Bridge Load Rating

Prepared for

Maine Department of Transportation

Bridge No. 1560

Brewer

IND. PARK ROAD

OVER

I-395

Date of Inspection: 1/5/2015

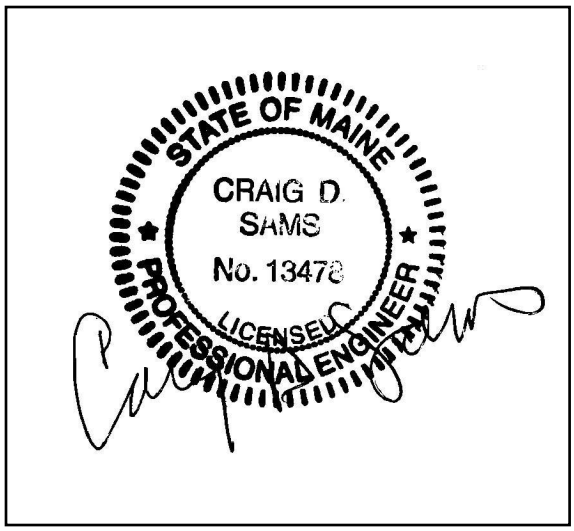
Date of Rating: 5/18/2016

Prepared By: Matthew M. Styckiewicz, P.E.

Checked By: Craig D. Sams, P.E.

Q.C. Review By: Charlie M. Roberts, P.E.

CEC – Childs Engineering Corporation



Bridge No:	1560	Owner:	MaineDOT
Town/City:	Brewer	Maintainer:	MaineDOT
Route Carried:	Ind. Park Rd.	Year Built:	1985
Crosses:	I-395	Year(s) Rebuilt/Rehab:	N/A

SUMMARY OF BRIDGE RATING

VEHICLE TYPE		RF	RT (TONS)	POSTING LOAD (TONS)
HL-93	INVENTORY	1.169	42.084	
	OPERATING	1.516	54.576	
HL-93 modified	INVENTORY			
	OPERATING			
CONFIGURATION 1				
CONFIGURATION 2				
CONFIGURATION 3				
CONFIGURATION 4				
CONFIGURATION 5				
CONFIGURATION 6				
CONFIGURATION 7				
CONFIGURATION 8				

Group 1 Posting Analysis (Configuration 1)

Governing Posting: N/A

Governing Load Model:

Group 2 Posting Analysis (Configuration 2 - 5)

Governing Posting: N/A

Governing Load Model:

Group 3 Posting Analysis (Configuration 6 - 8)

Governing Posting: N/A

Governing Load Model:

LRFR Evaluation Factors:

Live Load Distribution Factor:	Varies (see calculations)
Impact Factor:	1.33
Governing Condition Factor, φ_c:	1.0
System Factor, φ_c:	1.0
ADTT (one-way):	51

Please Check all the boxes that apply:

- ☐ Bridge load rating is governed by substructure rating
- ☐ Connection control the load rating
- ☐ Exterior girder control load rating
- ☑ As-build load rating
- ☐ As-inspected load rating
- ☐ One Lane Loaded
- ☑ Advanced Analysis Used
- ☐ Actual Measurements Taken
- ☐ Finite Fatigue life ____ years

BREAKDOWN OF BRIDGE RATING

Town/City: Brewer

Bridge No.: 1560

Route Carried: Ind. Park Rd.

Crosses: I-395

LOAD RATING POINTS OF INTEREST

Bridge Component	HL-93		HL-93 Modified		MaineDOT Truck Configurations							
	Inv 72.0 kip	Oper 72.0 kip	Inv 90.0 kip	Oper 90.0 kip	1 100.0 kip	2 94.0 kip	3 88.0 kip	4 88.0 kip	5 88.0 kip	6 75.9 kip	7 59.0 kip	8 37.4 kip
Interior Girder Strength I Positive Bending	1.657	2.148										
Interior Girder Service II Positive Bending	1.657											
Interior Girder Strength I Negative Bending	1.541	1.998										
Interior Girder Service II Negative Bending	2.24											
Exterior Girder Strength I Positive Bending	1.694	2.196										
Exterior Girder Service II Positive Bending	1.746											
Exterior Girder Strength I Negative Bending	1.169	1.516										
Exterior Girder Service II Negative Bending	1.724											
Girder Strength I Shear - Interior Support	3.998	5.182										
Girder Strength I Shear - End Support	3.42	4.43										
[COMPONENT] [LIMIT STATE] [ANALYZED CONDITION]												
[COMPONENT] [LIMIT STATE] [ANALYZED CONDITION]												
[COMPONENT] [LIMIT STATE] [ANALYZED CONDITION]												
CONTROLLING RATING FACTORS (STRENGTH I)	1.169	1.516										

DESCRIPTION OF BRIDGE

Bridge Number:	1560
Owner:	MaineDOT
Maintained By:	MaineDOT
Location:	Brewer
Route Carried:	Ind. Park Rd.
Featured Intersection:	I-390
Latest NBI Inspection Date:	01/05/2015
Field Verification Date:	02/24/2016
Date of Construction:	1985
Bridge Type:	Steel Girder
Material Properties:	Fy = 50 ksi, Fy (rebar) = 40 ksi, f'c = 3.0 ksi
Original Design Loading:	Unknown
Date(s) of Rebuild/Rehab:	N/A
Description of Rebuild/Rehab:	N/A
Posting:	N/A
Superstructure:	Steel Girder with Concrete Deck
Substructure:	Reinforced Concrete Abutments
Bearings:	Fixed Hinged Pedestal with Expansion Roller Pedestals
Bridge Spans:	Span 1 = 98 ft, Span 2 = 98 ft
Bridge Skew:	00°00'00"
Bridge Width:	36.8 ft edge to edge
Roadway Surface:	33 ft inside curb to inside curb
Curbs:	Concrete
Sidewalk/Walkway/Median:	N/A
Utilities:	N/A
Bridge Railing:	Steel posts and railings in concrete curb
Approach Railings:	Steel Guardrail
Wearing Surface Condition:	
Bridge Railing Condition:	--- from inspection report dated 1/5/2015 ----
Deck Condition:	Deck – 6 Satisfactory
Beam Condition:	Superstructure – 7 Good
Bearing Condition:	
Abutment Condition:	Substructure – 5 Fair
Pier Condition:	

NOTES AND ASSUMPTIONS

References Used:

- *The Manual for Bridge Evaluation (MBE),* Second Edition, 2011 (MBE) w/ 2013 Interims
- *AASHTO LRFD Bridge Design Specifications,* Sixth Edition, 2012
- MaineDOT Load Rating Guide, April 2015

General Notes:

This load rating was performed in accordance with MaineDOT guidelines.

Bridge No. 1560 is a continuous 2 span bridge with 5 steel W-shape girders which act compositely with a steel reinforced concrete deck. The concrete deck thickness is 8 inches with 3 inch deep beam haunches and a 3 inch thick bituminous wearing surface. The bridge has concrete curbs of both sides of the roadway with steel guardrails but now walkways.

The bridge has an overall width of 36.8 ft with a roadway width of 33 ft carrying 2 lanes of traffic. The current ADT of the bridge was recorded as 1228 from the previous inspection. The ADTT was calculated as 51 with a Truck ADT of 5%.

The bridge was evaluated at the Inventory and Operating levels for the Strength I limit state, as well as the Service II limit state. The superstructure was rated for the AASHTO HL-93 load condition. Due to the inventory rating factor of greater than 1 at the HL-93 condition, it was not necessary to rate the structure for the MaineDOT legal loads.

STAAD.Pro V8i was used to generate moment and shear forces in the girders due to the various load conditions. The bridge girders and deck were then evaluated at those forces using the distribution factors and capacity calculations provided by the AASHTO LRFD Bridge Design Specifications.

Condition Factors:

The condition factor used for this bridge was 1.0 due to the "Good" rating that the superstructure received in the most recent (2015) inspection report.

Assumptions:

- Girders specified as A572 steel, F_y assumed to be 50 ksi (most common grade of A572)
- Concrete strength (f'_c) assumed to be 3.0 ksi
- Reinforcing steel yield strength (F_y) assumed to be 40 ksi
- Superimposed dead loads such as wearing surface and guardrails distributed evenly between all girders.
- Wearing surface thickness is equal to that shown on the plans of 3"

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APPENDIX A

Structural Inventory and Appraisal Sheets

Structure Inventory and Appraisal Sheet (English Units)

Bridge Key: 1560 Agency ID: 1560 SR: 87.9 SD/FO: ND

IDENTIFICATION

State 1: 23 Maine
Struc Num 8: 1560
Facility Carried 7: IND. PARK RD
Location 9: OVER 395 0.4 MI E OF T.L.
Rte.(On/Under)5A: Route On Structure
Rte. Signing Prefix 5B: 5 City Street
Level of Service 5C: 0 None of the below
Rte. Number 5D: 00000
Directional Suffix 5E: 0 N/A (NBI)
% Responsibility : 0
SHD District 2: 04 Eastern
County Code 3: 019 Penobscot
Place Code 4: 19050 Brewer
Mile Post 11: 0.120 mi
Feature Intersected 6: I-395
Latitude 16: 44d 46' 57"
Longitude 17: 068d 45' 55"
Border Bridge Code 98: Not Applicable (P)
Border Bridge Number 99: n/a

INSPECTION

Frequency 91: 24 months
Inspection Date 90: 1/5/2015
Next Inspection: 01/05/2017
FC Frequency 92A: NA
FC Inspection Date 93A: NA
Next FC Inspection: NA
UW Frequency 92B: NA
UW Inspection Date 93B: NA
Next UW Inspection: NA
SI Frequency 92C: NA
SI Date 93C: NA
Next SI: NA
Element Frequency: 24 months
Element Inspection Date: 01/05/2015
Next Elem. Insp. Due: 01/05/2017

CLASSIFICATION

Defense Highway 100: 0 Not a STRAHNET hwy
Parallel Structure 101: No || bridge exists
Direction of Traffic 102: 2 2-way traffic
Temporary Structure 103: Not Applicable (P)
Highway System 104: 0 Not on NHS
NBIS Length 112: Long Enough
Toll Facility 20: 3 On free road
Functional Class 26: 19 Urban Local
Defense Hwy 110: 0 Not a STRAHNET hwy
Historical Significance 37: 4 Hist sign not determin
Owner 22: 01 State Highway Agency
Custodian 21: 01 State Highway Agency

STRUCTURE TYPE AND MATERIALS

Number of Approach Spans 46: 0
Number of Spans Main Unit 45: 2
Main Span Material/Design 43A/B:
4 Steel Continuous
02 Stringer/Girder
Deck Type 107: 1 Concrete-Cast-in-Place
Wearing Surface 108A: 6 Bituminous
Membrane 108B: 2 Preformed Fabric
Deck Protection 108C: None

CONDITION

Deck 58: 6 Satisfactory
Super 59: 7 Good
Sub 60: 5 Fair
Culvert 62: N N/A (NBI)
Channel/Channel Protection 61: N N/A (NBI)

LOAD RATING AND POSTING

Inventory Rating Method 65: 1 LF Load Factor
Operating Rating Method 63: 1 LF Load Factor
Inventory Rating 66: HS26.6
Operating Rating 64: HS44.5
Design Load 31: MS 22.5 or greater
Posting 70: 5 At/Above Legal Loads
Posting status 41: A Open, no restriction

AGE AND SERVICE

Year Built 27: 1985
Year Reconstructed 106: 0
Type of Service on 42A: 1 Highway
Type of Service under 42B: 1 Highway
Lanes on 28A: 2
Lanes Under 28B: 5
Detour Length 19: 1.1 mi
ADT 29: 1,228
Truck ADT 109: 5 %
Year of ADT 30: 2014

APPRAISAL

Bridge Rail 36A: 1 Meets Standards
Approach Rail 36C: 1 Meets Standards
Transition 36B: 1 Meets Standards
Approach Rail Ends 36D: 1 Meets Standards
Str. Evaluation 67: 5
Deck Geometry 68: 5 Above Tolerable
Underclearance, Vertical and Horizontal 69: 6 Equal Minimum
Waterway Adequacy 71: N Not applicable
Approach Alignment 72: 8 Equal Desirable Crit
Scour Critical 113: N Not Over Waterway

