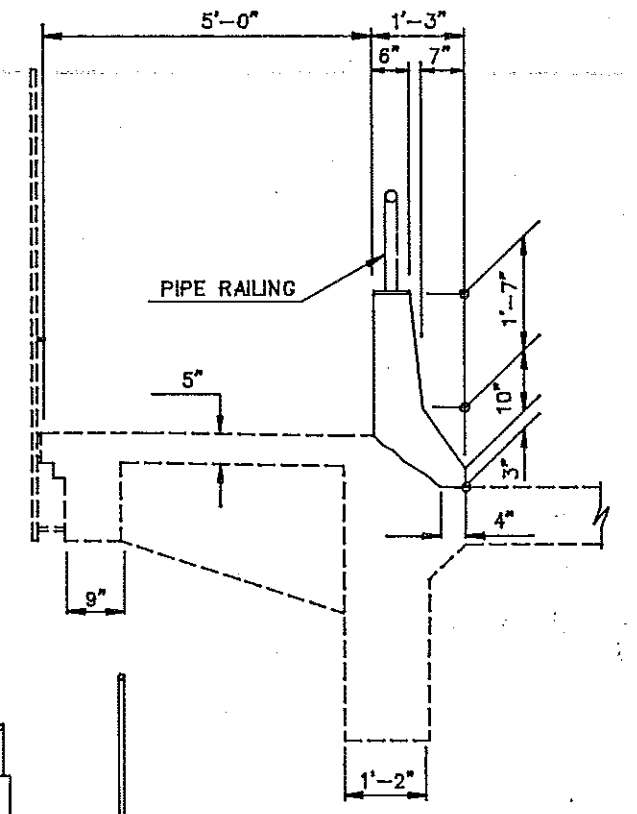
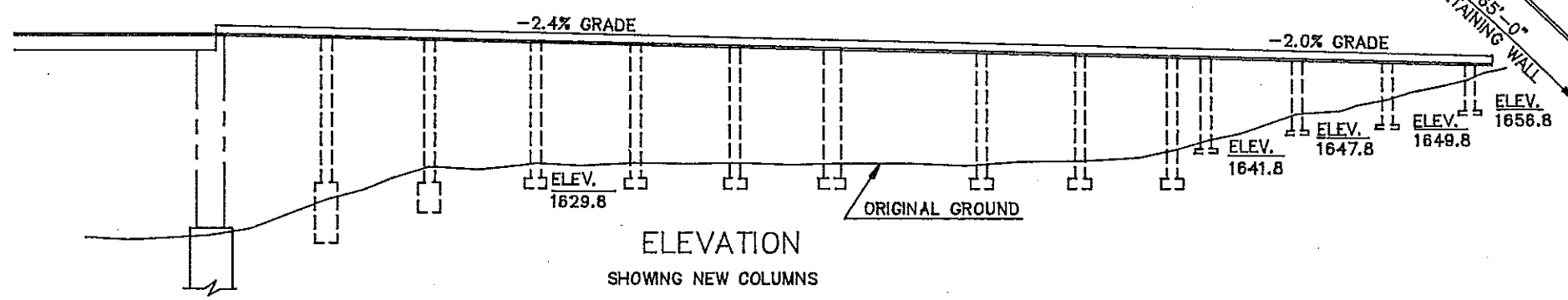
QUANTITIES
SEE DWG. 94-920.914-3T
MEMORIAL BRIDGE TRAFFIC RAIL END CONNECTION NW CORNER

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	



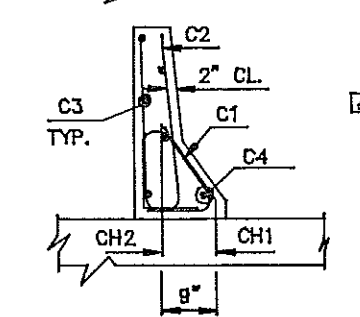
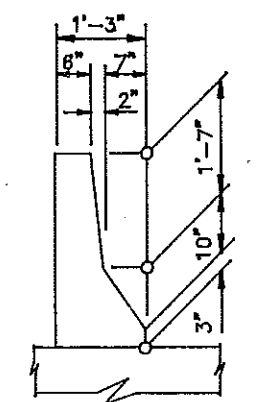
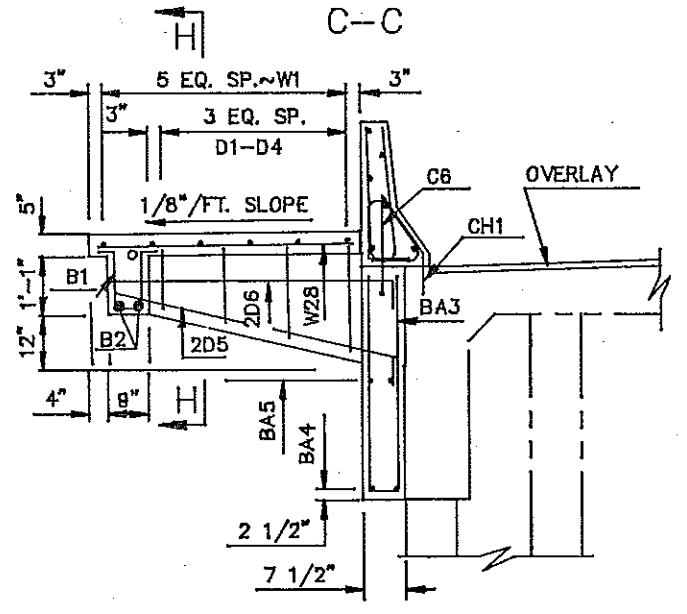
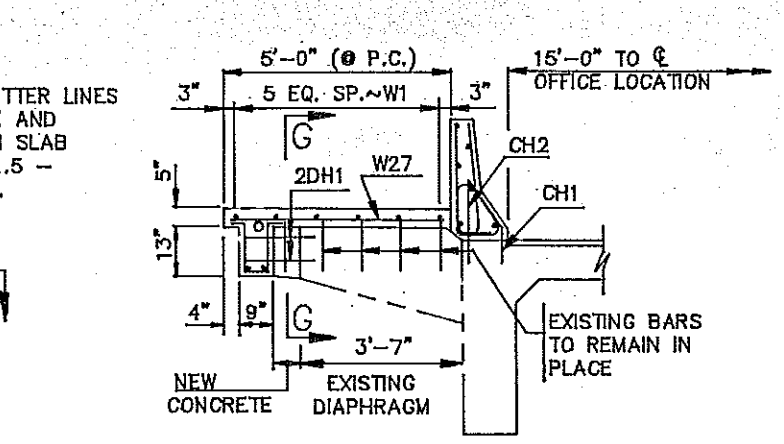
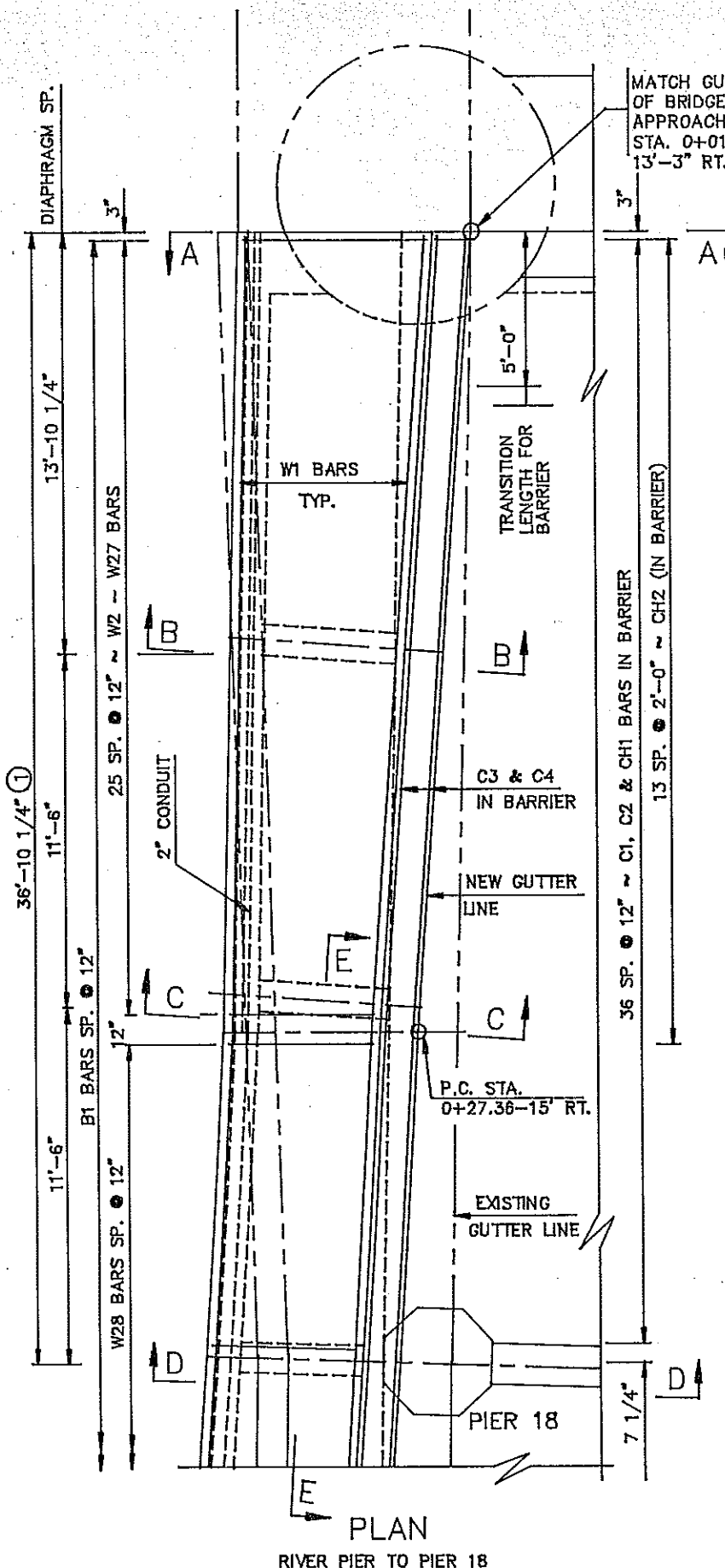
CURVE DATA

SURVEY ϕ	OFF.LOC. ϕ
$\Delta=45'40''$	$\Delta=45'40''$
$D=9'30''$	$D=9'54''$
$R=603.8'$	$R=579.46'$
$T=253.9'$	$T=243.96'$
$L=480.7'$	$L=461.28'$
$E=51.34'$	$E=49.27'$

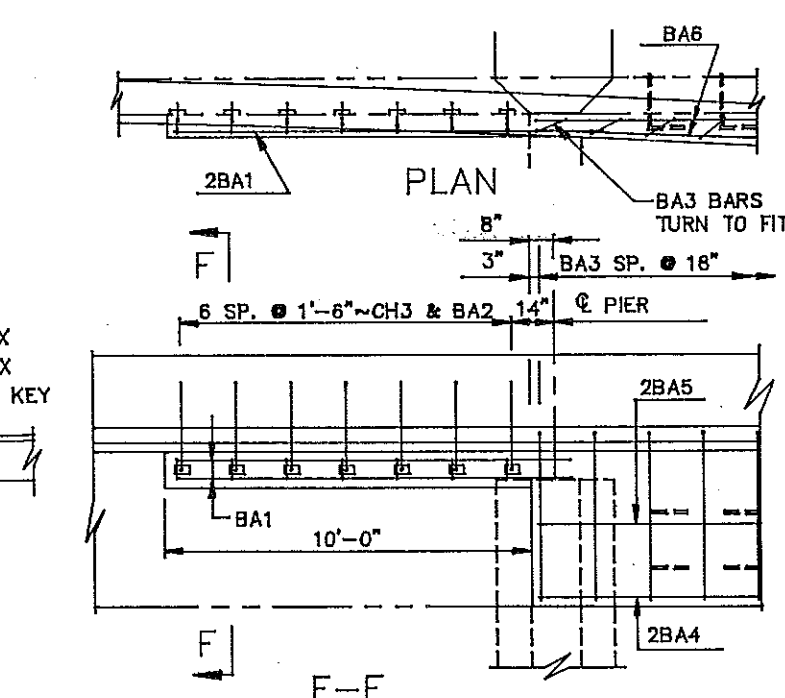
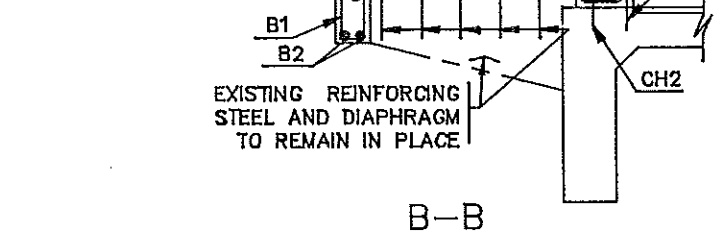
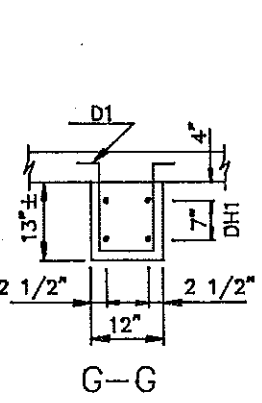
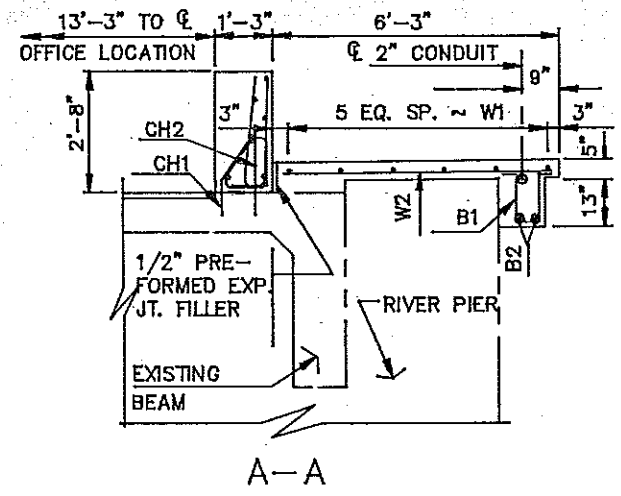


**MEMORIAL BRIDGE
EAST APPROACH
LAYOUT**
BURLEIGH-MORTON COUNTIES

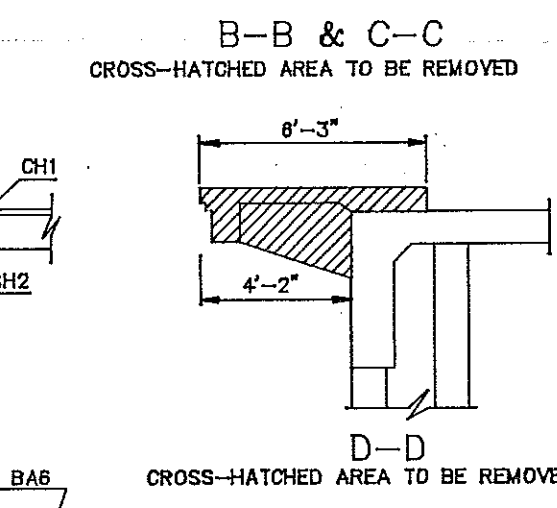
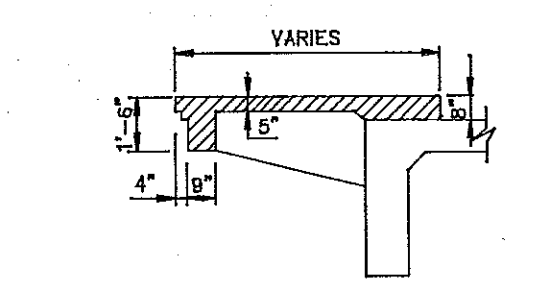
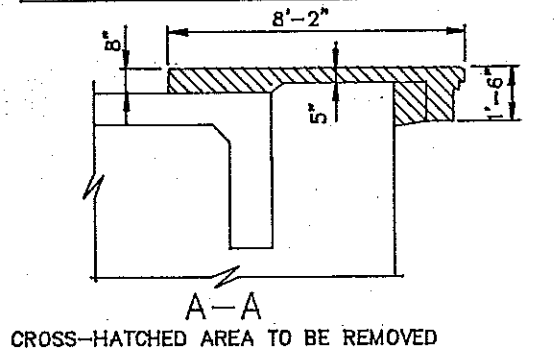
FHWA REGION 8	STATE N.D.	FED. AID PROJ. NO. F-1-084(007)820	SHEET NO.
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BARRIER DETAIL



PLAN



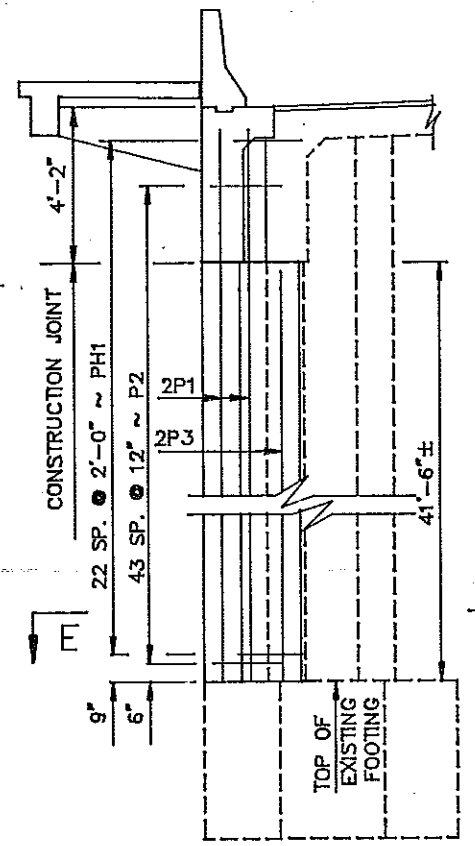
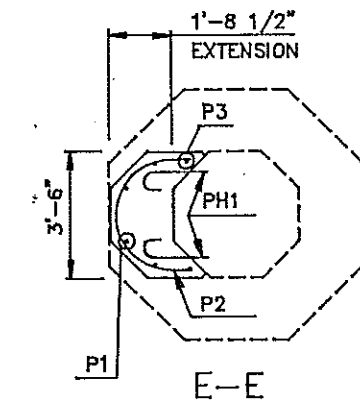
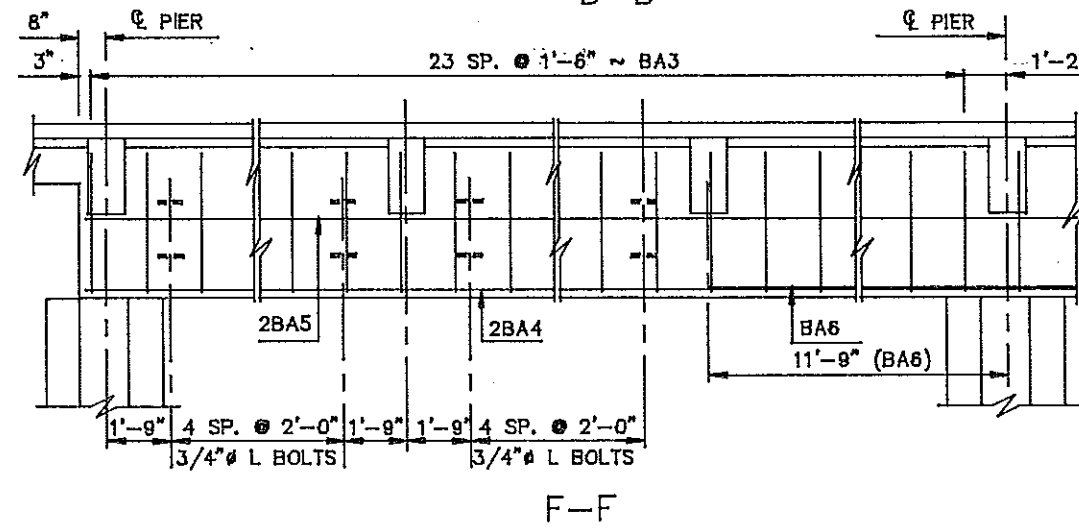
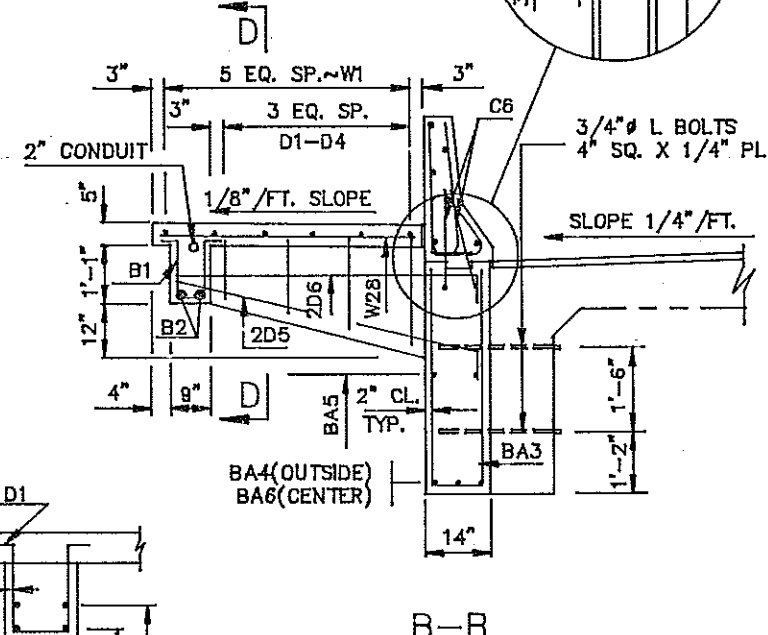
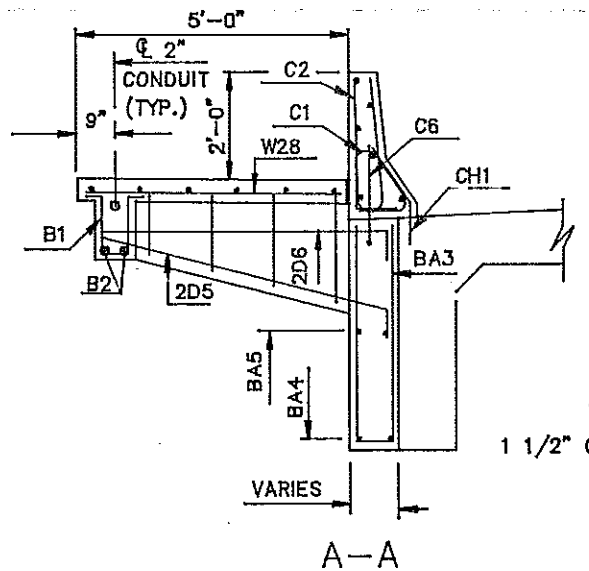
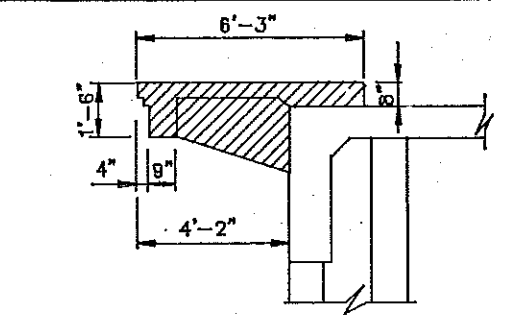
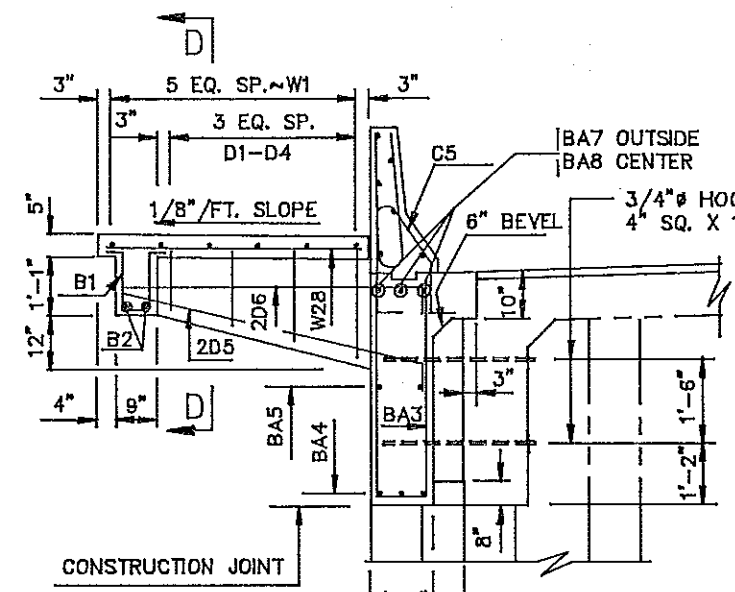
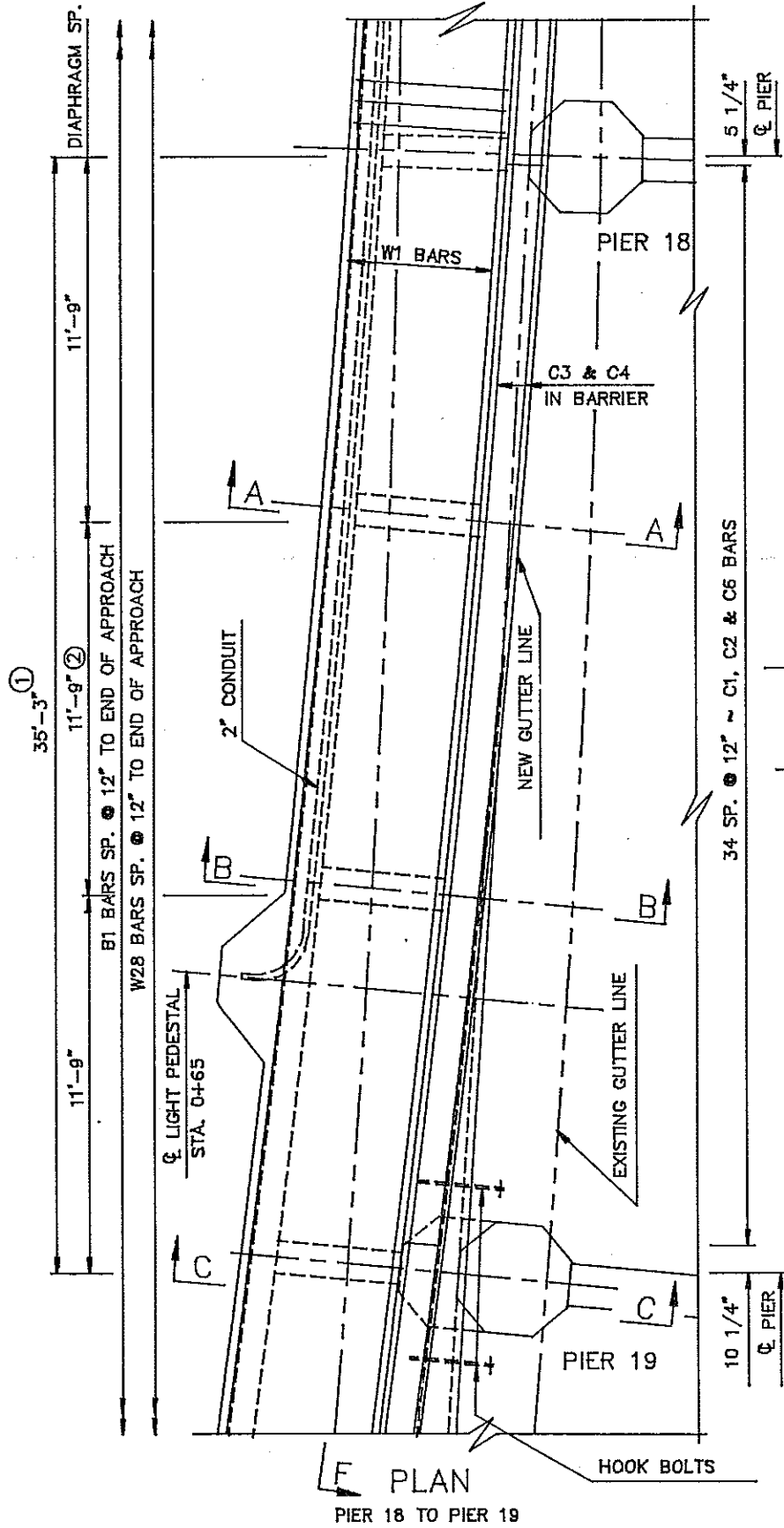
① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.

QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING

RIVER PIER TO PIER 18

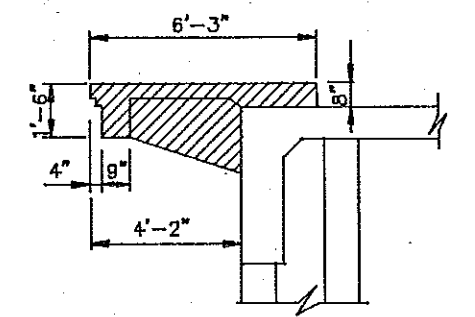
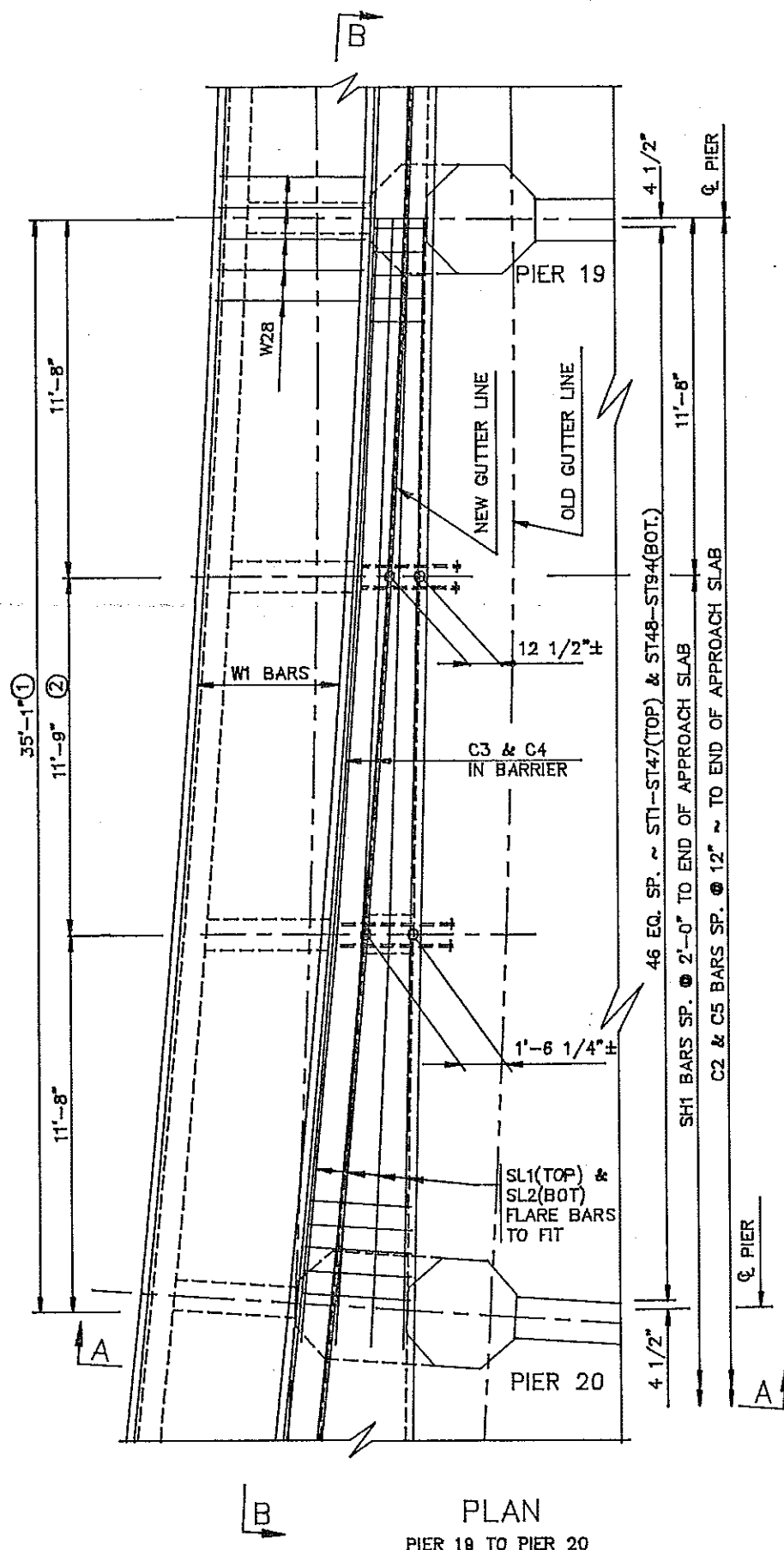
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	



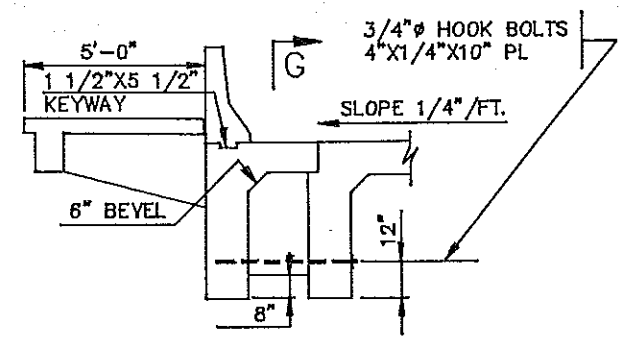
- ① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIERS.
- ② DIAPHRAGMS TO MATCH EXISTING SIDEWALK DIAPHRAGMS.

QUANTITIES
SEE DWG. 84-920.914-29E
MEMORIAL BRIDGE EAST APPROACH WIDENING
PIER 18 TO PIER 19

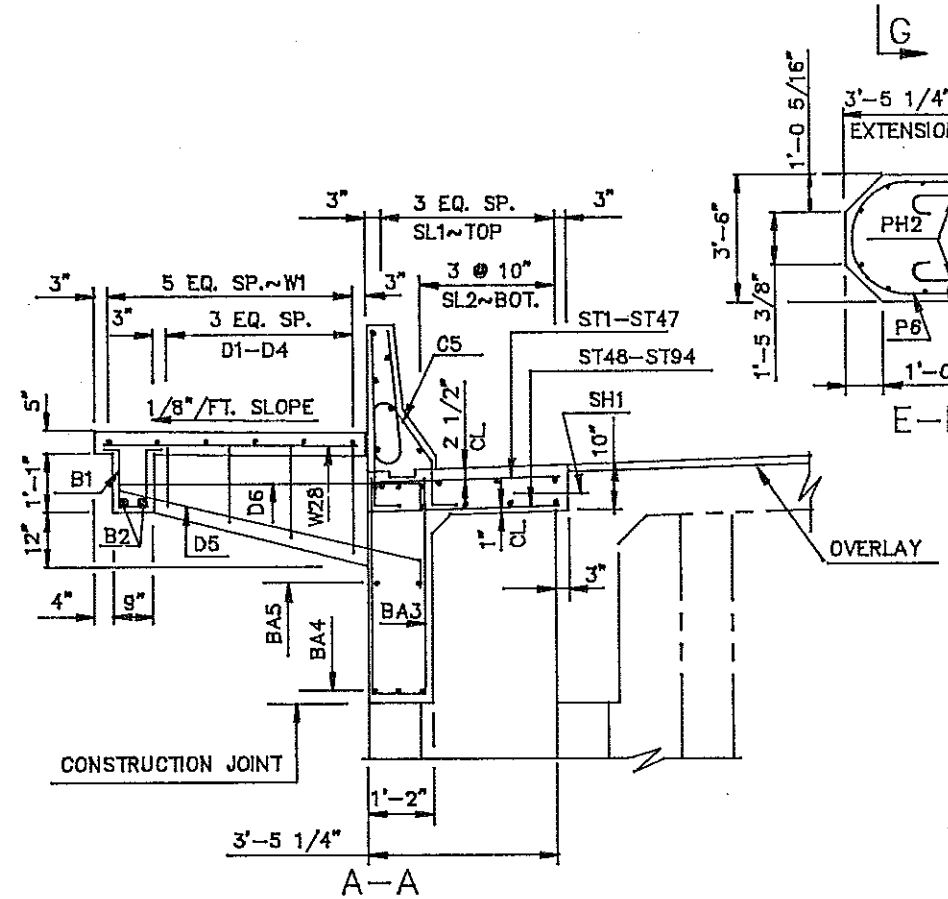
- ① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.
- ② DIAPHRAGMS TO MATCH EXISTING SIDEWALK DIAPHRAGMS.



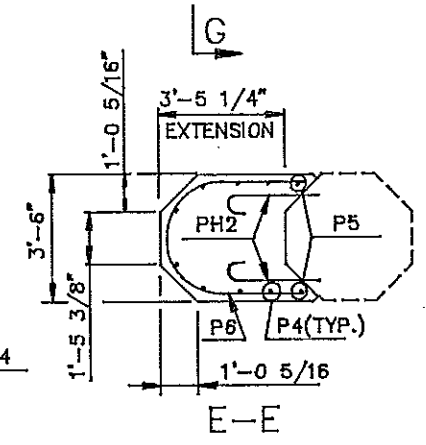
SECTION AT DIAPHRAGMS
CROSS-HATCHED AREA TO BE REMOVED



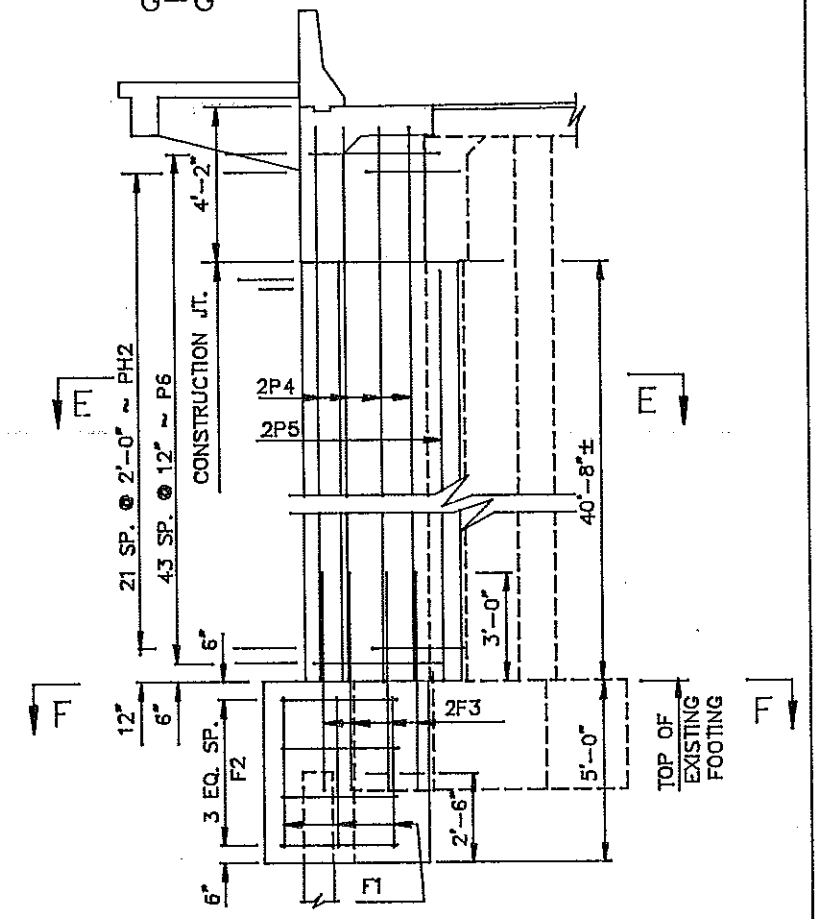
SECTION AT INTERMEDIATE DIAPHRAGMS



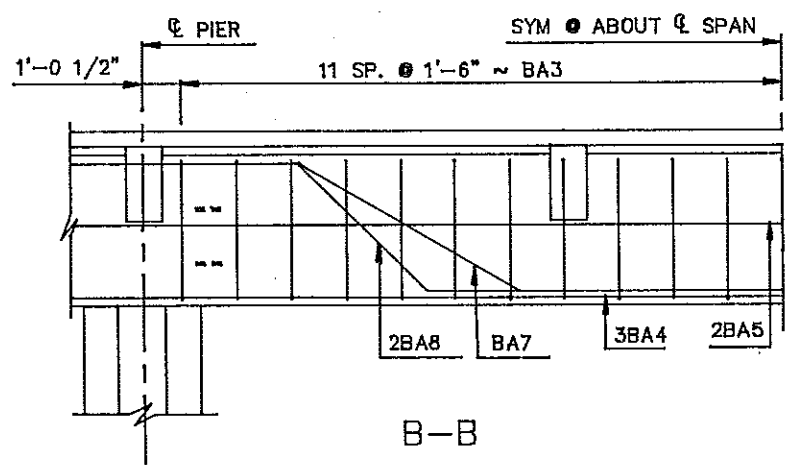
A-A



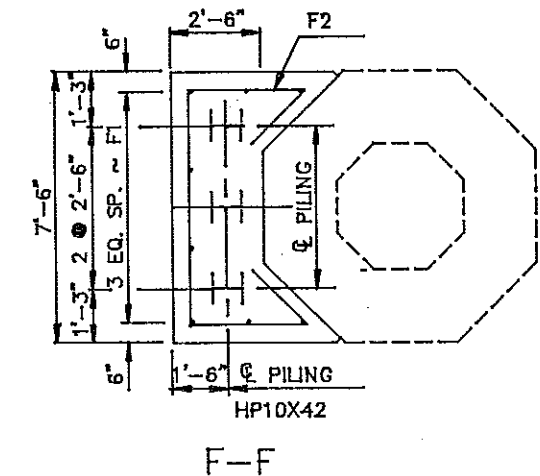
E-E



PIER ELEVATION



B-B

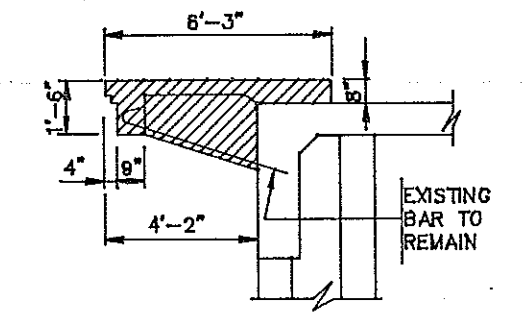
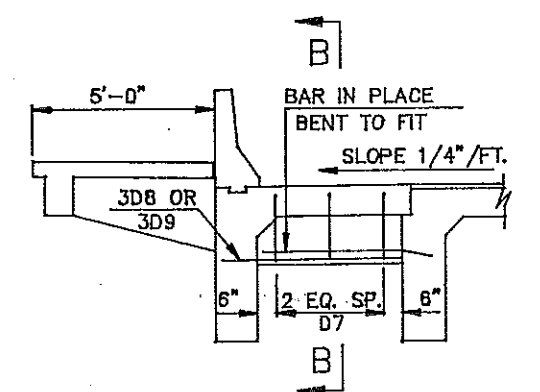
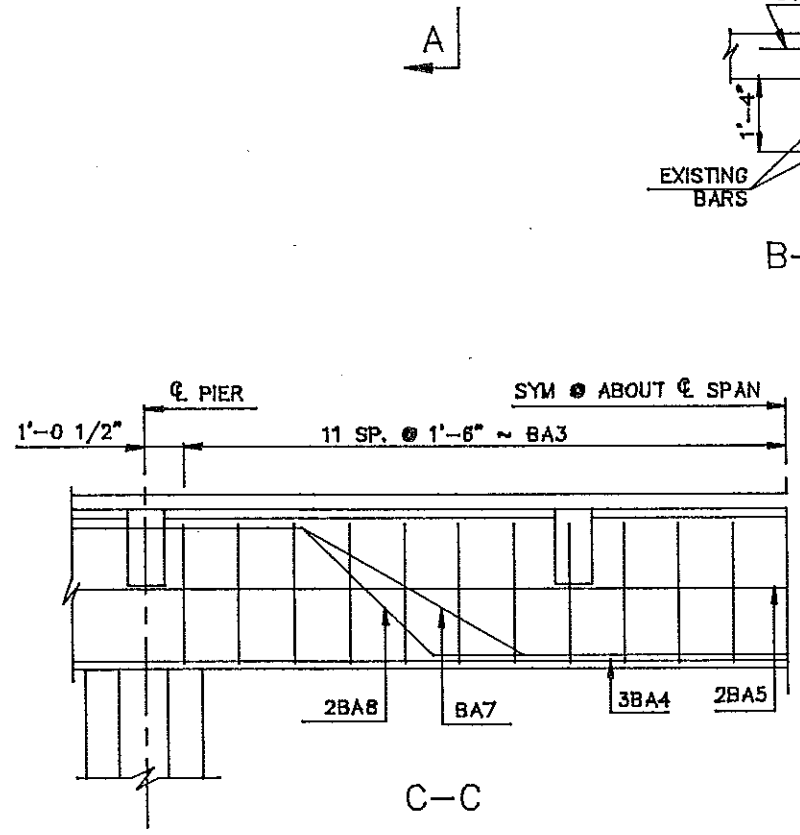
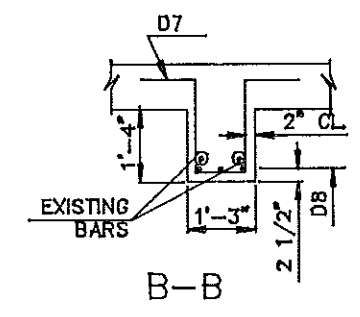
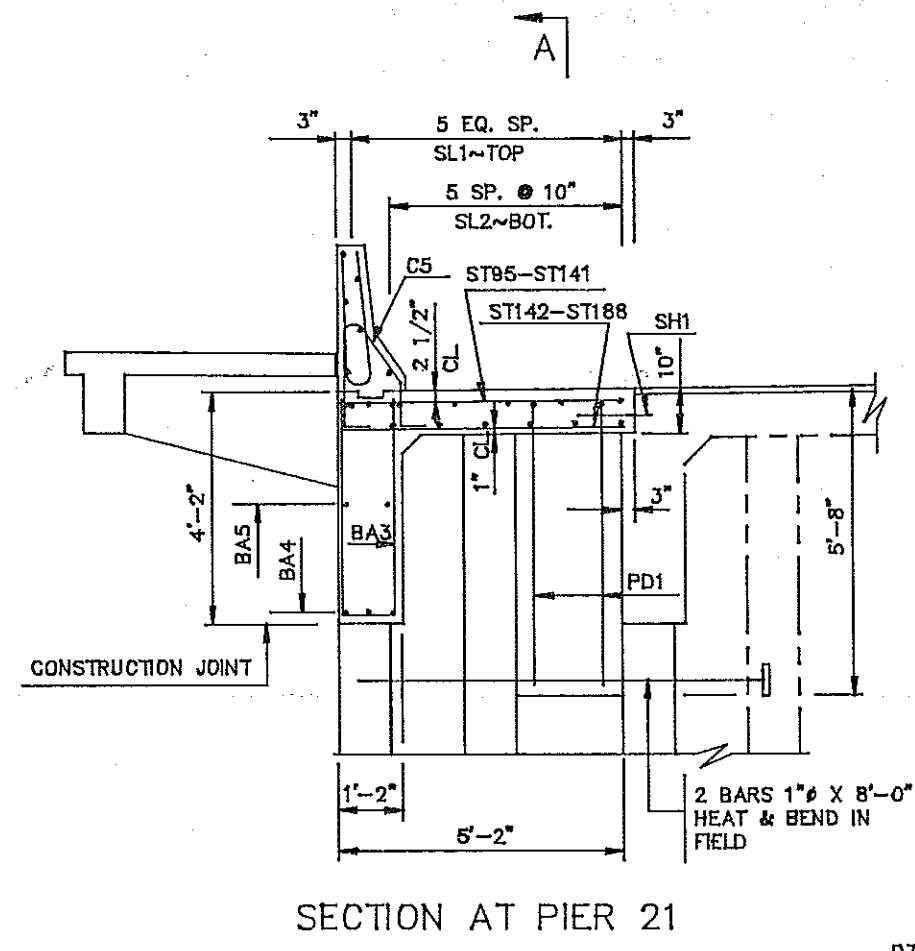
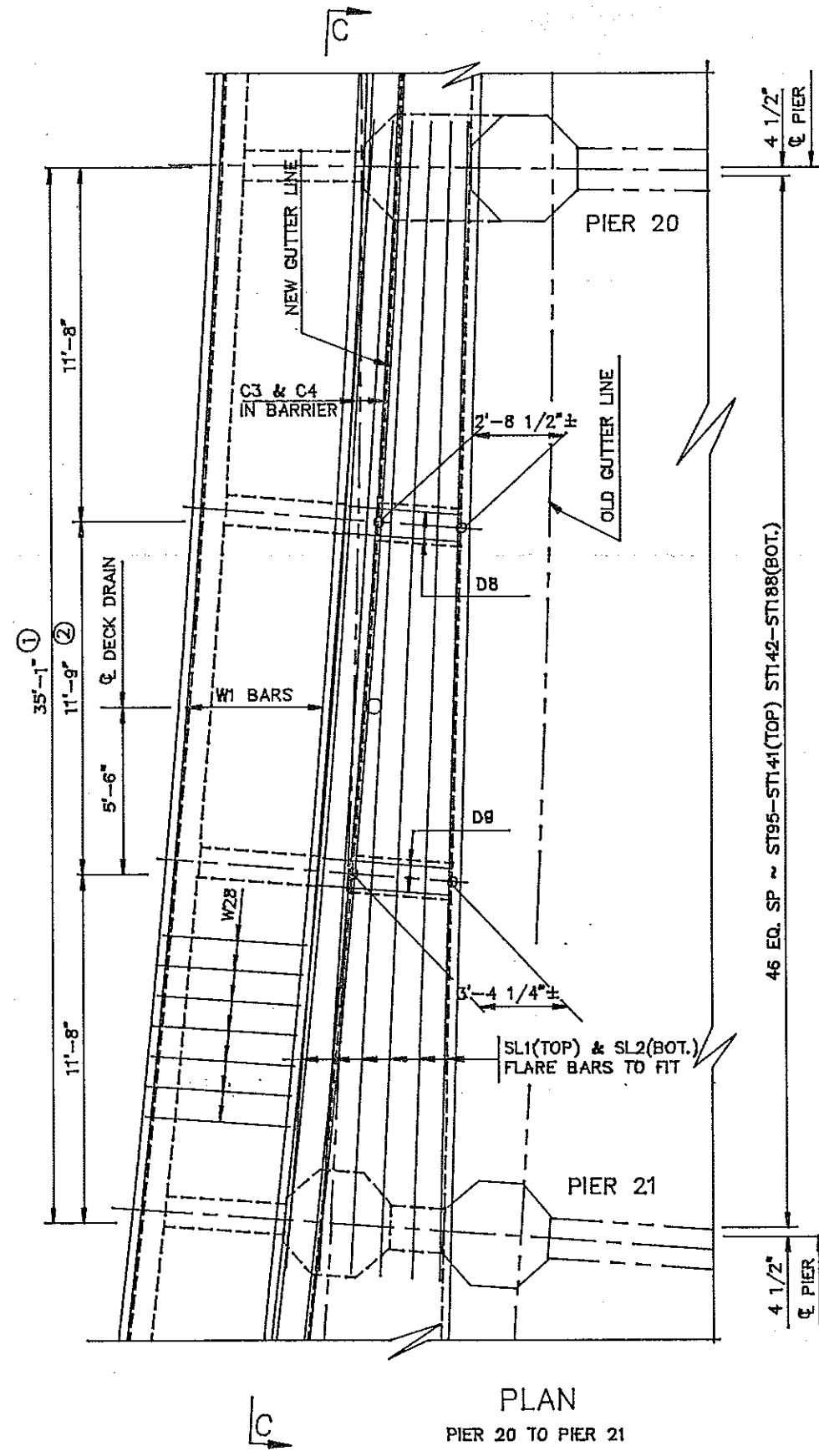


F-F

QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 19 TO PIER 20

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-084(007)920	

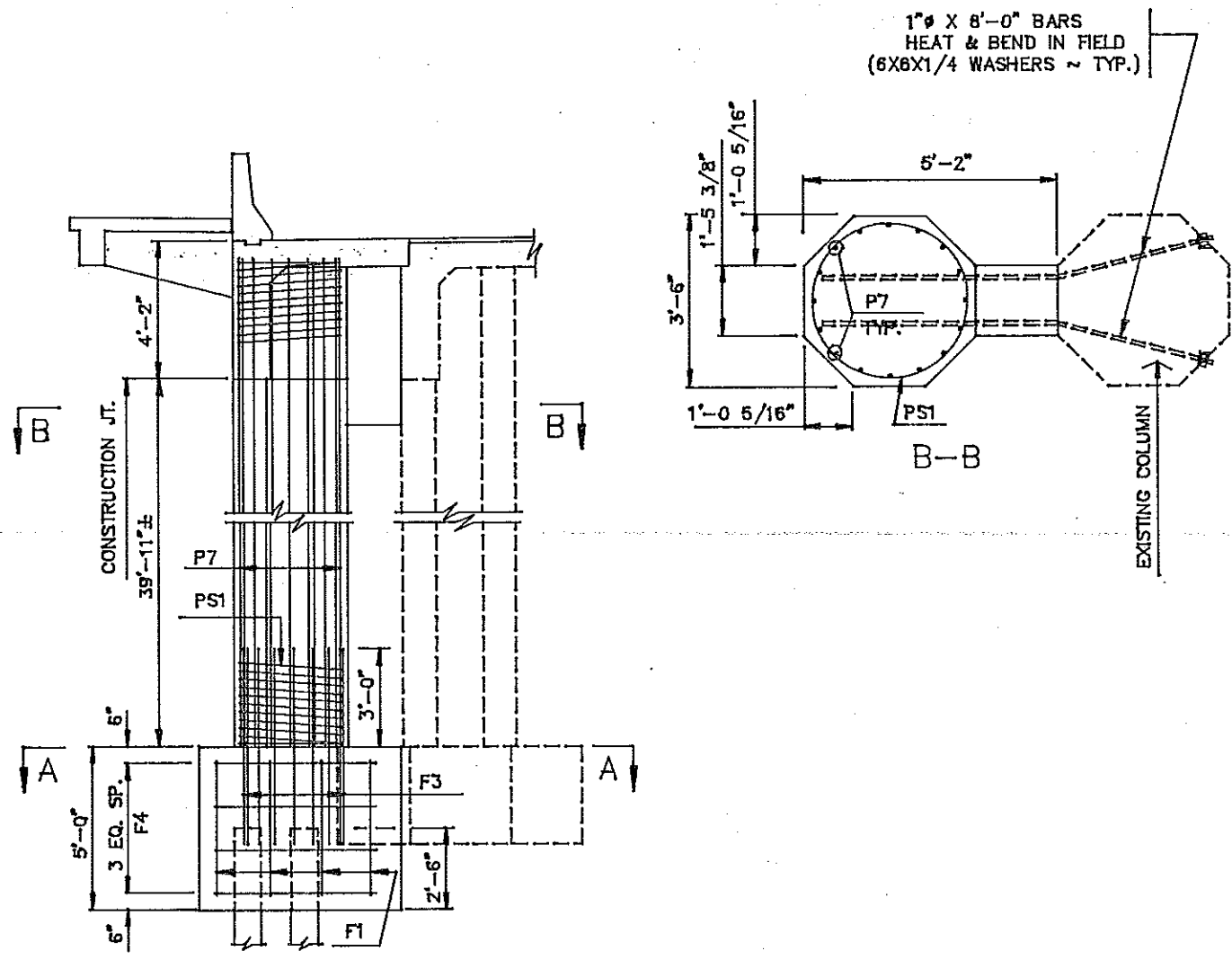


- ① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.
- ② DIAPHRAGMS TO MATCH EXISTING SIDEWALK DIAPHRAGMS.

