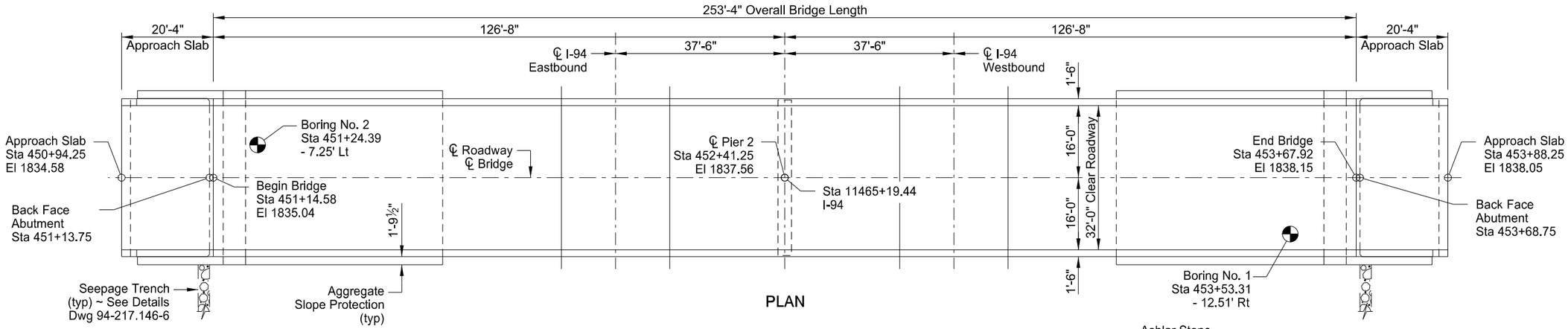
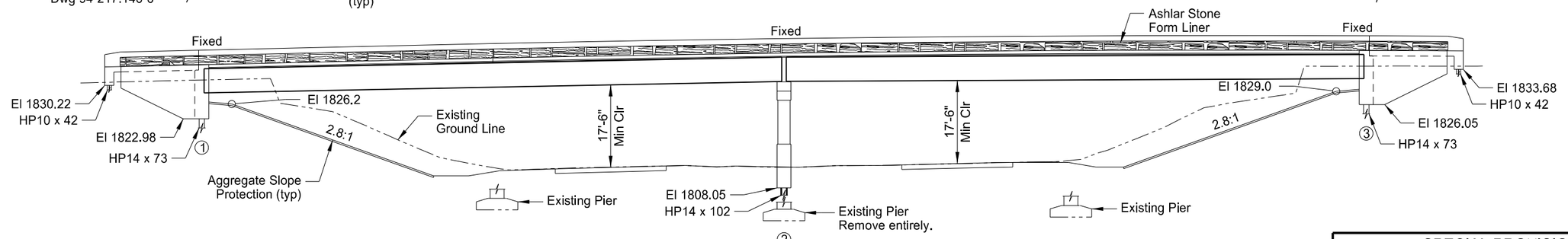
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

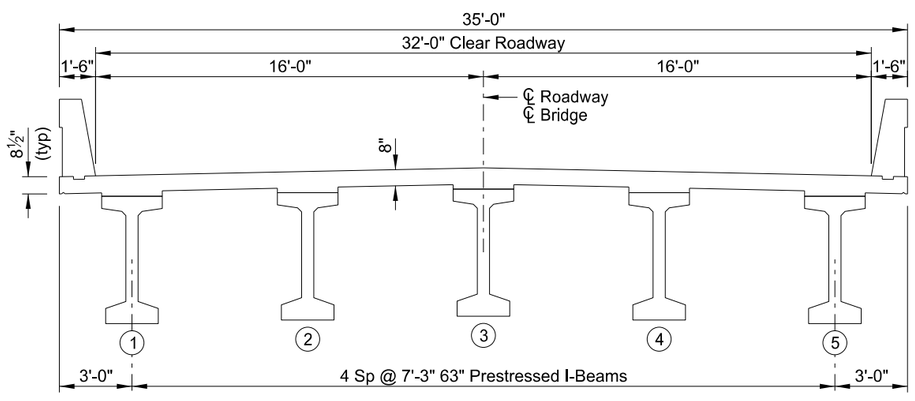
BRIDGE CODE		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
X781		ND	IM-2-094(186)217	170	1



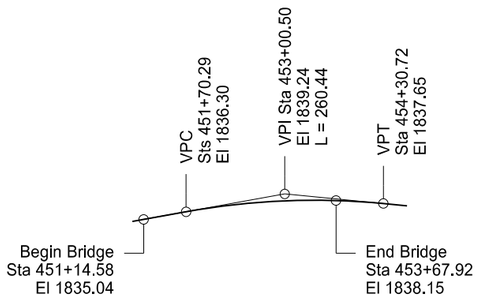
PLAN



ELEVATION



TYPICAL SECTION



VERTICAL CURVE DATA

DESIGN STRENGTHS:

f'c = 4,000 psi ~ Bridge Substructure Concrete
f'c = 4,000 psi ~ Bridge Deck Concrete
f'c = 4,000 psi ~ Bridge Barrier Concrete
f'c = 7,000 psi ~ Prestressed Beam Concrete
fy = 60,000 psi ~ Reinforcing Steel

Load & Resistance Factor Design

SURVEY CONTROL POINTS			
POINT	NORTHING	EASTING	ELEVATION
RTK 30000	443,540.15	2,200,275.01	1,812.93
RTK 35619	447,027.05	2,200,506.86	1,812.96

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

SPECIAL PROVISIONS	
SSP 2	MIGRATORY BIRD TREATY ACT
SP 199(24)	ARCHITECTURAL SURFACE FINISH
SP 642(24)	PILE DYNAMIC ANALYZER

STANDARD DRAWINGS
D-622-1, D-714-18, D-900-1

DESIGN SPECIFICATIONS
AASHTO LRFD BRIDGE DESIGN 10TH EDITION
HL-93 DESIGN LOADING
F.W.S. 15 PSF

I-94/PETTIBONE INTERCHANGE

STATION: 11465+19.44

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

DRAWING NO. 94-217.146-1

NOTES

100 SCOPE OF WORK: This project consists of removing an existing bridge and building a new 2-span prestressed concrete I-beam bridge with an overall bridge length of 253'-4" and a clear roadway width of 32'-0".

100 GENERAL: Include the cost of furnishing and placing preformed expansion joint filler, concrete inserts, rebar couplers, silicone sealant, waterproof membrane, and other miscellaneous items in the price bid for the appropriate concrete bid items.

202 REMOVAL OF STRUCTURE: The existing structure is a 4-span prestressed concrete I-beam bridge, 224'-0" long with a clear roadway width of 24'-0", and concrete substructures. The abutments are supported on steel H-piling and the piers are supported on spread footings. There are pier protection items including concrete barriers, barrels, and concrete barrel slabs, adjacent to the middle pier.

Remove the bridge superstructure, concrete abutments, middle pier and middle pier protection items entirely. Cut the abutment piling at a depth 1 foot below the finished grade. Remove the outside piers to a depth 1 foot below the finished ground line. Removal of outside pier protection items are paid separately.

Include all costs for the removal of the bridge and median pier protection items in the contract unit price for “Removal of Structure.”

210 EXCAVATION: Include the excavation costs at the abutments, as shown in the “Detail at Abutment”, and the excavation costs at the pier in the lump sum bid item, “Class 1 Excavation.”

602 BRIDGE CONCRETE: Supply AE Portland Cement Concrete using well graded or optimized aggregates as specified in Section 802.02 B. Design a mix that meets Section 802 and will attain a minimum compressive strength of 4,000 psi at 28-days.

The Engineer will verify the mix design using materials that are to be used on the project. Supply samples of materials as specified in the table below. Provide additional materials upon request.

Material	Sample Size
Cement	100 lbs
SCM	35 lbs
Aggregate	1000 lbs
Admixtures	½ pint each

Deliver the samples and the mix design, including the test results, to the Materials and Research Division a minimum of 14 calendar days before placing concrete. Attach a tag to all samples identifying the Department’s project number and the type of material. On the day the material is delivered, provide the Engineer with a copy of the mix design and test results, and notify the Engineer the samples have been delivered.

602 DIAPHRAGMS AND ENDWALLS: Place the pier diaphragm and endwall concrete at the same time as the bridge slab concrete.

602 DECK PLACEMENT: Do not place deck concrete until the entire deck is formed. Place the deck concrete at a minimum rate of 40 CY per hour. Allow the deck to cure a minimum of 72 hours between deck pours.

602 FORM LINERS: Include the cost to provide and install the form liners in the price bid for the appropriate concrete bid items.

602 BARRIERS: Do not construct V-grooves through form liner areas.

602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.

602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the driving surface of the bridge deck and approach slabs prior to crack sealing. Do not allow traffic on the driving surfaces until the solution has completely penetrated and the entire driving surface is dry.

602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck and approach slabs to determine the need for crack sealing. Mark and repair all visible cracks on the top surface measuring 0.012" or greater in width at the widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer’s recommendations. Chase crack with the sealant application to the limits of the crack, including those portions that are narrower than 0.012" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all material, labor, and equipment required to crack seal the bridge deck and approach slabs in the price bid for Bridge Deck Concrete.

602 SPECIAL SURFACE FINISH: Clean the surfaces that are to receive the Tex-Cote surface finish using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, and laitance. Ensure any curing compounds and release agents have been completely removed from the surfaces to receive the Tex-Cote surface finish.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the areas listed below. Apply the surface finish in accordance with the manufacturer’s recommended application procedures to attain a dry film thickness of 15 mils. Do not apply Tex-Cote special surface finish to any form liner areas.

- All exposed substructure surfaces
- Outside edges of the bridge deck
- Underside of the bridge deck overhang
- Outside and bottom surfaces of the exterior beams
- Exposed endwall areas outside the exterior beams
- All bridge and approach slab barrier surfaces (except form liner areas)

Finish the surface with a uniform texture, color, and appearance free from fins, projections, cavities, and porous areas. Use a sand textured finish. Use gray surface finish color number 36424 meeting AMS-STD-595 for the inside and top surfaces of the bridge and approach slab barriers. Use a color matching the lightest shade of brown used in the Architectural Surface Finish, as it looks applied to the barrier form liner

NOTES

areas, for all other surfaces. Submit to the Engineer a 1' x 1' sample of the brown surface finish.

Include all special surface finish costs in the price bid for the appropriate concrete bid items.

602 WEATHER LIMITATIONS: All requests in accordance with 602.04 C.4 "Weather Limitations" require approval from the NDDOT Bridge Division.

602 REMOVAL OF FORMS: Deck slab forms may be removed 1 day after completion of the curing period if the bridge deck concrete has reached 70 percent of the required design strength.

604 PRESTRESSED BEAMS: Set prestressed beams on bearing seats without field bending substructure or beam reinforcing steel.

622 PILING: Drive piling using a diesel hammer meeting the minimum specifications listed below for each substructure unit. The operating energy is the energy a hammer is capable of producing during pile driving under actual project conditions, and shall be estimated to be no greater than 85% of the hammer's maximum rated energy as specified in the manufacturer's literature. Submit specifications for all pile hammers proposed for use on the project to the Engineer for review at least 14 calendar days prior to beginning pile driving operations.

Approach Slab Piling:	Minimum Ram Weight = 3,500 lbs Minimum Operating Energy = 32,000 foot-pounds
Abutment Piling:	Minimum Ram Weight = 5,500 lbs Minimum Operating Energy = 53,000 foot-pounds
Pier Piling:	Minimum Ram Weight = 6,500 lbs Minimum Operating Energy = 60,000 foot-pounds

Run the hammer at an energy that produces a penetration at bearing between ½" and 3 inches in the last 10 blows.

If the pile has not reached bearing 10 feet beyond the estimated depth, stop driving the pile and wait 24 hours to allow pile setup to occur. After 24 hours, warm the hammer with a minimum of 20 blows by striking the ground or timber mats. If bearing was not achieved during restrike, continue to drive the pile until bearing is achieved.

930 ROADWAY CANOPY: Construct a canopy above the traveled roadway under the new structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the Contractor from any responsibility for the safety of the public.

Submit the canopy details, including materials that will be used, to the Engineer for review at least 14 calendar days prior to installation of the canopy. Provide a canopy under the new structure with a minimum vertical clearance of 16'-6" above the traveled roadway. Extend the canopy a minimum distance of 5'-0" beyond the outside edge of the bridge deck and a minimum distance of 5'-0" beyond the edge of the driving lanes beneath the structure. Notify the Engineer two calendar days prior to installation of the canopy. The Engineer will update the NDDOT travel map for the reduced vertical clearance with the canopy in place.

The canopy must be in place before installing formwork for the new deck and remain in place until after the new superstructure is complete. The canopy may be supported from the ground or suspended from the girders. Complete the installation of the canopy in a minimum amount of time and with the least inconvenience to the public. Remove the canopy after the bridge superstructure is completed.

Include all costs for construction, maintenance, and removal of the canopy system in the contract unit price for "Roadway Canopy."

930 AGGREGATE SLOPE PROTECTION: Place aggregate slope protection on the embankment slopes as shown.

Clear the subgrade of rubbish and vegetation before placing the aggregate slope protection. Thoroughly compact all loose material. Excavate or backfill as required to obtain the plan cross-section or lines and grades established in the field.

The gradation of the material used to form the slope protection is given in the following chart:

Sieve Size	% Passing
2"	100%
¾"	5-35%
#4	0-5%

The minimum fractured face requirement of the aggregate is 50% by weight on the portion of the aggregate retained on the No. 4 sieve. To be considered fractured the rock must have at least one fractured face.

Deposit, spread, consolidate, and shape the aggregate by mechanical or hand methods to provide a uniform depth and density and produce a uniform surface appearance. Apply MC-250 that meets the requirements of Section 818.02 C, "Medium-Curing Cutback Asphalt" at an approximate rate of 1.8 gallons per square yard. Emulsified asphalts grade CSS-1, CSS-1H, RS-1, or CRS-2 that meet the requirements of Section 818.02 E, "Cationic Emulsified Asphalt," or Section 818.02 F "Anionic Emulsified Asphalt", can be substituted for MC-250. Apply the emulsified asphalts at a rate of 2.5 gallons per square yard based on a dilution ratio of 7 parts emulsion to 3 parts water.

The bituminous materials are to penetrate to a depth of not less than one-half the required thickness of the aggregate. Protect adjacent structure surfaces against bituminous splatter.

Include all costs for labor, materials, and equipment to complete this work in the unit price bid for "Aggregate Slope Protection".

930 SHORING: Install temporary shoring as needed for removal of the center bridge pier. Temporary shoring may only be in place when barriers shown in the Median Barrier Layout are present. Design, construct, maintain, and remove the temporary shoring. Submit a shoring plan to the Engineer at least 14 calendar days prior to installation of the temporary shoring. Include all labor, equipment, and materials required to complete this work, including any excavation required outside the limits of Class 1 Excavation defined in the plans, in the bid item "Shoring". A quantity of 1 EA will be paid for this work.

