

TBM #21: Railroad Spike in power pole on North side of U.S. Route 24, Sta. 1862+04, Elev. 637.32.

Existing Structure: SN 038-0032. Three span reinforced concrete slab, 35'-8" Out to Out, and continuous steel I beams (non-composite). Reinforced concrete spill through abutments and pier caps on precast concrete piles. Remove and replace superstructure, replace abutments and widen piers to provide 40'-0" clear between parapets. Reconstruct end slopes with stone riprap. One lane of traffic is to be maintained at all times using staged construction. No salvage.

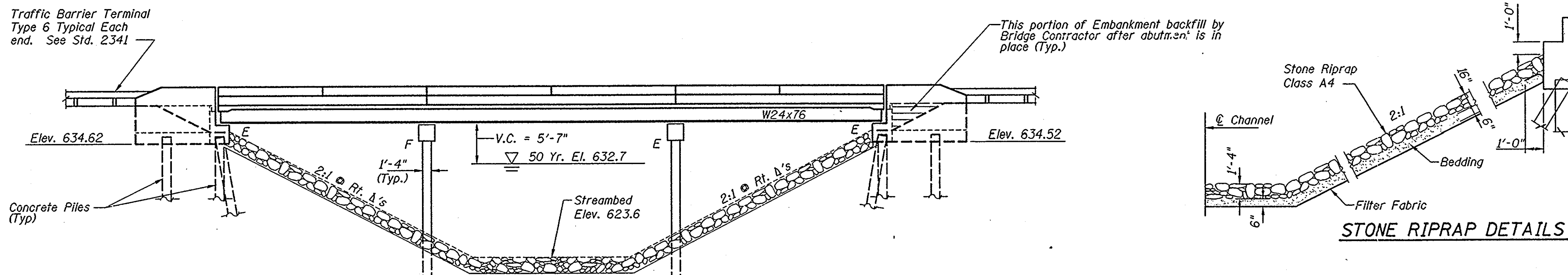
STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

ROUTE	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAP 317	21BR	IROQUOIS	255	103

Bridge Sheet 1 of 19 Sheets.

GENERAL NOTES

See Bridge Sheet 2 of 19 for General Notes

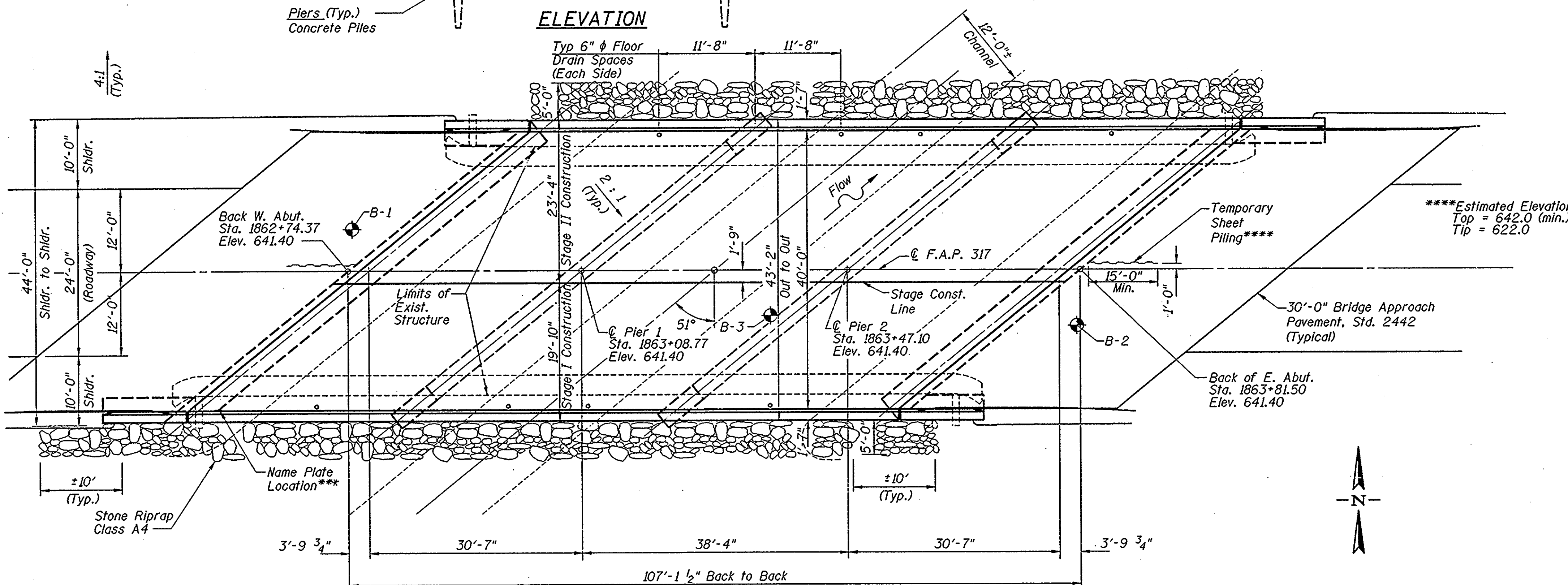


STONE RIPRAP DETAILS

TOTAL BILL OF MATERIAL

ITEM	UNIT	SUPER	SUB	TOTAL
Concrete Superstructure	Cu. Yd.	133.8		133.8
Concrete Structures	Cu. Yd.		115.0	115.0
Reinforcement Bars, Epoxy Coated	Pounds	32,050	10,230	42,280
Name Plates	Each	1		1
Floor Drains	Each	8		8
Furnishing Concrete Piles	Foot		1564	1564
Driving Concrete Piles	Foot		1564	1564
Test Piles, Concrete	Each		1	1
Temporary Sheet Piling	Sq. Ft.		600	600
Structure Excavation	Cu. Yd.		293	293
Removal of Existing Superstructures	Each		1	1
Structural Steel	L.S.	1		1
Elastomeric Bearing Assembly, Type I	Each		18	18
Neoprene Expansion Joint (2")	Foot	132		132
Stone Riprap, Class A4	Sq. Yd.		690	690
Filter Fabric for use with Riprap	Sq. Yd.		690	690
Concrete Removal	Cu. Yd.		68.1	68.1
Bar Splicers	Each	346	36	382
Struct. Excav. Prot. for 2" Bearings	Sq. Ft.		4	4
Protective Coat	Sq. Yd.	84	16	100
Bridge Deck Grooving	Sq. Yd.	430		430
Bridge Seat Sealer	Sq. Ft.		360	360

\* See Special Provisions  
\*\* Quantity is for top & inside of parapet only. Do not use on deck.



PLAN

EXISTING PROFILE GRADE  
(along & F.A.P. 317)

SEISMIC DATA

SPC = A  
A = 4.3%  
S = 1.2

DESIGN SPECIFICATIONS

1992 AASHTO & 1993 Interims  
1983 Seismic Retrofitting Guidelines for Highway Bridges FHWA/RD-83/007

DESIGN STRESSES (NEW CONSTR.)

f'c = 3,500 p.s.i.  
fy = 60,000 p.s.i. (Reinforcement)  
Fy = 36,000 p.s.i. (Structural Steel - M270-GR36)  
fo = 800 p.s.i. (existing substructure)  
fs = 20,000 p.s.i. (existing reinforcement)

LOADING HS 20-44

Allow 25 lbs./sq.ft. for future wearing surface.

STATION 1863+27.94  
REBUILT 1993 BY  
STATE OF ILLINOIS  
F.A.P. RT. 317 SEC. 21BR  
F.C. PROJECT  
LOADING HS20  
STR. NO. 038-0032

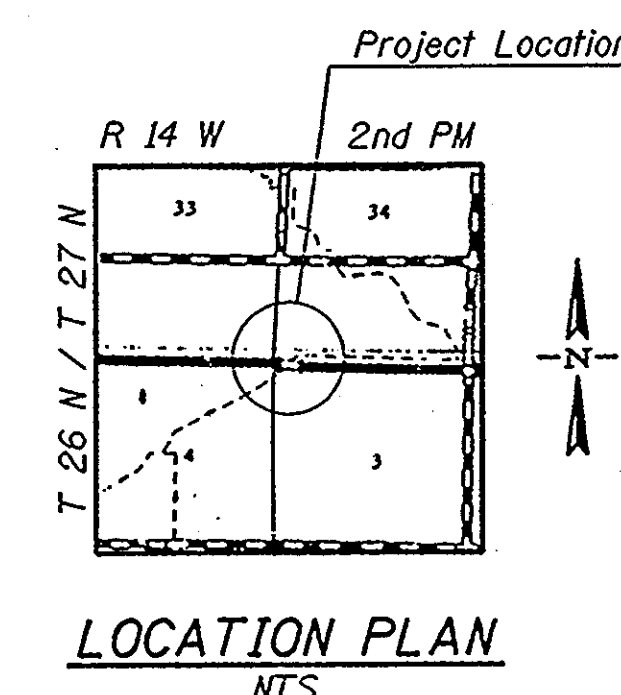
NAME PLATE

See Std. 2113

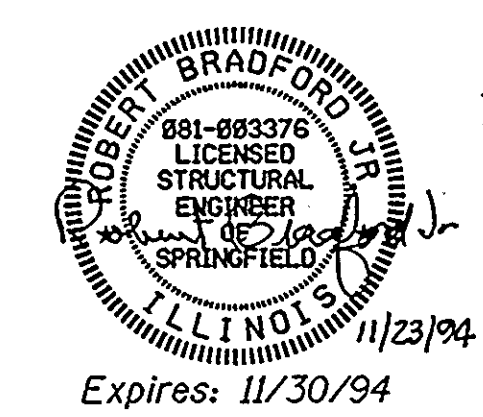
\*\*\*Clean and Relocate existing Name Plate next to the new name plate. (Cost incidental to Name Plates)

WATERWAY INFORMATION TABLE

Drainage Area: 14.1 Sq. Miles		Low Grade Elev. = 640.81 @ Sta. 1860+00							
Flood Year	Freq. Year	Q C.F.S.	Opening, S.F. Exist.	Prop.	Nat. H.W.E. Exist.	Prop.	Headwater El. Exist.	Prop.	
Design	50	1010	248	248	632.7	0	0	632.4	632.4
Base	100	1130	269	269	633.2	0	0	632.9	632.9
Max. Calc.	500	1410	313	313	634.2	0	0	633.9	633.9