QUANTITIES
SEE DWG. 94-920.914-29E

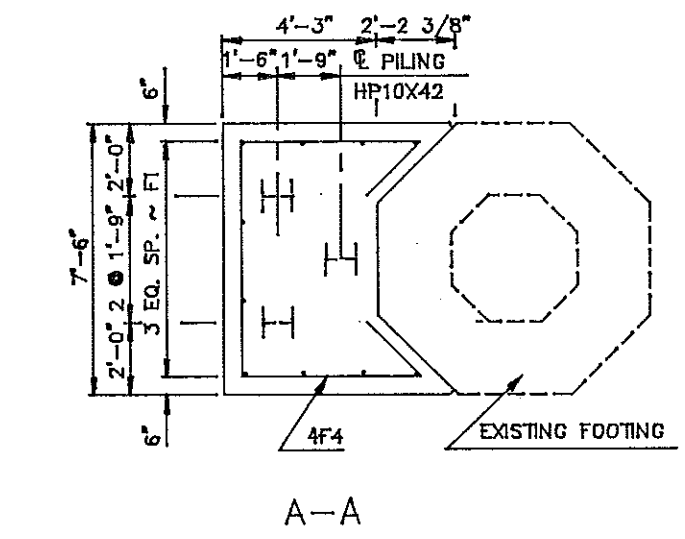
MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 20 TO PIER 21

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	

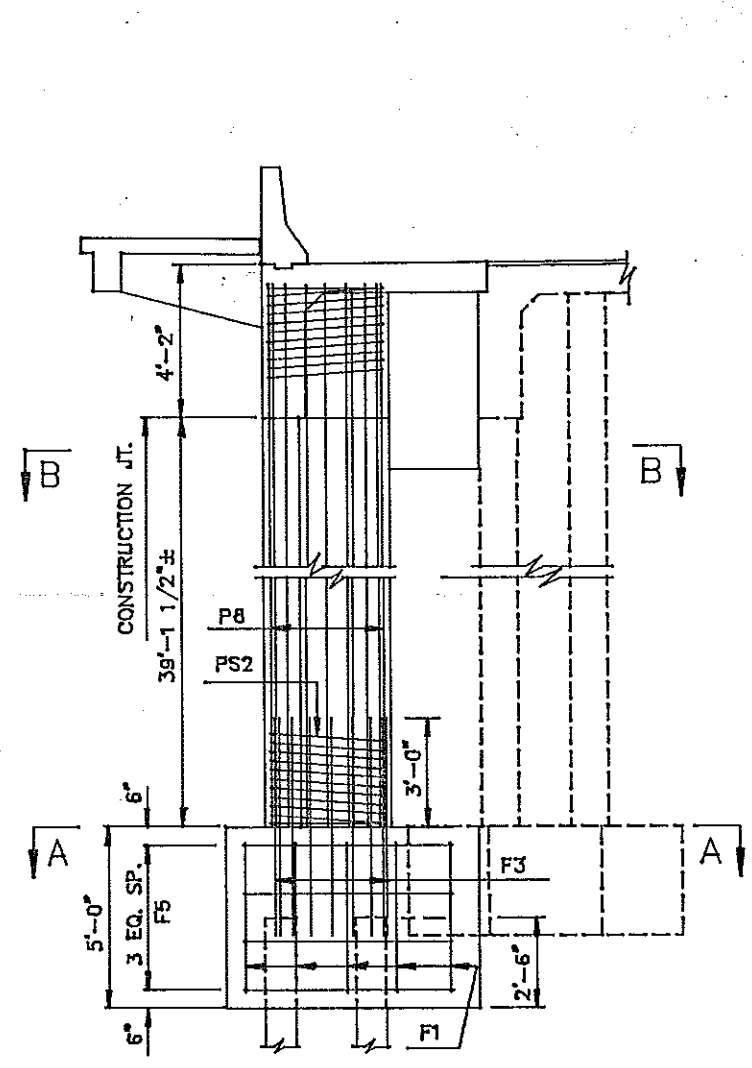


PIER ELEVATION

PIER 21

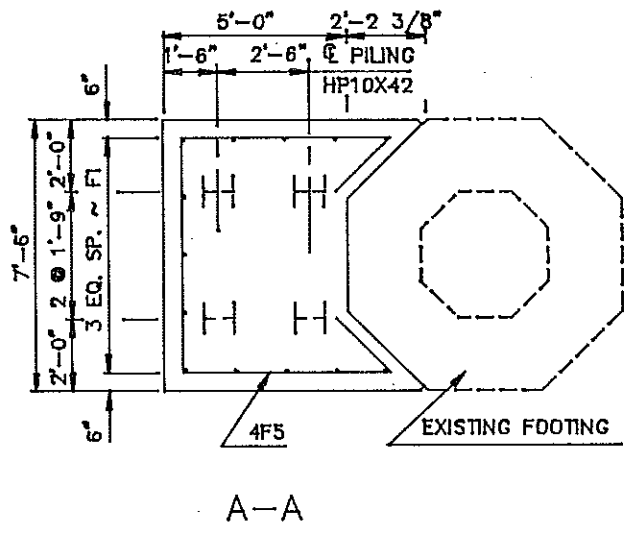


A-A



PIER ELEVATION

PIER 22

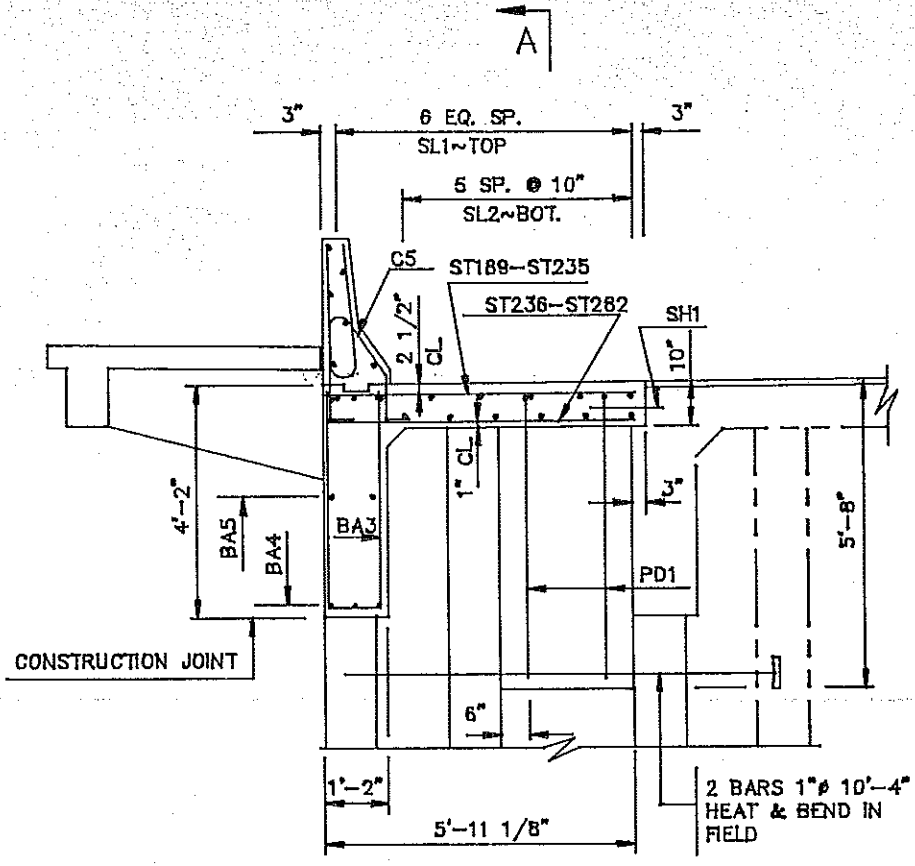
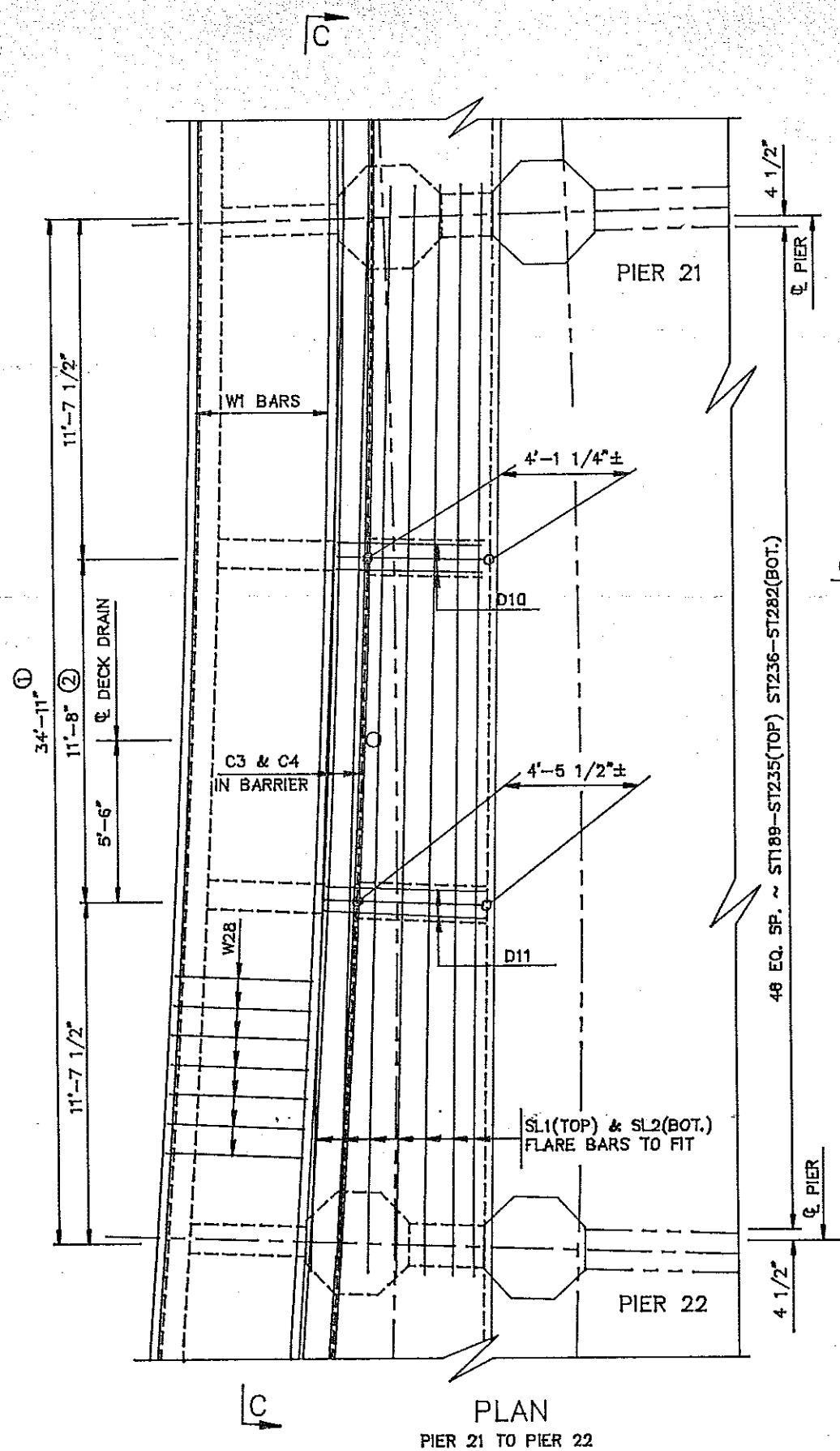


A-A

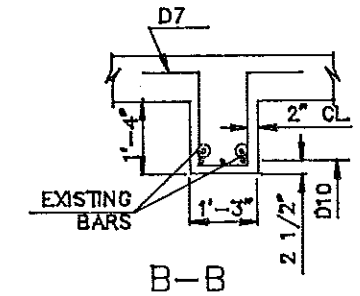
QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIERS 21 & 22

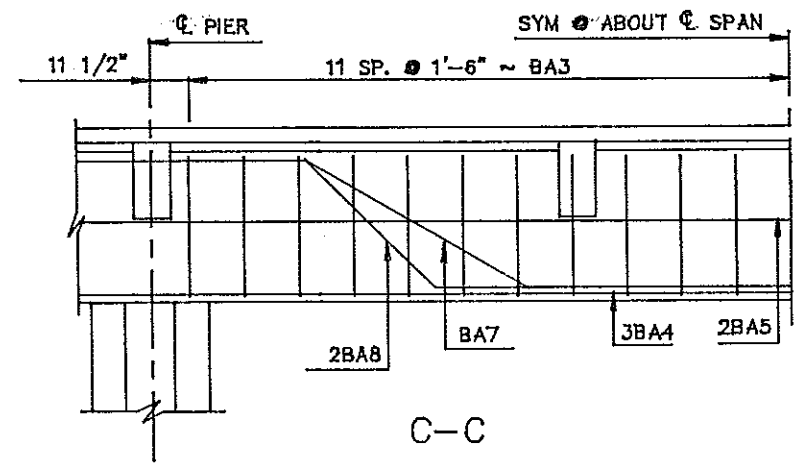
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	



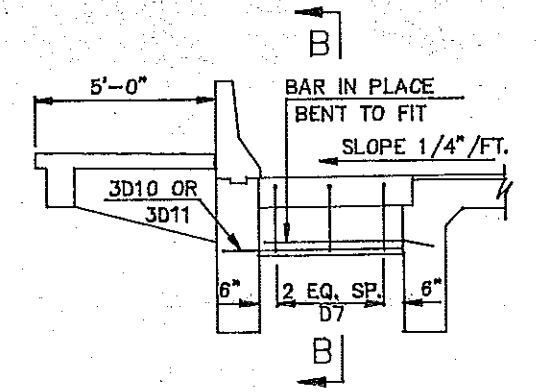
SECTION AT PIER 22



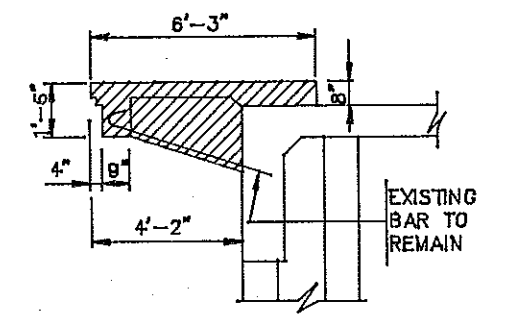
B-B



C-C



SECTION AT INTERMEDIATE DIAPHRAGMS

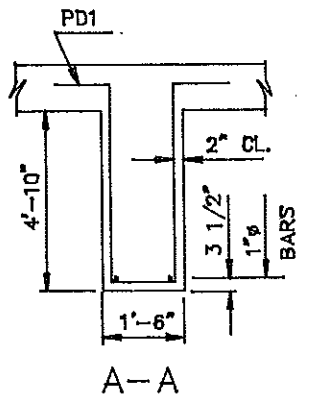


SECTION AT DIAPHRAGMS
CROSS-HATCHED AREA TO BE REMOVED
TYPICAL TO END OF APPROACH

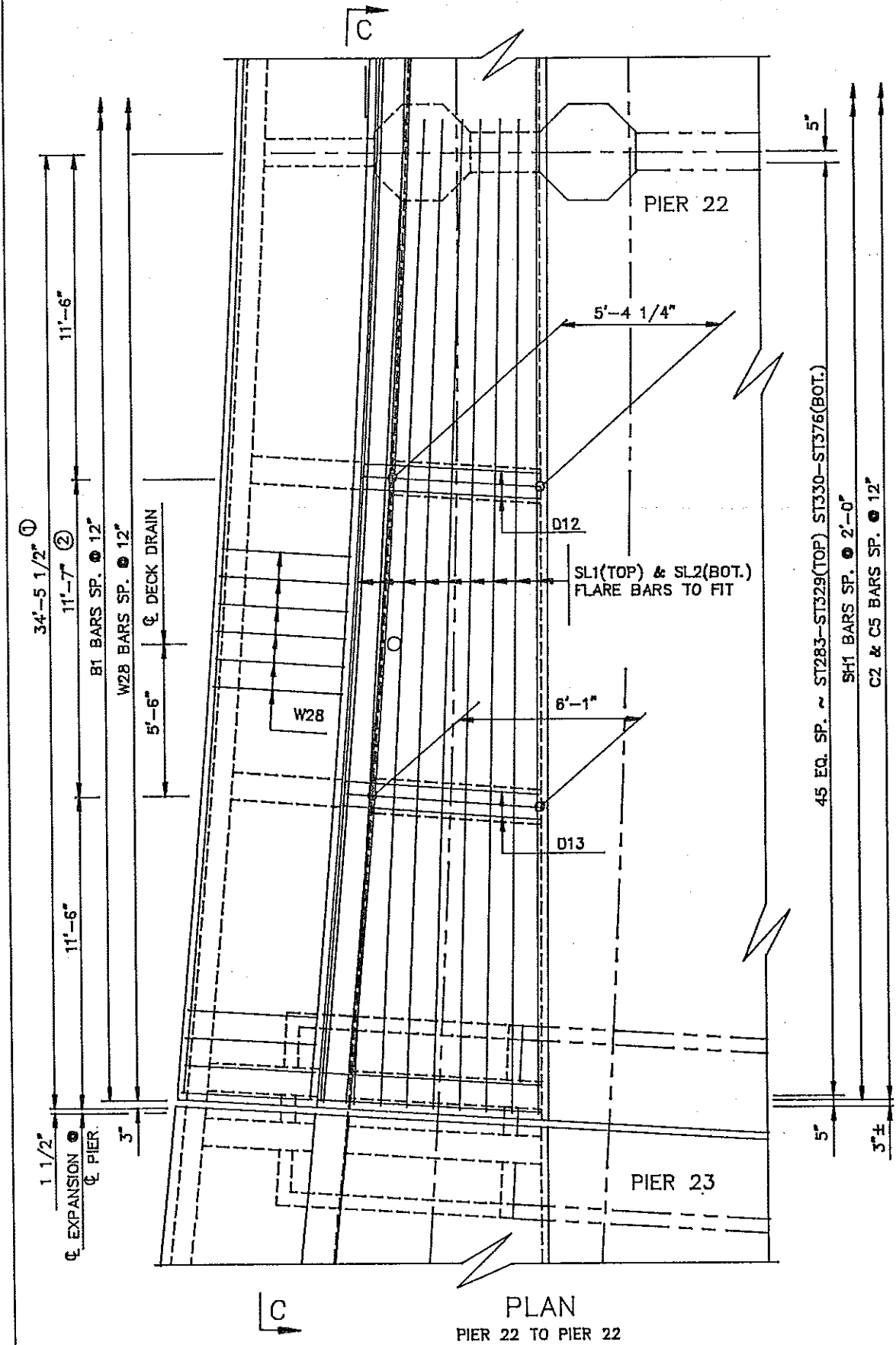
- ① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.
- ② DIAPHRAGMS TO MATCH EXISTING SIDEWALK DIAPHRAGMS.

QUANTITIES
SEE DWG. 94-920.914-29E

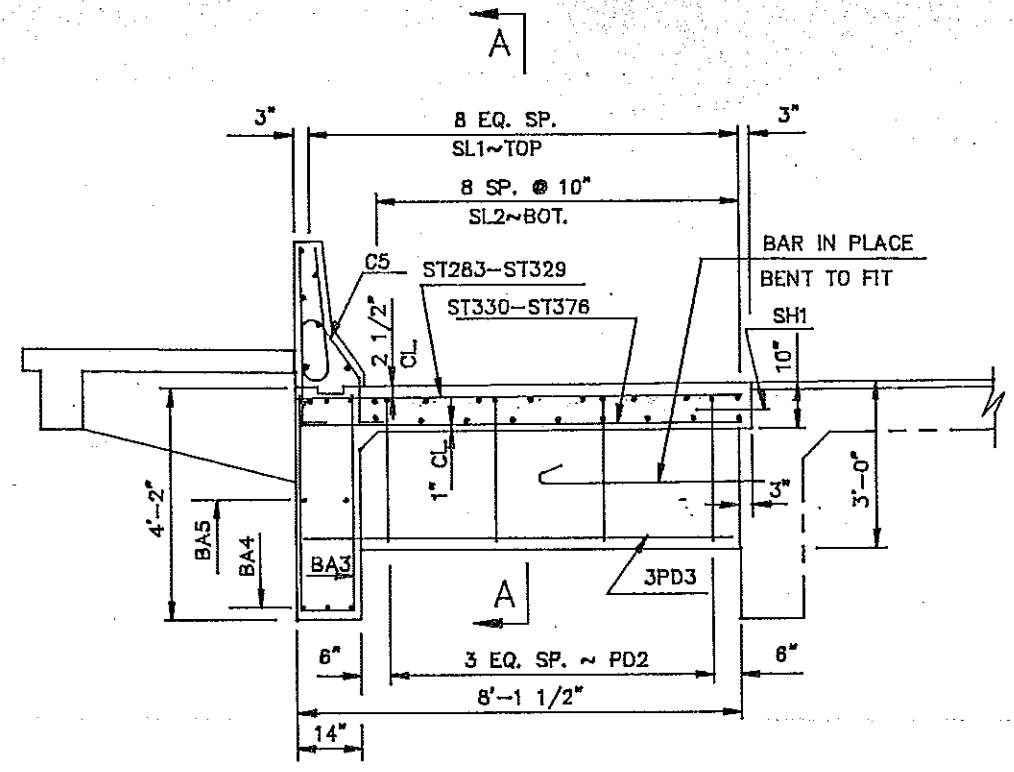
MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 21 TO PIER 22



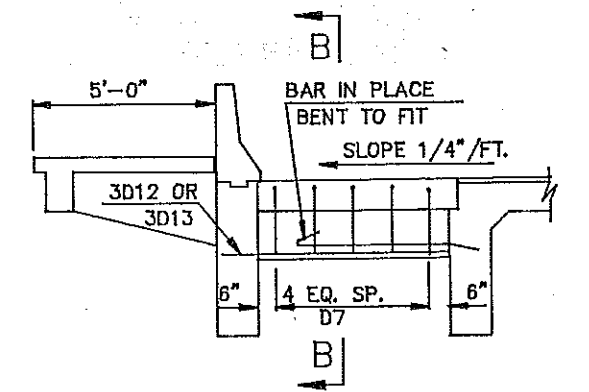
A-A



PLAN
PIER 22 TO PIER 23

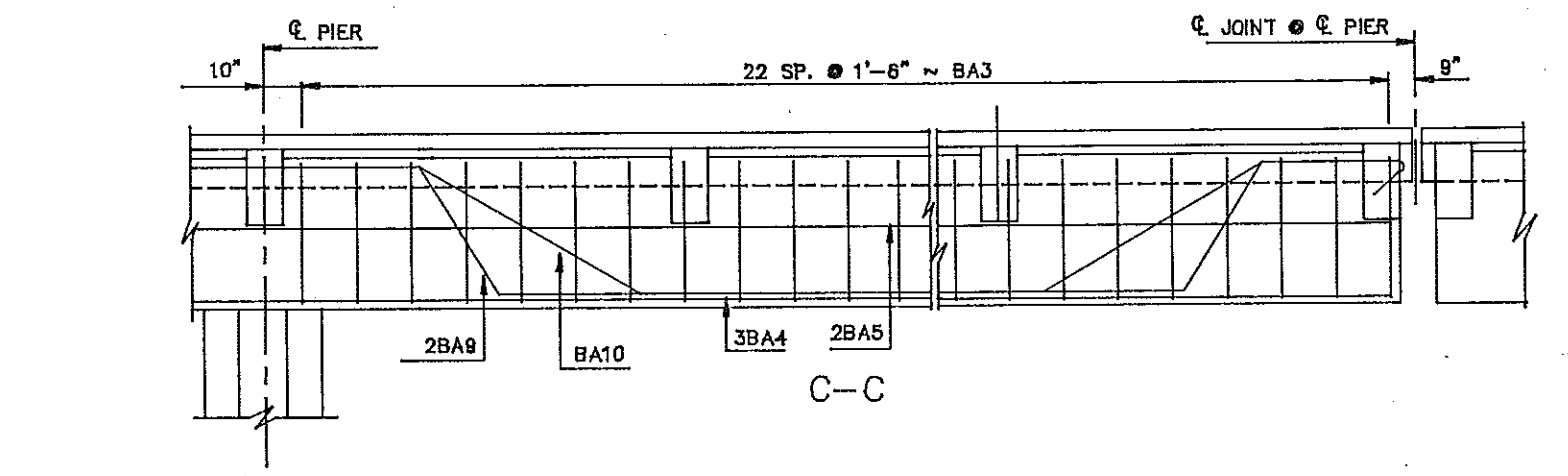


SECTION AT PIER 23

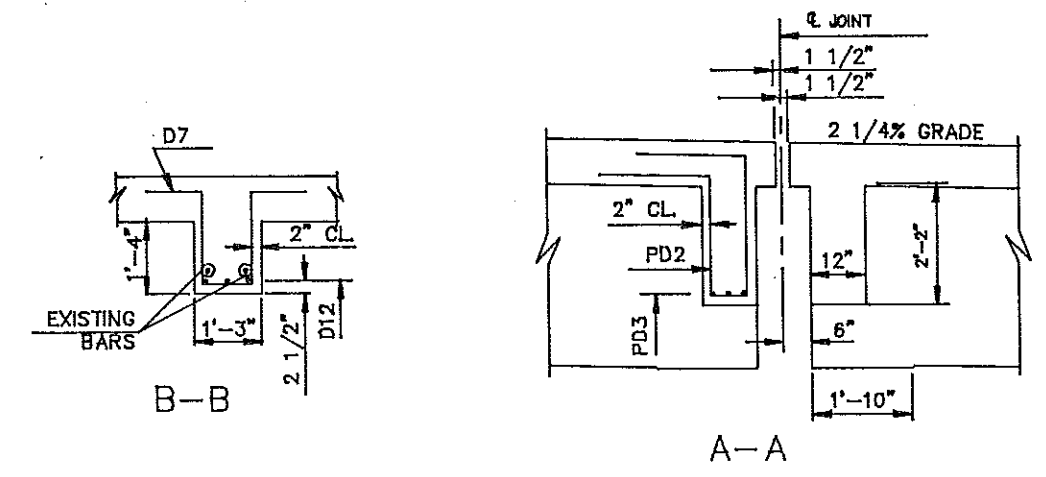


SECTION AT INTERMEDIATE DIAPHRAGMS

- ① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.
- ② DIAPHRAGMS TO MATCH EXISTING SIDEWALK DIAPHRAGMS.



C-C

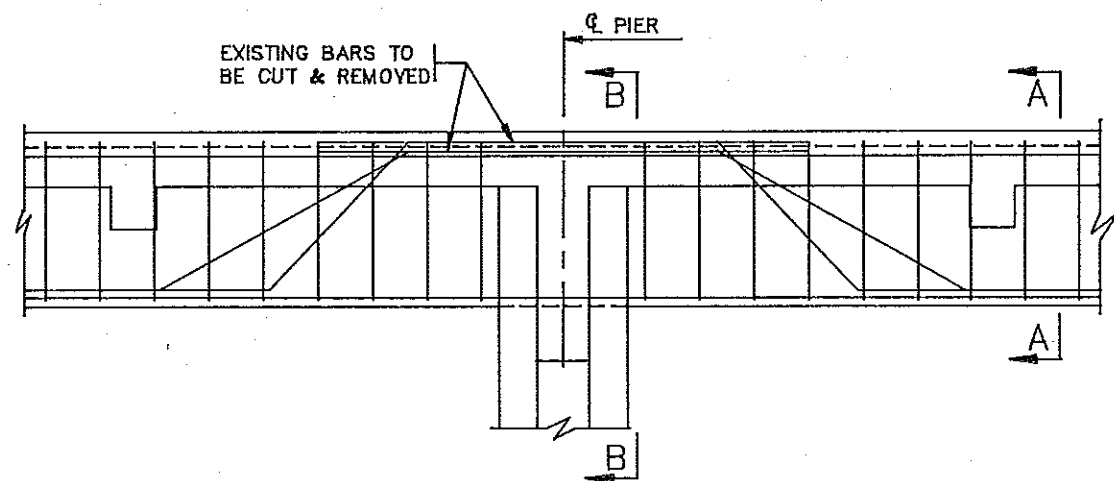


B-B

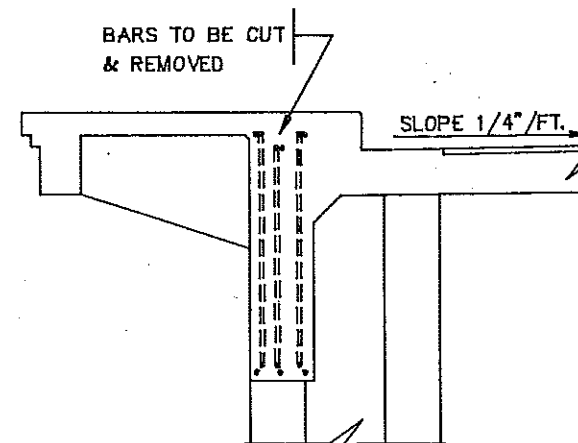
A-A

QUANTITIES	
SEE DWG. 94-920.914-29E	

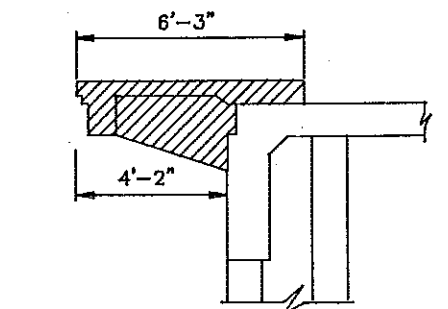
MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 22 TO PIER 23



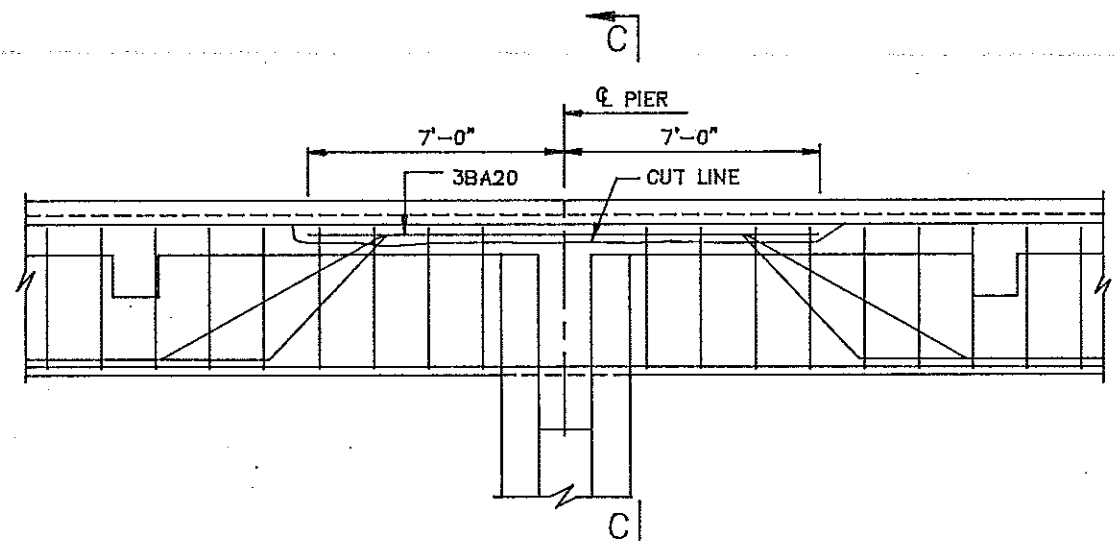
EXISTING OUTSIDE BEAM
SHOWING EXISTING REINFORCING STEEL



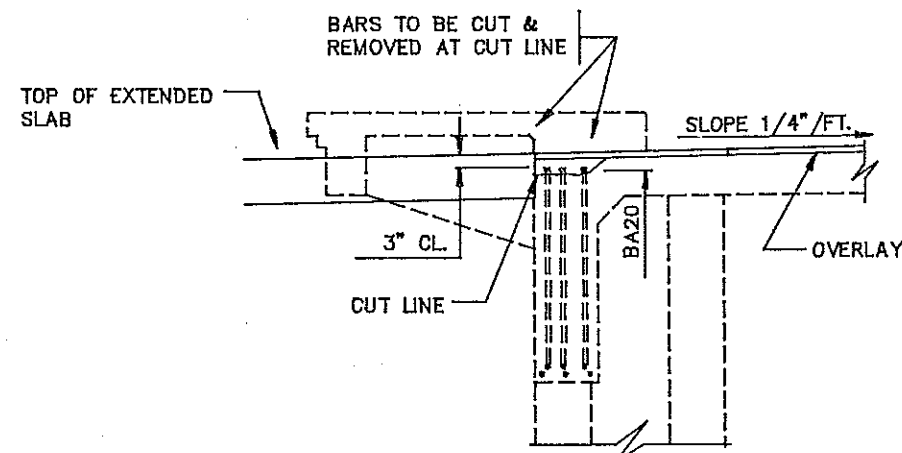
B-B



REMOVAL SECTION
CROSS-HATCHED AREA TO BE REMOVED



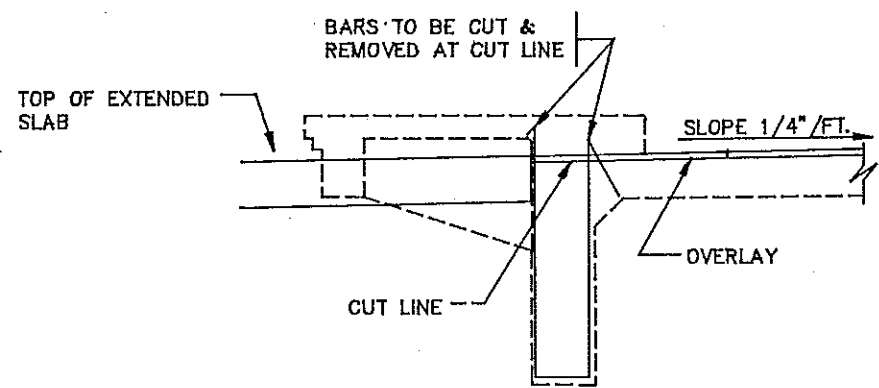
EXISTING OUTSIDE BEAM
SHOWING EXISTING STEEL CUT & NEW STEEL



C-C

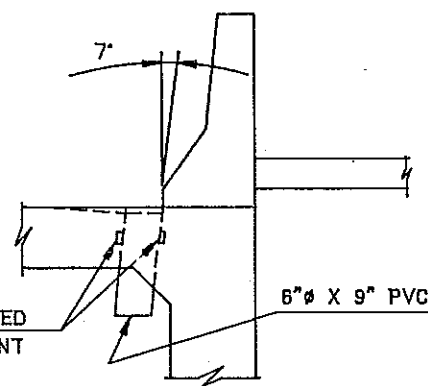
NOTE:

PIER 23 - CUT EXISTING STEEL.
NO NEW STEEL REQUIRED.



A-A

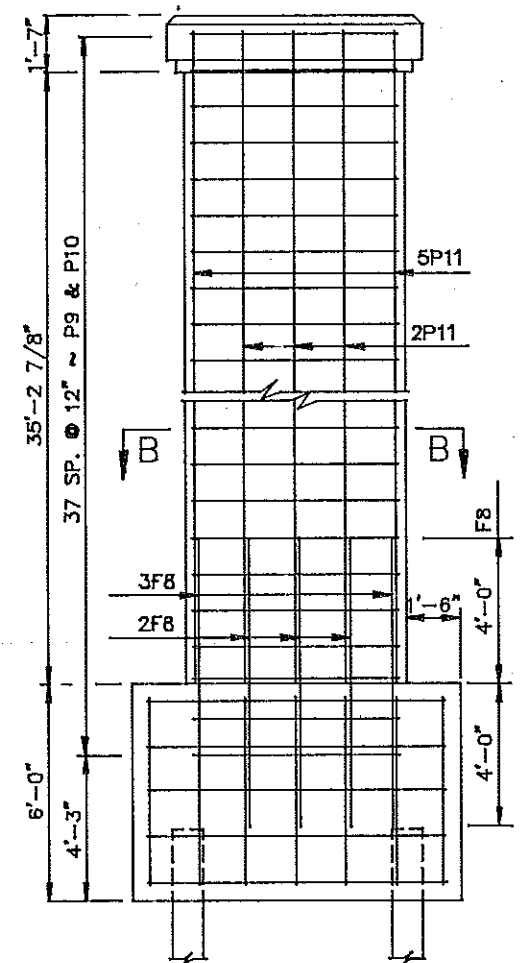
2"x2" PVC CEMENTED
TO PIPE TO PREVENT
SLIPPAGE



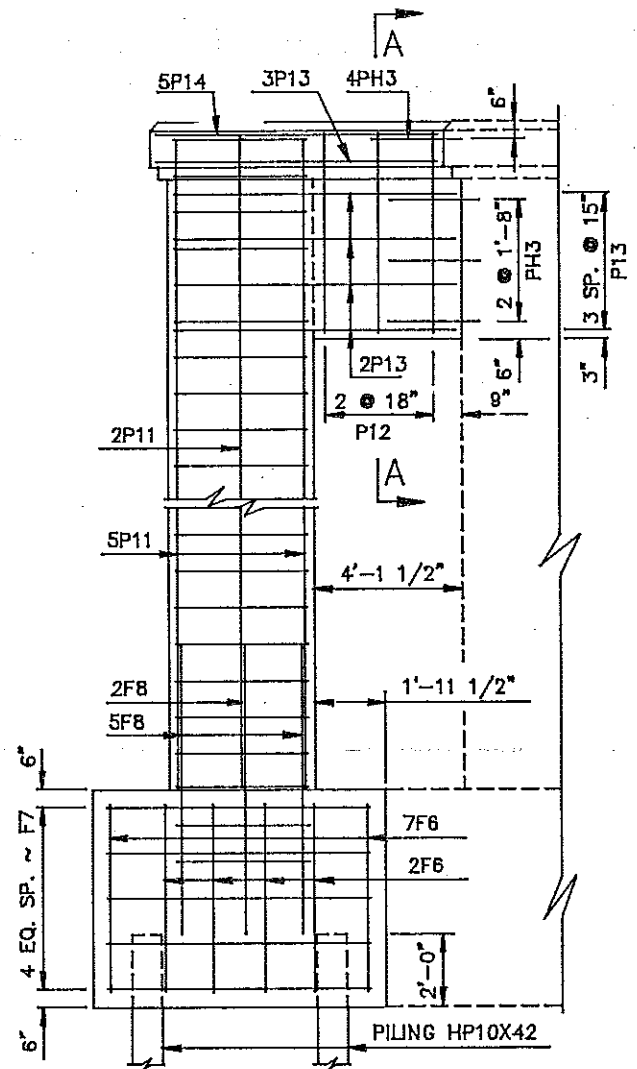
DECK DRAIN DETAIL
LABOR & MATERIALS TO INSTALL DECK DRAINS SHALL
BE INCIDENTAL TO CLASS AAE-3 CONCRETE.

QUANTITIES

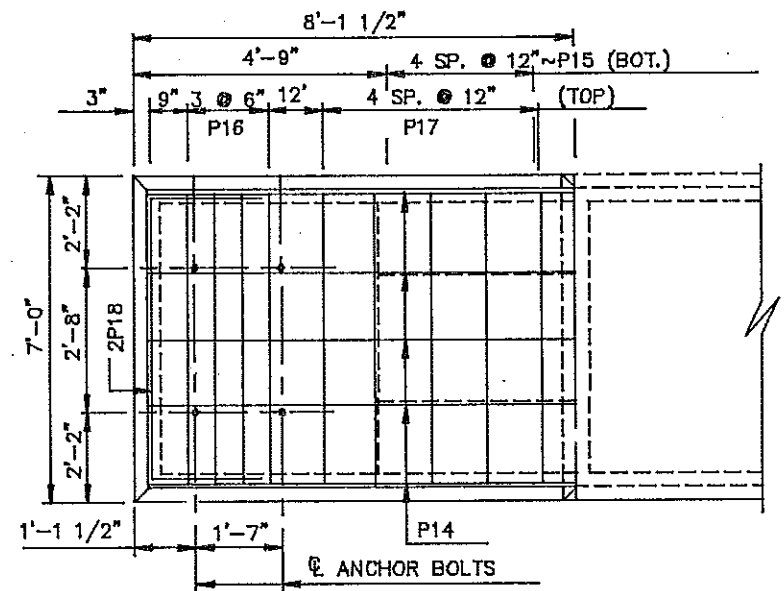
MEMORIAL BRIDGE
EAST APPROACH
WIDENING
EXISTING OUTSIDE BEAM



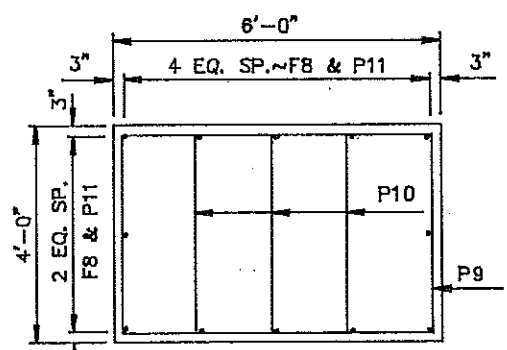
FRONT VIEW



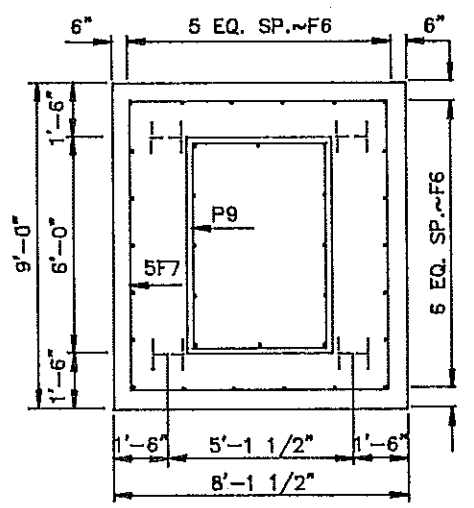
ELEVATION



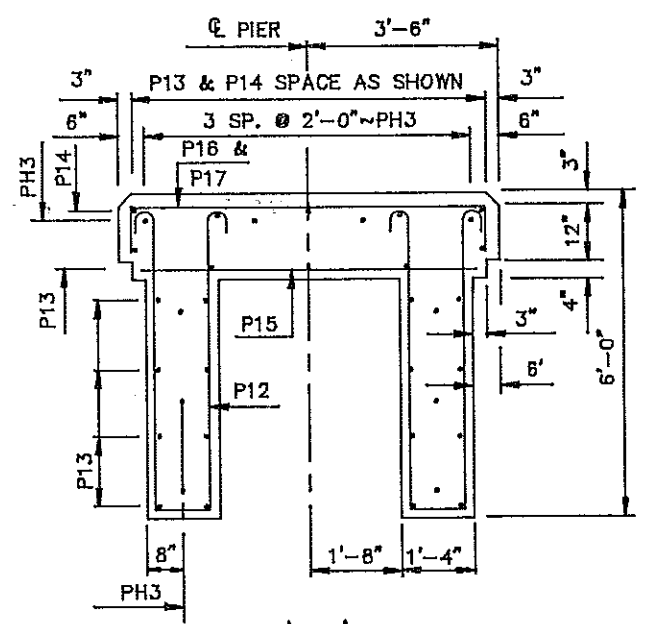
TOP VIEW



B-B



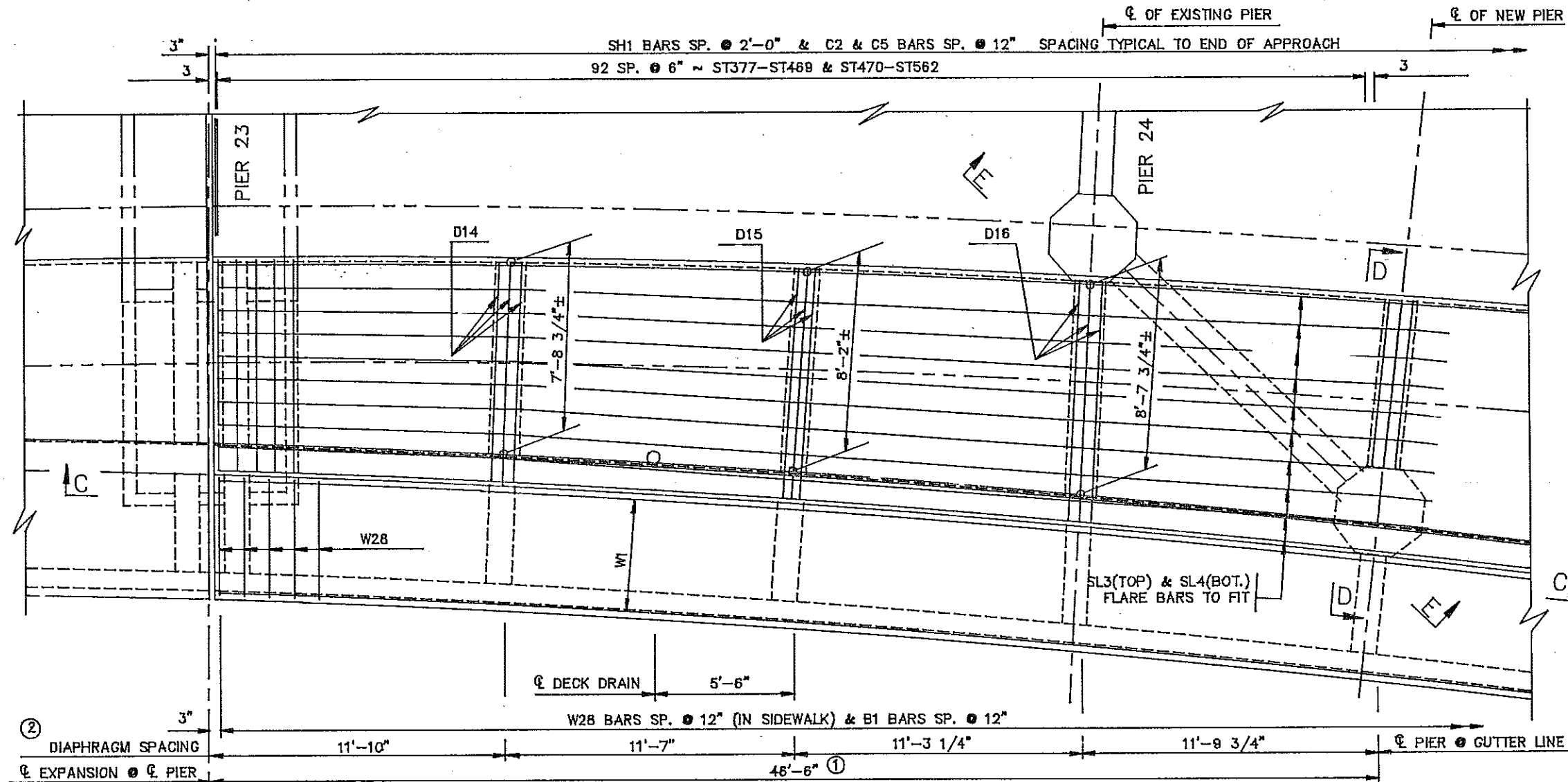
FOOTING PLAN



A-A

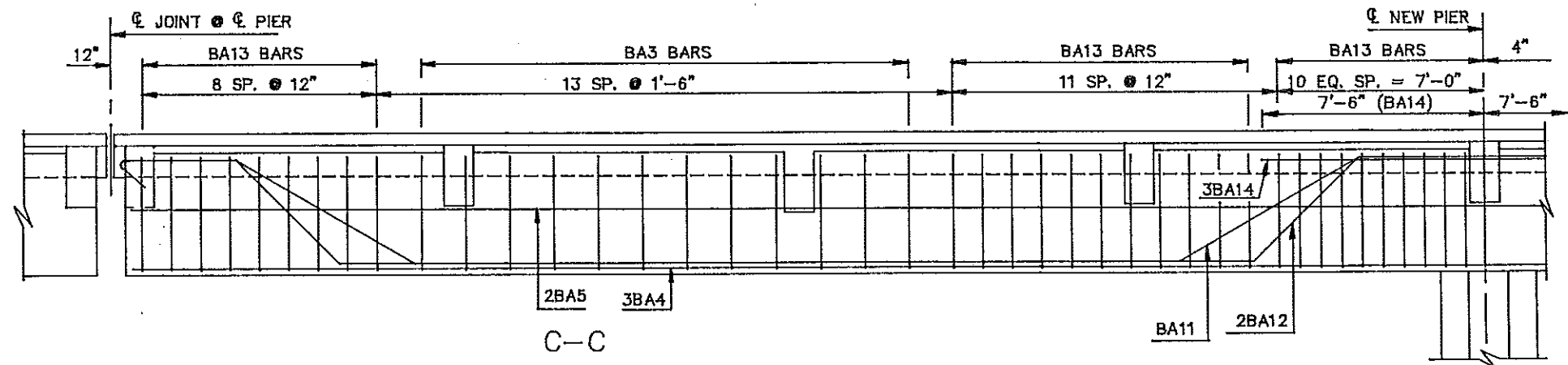
QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 23



PLAN
PIER 23 TO PIER 24

SEE DWG. 94-920.914-12E
FOR SECTIONS D-D, E-E.