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	4

CL BEAM 1	CL BEAM 2	CL BEAM 3	CL BEAM 4	CL BEAM 5
1834.74	1834.89	1835.04	1834.89	1834.74
1834.76	1834.92	1835.07	1834.92	1834.76
1835.10	1835.25	1835.40	1835.25	1835.10
1835.43	1835.58	1835.73	1835.58	1835.43
1835.75	1835.90	1836.05	1835.90	1835.75
1836.05	1836.20	1836.35	1836.20	1836.05
1836.34	1836.49	1836.64	1836.49	1836.34
1836.59	1836.74	1836.89	1836.74	1836.59
1836.80	1836.95	1837.11	1836.95	1836.80
1836.98	1837.13	1837.29	1837.13	1836.98
1837.13	1837.28	1837.43	1837.28	1837.13
1837.25	1837.41	1837.56	1837.41	1837.25
1837.27	1837.42	1837.57	1837.42	1837.27
1837.47	1837.62	1837.77	1837.62	1837.47
1837.65	1837.80	1837.95	1837.80	1837.65
1837.80	1837.95	1838.10	1837.95	1837.80
1837.91	1838.06	1838.21	1838.06	1837.91
1837.99	1838.14	1838.29	1838.14	1837.99
1838.03	1838.18	1838.33	1838.18	1838.03
1838.03	1838.19	1838.34	1838.19	1838.03
1838.00	1838.16	1838.31	1838.16	1838.00
1837.94	1838.09	1838.25	1838.09	1837.94
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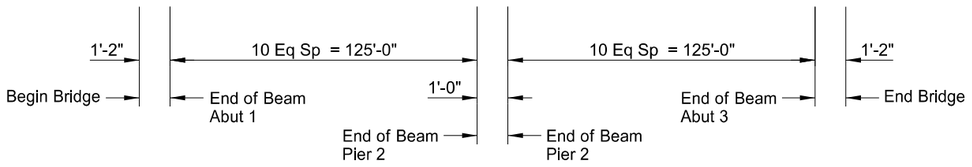
1837.85	1838.00	1838.15	1838.00	1837.85

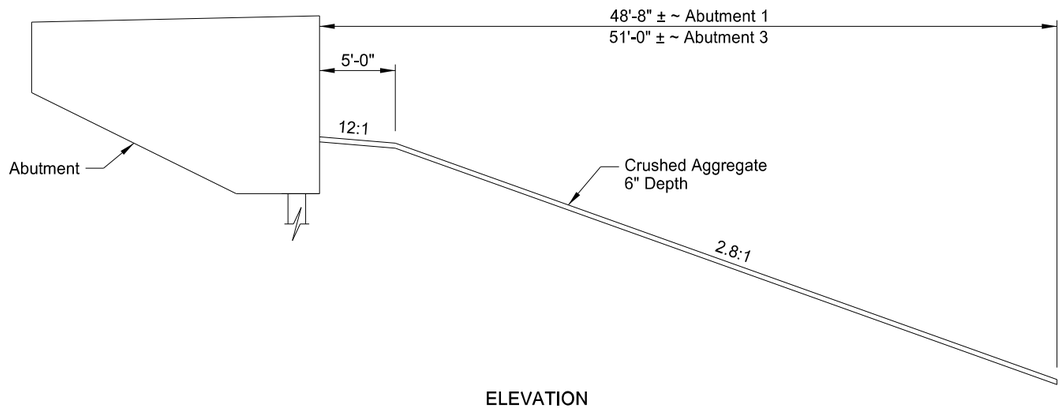


Beam 1 is the west beam.

SCREED ELEVATIONS

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0105	REMOVAL OF STRUCTURE	L SUM	1
210	0099	CLASS 1 EXCAVATION	L SUM	1
210	0201	FOUNDATION PREPARATION	EA	1
602	0500	BRIDGE SUBSTRUCTURE CONCRETE	CY	147.5
602	0510	BRIDGE DECK CONCRETE	CY	298.6
602	0520	BRIDGE BARRIER CONCRETE	CY	72.2
602	1134	PILE SUPPORTED APPROACH SLAB	SY	158.1
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,045
604	9920	PRESTRESSED I-BEAM-63IN	LF	1,250
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	87,100
616	5890	STRUCTURAL STEEL	L SUM	1
622	0020	STEEL PILING HP 10 X 42	LF	340
622	0060	STEEL PILING HP 14 X 73	LF	420
622	0070	STEEL PILING HP 14 X 102	LF	350
622	7001	DYNAMIC PILE TEST	EA	3
930	3000	BRIDGE BENCH MARKS	SET	1
930	7012	ROADWAY CANOPY	L SUM	1
930	8230	SHORING	EA	1
930	8600	ELASTOMERIC BEARING PAD	SF	40
930	8686	AGGREGATE SLOPE PROTECTION	SY	427.3
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2



ELEVATION

AGGREGATE SLOPE PROTECTION DETAIL

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

I-94/PETTIBONE INTERCHANGE

SCREED ELEVATIONS, BID ITEM QUANTITIES & SLOPE PROTECTION DETAIL

DRAWING NO. 94-217.146-4

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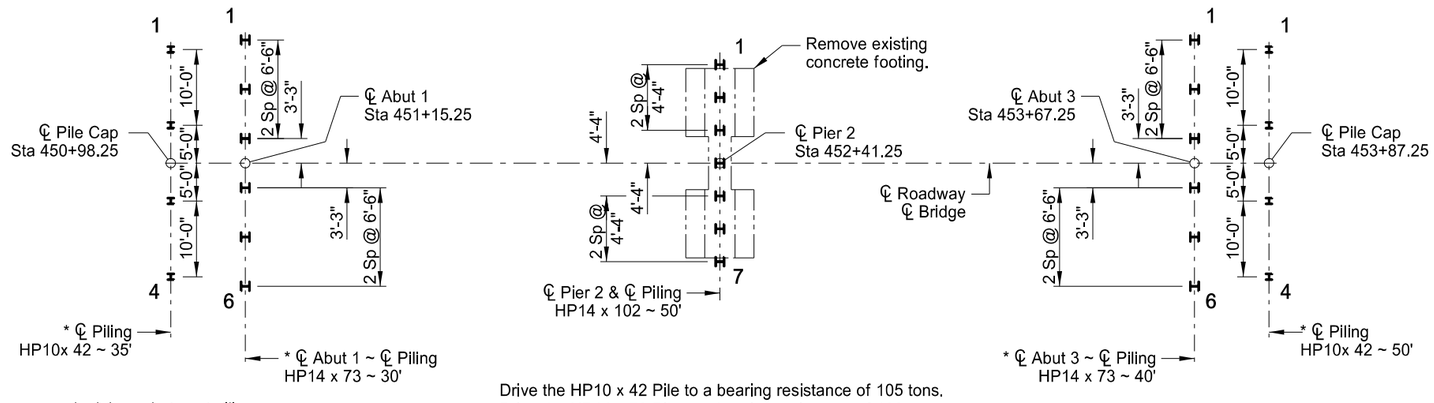
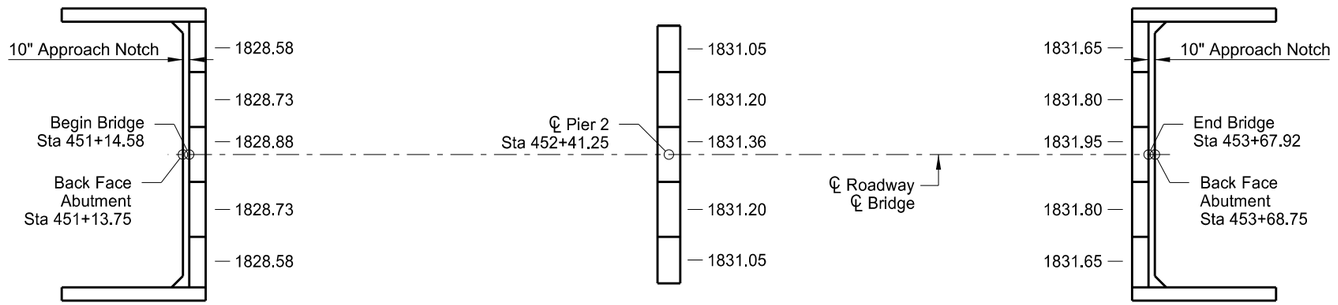
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	5



* Do not drive approach slab or abutment piling until all constructed embankment is in place.

Drive the HP10 x 42 Pile to a bearing resistance of 105 tons.
Drive the HP14 x 73 Pile to a bearing resistance of 180 tons.
Drive the HP14 x 102 Pile to a bearing resistance of 250 tons.

PILING LAYOUT



Elevations shown are to top of finished concrete.

BEARING ELEVATION

NOTE:

For double acting or single acting diesel hammers, calculate the bearing resistance of piles by the following formula:

$$\Phi Rn = \frac{4.5E}{S + 0.2} \times \frac{W + 0.2M}{W + M}$$

Where:

ΦRn = Factored pile bearing resistance, in pounds. The Φ factor is included in equation.
W = Weight of striking parts (ram), in pounds.
M = Weight of parts being driven, in pounds. Includes pile weight, anvil (if any), driving cap, etc.
E = Energy per blow, in foot-pounds.
S = Average penetration of pile in inches per blow for last ten blows.

For single acting hammers, calculate E by multiplying observed stroke (ft) and W (lbs).

	PILE COORDINATES		
	PILE	NORTHING	EASTING
APPR SLAB	1	443,800.40	2,200,425.44
	4	443,800.68	2,200,455.44
ABUT 1	1	443,820.39	2,200,424.00
	6	443,820.70	2,200,456.50
PIER 2	1	443,946.41	2,200,426.06
	7	443,946.66	2,200,452.06
ABUT 3	1	444,072.38	2,200,421.62
	6	444,072.68	2,200,454.11
APPR SLAB	1	444,092.39	2,200,422.68
	4	444,092.67	2,200,452.69

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

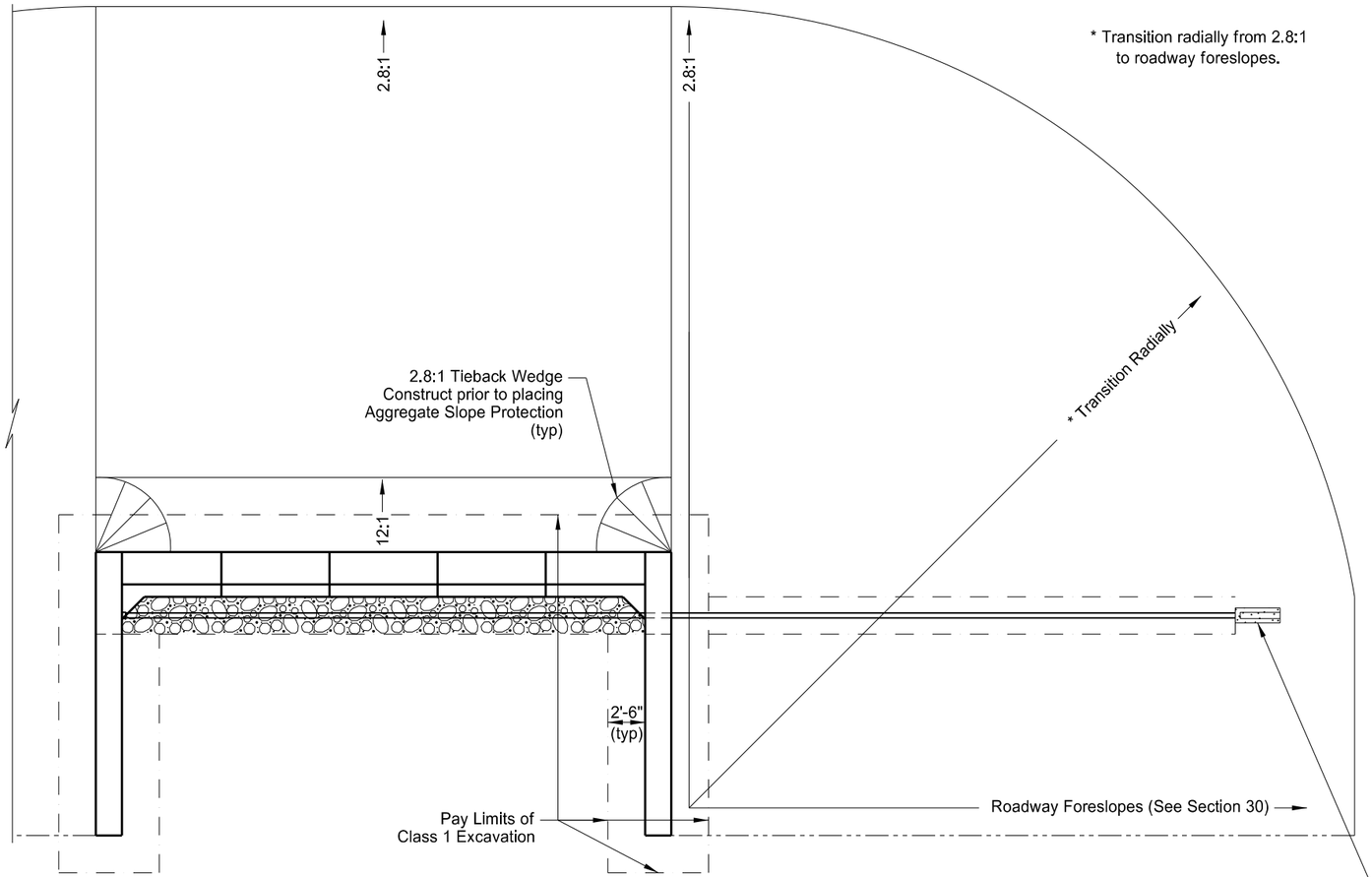
I-94/PETTIBONE INTERCHANGE

PILING LAYOUT &
BEARING ELEVATIONS

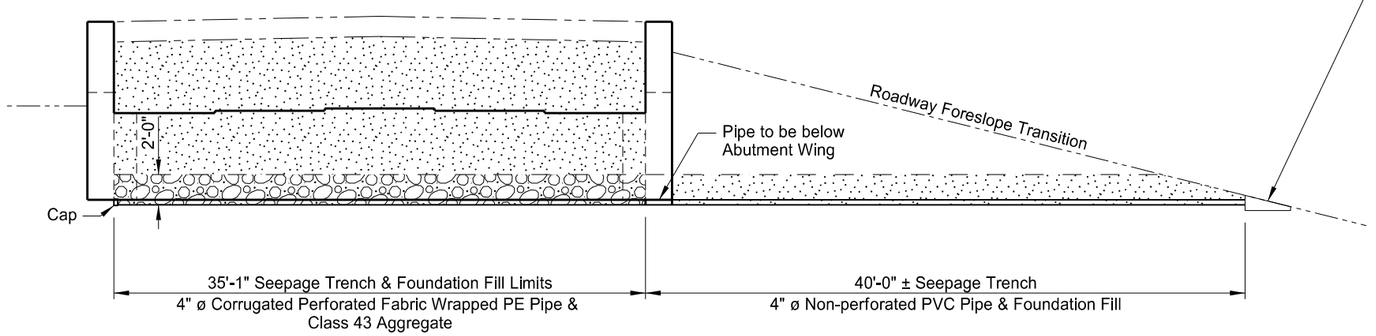
DRAWING NO. 94-217.146-5

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	6



ABUTMENT PLAN

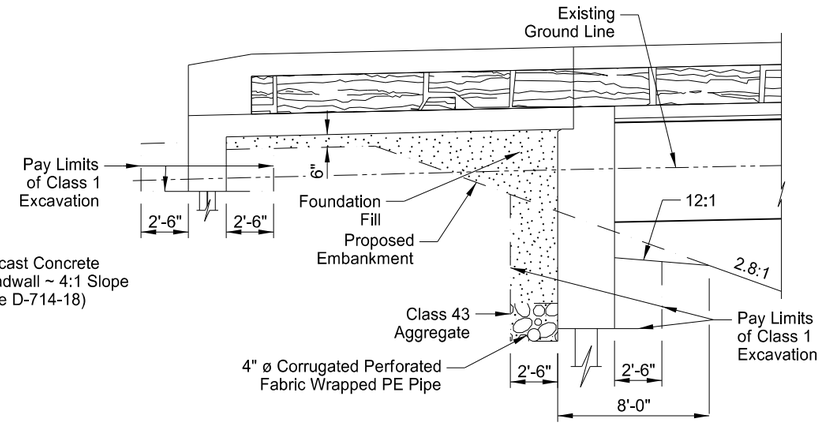


BACK FACE OF ABUTMENT

NOTES:

Use corrugated perforated fabric wrapped PE pipe that meets the requirements of Section 830.03 A.4. Provide fabric wrapping for the pipe that meets the requirements of Section 858.01 for D3 or D4 drainage fabric. Provide aggregate that meets the requirements of Section 816.03, Class 43. Provide foundation fill that meets the requirements of Section 210. Compact the foundation fill beneath the approach slab according to Section 714.04 A.10

Include the cost to furnish and place the foundation fill, aggregate, corrugated perforated pipe and headwalls in the pay item "Abutment Underdrain System."