GEOMETRIC DATA

Length Max Span 48: 98.0 ft
Structure Length 49: 201.0 ft
Curb/Sdwlk Width L 50A: 0.5 ft
Curb/Sidewalk Width R 50B: 0.5 ft
Width Curb to Curb 51: 33.0 ft
Width Out to Out 52: 36.8 ft
Approach Roadway Width 32: (w/ shoulders) 34.0 ft
Median 33: 0 No median
Deck Area: 7,397.1 sq. ft
Skew 34: 0.00 °
Structure Flared 35: 0 No flare
Vertical Clearance 10: 99.99 ft
Horiz. Clearance 47: 33.00 ft
Minimum Vertical Clearance Over Bridge 53: 327.8 ft
Minimum Vertical Underclearance Reference 54A: H Hwy beneath struct
Minimum Vertical Underclearance 54B: 19.2 ft
Minimum Lateral Underclearance Reference R 55A: H Hwy beneath struct
Minimum Lateral Underclearance R 55: 16.1 ft
Minimum Lateral Underclearance L 56: 18.0 ft

PROPOSED IMPROVEMENTS

Bridge Cost 94: NA
Type of Work 75: Unknown (P)
Roadway Cost 95: Unknown
Length of Improvement 76:
Total Cost 96: Unknown
Future ADT 114: 1,842
Year of Cost Estimate 97: Unknown
Year of Future ADT 115: 2034

NAVIGATION DATA

Navigation Control 38: N NA-no waterway
Vertical Clearance 39: 0.0 ft
Horizontal Clearance 40: 0.0 ft
Pier Protection 111: Not Applicable (P)
Lift Bridge Vertical Clearance 116: 0.0 ft

ELEMENT CONDITION STATE DATA

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4	% in 5	Qty. St. 5
1	14/2	P Conc Deck/AC Ovly	(SF)	7,397	0 %	0	100 %	7,397	0 %	0	0 %	0	0 %	0
1	107/2	Paint Stl Opn Girder	(LF)	1,005	70 %	704	20 %	201	5 %	50	5 %	50	0 %	0
1	210/2	R/Conc Pier Wall	(LF)	37	80 %	30	20 %	7	0 %	0	0 %	0	0 %	0
1	215/2	R/Conc Abutment	(LF)	73	0 %	0	90 %	66	10 %	7	0 %	0	0 %	0
1	218/2	Undefined Wall Elem.	(LF)	88	0 %	0	75 %	66	15 %	13	10 %	9	0 %	0
1	302/2	Compressn Joint Seal	(LF)	74	100 %	74	0 %	0	0 %	0	0 %	0	0 %	0

Structure Inventory and Appraisal Sheet (English Units)

Str Unit	Elm/Env	Description	Units	Total Qty	% in 1	Qty. St. 1	% in 2	Qty. St. 2	% in 3	Qty. St. 3	% in 4	Qty. St. 4	% in 5	Qty. St. 5
1	311/2	Moveable Bearing	(EA)	10	90 %	9	10 %	1	0 %	0	0 %	0	0 %	0
1	313/2	Fixed Bearing	(EA)	5	100 %	5	0 %	0	0 %	0	0 %	0	0 %	0
1	330/2	Metal Rail Uncoated	(LF)	402	90 %	362	10 %	40	0 %	0	0 %	0	0 %	0
1	383/2	Wear.Surf- AC+Membr.	(SF)	6,633	90 %	5,970	10 %	663	0 %	0	0 %	0	0 %	0
1	388/2	Paint	(SF)	15,225	95 %	14,464	0 %	0	0 %	0	5 %	761	0 %	0

Str Unit	Elm/Env	Description	Element Notes
1	14/2	Concrete Deck - Protected w/ AC C	Approximately 10% cracking bituminous wearing surface. Curbs, fascias and exterior bays have isolated moderate deteriorated concrete areas. Interior bays are in good condition.
1	107/2	Painted Steel Open Girder/Beam	Beam ends at exterior locations and at northern end has corrosion with some scale rust. Beam edges and splices showing light corrosion with chalking along beam bottoms over I-395 roadway areas.
1	210/2	Reinforced Conc Pier Wall	< none >
1	215/2	Reinforced Conc Abutment	Moderate cracking at wing turns & breastwall areas.
1	218/2	Undefined Wall Elem (Incl. Wing-,	Moderate/ isolated heavy cracking with efflo staining areas.
1	302/2	Compression Joint Seal	Newer seals
1	311/2	Moveable Bearing (roller, sliding, e	Paint failure & moderate corrosion of NW abutment exterior bearing. Remaining bearings have minor paint failure only.
1	313/2	Fixed Bearing	Minor paint failure only.
1	330/2	Metal Bridge Railing - Uncoated (A	Minor collision scraping areas.
1	383/2	Wearing Surface - AC & Membrane	<none>
1	388/2	Paint (Dummy Element)	Beams ends at exterior with scale rust at east face, both abutments..

BRIDGE NOTES

1985 Two span 5 steel painted girders with concrete deck, abutments and center pier. Bituminous wearing surface with granite curb and two rail aluminum bridge rail.

PAST INSPECTION

Inspection Date: 01/05/2015 Type: 1 Regular NBI

Inspector: DT2HARR Pontis User Key: DT2HARR - SCOT

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

Structure is in overall satisfactory condition with moderate deterioration of main elemenets. Abutments & wings have a high percentage of cracking with efflo staining rehab desireable. See individual elements & photos for details.

Structure Inventory and Appraisal Sheet (English Units)

PAST INSPECTION

Inspection Date: 10/17/2013 Type: 1 Regular NBI

Inspector: DTPDERO Pontis User Key: DTPDERO - PETE

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

Structure is in overall Good condition with the exception of the substructure.

CHANGED: Dropped deck NBI to 6 due to the map cracking and transverse cracking at the fascias and soffits. Dropped substructure rating to 5 due to the scattered to extensive, minor to moderate map cracking and heavy cracking of the wing walls at the tops.

Deck/WS: Deck is in Satisfactory condtion with prevalent minor map cracking at the facsias and isolated areas of heavy scaling at the end where the joint seals hang out. WS has 10% minor cracking. The concrete headers have moderate map cracking. The north joint seal has tears and is sagging and leaking.

Super: The girders are in good condition with isolated areas of scaling rust at the ends of the east exterior girders, both abutments

PAST INSPECTION

Inspection Date: 09/06/2011 Type: 1 Regular NBI

Inspector: DTJHARR Pontis User Key: DTJHARR - STEV

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

Superstructure & deck are in overall very good condition with minor deterioration only. The substructure has moderate deterioration of concrete at exterior areas abutments & piers. Wing walls have heavy cracking on top with addtional approx 15% cracking, efflo, and delamination. North joint has been pushed down in SB lane. Recent sealing of North abutmentment on East side and joint repair. Recommend joint seal replacement and rehab of wing walls.

Structure Inventory and Appraisal Sheet (English Units)

PAST INSPECTION

Inspection Date: 12/22/2009 Type: 1 Regular NBI

Inspector: DTRLANP Pontis User Key: DTRLANP - ROBE

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

CHANNEL: Road cut through granular material. Concrete slopes facing both abutments has slumped approximately 1"-2" into channel. Center pier is reinforced with asphalt for slope protection in good shape with drainage below.
SUBSTRUCTURE:
Abutments: generally fair condition with large scale map cracking and some larger cracks no larger than 1/8". Bridge seats in generally fair condition with exterior bearings and bridge seats in fair/poor condition. Northern abutment top in poorer shape due to failed bridge seal above.
Pier: generally good condition with some map cracking scattered cracking not as severe as abutments.
SUPERSTRUCTURE: Steel beams in very good condition with beam ends at exterior showing greater paint loss and corrosion. Northern beam ends has locations of large scale rust due to leaking joint above. Section loss at these locations estimated to be less than 5% but exact loss difficult to determine without complete paint removal and inspection. Bolted splices in good condition with corrosion present at bolts.
DECK: Good condition with no major defects noted, isolated cracking with efflorescence

PAST INSPECTION

Inspection Date: 02/14/2008 Type: 1 Regular NBI

Inspector: DT2HARR Pontis User Key: DT2HARR - SCOT

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

Superstructure & deck are in overall very good condition with minor deterioration only. The substructure has moderate deterioration of concrete at exterior areas abutments & piers. Wing walls have approx 15% cracking, efflo, and delamination. Recommend cleaning of joint seal winter sand & minor touch up paint @ NE girder/ bearing.

Structure Inventory and Appraisal Sheet (English Units)

PAST INSPECTION

Inspection Date: 05/04/2005 Type: 1 Regular NBI

Inspector: DT2HARR Pontis User Key: DT2HARR - SCOT

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

Superstructure & deck are in overall very good condition with minor deterioration only. The substructure has moderate deterioration of concrete at exterior areas abutments & piers. Wing walls have approx 15% cracking, efflo, and delamination. Recommend cleaning of joint seal winter sand & minor touch up paint @ NE girder/ bearing.

PAST INSPECTION

Inspection Date: 12/31/2003 Type: 1 Regular NBI

Inspector: -1 Pontis User Key: PWV

Scope:

NBI: ☑ Other: ☐ Element: ☑

Underwater: ☐ Fracture Critical: ☐

INSPECTION NOTES

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INSPECTOR WORK CANDIDATES

Work Candidate ID	Action	Object	Agency Status	Agency Priority	Assigned to a Project	Rec. Date
A-DOT001-19F2967B-00000000	Other	Bridge	Approved	High	No	10/17/2013
A-DOT001-0A0B3E95-00000022	Part Paint	Paint Stl Opn Girder	Approved	low	No	1/5/2015
A-DOT001-0A0B3E95-0000001E	Min Repair	R/Conc Abutment	Approved	Medium	No	12/22/2009
A-DOT001-0A0B3E95-00000020	Rehab Elem	R/Conc Abutment	Approved	Medium	No	1/5/2015
A-DOT001-0A0B3E95-0000001A	Rehab Elem	R/Conc Abutment	Approved	High	No	12/22/2009
A-DOT001-0A0B3E95-0000001C	Repl Elem	Compressn Joint Seal	Approved	High	No	9/6/2011