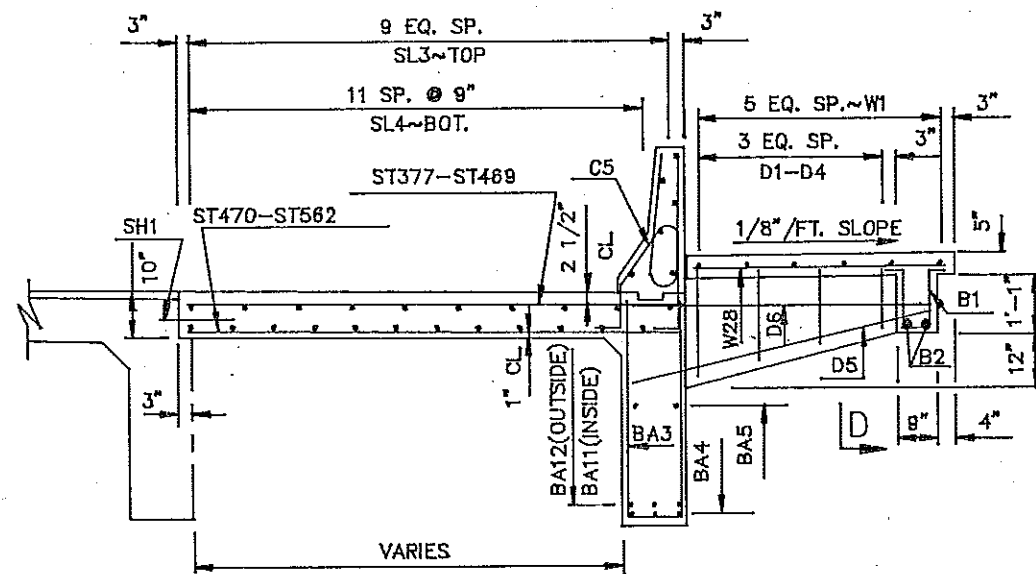


QUANTITIES
SEE DWG. 94-920.914-29E

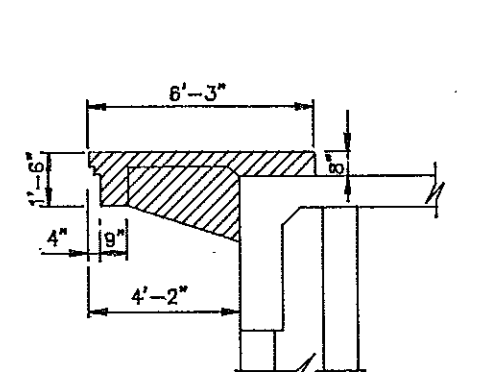
MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 23 TO PIER 24

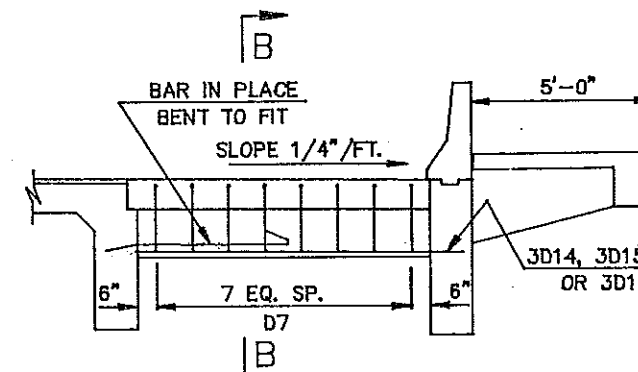
94-920.914-11E



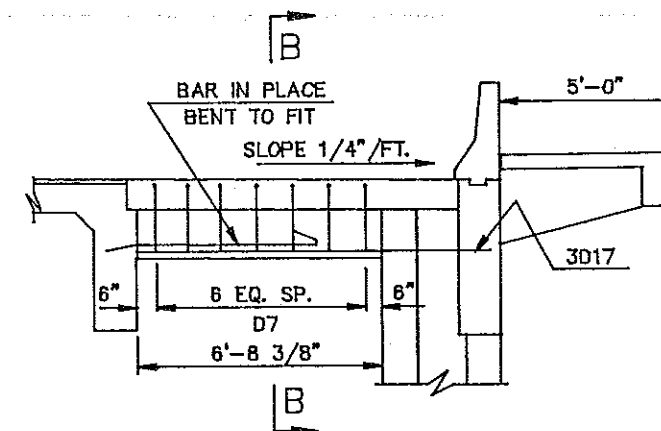
TYPICAL SLAB SECTION
BETWEEN PIER 23 & NEW PIER 24



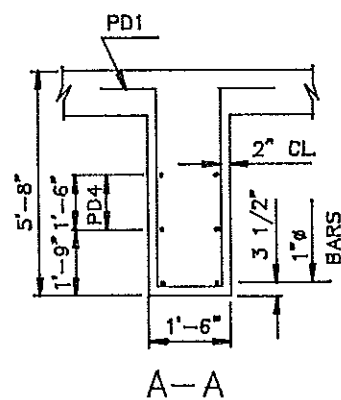
SECTION AT DIAPHRAGMS
CROSS-HATCHED AREA TO BE REMOVED



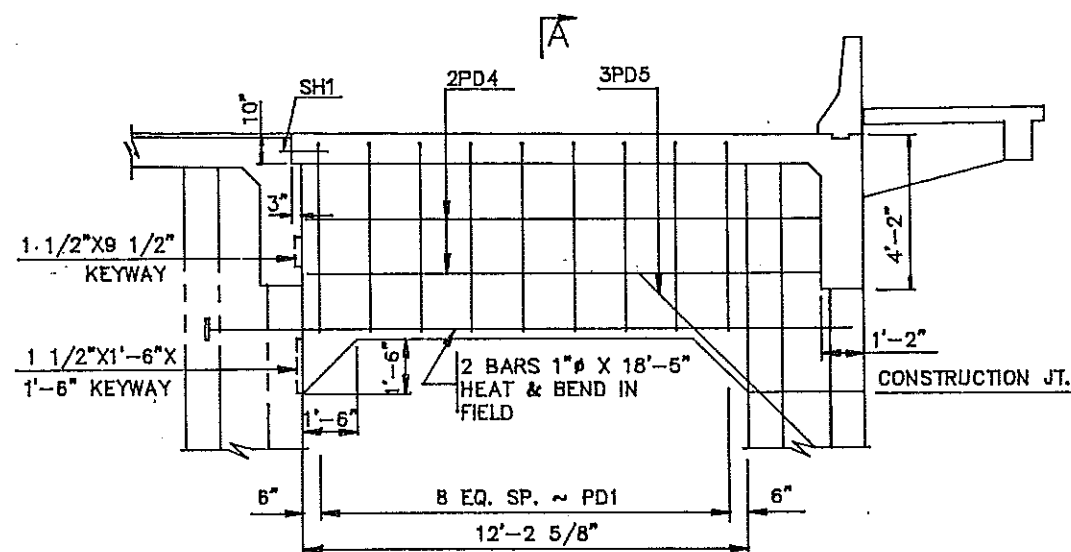
SECTION AT INTERMEDIATE
DIAPHRAGMS



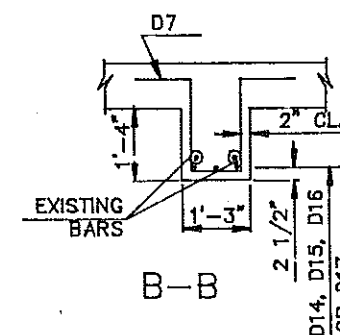
D-D
DIAPHRAGM TO MATCH
EXISTING BARS. ADJUST
IF NECESSARY.



A-A

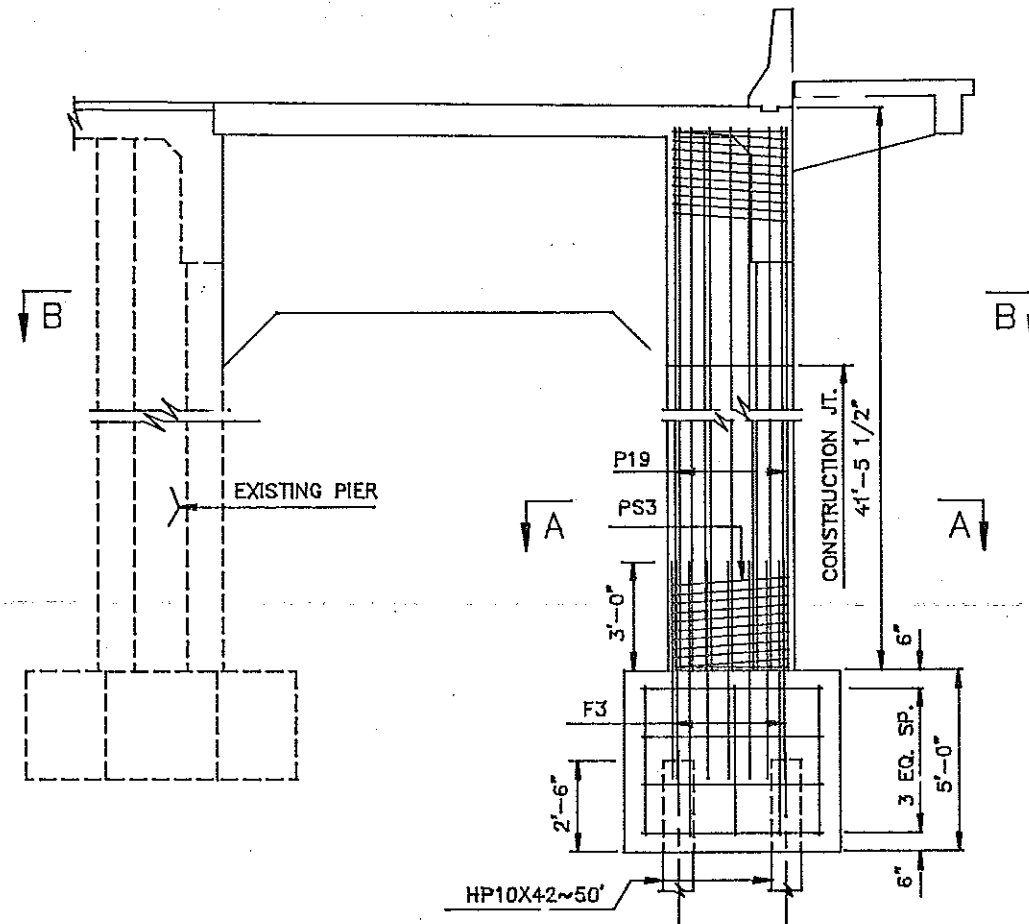


E-E

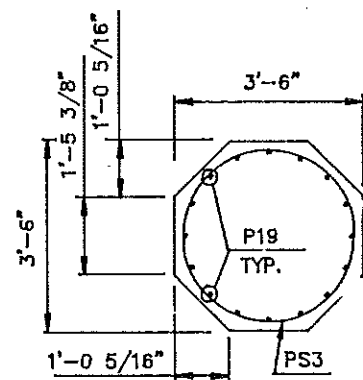


B-B

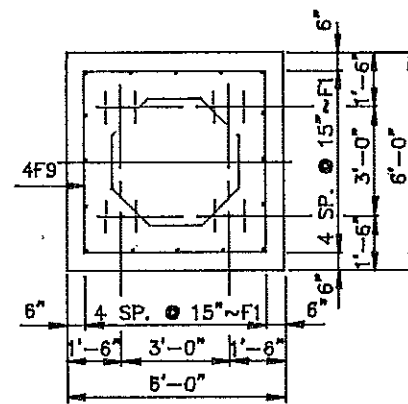
QUANTITIES	
SEE DWG. 94-920.914-29E	
MEMORIAL BRIDGE EAST APPROACH WIDENING	
PIER 23 TO PIER 24	



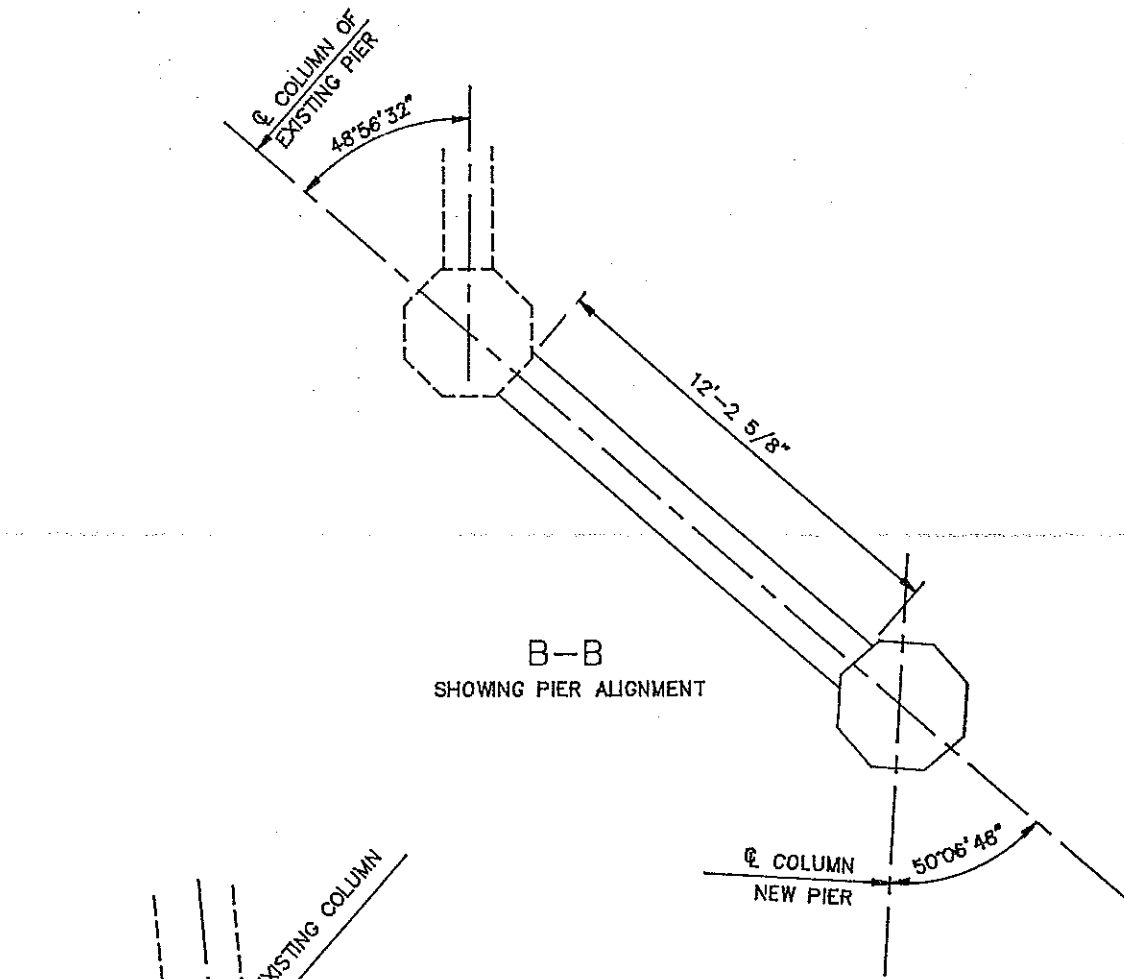
PIER ELEVATION



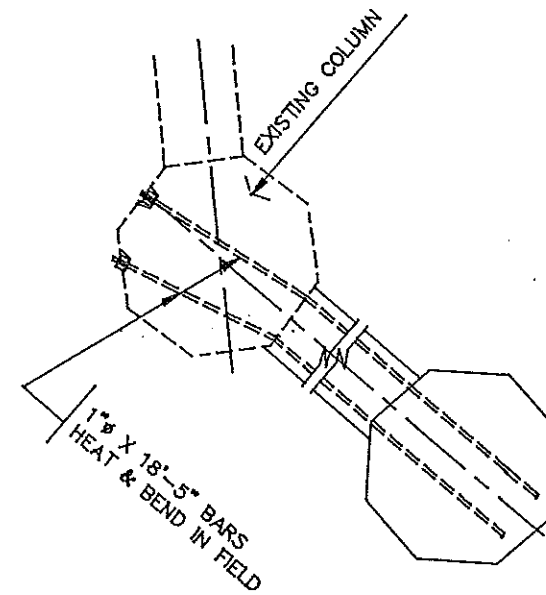
A-A



FOOTING PLAN



B-B
SHOWING PIER ALIGNMENT



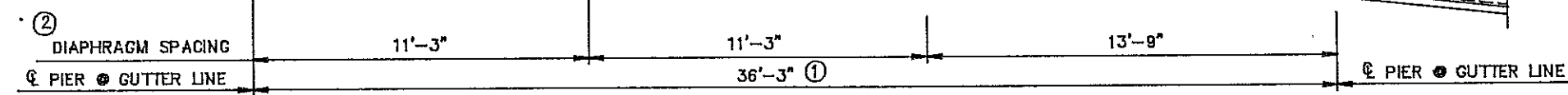
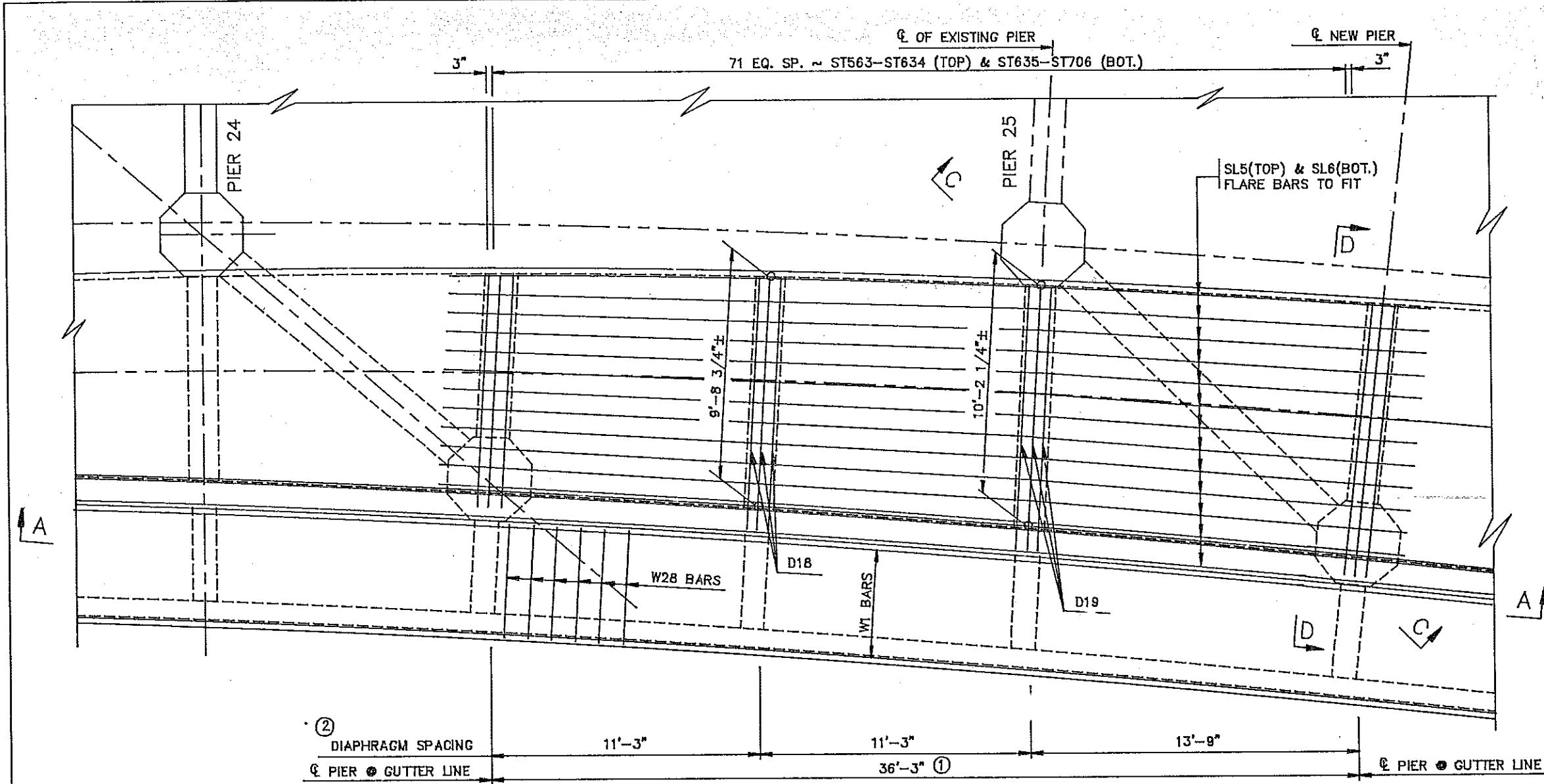
B-B
SHOWING 1" BAR THROUGH
EXISTING PIER COLUMN

QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 24

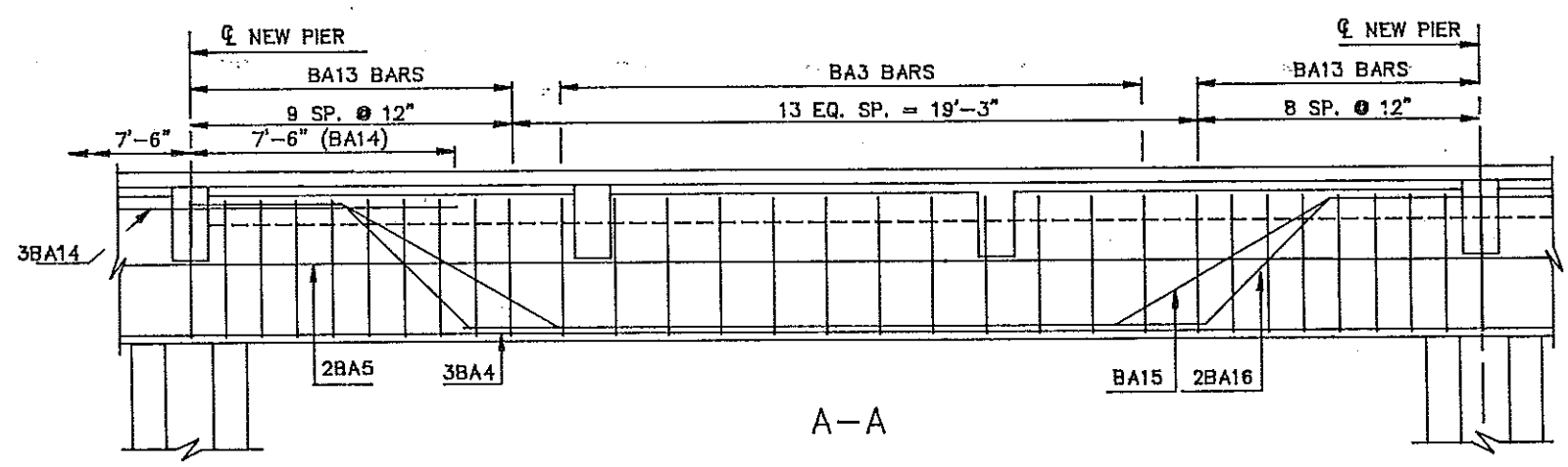
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PLAN
PIER 24 TO PIER 25

- ① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.
- ② DIAPHRAGMS TO MATCH EXISTING SIDEWALK DIAPHRAGMS.

SEE DWG. 94-920.914-15E FOR SECTIONS C-C & D-D.

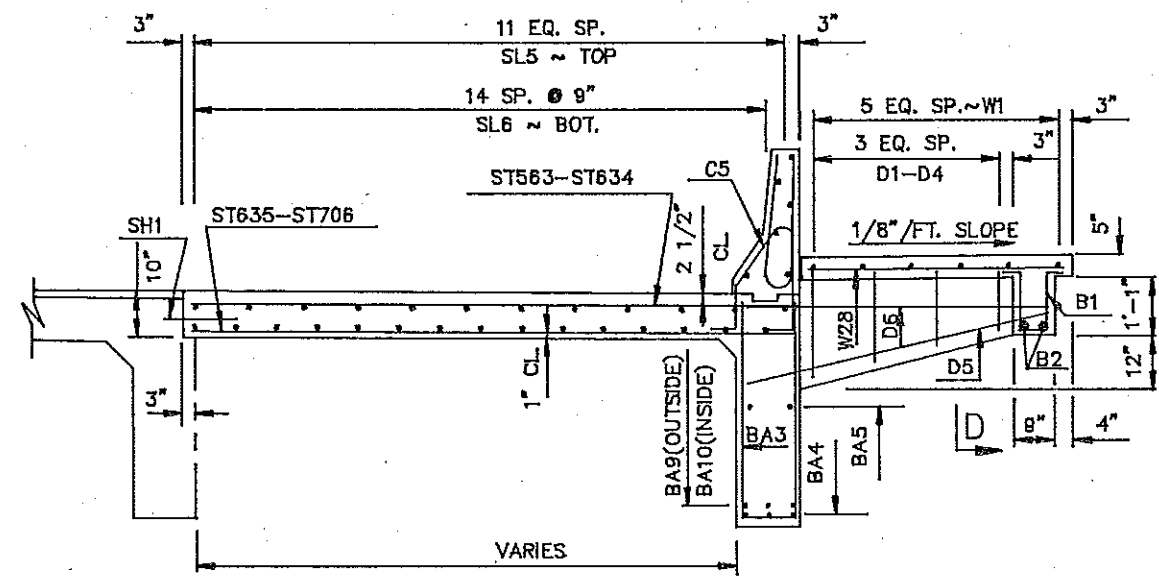


A-A

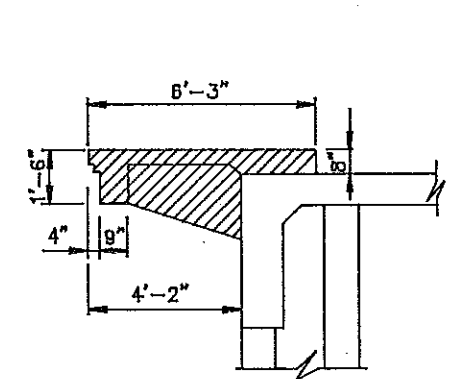
QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 24 TO PIER 25

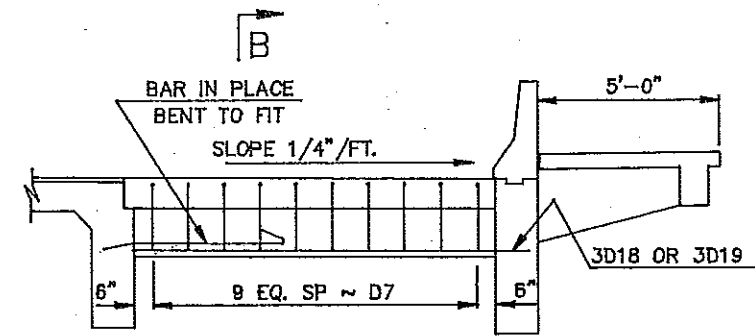
94-920.914-14E



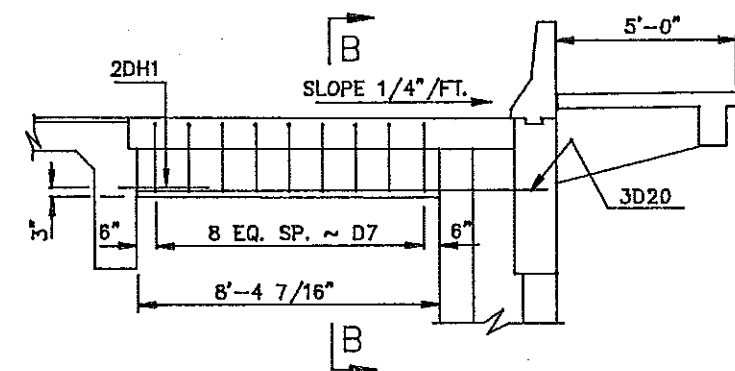
TYPICAL SLAB SECTION
BETWEEN NEW PIER 24 & NEW PIER 25



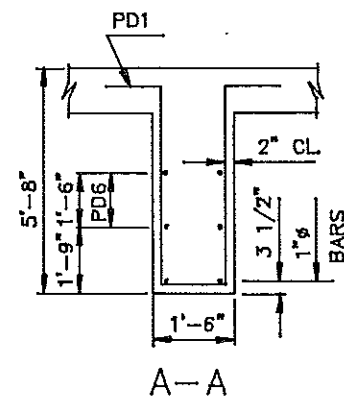
SECTION AT DIAPHRAGMS
CROSS-HATCHED AREA TO BE REMOVED



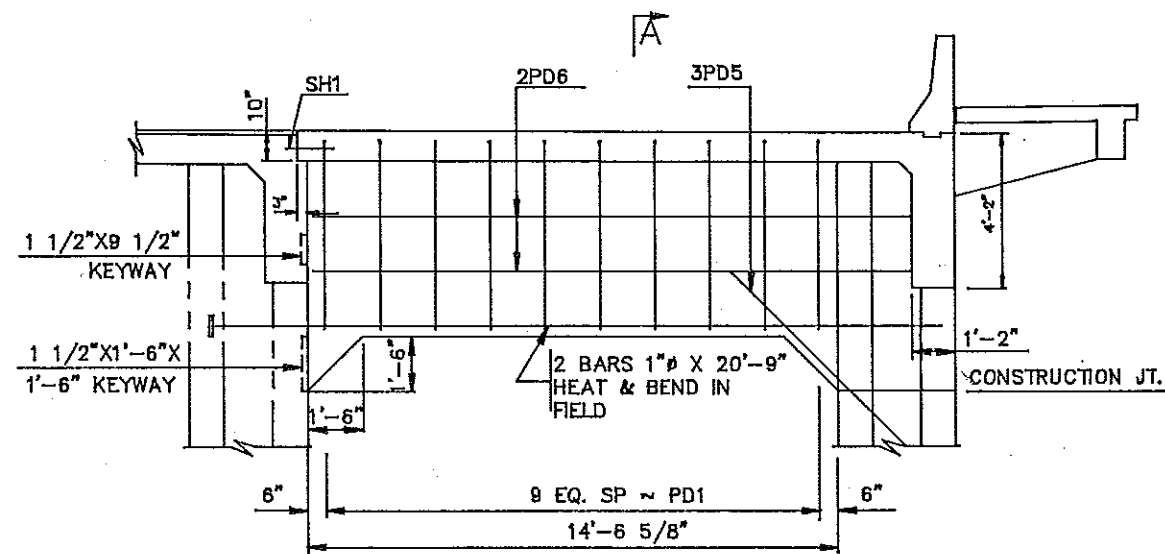
SECTION AT INTERMEDIATE
DIAPHRAGMS



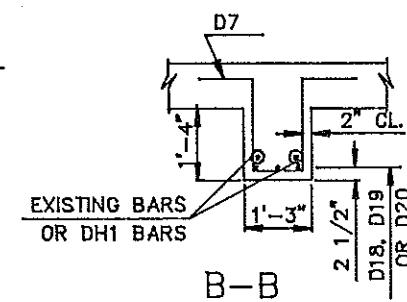
D-D



A-A

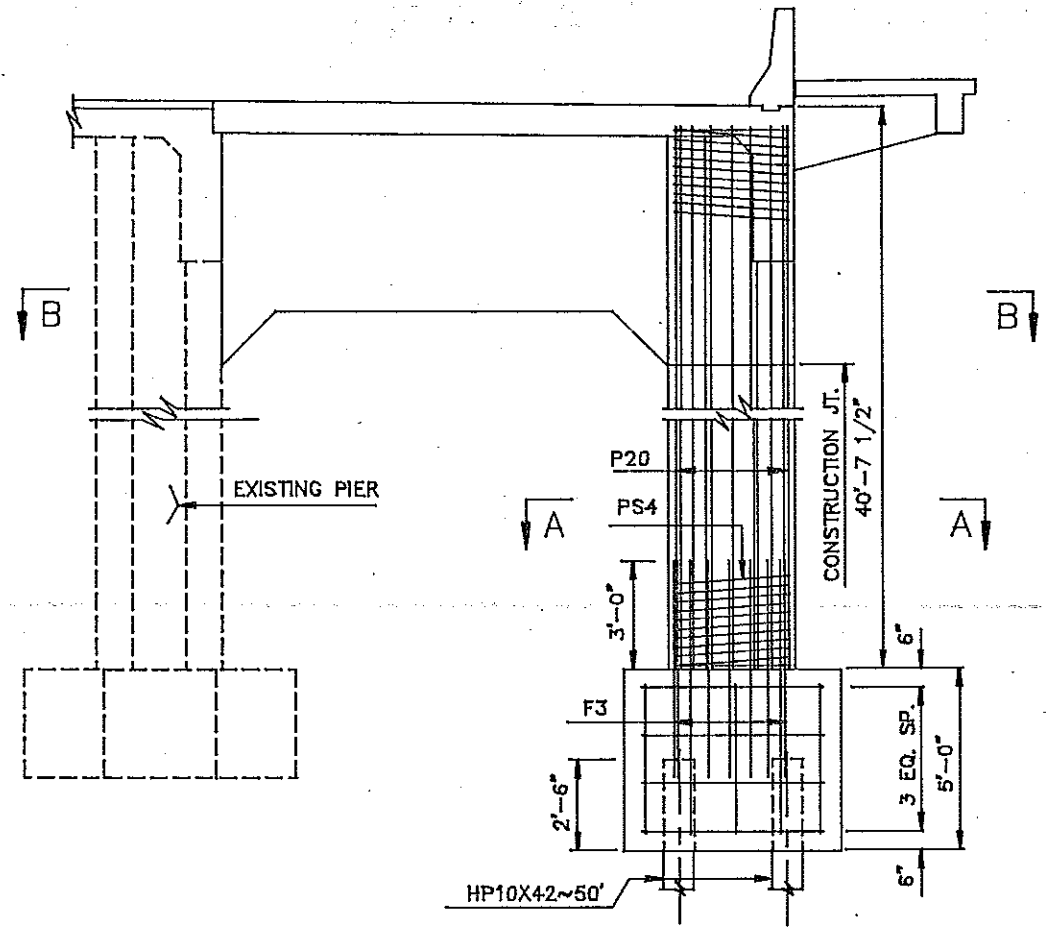


C-C

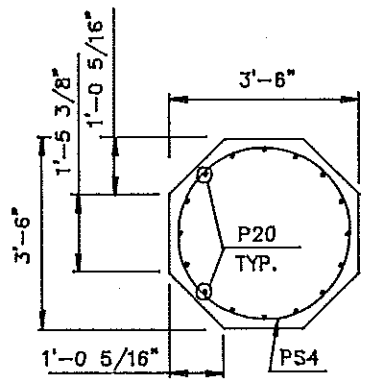


B-B

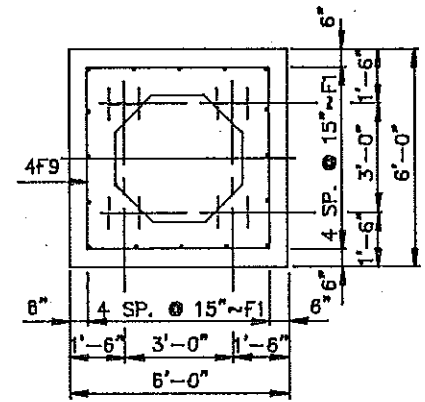
QUANTITIES	
SEE DWG. 94-920.914-29E	
MEMORIAL BRIDGE EAST APPROACH WIDENING PIER 24 TO PIER 25	



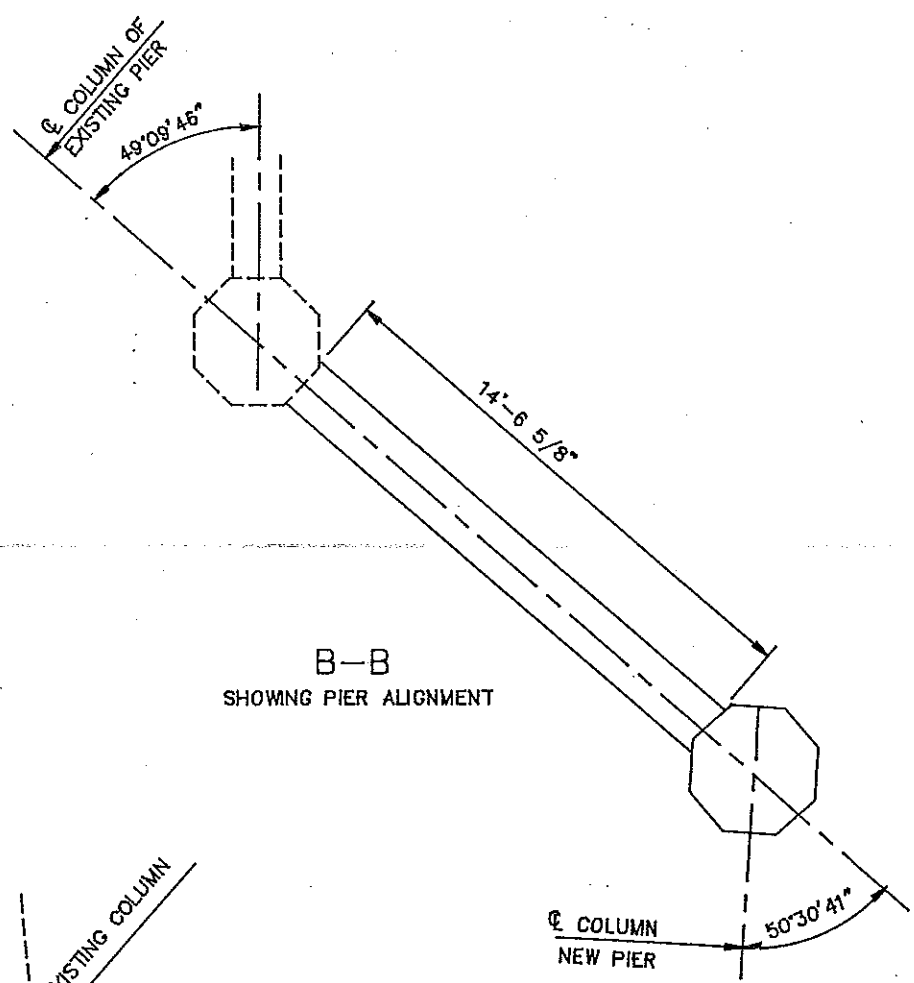
PIER ELEVATION



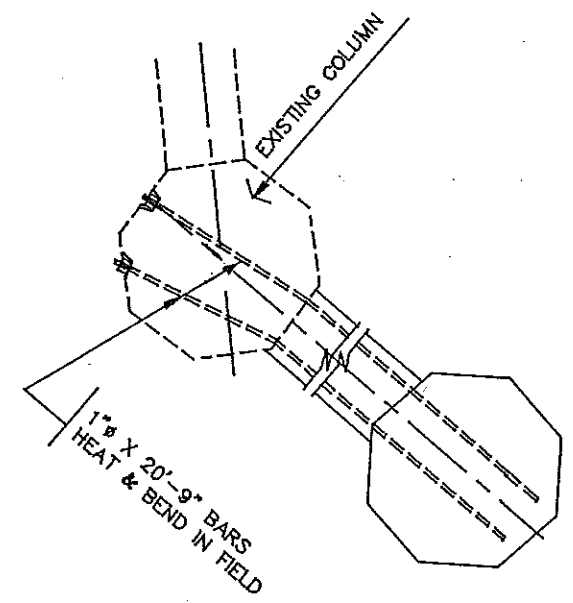
A-A



FOOTING PLAN



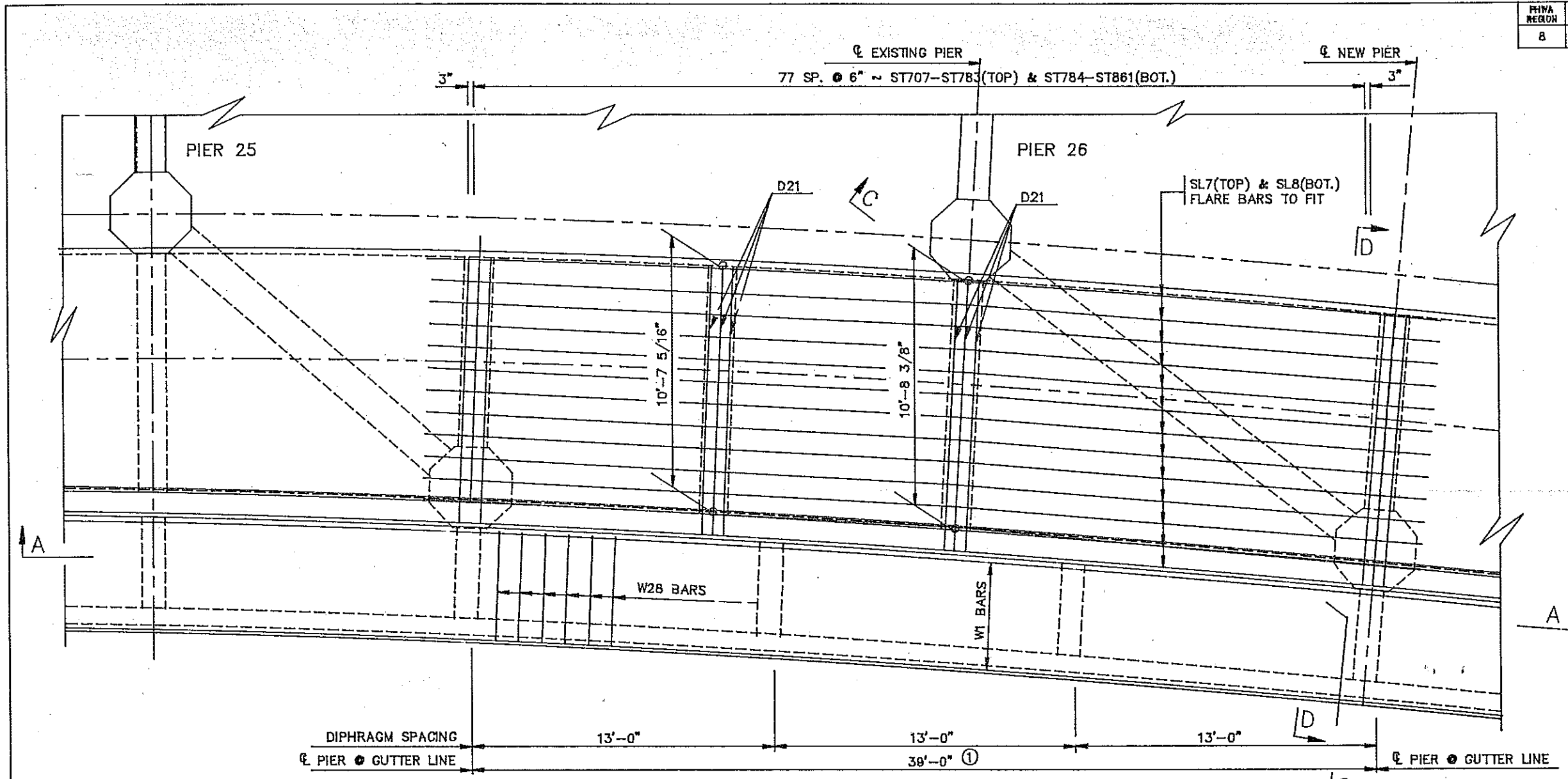
B-B
SHOWING PIER ALIGNMENT



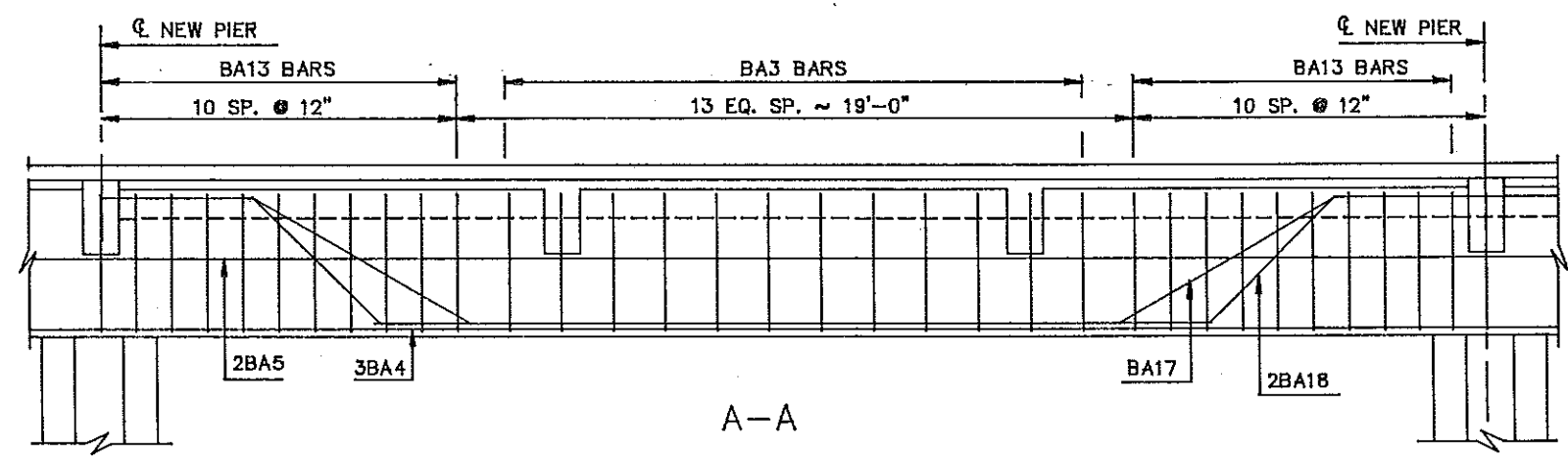
B-B
SHOWING 1" BAR THROUGH
EXISTING PIER COLUMN

QUANTITIES	
SEE DWG. 94-920.914-29E	
MEMORIAL BRIDGE EAST APPROACH WIDENING PIER 25	

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① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.

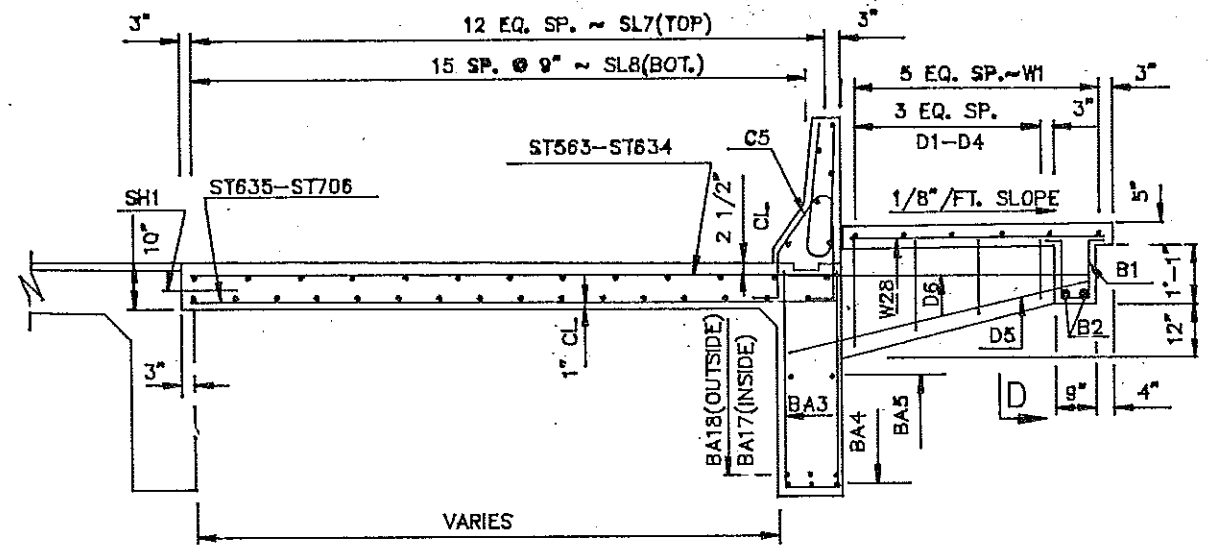


SEE DWG. 94-920.914-18E FOR SECTIONS C-C & D-D.