DETAIL AT ABUTMENT

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

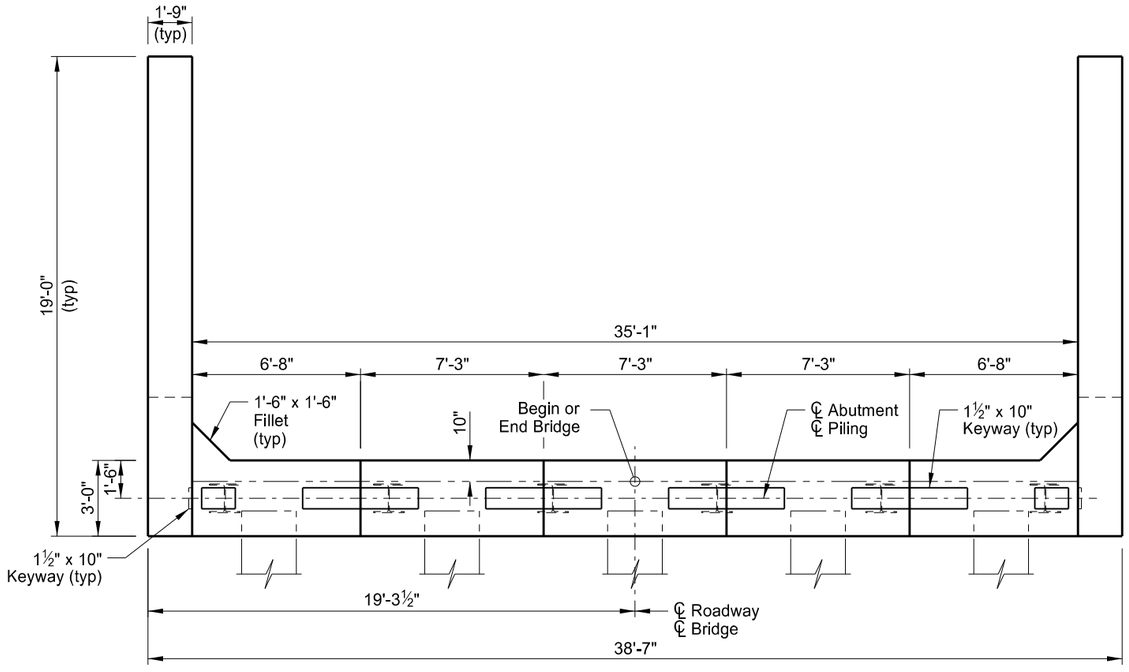
I-94/PETTIBONE INTERCHANGE

ABUTMENT UNDERDRAIN & EXCAVATION DETAILS

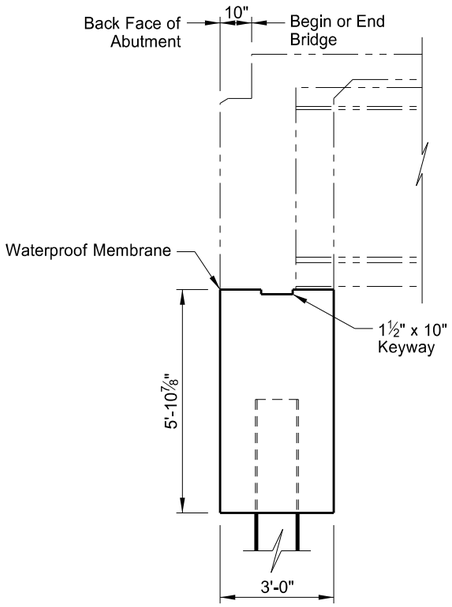
DRAWING NO. 94-217.146-6

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

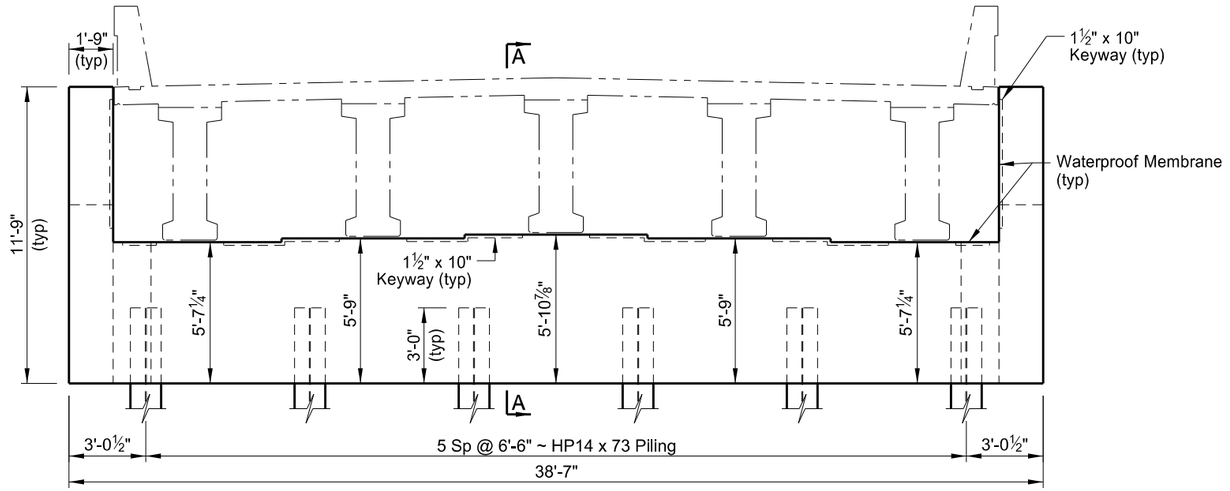
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	7



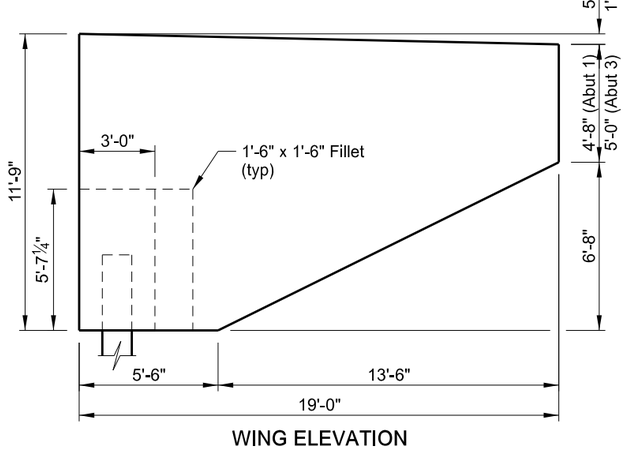
PLAN



A-A



ELEVATION



WING ELEVATION

NOTE:

Use waterproof membrane that meets the requirements of Section 602.03 B. Center the waterproof membrane (1'-0" minimum width) on the joint.

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES
SEE DWG 94-217.146-9

I-94/PETTIBONE INTERCHANGE

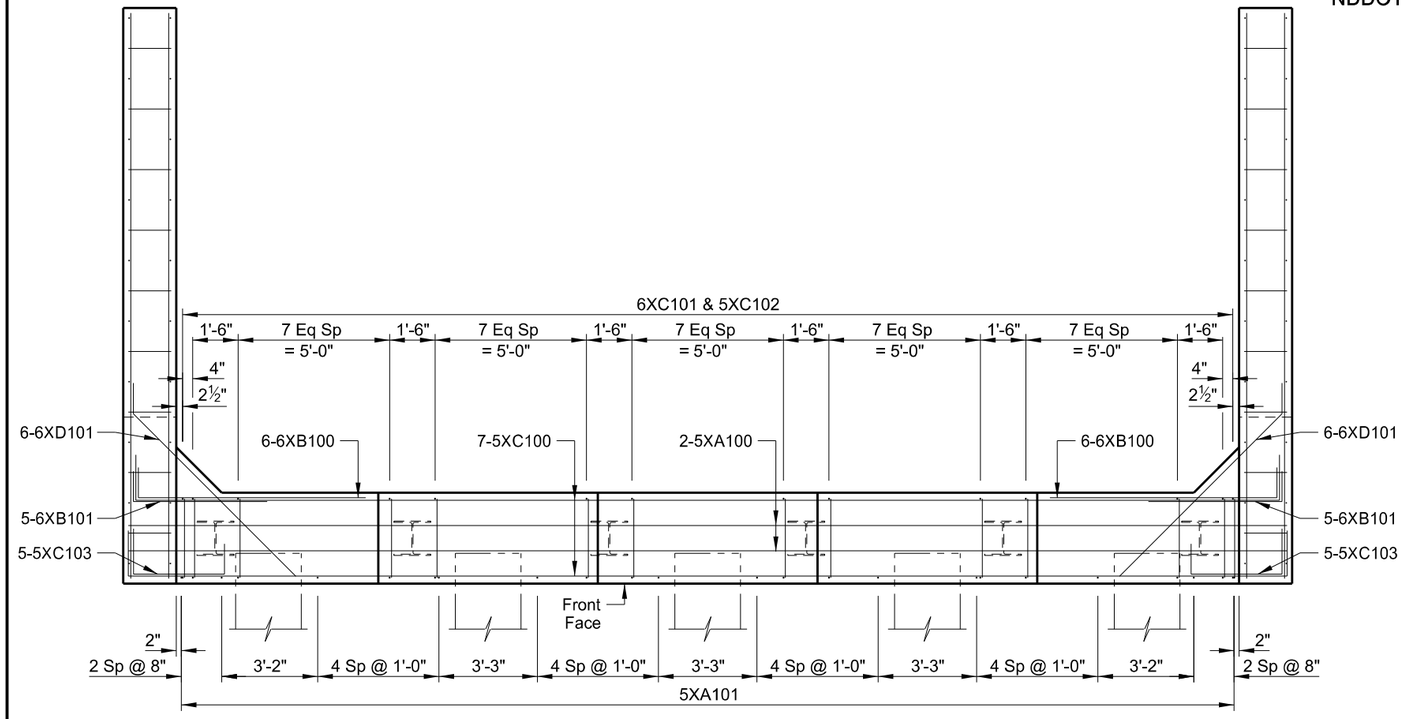
(SHOWING DIMENSIONS)

ABUTMENT DETAILS

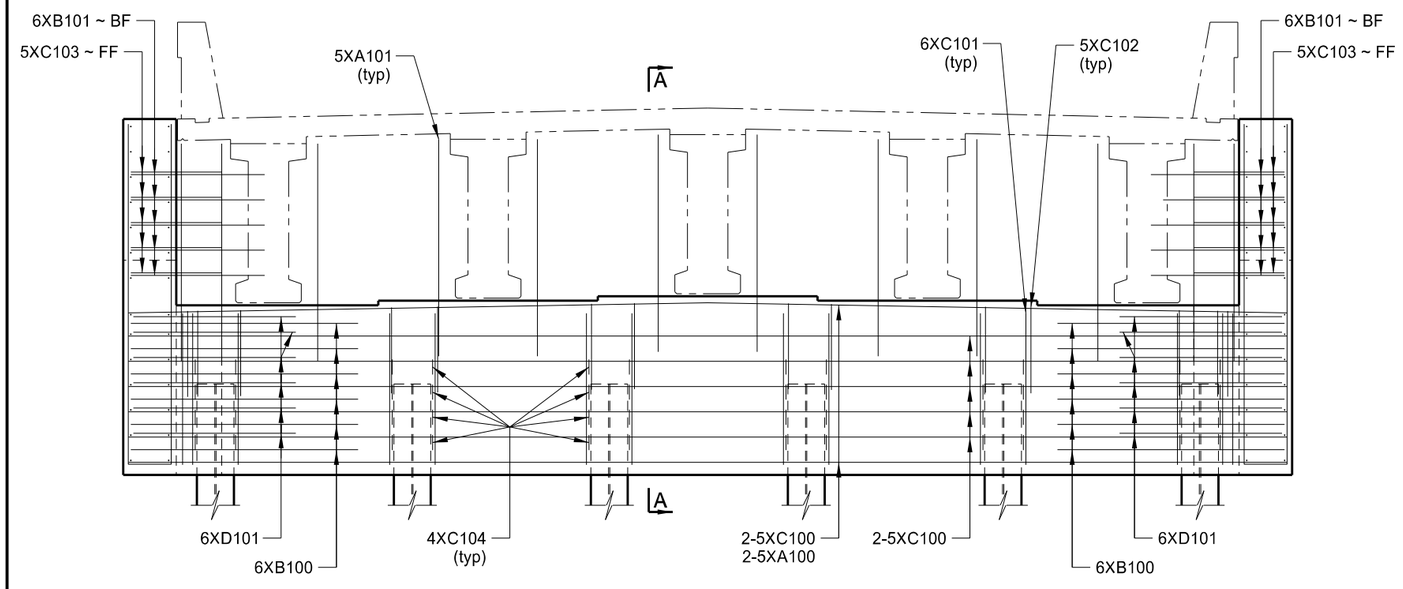
DRAWING NO.	94-217.146-7

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

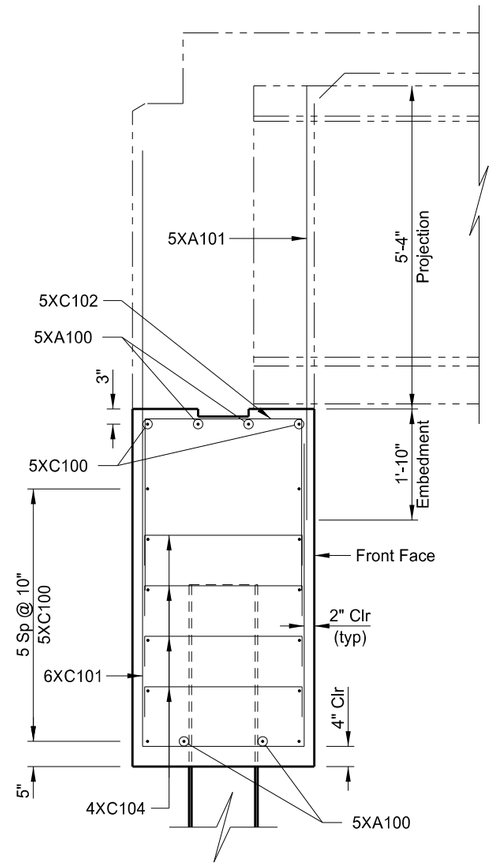
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	8



PLAN



ELEVATION



A-A

NOTES:

See Dwg 94-217.149-9
for Wingwall Reinforcement.

NOMECLATURE:

FF = Front Face
BF = Back Face

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES

SEE DWG 94-217.146-9

I-94/PETTIBONE INTERCHANGE

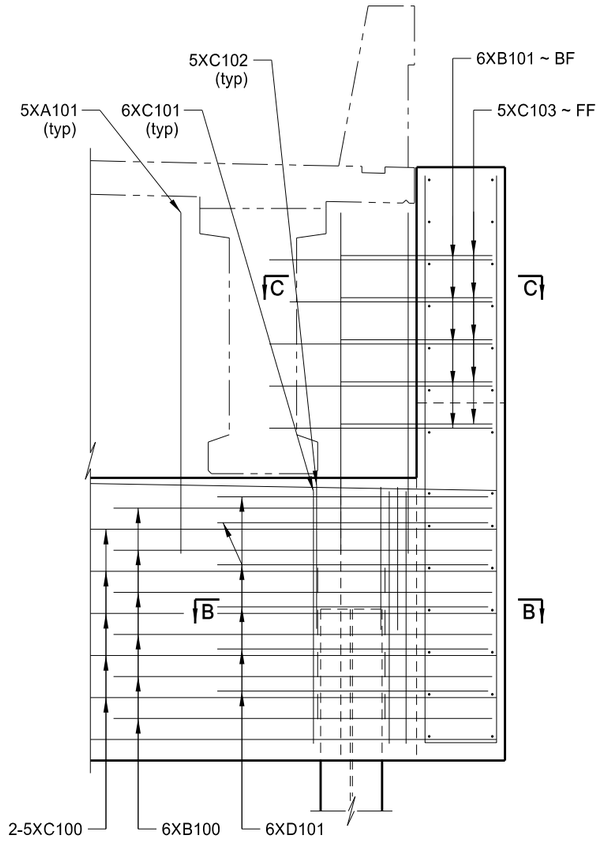
(SHOWING REINFORCING)