APPENDIX B

MaineDOT Legal Loads

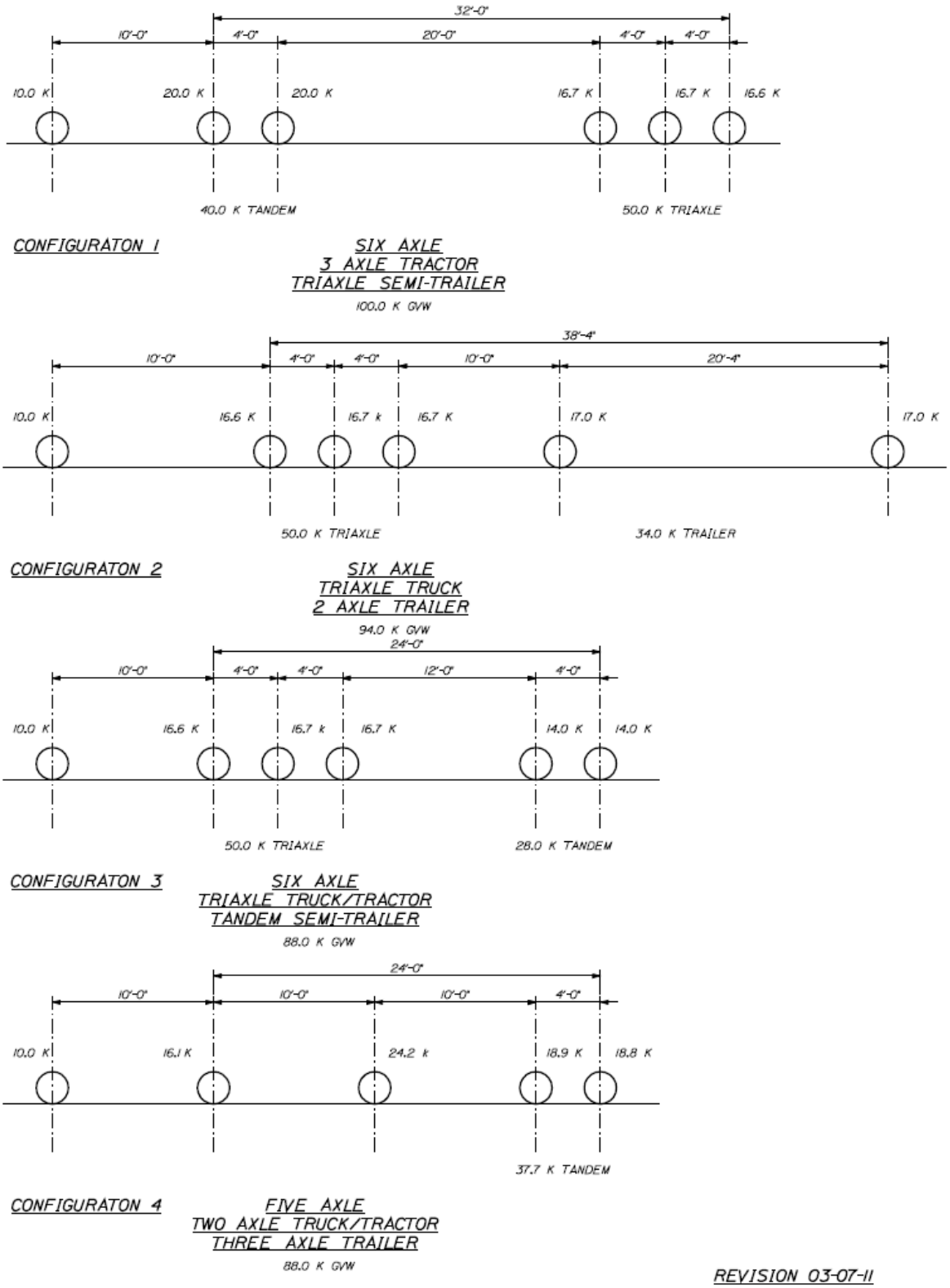
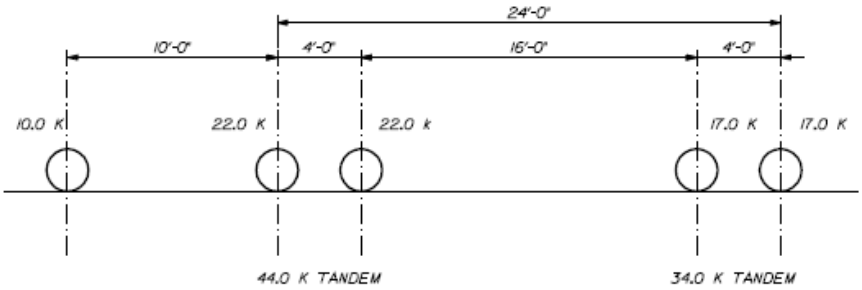
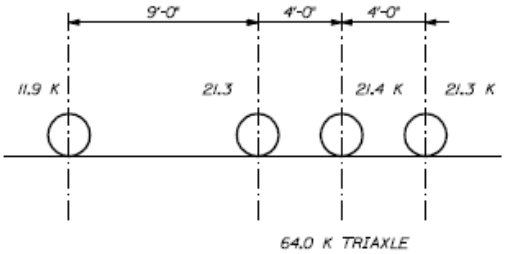


Figure 1. Maine DOT Legal Loads



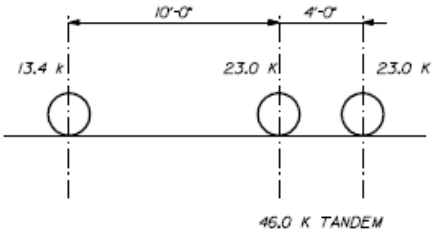
CONFIGURATON 5 — FIVE AXLE TANDEM AXLE TRUCK OR TRACTOR SEMI-TRAILER

88.0 K GVW



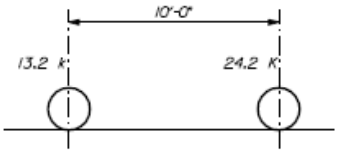
CONFIGURATON 6 — FOUR AXLE TRUCK

75.9 K GVW



CONFIGURATON 7 — THREE AXLE TRUCK

59.0 K GVW



CONFIGURATON 8 — TWO AXLE TRUCK

37.4 K GVW

Figure 2. Maine DOT Legal Loads

APPENDIX C

Load Ratings Calculations

Project: MaineDOT Bridge Load Rating
Job No.: 2582-15.02

Rated By: MMS Date: 5/25/16
Checked By: CDS

IND. PARK RD. BRIDGE OVER 395 No. 1560

BRIDGE INFO

$Year := 1985$ Year the bridge was constructed
$Bridge_L := 201 \cdot ft$ Overall bridge length
$Bridge_W := 36.8\ ft$ Overall bridge width
$Skew := 0$ Degree of skew
$Curvature := 10$ Degree of horizontal curvature
$Roadway_W := 33 \cdot ft$ Overall width of the roadway from curb to curb

$N_{spans} := 2$ Number of bridge spans
$Span_{L1} := 98.0\ ft$ Length of 1st span
$Span_{L2} := 98.0 \cdot ft$ Length of 2nd span
$Span_{L3} := 0 \cdot ft$ Length of 3rd span

$Span_{total} := Span_{L1} + Span_{L2} + Span_{L3} = 196\ ft$

$N_{beams} := 5$ Number of bridge girders
$S_{girders} := 7.74 \cdot ft$ Spacing between girders
$H := 3 \cdot in$ Haunch depth
$OVH := 2.85 \cdot ft$ Length deck overhangs exterior girders

$Deck_T := 8 \cdot in$ Deck Thickness
$WearingConc_T := 0 \cdot in$ Concrete wearing surface thickness (0 if none)
$WearingBit_T := 3 \cdot in$ Bituminous wearing surface thickness (0 if none)

$S_{brace\_neg} := 12 \cdot ft$ Spacing of braces in neg bending region

$S_{brace\_pos} := 25 \cdot ft$ Spacing of braces in pos bending region

$N_{vehlanes} := 2$ Number of possible vehicle lanes according to AASHTO LRFD SPECS

$N_{deslanes} := 2$ Number of designated lanes on the bridge

$Curb_H := .5$ Curb Height

$Curb_W := 1.83$ Curb Width

$Sidewalk_W := 0$ Sidewalk Width

$ADT_{cur} := 1228$

$ADT_{fut} := 1842$

$ADT_{Dir\_Split} := 0.55$

$PerTrucks := 5\%$

$ADTT := \text{ceil}\left(ADT_{fut} \cdot ADT_{Dir\_Split} \cdot PerTrucks\right) = 51$

$\varphi_c := 1.0$ Condititition factor - Satisfactory =1.0 / Fair=0.95 / Poor=0.85

$\varphi_s := 1.0$ System Factor - 1.0 for 5 girder bridges

LIMIT STATES

Strength I Limit State - Inventory Limit states required for a steel girder bridge

$$\gamma_{STI\_inv} := \begin{bmatrix} 1.25 \\ 1.50 \\ 1.75 \end{bmatrix}$$

Strength I Limit State - Operating

$$\gamma_{STI\_op} := \begin{bmatrix} 1.25 \\ 1.50 \\ 1.35 \end{bmatrix}$$

Service II Limit State

$$\gamma_{SEII} := \begin{bmatrix} 1.00 \\ 1.00 \\ 1.30 \end{bmatrix}$$

BRIDGE MATERIAL PROPERTIES

$\gamma_{steel} := 490\ pcf$ Unit weight of steel
$\gamma_{conc} := 150\ pcf$ Unit weight of concrete
$\gamma_{bit} := 140\ pcf$ Unit weight of bit. wearing surface

$f'_c := 3\ ksi$ Compressive strenght of concrete
$F_u := 50\ ksi$ Yield strength of steel girders
$F_{y\_rebar} := 40 \cdot ksi$ Yield strength of rebars

$E_{steel} := 29000\ ksi$
$E_{conc} := 1820 \cdot \sqrt{f'_c \cdot ksi} = \left(3.152 \cdot 10^3\right)\ ksi$

$n := \frac{E_{steel}}{E_{conc}} = 9.2$

GIRDER SECTION PROPERTIES

Positive Flexture --- Section W36x182

$A_{girder} := 53.6\ in^2$ Area of the steel section

$I_x := 11500 \cdot in^4$ Moment of inertia of the section

$D_{girder} := 36.3 \cdot in$ Depth of the girder

$W_{flange} := 12.1 \cdot in$ Width of the flange

$t_{flange} := 1.18 \cdot in$ Thickness of the flange

$t_{web} := .725 \cdot in$ Thickness of the web

$$S := min\left(0.25 \cdot Span_{L1}, \begin{cases} \text{if } t_{web} > \dfrac{t_{flange}}{2} \\ \quad 12 \cdot Deck_T + t_{web} \\ \text{else} \\ \quad 12 \cdot Deck_T + \dfrac{t_{flange}}{2} \end{cases}, S_{girders}\right) = 7.74\ ft$$

Effective deck slab width

$$S_{ext} := min\left(S, \frac{S_{girders}}{2} + OVH\right) = 6.72\ ft$$

Effective deck slab width for exterior beams

$W_{topplate} := 0 \cdot in$

Width of additional plate on top flange of girder

$t_{topplate} := 0 \cdot in$

Thickness of additional plate on top flange of girder

$$A_{topplate} := W_{topplate} \cdot t_{topplate} = 0\ in^2$$

$$I_{topplate} := \frac{W_{topplate} \cdot t_{topplate}^3}{12} = 0\ in^4$$

$W_{botplate} := 0 \cdot in$

Width of additional plate on bottom flange of girder

$t_{botplate} := 0 \cdot in$

Thickness of additional plate on bottom flange of girder

$$A_{botplate} := W_{botplate} \cdot t_{botplate} = 0\ in^2$$

$$I_{botplate} := \frac{W_{botplate} \cdot t_{botplate}^3}{12} = 0\ in^4$$

$d_0 := 300 \cdot in$

Transverse stiffener spacing

$d_{0\_end} := 15 \cdot in$

Distance from end support to transverse stiffener

$$y := \frac{A_{topplate} \cdot \left(\frac{t_{topplate}}{2} + D_{girder} + t_{botplate}\right) + A_{girder} \cdot \left(\frac{D_{girder}}{2} + t_{botplate}\right) + A_{botplate} \cdot \frac{t_{botplate}}{2}}{A_{topplate} + A_{girder} + A_{botplate}} = 18.15\ in$$

Distance to neutral axis of non-composite girder

$$I := I_x + A_{girder} \cdot \left(t_{botplate} + \frac{D_{girder}}{2} - y\right)^2 + I_{topplate} + A_{topplate} \cdot \left(t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y\right)^2 + I_{botplate} + A_{botplate} \cdot \left(y - \frac{t_{botplate}}{2}\right)^2 = \left(1.15 \cdot 10^4\right)\ in^4$$

Moment of inertia of non-composite girder

$$S_{x\_pos} := \frac{I}{y} = 633.609\ in^3$$

Section modulus of non-composite girder

$$e_g := t_{botplate} + D_{girder} + H - t_{flange} + \frac{Deck_T}{2} - y = 23.97\ in$$

$$K_{g\_pos} := n \cdot \left(I + \left(A_{girder} + A_{topplate} + A_{botplate}\right) \cdot e_g^{\ 2}\right) = \left(3.891 \cdot 10^5\right)\ in^4$$

Composite Section Properties Interior Girder

Short Term / Transient (n)

$$A_{deck} := \frac{S \cdot Deck_T}{n} \qquad I_{deck} := \frac{S \cdot Deck_T^{\ 3}}{12 \cdot n}$$

$$y_{STC} := \frac{A_{topplate} \cdot \left(\frac{t_{topplate}}{2} + D_{girder} + t_{botplate}\right) + A_{girder} \cdot \left(\frac{D_{girder}}{2} + t_{botplate}\right) + A_{botplate} \cdot \left(\frac{t_{botplate}}{2}\right) + A_{deck} \cdot \left(t_{botplate} + D_{girder} + H - t_{flange} + \frac{Deck_T}{2}\right)}{A_{topplate} + A_{girder} + A_{botplate} + A_{deck}} = 32.558\ in$$