LOCATION PLAN  
NTS



APPROVED

STRUCTURAL AGENCY ONLY

ILLINOIS DEPARTMENT OF TRANSPORTATION

GENERAL PLAN & ELEVATION

FAP ROUTE 317 (US RTE. 24) OVER TRIBUTARY TO SPRING CREEK, SEC 21BR, IROQUOIS COUNTY STA. 1863+27.94, S.N. 038-0032

REVISIONS	
NAME	DATE

SCALE: VERT. HORIZ.  
DATE: 7/25/94

DRAWN BY: BAB/MML  
DESIGNED BY: BRADFORD  
CHECKED BY: BANE



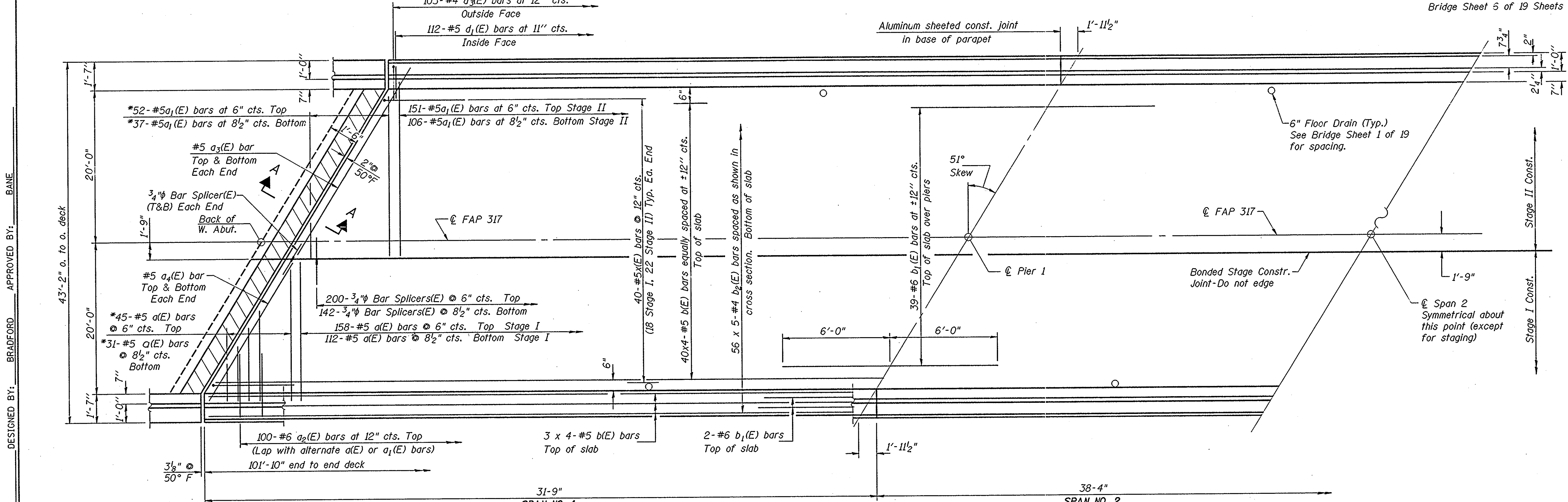
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93116GPE-10

DRAWN BY: BAB/MML CHECKED BY: BANE DESIGNED BY: BRADFORD APPROVED BY: BANE

STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

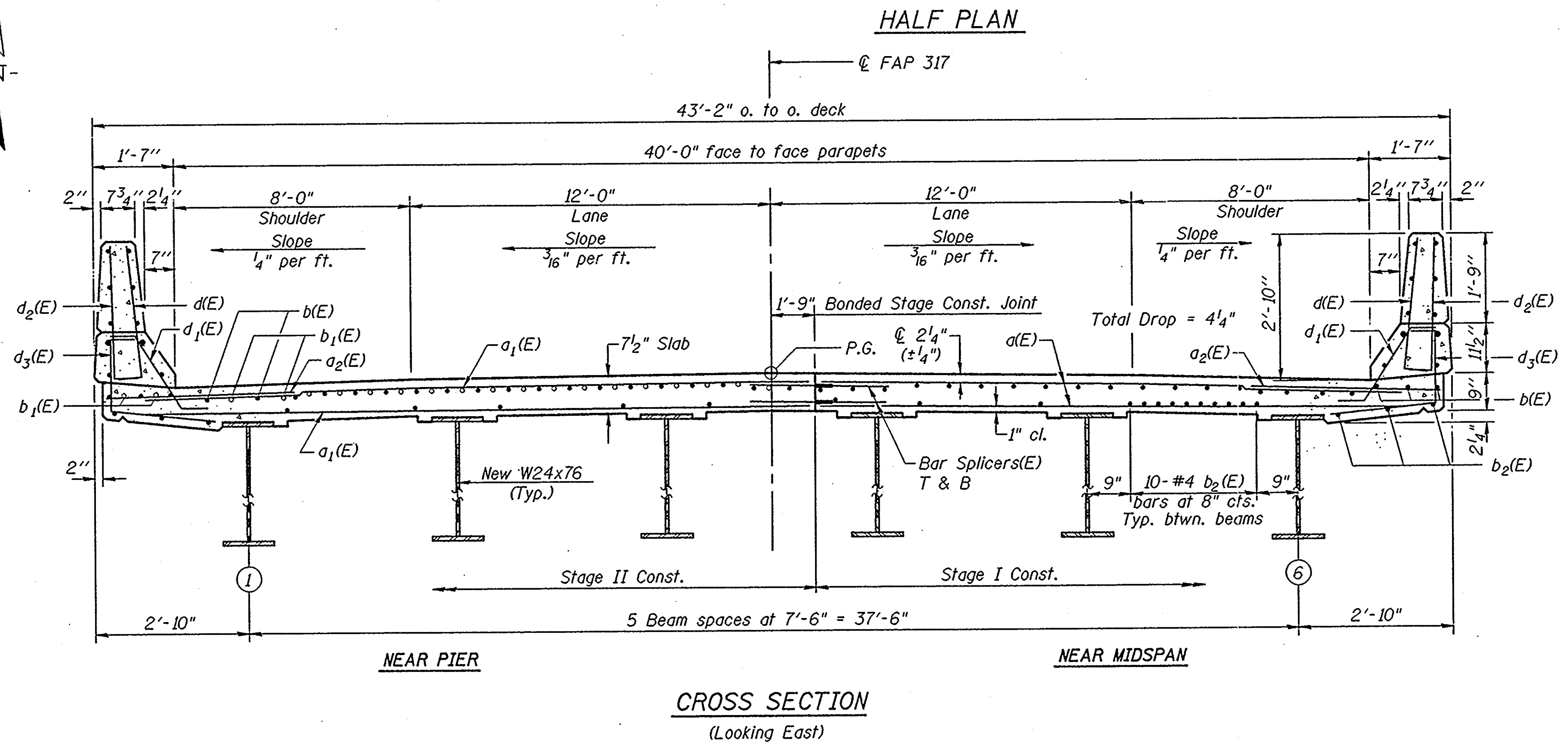
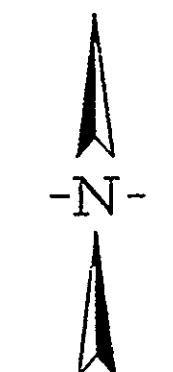
ROUTE	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAP 317	21BR	IROQUOIS	255	113
STA.	TO STA.			
FED. ROAD DIST. NO.	ILLINOIS FED. AID PROJECT			

Bridge Sheet 5 of 19 Sheets



DESIGNED BY: BRADFORD APPROVED BY: BANE  
CHECKED BY: LANDREY  
DRAWN BY: BANE

\* Order a(E) & a<sub>1</sub>(E) bars full length. Cut to fit skew and use remainder of bars in opposite end.



Notes: See Bridge Sheet 7 of 19 for superstructure details and Bill of Material.  
Reinforcement bars designated (E) shall be epoxy coated.  
Bars indicated thus 20 x 3-#5 etc. indicates 20 lines of bars with 3 lengths per line.  
See Bridge Sheet 7 of 19 for parapet reinforcement.  
See Bridge Sheet 7 of 19 for Section A-A.  
See Bridge Sheet 9 of 19 for Bar Splicer Details.  
Hatched areas to be poured after superstructure forms have been removed. Quantity of concrete included with Concrete Superstructure.

Minimum Bar Laps

#4	1'-4"
#5	1'-8"

REVISIONS	
NAME	DATE

ILLINOIS DEPARTMENT OF TRANSPORTATION  
**SUPERSTRUCTURE**  
FAP ROUTE 317 (US RTE. 24) OVER TRIBUTARY TO SPRING CREEK, SEC. 21BR, IROQUOIS COUNTY STA. 1863+27.94, S.N. 038-0032

SCALE: VERT. HORIZ.  
DATE: 6/29/94

DRAWN BY: LANDREY  
DESIGNED BY: BRADFORD  
CHECKED BY: BANE

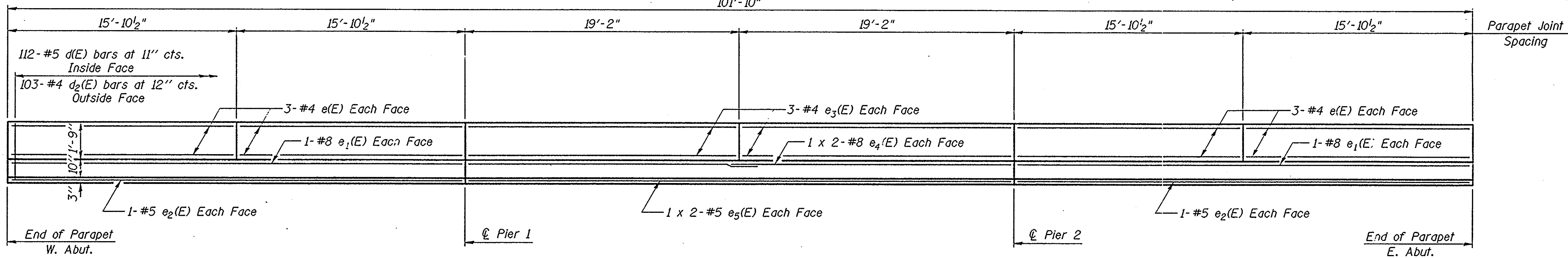
GREENE & BRADFORD, INC.  
OF SPRINGFIELD  
CONSULTING ENGINEERS  
2008 CONSTITUTION DRIVE  
SPRINGFIELD, ILLINOIS 62707  
TEL: 217-752-8844

COMPUTER FILE NO.  
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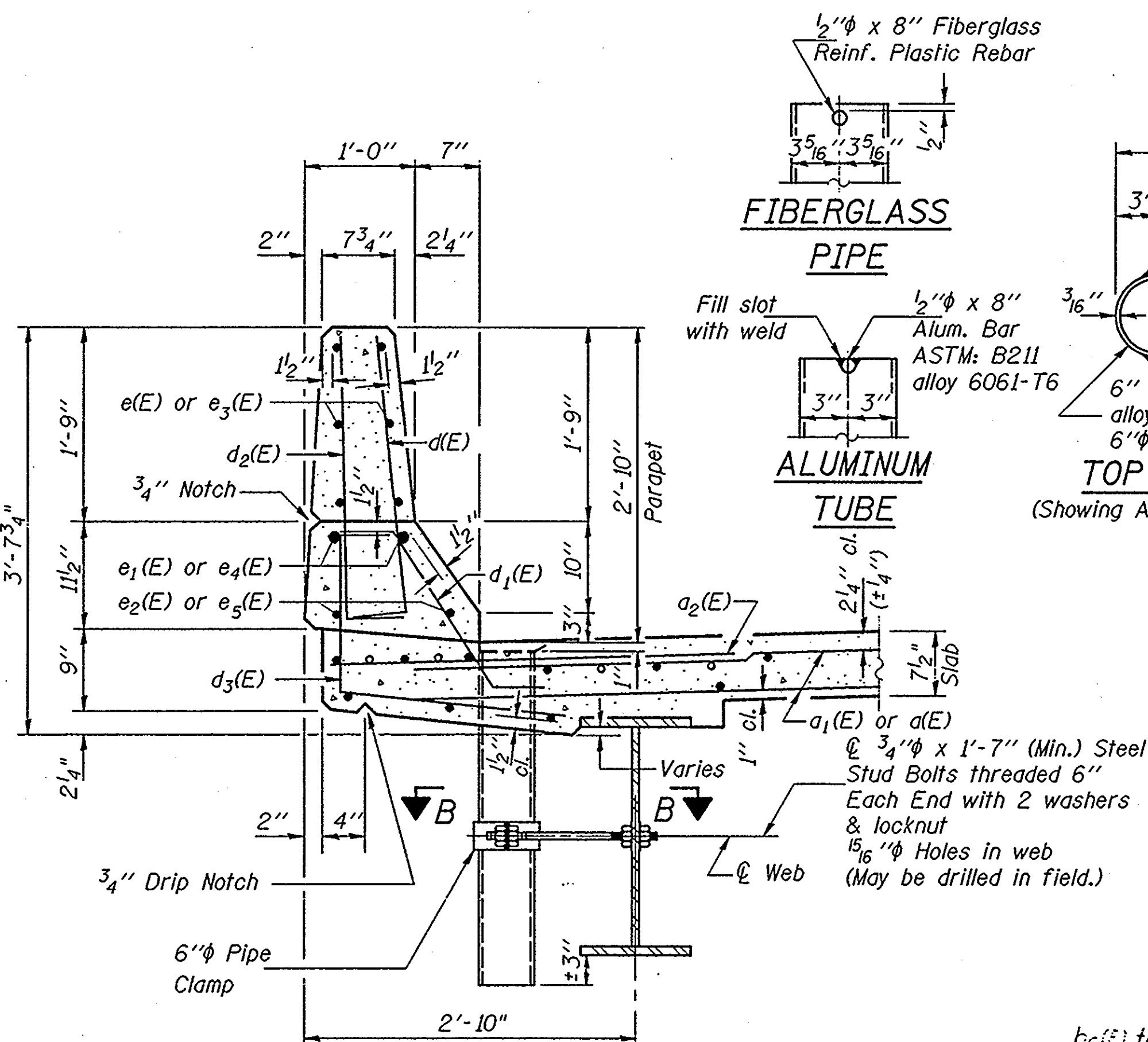


STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

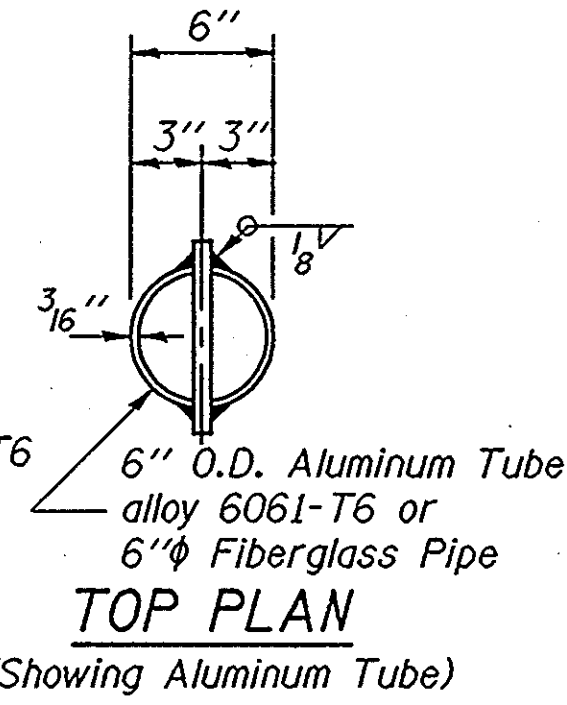
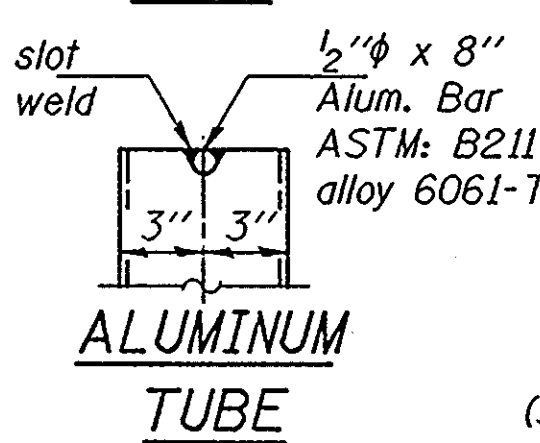
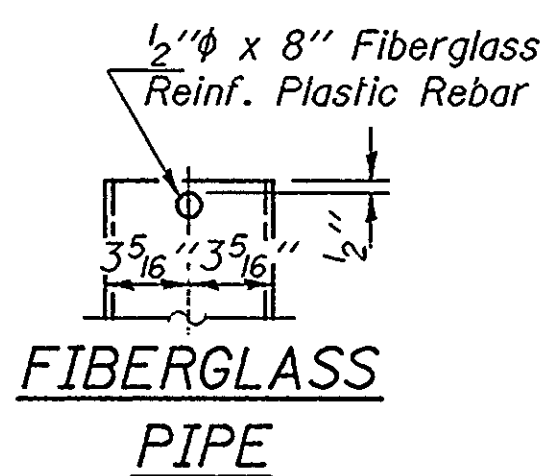
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FAP 317	21SR	IROQUOIS	255	114
TO STA.		ILLINOIS FED. HD PROJECT		
Bridge Sheet 7 of 19 Sheets				



INSIDE ELEVATION OF PARAPET

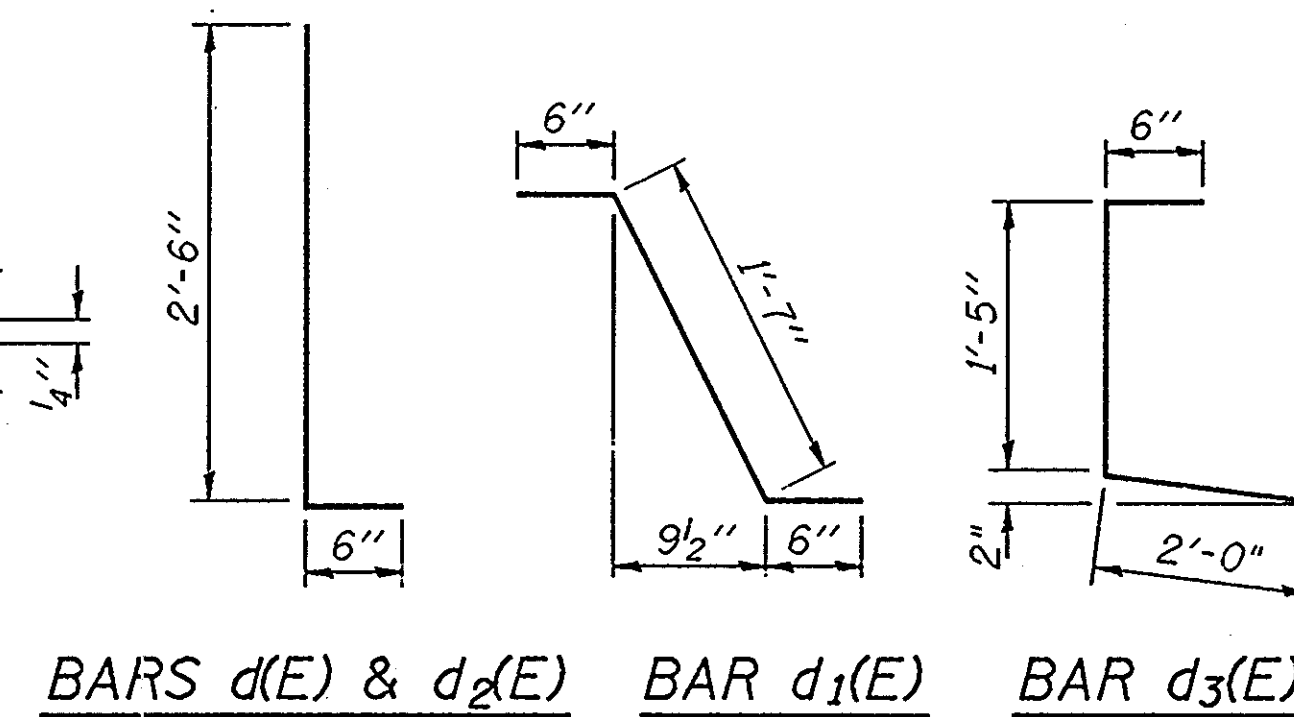


SECTION THRU PARAPET



PARAPET JOINT DETAILS

Notes:  
The exterior surfaces of the Floor Drain shall be painted with the finish coat of the paint system specified for Structural Steel. The exterior surfaces of the drain shall be cleaned and given a washcoat pretreatment in accordance with Steel Structures Painting Council's Spec. SSPC-SPI & SSPC-Paint 27 prior to painting.  
Fiberglass pipe shall conform to ASTM: D2996, with short-time rupture strength hoop tensile stress of 30,000 p.s.i. minimum. The surface of the Fiberglass pipe shall be free of bond inhibiting agents.  
For details of expansion joint see sheet #8 of 19.



MIN. BAR LAP

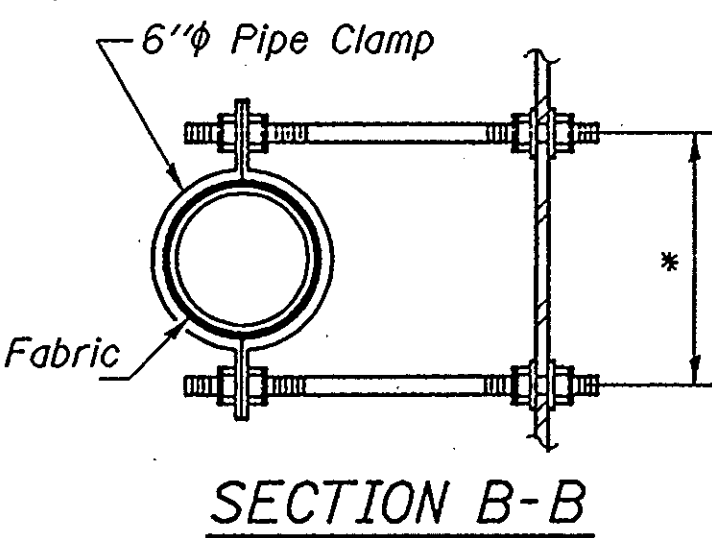
#5 bar 1'-8"  
#8 bar 3'-8"

SUPERSTRUCTURE  
BILL OF MATERIAL

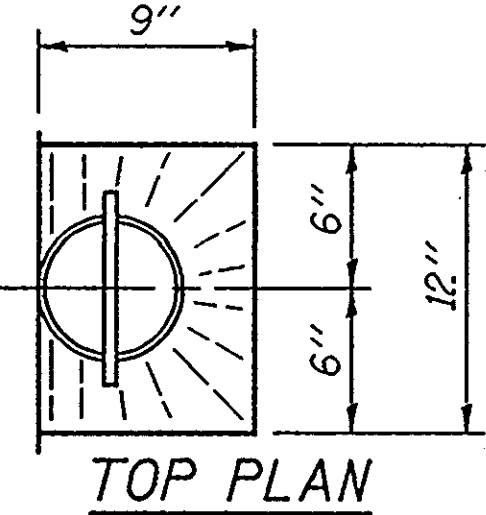
Bar	No.	Size	Length	Shape
a(E)	346	#5	19'-0"	—
a <sub>1</sub> (E)	346	#5	22'-6"	—
a <sub>2</sub> (E)	200	#6	4'-0"	—
a <sub>3</sub> (E)	6	#5	29'-3"	—
a <sub>4</sub> (E)	6	#5	23'-6"	—
b(E)	184	#5	26'-9"	—
b <sub>1</sub> (E)	86	#6	12'-0"	—
b <sub>2</sub> (E)	280	#4	21'-6"	—
d(E)	224	#5	3'-0"	┌
d <sub>1</sub> (E)	224	#5	2'-7"	└
d <sub>2</sub> (E)	206	#4	3'-0"	┌
d <sub>3</sub> (E)	206	#4	3'-11"	└
e(E)	48	#4	15'-7"	—
e <sub>1</sub> (E)	8	#8	31'-6"	—
e <sub>2</sub> (E)	8	#5	31'-6"	—
e <sub>3</sub> (E)	24	#4	18'-11"	—
e <sub>4</sub> (E)	8	#8	20'-9"	—
e <sub>5</sub> (E)	8	#5	19'-10"	—
x(E)	80	#5	4'-1"	┌
Reinforcement Bars, Epoxy Coated		Lbs.	32,050	
Concrete Superstructure		Cu. Yds.	133.8	

Reinforcement bars designated (E) shall be epoxy coated.  
Bars indicated thus 1 x 2-#5 etc. indicates 1 line of bars with 2 lengths per line.