ABUTMENT DETAILS

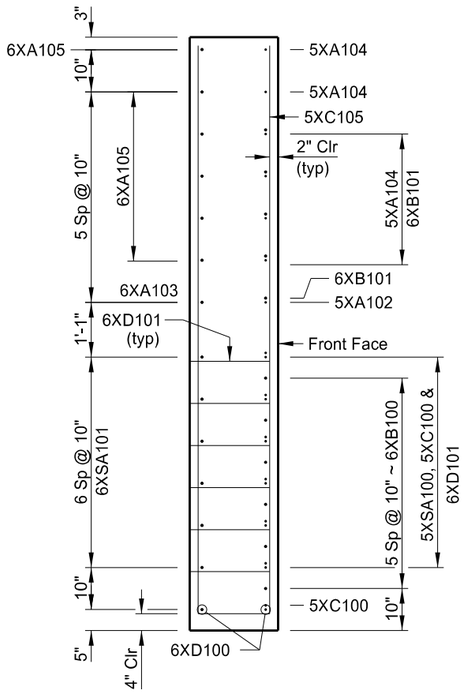
DRAWING NO. 94-217.146-8

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

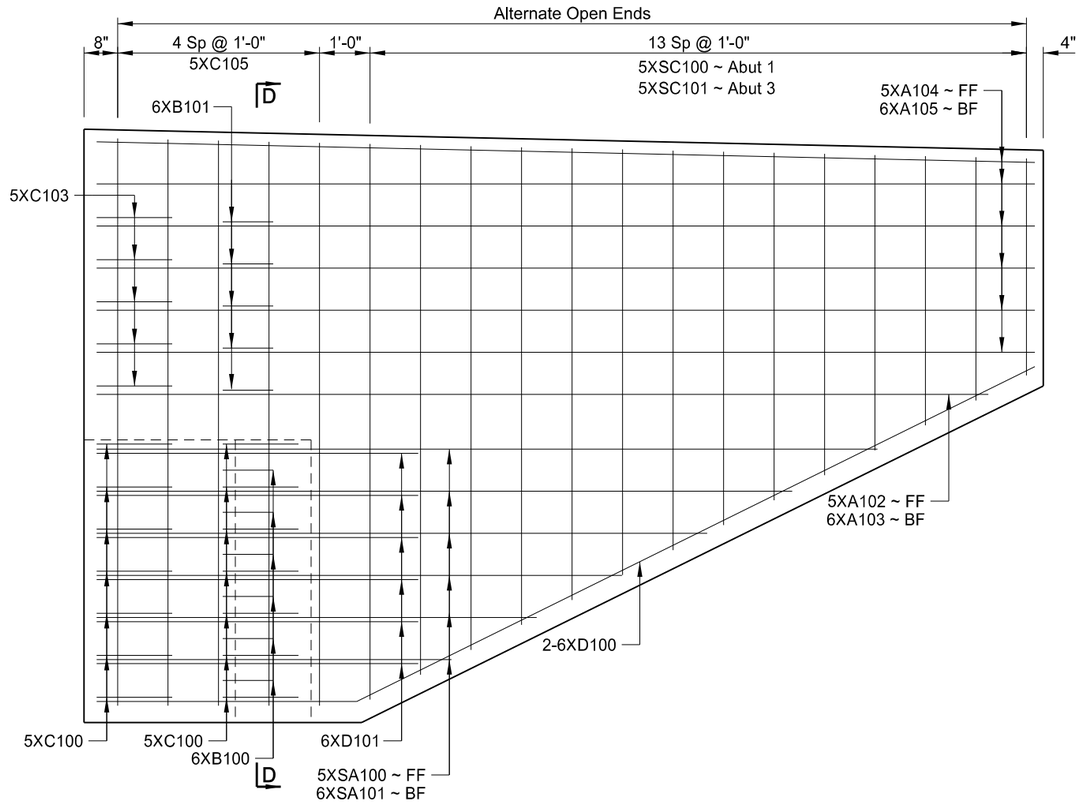
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	9



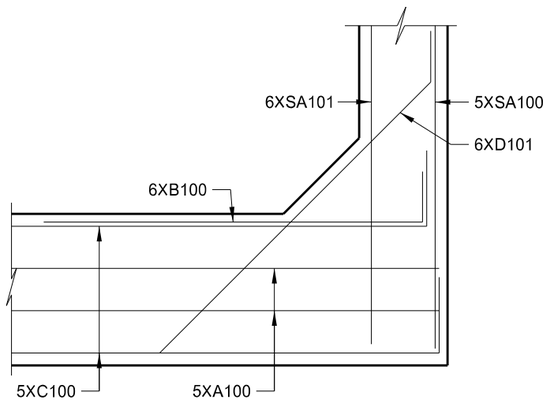
PARTIAL ELEVATION



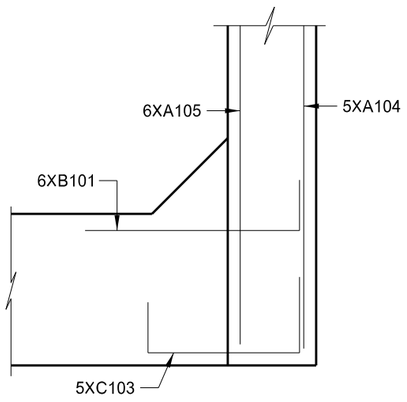
D-D



WING ELEVATION



B-B



C-C

NOMENCLATURE:

FF = Front Face
BF = Back Face

QUANTITIES	(ABUTMENT 1)
BRIDGE SUBSTRUCTURE CONCRETE	45.4 CY
REINFORCING STEEL (EPOXY)	4,914 LBS
QUANTITIES	**(ABUTMENT 3)**
BRIDGE SUBSTRUCTURE CONCRETE	45.8 CY
REINFORCING STEEL (EPOXY)	4,926 LBS

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

I-94/PETTIBONE INTERCHANGE

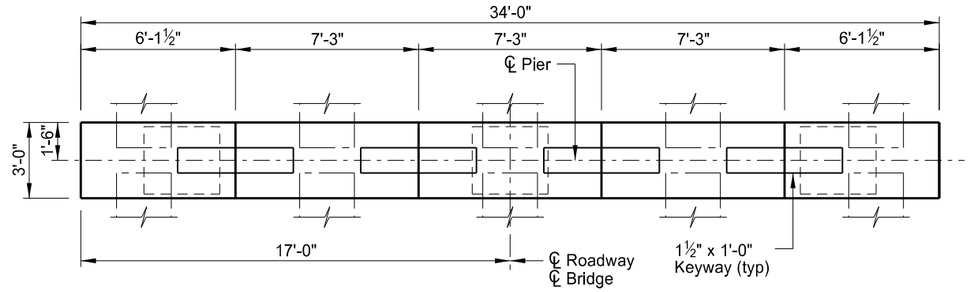
(SHOWING REINFORCING)

ABUTMENT DETAILS

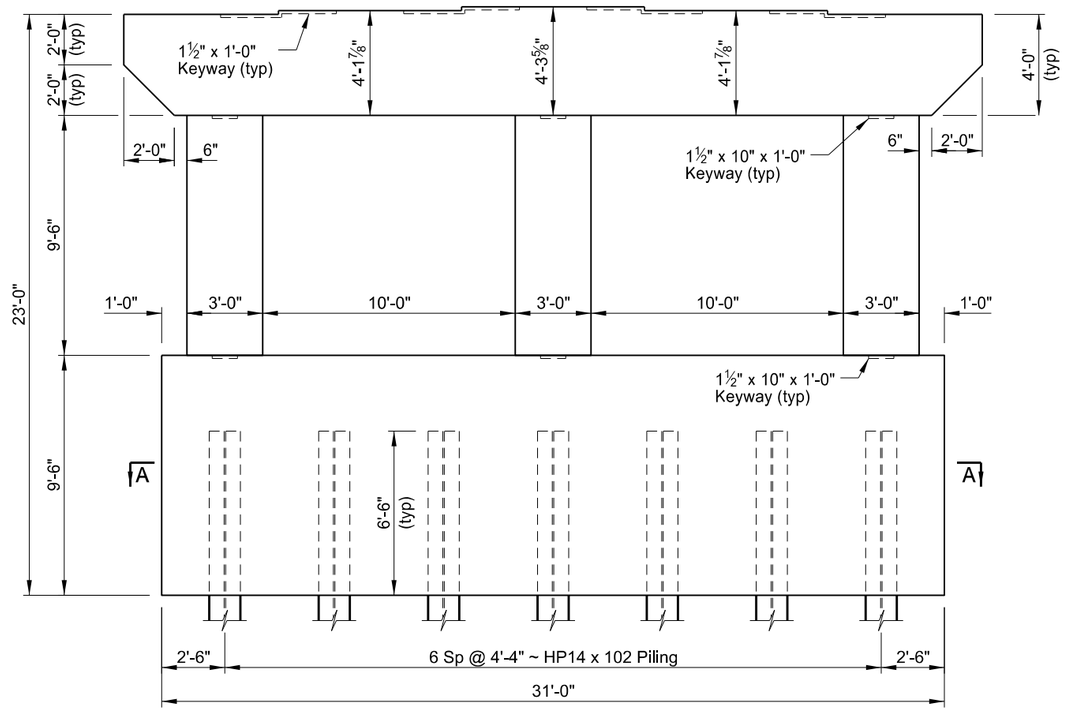
DRAWING NO. 94-217.146-9

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

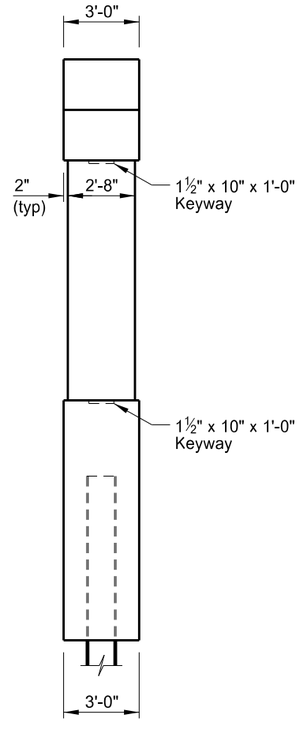
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	10



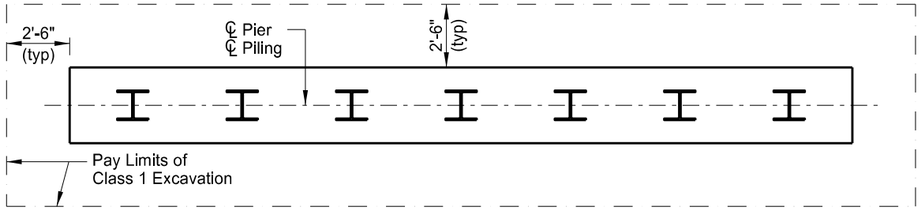
PLAN



ELEVATION



END VIEW



A-A

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES

SEE DWG 94-217.146-11

I-94/PETTIBONE INTERCHANGE

(SHOWING DIMENSIONS)

PIER DETAILS

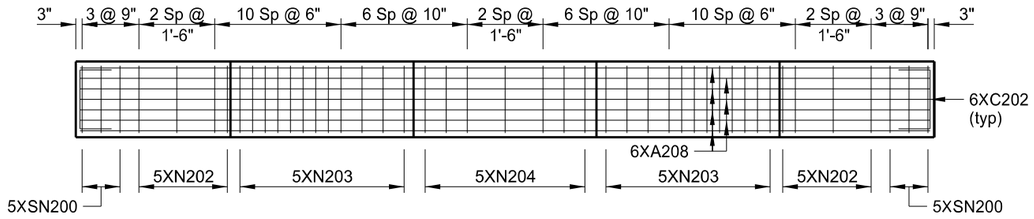
DRAWING NO. 94-217.146-10

4/7/2026 3:00:52 PM acahlin R:\SUPPORT\Teams\Bridge\Plan Prep Guide\Plan Sheets\Bridges\Prestressed Concrete I-Beam Plan Set\170BR_010_PIERDIM.dgn

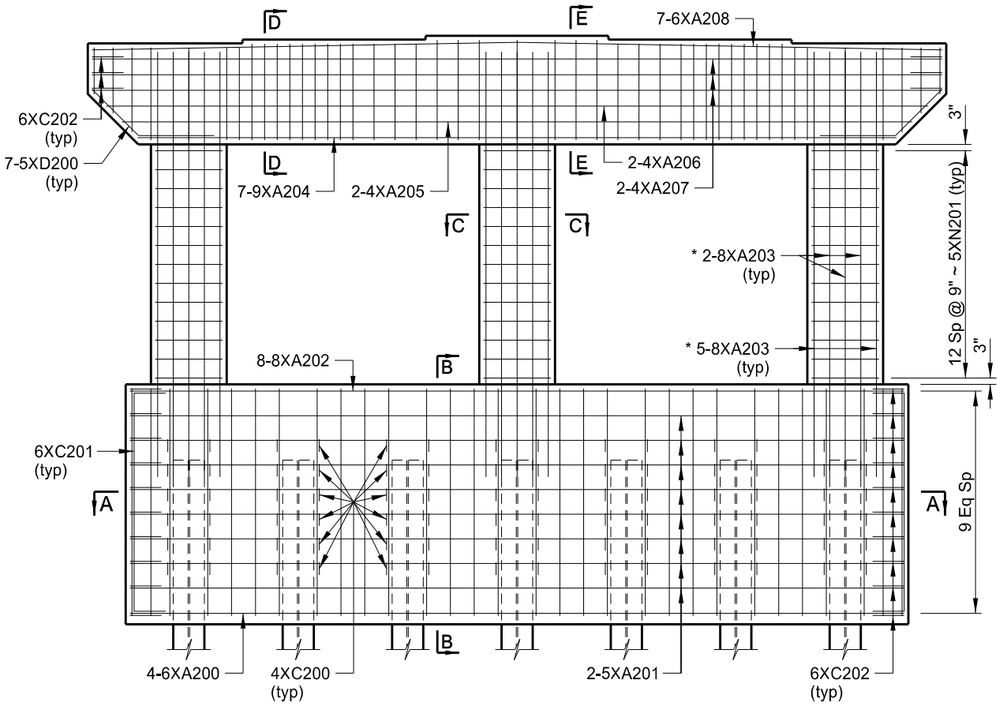
ATC JPG

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

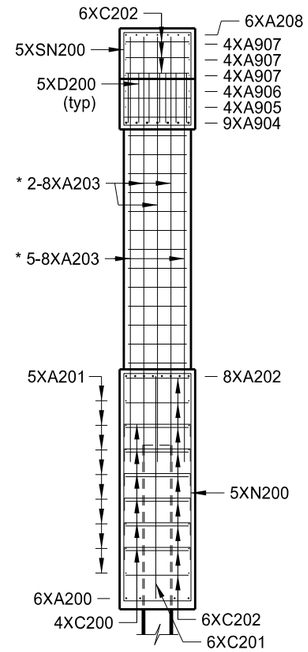
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	11



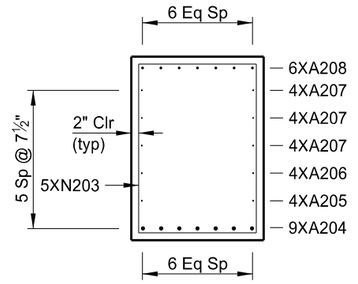
PLAN



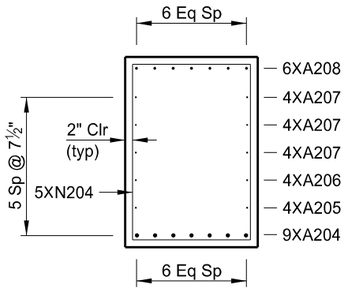
ELEVATION



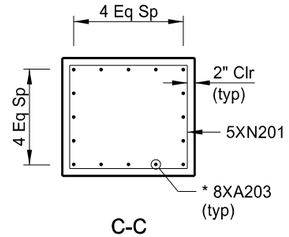
END VIEW



D-D

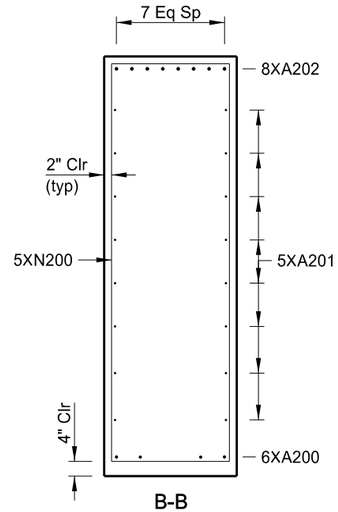


E-E

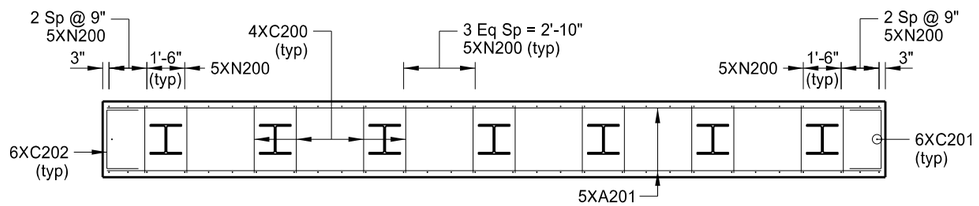


C-C

* Embed the 8XA203 bars 3'-8" into the footing wall and pier cap.