Distance to neutral axis of composite girder for short term loads

$$d_{girder} := t_{botplate} + \frac{D_{girder}}{2} - y_{STC}$$

$$d_{topplate} := t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y_{STC}$$

$$d_{botplate} := y_{STC} - \frac{t_{botplate}}{2}$$

$$d_{deck} := t_{botplate} + D_{girder} - t_{flange} + H + \frac{Deck_T}{2} - y_{STC}$$

$$I_{STC} := I_x + A_{girder} \cdot \left(d_{girder}\right)^2 + I_{topplate} + A_{topplate} \cdot \left(d_{topplate}\right)^2 + I_{botplate} + A_{botplate} \cdot \left(d_{botplate}\right)^2 + I_{deck} + A_{deck} \cdot \left(d_{deck}\right)^2 = \left(3.044 \cdot 10^4\right)\ in^4$$

Moment of inertia of composite girder for short term loads

$$S_{xSTC} := \frac{I_{STC}}{y_{STC}} = 935.014\ in^3$$

Section modulus of composite girder for short term loads

Long Term (3n)

$$A_{deck} := \frac{S \cdot Deck_T}{3\ n} \qquad I_{deck} := \frac{S \cdot Deck_T^{\ 3}}{12 \cdot 3\ n}$$

$$y_{LTC} := \frac{A_{topplate} \cdot \left(\frac{t_{topplate}}{2} + D_{girder} + t_{botplate}\right) + A_{girder} \cdot \left(\frac{D_{girder}}{2} + t_{botplate}\right) + A_{botplate} \cdot \left(\frac{t_{botplate}}{2}\right) + A_{deck} \cdot \left(t_{botplate} + D_{girder} + H - t_{flange} + \frac{Deck_T}{2}\right)}{A_{topplate} + A_{girder} + A_{botplate} + A_{deck}} = 26.164\ in$$

$$d_{girder} := t_{botplate} + \frac{D_{girder}}{2} - y_{LTC}$$

Distance to neutral axis of composite girder for long term loads

$$d_{topplate} := t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y_{LTC}$$

$$d_{botplate} := y_{LTC} - \frac{t_{botplate}}{2}$$

$$d_{deck} := t_{botplate} + D_{girder} - t_{flange} + H + \frac{Deck_T}{2} - y_{LTC}$$

$$I_{LTC} := I_x + A_{girder} \cdot (d_{girder})^2 + I_{topplate} + A_{topplate} \cdot (d_{topplate})^2 + I_{botplate} + A_{botplate} \cdot (d_{botplate})^2 + I_{deck} + A_{deck} \cdot (d_{deck})^2 = (2.194 \cdot 10^4)\ in^4$$

Moment of inertia of composite girder for long term loads

$$S_{xLTC} := \frac{I_{LTC}}{y_{LTC}} = 838.561\ in^3$$

Section modulus of composite girder for long term loads

Plastic Moments Interior Girder ----- AASHTO Table D6.1-1

$$P_t := W_{flange} \cdot t_{flange} \cdot F_y = 713.9\ kip$$
$$P_w := (D_{girder} - 2 \cdot t_{flange}) \cdot t_{web} \cdot F_y = (1.23 \cdot 10^3)\ kip$$
$$P_c := P_t = 713.9\ kip$$
$$P_{topplate} := A_{topplate} \cdot F_y = 0\ kip$$
$$P_{botplate} := A_{botplate} \cdot F_y = 0\ kip$$
$$P_s := 0.85 \cdot f'_c \cdot S \cdot Deck_T = (1.895 \cdot 10^3)\ kip$$
$$D := D_{girder} - 2\ t_{flange} = 33.94\ in$$

Forces in each component of the composite girder at the plastic moment

Case I - PNA in Web

$$Y_{web} := \frac{(D)}{2} \cdot \left(\frac{P_t + P_{botplate} - P_c - P_{topplate} - P_s}{P_w} + 1\right) = -9.165\ in$$

$$y_{web} := t_{botplate} + D_{girder} - t_{flange} - Y_{web} = 44.285\ in$$

$$d_{slab} := \frac{Deck_T}{2} + H + Y_{web}$$

t_{flange}

$$d_{comp} := \frac{t_{flange}}{2} + Y_{web}$$

$$d_{topplate} := \frac{t_{topplate}}{2} + t_{flange} + Y_{web}$$

$$d_{ten} := y_{web} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{web} - \frac{t_{botplate}}{2}$$

$$M_{p\_web} := \frac{P_w}{2 \cdot D} \cdot \left(Y_{web}^{\ 2} + \left(D - Y_{web}\right)^2\right) + \left(P_s \cdot \left(d_{slab}\right) + P_c \cdot \left(d_{comp}\right) + P_{topplate} \cdot \left(d_{topplate}\right) + P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{botplate}\right)\right) = \left(4.681 \cdot 10^3\right)\ kip \cdot ft$$

Plastic moment when PNA is in the web

Case II - PNA in Flange

$$Y_{flange} := \left(\frac{t_{flange} + t_{topplate}}{2}\right) \cdot \left(\frac{P_w + P_t + P_{botplate} - P_s}{P_c + P_{topplate}} + 1\right) = 0.631\ in$$

$$y_{flange} := t_{botplate} + D_{girder} - Y_{flange} = 35.669\ in$$

$$d_{slab} := \frac{Deck_T}{2} + H - \left(t_{flange} + t_{topplate} - Y_{flange}\right)$$

$$d_{ten} := y_{flange} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{flange} - \frac{t_{botplate}}{2}$$

$$d_{web} := \frac{D_{girder}}{2} - Y_{flange}$$

$$M_{p\_flange} := \frac{P_c + P_{topplate}}{2\ \left(t_{flange} + t_{topplate}\right)} \cdot \left(Y_{flange}^{\ 2} + \left(t_{flange} + t_{topplate} - Y_{flange}\right)^2\right) + \left(P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{botplate}\right) + P_w \cdot \left(d_{web}\right) + P_s \cdot \left(d_{slab}\right)\right) = \left(4.919 \cdot 10^3\right)\ kip \cdot ft$$

Plastic moment when PNA is in the flange

Case III - PNA in Slab

$$Y_{slab} := Deck_T \cdot \left(\frac{P_c + P_{topplate} + P_w + P_t + P_{botplate}}{P_s}\right) = 11.223\ in$$

$$y_{slab} := t_{botplate} + D_{girder} + H - t_{flange} + Deck_T - Y_{slab} = 34.897\ in$$

$$d_{comp} := y_{slab} - t_{botplate} - D_{girder} + \frac{t_{flange}}{2}$$

$$d_{topplate} := y_{slab} - t_{botplate} - D_{girder} - \frac{t_{topplate}}{}$$

$$d_{ten} := y_{slab} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{slab} - \frac{t_{botplate}}{2}$$

$$d_{web} := y_{slab} - t_{botplate} - \frac{D_{girder}}{2}$$

$$M_{p\_slab} := \left(\frac{Y_{slab}^{2} \cdot P_s}{2\ Deck_T}\right) + \left(P_{topplate} \cdot \left(d_{topplate}\right) + P_c \cdot \left(d_{comp}\right) + P_w \cdot \left(d_{web}\right) + P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{botplate}\right)\right) = \left(4.953 \cdot 10^{3}\right)\ kip \cdot ft$$

Plastic moment when PNA is in the slab

$$M_{p\_Location} := \left\| \begin{array}{l} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_s \\ \quad \text{"PNA in Web"} \\ \text{else} \\ \quad \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_s \\ \quad\quad \text{"PNA in Flange"} \\ \quad \text{else} \\ \quad\quad \text{"PNA in Slab"} \end{array} \right. = \text{"PNA in Flange"}$$

$$M_{p\_pos} := \left\| \begin{array}{l} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_s \\ \quad M_{p\_web} \\ \text{else} \\ \quad \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_s \\ \quad\quad M_{p\_flange} \\ \quad \text{else} \\ \quad\quad M_{p\_slab} \end{array} \right. = \left(4.919 \cdot 10^{3}\right)\ (kip \cdot ft)$$

Plastic Moment of the composite section

Nominal Flextural Resistance - Compression Flange Continuously Braced by Deck

Service Limit State

$f_{f\_top\_pos} := 0.95 \cdot F_y = 47.5\ ksi$ Allowable Stress in the top flange

$f_{f\_bot\_pos} := 0.95 \cdot F_y = 47.5\ ksi$ Allowable Stress in the bottom flange

f_l term can be ignored

Strength Limit State

$$D_{cp} := \begin{cases} \text{if } M_{p\_Location} = \text{“PNA in Web”} \\ \quad \dfrac{D}{2} \cdot \left(\dfrac{F_y \cdot (A_{botplate} - A_{topplate}) - (0.85 \cdot f'_c \cdot S \cdot Deck_T)}{F_y \cdot D \cdot t_{web}} + 1 \right) \\ \text{else} \\ \quad 0 \cdot in \end{cases} = 0\ in$$

$$D_t := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T = 46.12\ in$$

$$D_p := \begin{cases} \text{if } M_{p\_Location} = \text{“PNA in Web”} \\ \quad D_t - y_{web} \\ \text{else if } M_{p\_Location} = \text{“PNA in Flange”} \\ \quad D_t - y_{flange} \\ \text{else} \\ \quad D_t - y_{slab} \end{cases} = 10.451\ in$$

$$Compactness := \begin{cases} \text{if } \dfrac{D}{t_{web}} > 150 \\ \quad \text{“non compact”} \\ \text{else if } \dfrac{2 \cdot D_{cp}}{t_{web}} > 3.76 \cdot \sqrt{\dfrac{E_{steel}}{F_y}} \\ \quad \text{“non compact”} \\ \text{else} \\ \quad \text{“compact”} \end{cases} = \text{“compact”}$$

Compactness check

$$M_{n\_pos} := \begin{cases} \text{if } Compactness = \text{“compact”} \\ \quad \text{if } D_p \le 0.1 \cdot D_t \\ \quad\quad M_{p\_pos} \\ \quad \text{else} \\ \quad\quad M_{p\_pos} \cdot \left(1.07 - 0.7\ \dfrac{D_p}{D_t} \right) \\ \text{else} \\ \quad \text{“noncompact – check code”} \end{cases} = \left(4.483 \cdot 10^3\right)\ (kip \cdot ft)$$

Moment Capacity of the Composite Girder in Positive Bending for an Interior Girder

Nominal Shear Resistance

Strength Limit State

$V_p := 0.58 \cdot F_y \cdot D \cdot t_{web} = 713.589\ kip$ Shear Capacity of the web

$k := 5 + \dfrac{5}{\left(\dfrac{d_0}{D}\right)^2} = 5.064$ k value for typical web section with stiffeners

$k_{end} := 5 + \dfrac{5}{\left(\dfrac{d_{0\_end}}{D}\right)^2} = 30.598$ k value for end section of web above supports

$$C := \begin{cases} 1 & \text{if } \dfrac{D}{t_{web}} \le 1.12 \cdot \sqrt{\dfrac{E_{steel} \cdot k}{F_y}} \\ \dfrac{1.12}{\left(\dfrac{D}{t_{web}}\right)} \sqrt{\dfrac{E_{steel} \cdot k}{F_y}} & \text{else if } 1.12 \cdot \sqrt{\dfrac{E_{steel} \cdot k}{F_y}} < \dfrac{D}{t_{web}} \le 1.40 \cdot \sqrt{\dfrac{E_{steel} \cdot k}{F_y}} \\ \dfrac{1.57}{\left(\dfrac{D}{t_{web}}\right)^2} \left(\dfrac{E_{steel} \cdot k}{F_y}\right) & \text{else} \end{cases} = 1$$

C value for typical web section with stiffeners

$$C_{end} := \begin{cases} 1 & \text{if } \dfrac{D}{t_{web}} \le 1.12 \cdot \sqrt{\dfrac{E_{steel} \cdot k_{end}}{F_y}} \\ \dfrac{1.12}{\left(\dfrac{D}{t_{web}}\right)} \sqrt{\dfrac{E_{steel} \cdot k_{end}}{F_y}} & \text{else if } 1.12 \cdot \sqrt{\dfrac{E_{steel} \cdot k_{end}}{F_y}} < \dfrac{D}{t_{web}} \le 1.40 \cdot \sqrt{\dfrac{E_{steel} \cdot k_{end}}{F_y}} \\ \dfrac{1.57}{\left(\dfrac{D}{t_{web}}\right)^2} \left(\dfrac{E_{steel} \cdot k_{end}}{F_y}\right) & \text{else} \end{cases} = 1$$