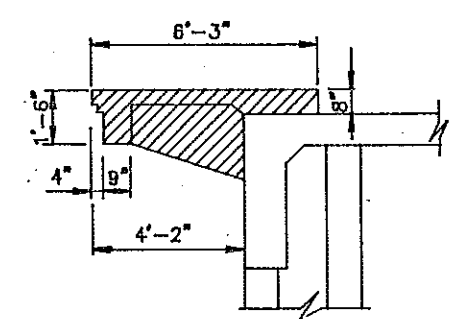
QUANTITIES
SEE DWG: 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING

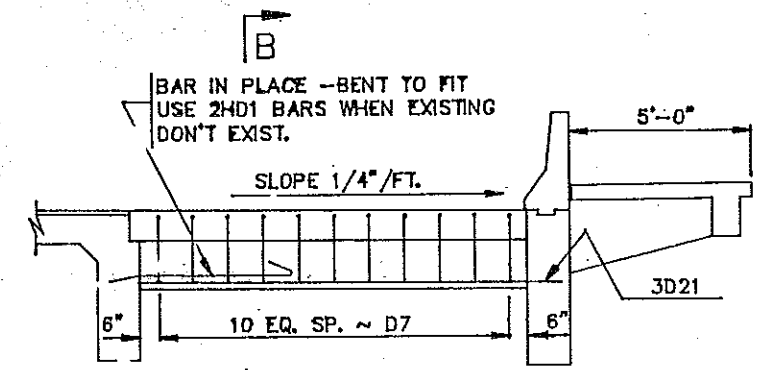
PIER 25 TO PIER 26



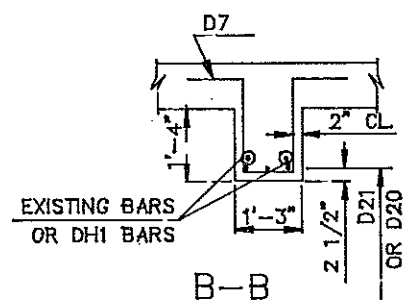
TYPICAL SLAB SECTION
BETWEEN NEW PIER 24 & NEW PIER 25



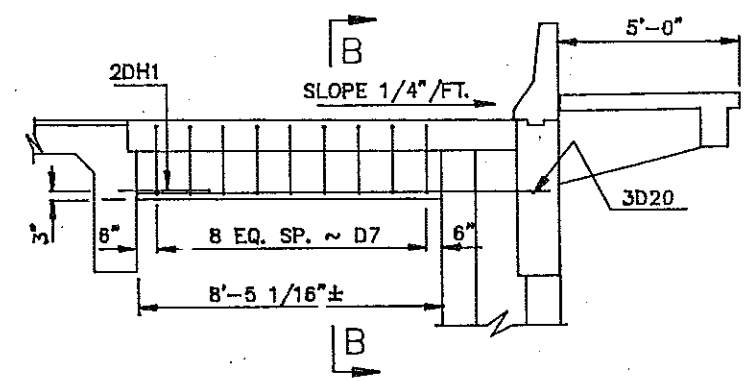
SECTION AT DIAPHRAGMS
CROSS-HATCHED AREA TO BE REMOVED



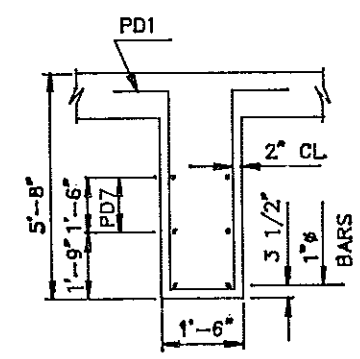
SECTION AT INTERMEDIATE
DIAPHRAGMS



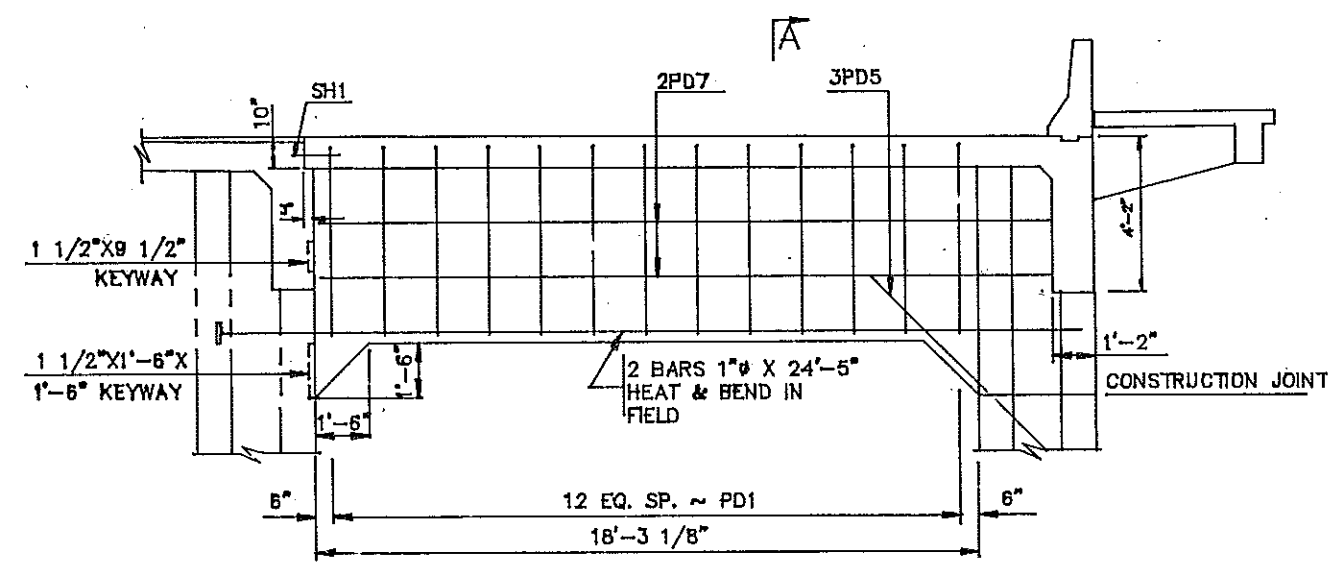
B-B



D-D



A-A



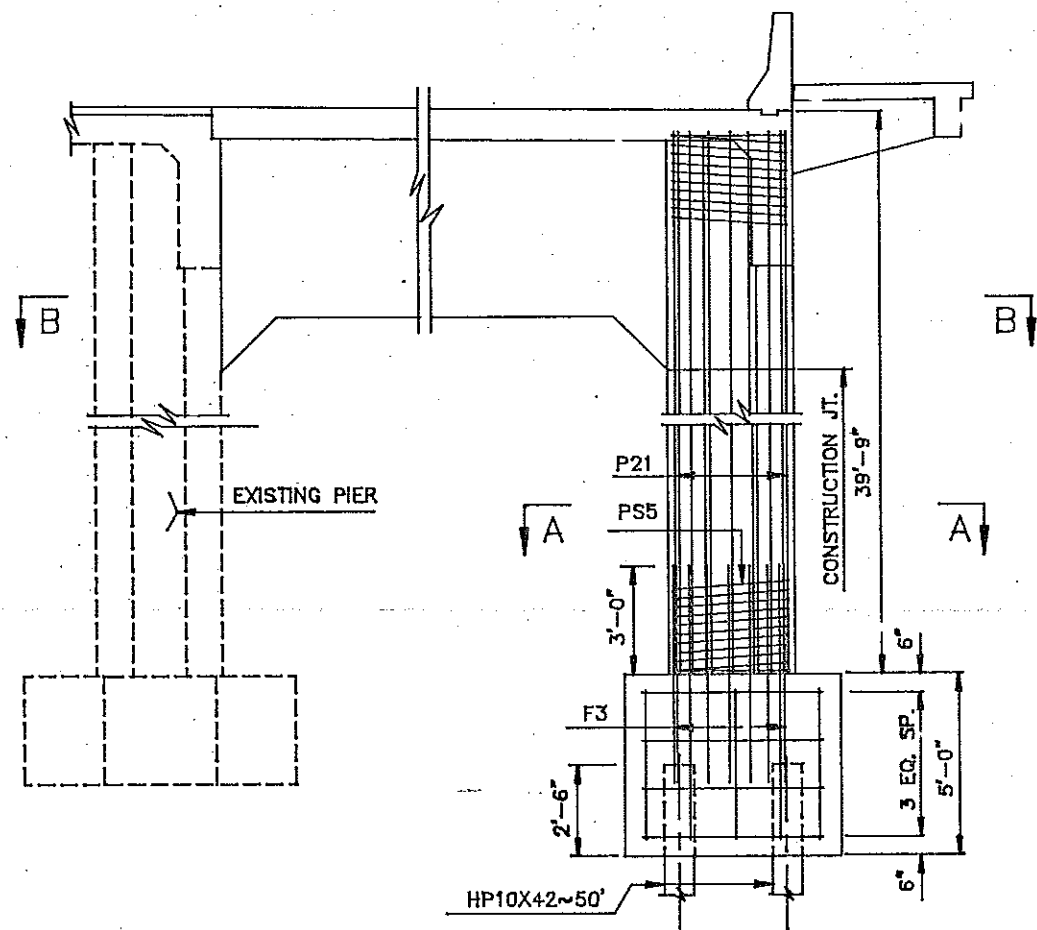
C-C

QUANTITIES
SEE DWG. 94-920.914-29E

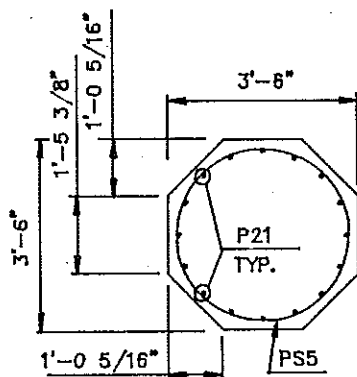
MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 25 TO PIER 26

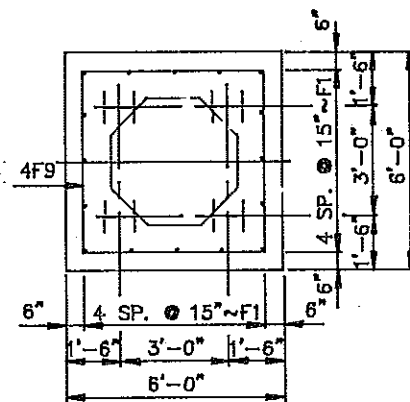
94-920.914-18E



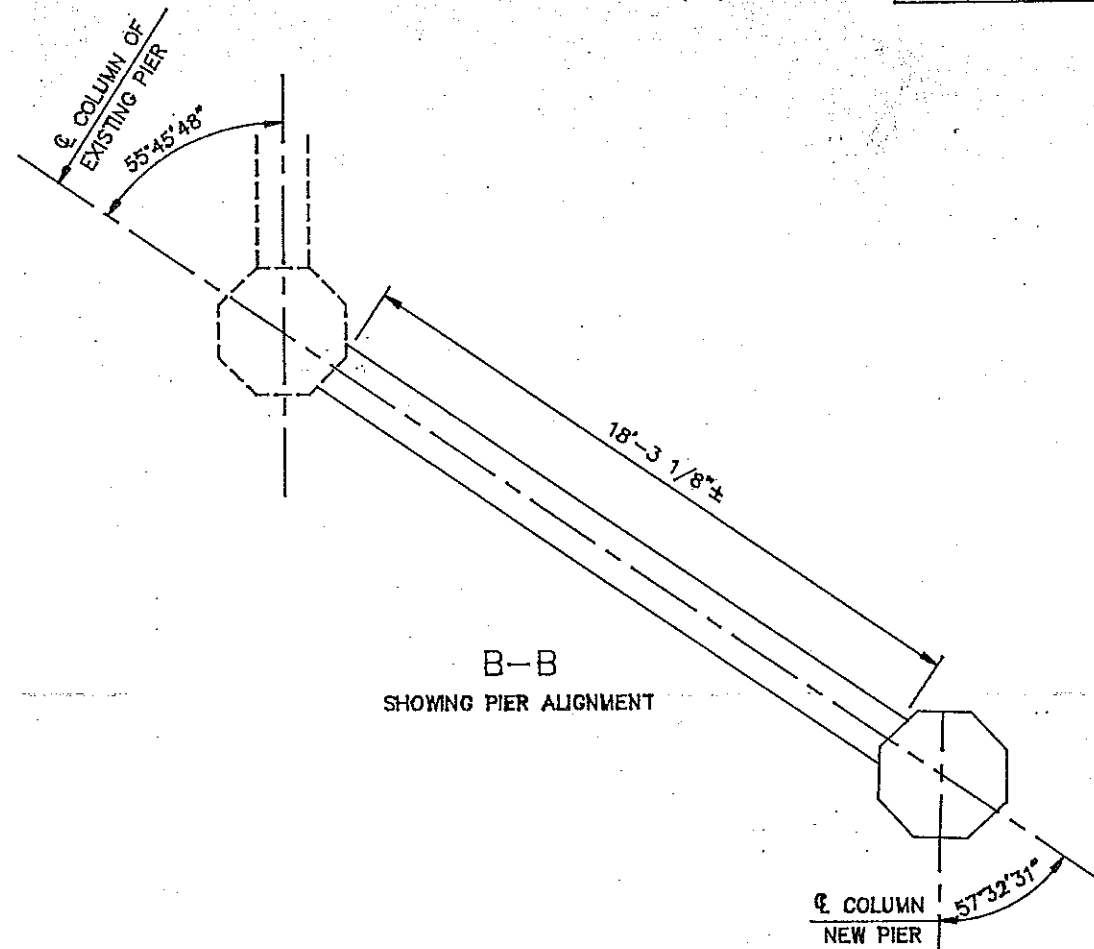
PIER ELEVATION



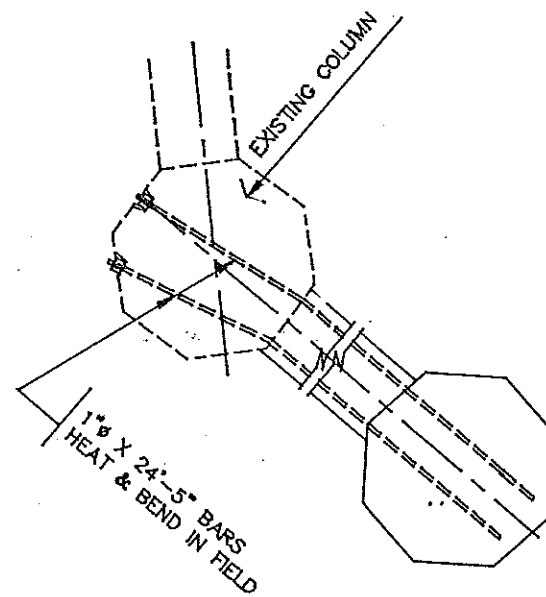
A-A



FOOTING PLAN



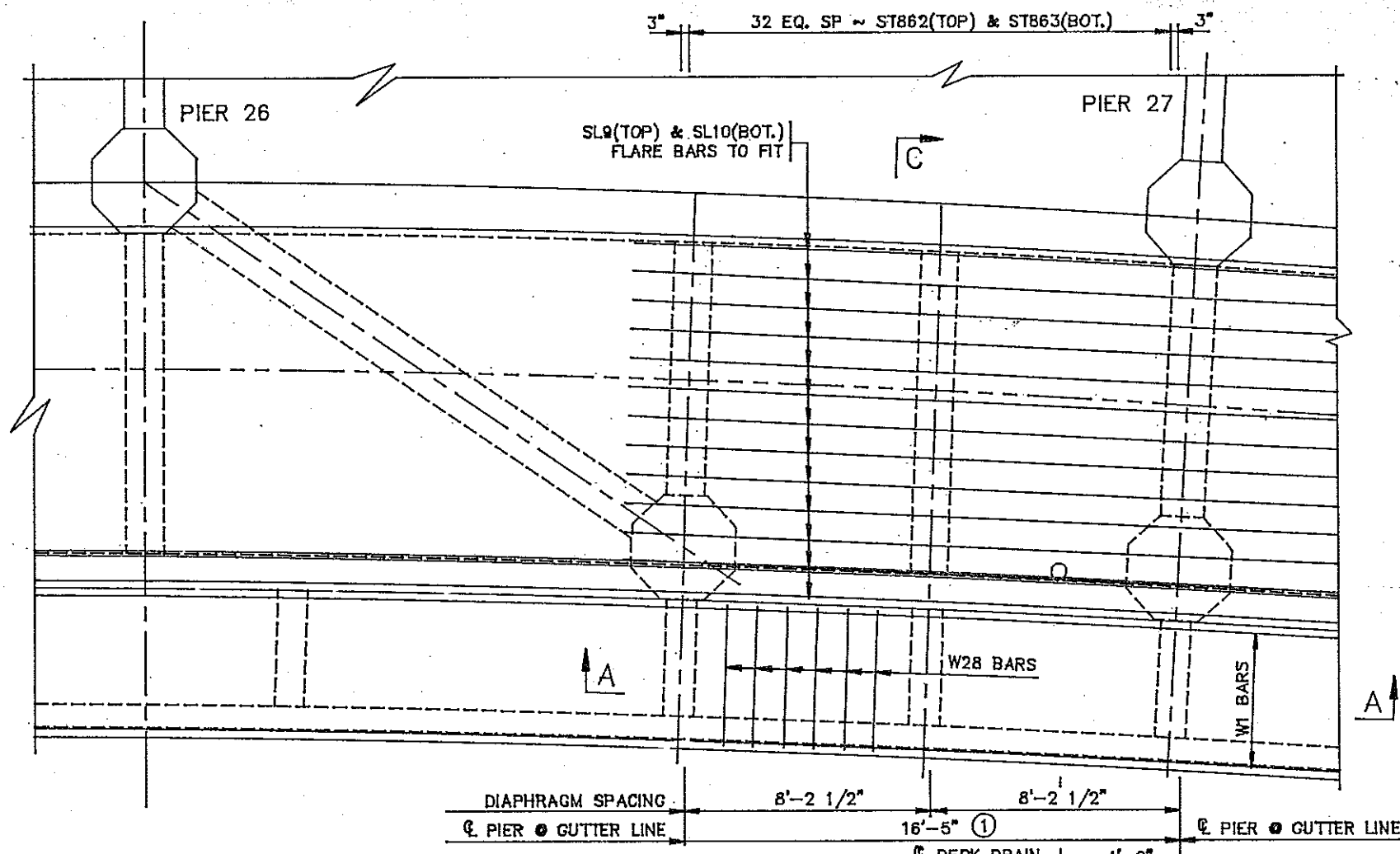
B-B
SHOWING PIER ALIGNMENT



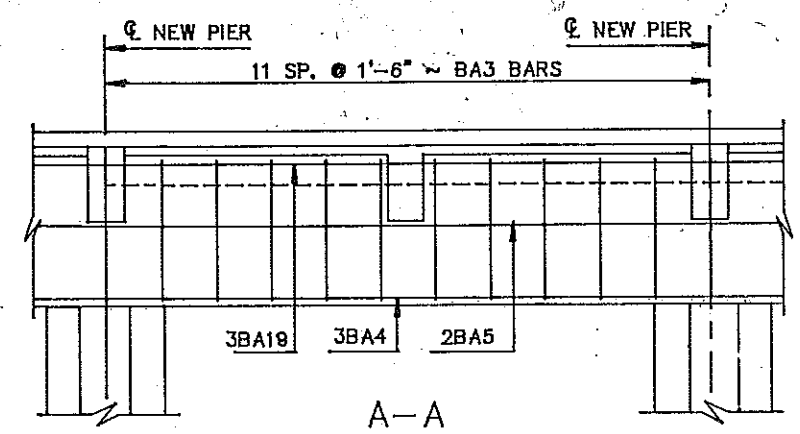
B-B
SHOWING 1" BAR THROUGH
EXISTING PIER COLUMN

QUANTITIES	
SEE DWG. 94-920.914-29E	
MEMORIAL BRIDGE EAST APPROACH WIDENING	
PIER 26	

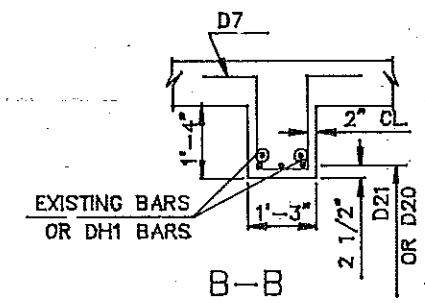
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PLAN
PIER 26 TO PIER 27



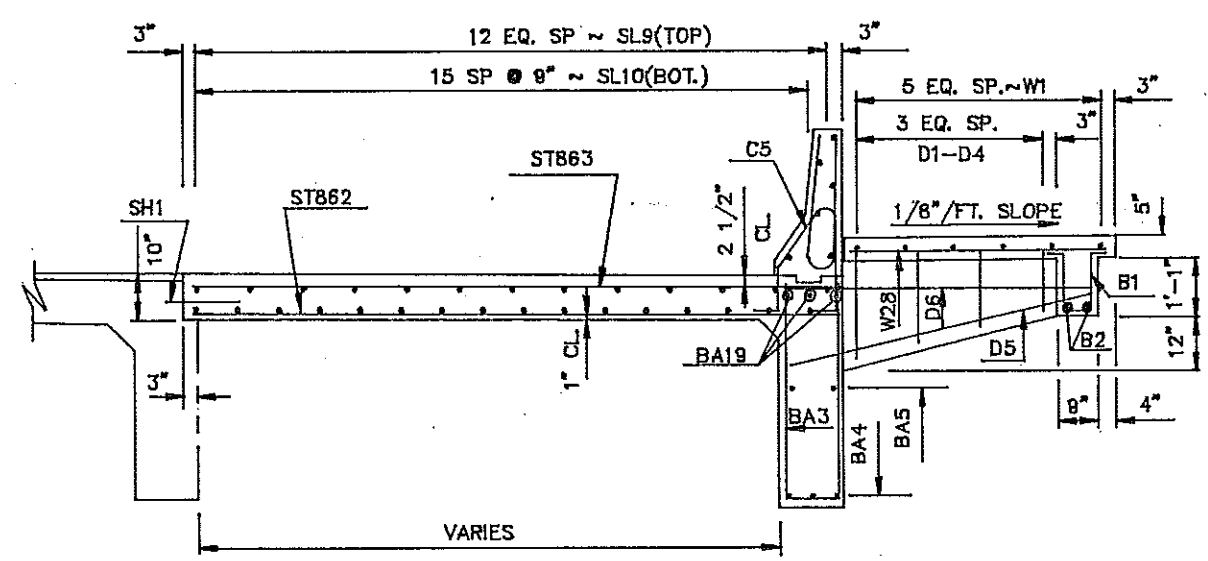
A-A



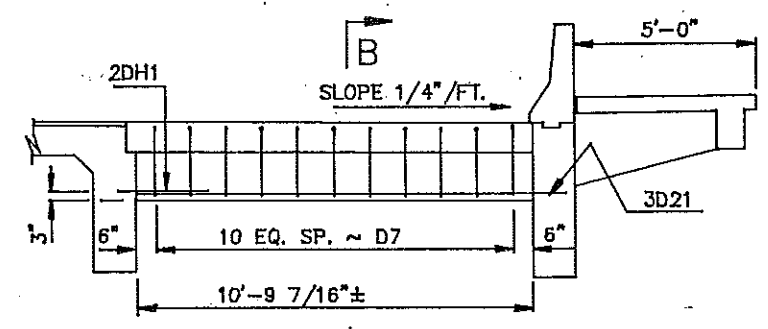
B-B

① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.

SEE DWG. 94-920.914-21E FOR SECTIONS D-D



TYPICAL SLAB SECTION
BETWEEN NEW PIER 26 & PIER 27



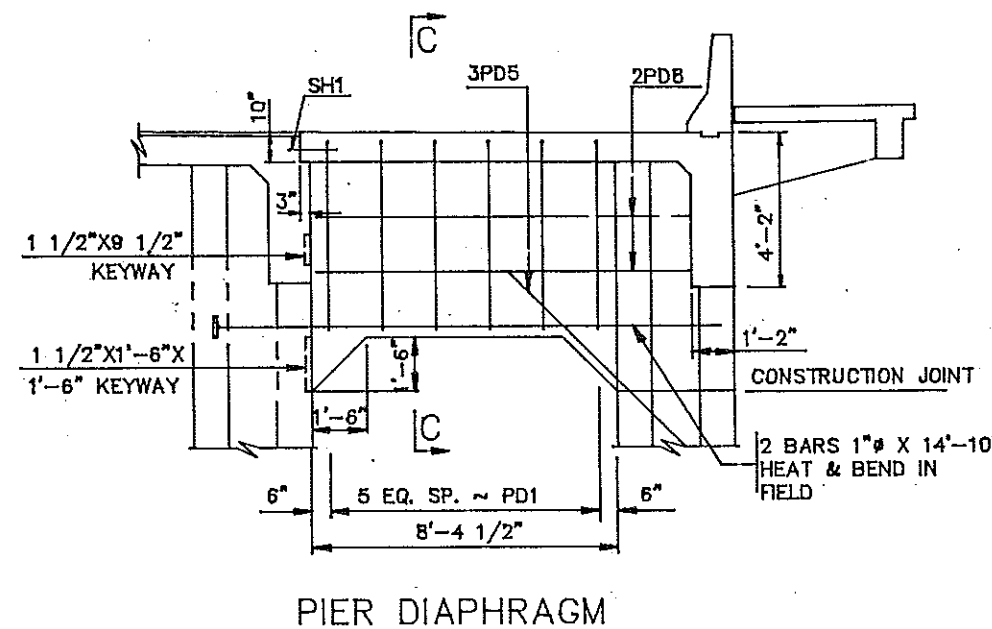
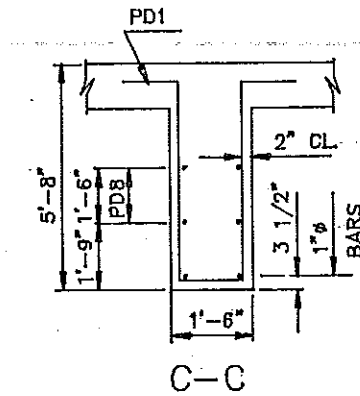
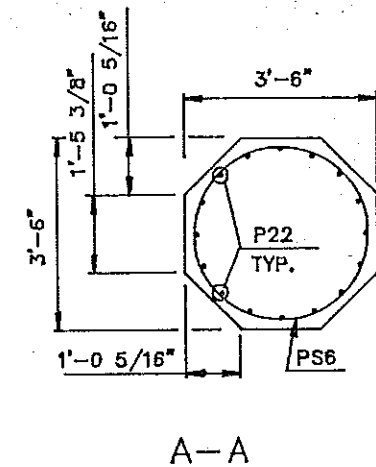
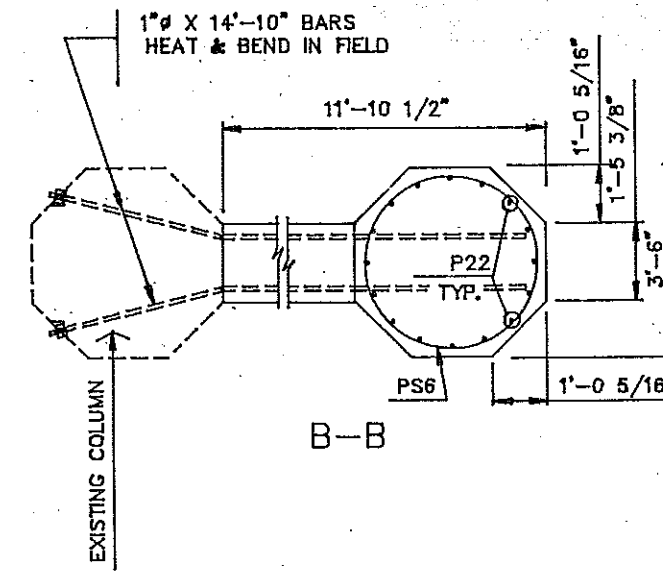
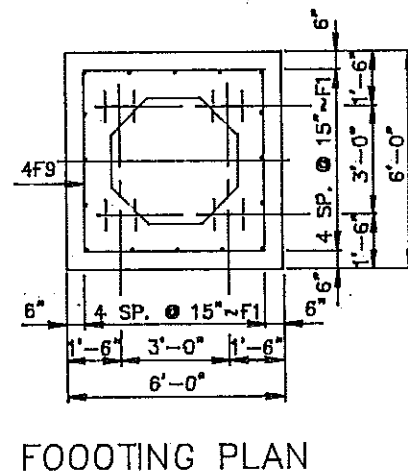
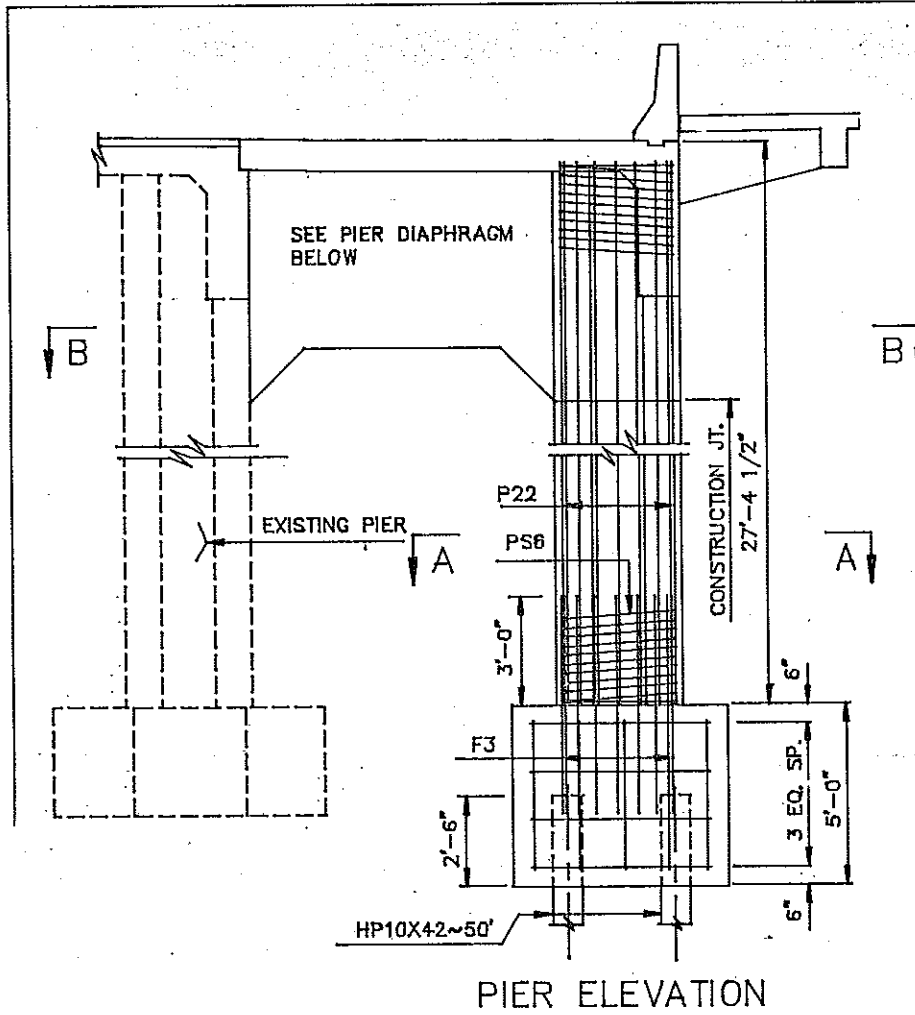
C-C

QUANTITIES
SEE DWG. 94-920.914-29E

MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 26 TO PIER 27

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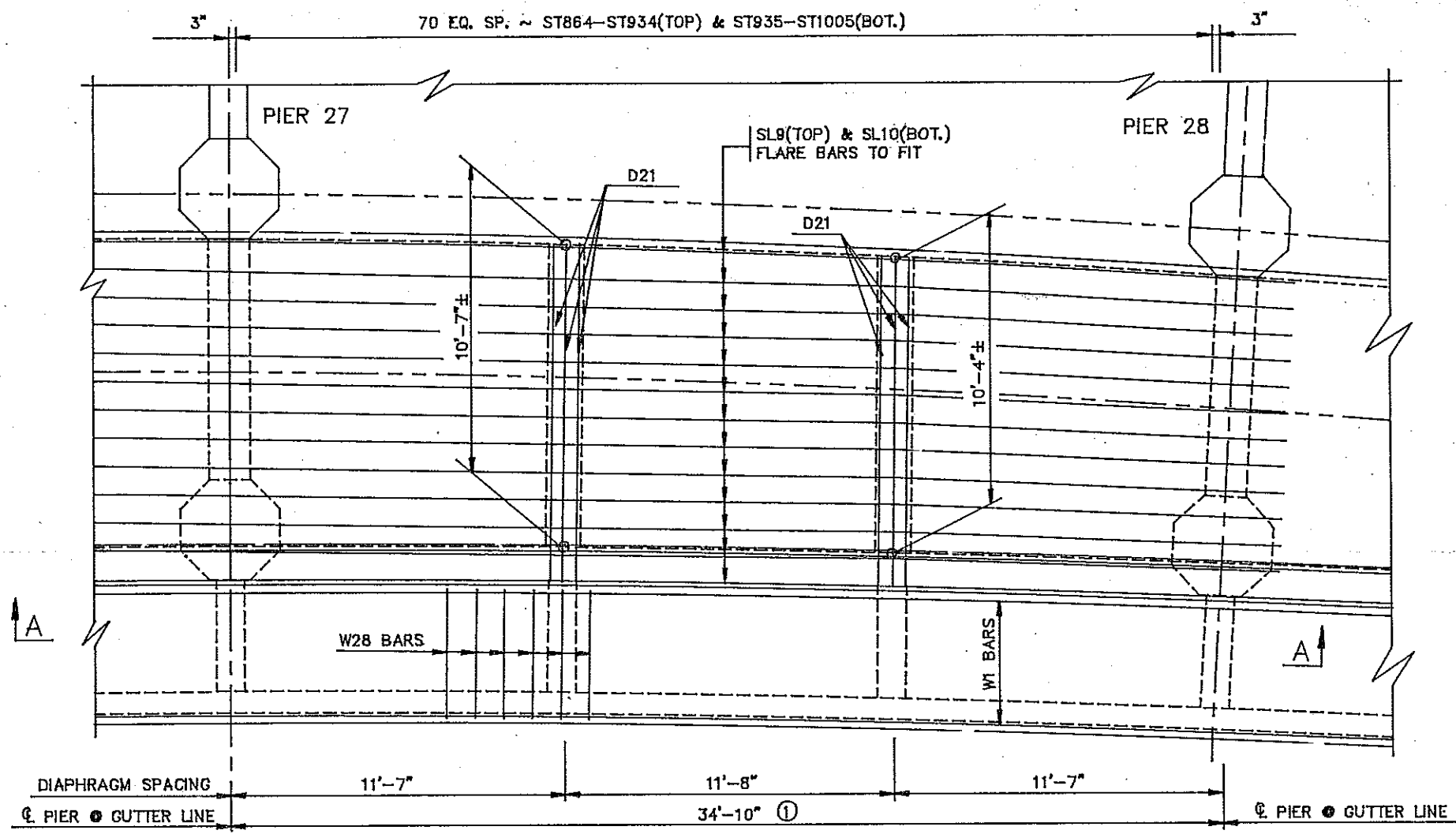


QUANTITIES
SEE DWG. 94-920.914-29E

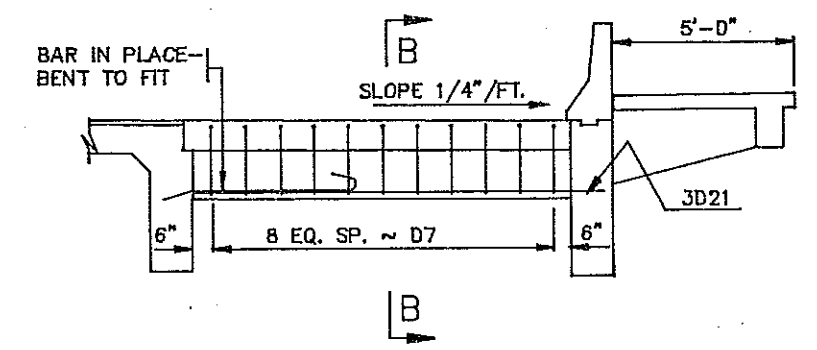
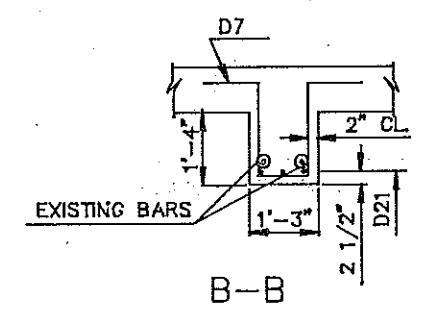
MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 27

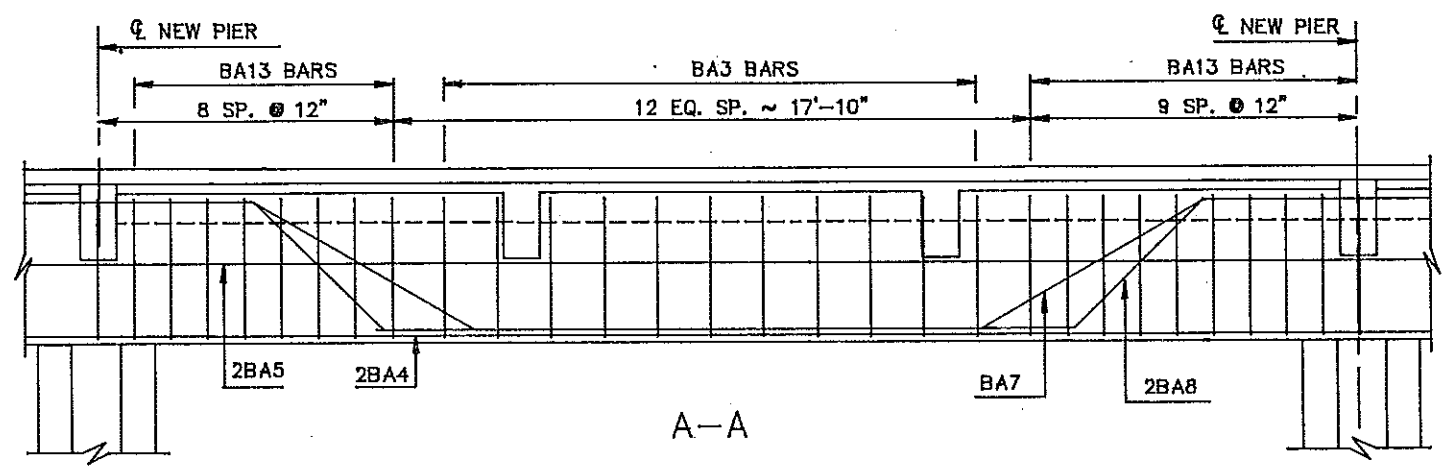
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PLAN
PIER 27 TO PIER 28



INTERMEDIATE DIAPHRAGMS

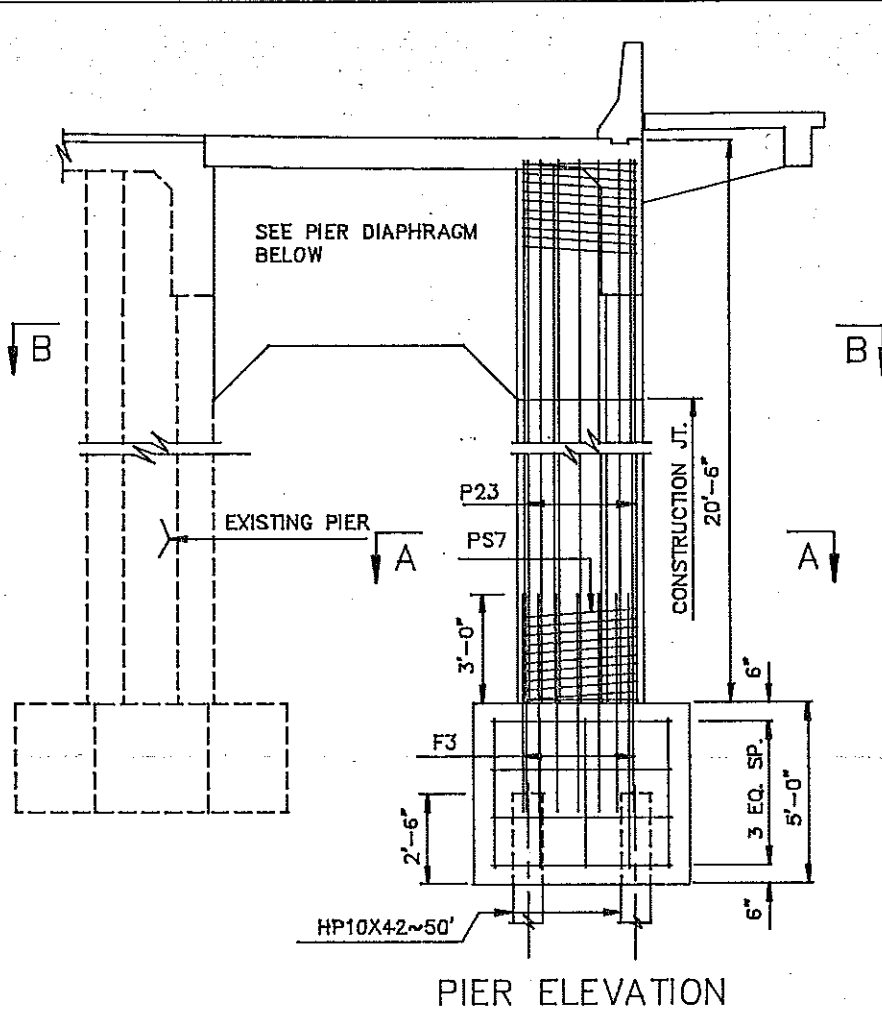


A-A

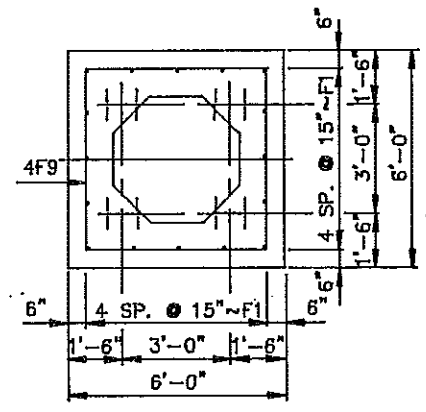
① DIMENSIONS GIVEN ARE FOR THE GUTTER LINE AT THE BARRIER.

QUANTITIES
SEE DWG. 94-920.914-29E
MEMORIAL BRIDGE EAST APPROACH WIDENING
PIER 27 TO PIER 28

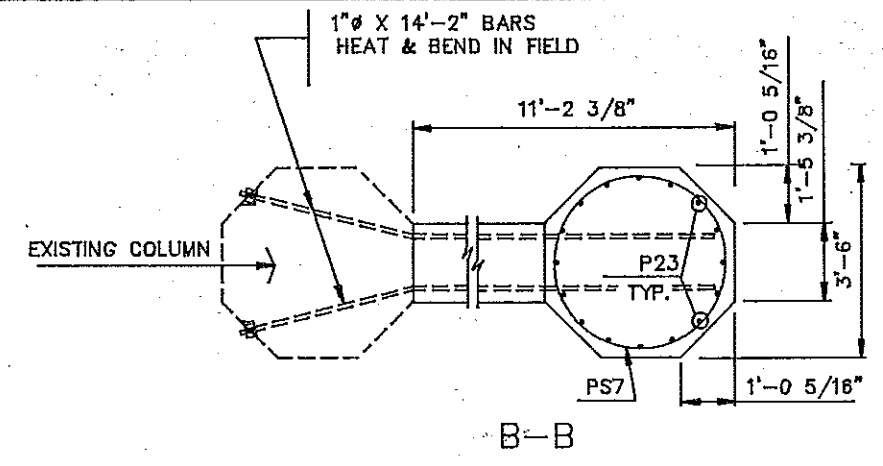
FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
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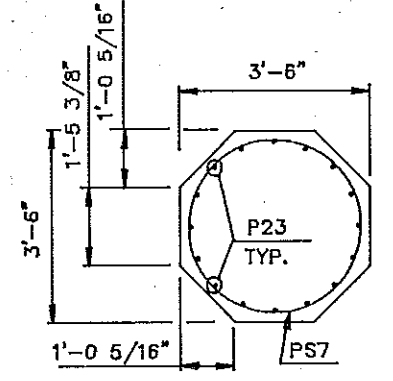
PIER ELEVATION



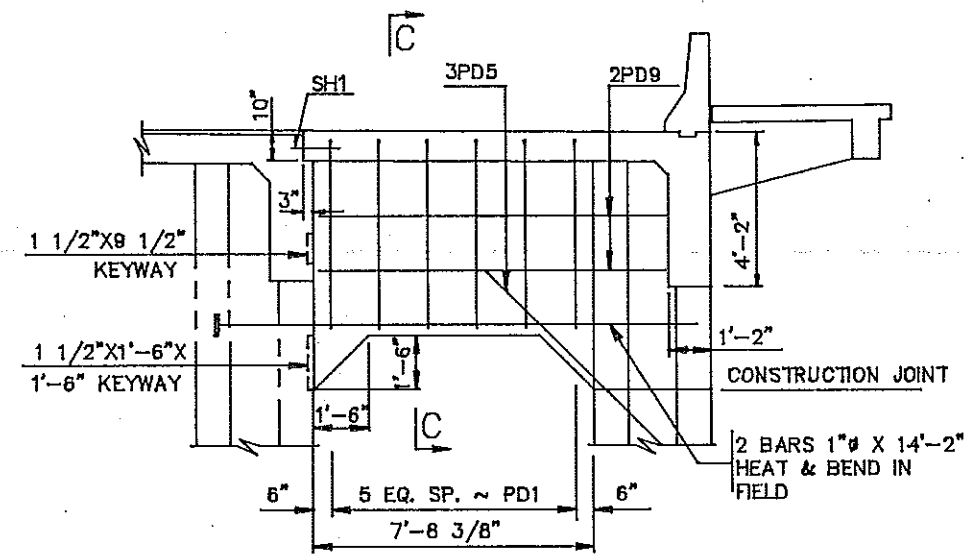
FOOTING PLAN



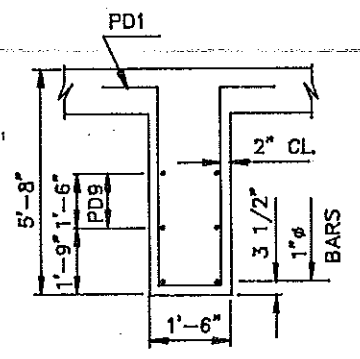
B-B



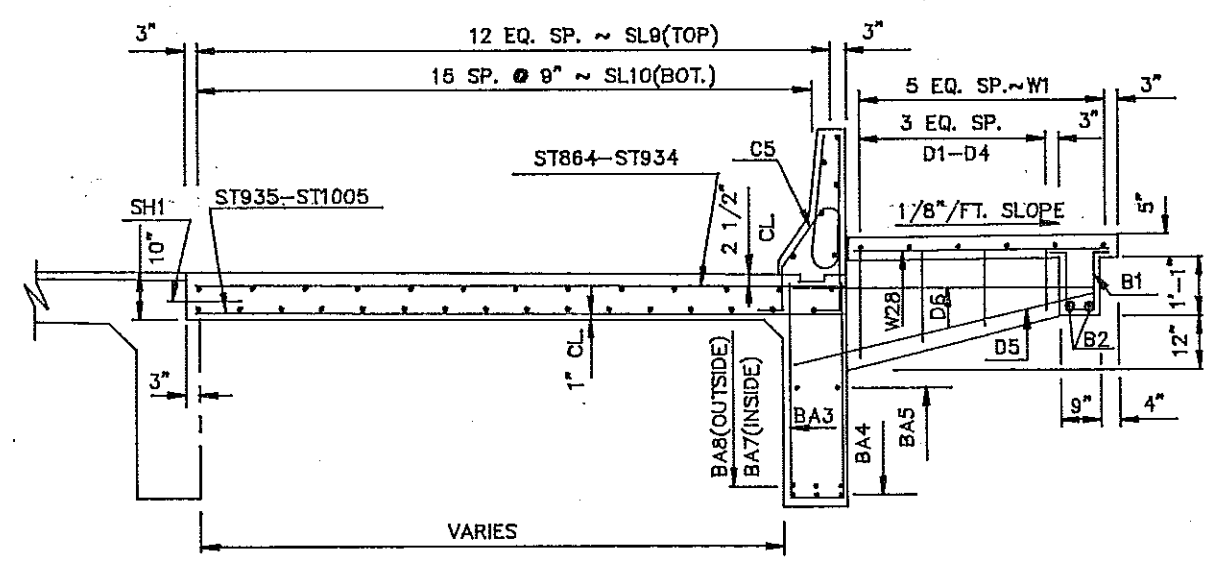
A-A



PIER DIAPHRAGM



C-C



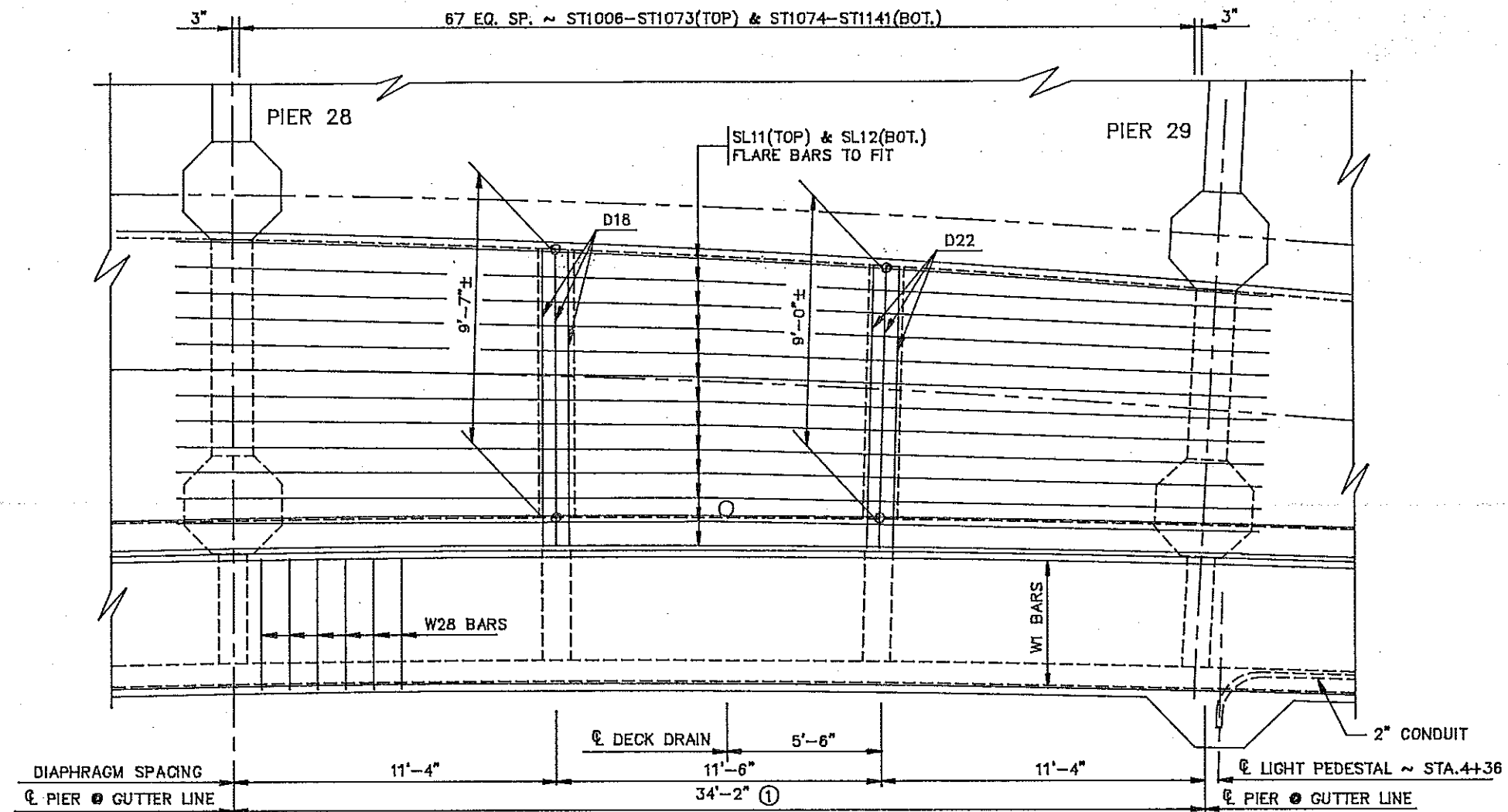
TYPICAL SLAB SECTION
BETWEEN NEW PIER 27 & NEW PIER 28

QUANTITIES
SEE DWG. 94-920.914-29E

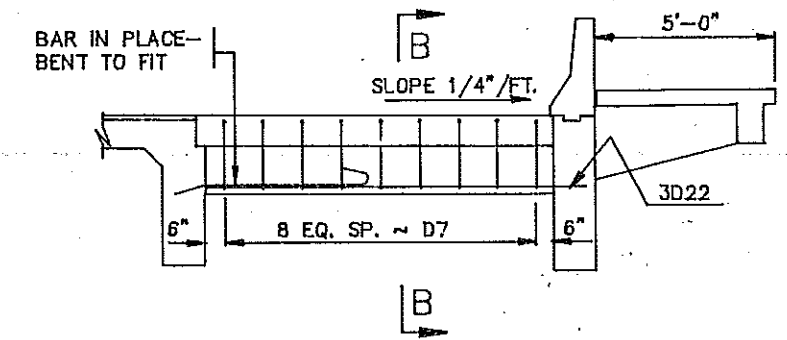
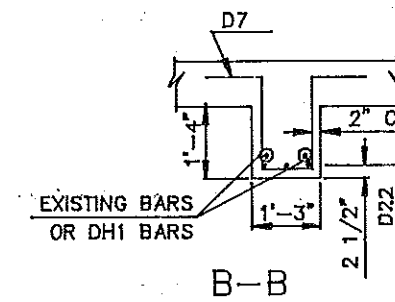
MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 28

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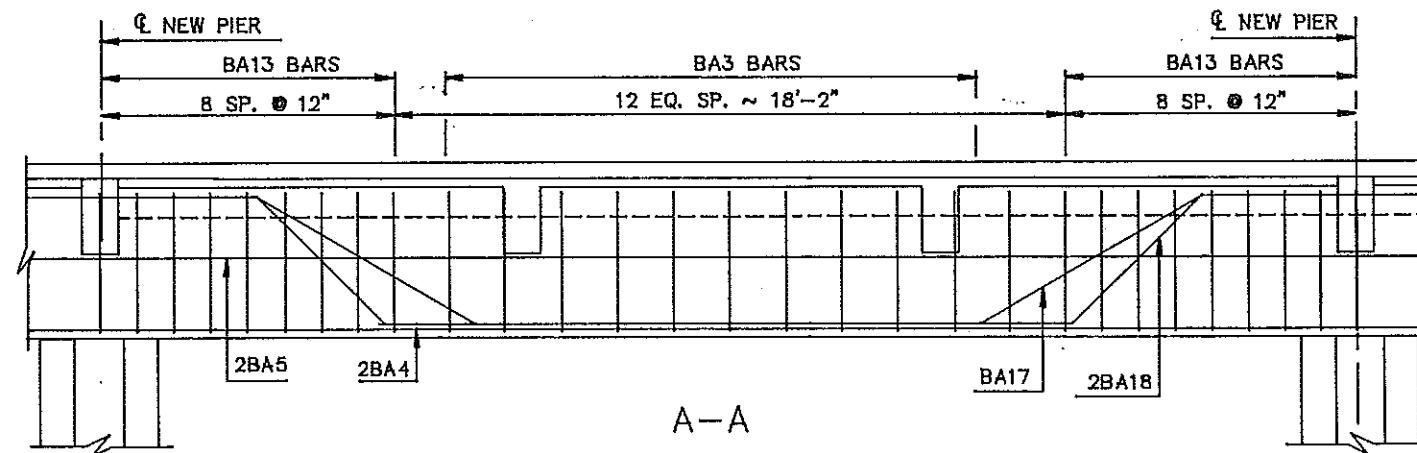


PLAN
PIER 28 TO PIER 29



INTERMEDIATE DIAPHRAGMS

① DIMENSIONS GIVEN ARE FOR THE
GUTTER LINE AT THE BARRIER.