B-B



A-A

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES	(PIER)
BRIDGE SUBSTRUCTURE CONCRETE	56.3 CY
REINFORCING STEEL (EPOXY)	7,158 LBS

I-94/PETTIBONE INTERCHANGE

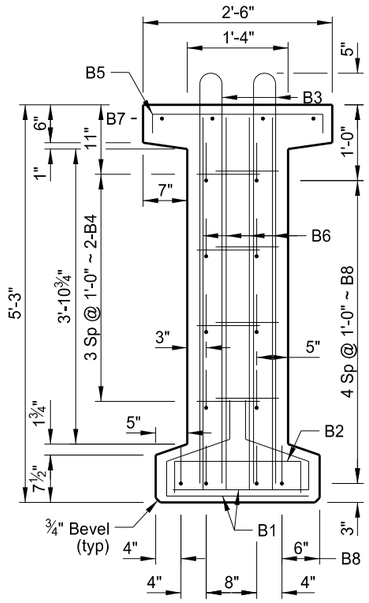
(SHOWING REINFORCING)

PIER DETAILS

DRAWING NO. 94-217.146-11

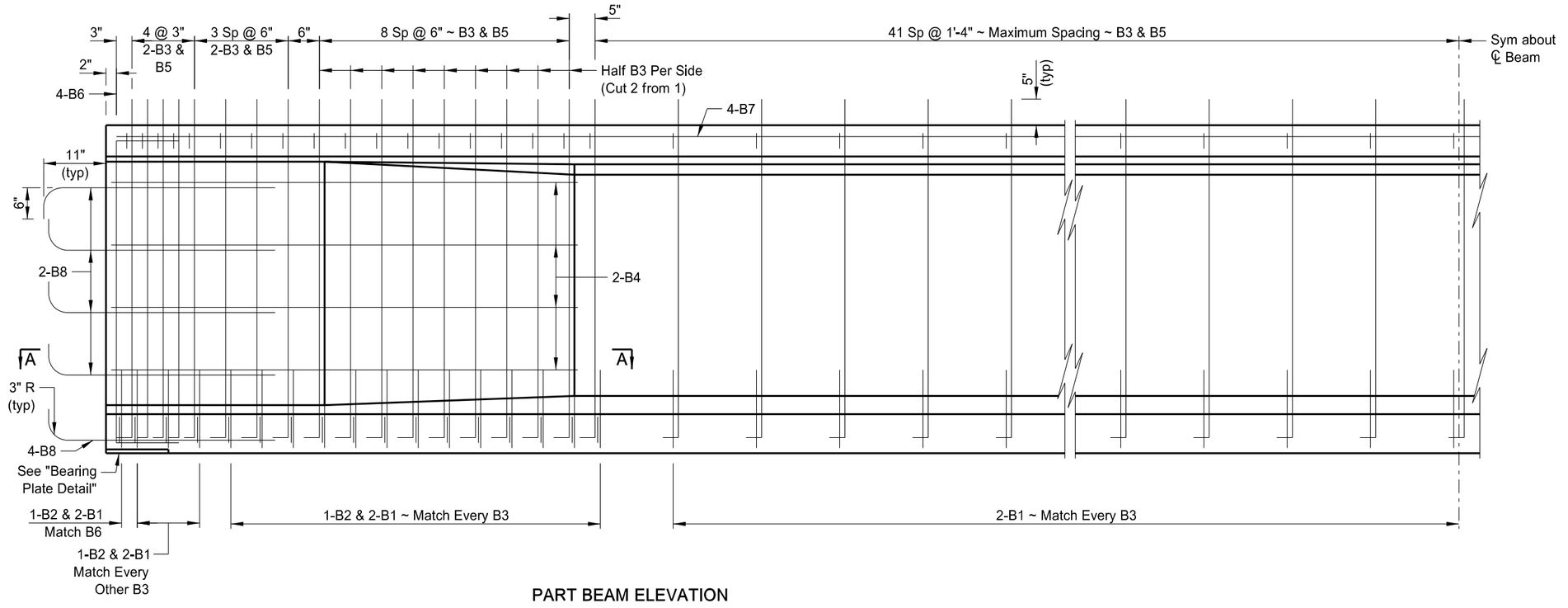
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	12

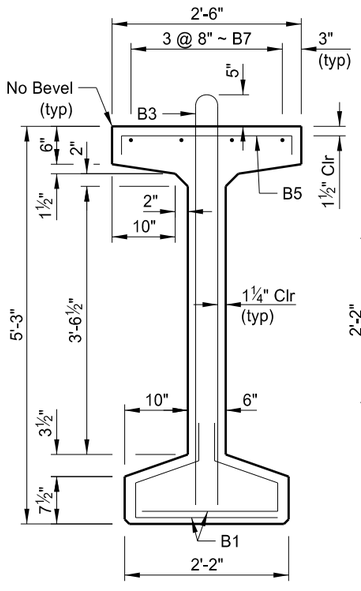


(DETAILS NOT SHOWN ARE SAME AS "SECTION @ ℄")

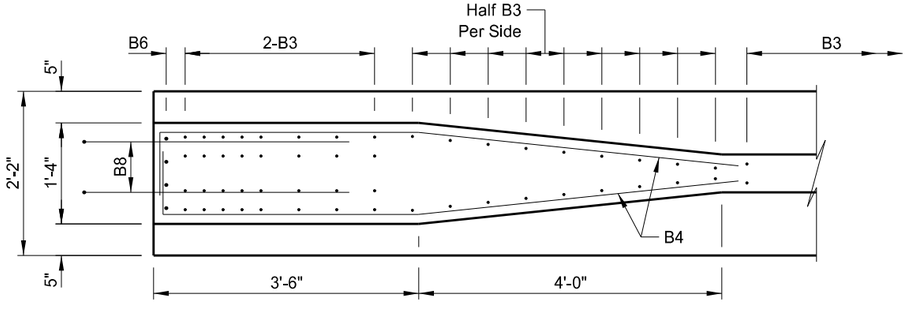
END VIEW



PART BEAM ELEVATION



SECTION @ ℄



A-A

BAR LIST ~ ONE BEAM				
MARK	SIZE	NO.	LENGTH	SHAPE
B1	3	232	3'- 9"	BENT
B2	3	34	2'- 10"	BENT
** B3	4	134	11'- 6"	BENT
B4	4	16	8'- 5"	BENT
B5	3	118	2'- 9"	BENT
B6	5	8	6'- 11"	BENT
B7	5	16	33'- 6"	STR
* B8	5	24	4'- 0"	STR

* Field bend as shown with a 2.5" minimum bar bend diameter.

** Epoxy Coated

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

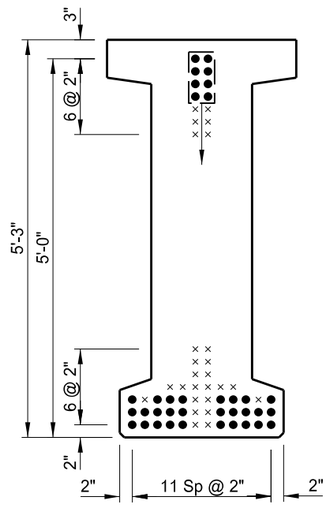
I-94/PETTIBONE INTERCHANGE

125'-0" BEAM LENGTH

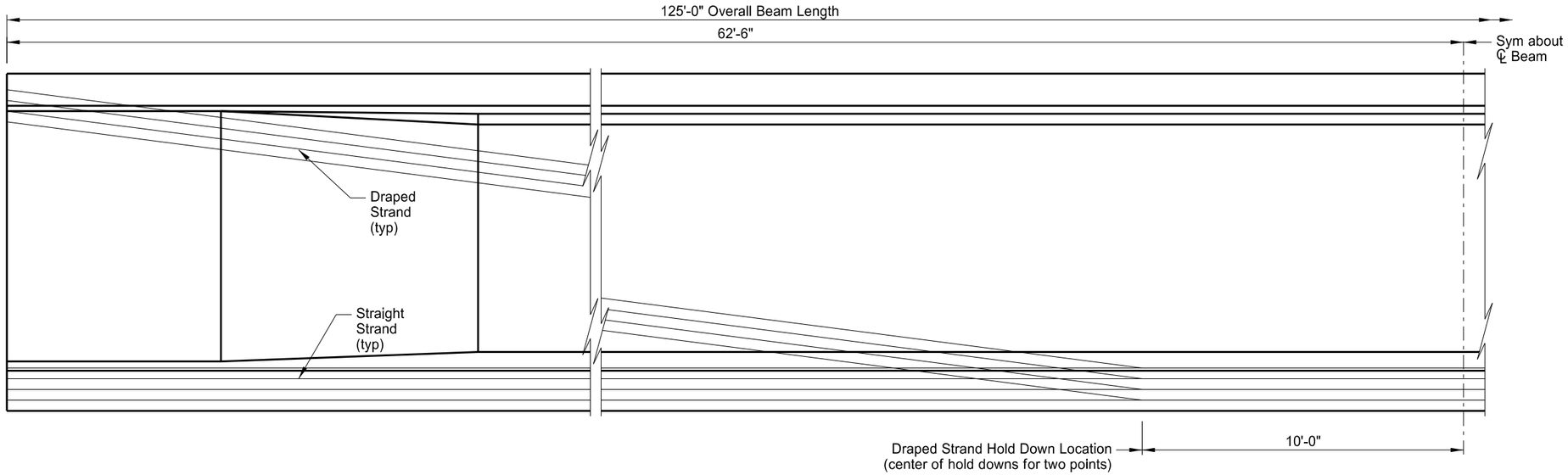
PRE-TENSIONED 63" PRESTRESSED I-BEAM

DRAWING NO.	94-217.146-12

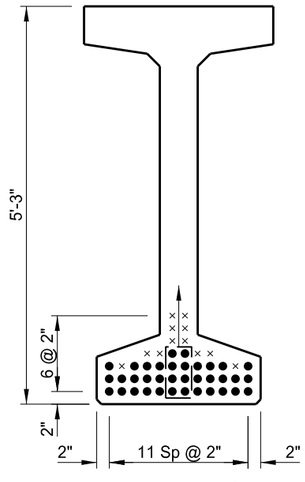
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	13



END VIEW



BEAM ELEVATION



SECTION @ ℄

PRESTRESSING STRAND LAYOUT

KEY:

× Vacant Strand Location

● Filled Strand Location (Bonded)

or — Indicates Locations of Draped Strands

BEAM SECTION DATA			
Beam Weight = 787.9 lbs/ft + 5337 lbs			
Beam Length		125	ft
Total Beam Weight		51.9	tons
Cross Sectional Area at End		1182.75	in^2
Cross Sectional Area at Midspan		732	in^2
C.G. from Bottom of Beam at Midspan		31.17	in
Midspan Moment of Inertia (I)		392,056	in^4
Midspan Section Modulus (Sb)		12,578	in^3
MINIMUM CONCRETE COMPRESSIVE STRENGTH			
Detensioning Strength (f'ci)		7.0	ksi
Acceptance Strength (f'c)		7.0	ksi
PRESTRESSING STRAND DATA			
0.6" Diameter Grade 270 Prestressing Strands			
Initial Prestress = 0.75 * fpu			
	Number	Y Distance (inches)	
		Midspan	End
Straight Strands	28	3.86	3.86
Draped Strands	8	5.00	57.00
Total Strands	36	4.11	15.67
PRESTRESS LOSSES			
Elastic Shortening Loss		18.02	ksi
Long Term Losses		23.41	ksi
Total Losses		41.43	ksi
PRESTRESS FORCES			
Initial Prestress Force		1,581.9	kips
Final Prestress Force after Losses		1,258.3	kips
ESTIMATED CAMBER			
Midspan Camber at Strand Release		2.50	inches

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

I-94/PETTIBONE INTERCHANGE

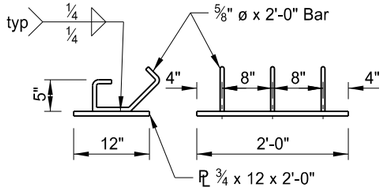
125'-0" BEAM LENGTH

PRE-TENSIONED 63" PRESTRESSED I-BEAM

DRAWING NO. 94-217.146-13

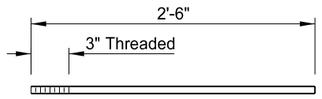
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	14



(Use ASTM A36 steel. Galvanize per Section 854. Include in the bid item for Prestressed Beam.)

BEARING PLATE DETAIL



No. 6 Deformed Rebar (Grade 60).
Include in bid item for Prestressed Beam.

6AT500 DETAIL

NOTES:

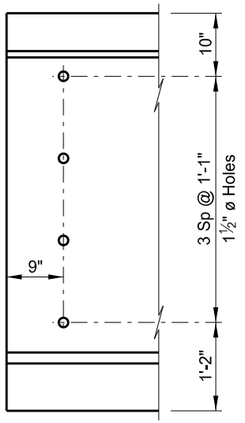
Provide holes and inserts in the beams at the locations shown to accommodate the diaphragm bars. Provide 6AT500 bars threaded to fit the inserts. Use galvanized, epoxy-coated, stainless steel, or non-metallic material for holes and inserts. See Slab Layout for diaphragm location details and required skew angle.

Provide lifting loops or handling hooks as required by the Contractor. Additional inserts, brackets, and hardware may be incorporated into the finished beam for the convenience of the Contractor. Use galvanized, epoxy-coated, stainless steel, or non-metallic material for all inserts, brackets, and hardware if less than 1 inch of concrete cover will be provided in the finished structure.

The required Detensioning Strength indicates the minimum required concrete strength at the time of prestress transfer. The required Acceptance Strength indicates the minimum required concrete strength prior to transporting and erecting the beams.

Y Distances shown in the table are measured from the bottom of the beam to the center of gravity of the strand group listed.

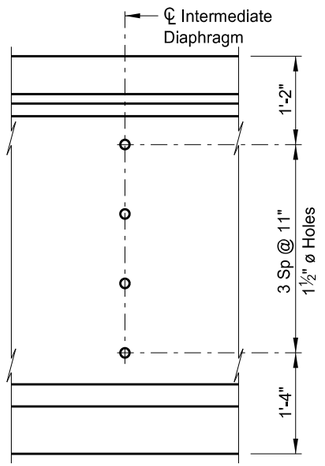
Minor changes to the shape of the beam and to the reinforcing steel may be made to accommodate the forms of various Contractors and their construction methods with the approval of the Engineer.



Use holes for all beams at the abutments and for interior beams at the piers. Use inserts for exterior beams at the piers.

ELEVATION

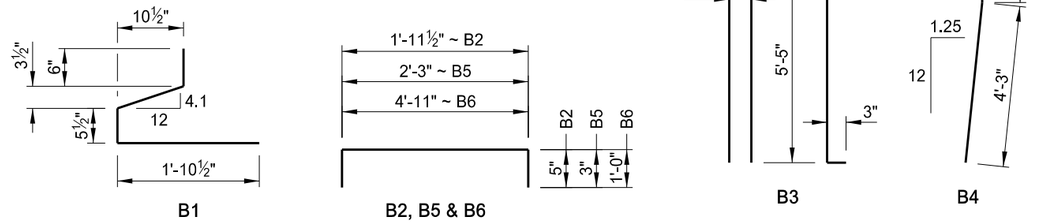
BEAM END DETAIL



Use holes for all beams.
See Dwg 94-217.146-15 for locations.

ELEVATION

INTERMEDIATE DIAPHRAGM DETAIL



BENT BAR DETAILS

NOTES:

All bar dimensions shown are out-to-out.

Unless noted otherwise, bend bars to the bend diameter (D) listed below.