C value for end section of web above supports

$$V_{n\_int} := \begin{cases} V_p \cdot \left(C + \dfrac{0.87\,(1-C)}{\sqrt{1+\left(\dfrac{d_0}{D}\right)^2}}\right) & \text{if } \dfrac{2\,D \cdot t_{web}}{(2\,W_{flange} \cdot t_{flange})} \le 2.5 \\ V_p \cdot \left(C + \dfrac{0.87\,(1-C)}{\sqrt{1+\left(\dfrac{d_0}{D}\right)^2} + \dfrac{d_0}{D}}\right) & \text{else} \end{cases} = 713.589\ kip$$

Shear capacity of girder with stiffeners

$$V_{n\_end} := C_{end} \cdot V_p = 713.589\ kip$$

Shear capacity of end section of girder with stiffeners

Composite Section Properties Exterior Girder

Short Term / Transient (n)

$$A_{deck} := \frac{S_{ext} \cdot Deck_T}{n} \qquad I_{deck} := \frac{S_{ext} \cdot Deck_T^{\,3}}{12 \cdot n}$$

$$y_{STC} := \frac{A_{topplate} \cdot \left(\frac{t_{topplate}}{2} + D_{girder} + t_{botplate}\right) + A_{girder} \cdot \left(\frac{D_{girder}}{2} + t_{botplate}\right) + A_{botplate} \cdot \left(\frac{t_{botplate}}{2}\right) + A_{deck} \cdot \left(t_{botplate} + D_{girder} + H - t_{flange} + \frac{Deck_T}{2}\right)}{A_{topplate} + A_{girder} + A_{botplate} + A_{deck}} = 31.736\ in$$

Distance to neutral axis of composite girder for short term loads

$$d_{girder} := t_{botplate} + \frac{D_{girder}}{2} - y_{STC}$$

$$d_{topplate} := t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y_{STC}$$

$$d_{botplate} := y_{STC} - \frac{t_{botplate}}{2}$$

$$d_{deck} := t_{botplate} + D_{girder} - t_{flange} + H + \frac{Deck_T}{2} - y_{STC}$$

$$I_{STC} := I_x + A_{girder} \cdot (d_{girder})^2 + I_{topplate} + A_{topplate} \cdot (d_{topplate})^2 + I_{botplate} + A_{botplate} \cdot (d_{botplate})^2 + I_{deck} + A_{deck} \cdot (d_{deck})^2 = \left(2.933 \cdot 10^4\right)\ in^4$$

Moment of inertia of composite girder for short term loads

$$S_{xSTC\_ext} := \frac{I_{STC}}{y_{STC}} = 924.159\ in^3$$

Section modulus of composite girder for short term loads

Long Term (3n)

$$A_{deck} := \frac{S_{ext} \cdot Deck_T}{3\ n} \qquad I_{deck} := \frac{S_{ext} \cdot Deck_T^{\,3}}{12 \cdot 3\ n}$$

$$y_{LTC} := \frac{A_{topplate} \cdot \left(\frac{t_{topplate}}{2} + D_{girder} + t_{botplate}\right) + A_{girder} \cdot \left(\frac{D_{girder}}{2} + t_{botplate}\right) + A_{botplate} \cdot \left(\frac{t_{botplate}}{2}\right) + A_{deck} \cdot \left(t_{botplate} + D_{girder} + H - t_{flange} + \frac{Deck_T}{2}\right)}{A_{topplate} + A_{girder} + A_{botplate} + A_{deck}} = 25.429\ in$$

Distance to neutral axis of composite girder for long term loads

$$d_{girder} := t_{botplate} + \frac{D_{girder}}{2} - y_{LTC}$$

$$d_{topplate} := t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y_{LTC}$$

$$d_{botplate} := y_{LTC} - \frac{t_{botplate}}{2}$$

$$d_{deck} := t_{botplate} + D_{girder} - t_{flange} + H + \frac{t_{deck}}{2} - y_{LTC}$$

$$I_{LTC} := I_x + A_{girder} \cdot (d_{girder})^2 + I_{topplate} + A_{topplate} \cdot (d_{topplate})^2 + I_{botplate} + A_{botplate} \cdot (d_{botplate})^2 + I_{deck} + A_{deck} \cdot (d_{deck})^2 = (2.098 \cdot 10^4)\ in^4$$

Moment of inertia of composite girder for long term loads

$$S_{xLTC\_ext} := \frac{I_{LTC}}{y_{LTC}} = 824.911\ in^3$$

Section modulus of composite girder for slong term loads

Plastic Moments Exterior Girder ----- AASHTO Table D6.1-1

$$P_t := W_{flange} \cdot t_{flange} \cdot F_y = 713.9\ kip$$
$$P_w := (D_{girder} - 2 \cdot t_{flange}) \cdot t_{web} \cdot F_y = (1.23 \cdot 10^3)\ kip$$
$$P_c := P_t = 713.9\ kip$$
$$P_{topplate} := A_{topplate} \cdot F_y = 0\ kip$$
$$P_{botplate} := A_{botplate} \cdot F_y = 0\ kip$$
$$P_s := 0.85 \cdot f'_c \cdot S_{ext} \cdot Deck_T = (1.645 \cdot 10^3)\ kip$$
$$D := D_{girder} - 2\ t_{flange} = 33.94\ in$$

Forces in each component of the composite girder at the plastic moment

Case I - PNA in Web

$$Y_{web} := \frac{(D)}{2} \cdot \left(\frac{P_t + P_{botplate} - P_c - P_{topplate} - P_s}{P_w} + 1 \right) = -5.72\ in$$

$$y_{web} := t_{botplate} + D_{girder} - t_{flange} - Y_{web} = 40.84\ in$$

$$d_{slab} := \frac{Deck_T}{2} + H + Y_{web}$$

$$d_{comp} := \frac{t_{flange}}{2} + Y_{web}$$

$$d_{topplate} := \frac{t_{topplate}}{2} + t_{flange} + Y_{web}$$

$$d_{ten} := y_{web} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{web} - \frac{t_{botplate}}{2}$$

$$M_{p\_web} := \frac{P_w}{2 \cdot D} \cdot \left(Y_{web}^2 + (D - Y_{web})^2 \right) + (P_s \cdot (d_{slab}) + P_c \cdot (d_{comp}) + P_{topplate} \cdot (d_{topplate}) + P_t \cdot (d_{ten}) + P_{botplate} \cdot (d_{botplate})) = (4.69 \cdot 10^3)\ kip \cdot ft$$

Case II - PNA in Flange

Plastic moment when PNA is in the web

$$Y_{flange} := \left(\frac{t_{flange} + t_{topplate}}{2}\right) \cdot \left(\frac{P_w + P_t + P_{botplate} - P_s}{P_c + P_{topplate}} + 1\right) = 0.837\ in$$

$$y_{flange} := t_{botplate} + D_{girder} - Y_{flange} = 35.463\ in$$

$$d_{slab} := \frac{Deck_T}{2} + H - \left(t_{flange} + t_{topplate} - Y_{flange}\right)$$

$$d_{ten} := y_{flange} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{flange} - \frac{t_{botplate}}{2}$$

$$d_{web} := \frac{D_{girder}}{2} - Y_{flange}$$

$$M_{p\_flange} := \frac{P_c + P_{topplate}}{2\ \left(t_{flange} + t_{topplate}\right)} \cdot \left(Y_{flange}^{\ 2} + \left(t_{flange} + t_{topplate} - Y_{flange}\right)^2\right) + \left(P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{botplate}\right) + P_w \cdot \left(d_{web}\right) + P_s \cdot \left(d_{slab}\right)\right) = \left(4.783 \cdot 10^3\right)\ kip \cdot ft$$

Case III - PNA in Slab

Plastic moment when PNA is in the flange

$$Y_{slab} := Deck_T \cdot \left(\frac{P_c + P_{topplate} + P_w + P_t + P_{botplate}}{P_s}\right) = 12.927\ in$$

$$y_{slab} := t_{botplate} + D_{girder} + H - t_{flange} + Deck_T - Y_{slab} = 33.193\ in$$

$$d_{comp} := y_{slab} - t_{botplate} - D_{girder} + \frac{t_{flange}}{2}$$

$$d_{topplate} := y_{slab} - t_{botplate} - D_{girder} - \frac{t_{topplate}}{2}$$

$$d_{ten} := y_{slab} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{slab} - \frac{t_{botplate}}{2}$$

$$d_{web} := y_{slab} - t_{botplate} - \frac{D_{girder}}{2}$$

$$M_{p\_slab} := \left(\frac{Y_{slab}^{\ 2} \cdot P_s}{2\ Deck_T}\right) + \left(P_{topplate} \cdot \left(d_{topplate}\right) + P_c \cdot \left(d_{comp}\right) + P_w \cdot \left(d_{web}\right) + P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{botplate}\right)\right) = \left(4.764 \cdot 10^3\right)\ kip \cdot ft$$

Plastic moment when PNA is in the slab

$$M_{p\_Location} := \begin{cases} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_s \\ \quad \text{"PNA in Web"} \\ \text{else} \\ \quad \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_s \\ \quad\quad \text{"PNA in Flange"} \\ \quad \text{else} \\ \quad\quad \text{"PNA in Slab"} \end{cases} = \text{"PNA in Flange"}$$

$$M_{p\_pos\_ext} := \begin{cases} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_s \\ \quad M_{p\_web} \\ \text{else} \\ \quad \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_s \\ \quad\quad M_{p\_flange} \\ \quad \text{else} \\ \quad\quad M_{p\_slab} \end{cases} = \left(4.783 \cdot 10^3\right) (kip \cdot ft)$$

Plastic Moment of the composite section in negative bending

Nominal Flextural Resistance - Compression Flange Continuously Braced by Deck

Service Limit State

$f_{f\_top\_pos\_ext} := 0.95 \cdot F_y = 47.5\ ksi$ Allowable Stress in the top flange

$f_{f\_bot\_pos\_ext} := 0.95 \cdot F_y = 47.5\ ksi$ Allowable Stress in the bottom flange

f_l term can be ignored

Strength Limit State

$$D_{cp} := \begin{cases} \text{if } M_{p\_Location} = \text{"PNA in Web"} \\ \quad \dfrac{D}{2} \cdot \left(\dfrac{F_y \cdot \left(A_{botplate} - A_{topplate}\right) - \left(0.85 \cdot f'_c \cdot S_{ext} \cdot Deck_T\right)}{F_y \cdot D \cdot t_{web}} + 1 \right) \\ \text{else} \\ \quad 0 \cdot in \end{cases} = 0\ in$$

$$D_t := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T = 46.12\ in$$

$$D_p := \begin{cases} \text{if } M_{p\_Location} = \text{“PNA in Web”} \\ \quad D_t - y_{web} \\ \text{else if } M_{p\_Location} = \text{“PNA in Flange”} \\ \quad D_t - y_{flange} \\ \text{else} \\ \quad D_t - y_{slab} \end{cases} = 10.657\ in$$

$$Compactness := \begin{cases} \text{if } \dfrac{D}{t_{web}} > 150 \\ \quad \text{“non compact”} \\ \text{else if } \dfrac{2 \cdot D_{cp}}{t_{web}} > 3.76 \cdot \sqrt{\dfrac{E_{steel}}{F_y}} \\ \quad \text{“non compact”} \\ \text{else} \\ \quad \text{“compact”} \end{cases} = \text{“compact”}$$

Compactness check

$$M_{n\_pos\_ext} := \begin{cases} \text{if } D_p \le 0.1 \cdot D_t \\ \quad M_{p\_pos\_ext} \\ \text{else} \\ \quad M_{p\_pos\_ext} \cdot \left(1.07 - 0.7\ \dfrac{D_p}{D_t}\right) \end{cases} = \left(4.344 \cdot 10^3\right)\ (kip \cdot ft)$$

Moment Capacity of the Composite Girder in Positive Bending for an Interior Girder