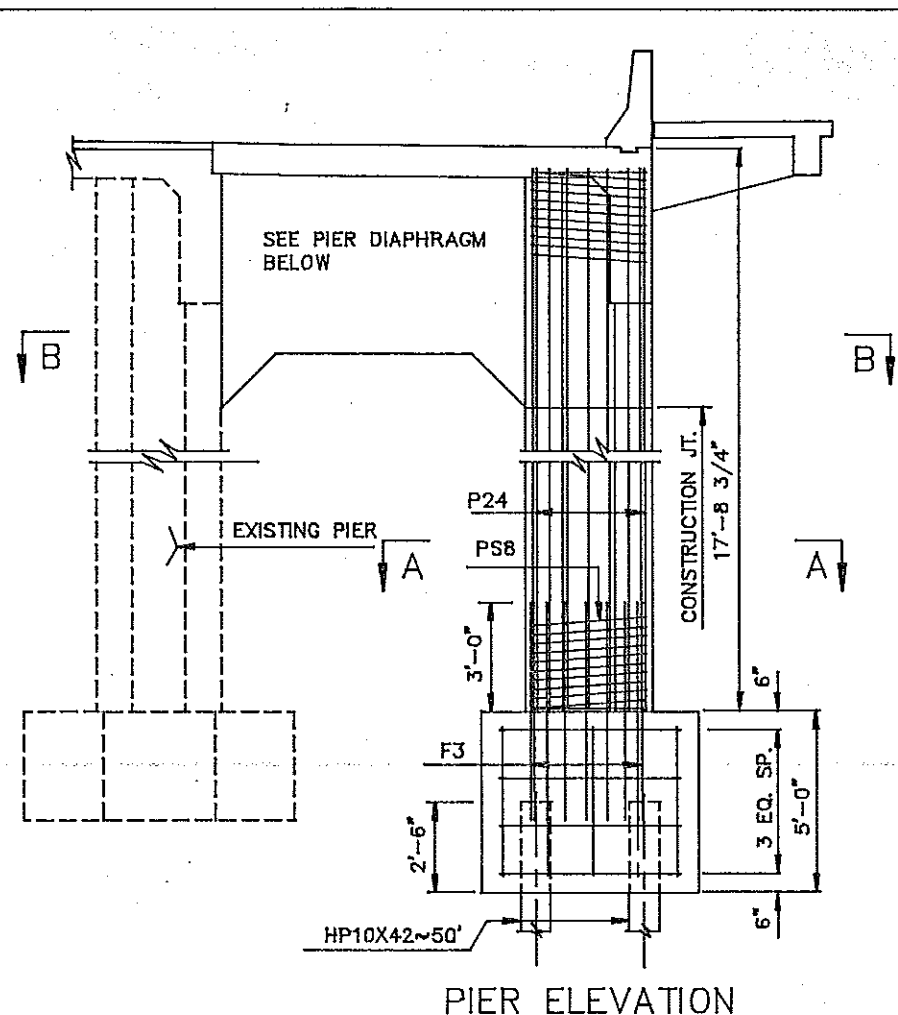


QUANTITIES
SEE DWG. 94-920.914-29E

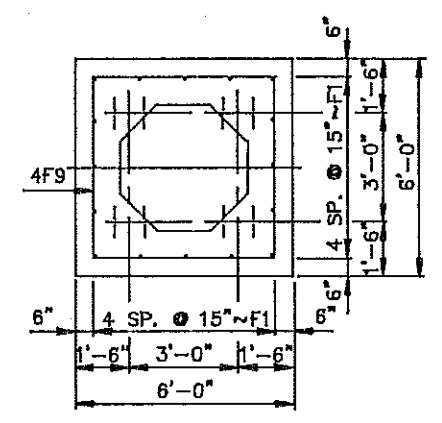
MEMORIAL BRIDGE
EAST APPROACH
WIDENING

PIER 28 TO PIER 29

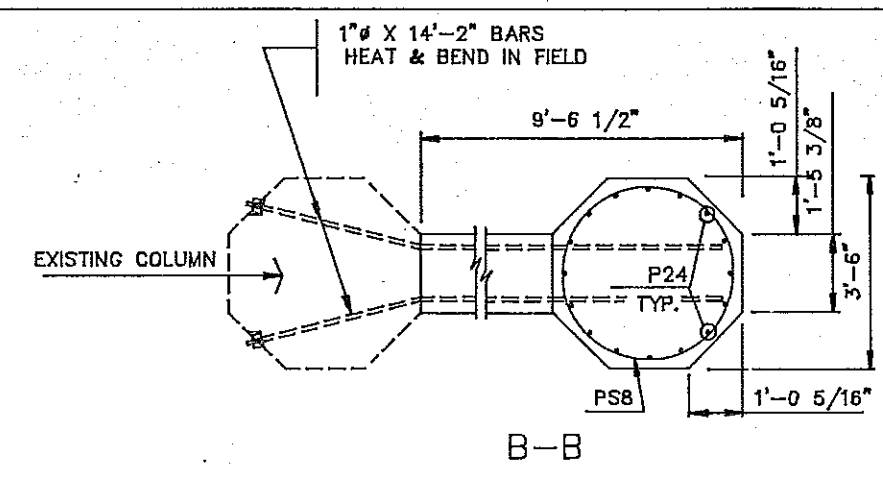
PHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	F-1-094(007)920	



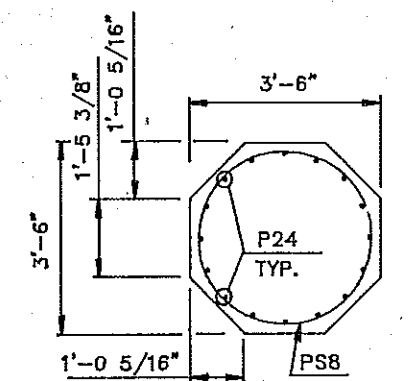
PIER ELEVATION



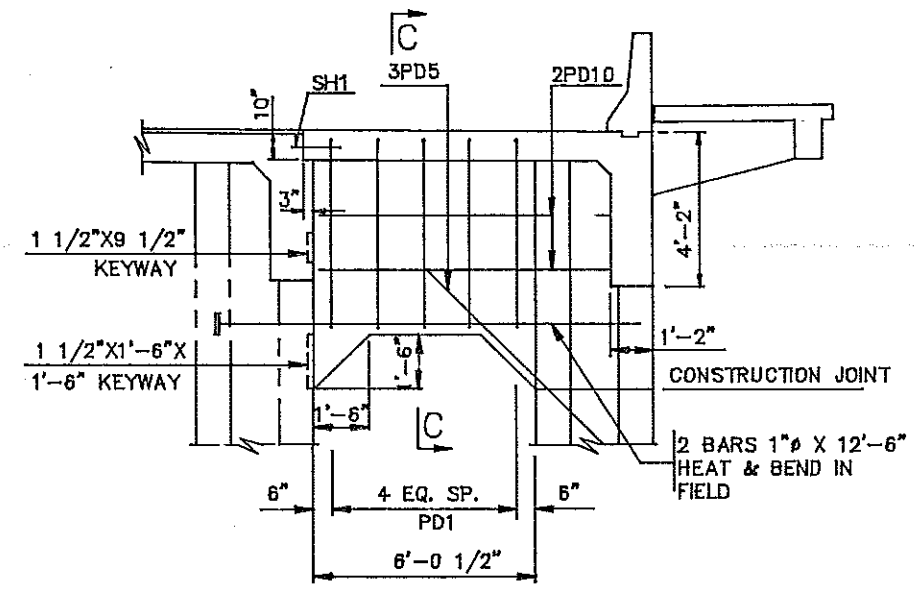
FOOTING PLAN



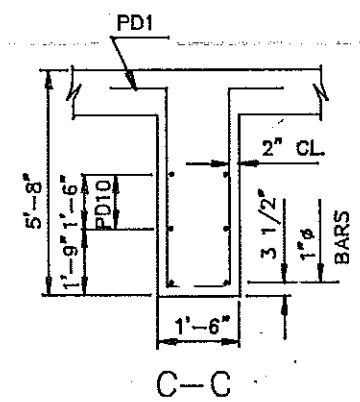
B-B



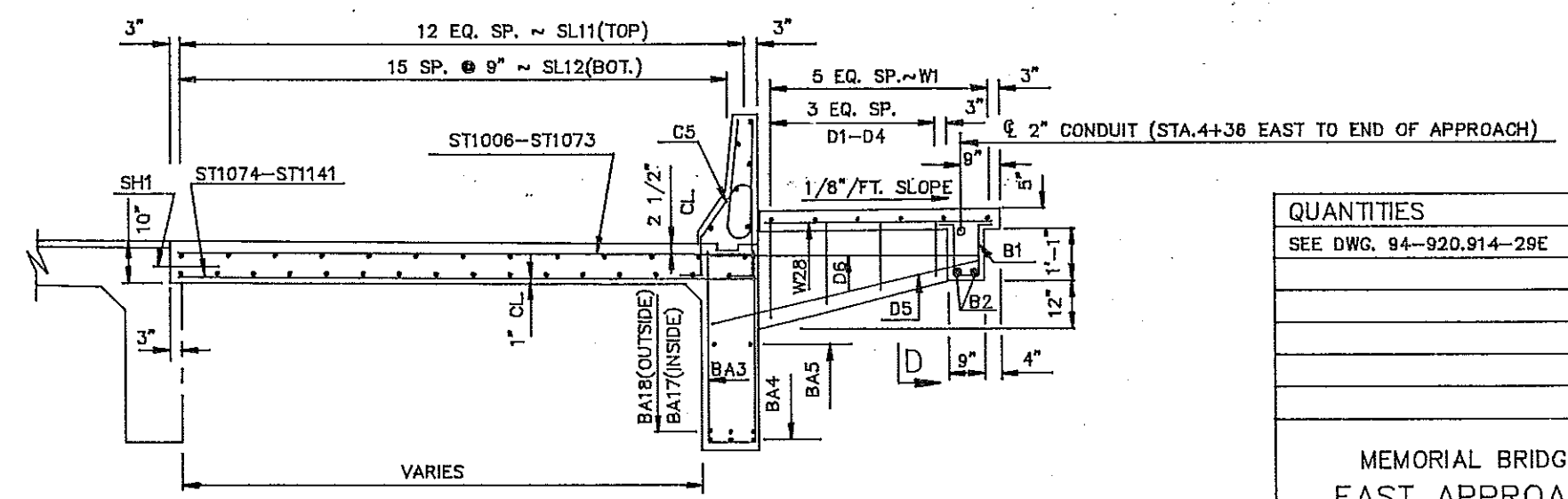
A-A



PIER DIAPHRAGM



C-C

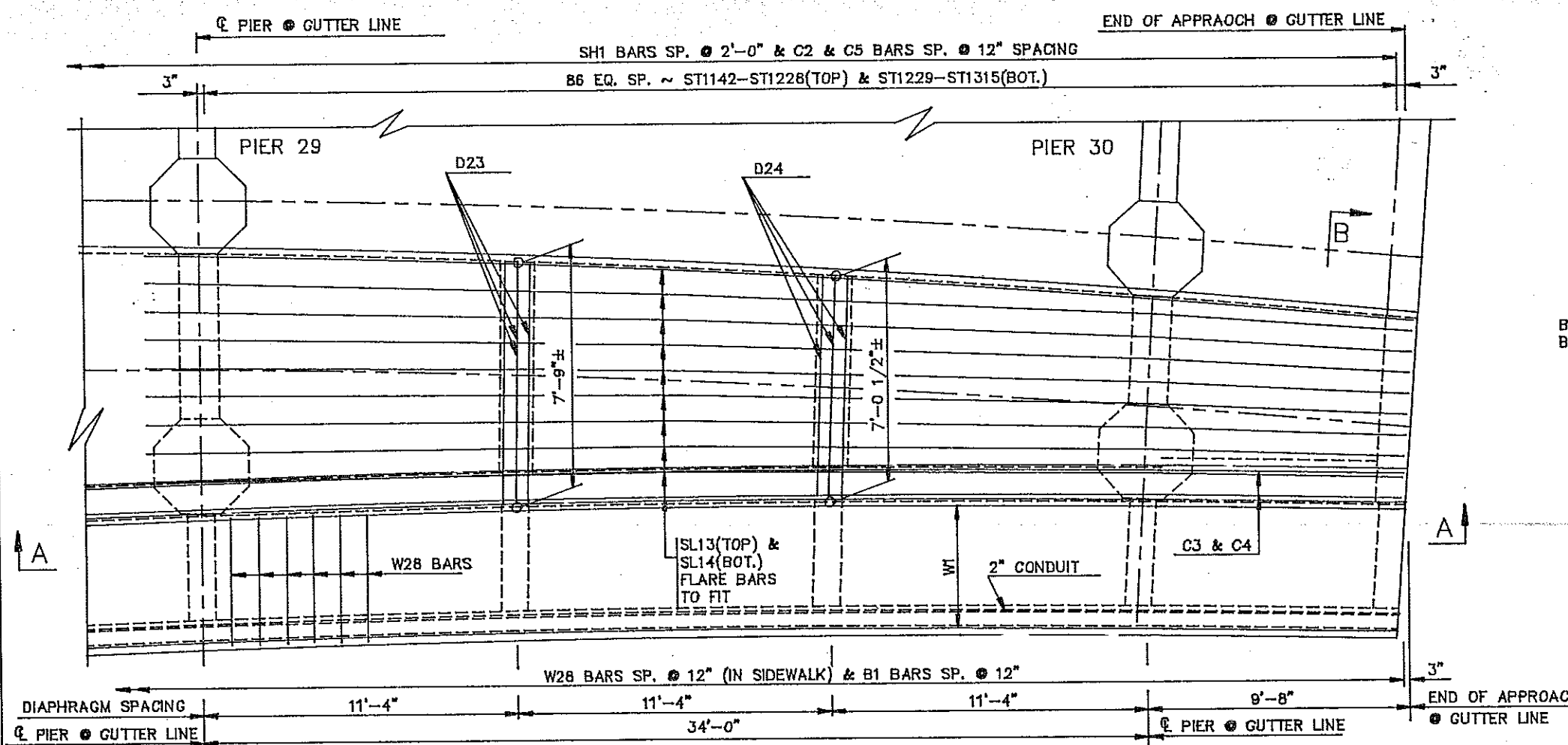


TYPICAL SLAB SECTION

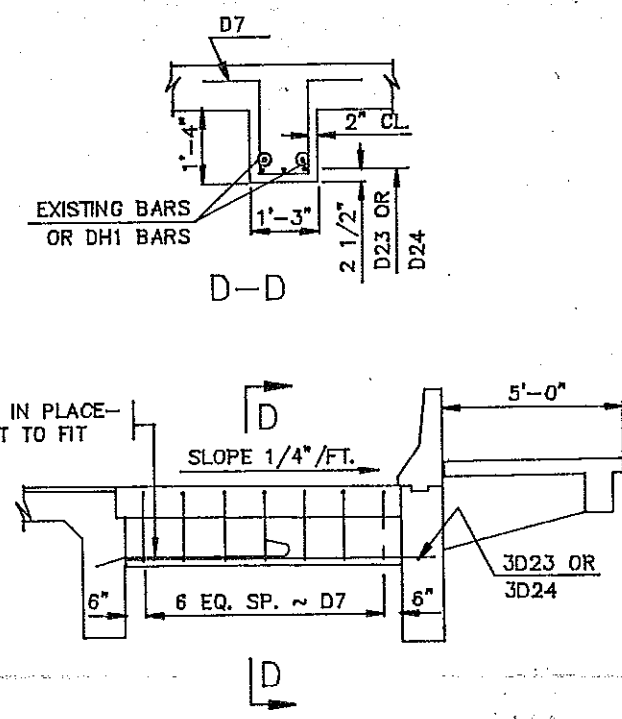
BETWEEN PIER 28 & PIER 29

QUANTITIES
SEE DWG. 94-920.914-29E

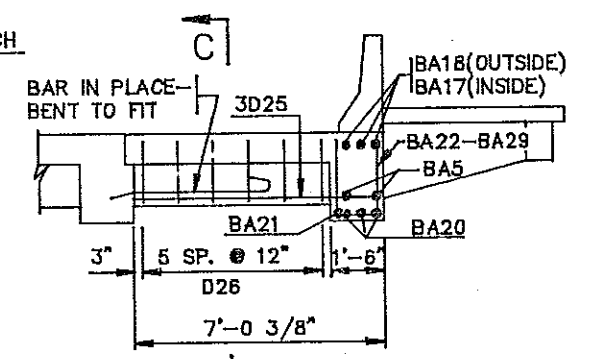
MEMORIAL BRIDGE
EAST APPROACH
WIDENING
PIER 29



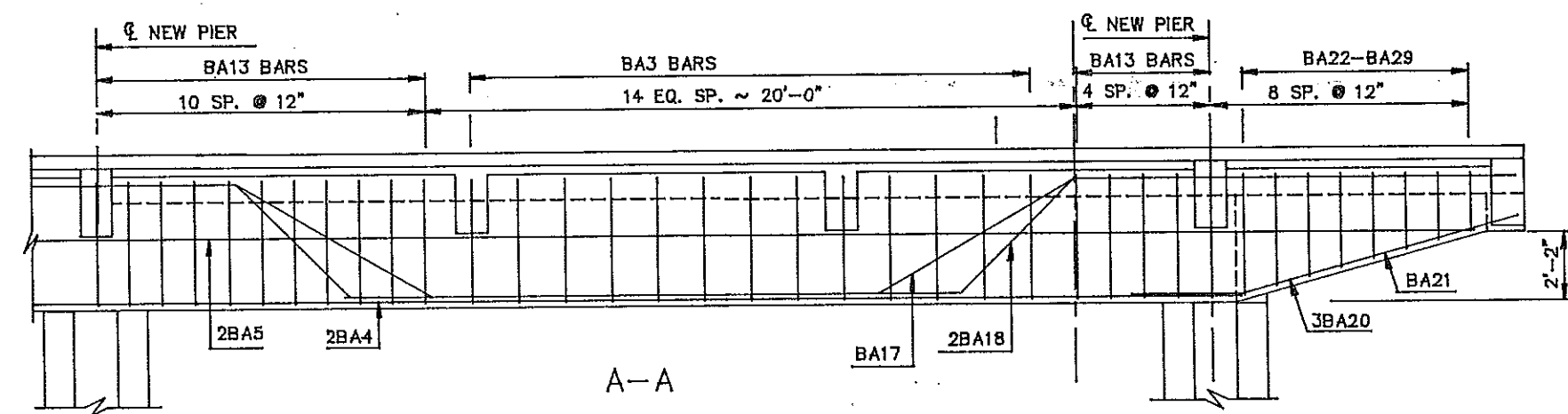
PLAN
PIER 29 TO END OF APPROACH



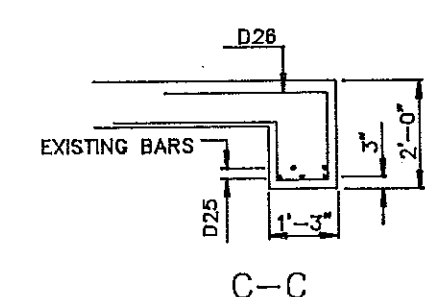
D-D
INTERMEDIATE DIAPHRAGMS



B-B



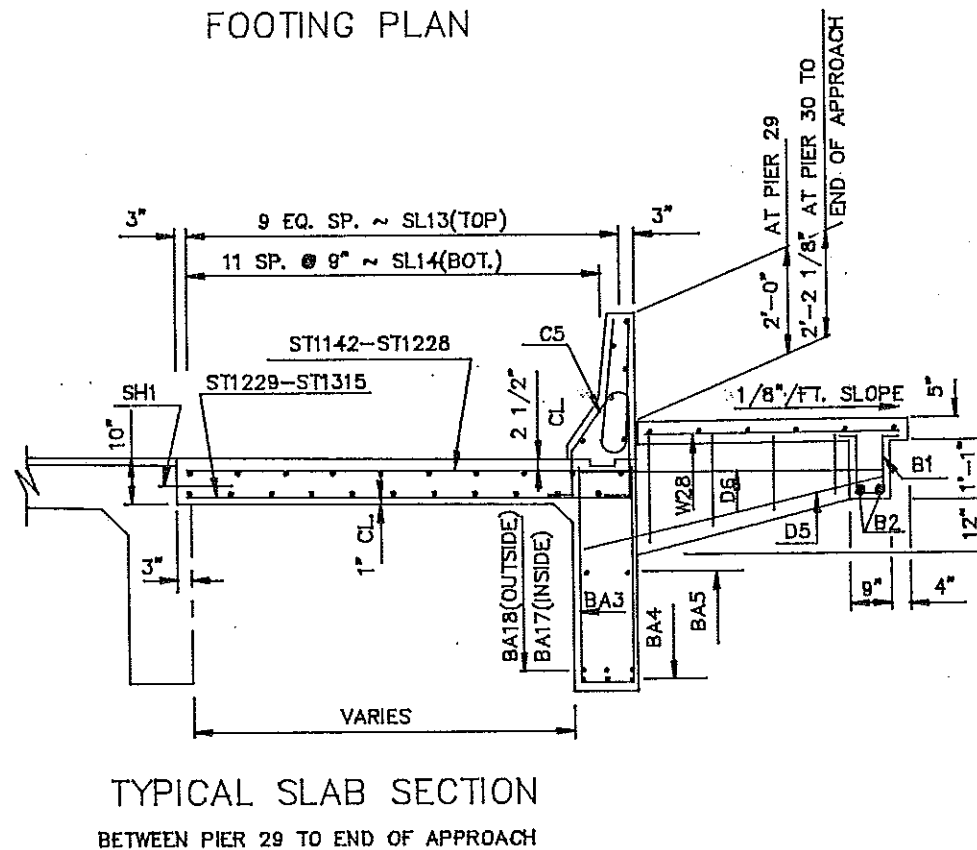
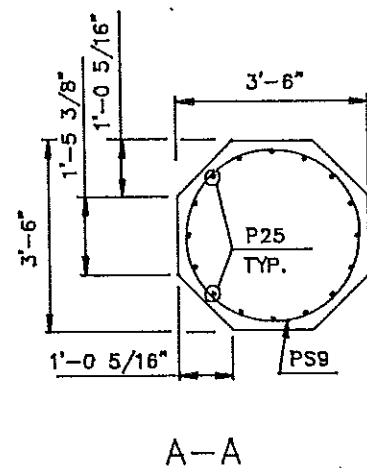
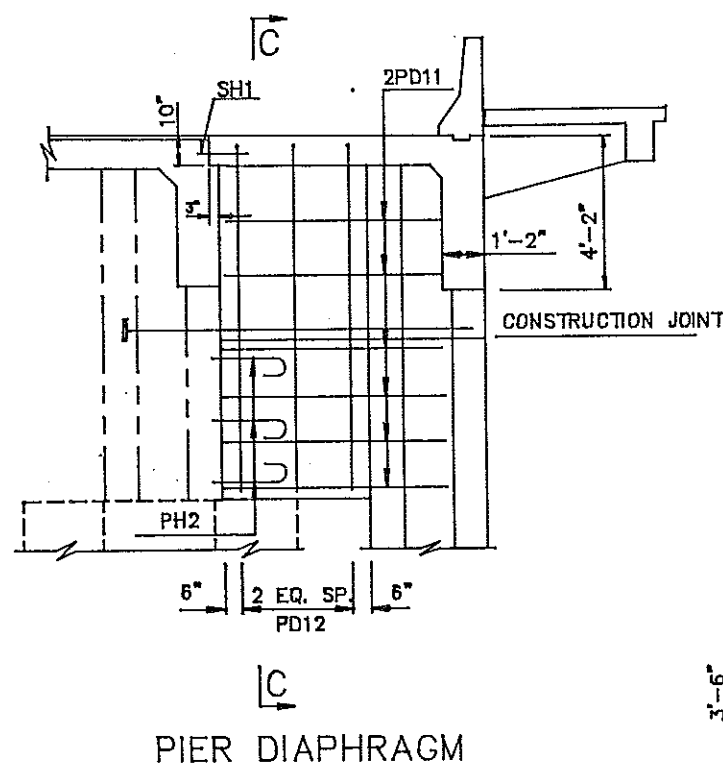
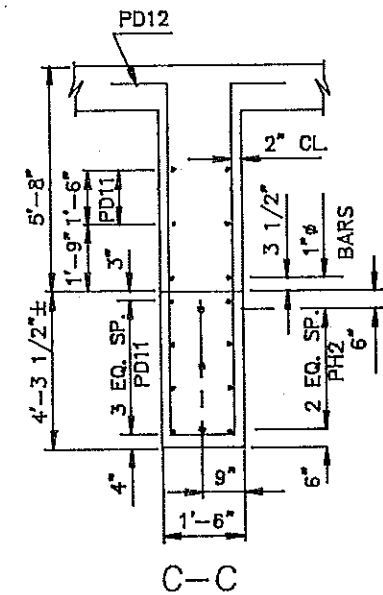
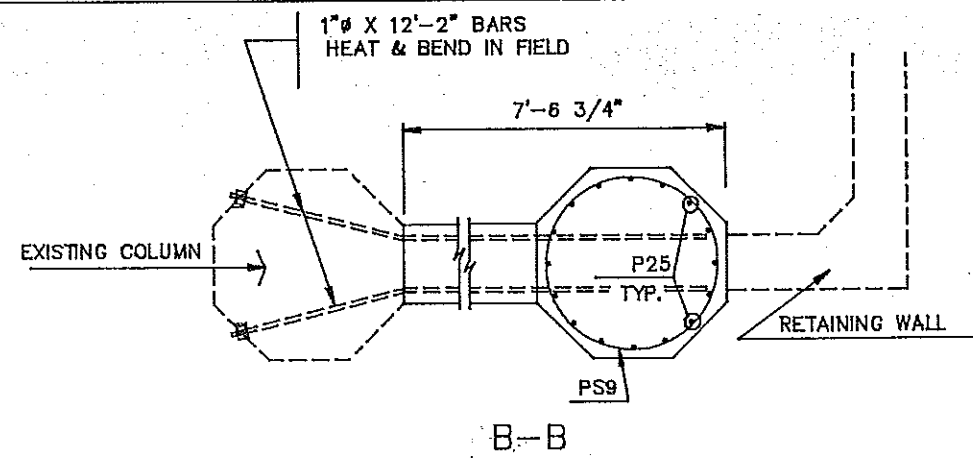
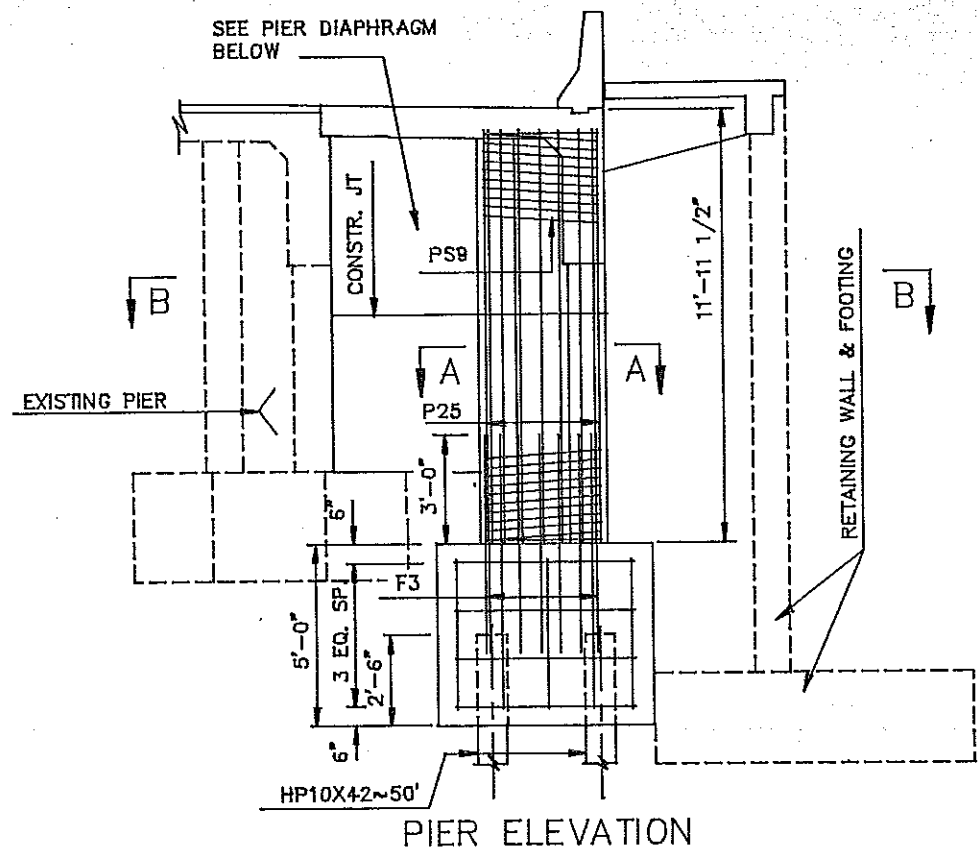
A-A



C-C

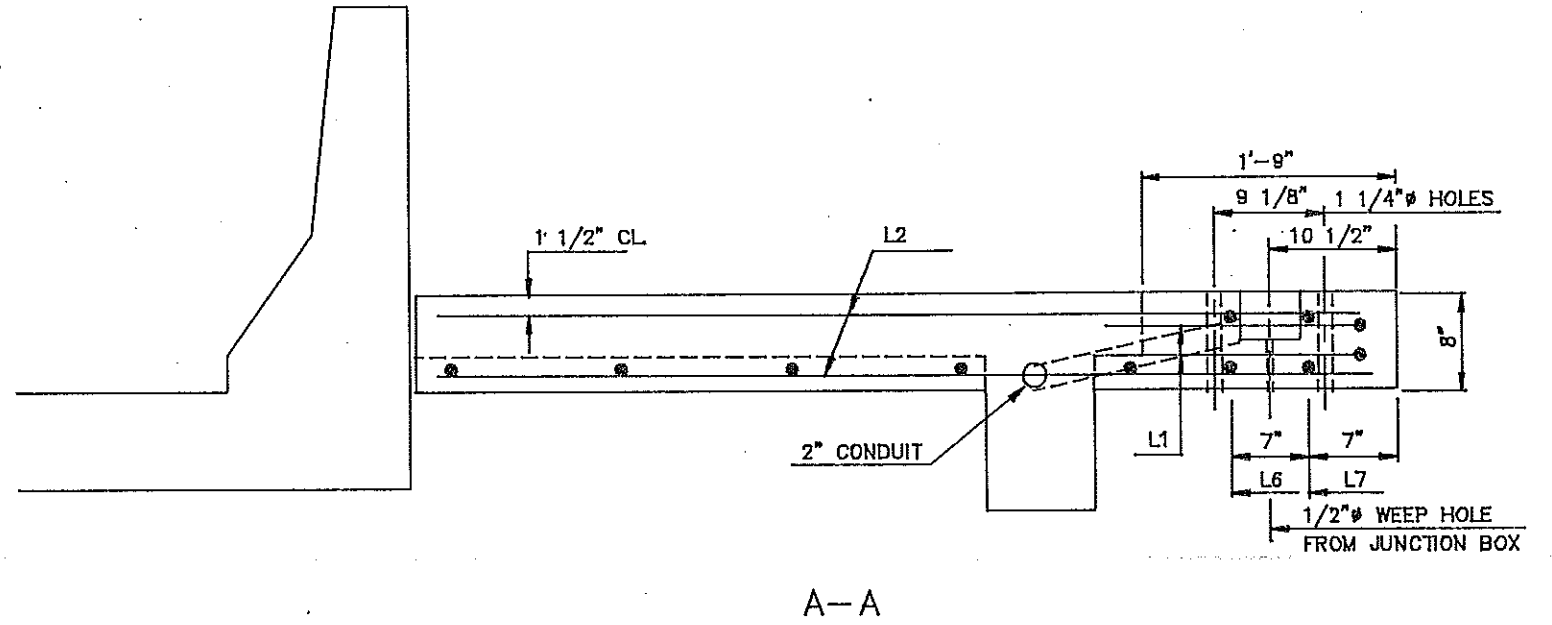
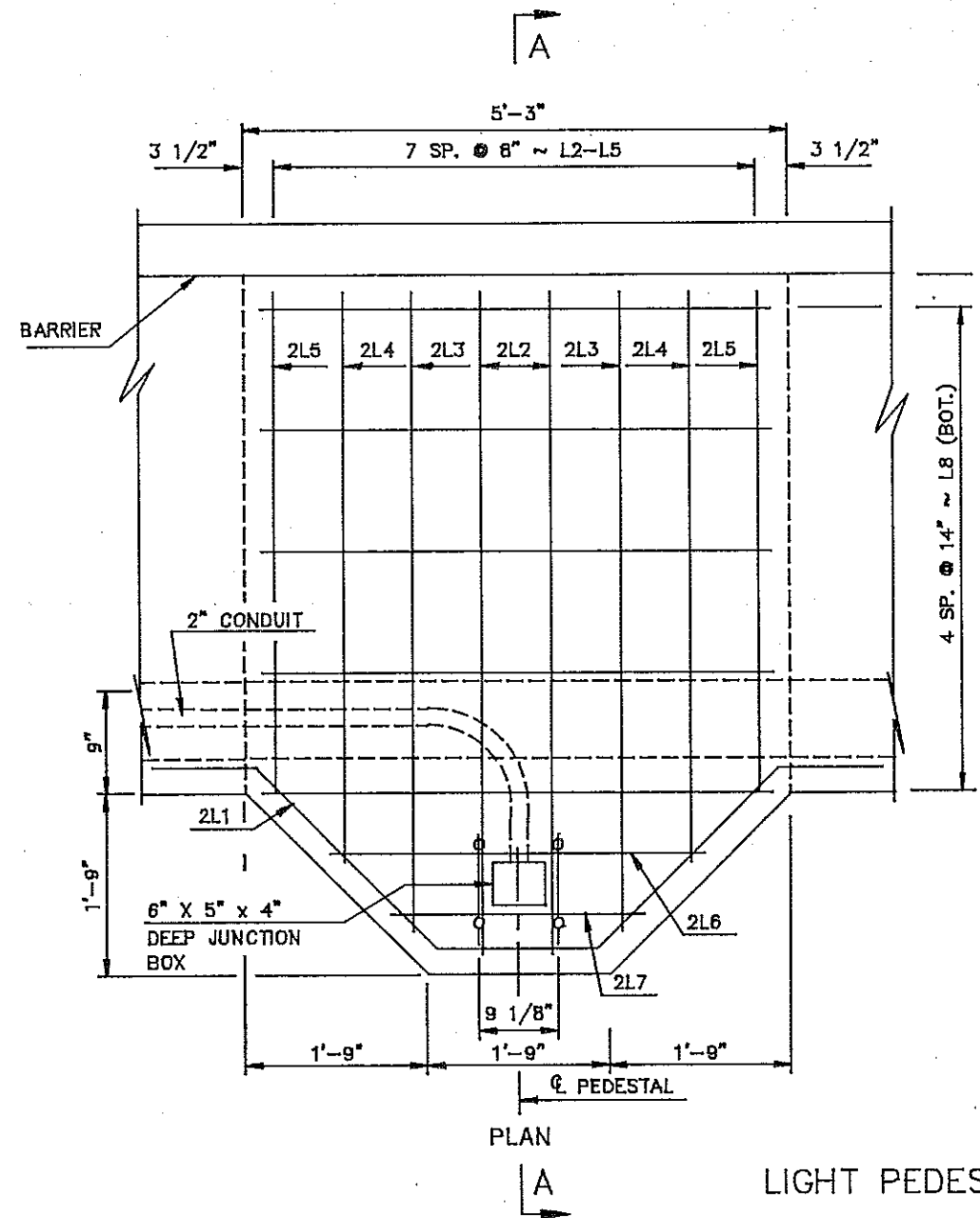
QUANTITIES	
SEE DWG 94-920.914-29E	
MEMORIAL BRIDGE EAST APPROACH WIDENING	
PIER 29 TO END OF APPROACH	

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	F-1-094(007)920	



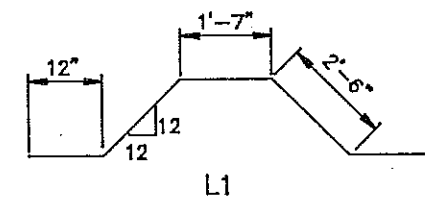
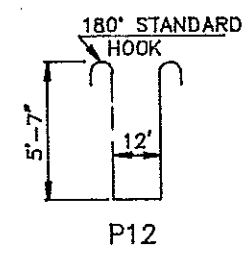
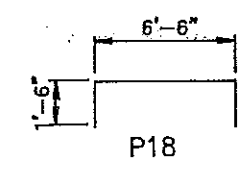
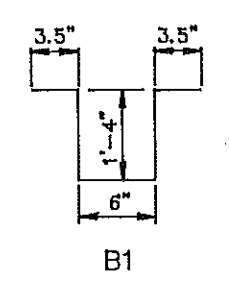
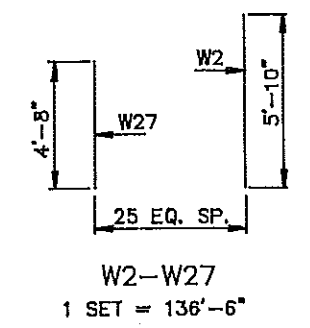
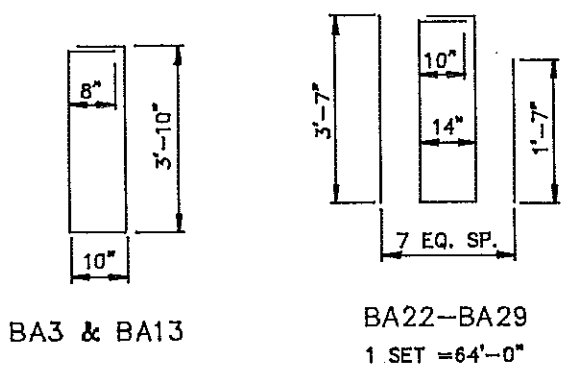
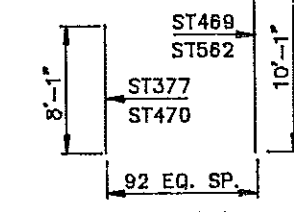
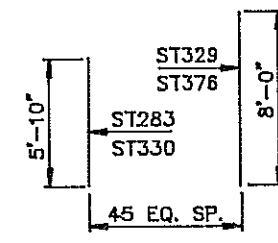
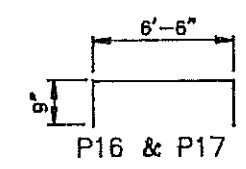
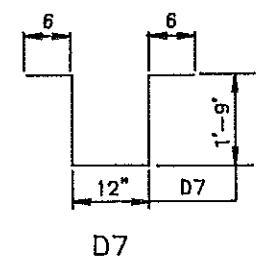
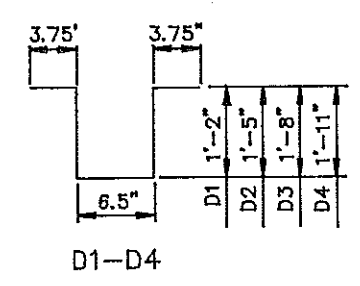
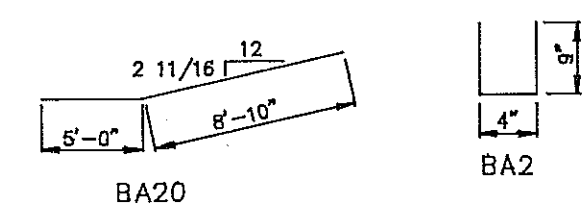
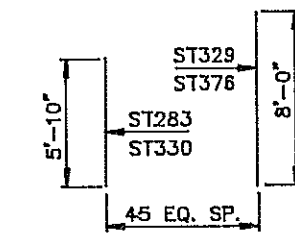
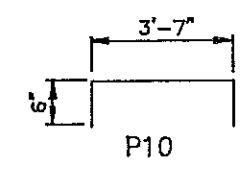
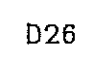
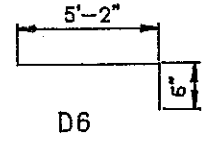
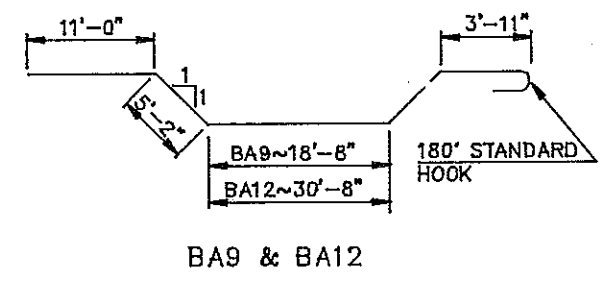
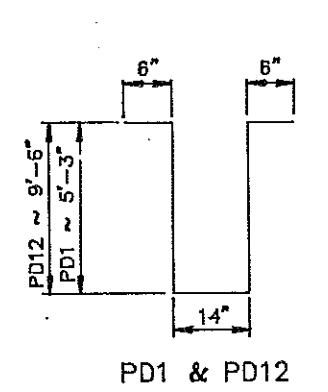
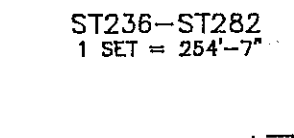
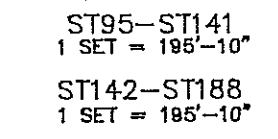
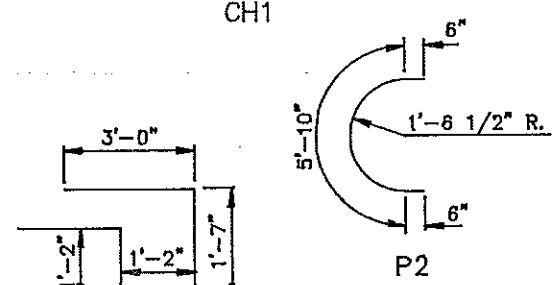
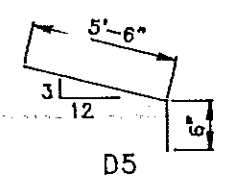
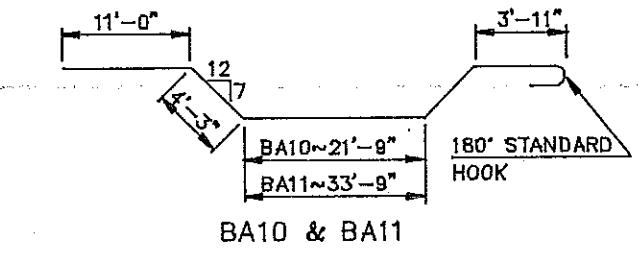
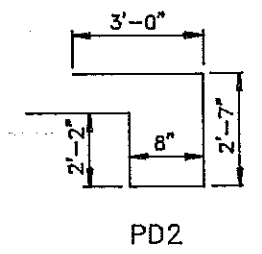
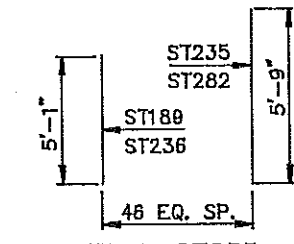
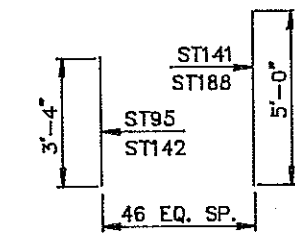
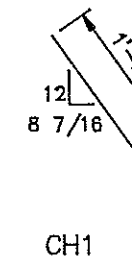
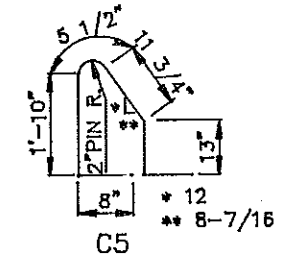
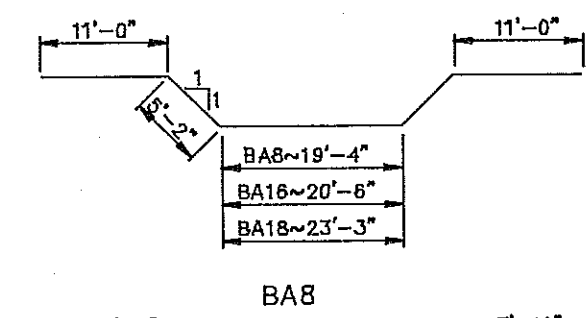
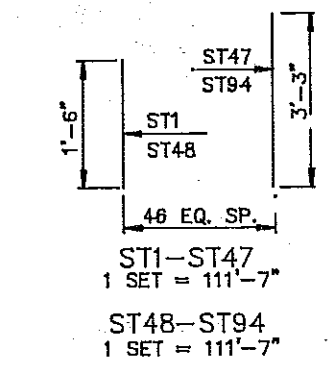
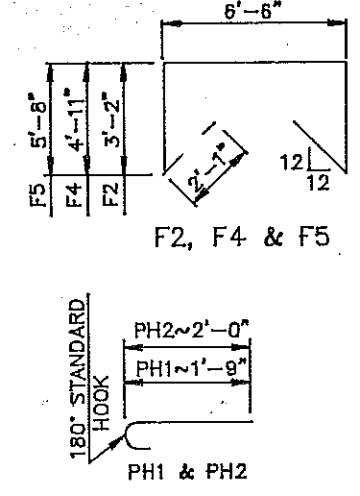
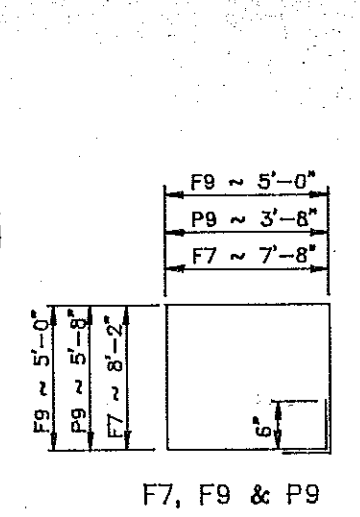
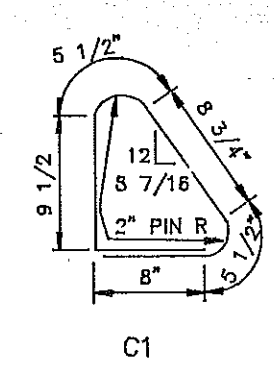
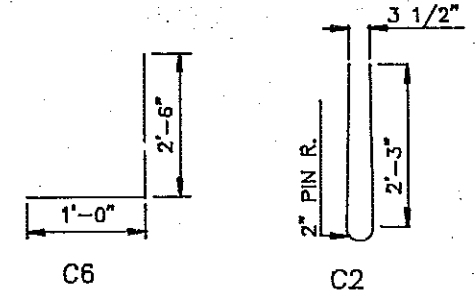
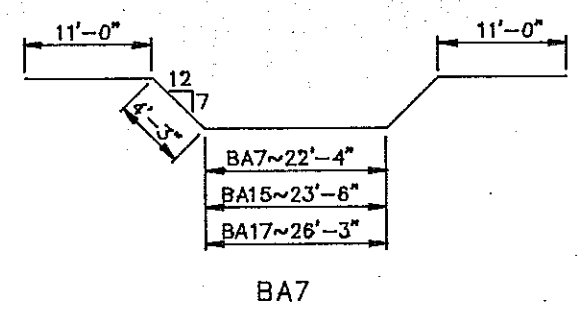
QUANTITIES
SEE DWG. 94-920.914-29E
MEMORIAL BRIDGE EAST APPROACH WIDENING PIER 30

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	



LIGHT PEDESTAL DETAILS @ STA. 0+65 RT. & 4+36 RT.

QUANTITIES
94-920.914-29E
MEMORIAL BRIDGE EAST APPROACH SUPERSTRUCTURE LIGHT PEDESTALS
94-920.914-27A-E



BENT BAR DETAILS
DIMENSIONS SHOWN ARE OUT TO OUT

QUANTITIES	
SEE DWG. 94-920.914-29E	
MEMORIAL BRIDGE EAST APPROACH WIDENING BAR DETAILS	

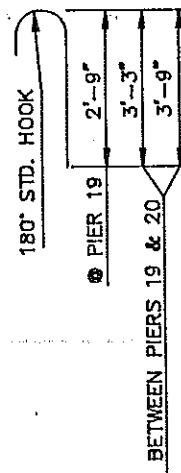
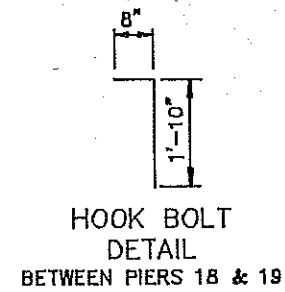
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
B1	464	4	3'-9"	BENT
B2	12	6	43'-11"	STR.
BA1	2	4	12'-0"	STR.
BA2	7	4	1'-10"	BENT
BA3	199	4	9'-10"	BENT
BA4	30	11	46'-3"	STR.
BA5	20	5	44'-9"	STR.
BA6	2	11	16'-5"	STR.
BA7	4	11	52'-10"	BENT
BA8	8	11	51'-8"	BENT
BA9	2	11	45'-6"	BENT
BA10	1	11	46'-9"	BENT
BA11	1	11	58'-9"	BENT
BA12	2	11	57'-6"	BENT
BA13	118	5	9'-10"	BENT
BA14	3	9	15'-0"	STR.
BA15	1	11	54'-0"	BENT
BA16	2	11	52'-10"	BENT
BA17	3	11	56'-9"	BENT
BA18	6	11	55'-7"	BENT
BA19	3	11	26'-5"	STR.
BA20	3	11	13'-10"	BENT
BA21	1	11	8'-10"	STR.
BA22-BA29	1 SET	4	64'-0"	BENT
*C1	72	5	3'-9"	BENT
C2	463	5	5'-1"	BENT
C3	55	4	44'-3"	STR.
*C4	11	4	44'-3"	STR.
*C5	392	5	5'-10"	BENT
C6	48	5	3'-6"	BENT
*CH1	37	5	2'-0"	BENT
CH2	14	5	2'-0"	STR.
CH3	10	5	2'-0"	BENT
D1	40	4	3'-6"	BENT
D2	39	4	4'-0"	BENT
D3	39	4	4'-6"	BENT
D4	39	4	5'-0"	BENT
D5	78	5	6'-0"	BENT
D6	78	5	5'-8"	BENT
D7	174	4	5'-6"	BENT
D8	3	6	3'-5"	STR.
D9	3	6	4'-1"	STR.
D10	3	6	4'-9"	STR.
D11	3	6	5'-2"	STR.
D12	3	6	6'-0"	STR.
D13	3	6	6'-9"	STR.
D14	3	6	9'-6"	STR.
D15	3	6	9'-11"	STR.
D16	3	6	10'-4"	STR.