#3 Bar: D = 1½"
#4 Bar: D = 2"
#5 Bar: D = 2½"

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

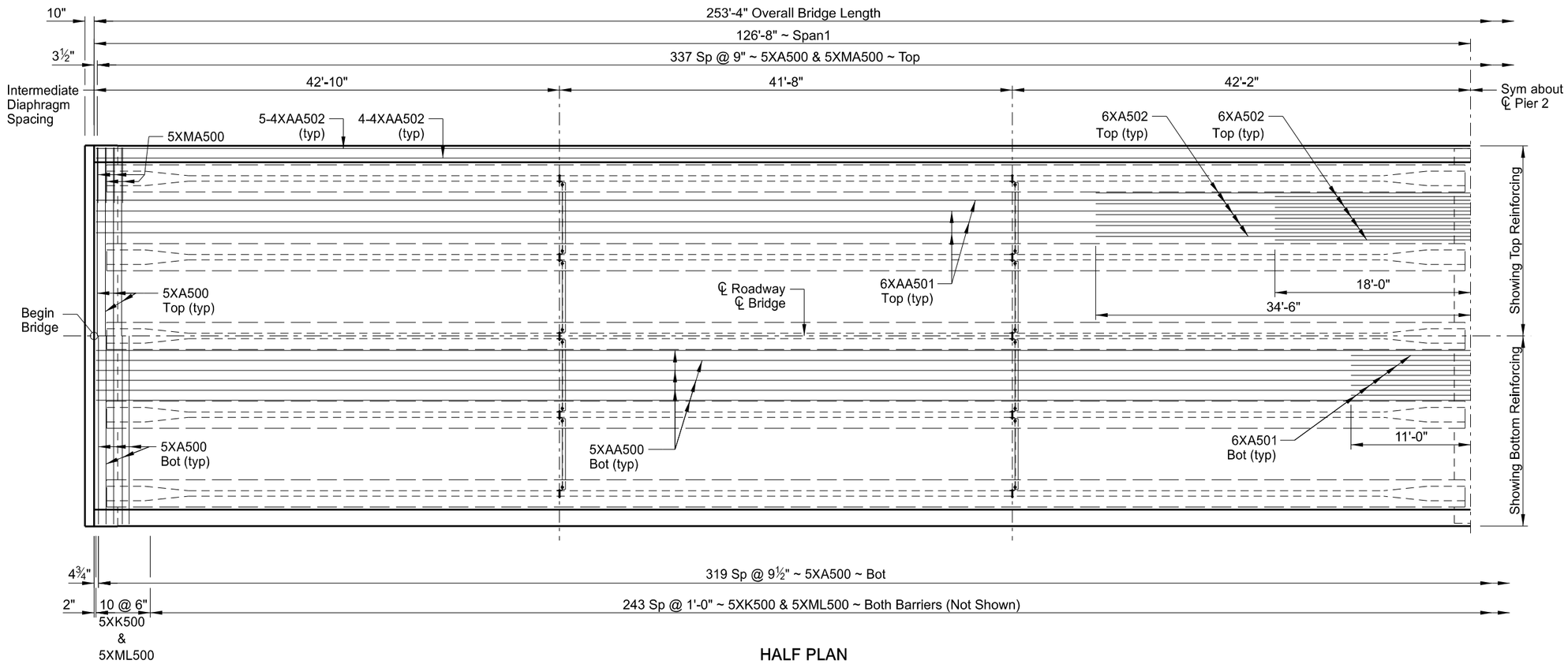
I-94/PETTIBONE INTERCHANGE

PRE-TENSIONED 63"
PRESTRESSED I-BEAM

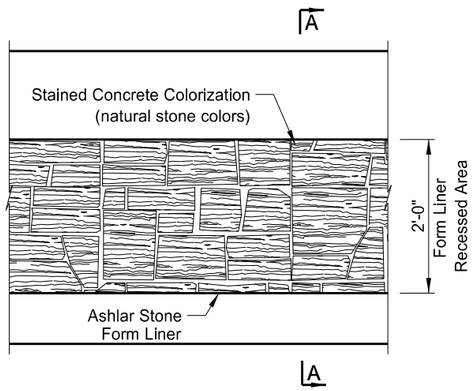
DRAWING NO. 94-217.146-14

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	15

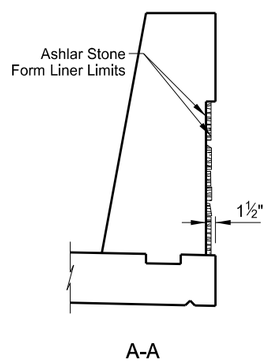


HALF PLAN



(SHOWING FORM LINER ~ BACK FACE)

BARRIER ELEVATION



A-A

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES
SEE DWG 94-217.146-19
I-94/PETTIBONE INTERCHANGE
HALF SLAB LAYOUT
DRAWING NO. 94-217.146-15

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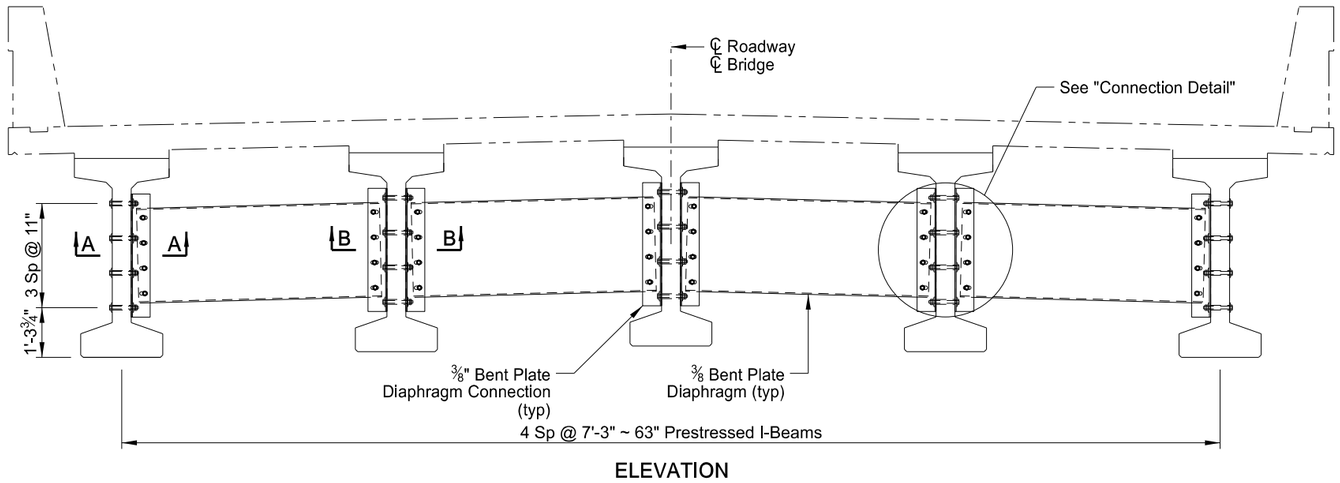
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	170	16



ELEVATION

NOTES:

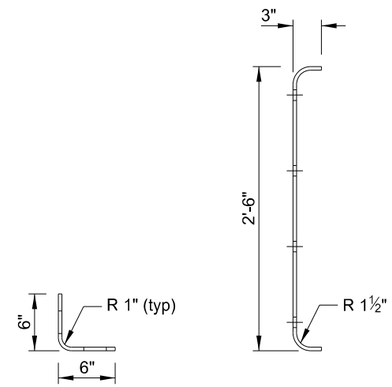
Use AASHTO M270 Grade 36 structural steel

Galvanize all structural steel and connection hardware per Section 854

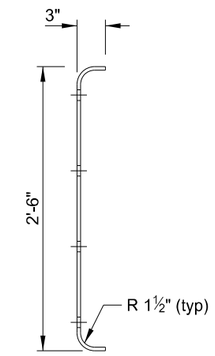
⅜" x 6" x 6" angles may be substituted for the bent plate diaphragm connection plates shown

Install diaphragms between adjacent girders in conjunction with girder erection

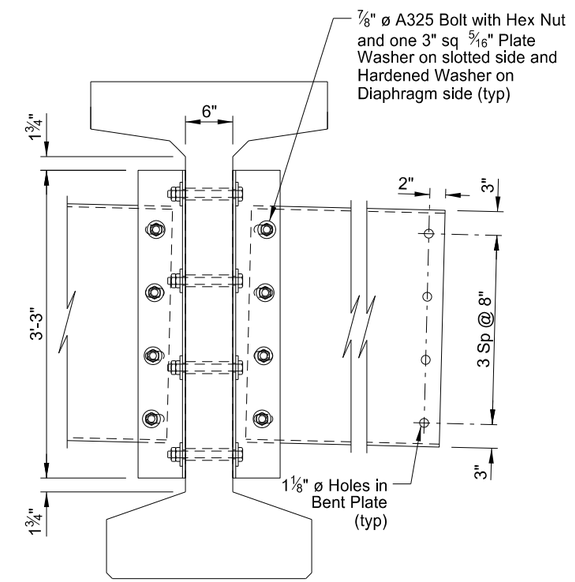
Include all costs for furnishing, fabricating, and installing the steel diaphragm in the lump sum price bid for structural steel



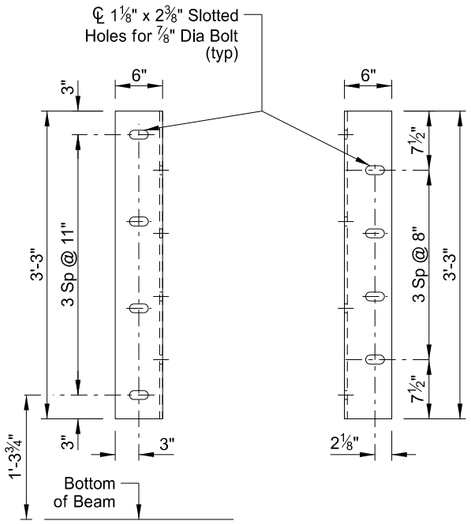
DIAPHRAGM CONNECTION
⅜" BENT PLATE



DIAPHRAGM
⅜" BENT PLATE

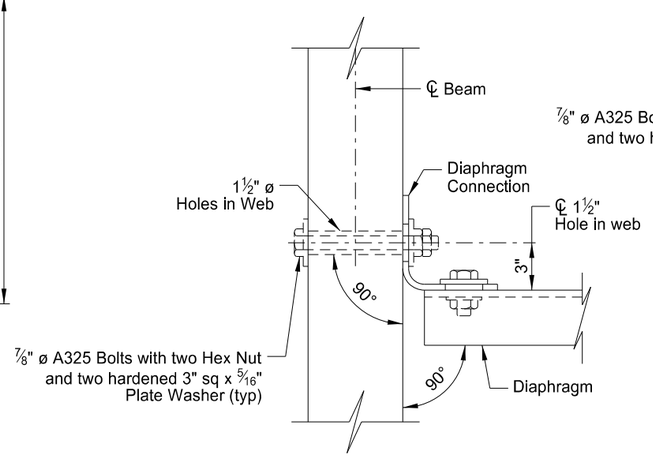


CONNECTION DETAIL

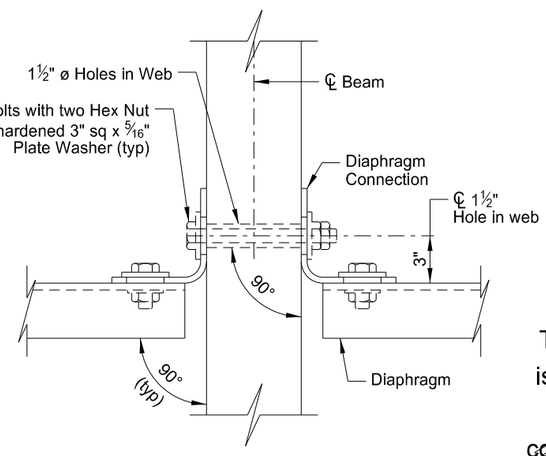


(BEAM FACE) (DIAPHRAGM FACE)

DIAPHRAGM CONNECTION
⅜" x 12" BENT PLATE



SECTION A-A



SECTION B-B

This drawing is preliminary and not for construction or implementation purposes.

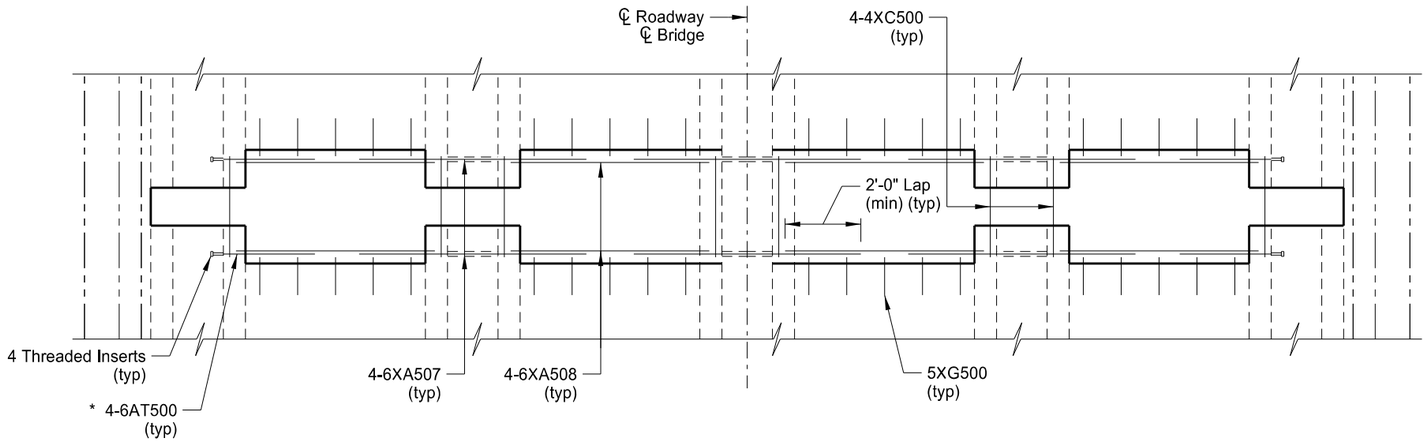
PRELIMINARY

I-94/PETTIBONE INTERCHANGE

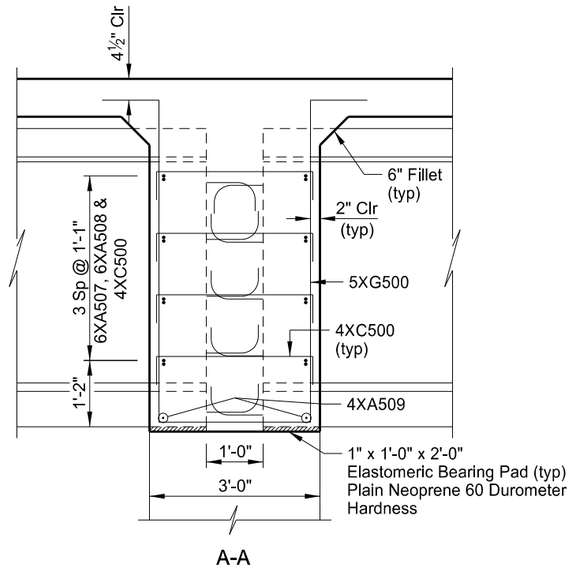
INTERMEDIATE
DIAPHRAGM DETAILS

DRAWING NO. 94-217.146-16

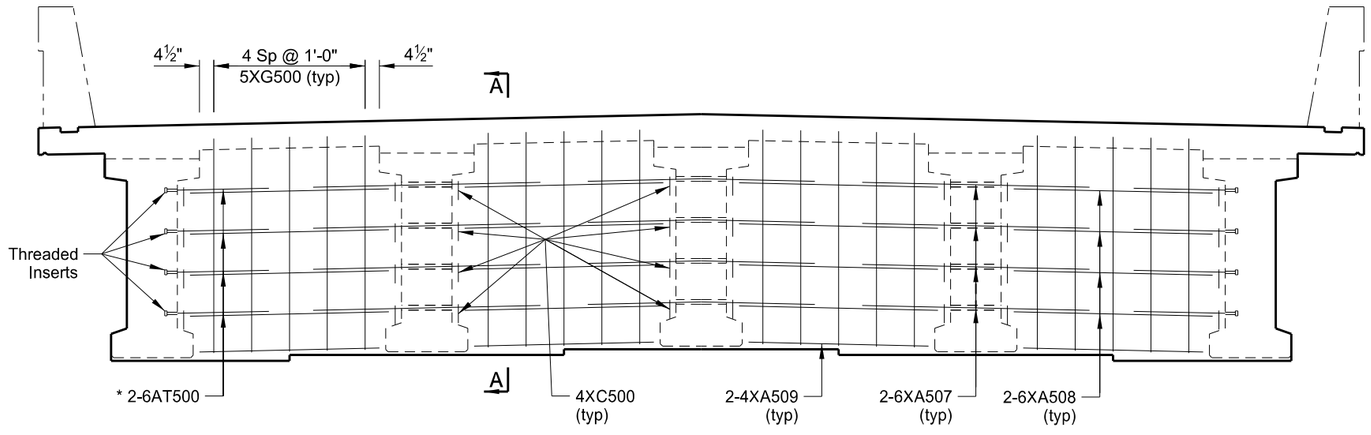
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	17