Negative Flexture--- Section W36x210

$A_{girder} := 61.8\ in^2$ Area of the steel section

$I_x := 13200 \cdot in^4$ Moment of inertia of the section

$D_{girder} := 36.7 \cdot in$ Depth of the girder

$W_{flange} := 12.2 \cdot in$ Width of the flange

$t_{flange} := 1.36 \cdot in$ Thickness of the flange

$t_{web} := .830 \cdot in$ Thickness of the web

$W_{topplate} := 10 \cdot in$ Width of additional plate added to top flange

$t_{topplate} := 1 \cdot in$ Thickness of additional plate added to top flange

$A_{topplate} := W_{topplate} \cdot t_{topplate} = 10\ in^2$

$I_{topplate} := \frac{W_{topplate} \cdot t_{topplate}^3}{12} = 0.833\ in^4$

$W_{botplate} := 10 \cdot in$ Width of additional plate added to bottom flange

$t_{botplate} := 1 \cdot in$ Thickness of additional plate added to bottom flange

$A_{botplate} := W_{botplate} \cdot t_{botplate} = 10\ in^2$

$I_{botplate} := \frac{W_{botplate} \cdot t_{botplate}^3}{12} = 0.833\ in^4$

$A_{rt} := 6.26 \cdot in^2$ Area of upper long. deck steel

$d_{rt} := 2 \cdot in$ Depth of upper long. deck steel

$A_{rb} := 4.03 \cdot in^2$ Area of lower long. deck steel

$d_{rb} := 7 \cdot in$ Depth of upper long. deck steel

$A_{rt\_ext} := 3.75 \cdot in^2$ Area of upper long. deck steel in exterior girder

$A_{rb\_ext} := 2.48 \cdot in^2$ Area of lower long. deck steel in exterior girder

$d_0 := 144 \cdot in$ Transverse stiffener spacing

$d_{0\_end} := 144 \cdot in$ Distance from support to transverse stiffener (if stiffener is at support then set d_{0_end} to d_0)

$$y := \frac{A_{topplate} \cdot \left(\frac{t_{topplate}}{2} + D_{girder} + t_{botplate}\right) + A_{girder} \cdot \left(\frac{D_{girder}}{2} + t_{botplate}\right) + A_{botplate} \cdot \frac{t_{botplate}}{2}}{A_{topplate} + A_{girder} + A_{botplate}} = 19.35\ in$$

Distance to neutral axis of non-composite section

$$I_{neg} := I_x + A_{girder} \cdot \left(t_{botplate} + \frac{D_{girder}}{2} - y\right)^2 + I_{topplate} + A_{topplate} \cdot \left(t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y\right)^2 + I_{botplate} + A_{botplate} \cdot \left(y - \frac{t_{botplate}}{2}\right)^2 = \left(2.031 \cdot 10^4\right)\ in^4$$

Moment of inetria of non-composite section

$$S_{x\_neg} := \frac{I_{neg}}{t_{botplate} + D_{girder} + t_{topplate} - y} = \left(1.05 \cdot 10^3\right)\ in^3$$

Section modulus of non-composite section

$$e_g := t_{botplate} + D_{girder} + H - t_{flange} + \frac{Deck_T}{2} - y = 23.99\ in$$

$$K_{g\_neg} := n \cdot \left(I + \left(A_{girder} + A_{topplate} + A_{botplate}\right) \cdot e_g^{\ 2}\right) = \left(5.389 \cdot 10^5\right)\ in^4$$

Composite Section Properties Interior Girder

$$d_{topplate} := \frac{t_{topplate}}{2} + D_{girder} + t_{botplate}$$

$$d_{girder} := \frac{D_{girder}}{2} + t_{botplate}$$

$$d_{botplate} := \frac{t_{botplate}}{2}$$

$$dd_{rt} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rt}$$

$$dd_{rb} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rb}$$

$$y := \frac{A_{topplate} \cdot (d_{topplate}) + A_{girder} \cdot (d_{girder}) + A_{botplate} \cdot (d_{botplate}) + A_{rt} \cdot (dd_{rt}) + A_{rb} \cdot (dd_{rb})}{A_{topplate} + A_{girder} + A_{botplate} + A_{rt} + A_{rb}} = 22.035\ in$$

Distance to neutral axis of composite section

$$d_{topplate} := t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y$$

$$d_{girder} := t_{botplate} + \frac{D_{girder}}{2} - y$$

$$d_{botplate} := y - \frac{t_{botplate}}{2}$$

$$dd_{rt} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rt} - y$$

$$dd_{rb} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rb} - y$$

Moment of inetria of composite section

$$I_{comp\_neg} := I_x + A_{girder} \cdot (d_{girder})^2 + I_{topplate} + A_{topplate} \cdot (d_{topplate})^2 + I_{botplate} + A_{botplate} \cdot (d_{botplate})^2 + A_{rt} \cdot (dd_{rt})^2 + A_{rb} \cdot (dd_{rb})^2 = (2.565 \cdot 10^4)\ in^4$$

$$S_{x\_comp\_neg\_rt} := \frac{I_{comp\_neg}}{(t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rt} - y)} = (1.101 \cdot 10^3)\ in^3$$

Section Modulus to top reinforcing steel

$$S_{x\_comp\_neg\_tf} := \frac{I_{comp\_neg}}{(t_{botplate} + D_{girder} + t_{topplate} - y)} = (1.539 \cdot 10^3)\ in^3$$

Section Modulus to top flange

$$S_{x\_comp\_neg\_bf} := \frac{I_{comp\_neg}}{y} = (1.164 \cdot 10^3)\ in^3$$

Section Modulus to bottom flange

Plastic Moments Interior Girder----- AASHTO Table D6.1-2

$$P_t := W_{flange} \cdot t_{flange} \cdot F_y = 829.6\ kip$$
$$P_w := (D_{girder} - 2 \cdot t_{flange}) \cdot t_{web} \cdot F_y = (1.41 \cdot 10^3)\ kip$$
$$P_c := P_t = 829.6\ kip$$
$$P_{topplate} := A_{topplate} \cdot F_y = 500\ kip$$
$$P_{botplate} := A_{botplate} \cdot F_y = 500\ kip$$
$$P_{rt} := A_{rt} \cdot F_{y\_rebar} = 250.4\ kip$$
$$P_{rb} := A_{rb} \cdot F_{y\_rebar} = 161.2\ kip$$

Forces in each component of the composite girder at the plastic moment in negative bending

$D := D_{girder} - 2\ t_{flange} = 33.98\ in$

Case I - PNA in Web

$$Y_{web} := \frac{(D)}{2} \cdot \left(\frac{P_t + P_{botplate} - P_c - P_{topplate} - P_{rt} - P_{rb}}{P_w} + 1 \right) = 12.031\ in$$

$$y_{web} := t_{botplate} + D_{girder} - t_{flange} - Y_{web} = 24.309\ in$$

Distance to the plastic neutral axis if it is located in the web

$$d_{comp} := \frac{t_{flange}}{2} + Y_{web}$$

$$d_{topplate} := \frac{t_{topplate}}{2} + t_{flange} + Y_{web}$$

$$d_{ten} := y_{web} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{web} - \frac{t_{botplate}}{2}$$

$$dd_{rt} := Y_{web} + H + Deck_T - d_{rt}$$

$$dd_{rb} := Y_{web} + H + Deck_T - d_{rb}$$

Plastic moment if the PNA is located in the web

$$M_{p\_web} := \frac{P_w}{2 \cdot D} \cdot \left(Y_{web}^{\ 2} + (D - Y_{web})^2 \right) + \left(P_c \cdot (d_{comp}) + P_{topplate} \cdot (d_{topplate}) + P_t \cdot (d_{ten}) + P_{botplate} \cdot (d_{botplate}) + P_{rt} \cdot (dd_{rt}) + P_{rb} \cdot (dd_{rb}) \right) = \left(5.752 \cdot 10^3\right)\ kip \cdot ft$$

Case II - PNA in Flange

$$Y_{flange} := \left(\frac{t_{flange} + t_{topplate}}{2} \right) \cdot \left(\frac{P_w + P_t + P_{botplate} - P_{rt} - P_{rb}}{P_c + P_{topplate}} + 1 \right) = 3.246\ in$$

$$y_{flange} := t_{botplate} + D_{girder} - Y_{flange} = 34.454\ in$$

Distance to the plastic neutral axis if it is located in the flange

$$d_Y := t_{flange} + t_{topplate} - Y_{flange}$$

$$d_{web} := \frac{D_{girder}}{2} - Y_{flange}$$

$$d_{ten} := y_{flange} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{bot} := y_{flange} - \frac{t_{botplate}}{2}$$

$$dd_{rt} := H - t_{topplate} - t_{flange} + Y_{flange} + Deck_T - d_{rt}$$

$$dd_{rb} := H - t_{topplate} - t_{flange} + Y_{flange} + Deck_T - d_{rb}$$

Plastic moment if the PNA is located in the flange

$$M_{p\_flange} := \frac{P_c + P_{topplate}}{2\ (t_{flange} + t_{topplate})} \cdot \left(Y_{flange}{}^2 + (d_Y)^2\right) + \left(P_t \cdot (d_{ten}) + P_{botplate} \cdot (d_{bot}) + P_w \cdot (d_{web}) + P_{rt} \cdot (dd_{rt}) + P_{rb} \cdot (dd_{rt})\right) = \left(6.06 \cdot 10^3\right)\ kip \cdot ft$$

$$M_{p\_Location} := \begin{array}{l} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_{rt} + P_{rb} \\ \quad \text{“PNA in Web”} \\ \text{else} \\ \quad \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_{rt} + P_{rb} \\ \quad\quad \text{“PNA in Flange”} \\ \quad \text{else} \\ \quad\quad \text{“Otherwise”} \end{array} = \text{“PNA in Web”}$$

$$M_{p\_neg} := \begin{array}{l} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_{rt} + P_{rb} \\ \quad M_{p\_web} \\ \text{else} \\ \quad \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_{rt} + P_{rb} \\ \quad\quad M_{p\_flange} \\ \quad \text{else} \\ \quad\quad M_{p\_slab} \end{array} = \left(5.752 \cdot 10^3\right)\ (kip \cdot ft)$$

Plastic moment of the composite section in negative bending

Nominal Flextural Resistance - Compression Flange Discretely Braced by Braces

Service Limit State

$$f_{f\_top\_neg} := 0.95 \cdot F_y = 47.5\ ksi$$

Allowable Stress in the top flange

$$f_{f\_bot\_neg} := 0.95 \cdot F_y = 47.5\ ksi$$

Allowable Stress in the bottom flange

f_l term can be ignored

Strength Limit State

$$\lambda_f := \frac{W_{flange}}{2 \cdot t_{flange}} = 4.485$$

$$\lambda_{pf} := 0.38 \cdot \sqrt{\frac{E_{steel}}{F_y}} = 9.152$$

$$\lambda_{rf} := 0.56 \cdot \sqrt{\frac{E_{steel}}{F_y}} = 13.487$$

$$\lambda_{rw} := 5.7 \cdot \sqrt{\frac{E_{steel}}{F_y}} = 137.274$$

$$D_c := y - t_{flange} - t_{botplate} = 19.675\ in$$

$$a_{wc} := \frac{2\ D_c \cdot t_{web}}{W_{flange} \cdot t_{flange}} = 1.968$$

$R_h := 1$

Hybrid Factor, 1 if Fy of flange and web are the same

$$R_b := \begin{cases} \text{if } \dfrac{2 \cdot D_c}{t_{web}} \le \lambda_{rw} \\ \quad 1 \\ \text{else} \\ \quad 1 - \left(\dfrac{a_{wc}}{1200 + 300 \cdot a_{wc}}\right)\left(\dfrac{2\ D_c}{t_{web}} - \lambda_{rw}\right) \end{cases} = 1$$

$$F_{nc\_LB} := \begin{cases} \text{if } \lambda_f \le \lambda_{pf} \\ \quad R_h \cdot R_b \cdot F_y \\ \text{else} \\ \quad \left(1 - \left(1 - \dfrac{0.7\ F_y}{R_h \cdot F_y}\right)\left(\dfrac{\lambda_f - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}}\right)\right) \cdot R_b \cdot R_h \cdot F_y \end{cases} = 50\ ksi$$

Allowable stress in the compression flange for local bucking

$$r_t := \frac{W_{flange}}{\sqrt{12\left(1 + \frac{1}{3} \cdot \frac{D_c \cdot t_{web}}{W_{flange} \cdot t_{flange}}\right)}} = 3.056\ in$$