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
D17	3	6	9'-9"	STR.
D18	6	6	10'-4"	STR.
D19	3	6	10'-10"	STR.
D20	6	6	11'-5"	STR.
D21	15	6	11'-3"	STR.
D22	3	6	9'-8"	STR.
D23	3	6	8'-5"	STR.
D24	3	6	7'-8"	STR.
D25	3	6	8'-8"	STR.
D26	6	6	9'-11"	STR.
DH1	4	5	2'-0"	STR.
F1	180	6	4'-6"	STR.
F2	4	6	17'-0"	BENT
F3	152	10	6'-0"	STR.
F4	4	6	20'-6"	BENT
F5	4	6	22'-0"	BENT
F6	22	6	5'-6"	STR.
F7	5	6	32'-8"	STR.
F8	12	10	8'-0"	STR.
F9	30	6	21'-0"	BENT
P1	4	10	45'-1"	STR.
P2	44	4	6'-10"	BENT
P3	2	10	41'-3"	STR.
P4	8	10	44'-3"	STR.
P5	2	10	40'-5"	STR.
P6	44	4	10'-4"	BENT
P7	16	10	43'-6"	STR.
P8	16	10	42'-8"	STR.
P9	38	4	19'-8"	BENT
P10	114	4	4'-7"	BENT
P11	12	9	36'-3"	STR.
P12	6	4	13'-6"	BENT
P13	19	4	7'-10"	STR.
P14	5	6	7'-10"	STR.
P15	5	4	8'-0"	STR.
P16	4	6	8'-0"	BENT
P17	5	4	8'-0"	BENT
P18	2	4	9'-6"	BENT
P19	16	10	40'-0"	STR.
P20	16	10	40'-0"	STR.
P21	16	10	39'-2"	STR.
P22	16	10	27'-9"	STR.
P23	16	10	19'-11"	STR.
P24	16	10	17'-1"	STR.
P25	16	10	11'-4"	STR.
PD1	55	4	12'-8"	BENT
PD2	8	4	11'-5"	BENT
PD3	6	9	7'-10"	STR.
PD4	4	5	15'-2"	STR.
PD5	18	5	7'-0"	STR.
PD6	4	5	17'-7"	STR.

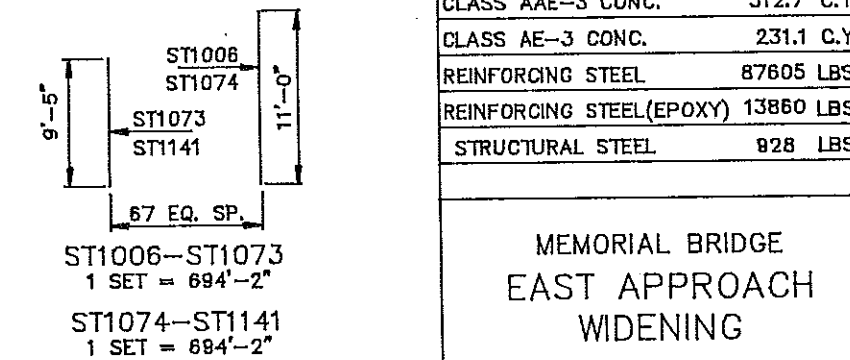
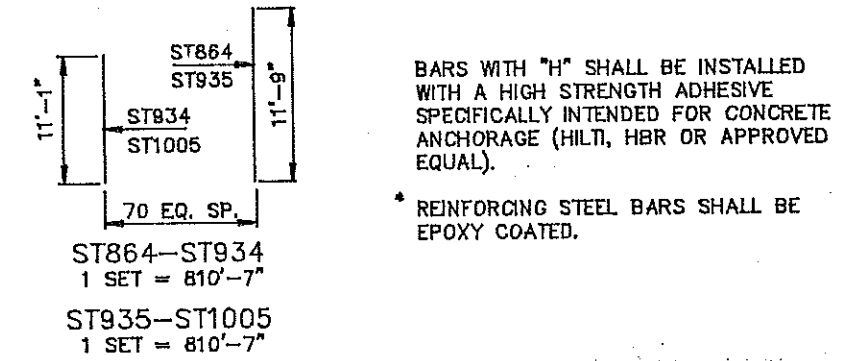
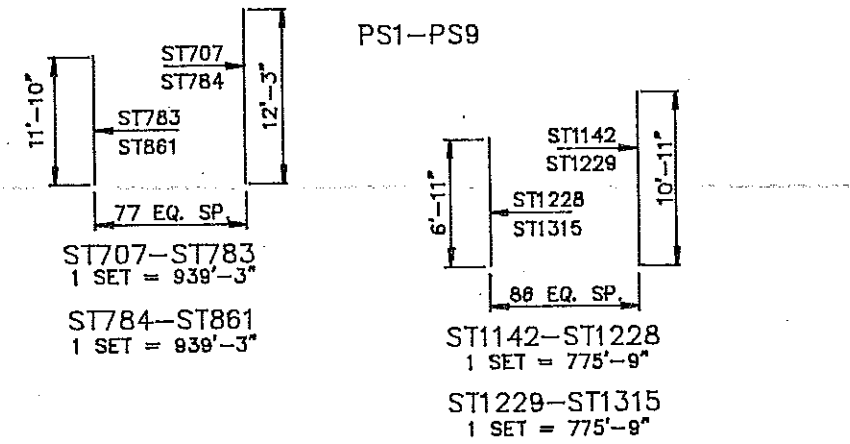
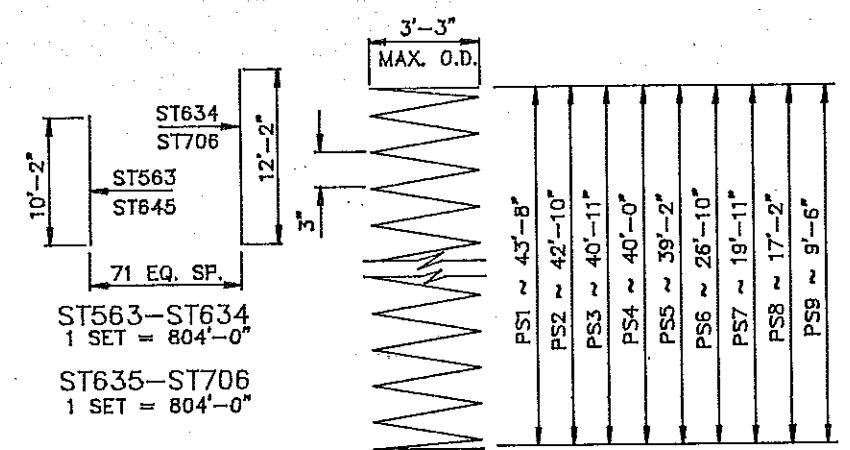
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
PD7	4	5	21'-4"	STR.
PD8	4	5	11'-5"	STR.
PD9	4	5	10'-8"	STR.
PD10	4	5	9'-1"	STR.
PD11	12	5	7'-1"	STR.
PD12	3	4	21'-2"	BENT
PH1	46	6	2'-5"	STR.
PH2	47	6	2'-8"	BENT
PH3	10	6	2'-6"	STR.
SH1	180	4	2'-0"	STR.
*SL1	26	5	39'-1"	STR.
SL2	25	4	39'-1"	STR.
*SL3	10	5	48'-3"	STR.
SL4	12	5	48'-3"	STR.
*SL5	12	5	40'-3"	STR.
SL6	15	5	40'-3"	STR.
*SL7	13	5	43'-0"	STR.
SL8	16	5	43'-0"	STR.
*SL9	13	5	55'-3"	STR.
SL10	16	5	55'-3"	STR.
*SL11	13	5	38'-2"	STR.
SL12	16	5	38'-2"	STR.
*SL13	10	5	45'-6"	STR.
SL14	12	5	45'-6"	STR.
ST1-SET	* 1	5	111'-7"	STR.
ST47	SET	5	111'-7"	STR.
ST48	1	5	111'-7"	STR.
ST94	SET	5	111'-7"	STR.
ST95	* 1	5	195'-10"	STR.
ST141	SET	5	195'-10"	STR.
ST142	1	5	195'-10"	STR.
ST188	SET	5	195'-10"	STR.
ST189	* 1	5	254'-7"	STR.
ST235	SET	5	254'-7"	STR.
ST236	1	5	254'-7"	STR.
ST282	SET	5	254'-7"	STR.
ST283	* 1	5	318'-2"	STR.
ST329	SET	5	318'-2"	STR.
ST330	1	5	318'-2"	STR.
ST376	SET	5	318'-2"	STR.
ST377	* 1	5	844'-9"	STR.
ST469	SET	5	844'-9"	STR.
ST470	1	5	844'-9"	STR.
ST562	SET	5	844'-9"	STR.
ST563	* 1	5	804'-0"	STR.
ST634	SET	5	804'-0"	STR.
ST635	1	5	804'-0"	STR.
ST706	SET	5	804'-0"	STR.
ST707	* 1	5	939'-3"	SET
ST783	SET	5	939'-3"	SET

BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
ST784	1	5	939'-3"	STR.
ST861	SET	5	939'-3"	STR.
ST862	* 33	5	11'-9"	STR.
ST863	33	5	11'-9"	STR.
ST864	* 1	5	810'-7"	STR.
ST934	SET	5	810'-7"	STR.
ST935	1	5	810'-7"	STR.
ST1005	SET	5	810'-7"	STR.
ST1006	* 1	5	694'-2"	STR.
ST1073	SET	5	694'-2"	STR.
ST1074	1	5	694'-2"	STR.
ST1141	SET	5	694'-2"	STR.
ST1142	* 1	5	775'-9"	STR.
ST1228	SET	5	775'-9"	STR.
ST1229	1	5	775'-9"	STR.
ST1315	SET	5	775'-9"	STR.
PS1	1	4	1790'-9"	SPIRAL
PS2	1	4	1757'-2"	SPIRAL
PS3	1	4	1679'-11"	SPIRAL
PS4	1	4	1642'-11"	SPIRAL
PS5	1	4	1609'-4"	SPIRAL
PS6	1	4	1112'-1"	SPIRAL
PS7	1	4	833'-3"	SPIRAL
PS8	1	4	722'-4"	SPIRAL
PS9	1	4	413'-3"	SPIRAL
W1	66	5	43'-11"	STR.
W2	1	4	136'-6"	STR.
W27	SET	4	136'-6"	STR.
W28	438	5	4'-8"	STR.
L1	4	4	8'-7"	BENT
L2	8	6	6'-5"	STR.
L3	8	6	6'-0"	STR.
L4	8	6	5'-4"	STR.
L5	8	6	4'-8"	STR.
L6	4	4	2'-5"	STR.
L7	4	4	3'-7"	STR.
L8	10	4	4'-11"	STR.

TIE BOLTS & WASHERS	
NO.	DESCRIPTION
20	3/4"ØX2'-6" 90° HOOK BOLTS, HEX. NUTS
4	3/4"ØX3'-0" 180° HOOK BOLTS, HEX. NUTS
4	3/4"ØX3'-0" 180° HOOK BOLTS, HEX. NUTS
2	3/4"ØX4'-1" 180° HOOK BOLTS, HEX. NUTS
2	1"ØX8'-0" BOLTS, HEX. NUTS ~ THREAD 1 END
2	1"ØX8'-0" BOLTS, HEX. NUTS ~ THREAD 1 END
2	1"ØX18'-5" BOLTS, HEX. NUTS ~ THREAD 1 END
2	1"ØX20'-9" BOLTS, HEX. NUTS ~ THREAD 1 END
2	1"ØX24'-5" BOLTS, HEX. NUTS ~ THREAD 1 END
2	1"ØX14'-10" BOLTS HEX. NUTS ~ THREAD 1 END
4	1"ØX14'-2" BOLTS HEX. NUTS ~ THREAD 1 END
2	1"ØX12'-2" BOLTS HEX. NUTS ~ THREAD 1 END
24	BAR 4X4X1/4 WASHER
18	6X6X1/4 WASHER



HOOK BOLT DETAIL



BARS WITH "H" SHALL BE INSTALLED WITH A HIGH STRENGTH ADHESIVE SPECIFICALLY INTENDED FOR CONCRETE ANCHORAGE (HILTI, HBR OR APPROVED EQUAL).

* REINFORCING STEEL BARS SHALL BE EPOXY COATED.

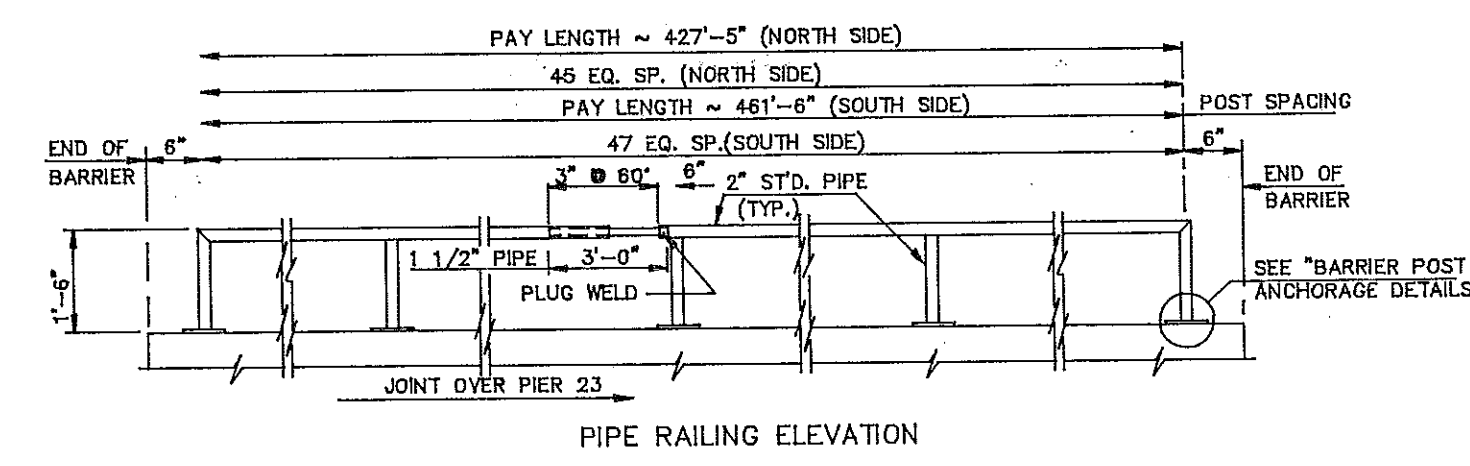
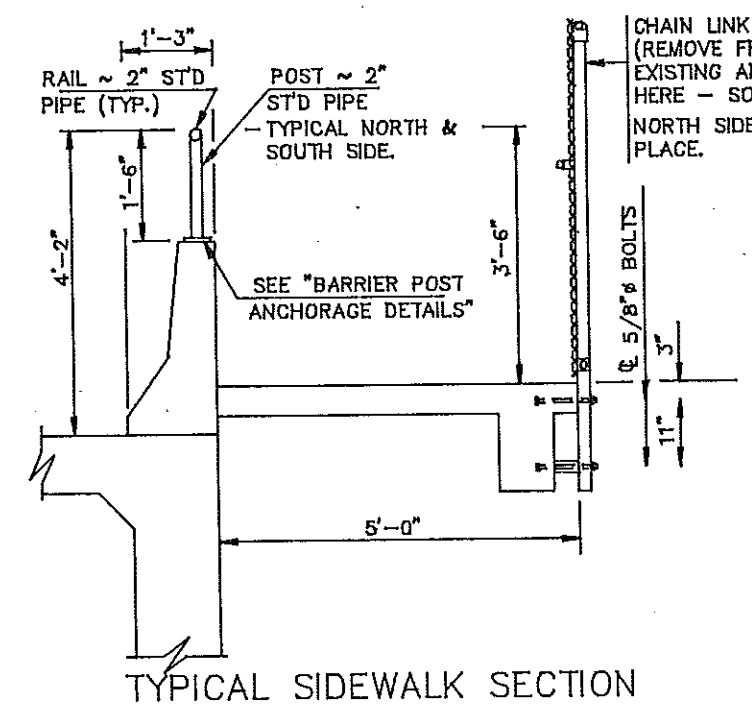
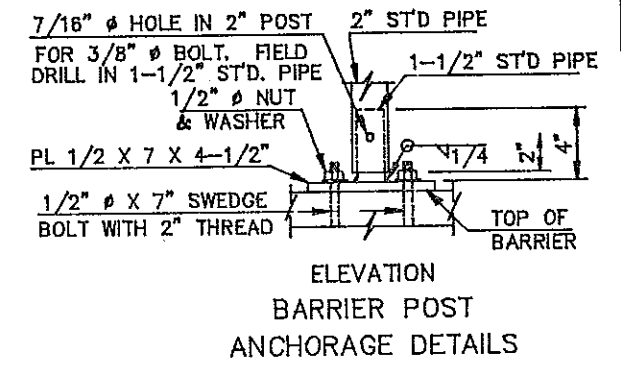
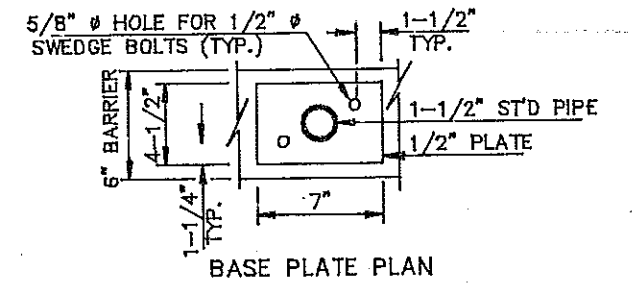
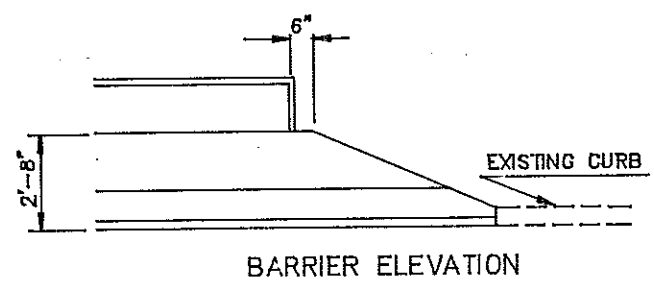
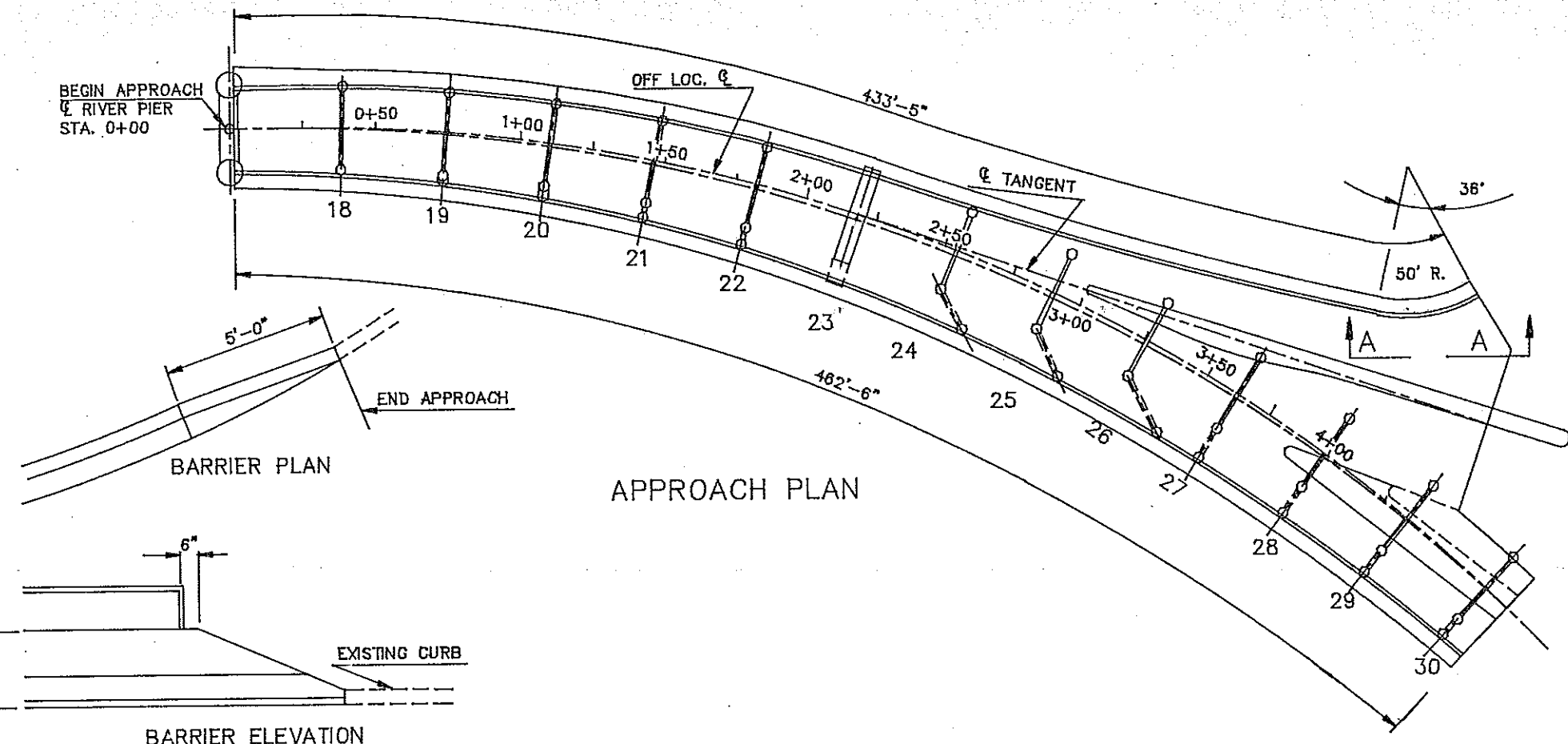
QUANTITIES (SOUTH SIDE)	
CLASS AAE-3 CONC.	312.7 C.Y.
CLASS AE-3 CONC.	231.1 C.Y.
REINFORCING STEEL	87605 LBS.
REINFORCING STEEL(EPOXY)	13860 LBS.
STRUCTURAL STEEL	928 LBS.

MEMORIAL BRIDGE
EAST APPROACH
WIDENING

BAR DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	F-1-094(007)920	

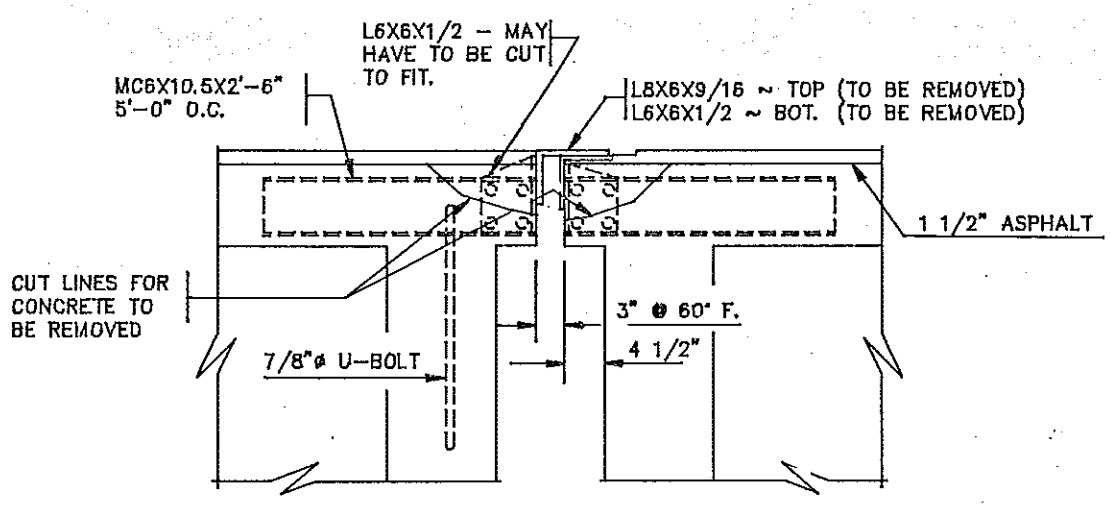
NOTE:
 POSTS AND FITTINGS SHALL BE AASHTO M181, CLASS I.
 ANCHORAGE PLATES SHALL BE AASHTO M270 GRADE 36 AND SHALL BE HOT-DIPPED GALVANIZED IN ACCORDANCE WITH AASHTO M232.
 TO ANCHOR BASE PLATES AND CHAIN LINK FENCE, THE CONTRACTOR HAS THE OPTION TO EITHER DRILL IN SWEDGE BOLTS OR PLACE THEM IN THE CONCRETE AT THE TIME OF POURING. IF THE CONTRACTOR ELECTS TO DRILL THE BOLT HOLES, EXTREME CAUTION SHALL BE EXERCISED NOT TO DAMAGE THE CONCRETE BARRIERS.



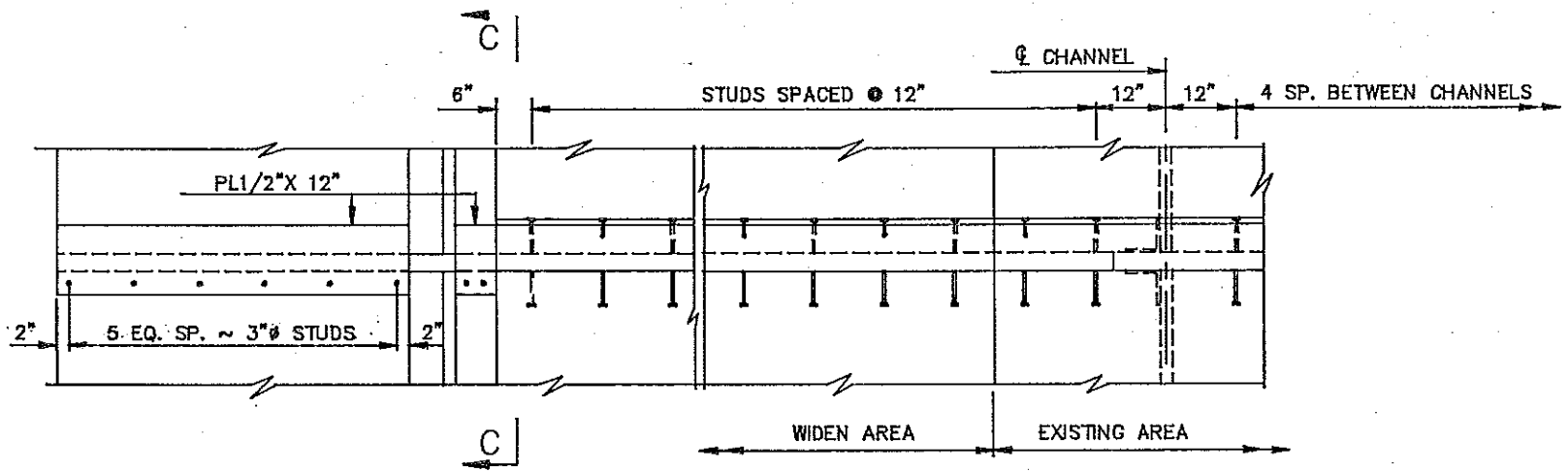
QUANTITIES	
PIPE RAIL	888.92 L. FT.

MEMORIAL BRIDGE
 EAST APPROACH
 WIDENING

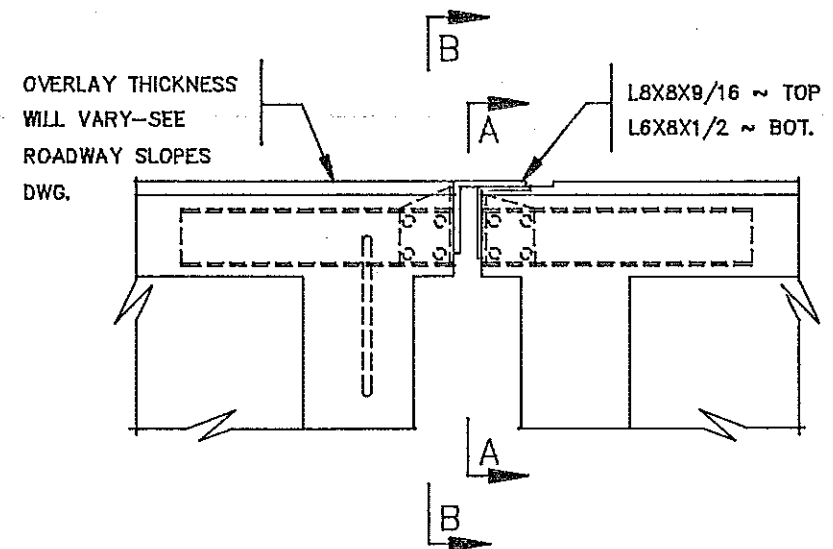
PEDESTRAIN RAILING
 94-920.914-30E



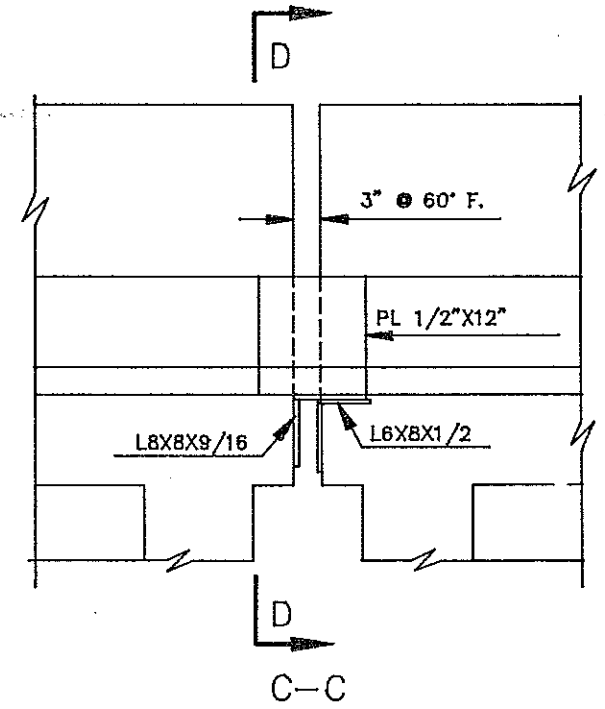
EXISTING EXPANSION JOINT @ PIER 23



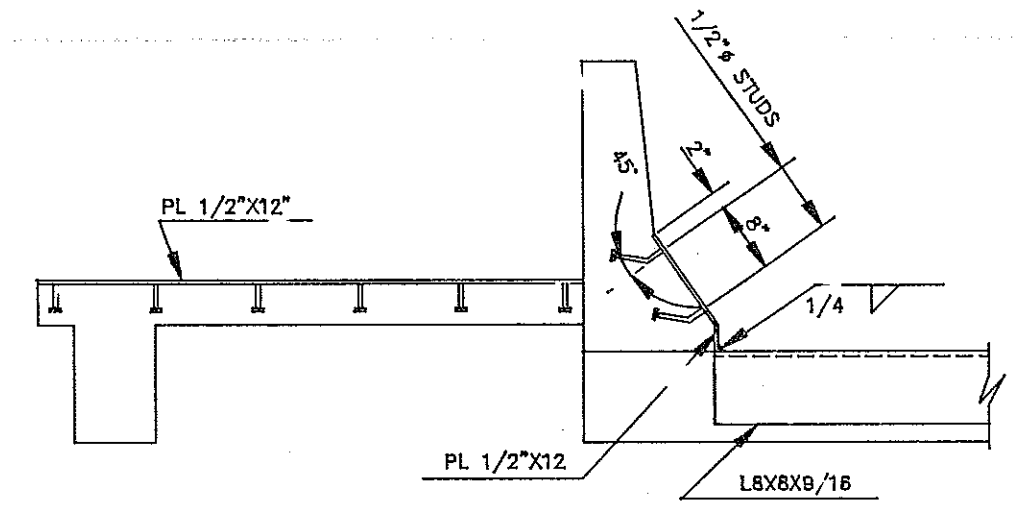
EXPANSION JOINT PLAN



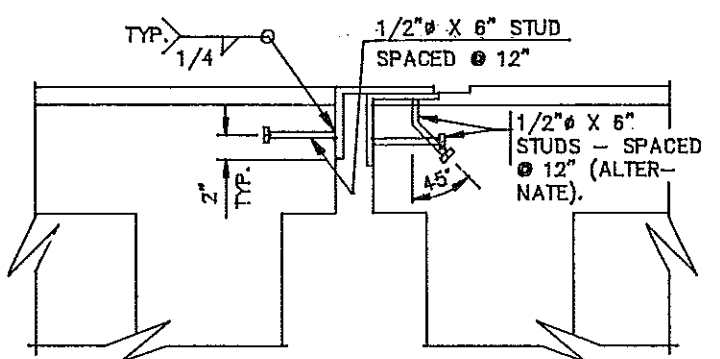
AT EXISTING CHANNELS



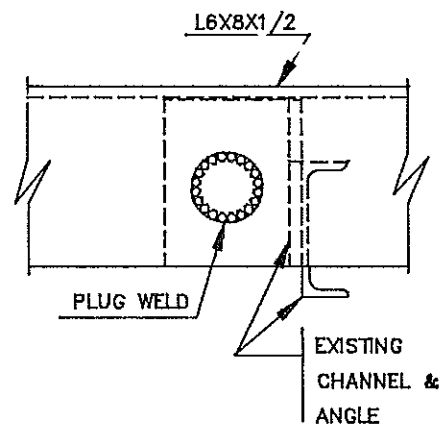
C-C



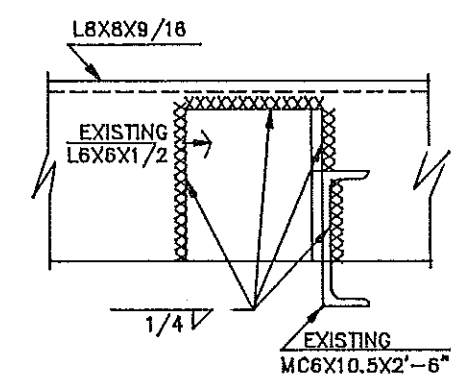
D-D



BETWEEN EXISTING CHANNEL AND AT WIDENING
REVISED EXPANSION JOINT



A-A

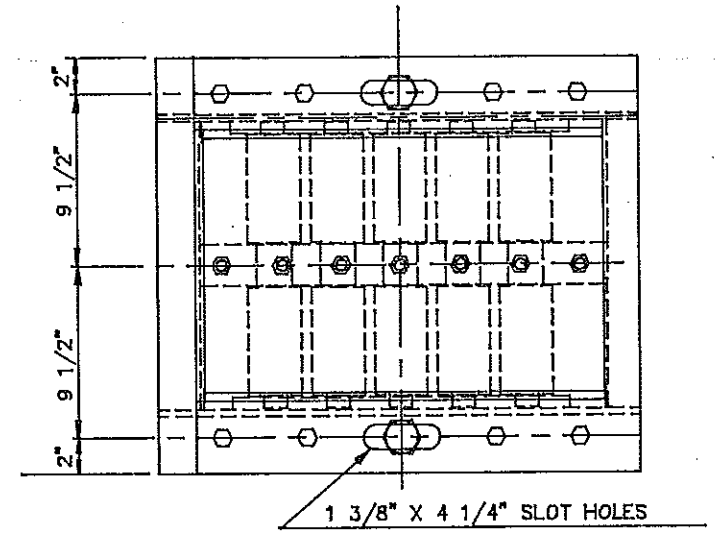
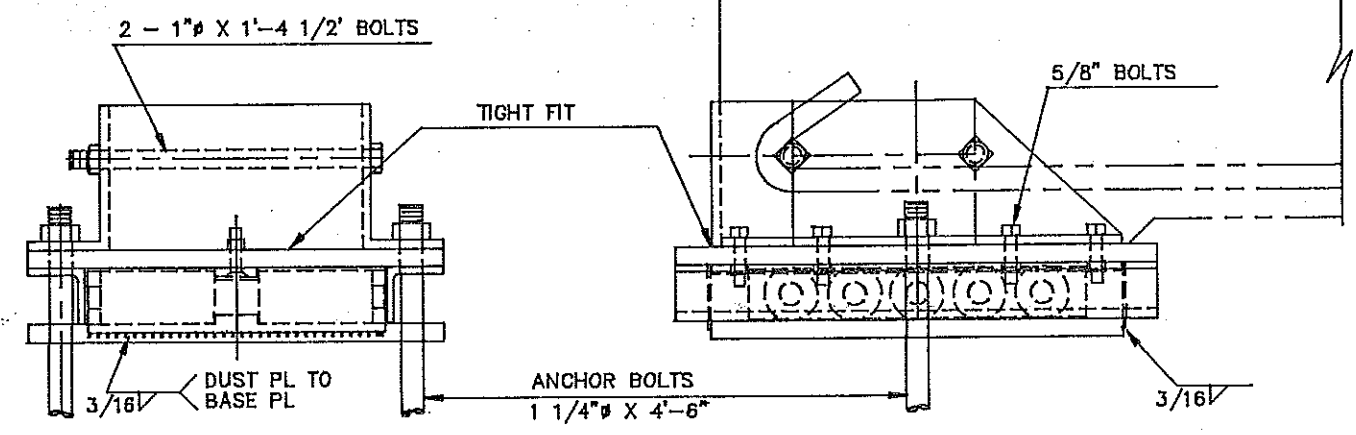
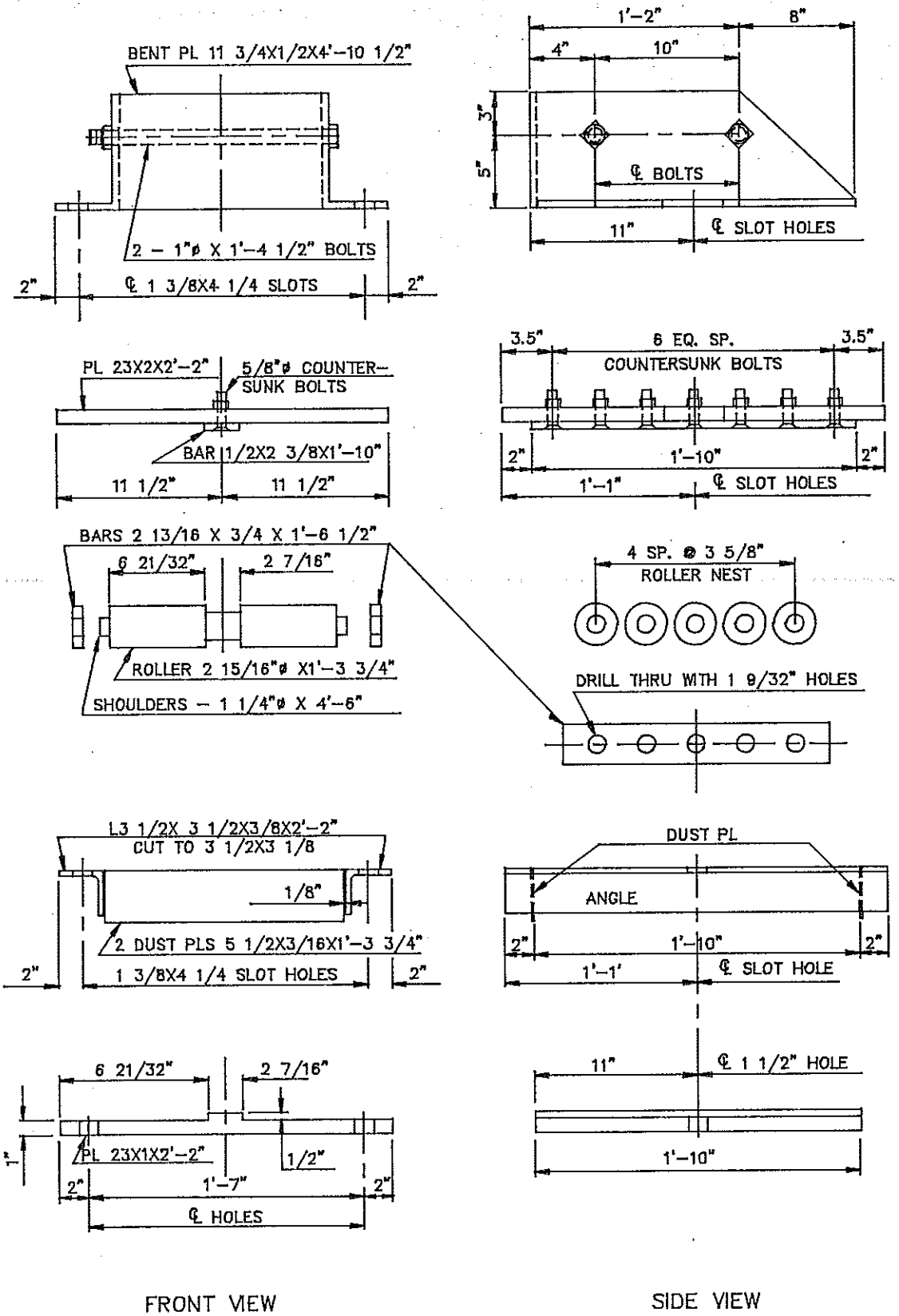


B-B

QUANTITIES		
1	STRUCTURAL STEEL	2208 LBS.

MEMORIAL BRIDGE
EAST APPROACH
EXPANSION JOINT

PIER 23



BEARING PLATE

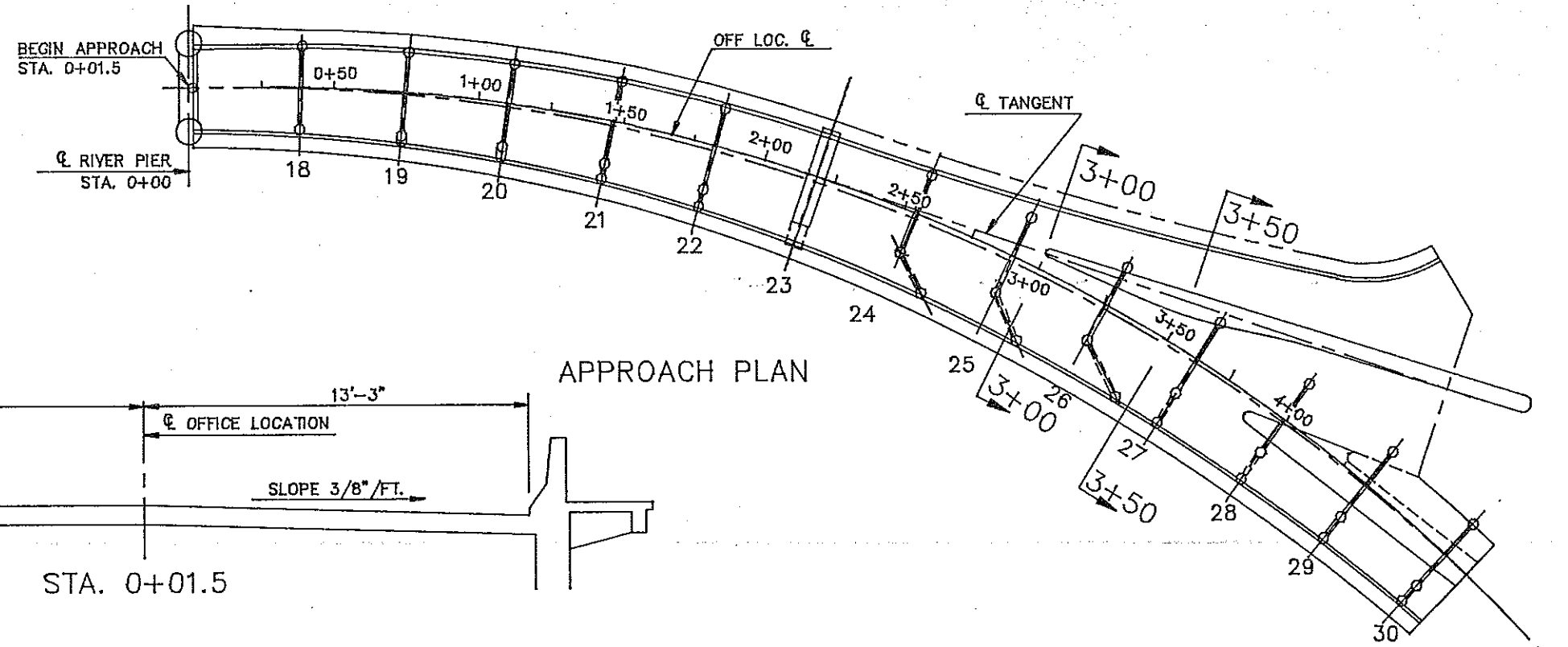
① M270 GRADE 36

QUANTITIES		
①	STRUCTURAL STEEL	1972 LBS.

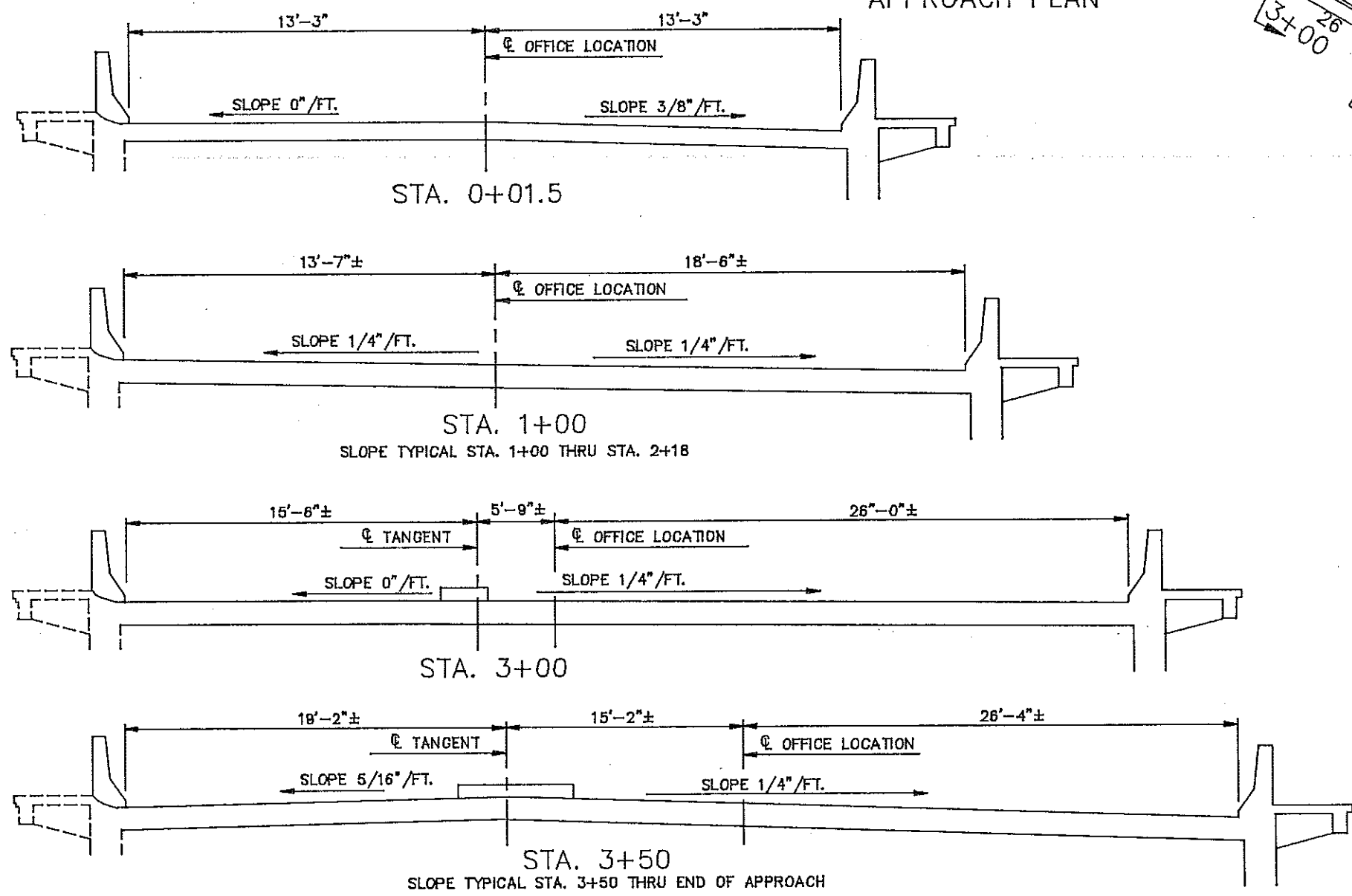
MEMORIAL BRIDGE
EAST APPROACH
BEARING PLATE

PIER 23

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	

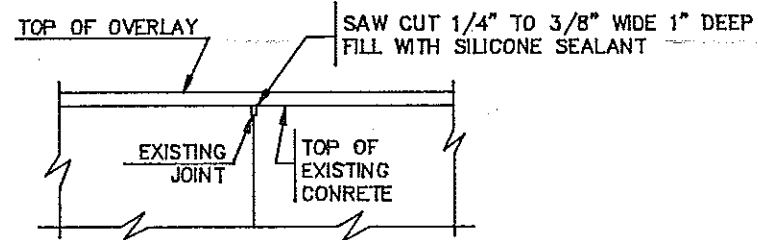
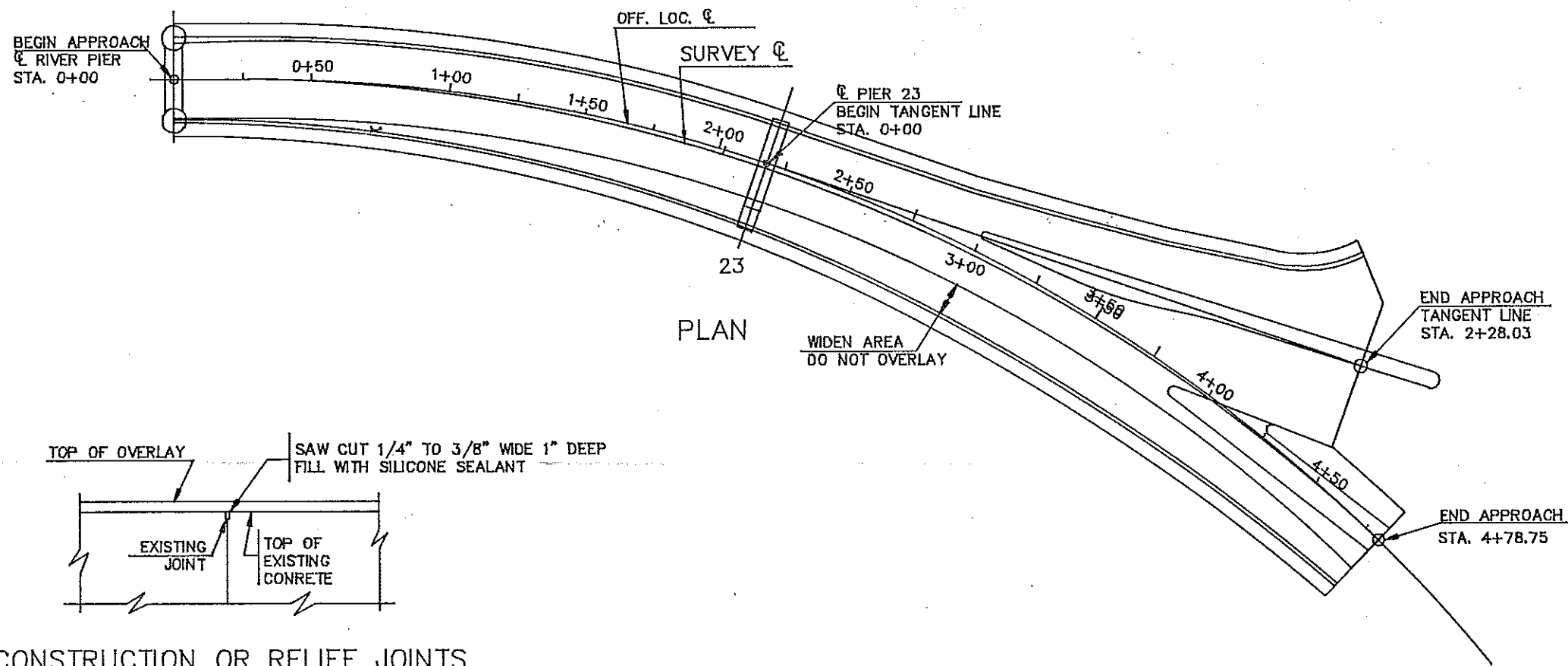


APPROACH PLAN

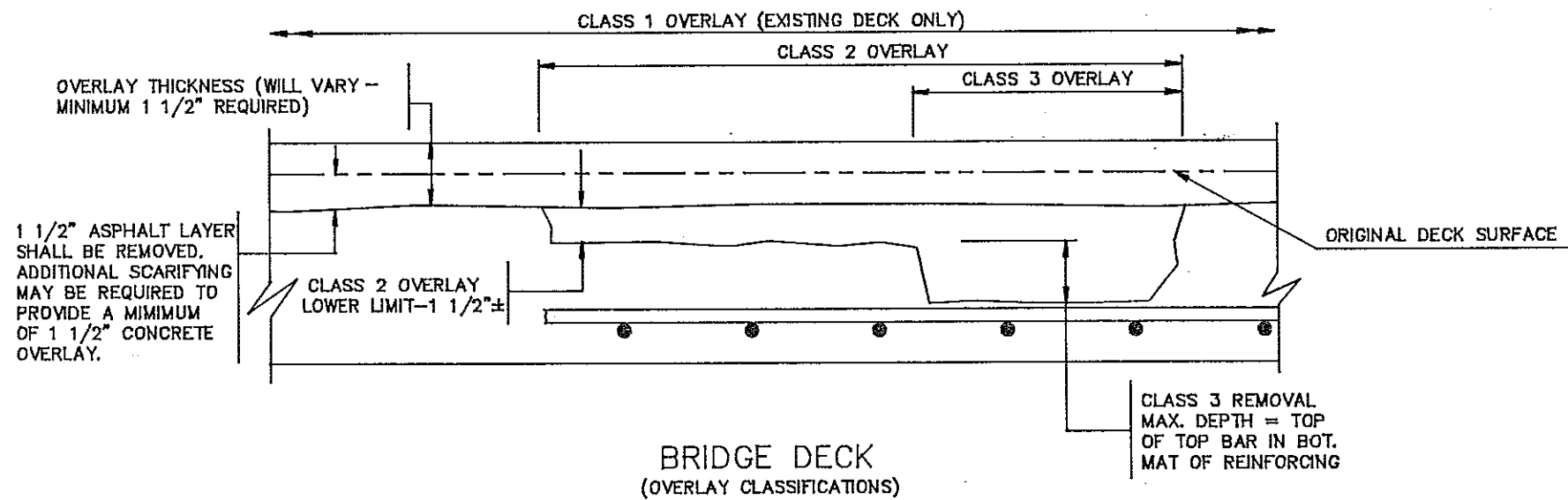


SLAB SECTIONS

MEMORIAL BRIDGE
EAST APPROACH
ROADWAY SLOPES



CONSTRUCTION OF RELIEF JOINTS
INCIDENTAL TO CLASS 1 OVERLAY



QUANTITIES		
CLASS 1 OVERLAY	1923	S.Y.
CLASS 2 OVERLAY	385	S.Y.
CLASS 3 OVERLAY	96	S.Y.
CLASS 2A OVERLAY	693	L. FT.