PLAN



A-A



ELEVATION

* See "6AT500 Detail" Dgn 94-217.146-14

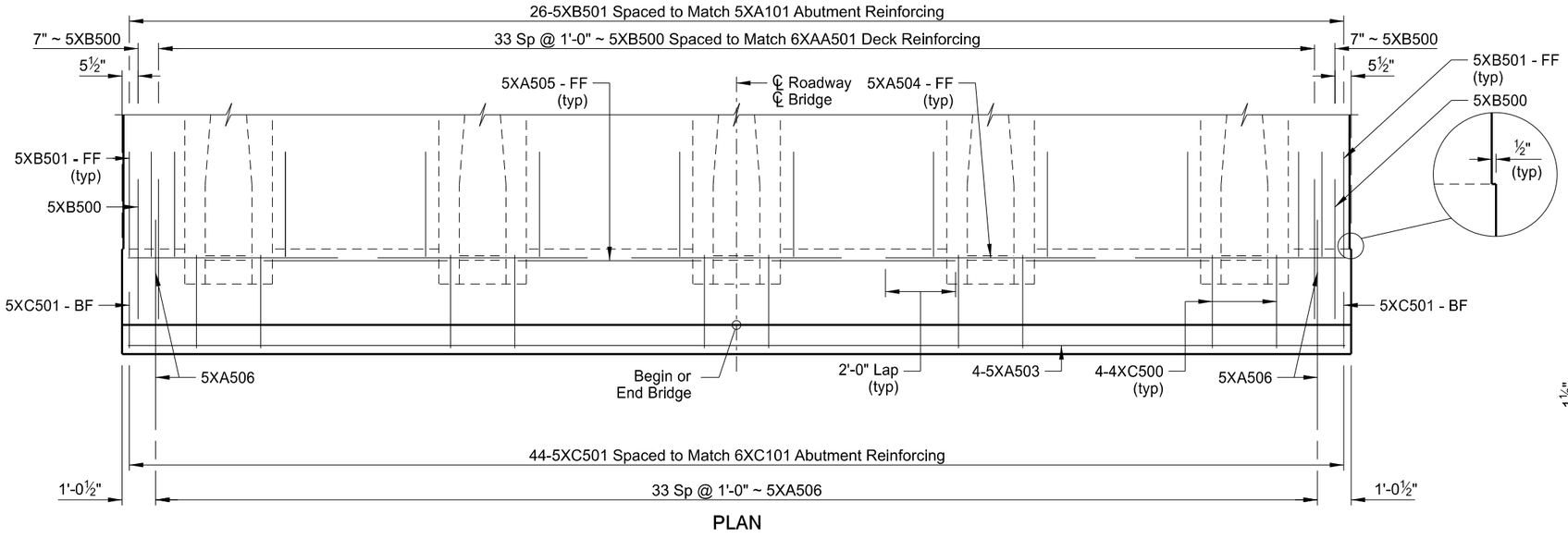
This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

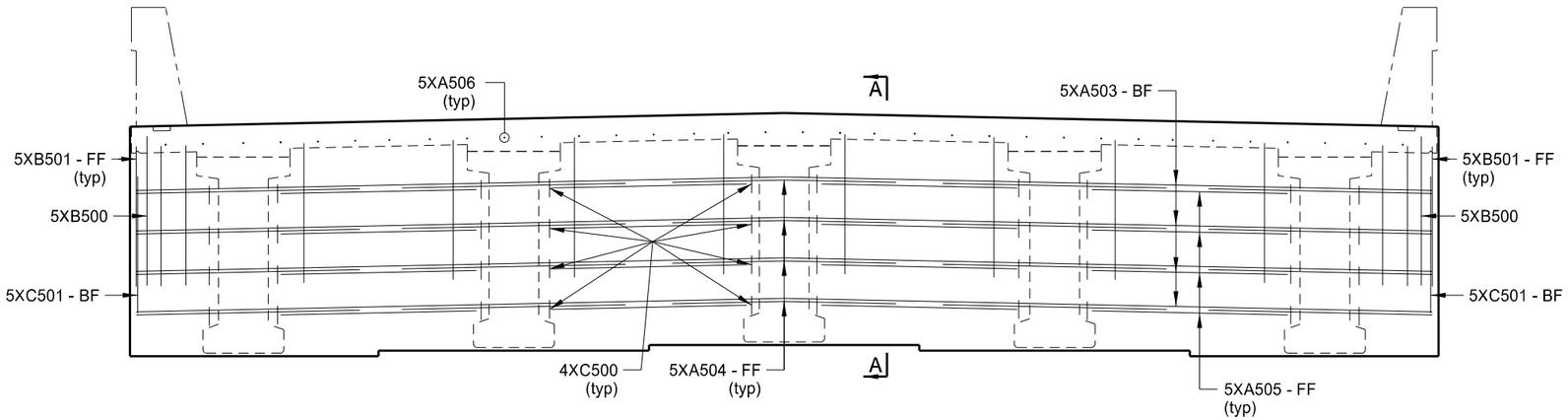
QUANTITIES
SEE DWG 94-217.146-19
I-94/PETTIBONE INTERCHANGE
PIER DIAPHRAGM DETAILS
DRAWING NO. 94-217.146-17

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	18

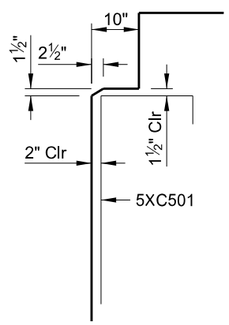


PLAN

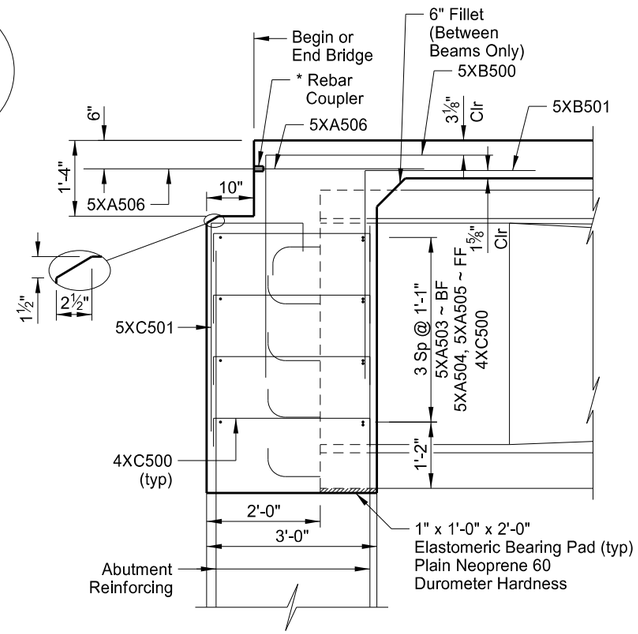


(APPROACH NOTCH NOT SHOWN)

ELEVATION



APPROACH NOTCH DETAIL



A-A

* Use mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.

NOTE:

Do not install the 5XA506 bars into the approach slab until all of the foundation fill is in place.

Position the 4'-0" leg of 5XB500 bar and the 3'-0" leg of 5XB501 bar horizontal.

NOMENCLATURE:

FF = Front Face
BF = Back Face

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES

SEE DWG 94-217.146-19

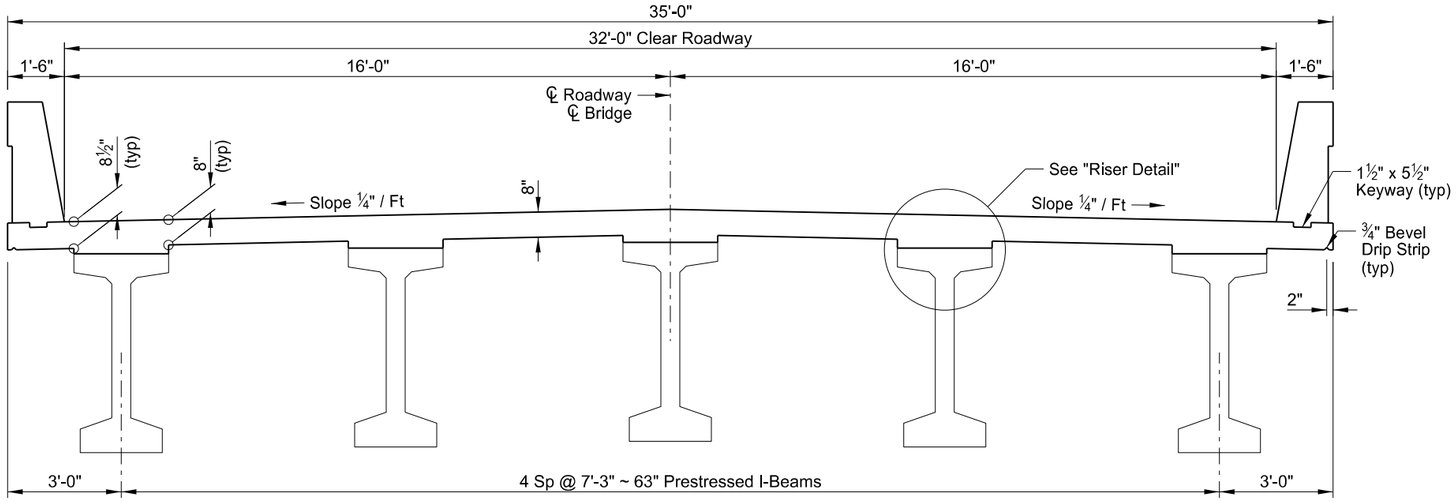
I-94/PETTIBONE INTERCHANGE

ENDWALL DETAILS

DRAWING NO. 94-217.146-18

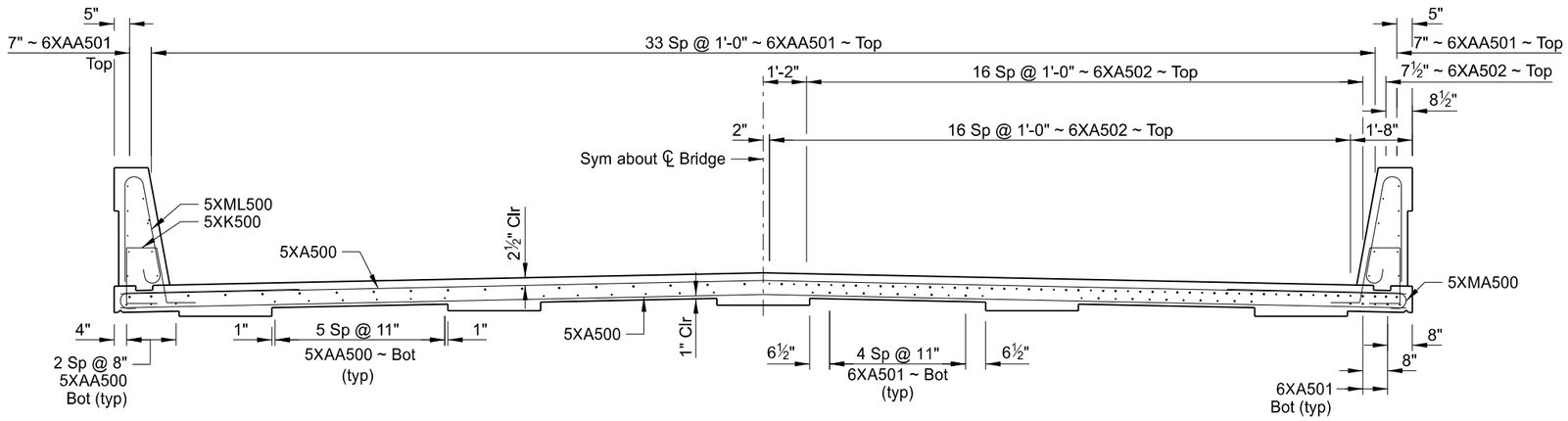
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	19



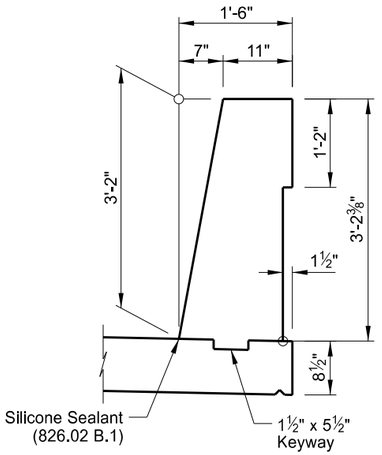
(SHOWING DIMENSIONS)

SLAB SECTION

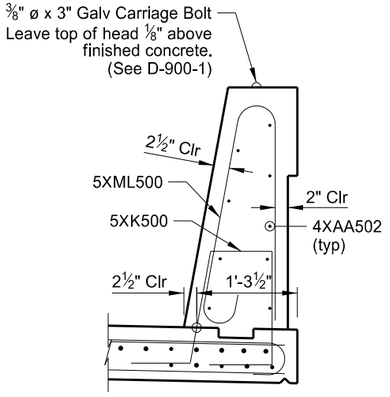


(SHOWING REINFORCING BETWEEN SUPPORTS) (SHOWING REINFORCING OVER PIERS)

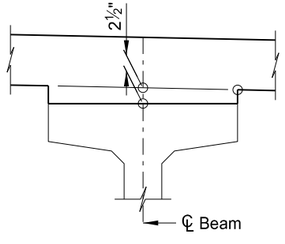
SLAB SECTION



SHOWING DIMENSIONS



SHOWING REINFORCING BARRIER DETAIL



RISER DETAIL

The 2½" dimension shown is located at the supports. The anticipated midspan riser for span 1 is 1½" and for span 2 is 3". Adjust the riser to maintain the 8" slab thickness.

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES	
BRIDGE DECK CONCRETE	298.6 CY
BRIDGE BARRIER CONCRETE	72.2 CY
REINFORCING STEEL (EPOXY)	70,103 LBS

I-94/PETTIBONE INTERCHANGE

SLAB SECTION

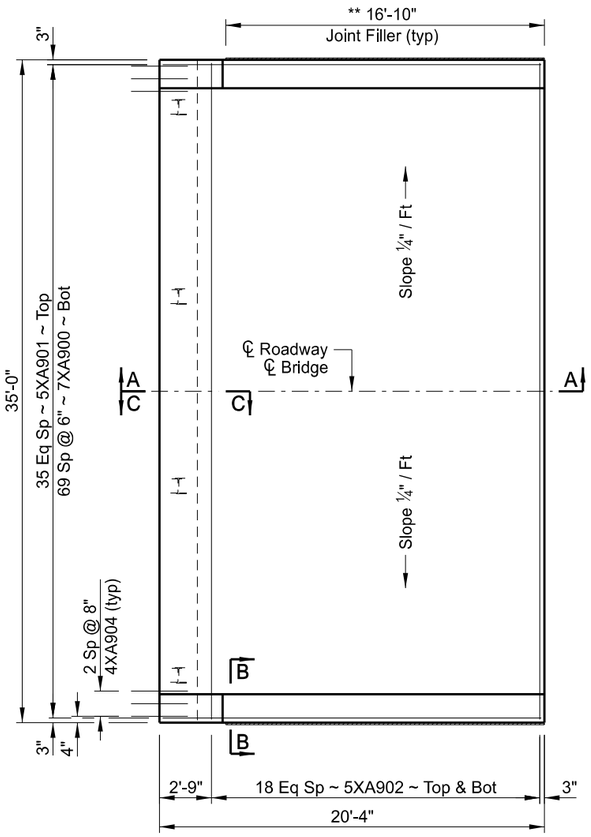
DRAWING NO.	94-217.146-19

4/7/2026 3:00:55 PM acahlin R:\SUPPORT\Teams\Bridge\Plan Prep Guide\Plan Sheets\Bridges\Prestressed Concrete I-Beam Plan Set\170BR_019_SLABSEC.dgn ATC JPG

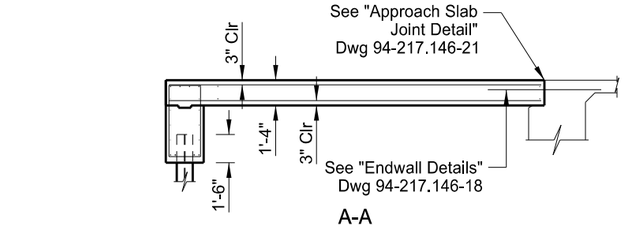
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	20

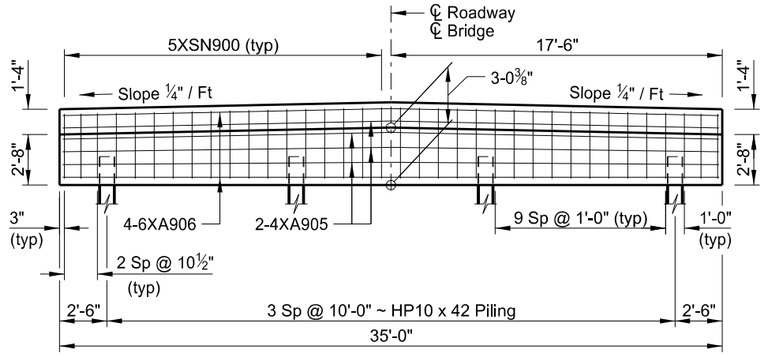
** ½" x 16" Pref Exp Joint Filler
Place between approach
slab & abutment wing (typ).