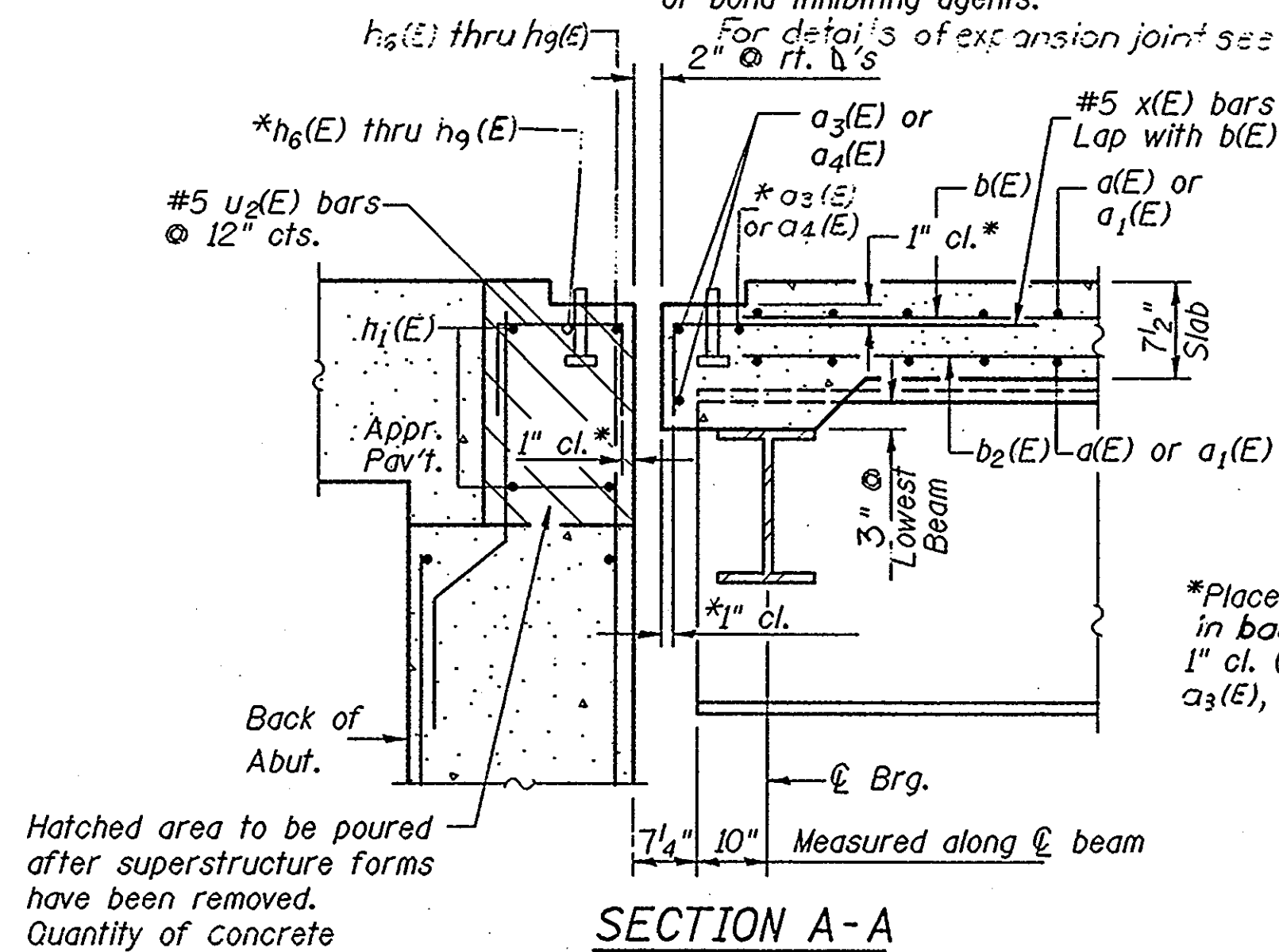
\* Dimension as required by Pipe Clamp



SECTION B-B



TOP PLAN



SECTION A-A

Hatched area to be poured after superstructure forms have been removed. Quantity of concrete included with Concrete Superstructure.

\*Place a<sub>3</sub>(E), a<sub>4</sub>(E) and h<sub>6</sub>(E) thru h<sub>9</sub>(E) bars in back of anchor bolt as shown in req'd to maintain 1" cl. (+0-1/8"). Anchor bolts should be tied to a<sub>3</sub>(E), a<sub>4</sub>(E) and h<sub>6</sub>(E) thru h<sub>9</sub>(E) bars.

REVISIONS	
NAME	DATE

SCALE: VERT. HORIZ.  
DATE: 7/25/94

ILLINOIS DEPARTMENT OF TRANSPORTATION  
**SUPERSTRUCTURE**  
FAP ROUTE 317 (US RTE 24) OVER TRIBUTARY TO SPRING CREEK, SEC. 21BR, IROQUOIS COUNTY STA. 1863+27.94, S.N. 038-0032

DRAWN BY: LANDREY  
DESIGNED BY: BRADFORD  
CHECKED BY: BANE

GREENE & BRADFORD, INC.  
OF SPRINGFIELD  
CONSULTING ENGINEERS  
300 CONVENT ROAD  
SPRINGFIELD, ILLINOIS 62767  
TEL: 217-243-4444

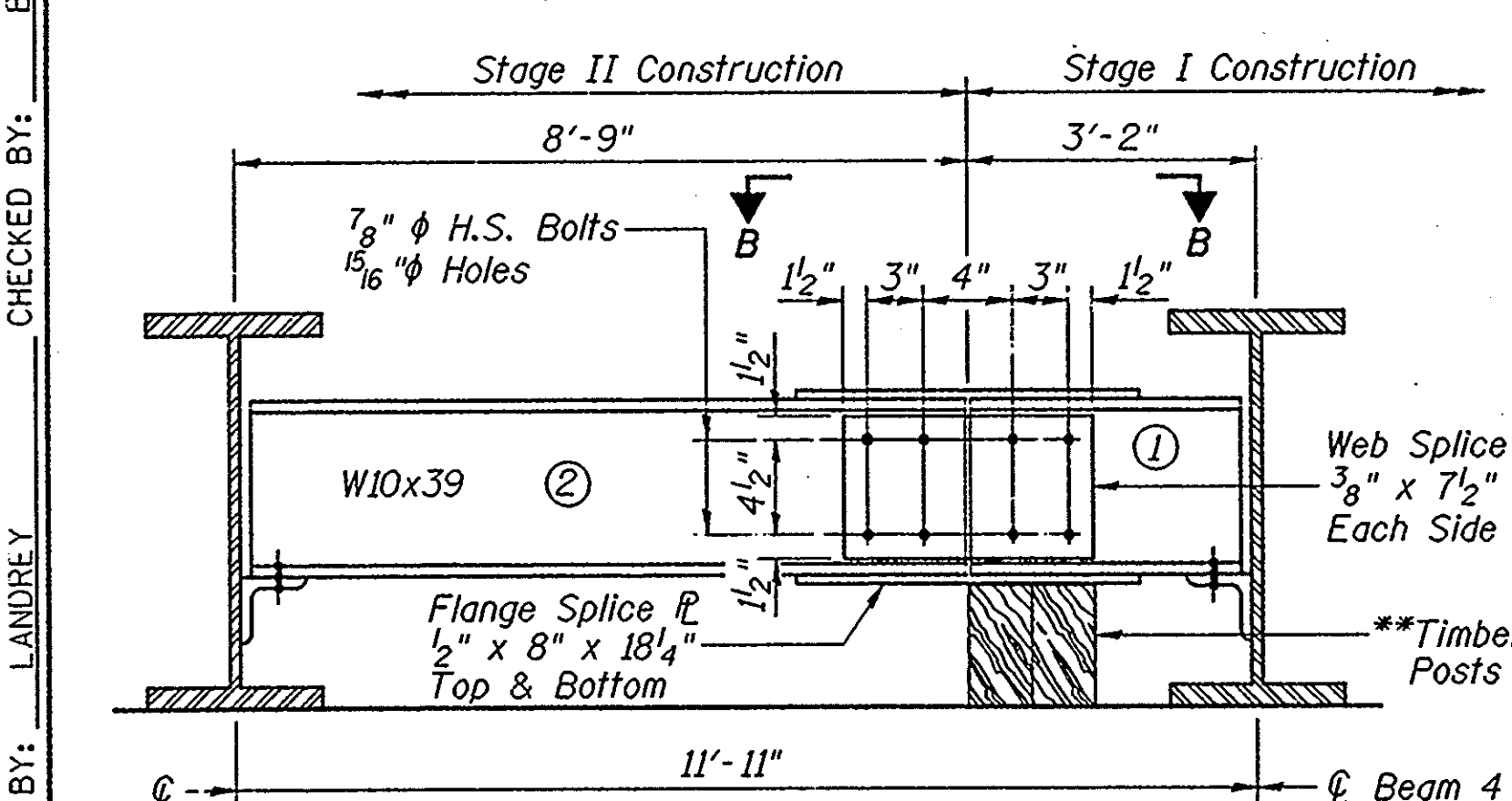
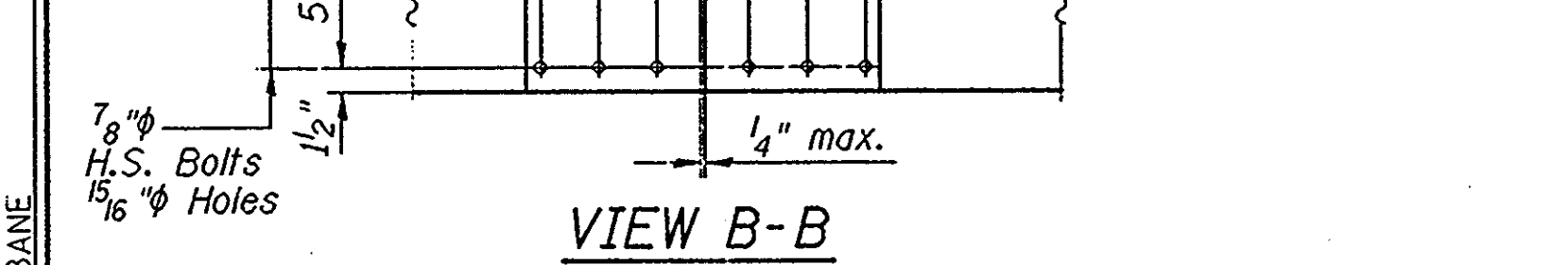
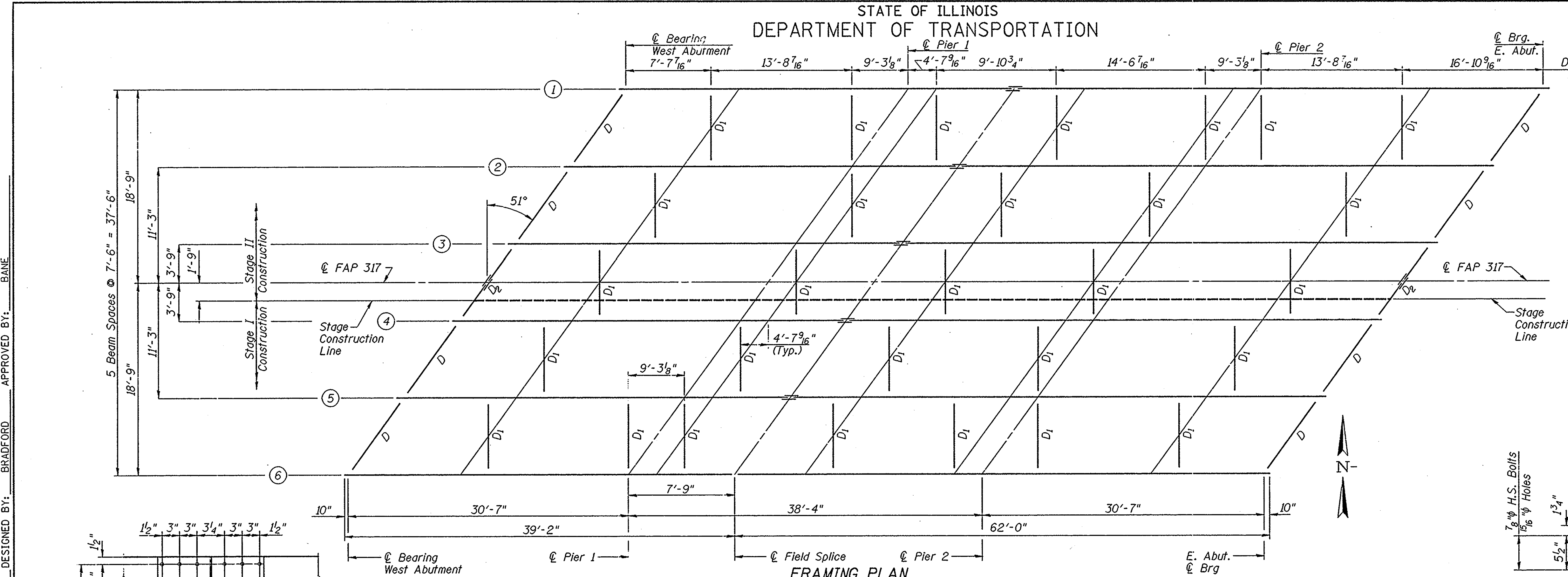
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STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