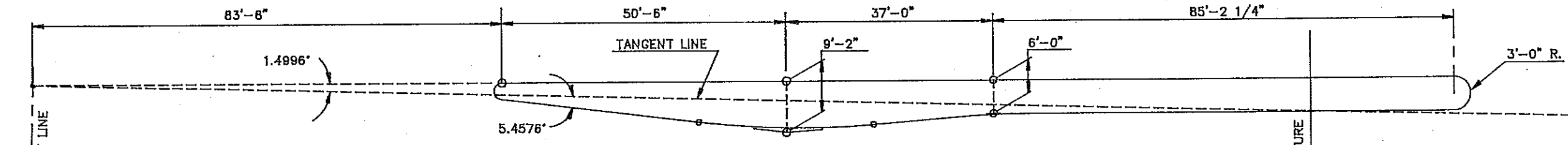
MEMORIAL BRIDGE
EAST APPROACH
OVERLAY DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	

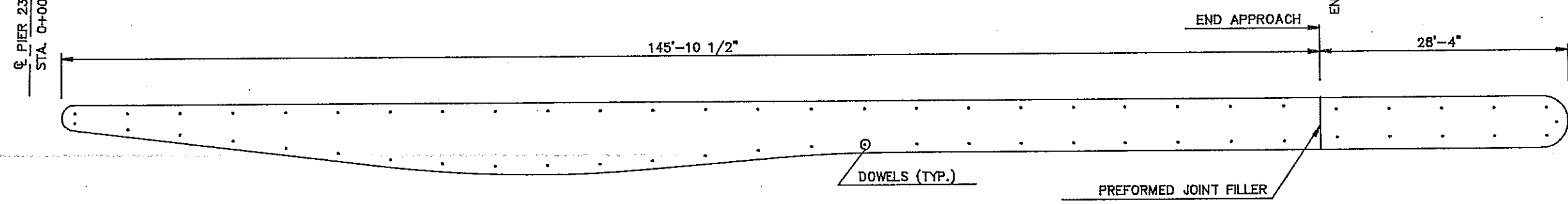
$\Delta = 173.0429'$
 $R = 1.5'$
 $L = 4.53'$

$\Delta = 11.8540'$
 $D = 38.9424'$
 $R = 150'$
 $T = 15.57'$
 $L = 30.44'$

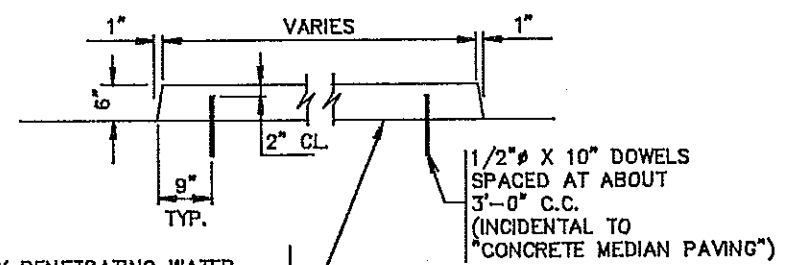
$\Delta = 4.8969'$
 $D = 38.9424'$
 $R = 150'$
 $T = 6.41'$
 $L = 12.57'$



CENTER ISLAND PLAN
SHOWING GEOMETRICS

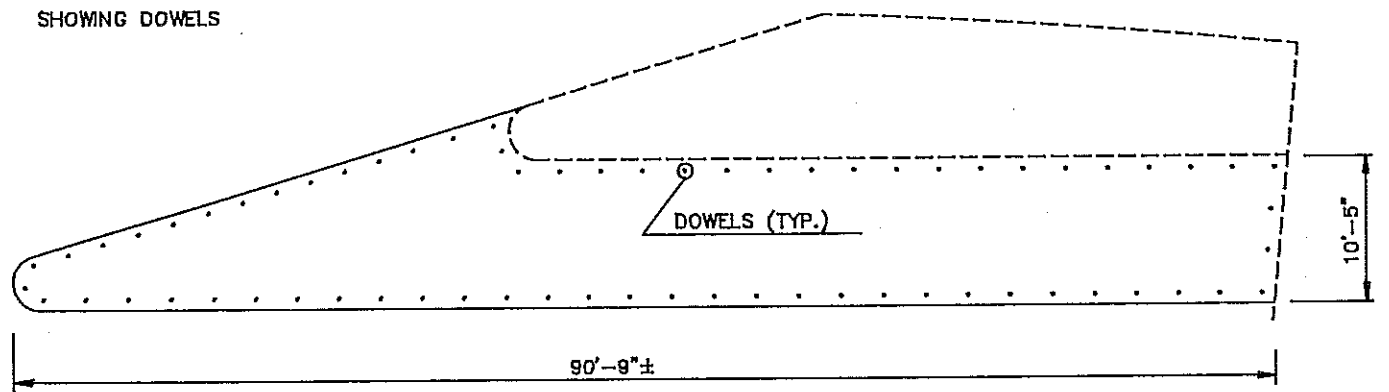


CENTER ISLAND PLAN
SHOWING DOWELS

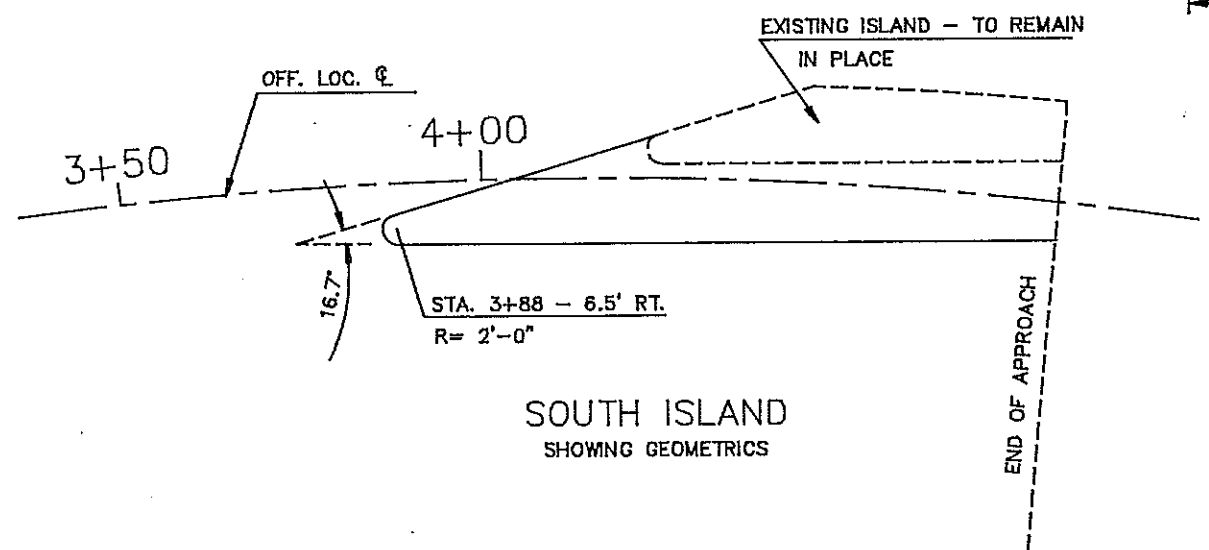


APPLY PENETRATING WATER REPELLANT TREATMENT UNDER ISLAND TO ACT AS A BOND BREAKER.

TYPICAL SECTION



SOUTH ISLAND
SHOWING DOWELS

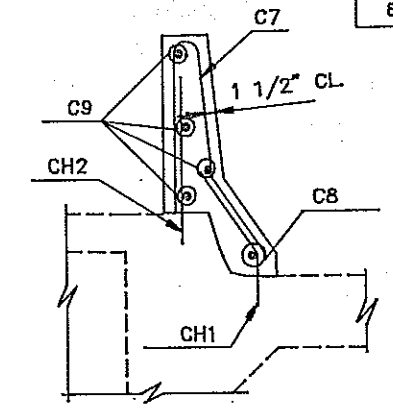
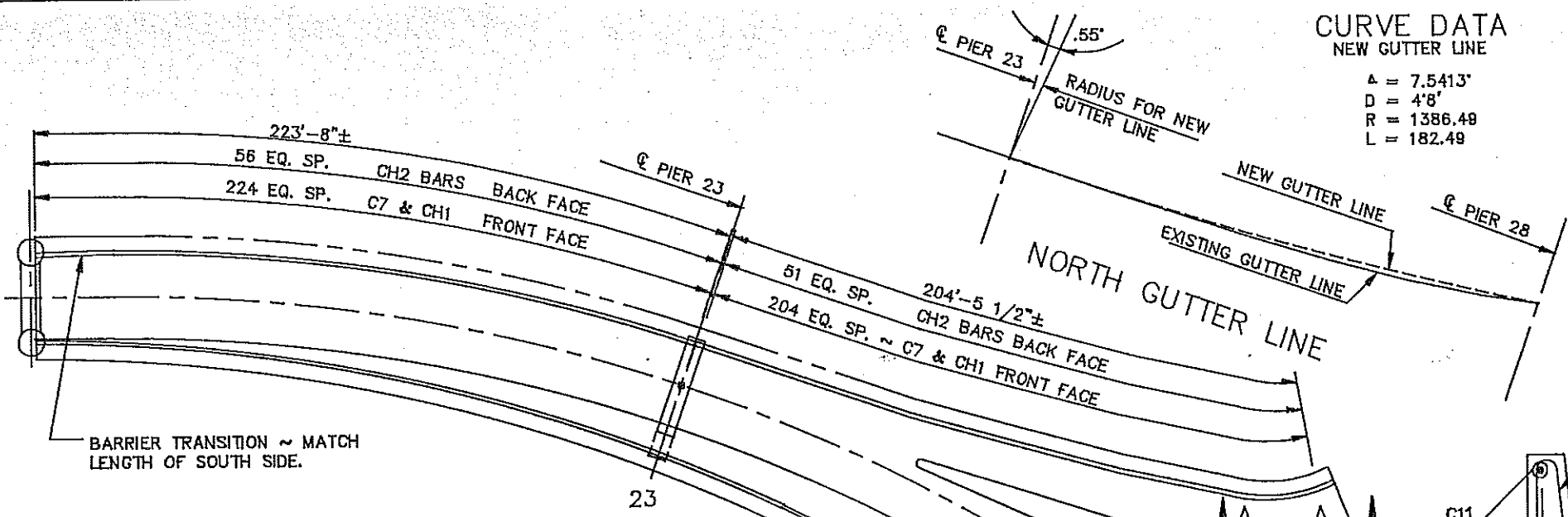


SOUTH ISLAND
SHOWING GEOMETRICS

QUANTITIES	
CONC. MEDIAN PAVING	2052 S.Y.

MEMORIAL BRIDGE
EAST APPROACH
ISLAND LAYOUT

CURVE DATA
NEW GUTTER LINE
 $\Delta = 7.5413^\circ$
 $D = 4'8"$
 $R = 1386.49$
 $L = 182.49$



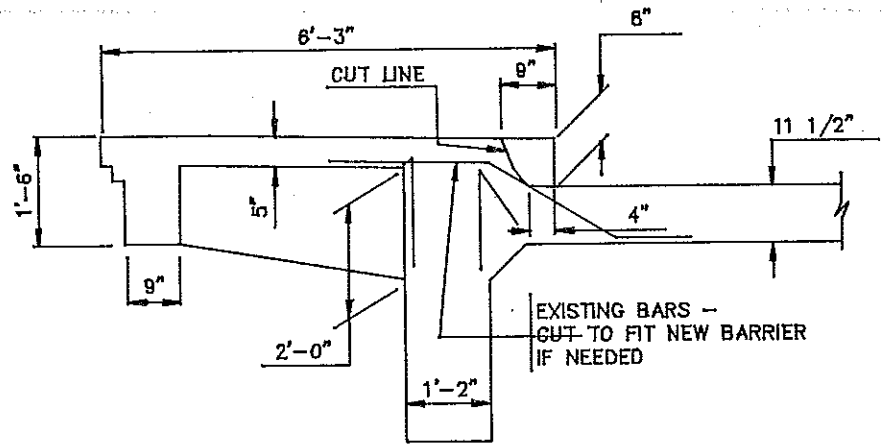
BAR LIST				
MARK	NO.	SIZE	LENGTH	SHAPE
① C7	430	5	4'-3"	BENT
① C8	5	4	46'-3"	STR.
① C9	20	4	46'-3"	STR.
① C10	5	4	42'-6"	STR.
① C11	20	4	42'-6"	STR.
① C12	1	4	5'-8"	STR.
① CH1	433	5	2'-0"	BENT
① CH2	111	5	2'-0"	STR.

① REINFORCING STEEL BARS SHALL BE EPOXY COATED.

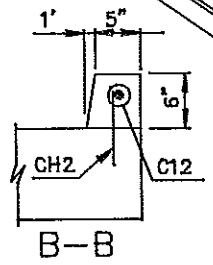
CH1 & CH2 SHALL BE INSTALLED WITH A HIGH STRENGTH ADHESIVE SPECIFICALLY INTENDED FOR CONCRETE ANCHORAGE (HILTI HBR OR APPROVED EQUAL).

BARRIER TRANSITION ~ MATCH LENGTH OF SOUTH SIDE.

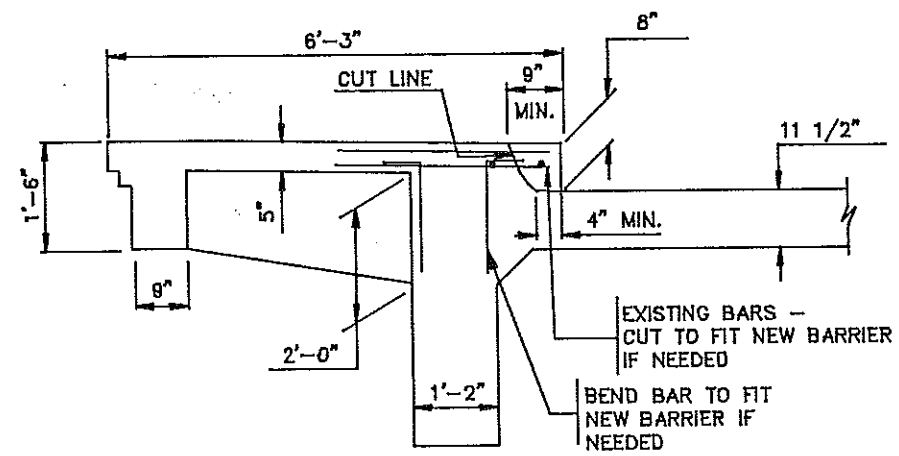
PLAN



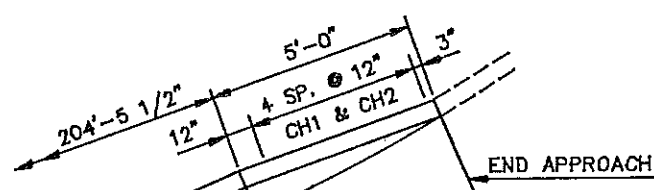
TYPICAL SECTION WEST OF PIER 23



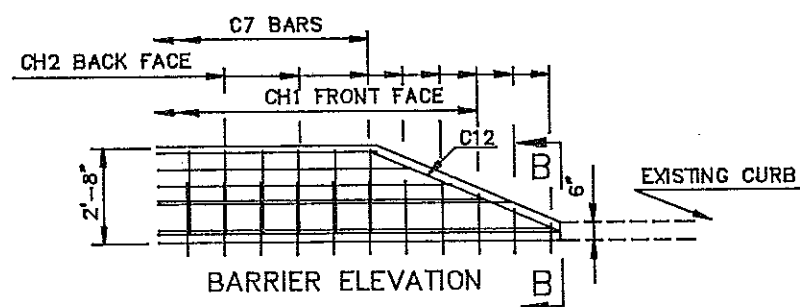
B-B



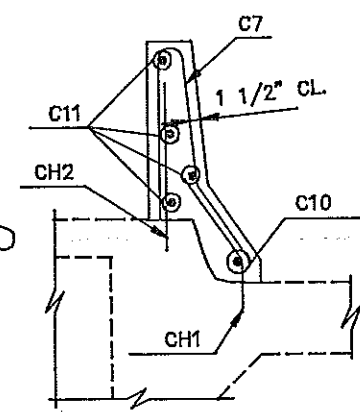
TYPICAL SECTION EAST OF PIER 23



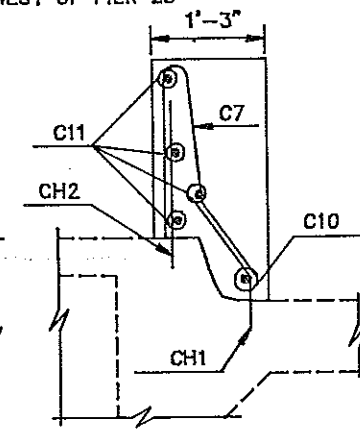
BARRIER PLAN



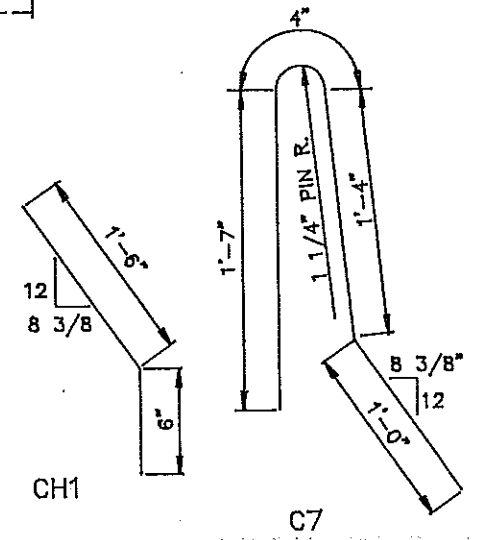
A-A



BARRIER DETAIL EAST OF PIER 23

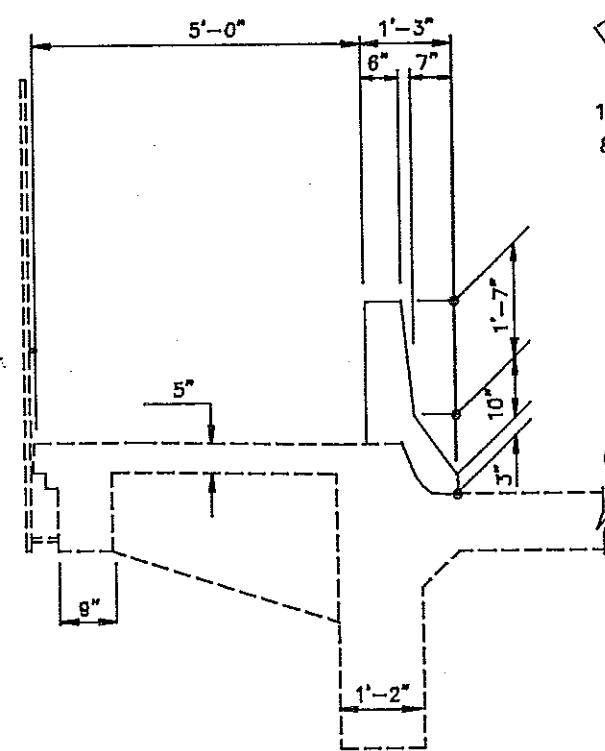


BEGIN BARRIER @ TRUSS



CH1

C7

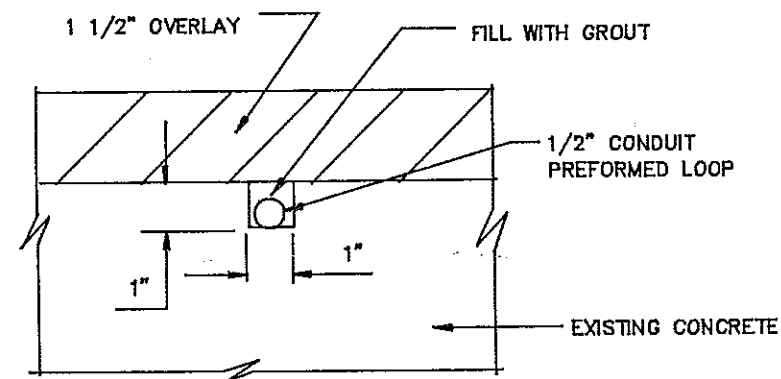
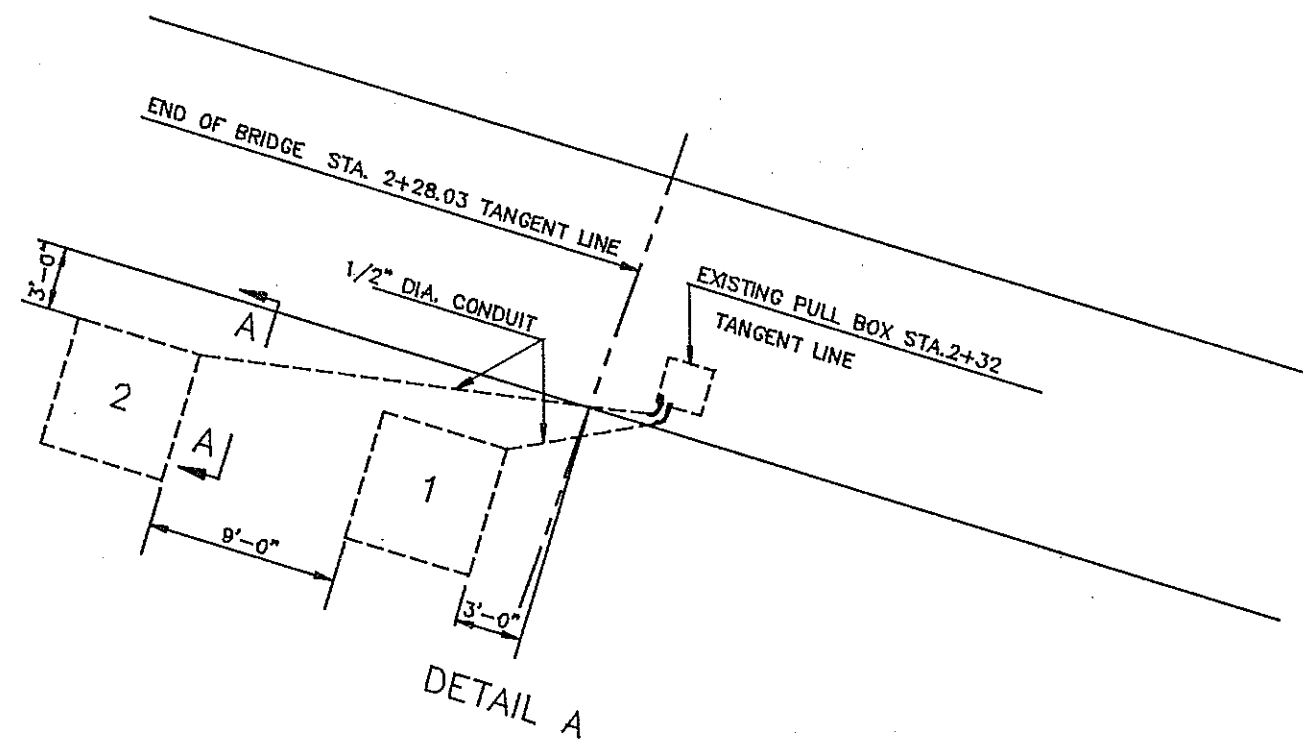
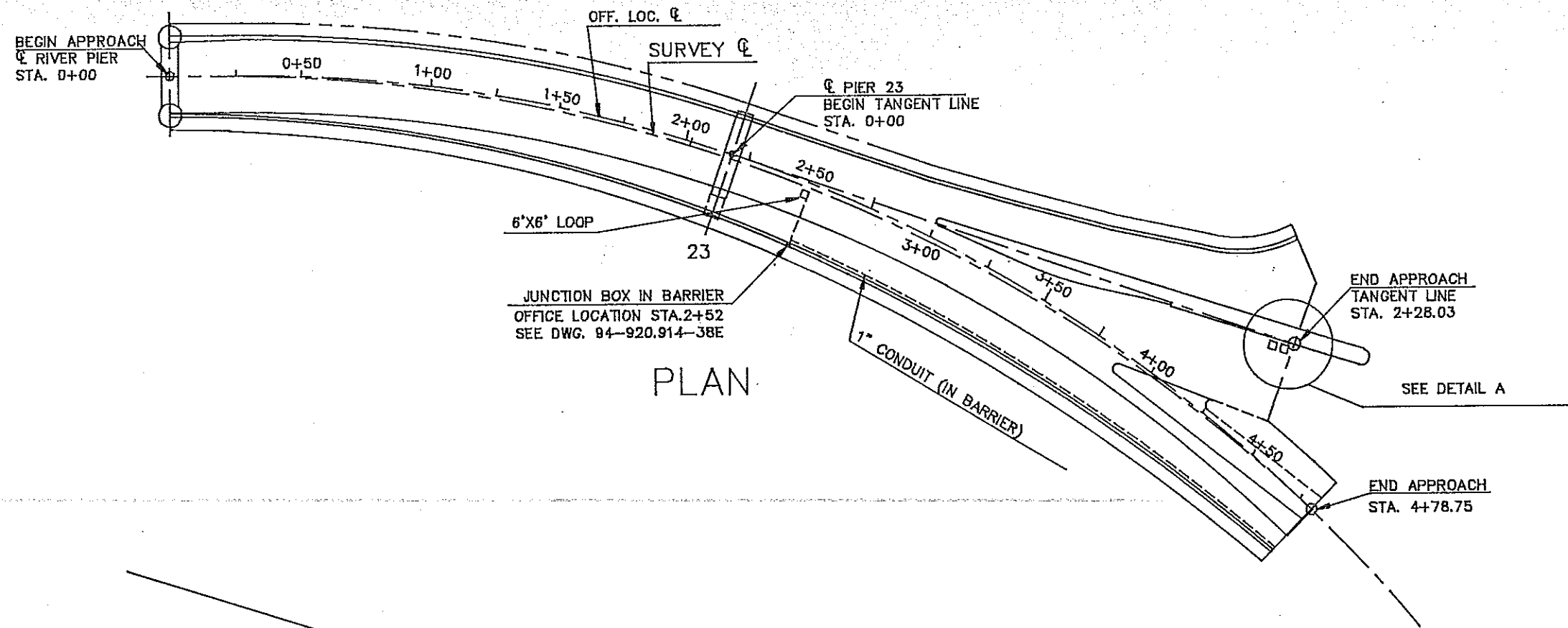


TYPICAL SECTION

QUANTITIES		
CLASS AAE-3 CONC.	25.4	C.Y.
REINFORCING STEEL	1421	LBS.
REINFORCING STEEL	3106	LBS.

MEMORIAL BRIDGE
EAST APPROACH
NORTH BARRIER
DETAILS

FHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
B	N.D.	F-1-094(007)920	

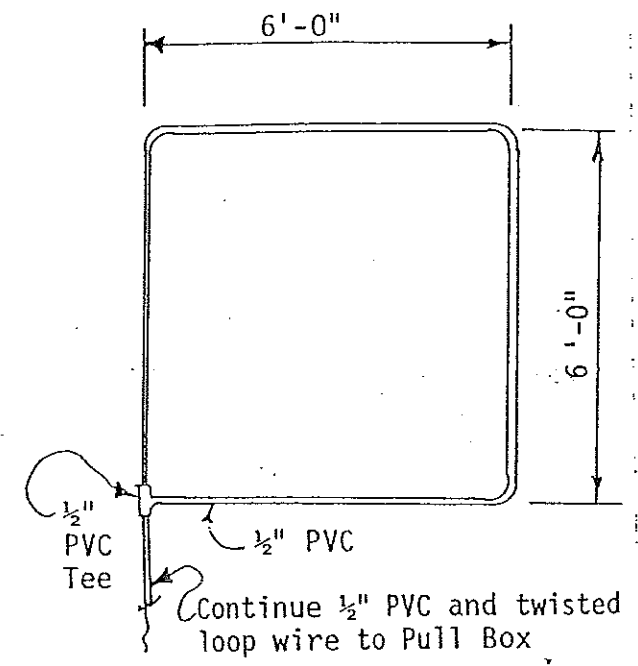


NOTE: SAWCUT AND PREFORMED LOOP SHALL BE PLACED BEFORE PLACING OF THE OVERLAY.

A-A

QUANTITIES

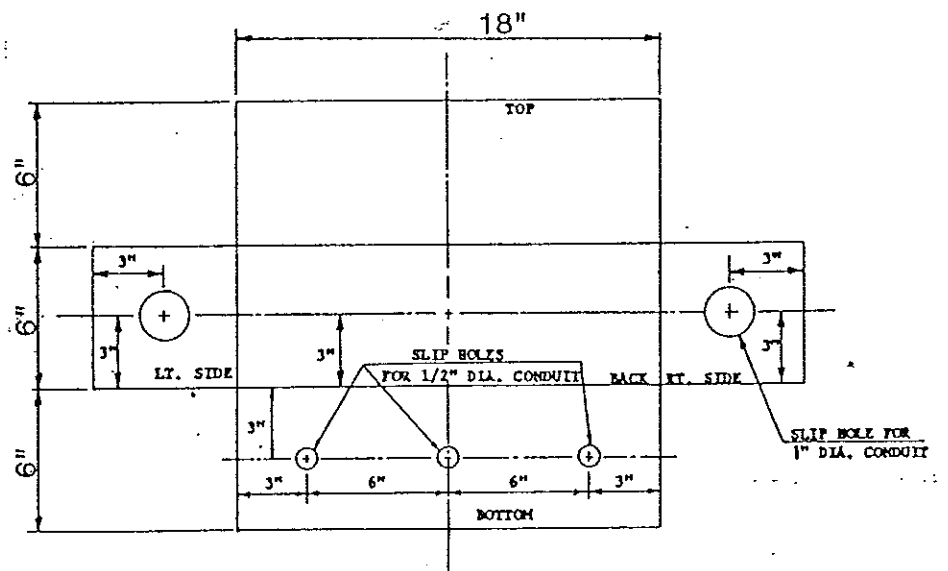
MEMORIAL BRIDGE
EAST APPROACH
CONDUIT & LOOP
LAYOUT



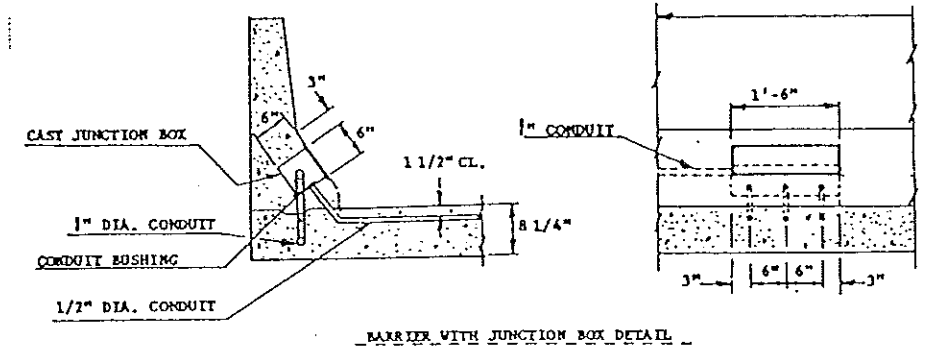
PREFORMED LOOP DETECTOR LAYOUT

PERFORMED LOOP DETECTOR: The Preformed Loop Detector shall be constructed of PVC and loop conductor. The loop detector shall be totally encased in $\frac{1}{2}$ " schedule 40 PVC, (sprinkler pipe, heavy wall construction) with pipe fittings and glue. One corner shall be terminated with a $\frac{1}{2}$ " PVC tee fitting to provide an exit to the pull box's conduit. The PVC is to be sealed at the joints with water pipe fitting flue to prevent water entrenchment. The wire shall be No. 14 AWG, Type XHHW or RHHN/ THWN, 600 V stranded single conductor. The wire loop shall be constructed from a continuous piece of wire with no splices throughout the entire length to the pull box. Four (4) turns shall be placed in the preformed loop. The wire from the loop to the junction box shall be twisted to provide a minimum of two to five turns per foot. A minimum of 6 feet of loop wire slack shall be coiled and left in the junction box. The junction box end of the conduit shall be sealed to protect against water entrenchment.

Loop detectors shall be tied down.



CAST JUNCTION BOX
DIMENSIONS ARE INSIDE MEASUREMENTS.
TYPE "YR" CAST IRON
VIEW LOOKING INTO BOX-SIDES LAID DOWN.

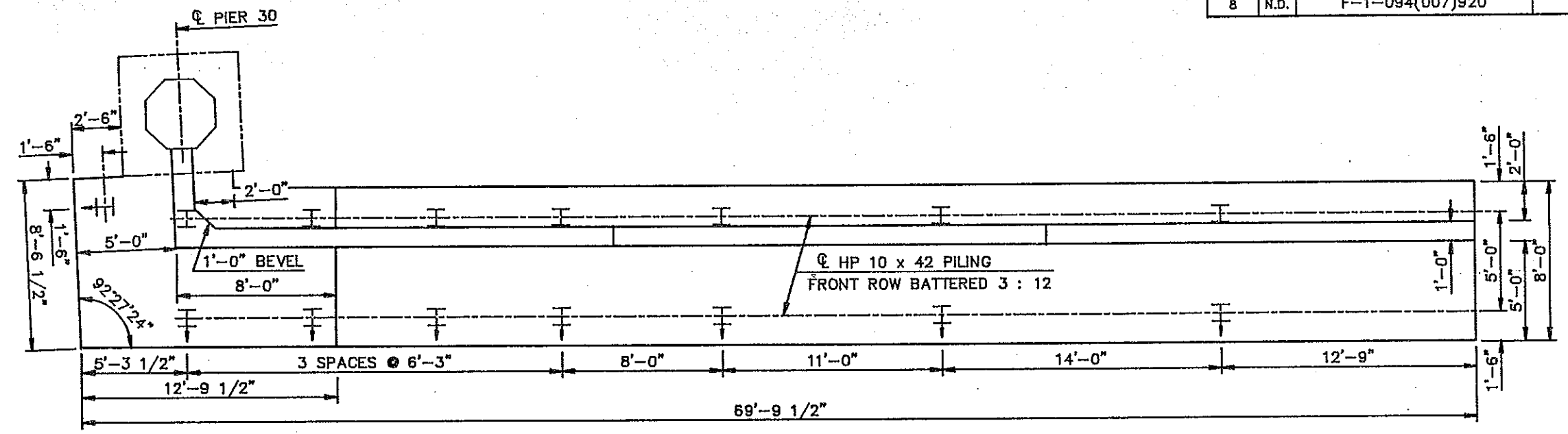


THE JUNCTION BOX: Shall be a flush mounted watertight (NEMA-4)-rain tight cast iron - Type "YR." The type "YR" recessed cover box shall be listed by the Underwriters Laboratories, Inc. The box shall be designed especially for flush mounting and the steel cover shall be suitable for vehicle traffic. The cover shall be provided with a neoprene gasket. The box and cover shall be hot dip galvanized.

The conduit and cast iron junction box shall be installed in the bridge barrier wall. The conduit leading to the loops shall be installed in the deck of the bridge at the barrier prior to installation of the barrier. The conduit shall extend a sufficient distance into the wider portion of the barrier wall with a coupling so that the remaining conduit can be installed and sealed. Before the loops are covered with concrete, the contractor shall test the loop in accordance with section 772.03 F.7 of the Std. Spec and the results shall be recorded and reported as specified in the section 772.03 F.9 of the Std. Spec.

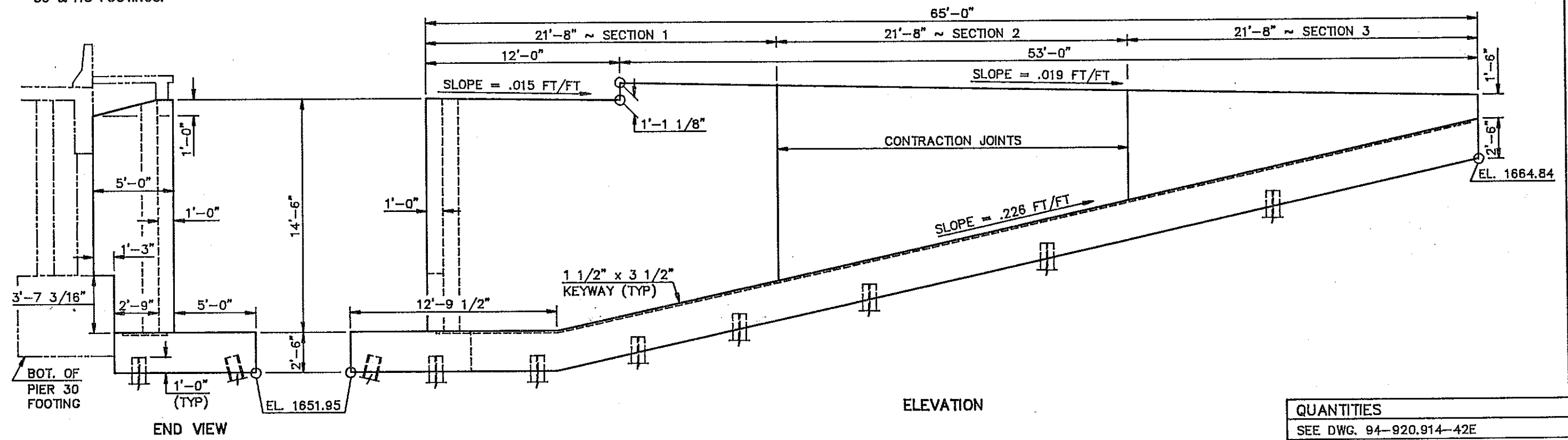
TRAFFIC CONTROL SYSTEM
Preformed Loop Details

I-94 Bus. Loop & Memorial Hwy.
Bismarck, ND



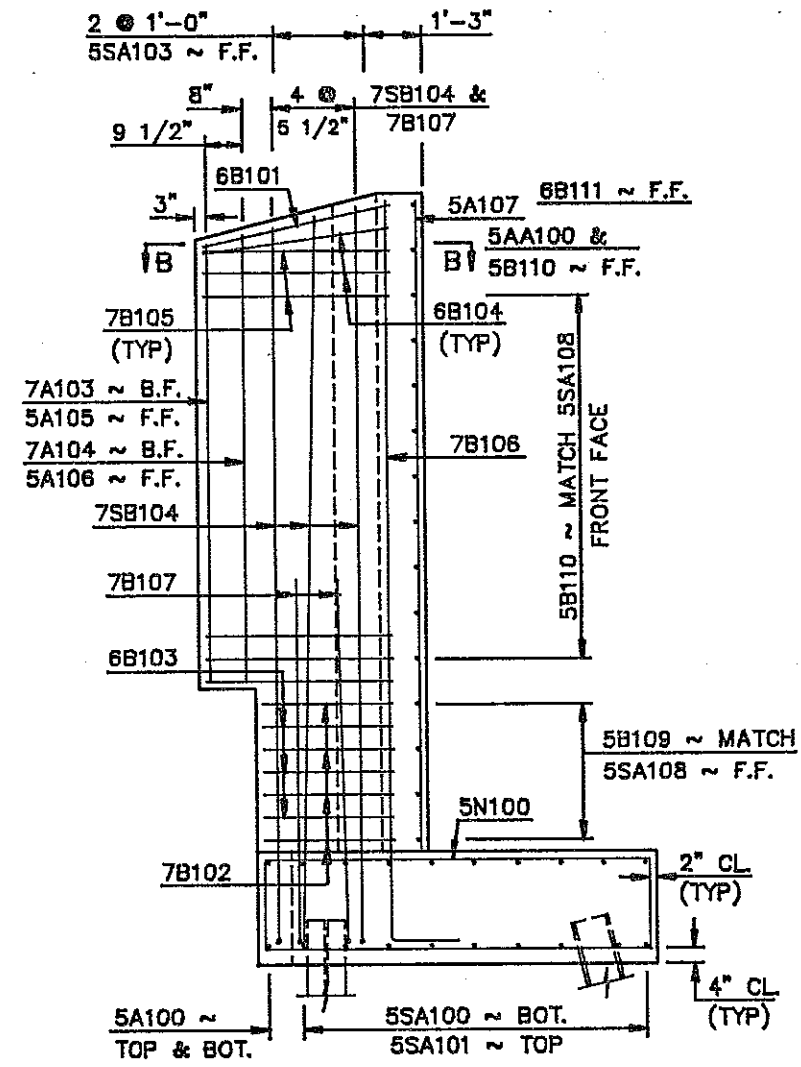
PLAN

NOTE:
PLACE 1/2" PREFORMED JOINT FILLER WHERE THE
RETAINING WALL & ITS FOOTINGS ABUT WITH PIER
30 & ITS FOOTINGS.

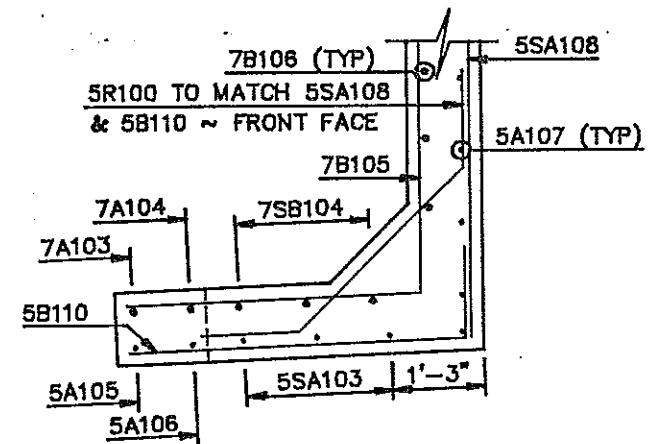


ELEVATION

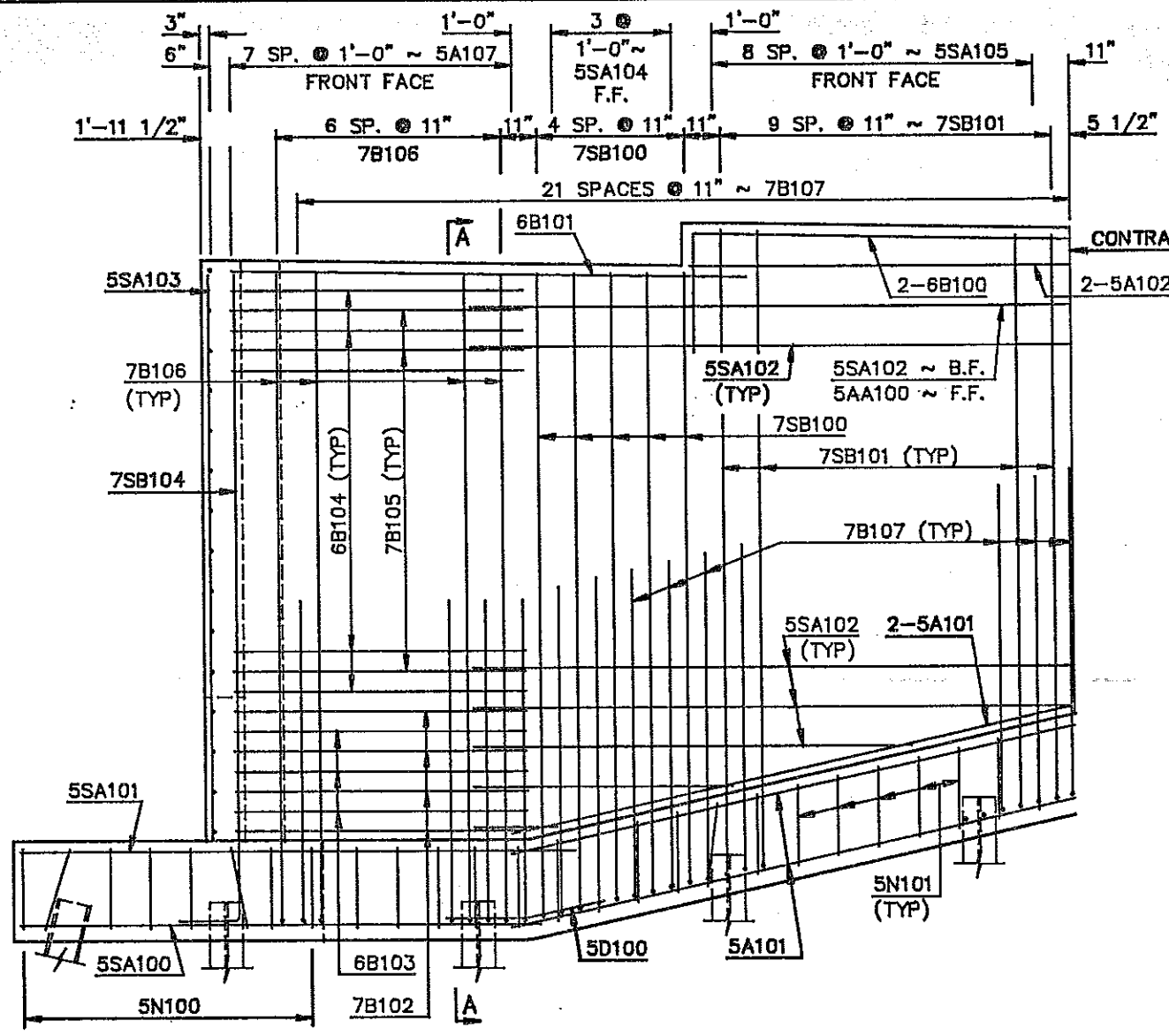
QUANTITIES
SEE DWG. 94-920.914-42E
MEMORIAL HIGHWAY EAST APPROACH BISMARCK
RETAINING WALL LAYOUT