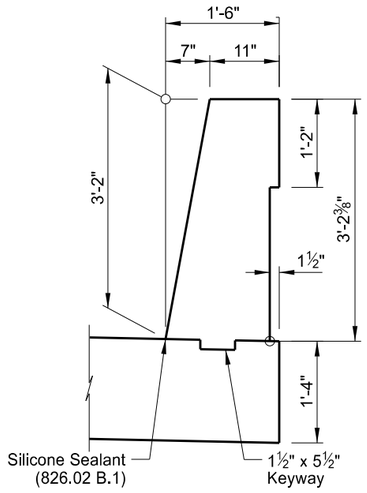
PLAN



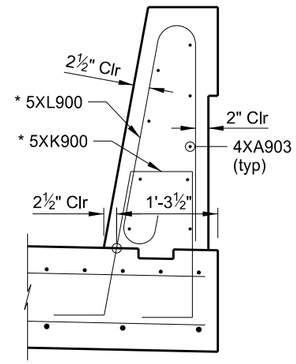
A-A



FOOTING ELEVATION



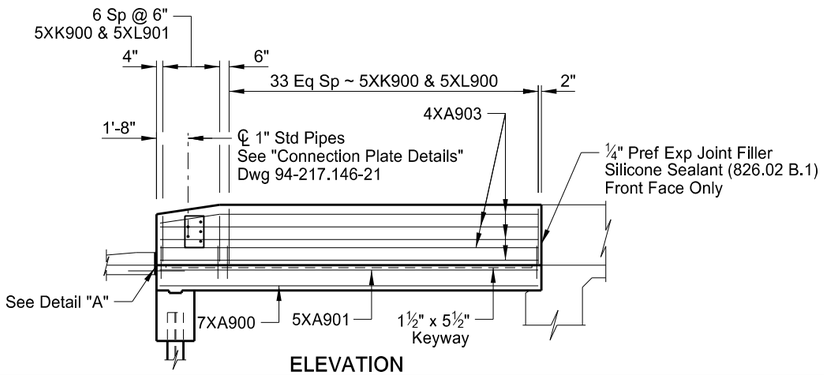
SHOWING DIMENSIONS



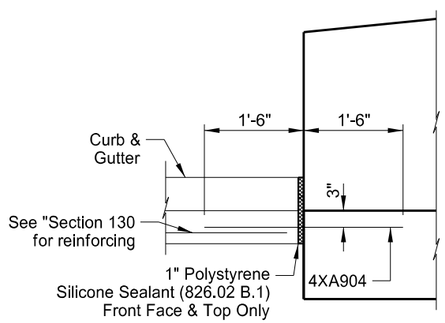
SHOWING REINFORCING

B-B

C-C



ELEVATION



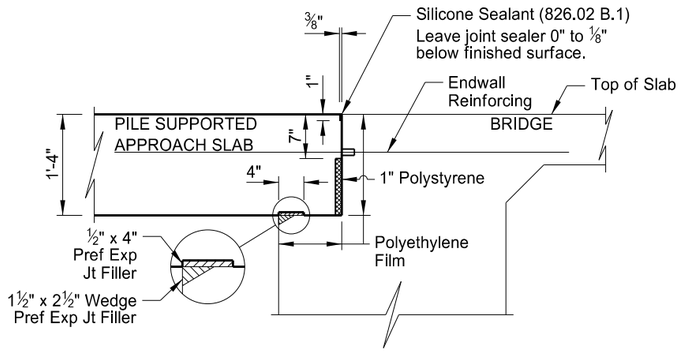
DETAIL "A"

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES
SEE DWG 94-217.146-21
I-94/PETTIBONE INTERCHANGE
APPROACH SLAB DETAILS
DRAWING NO. 94-217.146-20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	21

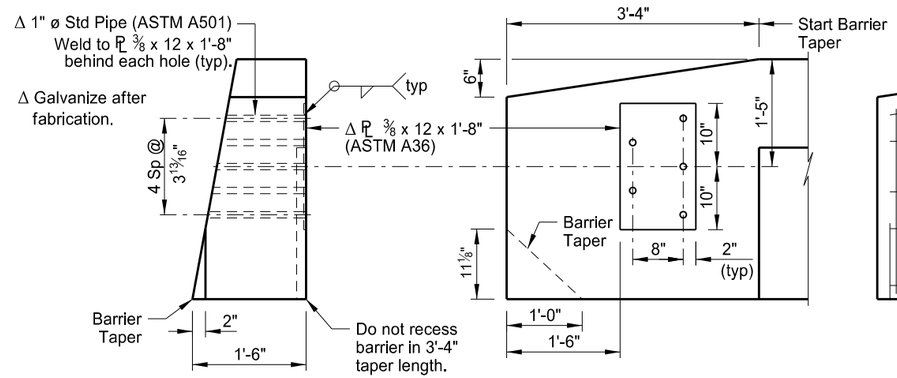


APPROACH SLAB JOINT DETAIL

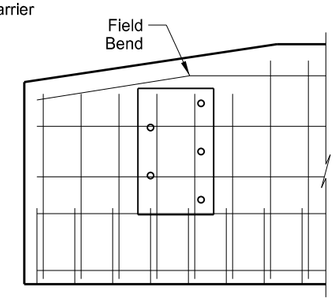
NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, connection plates and pipes, and labor required to build the approach slabs and barriers in the Approach Slab pay item. Use concrete that meets the requirements of Section 602. Provide grade 60 reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

ESTIMATED MATERIAL QUANTITIES		
BRIDGE SUBSTRUCTURE CONCRETE	7.4	CY
BRIDGE DECK CONCRETE	35.1	CY
BRIDGE BARRIER CONCRETE	5.8	CY
REINFORCING STEEL (EPOXY)	7,377	LBS

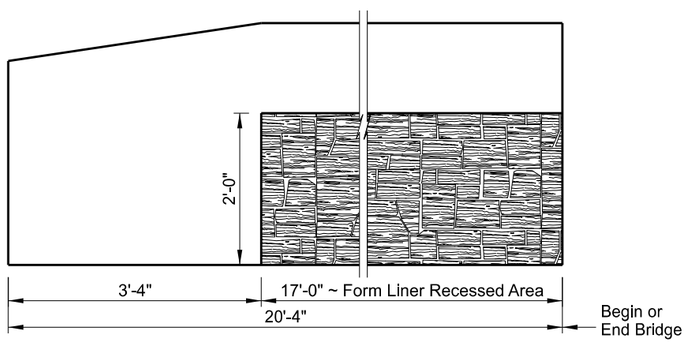


SHOWING DIMENSIONS



SHOWING REINFORCING

(SHOWING BACK FACE)
CONNECTION PLATE DETAILS



(SHOWING FORM LINER ~ BACK FACE)
BARRIER ELEVATION

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

QUANTITIES	(ONE SLAB)
APPROACH SLAB	79.1 SY

I-94/PETTIBONE INTERCHANGE

APPROACH SLAB DETAILS

DRAWING NO. 94-217.146-21

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	22

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
ABUTMENTS	5	XA100	8	38'- 3"		38'- 3"							
	5	XA101	52	7'- 2"		7'- 2"							
	5	XA102	4	17'- 7"		17'- 7"							
	6	XA103	4	17'- 7"		17'- 7"							
	5	XA104	24	18'- 7"		18'- 7"							
	6	XA105	24	18'- 7"		18'- 7"							
	6	XB100	24	8'- 6"		1'- 0"	7'- 6"						
	6	XB101	20	5'- 5"		1'- 0"	4'- 5"						
	5	XC100	28	41'- 3"		1'- 6"	38'- 3"	1'- 6"					
	6	XC101	88	17'- 6"		5'- 0"	2'- 8"	9'- 10"					
	5	XC102	88	8'- 4"		2'- 10"	2'- 8"	2'- 10"					
	5	XC103	20	5'- 6"		1'- 0"	3'- 0"	1'- 6"					
	4	XC104	96	3'- 8"		6"	2'- 8"	6"					
	5	XC105	20	23'- 9"		11'- 2"	1'- 5"	11'- 2"					
	6	XD100	8	20'- 0"		5'- 3"	14'- 9"					12	5.9
	6	XD101	24	8'- 7"		1'- 0"	7'- 7"					12	12
	5	XSA100	4	67'- 3"	7'- 0"	15'- 5"			5				
	6	XSA101	4	67'- 3"	7'- 0"	15'- 5"			5				
	5	XSC100	2	233'- 4"	1'- 5"	4'- 3"	11'- 0"	1'- 5"	13				
	5	XSC101	2	239'- 2"	1'- 5"	4'- 7"	11'- 1"	1'- 5"	13				

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
PIER	6	XA200	4	30'- 8"		30'- 8"							
	5	XA201	16	30'- 8"		30'- 8"							
	8	XA202	8	30'- 8"		30'- 8"							
	8	XA203	48	16'- 10"		16'- 10"							
	9	XA204	7	30'- 0"		30'- 0"							
	4	XA205	2	31'- 3"		31'- 3"							
	4	XA206	2	32'- 6"		32'- 6"							
	4	XA207	6	33'- 8"		33'- 8"							
	6	XA208	7	33'- 8"		33'- 8"							
	4	XC200	84	3'- 8"		6"	2'- 8"	6"					
	6	XC201	2	11'- 4"		1'- 3"	8'- 10"	1'- 3"					
	6	XC202	26	5'- 0"		1'- 3"	2'- 6"	1'- 3"					
	5	XD200	14	5'- 7"		3'- 0"	2'- 7"					12	12
	5	XN200	30	24'- 4"	2'- 8"	9'- 0"	6"					0	12
	5	XN201	39	11'- 0"	2'- 8"	2'- 4"	6"					0	12
	5	XN202	8	13'- 8"	2'- 8"	3'- 8"	6"					0	12
	5	XN203	24	13'- 10"	2'- 8"	3'- 9"	6"					0	12
	5	XN204	7	14'- 2"	2'- 8"	3'- 11"	6"					0	12
	5	XSN200	2	34'- 6"	2'- 8"	1'- 10"	6"	3'- 4"	2				

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-22

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	23

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE	5	XA500	658	34'- 8"		34'- 8"							
	6	XA501	24	22'- 0"		22'- 0"							
	6	XA502	68	52'- 6"		52'- 6"							
	5	XA503	8	34'- 9"		34'- 9"							
	5	XA504	40	6'- 0"		6'- 0"							
	5	XA505	32	5'- 3"		5'- 3"							
	5	XA506	136	3'- 0"		3'- 0"							
	6	XA507	24	6'- 0"		6'- 0"							
	6	XA508	32	5'- 3"		5'- 3"							
	4	XA509	8	4'- 9"		4'- 9"							
	5	XB500	72	8'- 0"		4'- 0"	4'- 0"						
	5	XB501	52	6'- 9"		3'- 9"	3'- 0"						
	4	XC500	112	3'- 8"		6"	2'- 8"	6"					
	5	XC501	88	5'- 9"		6"	1'- 7"	3'- 8"					
	5	XG500	20	16'- 0"	5'- 8"	2'- 8"	5'- 8"	1'- 0"				12	0
	5	XK500	528	5'- 6"	1'- 6"	10"			1'- 0"		10"	2.2	12
	5	XL500	528	6'- 7"		2'- 7"	9"	2'- 8"		2.375		2.2	12
	5	XMA500	676	5'- 5"		4'- 10"							
	5	XAA500	30	265'- 0"		60'- 0"	3'- 0"	25'- 0"	4		253'- 0"		
	6	XAA501	36	268'- 0"		60'- 0"	3'- 9"	28'- 0"	4		253'- 0"		
	4	XAA502	18	263'- 0"		60'- 0"	2'- 6"	23'- 0"	4		253'- 0"		

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-23

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	24

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

APPROACH SLAB (ONE SLAB)

LOCA-TION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
	7	XA900	70	20'- 0"		20'- 0"							
	5	XA901	36	20'- 0"		20'- 0"							
	5	XA902	38	34'- 8"		34'- 8"							
	4	XA903	18	20'- 0"		20'- 0"							
	4	XA904	6	3'- 0"		3'- 0"							
	4	XA905	8	34'- 8"		34'- 8"							
	6	XA906	8	34'- 8"		34'- 8"							
	5	XK900	82	6'- 6"	2'- 0"	10"			1'- 1"		10"	2.2	12
	5	XL900	68	6'- 7"		2'- 7"	9"	2'- 8"		2.375		2.2	12
	5	XL901	14	5'- 7"		2'- 0"	11"	2'- 1"		3		2.2	12
	5	XSN900	2	207'- 0"	1'- 8"	3'- 5"	6"	3'- 9"	17				

LOCA-TION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

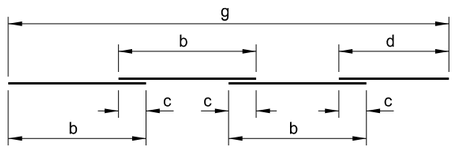
I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-24

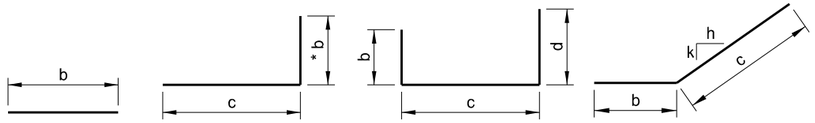
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	170	25

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections



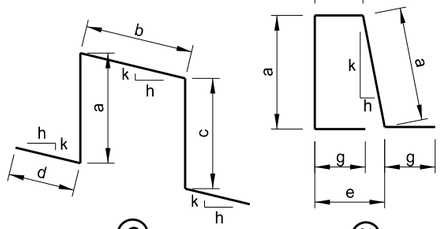
c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d

AA



A B C D

* b = Vertical Leg for
XB500 and XB501



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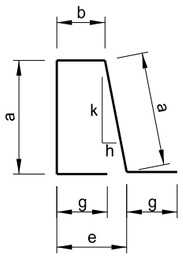

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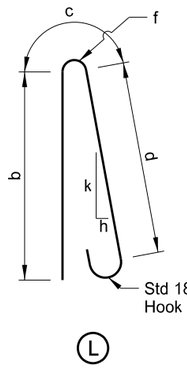

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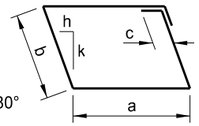

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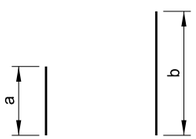
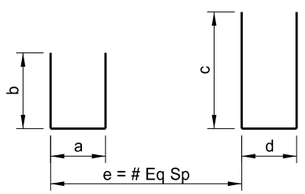


SA



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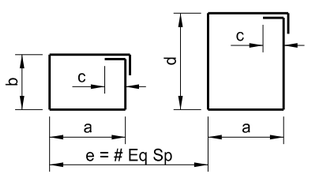
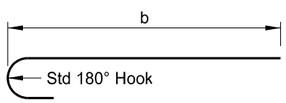


SN



MA

NOTES:

1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
4. Turn adjacent "AA" bars end for end so that the splice locations are staggered.
5. The "f" dimension indicates the inside radius unless otherwise noted.
6. An "X" preceding a bar designation indicates an epoxy coated bar.
7. Reinforcing steel bid items do not include bar list quantity of approach slab reinforcing steel. Include the approach slab bar list quantity in the approach slab pay items.

This drawing is preliminary and not for construction or implementation purposes.

PRELIMINARY

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO.	94-217.146-25