ROUTE	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAP 317	21BR	IROQUOIS	255	117
STA.	TO STA.		ILLINOIS FED. AID PROJECT	
FED. ROAD DIST. NO.	ILLINOIS		FED. AID PROJECT	

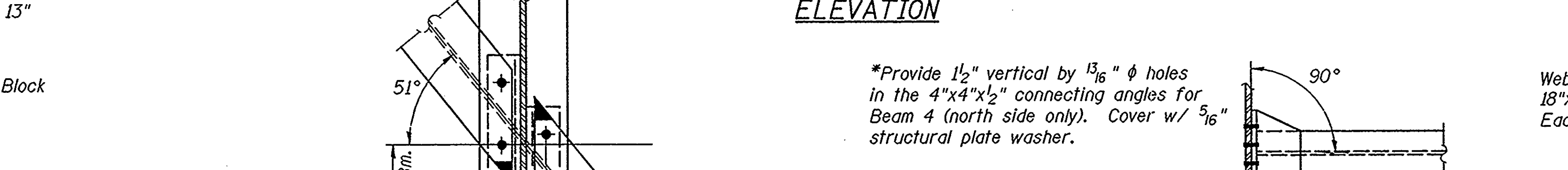
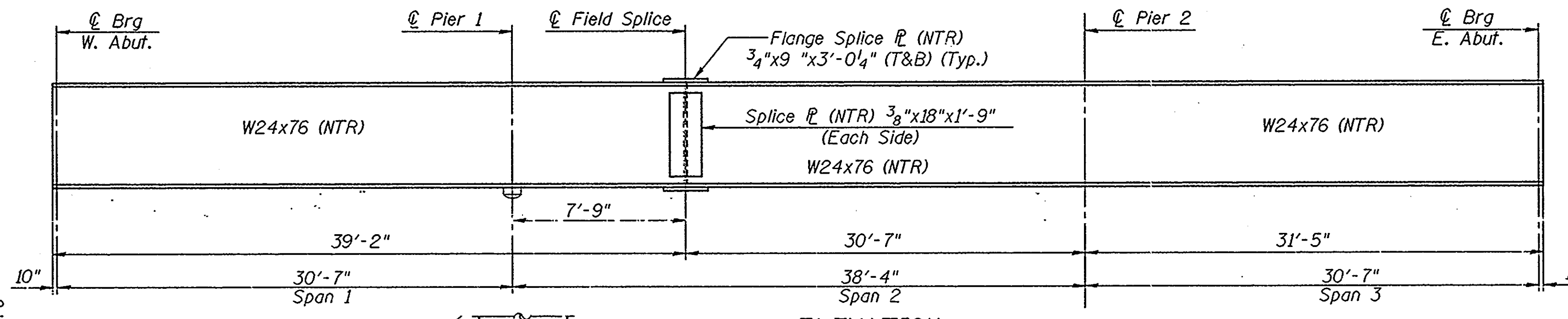
Bridge Sheet 10 of 19 Sheets

**NOTE:**  
The following material is subject to Notch Toughness Requirement - Zone 2:  
1. All W24x76 Beams  
2. All splice plates



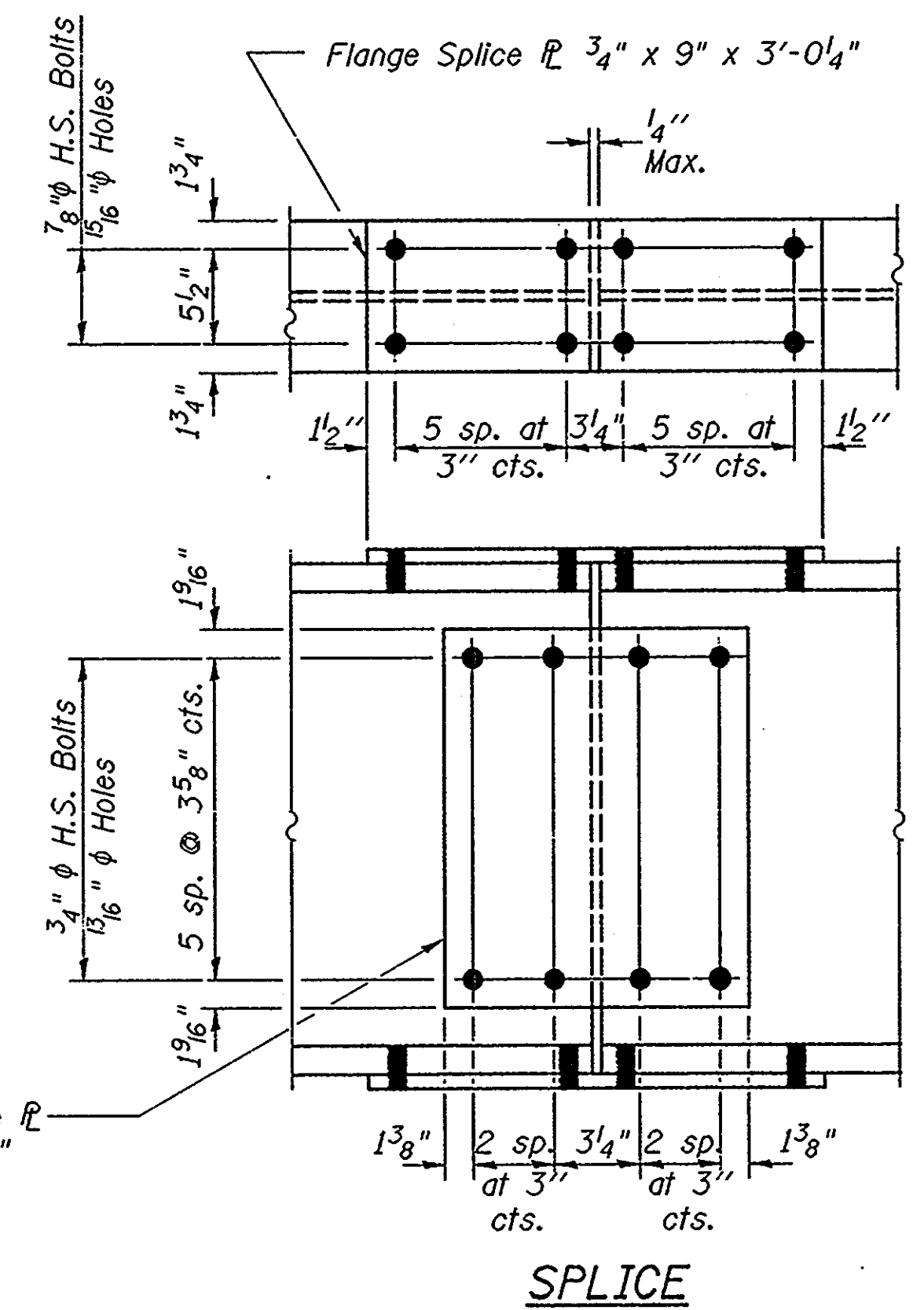
**DIAPHRAGM D<sub>2</sub>**  
2 Required (Looking East)  
For details of connections to beams see diaphragm D.

- DIAPHRAGM D<sub>2</sub> CONSTRUCTION SEQUENCE**
- 1.) Order Diaphragm D<sub>2</sub> in two sections with lengths of 8'-8 1/4" and 3'-1 1/4".
  - 2.) Attach section ① of Diaphragm to Beam 4 and top flange splice R during Stage I Construction.
  - 3.) Place Timber Block Posts between section ① of diaphragm and abutment bearing seat.
  - 4.) Attach section ② of diaphragm to both Beam 3 and top flange splice R during Stage II Construction.
  - 5.) Attach web splice plates to sections ① and ② of diaphragms.
  - 6.) Remove Timber Block Posts.
  - 7.) Attach bottom flange splice plate to sections ① and ② of diaphragms.



**DIAPHRAGM D<sub>1</sub>**  
8 Required

Note: Two hardened washers shall be required over all oversized holes for diaphragms.