$L_b := S_{brace\_neg} = 12\ ft$ Unbraced length of the girders

$L_p := 1.0 \cdot r_t \cdot \sqrt{\frac{E_{steel}}{F_y}} = 6.133\ ft$

$L_r := \pi \cdot r_t \cdot \sqrt{\frac{E_{steel}}{F_y}} = 19.268\ ft$

$C_b := 1$ Beam bending coefficient

$$F_{nc\_LTB} := \begin{cases} R_b \cdot R_h \cdot F_y & \text{if } L_b \le L_p \\ C_b \cdot \left(1 - \left(1 - \frac{F_y}{R_h \cdot F_y}\right)\left(\frac{L_b - L_p}{L_r - L_p}\right)\right) \cdot R_h \cdot R_b \cdot F_y & \text{else if } L_p < L_b \le L_r \\ \frac{C_b \cdot R_b \cdot \pi^2 \cdot E_{steel}}{\left(\frac{L_b}{r_t}\right)^2} & \text{else} \end{cases} = 50\ ksi$$

Allowable stress in the compression flange for lateral torsional bucking

$F_{nc} := min\left(F_{nc\_LB}, F_{nc\_LTB}, R_h \cdot R_b \cdot F_y\right) = 50\ ksi$ Allowable stress in the compression flange for negative bending

$F_{nt} := R_h \cdot F_y = 50\ ksi$ Allowable stress in the tension flange for negative bending

Nominal Shear Resistance

Strength Limit State

$V_p := 0.58 \cdot F_y \cdot D \cdot t_{web} = 817.899\ kip$ Shear capacity of the web

$k := 5 + \frac{5}{\left(\frac{d_0}{D}\right)^2} = 5.278$ k value for interior of stiffened web

$k_{end} := 5 + \frac{5}{\left(\frac{d_{0\_end}}{D}\right)^2} = 5.278$ k value for end section of stiffened web

$$C := \begin{cases} 1 & \text{if } \frac{D}{t_{web}} \le 1.12 \cdot \sqrt{\frac{E_{steel} \cdot k}{F_y}} \\ \frac{1.12}{\left(\frac{D}{t_{web}}\right)} \sqrt{\frac{E_{steel} \cdot k}{F_y}} & \text{else if } 1.12 \cdot \sqrt{\frac{E_{steel} \cdot k}{F_y}} < \frac{D}{t_{web}} \le 1.40 \cdot \sqrt{\frac{E_{steel} \cdot k}{F_y}} \\ \frac{1.57}{\left(\frac{D}{t_{web}}\right)^2} \left(\frac{E_{steel} \cdot k}{F_y}\right) & \text{else} \end{cases} = 1$$

C value for interior of stiffened web

$$C_{end} := \begin{cases} 1 & \text{if } \frac{D}{t_{web}} \le 1.12 \cdot \sqrt{\frac{E_{steel} \cdot k_{end}}{F_y}} \\ \frac{1.12}{\left(\frac{D}{t_{web}}\right)} \sqrt{\frac{E_{steel} \cdot k_{end}}{F_y}} & \text{else if } 1.12 \cdot \sqrt{\frac{E_{steel} \cdot k_{end}}{F_y}} < \frac{D}{t_{web}} \le 1.40 \cdot \sqrt{\frac{E_{steel} \cdot k_{end}}{F_y}} \\ \frac{1.57}{\left(\frac{D}{t_{web}}\right)^2} \left(\frac{E_{steel} \cdot k_{end}}{F_y}\right) & \text{else} \end{cases} = 1$$

C value for end section of stiffened web

$$V_{n\_int\_neg} := \begin{cases} V_p \cdot \left(C + \frac{0.87\,(1-C)}{\sqrt{1+\left(\frac{d_0}{D}\right)^2}}\right) & \text{if } \frac{2\,D \cdot t_{web}}{\left(2\,W_{flange} \cdot t_{flange}\right)} \le 2.5 \end{cases} = 817.899\ kip$$

Shear capacity of interior section of stiffened girder

else

$$V_p \cdot \left(C + \frac{0.87\,(1-C)}{\sqrt{1+\left(\frac{d_0}{D}\right)^2} + \frac{d_0}{D}} \right)$$

Composite Section Properties Exterior Girder

$$d_{topplate} := \frac{t_{topplate}}{2} + D_{girder} + t_{botplate}$$

$$d_{girder} := \frac{D_{girder}}{2} + t_{botplate}$$

$$d_{botplate} := \frac{t_{botplate}}{2}$$

$$dd_{rt} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rt}$$

$$dd_{rb} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rb}$$

$$y := \frac{A_{topplate} \cdot \langle d_{topplate} \rangle + A_{girder} \cdot \langle d_{girder} \rangle + A_{botplate} \cdot \langle d_{botplate} \rangle + A_{rt\_ext} \cdot \langle dd_{rt} \rangle + A_{rb\_ext} \cdot \langle dd_{rb} \rangle}{A_{topplate} + A_{girder} + A_{botplate} + A_{rt\_ext} + A_{rb\_ext}} = 21.048\ in$$

Distance to neutral axis of composite section

$$d_{topplate} := t_{botplate} + D_{girder} + \frac{t_{topplate}}{2} - y$$

$$d_{girder} := t_{botplate} + \frac{D_{girder}}{2} - y$$

$$d_{botplate} := y - \frac{t_{botplate}}{2}$$

$$dd_{rt} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rt} - y$$

$$dd_{rb} := t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rb} - y$$

Moment of inetria of composite section

$$I_{comp\_neg\_ext} := I_x + A_{girder} \cdot \langle d_{girder} \rangle^2 + I_{topplate} + A_{topplate} \cdot \langle d_{topplate} \rangle^2 + I_{botplate} + A_{botplate} \cdot \langle d_{botplate} \rangle^2 + A_{rt\_ext} \cdot \langle dd_{rt} \rangle^2 + A_{rb\_ext} \cdot \langle dd_{rb} \rangle^2 = \left(2.368 \cdot 10^4\right)\ in^4$$

$$S_{x\_comp\_neg\_ext\_rt} := \frac{I_{comp\_neg\_ext}}{\left(t_{botplate} + D_{girder} - t_{flange} + H + Deck_T - d_{rt} - y\right)} = 974.82\ in^3$$

Section Modulus to top reinforcing steel

$$S_{x\_comp\_neg\_ext\_tf} := \frac{I_{comp\_neg\_ext}}{\left(t_{botplate} + D_{girder} + t_{topplate} - y\right)} = \left(1.342 \cdot 10^3\right)\ in^3$$

Section Modulus to top flange

$$S_{x\_comp\_neg\_ext\_bf} := \frac{I_{comp\_neg\_ext}}{y} = \left(1.125 \cdot 10^3\right)\ in^3$$

Section Modulus to bottom flange

Plastic Moments Exterior Girder----- AASHTO Table D6.1-2

$$P_t := W_{flange} \cdot t_{flange} \cdot F_y = 829.6\ kip$$
$$P_w := \left(D_{girder} - 2 \cdot t_{flange}\right) \cdot t_{web} \cdot F_y = \left(1.41 \cdot 10^3\right)\ kip$$
$$P_c := P_t = 829.6\ kip$$
$$P_{topplate} := A_{topplate} \cdot F_y = 500\ kip$$
$$P_{botplate} := A_{botplate} \cdot F_y = 500\ kip$$

Forces in each component of the composite girder at the plastic moment in negative bending

$$P_{rt} := A_{rt\_ext} \cdot F_{y\_rebar} = 150\ kip$$
$$P_{rb} := A_{rb\_ext} \cdot F_{y\_rebar} = 99.2\ kip$$
$$D := D_{girder} - 2\ t_{flange} = 33.98\ in$$

Case I - PNA in Web

$$Y_{web} := \frac{(D)}{2} \cdot \left(\frac{P_t + P_{botplate} - P_c - P_{topplate} - P_{rt} - P_{rb}}{P_w} + 1\right) = 13.988\ in$$

$$y_{web} := t_{botplate} + D_{girder} - t_{flange} - Y_{web} = 22.352\ in$$

Distance to the plastic neutral axis if it is located in the web

$$d_{comp} := \frac{t_{flange}}{2} + Y_{web}$$

$$d_{topplate} := \frac{t_{topplate}}{2} + t_{flange} + Y_{web}$$

$$d_{ten} := y_{web} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{botplate} := y_{web} - \frac{t_{botplate}}{2}$$

$$dd_{rt} := Y_{web} + H + Deck_T - d_{rt}$$

$$dd_{rb} := Y_{web} + H + Deck_T - d_{rb}$$

Plastic moment if the PNA is located in the web

$$M_{p\_web} := \frac{P_w}{2 \cdot D} \cdot \left(Y_{web}^{\ 2} + \left(D - Y_{web}\right)^2\right) + \left(P_c \cdot \left(d_{comp}\right) + P_{topplate} \cdot \left(d_{topplate}\right) + P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{botplate}\right) + P_{rt} \cdot \left(dd_{rt}\right) + P_{rb} \cdot \left(dd_{rb}\right)\right) = \left(5.48 \cdot 10^3\right)\ kip \cdot ft$$

Case II - PNA in Flange

$$Y_{flange} := \left(\frac{t_{flange} + t_{topplate}}{2}\right) \cdot \left(\frac{P_w + P_t + P_{botplate} - P_{rt} - P_{rb}}{P_c + P_{topplate}} + 1\right) = 3.39\ in$$

$$y_{flange} := t_{botplate} + D_{girder} - Y_{flange} = 34.31\ in$$

Distance to the plastic neutral axis if it is located in the flange

$$d_Y := t_{flange} + t_{topplate} - Y_{flange}$$

$$d_{web} := \frac{D_{girder}}{2} - Y_{flange}$$

$$d_{ten} := y_{flange} - t_{botplate} - \frac{t_{flange}}{2}$$

$$d_{bot} := y_{flange} - \frac{t_{botplate}}{2}$$

$$dd_{rt} := H - t_{topplate} - t_{flange} + Y_{flange} + Deck_T - d_{rt}$$

$$dd_{rb} := H - t_{topplate} - t_{flange} + Y_{flange} + Deck_T - d_{rb}$$

Plastic moment if the PNA is located in the flange

$$M_{p\_flange} := \frac{P_c + P_{topplate}}{2\ \left(t_{flange} + t_{topplate}\right)} \cdot \left(Y_{flange}^{\ 2} + \left(d_Y\right)^2\right) + \left(P_t \cdot \left(d_{ten}\right) + P_{botplate} \cdot \left(d_{bot}\right) + P_w \cdot \left(d_{web}\right) + P_{rt} \cdot \left(dd_{rt}\right) + P_{rb} \cdot \left(dd_{rb}\right)\right) = \left(5.884 \cdot 10^3\right)\ kip \cdot ft$$

$$M_{p\_Location} := \left\| \begin{array}{l} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_{rt} + P_{rb} \\ \quad \left\| \text{“PNA in Web”} \right. \\ \text{else} \\ \quad \left\| \begin{array}{l} \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_{rt} + P_{rb} \\ \quad \left\| \text{“PNA in Flange”} \right. \\ \text{else} \\ \quad \left\| \text{“Otherwise”} \right. \end{array} \right. \end{array} \right. = \text{“PNA in Web”}$$

$$M_{p\_neg\_ext} := \begin{cases} \text{if } P_t + P_w + P_{botplate} \geq P_c + P_{topplate} + P_{rt} + P_{rb} \\ \quad M_{p\_web} \\ \text{else} \\ \quad \begin{cases} \text{if } P_t + P_{botplate} + P_w + P_c + P_{topplate} \geq P_{rt} + P_{rb} \\ \quad M_{p\_flange} \\ \text{else} \\ \quad \text{"check PNA location"} \end{cases} \end{cases} = \left(5.48 \cdot 10^3\right) \ (kip \cdot ft)$$

Plastic moment of the composite section in negative bending

Nominal Flextural Resistance - Compression Flange Discretely Braced by Braces

Service Limit State

$f_{f\_top\_neg\_ext} := 0.95 \cdot F_y = 47.5 \ ksi$ Allowable Stress in the top flange