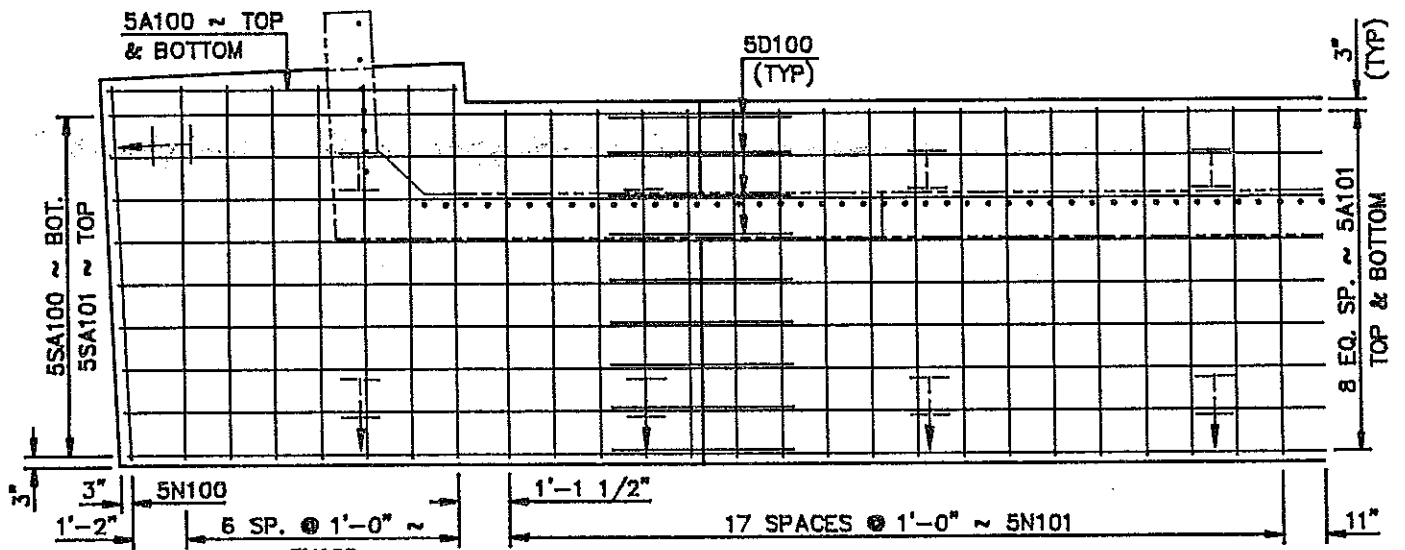
(FRONT FACE NOT SHOWN)
END VIEW



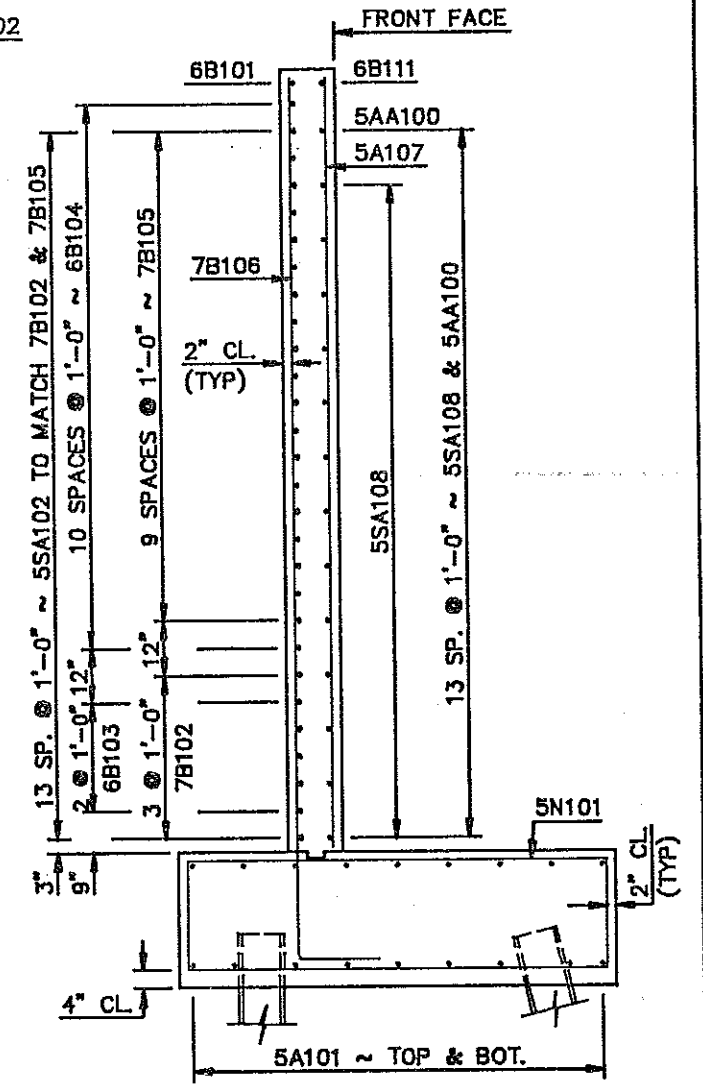
B-B



(FRONT FACE NOT SHOWN)
ELEVATION

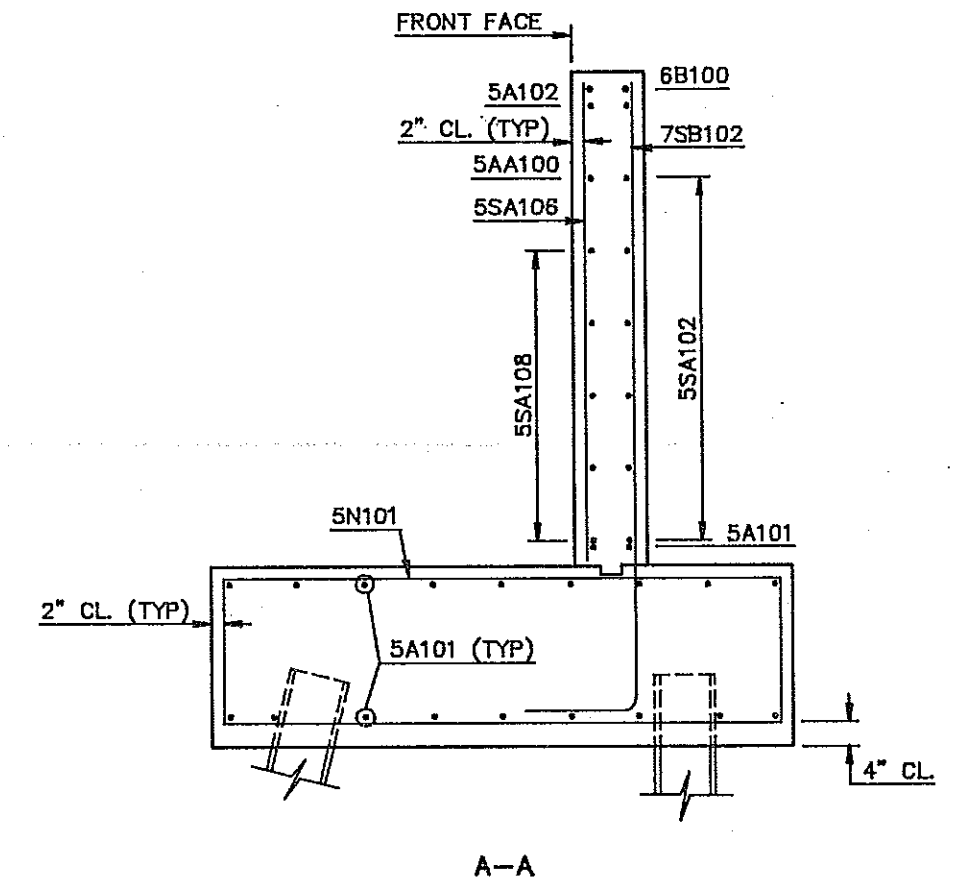
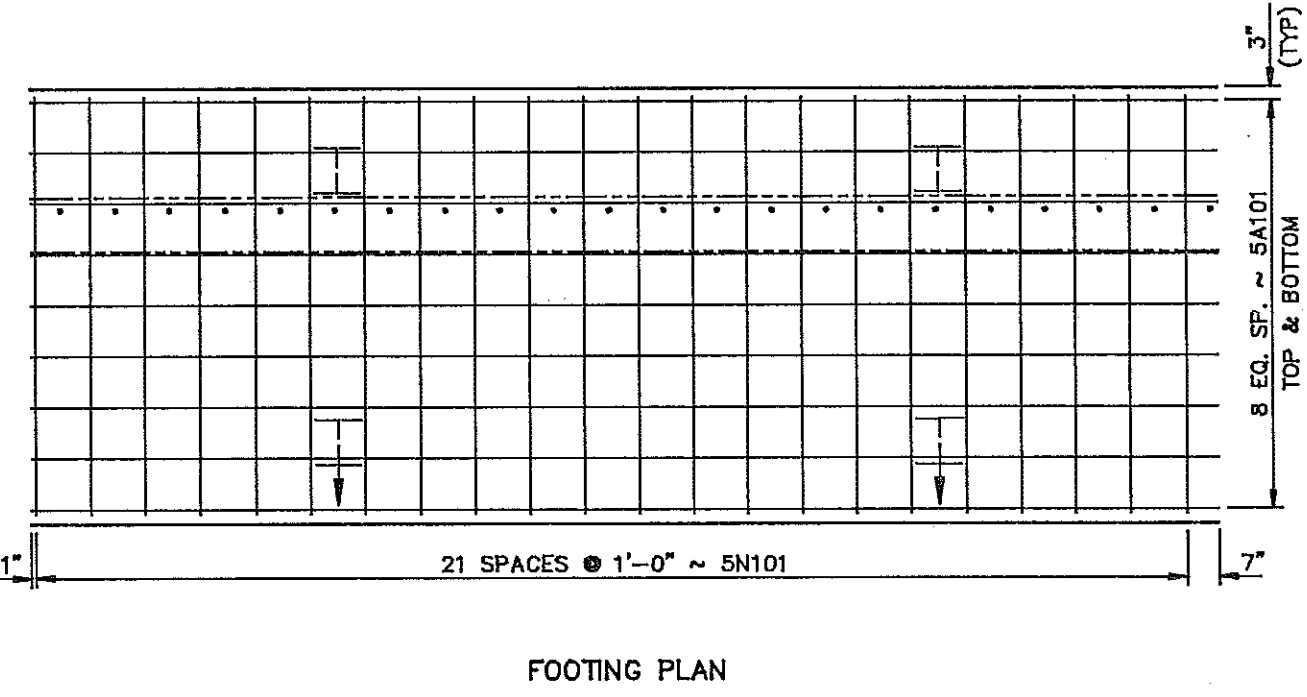
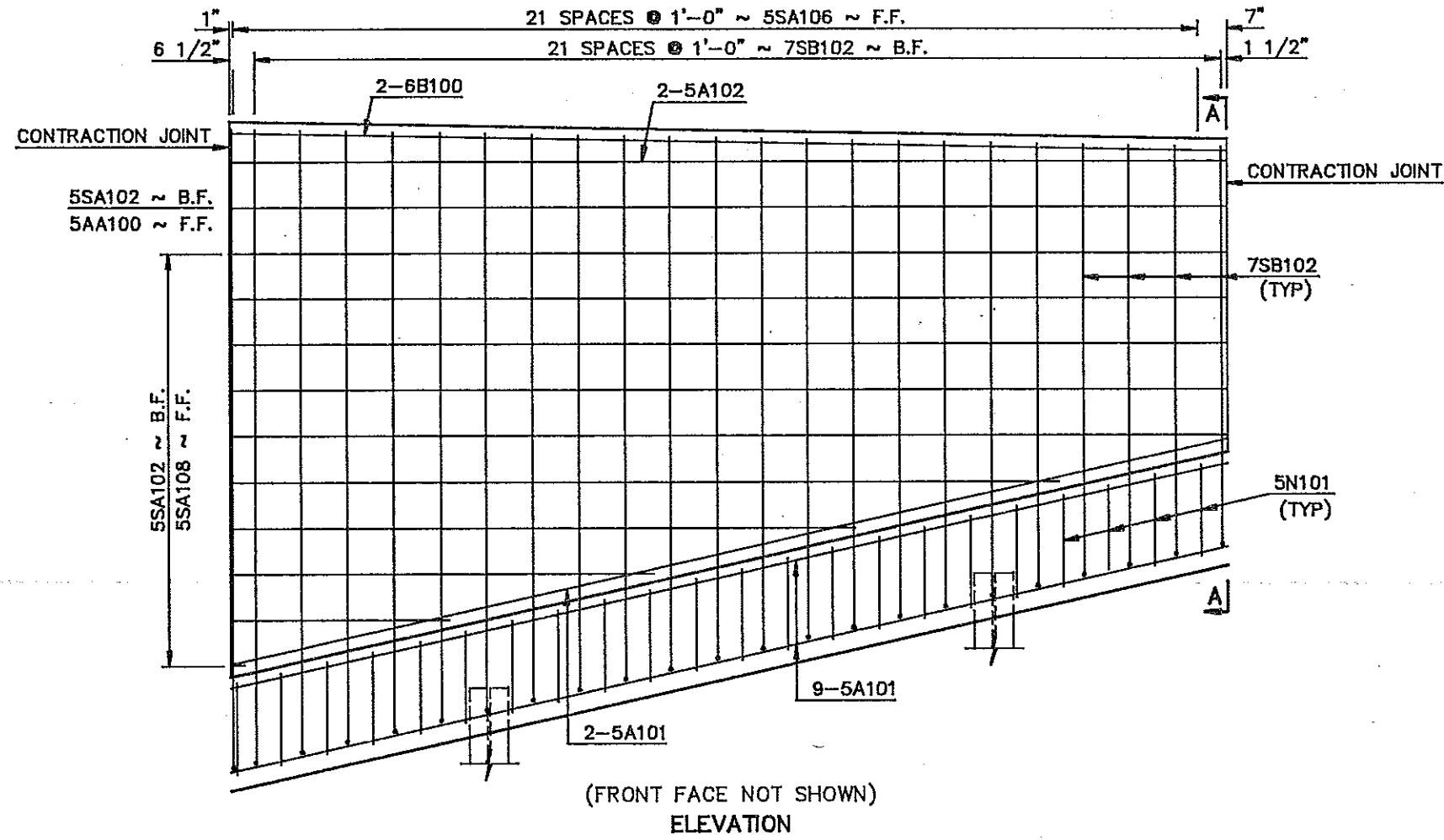


FOOTING PLAN

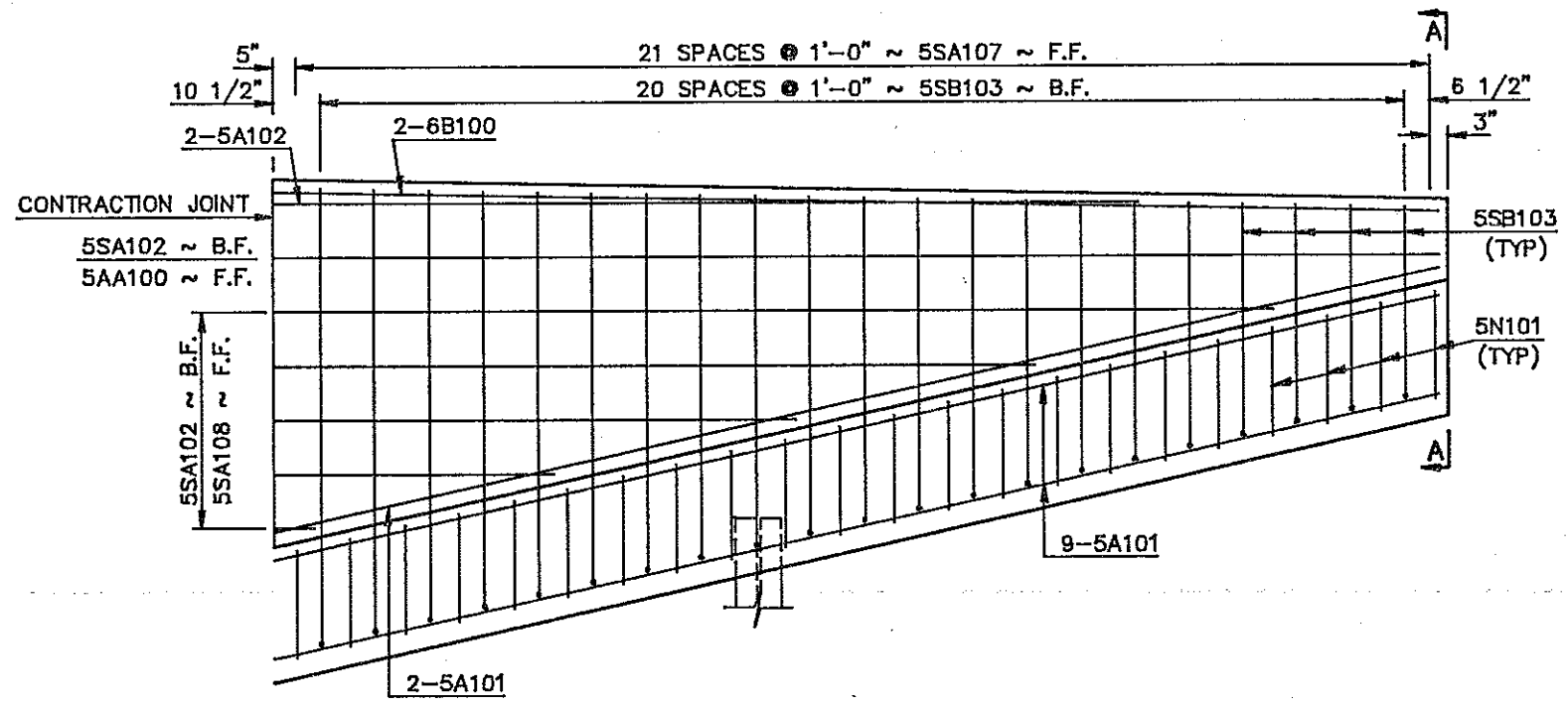


A-A

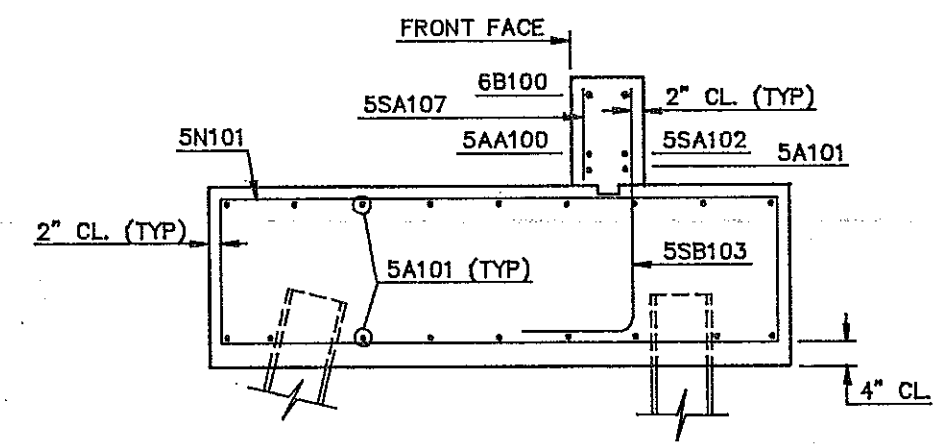
QUANTITIES
SEE DWG. 94-920.914-42E
MEMORIAL HIGHWAY EAST APPROACH BISMARCK (SECTION 1) RETAINING WALL DETAILS



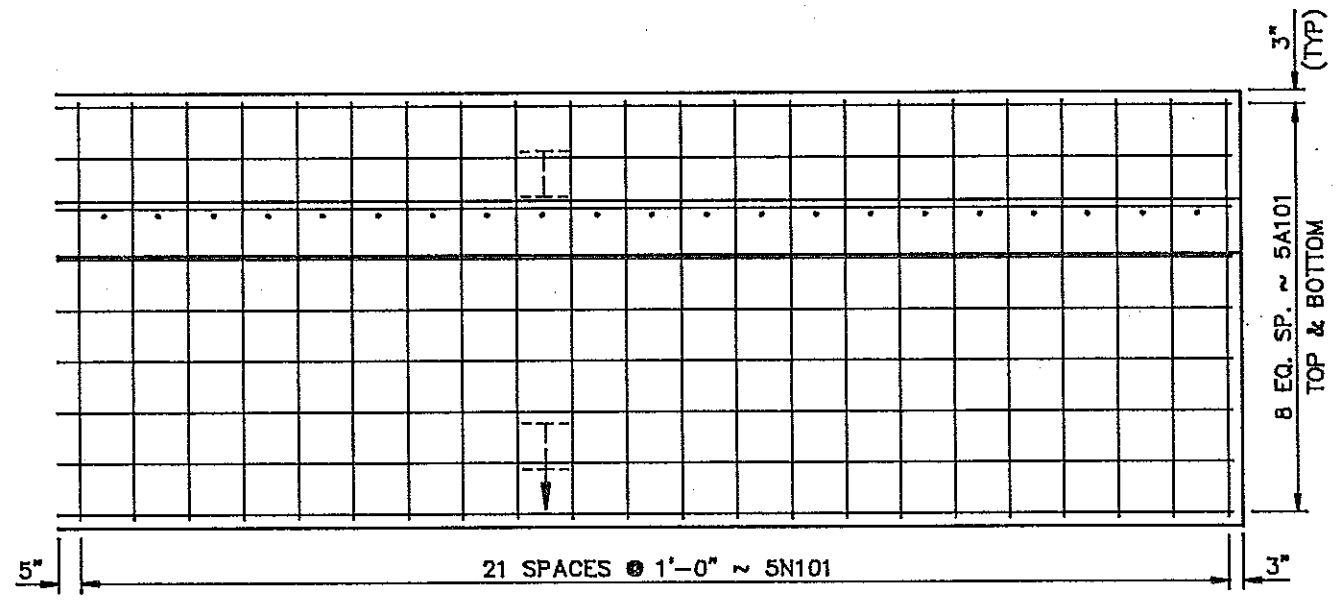
QUANTITIES
SEE DWG. 94-920.914-42E
MEMORIAL HIGHWAY EAST APPROACH BISMARCK (SECTION 2) RETAINING WALL DETAILS



(FRONT FACE NOT SHOWN)
ELEVATION



A-A



FOOTING PLAN

QUANTITIES	
CL. AE-3 CONCRETE	76.6 C.Y.
REINFORCING STEEL	7829 LBS.

MEMORIAL HIGHWAY EAST APPROACH
BISMARCK
(SECTION 3)
RETAINING WALL DETAILS

BILL OF REINFORCING STEEL, GRADE 60

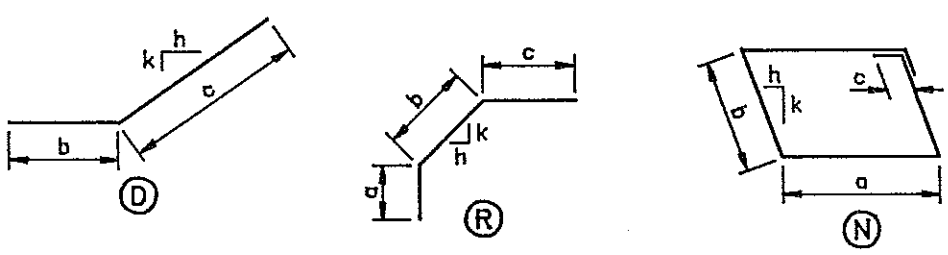
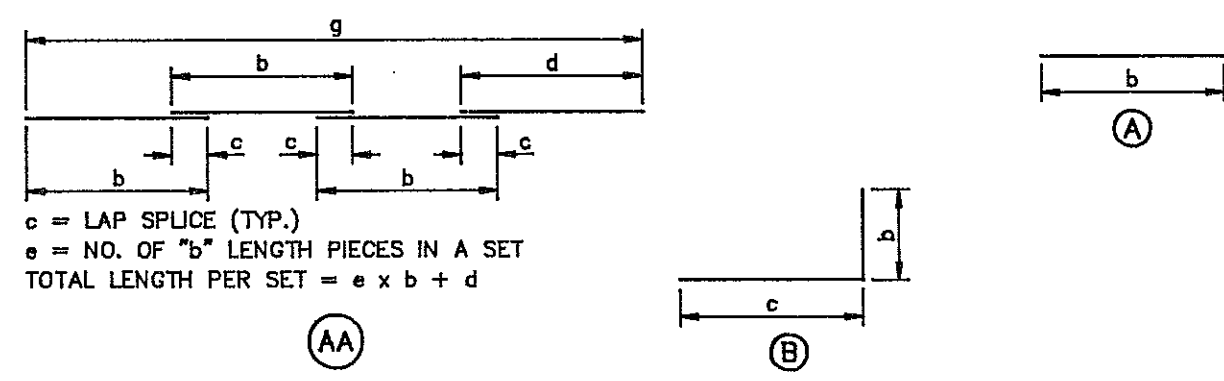
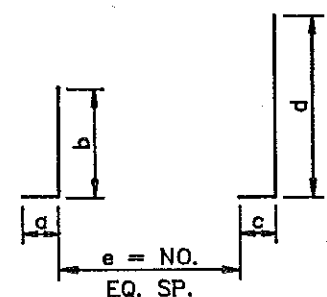
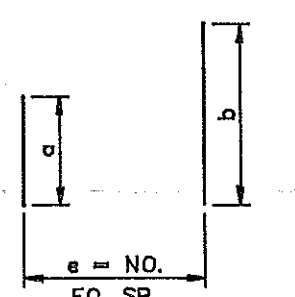
PHWA REGION	STATE	FED. AID PROJ. NO.	SHEET NO.
8	N.D.	F-1-094(007)920	

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS										
					a	b	c	d	e	f	g	h	k		
RETAINING WALL	5	A100	2	7'-8"		7'-8"									
	5	A101	20	58'-8"		58'-8"									
	5	A102	2	47'-1"		47'-1"									
	7	A103	1	9'-8"		9'-8"									
	7	A104	1	9'-10"		9'-10"									
	5	A105	1	9'-8"		9'-8"									
	5	A106	1	9'-10"		9'-10"									
	5	A107	9	14'-1"		14'-1"									
	6	B100	2	55'-7"		3'-0"	52'-7"								
	6	B101	1	17'-3"		4'-5"	12'-10"								
	7	B102	4	10'-1"		2'-10"	7'-3"								
6	B103	3	10'-1"		2'-10"	7'-3"									
6	B104	11	11'-4"		4'-1"	7'-3"									
7	B105	10	11'-4"		4'-1"	7'-3"									
7	B106	7	17'-8"		1'-6"	16'-2"									
7	B107	24	9'-6"		1'-6"	8'-0"									
5	B109	4	4'-8"		1'-3"	3'-5"									
5	B110	10	5'-11"		1'-3"	4'-8"									
6	B111	1	17'-6"		4'-8"	12'-10"									
5	D100	9	4'-0"		2'-0"	2'-0"					12	2.7			
5	N100	8	21'-6"		8'-3"	2'-0"	6"				0	12			
5	N101	62	20'-4"		7'-8"	2'-0"	6"				0	12			

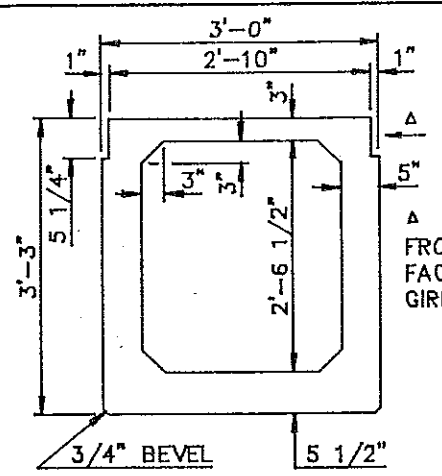
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS									
					a	b	c	d	e	f	g	h	k	
5	R100	15	6'-0"	1'-3"	3'-6"	1'-3"							12	12
5	AA100	1	65'-11"		33'-7"	1'-3"	32'-4"	1		64'-8"				
5	SA100	1	117'-9"	12'-11"	13'-3"			8						
5	SA101	1	125'-3"	13'-9"	14'-1"			8						
5	SA102	1	418'-10"	1'-8"	58'-2"			13						
5	SA103	1	41'-8"	13'-8"	14'-2"			2						
5	SA104	1	54'-0"	13'-2"	13'-10"			3						
5	SA105	1	117'-0"	12'-0"	14'-0"			8						
5	SA106	1	201'-8"	6'-7"	11'-9"			21						
5	SA107	1	84'-4"	1'-3"	6'-5"			21						
5	SA108	1	451'-9"	8'-3"	61'-3"			12						
7	SB100	1	85'-5"	1'-6"	15'-2"	1'-6"	16'-0"	4						
7	SB101	1	165'-10"	1'-6"	14'-1"	1'-6"	16'-1"	9						
7	SB102	1	280'-6"	1'-6"	8'-8"	1'-6"	13'-10"	21						
5	SB103	1	155'-9"	1'-6"	3'-5"	1'-6"	8'-5"	20						
7	SB104	1	52'-3"	1'-6"	15'-8"	1'-6"	16'-2"	2						

- NOTES:**
- FABRICATION AND TOLERANCES SHALL BE IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.
 - ALL DIMENSIONS ARE OUT TO OUT OF BARS.
 - NOMINAL LENGTH OF EACH BENT BAR OR CUT BAR IS THE SUM TOTAL OF THE DETAILING DIMENSIONS FOR THAT BAR, UNLESS OTHERWISE NOTED.
 - ADJACENT AA BARS SHALL BE TURNED END FOR END SO THAT THE SPLICE LOCATIONS ARE STAGGERED.

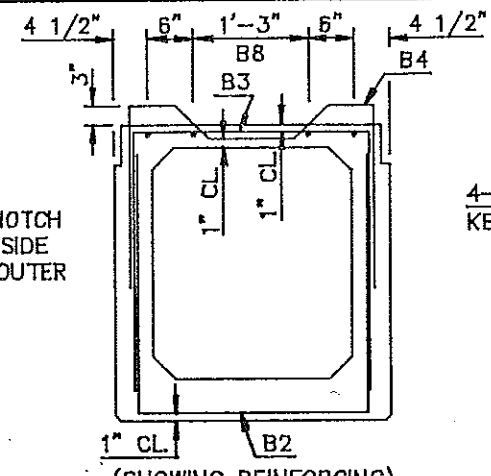


MEMORIAL HIGHWAY EAST APPROACH
BISMARCK

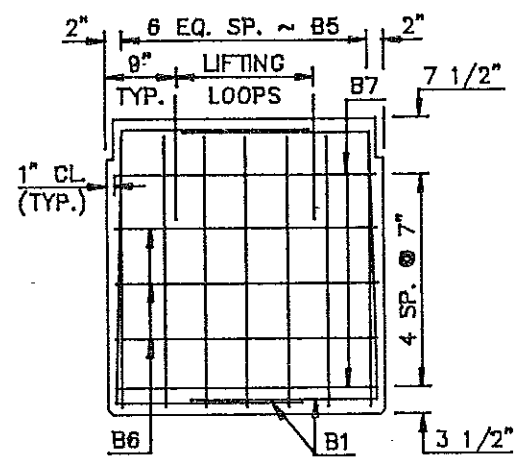
RETAINING WALL
REINFORCING BAR LIST
& DETAILS



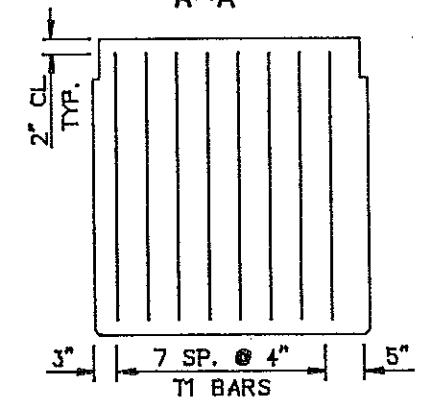
A-A



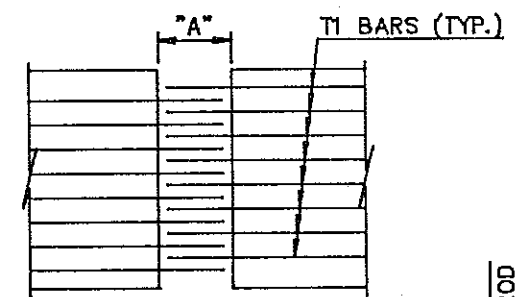
A-A



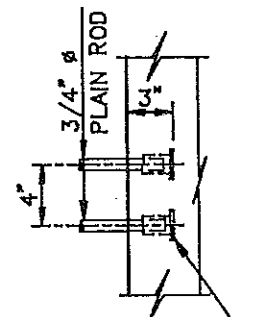
B-B



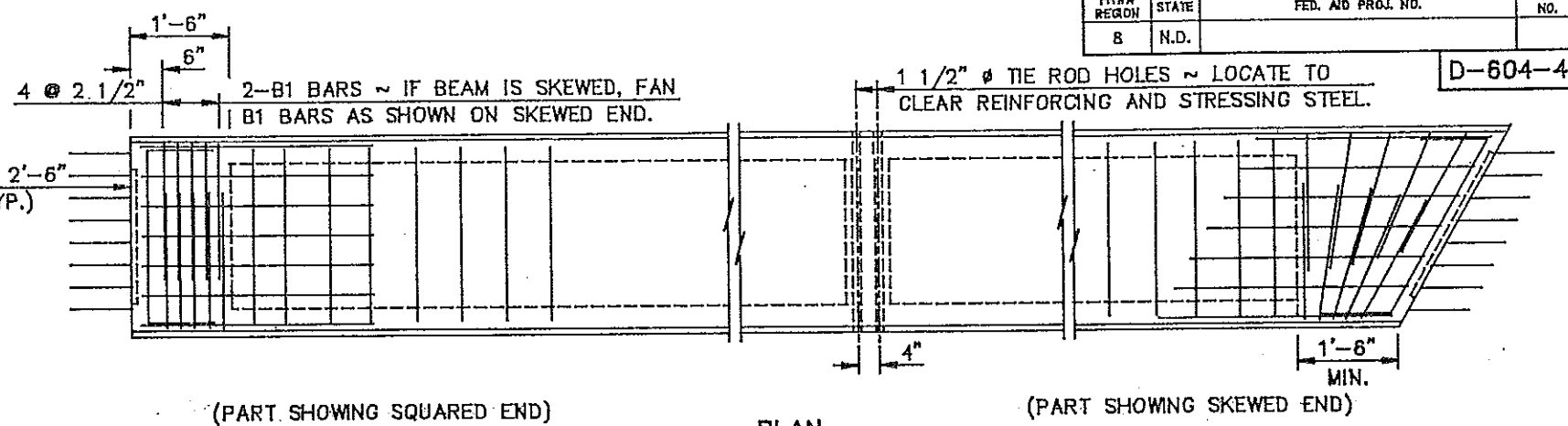
END VIEW



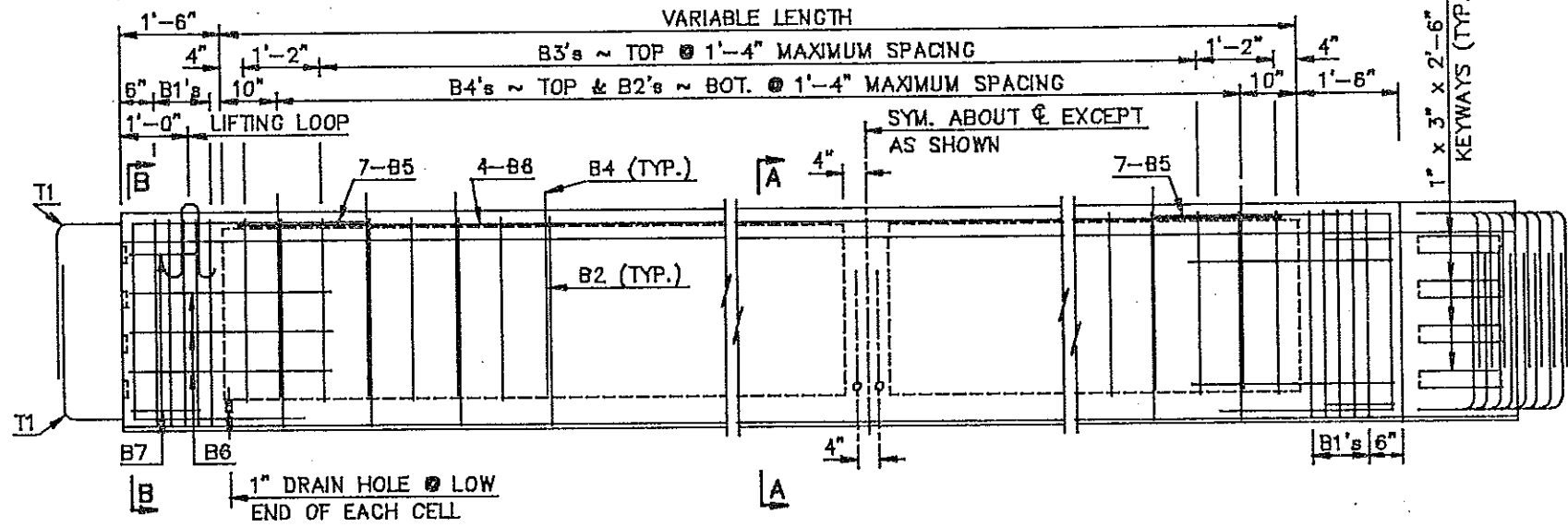
GIRDER END PLAN AT PIER



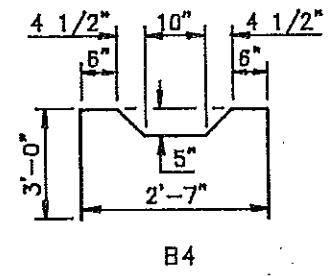
3/4" THREADED INSERT CAPABLE OF DEVELOPING STRENGTH OF A 3/4" BOLT.
(OUTER GIRDERS ONLY)
DIAPHRAGM BAR INSERT



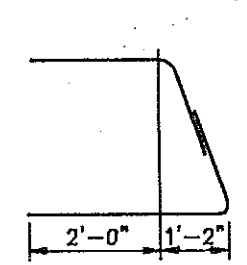
PLAN



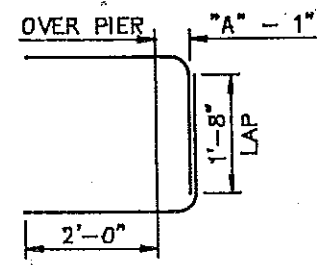
ELEVATION



B4



B5



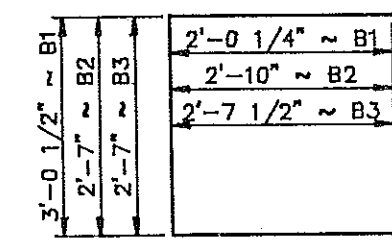
B6 & B7

(AT ABUTMENTS)

(AT PIERS)

** FIELD BEND AS SHOWN (GRADE 40)

BENT BAR DETAILS



B1, B2 & B3

BAR LIST			
MARK	SIZE	LENGTH	SHAPE
B1	4	7'-1"	BENT
* B2	4	8'-3"	BENT
* B3	4	7'-10"	BENT
B4	4	9'-0"	BENT
B5	4	9'-0"	BENT
B6	4	VARIABLE	STR.
B7	4	VARIABLE	STR.
B8	4	VARIABLE	STR.
** T1	4	VARIABLE	STR.

(COMPOSITE SLAB)

39" x 36"
SPREAD SUSPENDED
PRESTRESSED BOX GIRDER

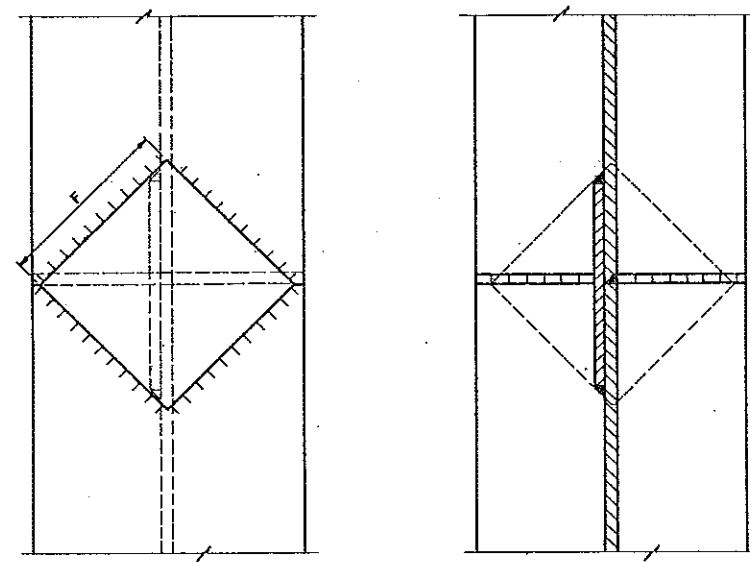
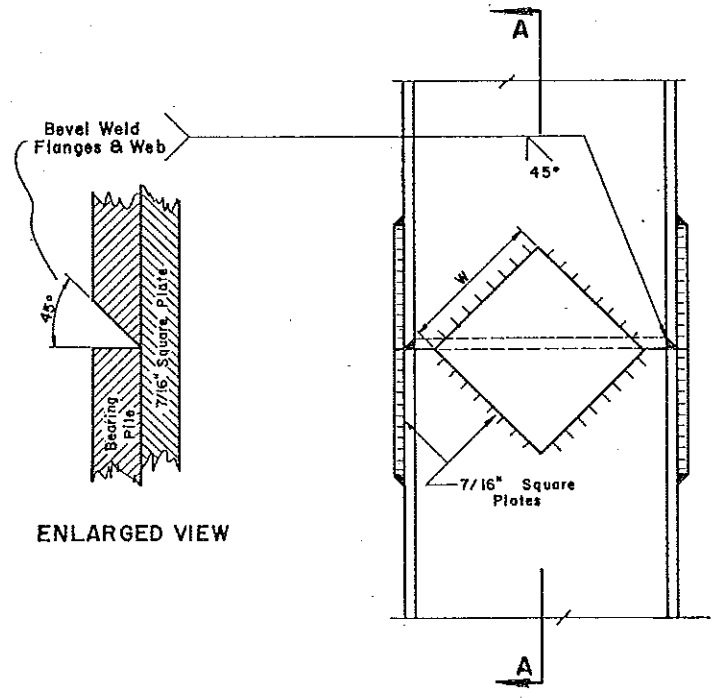
NOTES:

AT LEAST 14 DAYS PRIOR TO THE FORMING AND CASTING OF ANY GIRDERS, THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE CONSTRUCTION OFFICE OF THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION FOR APPROVAL. THE FINAL PRESTRESS FORCE SHALL BE CALCULATED USING CALCULATED LOSSES AS SPECIFIED IN THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. STRAND PATTERN ARRANGEMENTS SHALL ASSURE COMPRESSIVE AND TENSILE STRESSES ARE WITHIN THE LIMITS AS SPECIFIED IN THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. MINOR CHANGES TO THE SHAPE OF THE GIRDER AND TO THE REINFORCING STEEL MAY BE MADE TO ACCOMMODATE THE FORMS OF VARIOUS CONTRACTORS AND CONSTRUCTION METHODS AND SHALL BE SHOWN ON THE SHOP DRAWINGS.

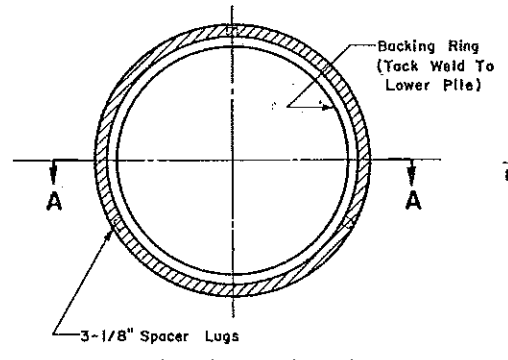
THE GIRDERS SHALL BE CAST IN ALL-STEEL FORMS. THE REINFORCING STEEL SHALL BE GRADE 60.

C.G. = 17.65" FROM BOTTOM: AREA = 818.5 SQ. IN.:
MOMENT OF INERTIA = 113,789 IN.⁴

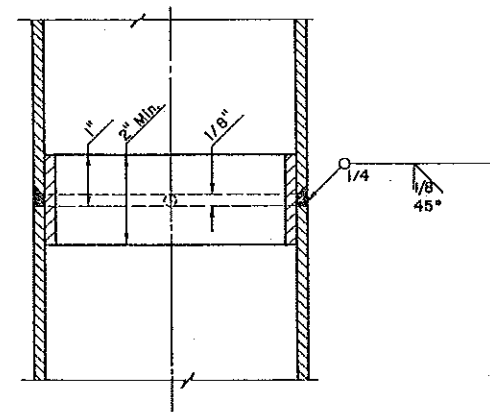
* WELDED WIRE FABRIC WITH MINIMUM CIRCUMFERENTIAL STEEL AREA OF 0.15 SQ. IN. PER FT. MAY BE SUBSTITUTED FOR B2's AND B3's.



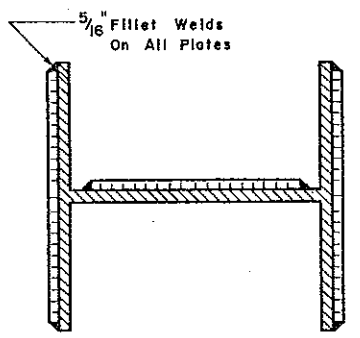
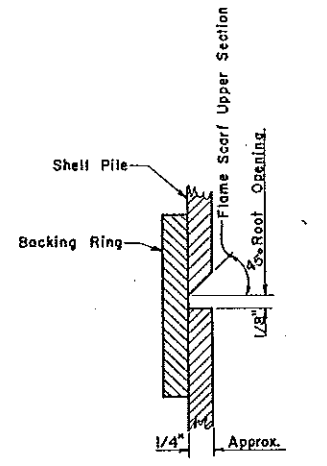
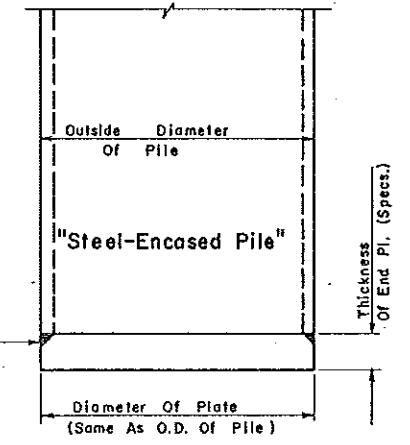
Flare Scarf Inside Of Both Flanges And One Side Of Web Of Upper Section



Backing Ring may be made from pile cut-offs or other material of a like quality.

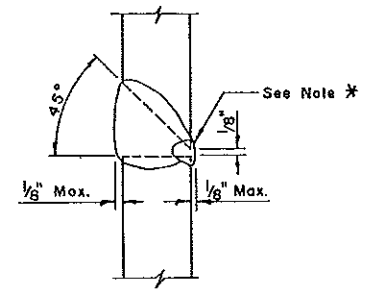


SHELL PILE SPLICE DETAIL



PILE	8"	10"	12"	14"
F FLANGE	5"	6 1/2"	8"	10"
W WEB	4"	5 1/2"	6 1/2"	8"

H-PILE SPLICE DETAIL



ALTERNATE H-PILE SPLICE DETAIL

Steel H-Pile may be spliced with complete penetration groove welds in both flanges and web in lieu of using the 7/16" reinforcing plates.

AWS classification E70XX low hydrogen electrodes shall be used.

*Welds made without the use of backing material shall have the root gauged to sound metal and welded from the second side.

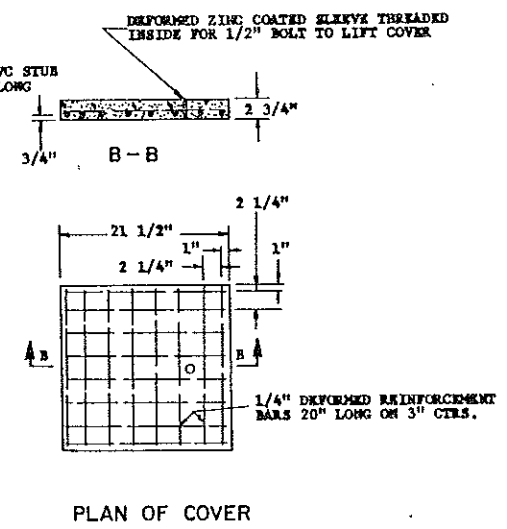
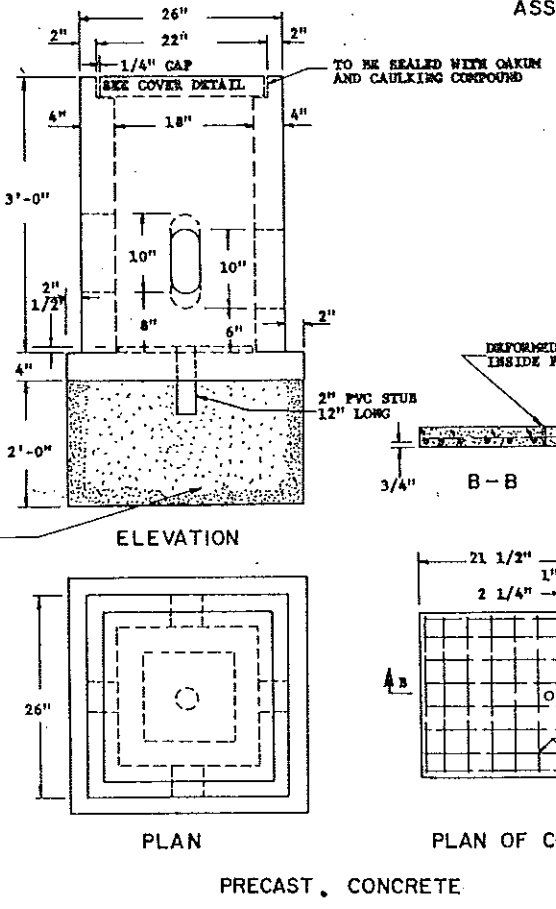
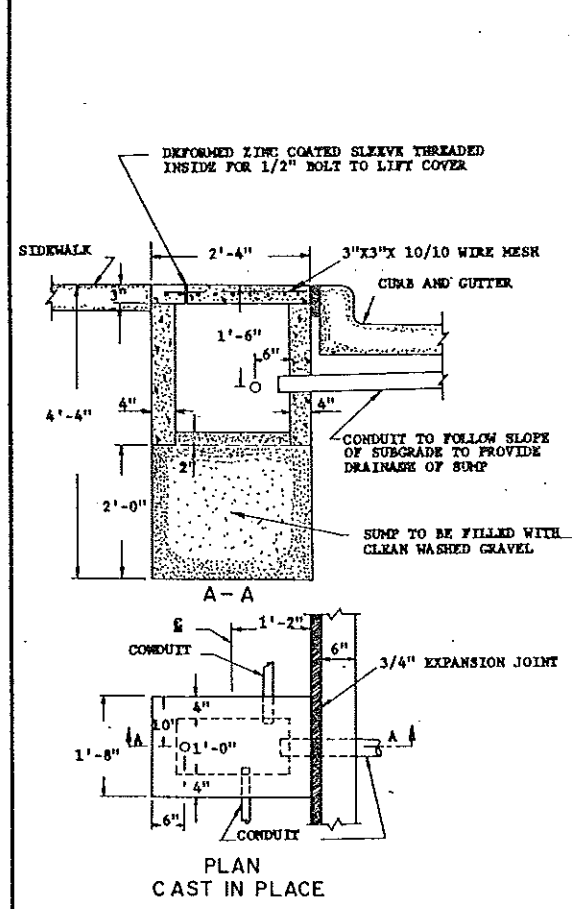
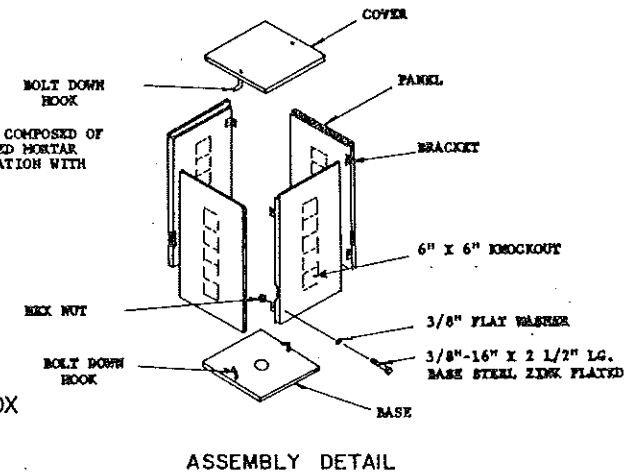
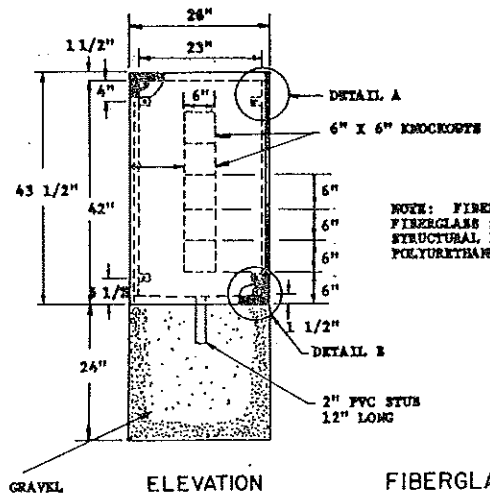
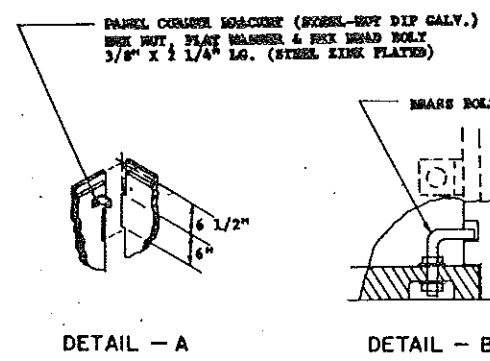
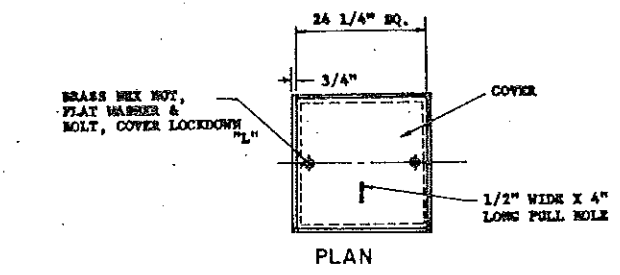
All welding shall conform to the current specification for "Welded Highway and Railway Bridges of the American Welding Society."

10-1-86	
REVISIONS	
DATE	CHANGE

NORTH DAKOTA
STATE HIGHWAY DEPARTMENT
APPROVED: *Robert Wilson*
BRIDGE ENGINEER

PILE SPLICE
DETAILS

PULL BOX DETAILS



10-1-88		NORTH DAKOTA STATE HIGHWAY DEPARTMENT
REVISIONS		
DATE	CHANGES	APPROVED: <i>David K. L...</i> DESIGN ENGINEER

CONCRETE PULL BOX