ILLINOIS DEPARTMENT OF TRANSPORTATION  
**STRUCTURAL DETAILS**  
FAP ROUTE 317 (US RTE. 24) OVER TRIBUTARY TO SPRING CREEK, SEC. 21BR, IROQUOIS COUNTY STA. 1863+27.94, S.N. 038-0032

REVISIONS	
NAME	DATE
DIAPHRAM SPACING	5/4/94
REVISE D & D2	4/7/95

SCALE: VERT. HORIZ.  
DATE: 4/7/95-MML

DESIGNED BY: BRADFORD  
CHECKED BY: BANE

GREENE & BRADFORD, INC.  
CONSULTING ENGINEERS  
OF SPRINGFIELD  
304 CONSTRUCTION DRIVE  
SPRINGFIELD, ILLINOIS 62707  
(217) 752-2244

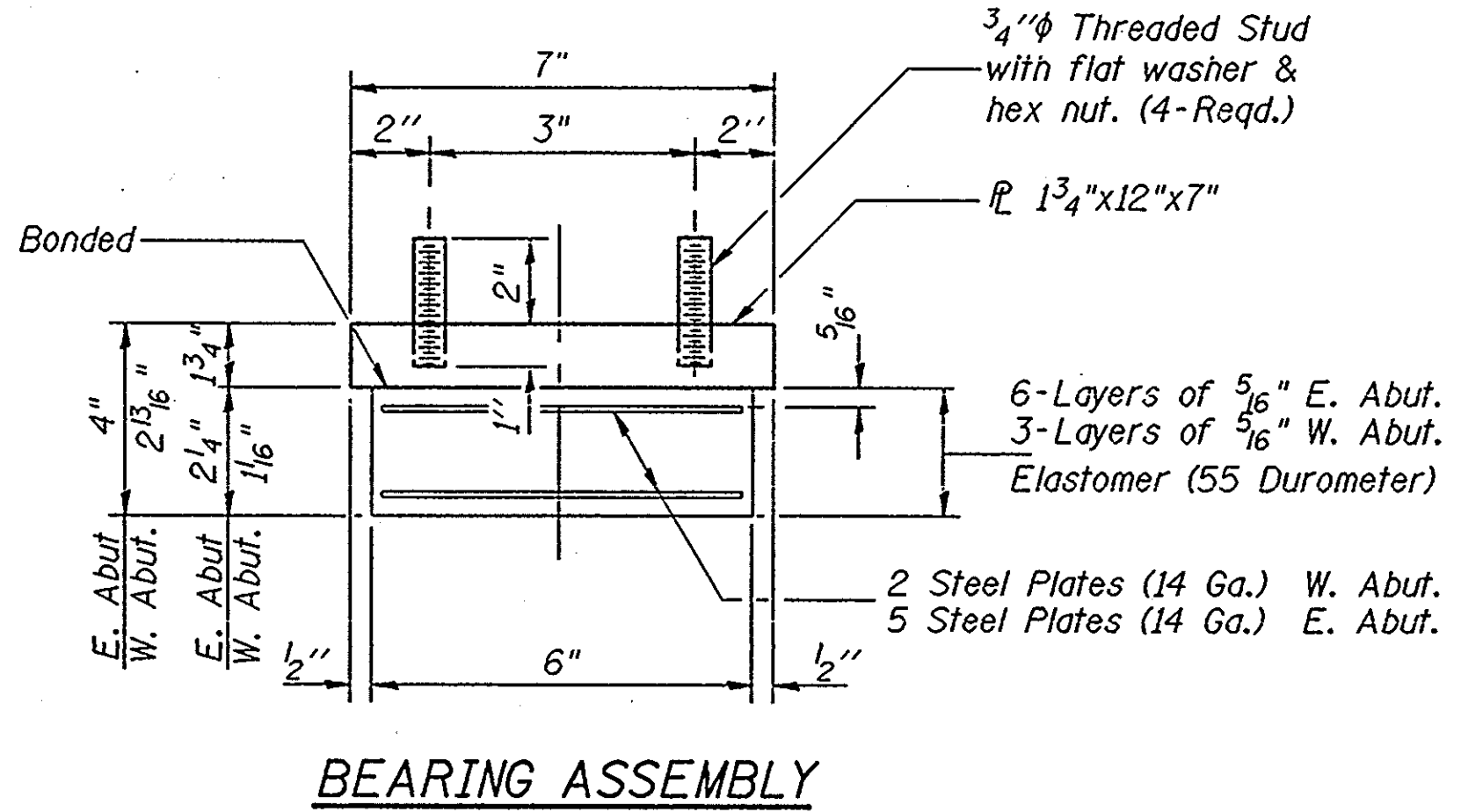
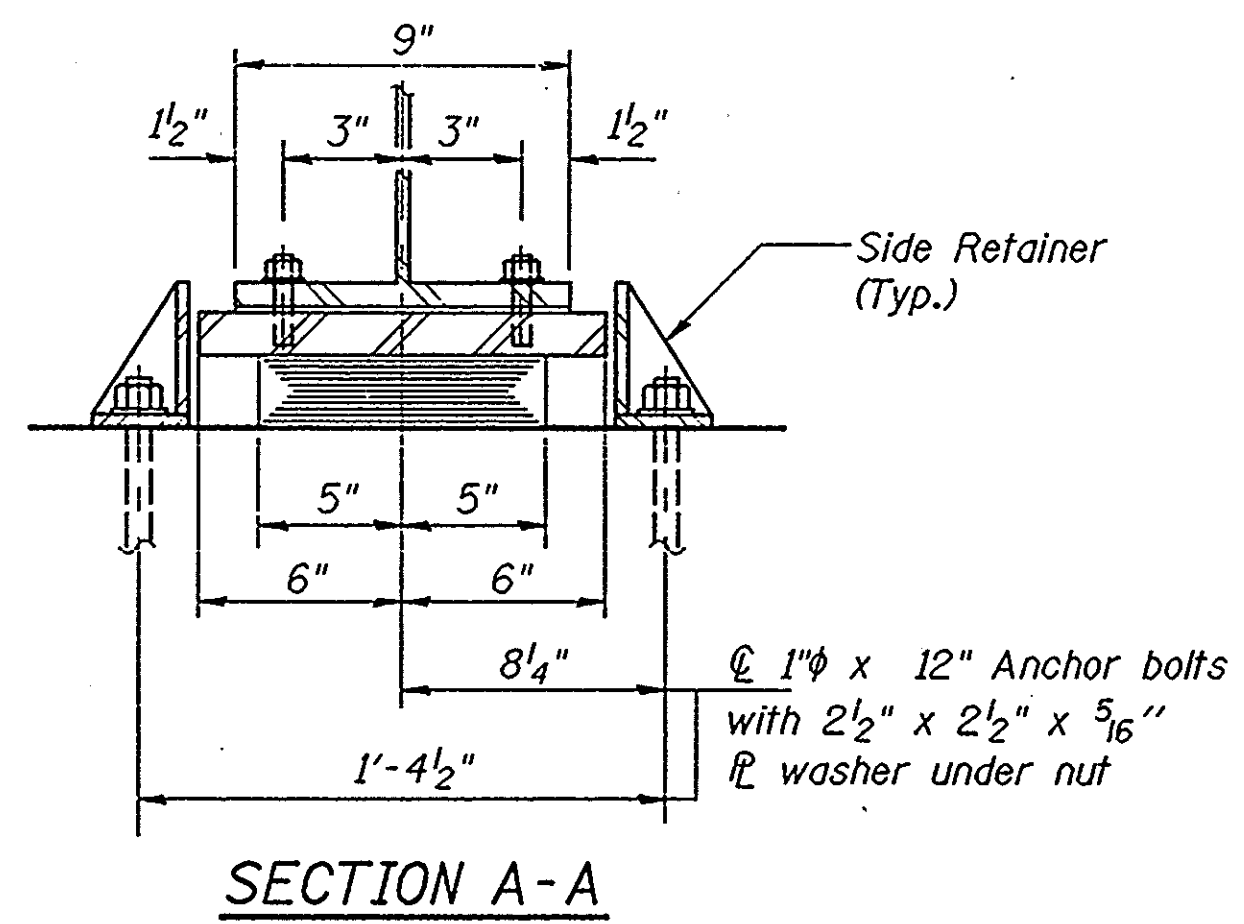
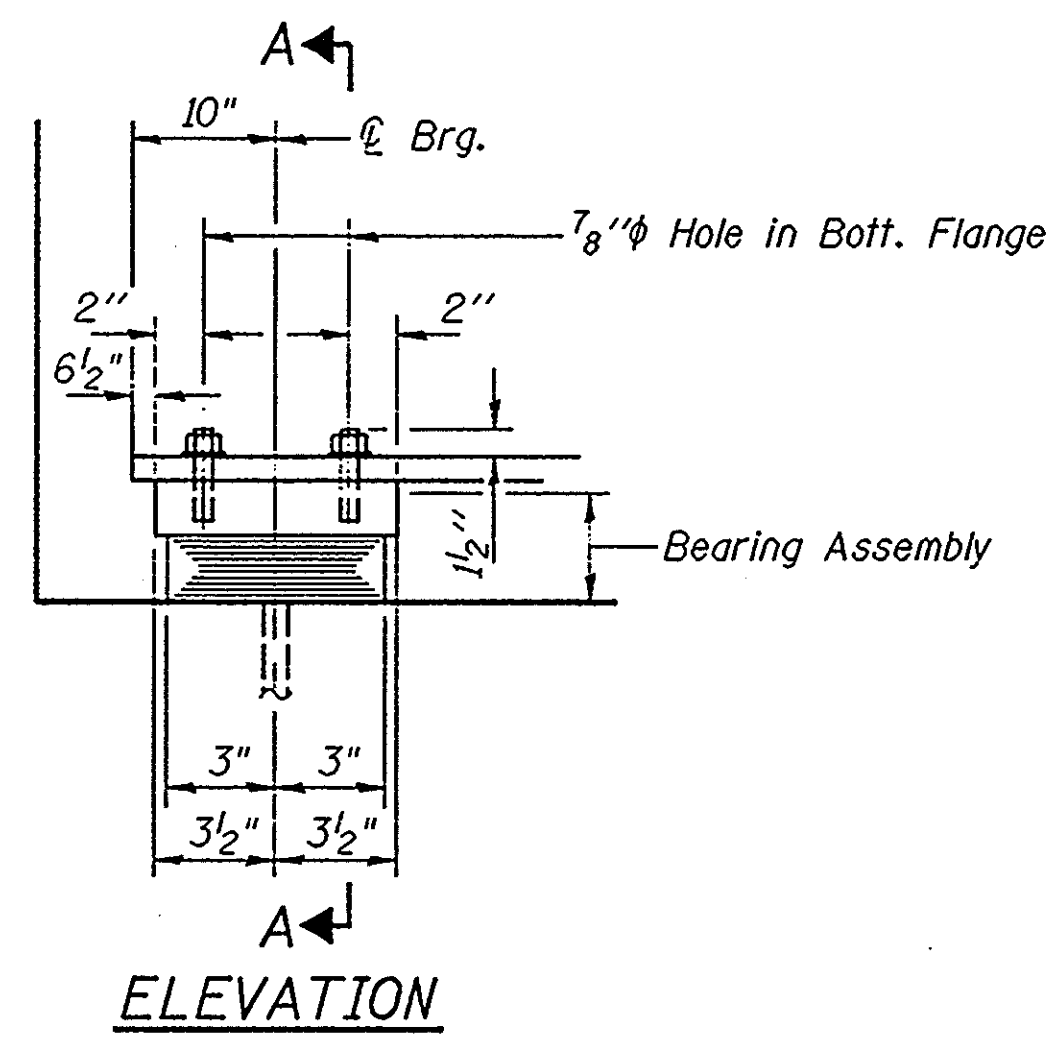
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93116SD1-1



STATE OF ILLINOIS  
DEPARTMENT OF TRANSPORTATION

ROUTE	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
FAP 317	21B	IROQUOIS	255	118
STA.	TO STA.			
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		

Bridge Sheet 11 of 19 Sheets



**TYPE I ELASTOMERIC EXP. BRG.**

(Typical for East & West Abutment unless otherwise noted)

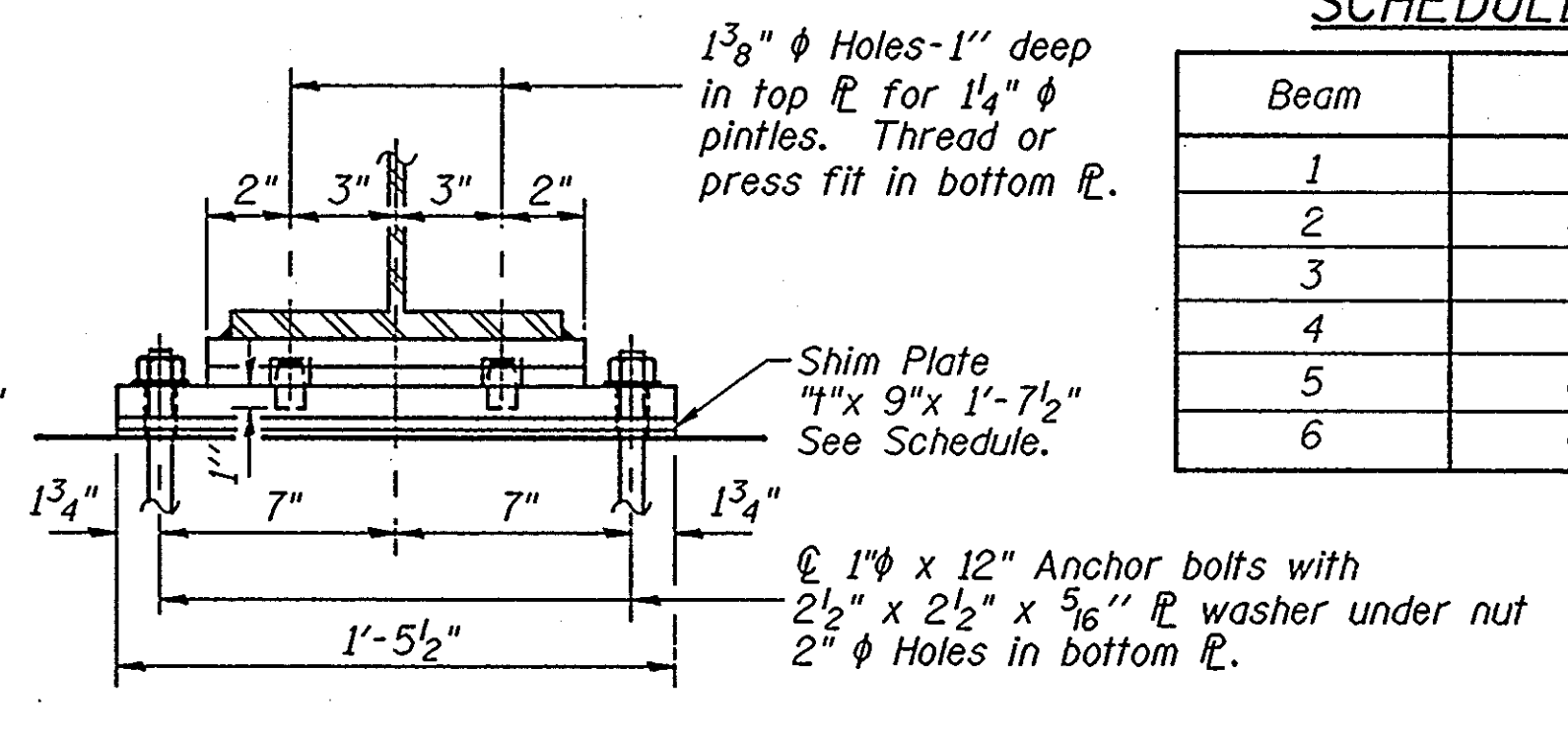
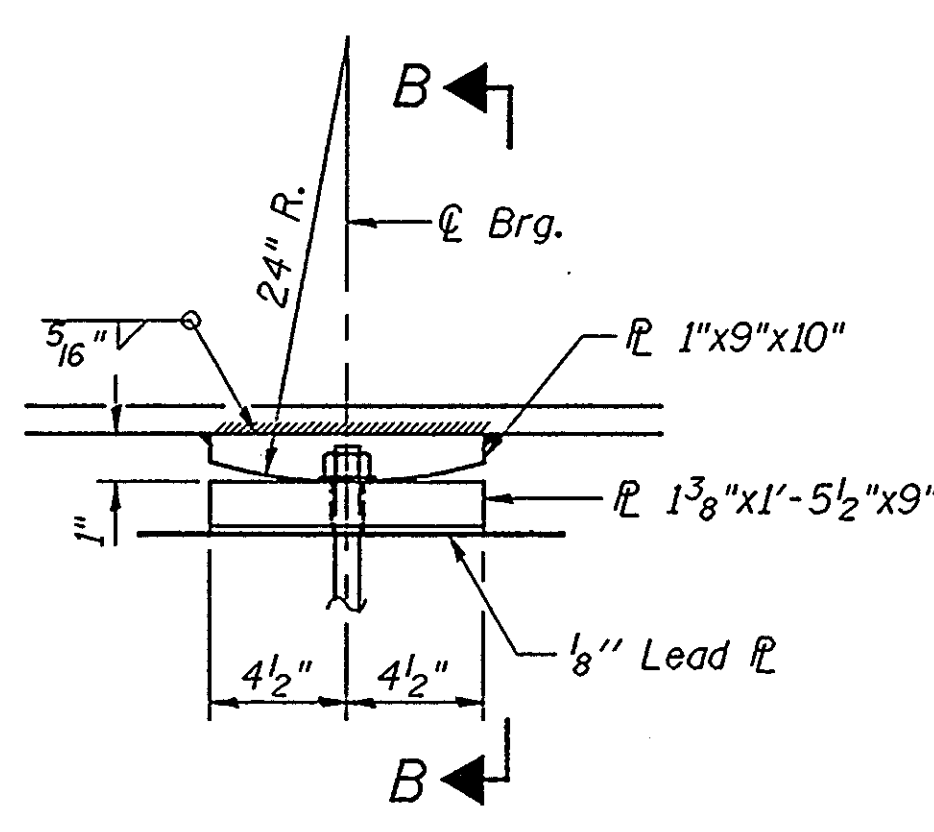
Note: Shim plates shall not be placed under Bearing Assembly.

Notes:  
Anchor bolts at fixed bearings may be built into the masonry.  
See Bridge Sheet 12 of 19 for Anchor Bolt Installation.  
All fixed bearings, anchor bolts and side retainers included with structural steel.

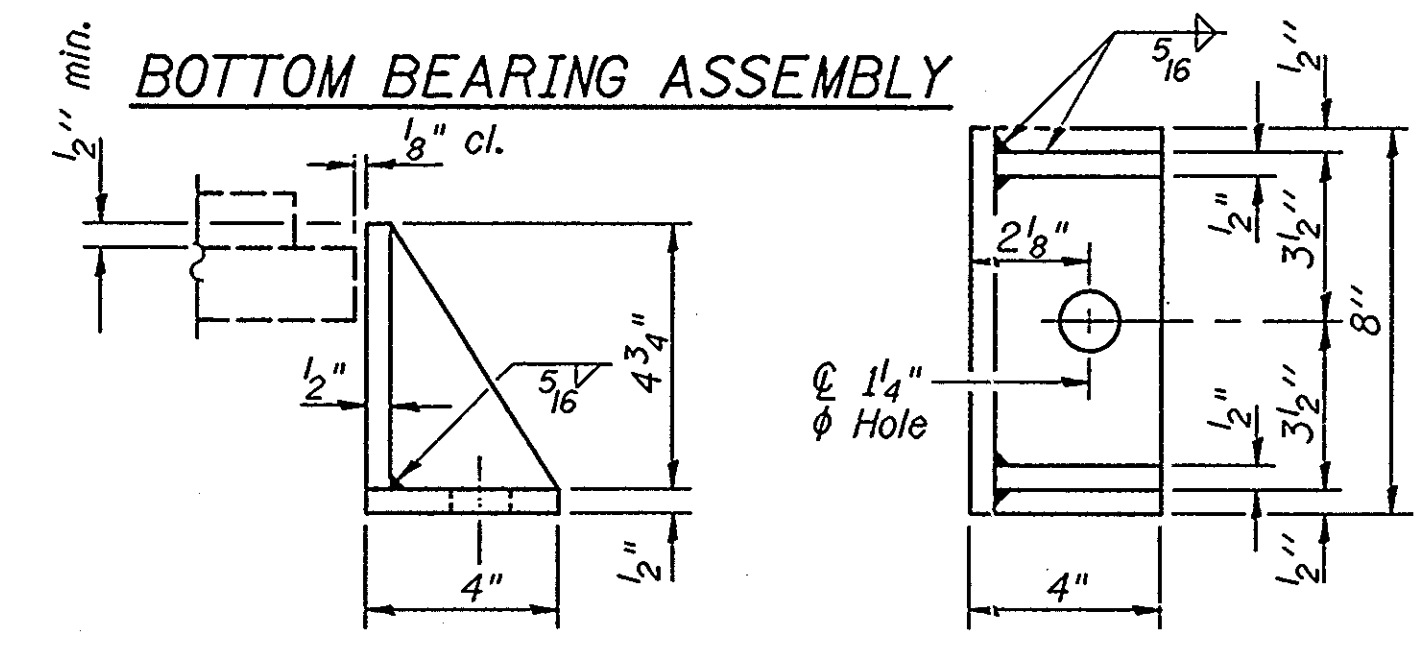
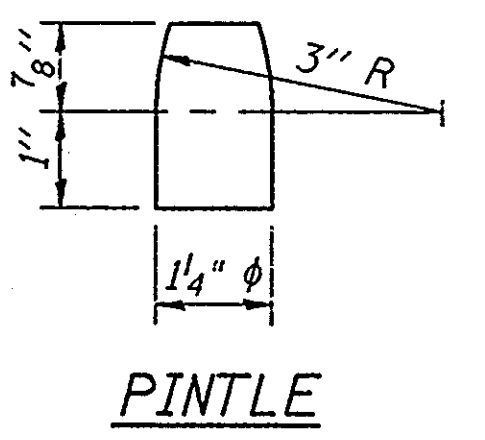
	Abut.	Pier
R <sub>l</sub> (K)	12.8	43.2
R <sub>t</sub> (K)	32.0	43.6
Imp. (K)	9.6	13.1
R (Total) (K)	54.4	99.9

$I_s$  and  $S_s$  are the moment of inertia and section modulus of the steel section used in computing  $f_s$  (Total & Overload).  
 $VR$  is the maximum Live Load + Impact shear range in span.  
 $Z$  is the plastic section modulus used to determine the fully plastic moments in the non-composite areas.  
 $M_a$  (Applied Moment) =  $1.3CM\ell + Ms\ell + S_3(M\ell + I)$ .  
 $M_u$  is the Full Plastic Moment Capacity for Compact, Braced section.  
 $f_s$  (Overload) is the sum of the stresses due to  $M\ell + Ms\ell + S_3(M\ell + I)$ .

	0.6 Sp. 3 0.4 Sp. 1	Pier 1 & 2	0.5 Span 2
$I_s$ (in <sup>4</sup> )	2100	2100	2100
$S_s$ (in <sup>3</sup> )	176	176	176
$Z$ (in <sup>3</sup> )	200	200	200
$\phi$ (K/ft.)	1.125	1.125	1.125
$M\ell$ (K)	72.0	-135.6	71.0
$M_t$ (K)	162.0	-138.1	171.5
$M$ (Imp) (K)	48.6	-41.4	51.5
$S_3(M\ell + I)$ (K)	351.0	-299.2	371.7
$M_a$ (K)	549.9	-565.2	575.5
$M_u$ (K)	600.0	-600.0	600.0
$f_s\ell$ non-comp (k.s.i.)	4.91	-9.25	4.84
$f_s\ell$ (comp) (k.s.i.)			
$f_s S_3(\ell + I)$ (k.s.i.)	23.93	-20.40	25.34
$f_s$ (Overload) (k.s.i.)	28.84	-29.65	30.18
$VR$ (K)	48.2		52.8



Beam	"
1	0"
2	0"
3	1/2"
4	1/2"
5	0"
6	0"

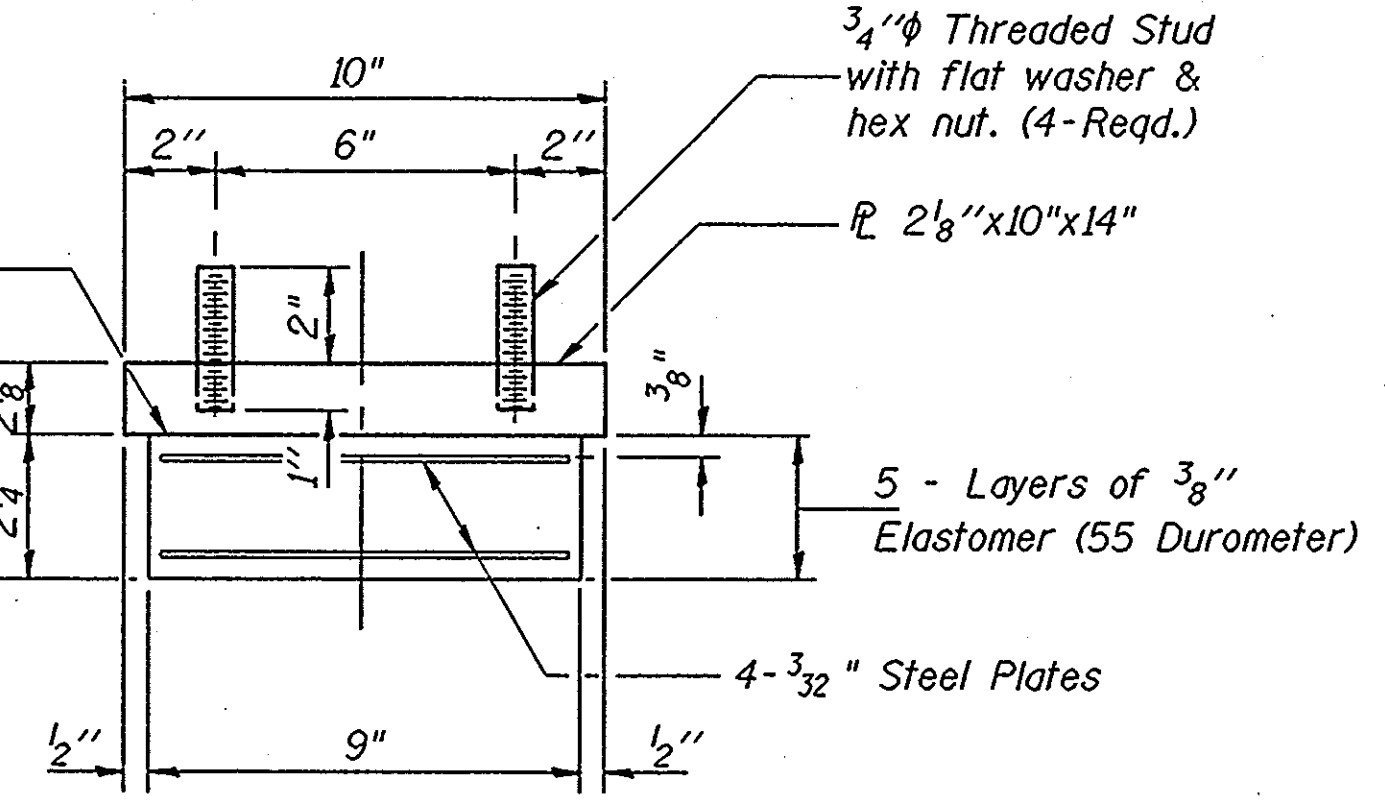
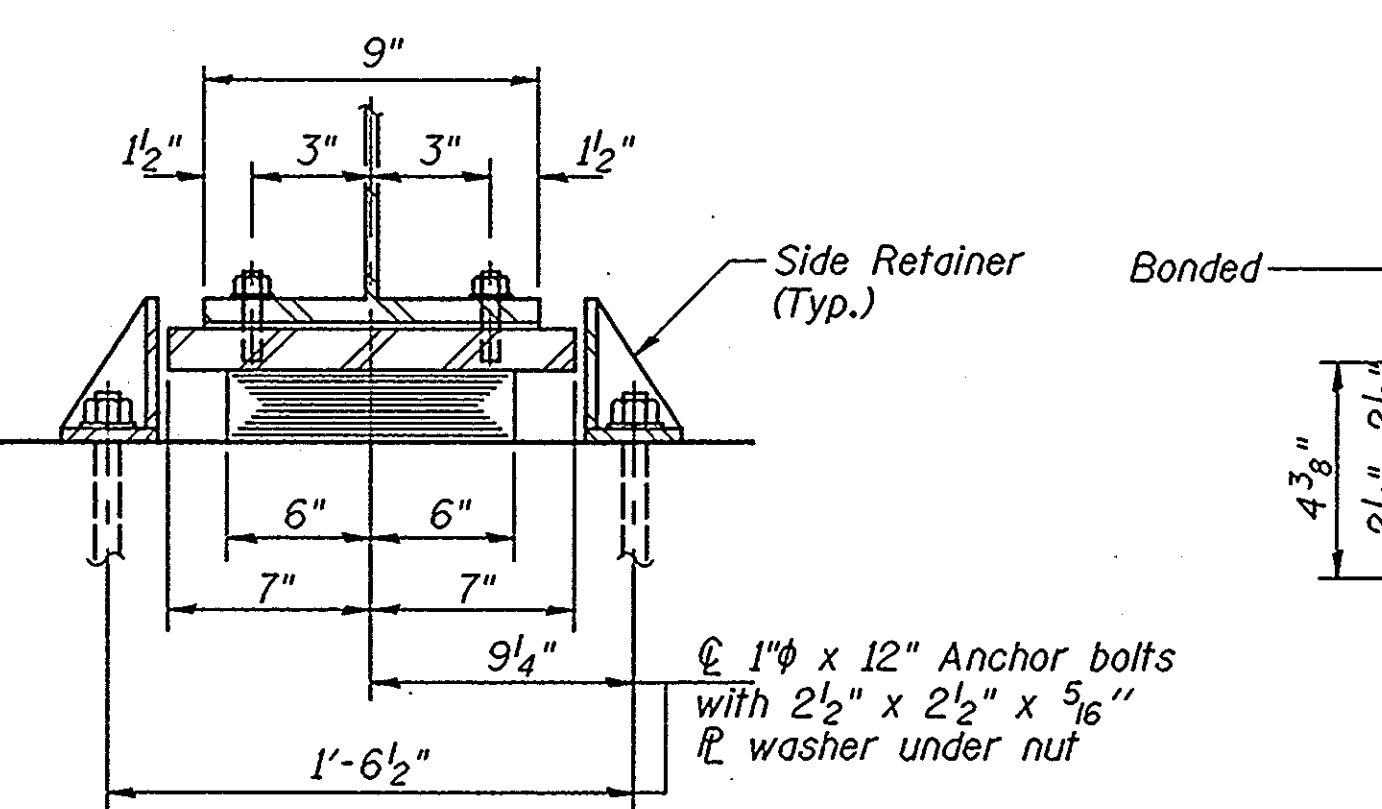
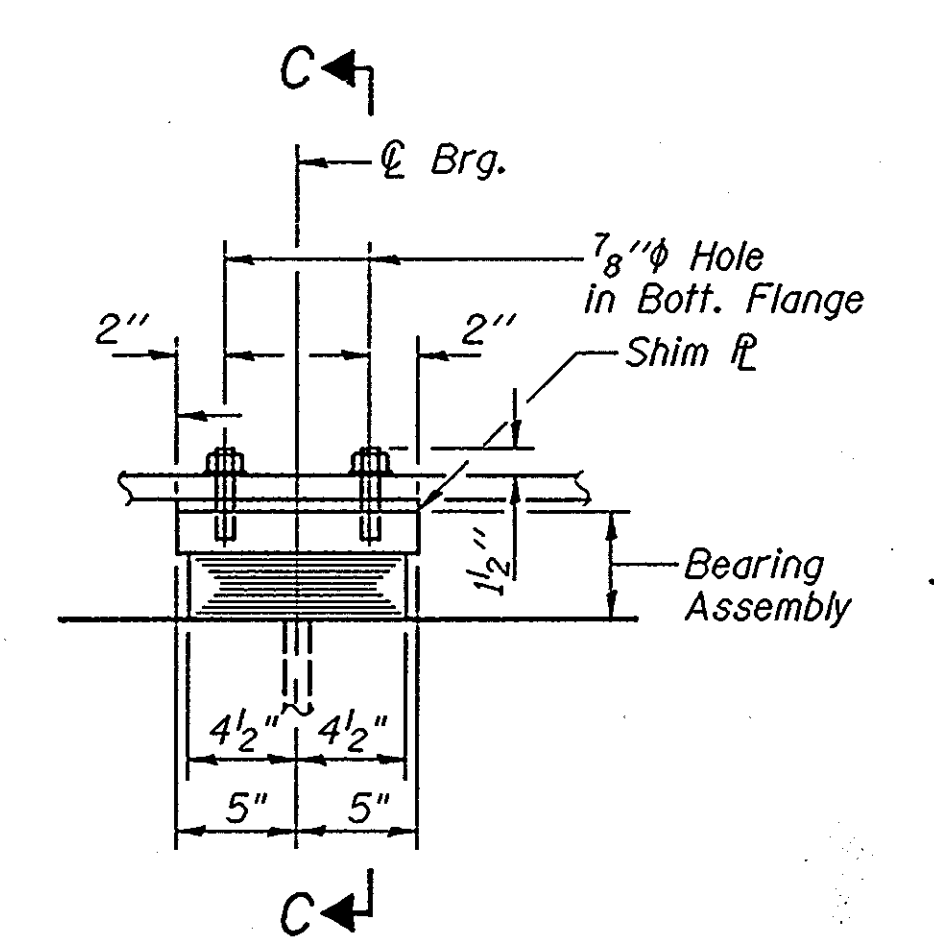


Equivalent rolled angle with stiffeners will be allowed in lieu of welded plates. Weight included with Structural Steel. (36 Req'd)

**TOP OF BEAM ELEVATIONS\***

Loc.	Bm	Beam 1	Beam 2	Beam 3	Beam 4	Beam 5	Beam 6
⊙ Bearing West Abut.	640.35	640.50	640.62	640.62	640.50	640.35	640.35
⊙ Pier 1	640.35	640.50	640.62	640.62	640.50	640.35	640.35
⊙ Splice	640.35	640.50	640.62	640.62	640.50	640.35	640.35
⊙ Pier 2	640.35	640.50	640.62	640.62	640.50	640.35	640.35
⊙ Brg. E. Abut.	640.35	640.50	640.62	640.62	640.50	640.35	640.35

\*For fabrication use only



Note: Shim plates shall not be placed under Bearing Assembly.

**TYPE I ELASTOMERIC EXP. BRG.**

(PIER 2)

**BILL OF MATERIAL**

Item	Unit	Total
Elastomeric Bearing Assembly, Type I	Each	18

ILLINOIS DEPARTMENT OF TRANSPORTATION  
**BEARING DETAILS**  
FAP ROUTE 317 (US RTE 24) OVER TRIBUTARY TO SPRING CREEK, SEC. 21BR, IROQUOIS COUNTY STA. 1863+27.94, S.N. 038-0032

REVISIONS	
NAME	DATE

SCALE: VERT. HORIZ.  
DATE: 6/28/94  
DRAWN BY: LANDREY  
DESIGNED BY: BRADFORD  
CHECKED BY: BANE  
GREENE & BRADFORD, INC.  
OF SPRINGFIELD  
CONSULTING ENGINEERS  
300 SOUTH TULLOCH AVENUE  
SPRINGFIELD, ILLINOIS 62761  
93116BRC-1

DESIGNED BY: BRADFORD  
CHECKED BY: LANDREY  
DRAWN BY: LANDREY  
APPROVED BY: BANE