$f_{f\_bot\_neg\_ext} := 0.95 \cdot F_y = 47.5 \ ksi$ Allowable Stress in the bottom flange

f_l term can be ignored

Strength Limit State

$$D_c := y - t_{flange} - t_{botplate} = 18.688 \ in$$

$$a_{wc} := \frac{2 \ D_c \cdot t_{web}}{W_{flange} \cdot t_{flange}} = 1.87$$

$$R_h := 1$$

$$R_b := \begin{cases} \text{if } \dfrac{2 \cdot D_c}{t_{web}} \leq \lambda_{rw} \\ \quad 1 \\ \text{else} \\ \quad 1 - \left(\dfrac{a_{wc}}{1200 + 300 \cdot a_{wc}}\right) \left(\dfrac{2 \ D_c}{t_{web}} - \lambda_{rw}\right) \end{cases} = 1$$

$$F_{nc\_LB} := \begin{cases} \text{if } \lambda_f \le \lambda_{pf} \\ \quad R_h \cdot R_b \cdot F_y \\ \text{else} \\ \quad \left(1 - \left(1 - \frac{0.7\ F_y}{R_h \cdot F_y}\right)\left(\frac{\lambda_f - \lambda_{pf}}{\lambda_{rf} - \lambda_{pf}}\right)\right) \cdot R_b \cdot R_h \cdot F_y \end{cases} = 50\ ksi$$

Allowable stress in the compression flange for local bucking

$$r_t := \frac{W_{flange}}{\sqrt{12\left(1 + \frac{1}{3} \cdot \frac{D_c \cdot t_{web}}{W_{flange} \cdot t_{flange}}\right)}} = 3.075\ in$$

$$L_b := S_{brace\_neg} = 12\ ft$$

Unbraced length of the girders

$$L_p := 1.0 \cdot r_t \cdot \sqrt{\frac{E_{steel}}{F_y}} = 6.172\ ft$$

$$L_r := \pi \cdot r_t \cdot \sqrt{\frac{E_{steel}}{F_y}} = 19.389\ ft$$

$$C_b := 1$$

Beam bending coefficient

$$F_{nc\_LTB} := \begin{cases} \text{if } L_b \le L_p \\ \quad R_b \cdot R_h \cdot F_y \\ \text{else if } L_p < L_b \le L_r \\ \quad C_b \cdot \left(1 - \left(1 - \frac{F_y}{R_h \cdot F_y}\right)\left(\frac{L_b - L_p}{L_r - L_p}\right)\right) \cdot R_h \cdot R_b \cdot F_y \\ \text{else} \\ \quad \frac{C_b \cdot R_b \cdot \pi^2 \cdot E_{steel}}{\left(\frac{L_b}{r_t}\right)^2} \end{cases} = 50\ ksi$$

Allowable stress in the compression flange for lateral torsional bucking

$$F_{nc\_ext} := min\left(F_{nc\_LB}, F_{nc\_LTB}, R_h \cdot R_b \cdot F_y\right) = 50\ ksi$$

Allowable stress in the compression flange for negative bending

$$F_{nt\_ext} := R_h \cdot F_y = 50\ ksi$$

Allowable stress in the tension flange for negative bending

Dead Loads

Steel Weight

W36x182

$wt_{girder1} := 182 \cdot plf$ # per linear foot of the girder section

$l_{girder1} := 140 \cdot ft$ overall length of the girder section

W36x210

$wt_{girder2} := 210 \cdot plf$ # per linear foot of the girder section

$l_{girder2} := 56 \cdot ft$ overall length of the girder section

$$wt_{girder} := \frac{\left(wt_{girder1} \cdot l_{girder1} + wt_{girder2} \cdot l_{girder2}\right)}{Span_{total}} = 190\ plf$$

Girder Cover Plates

$l_{topplate} := 17 \cdot ft$ length of the top plates on the girders

$l_{botplate} := 17 \cdot ft$ length of the bottom plates on the girders

$$wt_{plates} := \frac{\left(l_{topplate} \cdot W_{topplate} \cdot t_{topplate} + l_{botplate} \cdot W_{botplate} \cdot t_{botplate}\right) \cdot \gamma_{steel}}{Span_{total}} = 5.903\ plf$$

Diaphrams

$N_{xframes} := 11$ # of diaphrams per girder

$N_{sections} := 3$ # of members per brace (2 for cross brace)

$wt_{xframe} := 9 \cdot plf$ # per lf of each brace member

$l_{xframe} := 8 \cdot ft$ Length of each brace member

$$wt_{diaphram} := \frac{N_{xframes} \cdot N_{sections} \cdot wt_{xframe} \cdot l_{xframe}}{Span_{total}} = 12.122\ plf$$

$$wt_{diaphram\_ext} := \frac{0.5 \cdot N_{xframes} \cdot N_{sections} \cdot wt_{xframe} \cdot l_{xframe}}{Span_{total}} = 6.061\ plf$$

Connection Plates

Girder Splice Plates

$w_{sp} := 16 \cdot in$ Width of the girder splice plates

$t_{sp} := 6 \cdot in$ Thickness of the girder plice plates

$l_{sp} := 21 \cdot in$ length of the girder splice plates

$N_{sp} := 2$ # of girder splices per girder

$wt_{sp} := w_{sp} \cdot t_{sp} \cdot l_{sp} \cdot \gamma_{steel} = (5.606 \cdot 10^3) \frac{m}{s^2} \cdot lb$

Diaphram Connection Plates

$w_{cp} := 8 \cdot in$ Width of the diaphram connection plates

$t_{cp} := .375 \cdot in$ Thickness of the diaphram connection plates

$l_{cp} := 30 \cdot in$ Length of the diaphram connection plates

$N_{cp} := N_{xframes} \cdot 2 = 22$ # of diaphrams per girder

$wt_{cp} := w_{cp} \cdot t_{cp} \cdot l_{cp} \cdot \gamma_{steel} = 250.274 \frac{m}{s^2} \cdot lb$

$$wt_p := \frac{wt_{sp} \cdot N_{sp} + wt_{cp} \cdot N_{cp}}{Span_{total}} = 8.698\ plf$$

Miscellaneos

$wt_{misc\ ext} := 5 \cdot plf$ Weight of additional steel per

$wt_{misc\_int} := 10 \cdot plf$ girder (bolts, welds, studs)

Concrete Weight

$Deck_T = 8\ in$

$Bridge_W = 441.6\ in$

Deck

$$wt_{deck} := \frac{Deck_T \cdot Bridge_W \cdot \gamma_{conc}}{N_{beams}} = 736\ plf$$

Haunches

$H_w := 20 \cdot in$ Haunch width

$wt_{haunch} := (H \cdot H_w - W_{flange} \cdot t_{flange}) \cdot \gamma_{conc} = 45.217\ plf$

Superimposed Dead Loads

Curbs

$CurbR_w := 1.5 \cdot in$ Width of right curb including sidewalk

$CurbL_w := 1.5 \cdot in$ Width of left curb including sidewalk

$Curb_{ht} := 6 \cdot in$ Height of curbs

$$wt_{curb} := \frac{(CurbR_w + CurbL_w) \cdot Curb_{ht} \cdot \gamma_{conc}}{N_{beams}} = 3.75\ plf$$

Guardrail Loads

$Rail := 20 \cdot plf$ Weight of each guardrails

$N_{rails} := 2$ No. of guardrails

$$wt_{rail} := \frac{N_{rails}\ Rail}{N_{beams}} = 8\ plf$$

Wearing Surface

$$wt_{ws} := \left\| \begin{array}{l} \text{if } WearingBit_T \neq 0 \\ \quad \left\| \dfrac{WearingBit_T \cdot Roadway_W \cdot \gamma_{bit}}{N_{beams}} \right. \\ \text{else} \\ \quad \left\| \dfrac{WearingConc_T \cdot Roadway_W \cdot \gamma_{conc}}{N_{beams}} \right. \end{array} \right. = 231\ plf$$

Weight of wearing surface

$$wt_{DC1} := wt_{girder} + wt_{plates} + wt_{diaphram} + wt_p + wt_{deck} + wt_{haunch} + wt_{misc\_int} = \left(1.008 \cdot 10^3\right)\ plf$$

Weight of long term dead loads (interior girder)

$$wt_{DC1\_ext} := wt_{girder} + wt_{plates} + wt_{diaphram\_ext} + wt_p + wt_{deck} + wt_{haunch} + wt_{misc\_ext} = 996.879\ plf$$

Weight of long term dead loads (exterior girder)

$$wt_{DC2} := wt_{curb} + wt_{rail} = 11.75\ plf$$

Weight of superimposed dead loads

CAPACITY CHECKS

Interior Girder - Positive Bending

$L := Span_{L1} = 98\ ft$ — Length of span in which moments are being evaluated

$M_{DC1} := 675 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using wt_{DC1}

$M_{DC2} := 7.33 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using wt_{DC2}

$M_{DW} := 154 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using wt_{ws}

$M_{LL} := 1508 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using HL-93

$IM := 33$ — Dynamic Load Allowance

Moment distribution factor for interior steel girders

$$g_{pos\_int} := \max\left(0.06 + \left(\frac{S_{girders}}{14 \cdot ft}\right)^{0.4} \left(\frac{S_{girders}}{L}\right)^{0.3} \left(\frac{K_{g\_pos} \cdot ft}{12.0\ L \cdot Deck_T^{\ 3} \cdot in}\right)^{0.1}, 0.075 + \left(\frac{S_{girders}}{9.5 \cdot ft}\right)^{0.6} \left(\frac{S_{girders}}{L}\right)^{0.2} \left(\frac{K_{g\_pos} \cdot ft}{12.0\ L \cdot Deck_T^{\ 3} \cdot in}\right)^{0.1}\right) = 0.585$$

$DC1 := M_{DC1}$

$DC2 := M_{DC2}$ — Load Effects due to bridge moments

$DW := M_{DW}$

$$LL\_IM := M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{pos\_int}$$

Strength I - Inventory

$$F_{ad} := F_y - \gamma_{STI\_inv_0} \cdot \frac{M_{DC1}}{S_{x\_pos}} - \gamma_{STI\_inv_0} \cdot \frac{M_{DC2}}{S_{xLTC}} - \gamma_{STI\_inv_1} \cdot \frac{M_{DW}}{S_{xLTC}} = 30.583\ ksi$$

Additional stress in the girder before yielding occurs

$$M_{ad} := \frac{F_{ad} \cdot S_{xSTC}}{\gamma_{STI\_inv_2}} = \left(1.362 \cdot 10^3\right)\ kip \cdot ft$$

Additional moment on girder before yielding occurs

$$M_y := \gamma_{STI\_inv_0} \cdot M_{DC1} + \gamma_{STI\_inv_0} \cdot M_{DC2} + \gamma_{STI\_inv_1} \cdot M_{DW} + \gamma_{STI\_inv_2} \cdot M_{ad} = \left(3.467 \cdot 10^3\right)\ kip \cdot ft$$

Moment on girder when yielding occurs

$$M_n := min\left(M_{n\_pos}, 1.3 \cdot R_h \cdot M_y\right) = \left(4.483 \cdot 10^3\right)\ (kip \cdot ft)$$

Moment capacity of composite girder in positive bending

$\varphi := 1$ — LRFD Resistance Factor

$C := \varphi_c \cdot \varphi_c \cdot \varphi \cdot M_n = \left(4.483 \cdot 10^3\right)\ (kip \cdot ft)$ — Strength Limit State Capacity

$$RF_{posM\_int\_STI\_INV} := \frac{C - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 1.657$$

Rating Factor for positive bending of an interior girder in the STRENGTH I - INVERTORY load case

Strength I - Operating

$$F_{ad} := F_y - \gamma_{STI\_op_0} \cdot \frac{M_{DC1}}{S_{x\_pos}} - \gamma_{STI\_op_0} \cdot \frac{M_{DC2}}{S_{xLTC}} - \gamma_{STI\_op_1} \cdot \frac{M_{DW}}{S_{xLTC}} = 30.583\ ksi$$

Additional stress in the girder before yielding occurs

$$M_{ad} := \frac{F_{ad} \cdot S_{xSTC}}{\gamma_{STI\_op_2}} = \left(1.765 \cdot 10^3\right)\ kip \cdot ft$$

Additional moment on girder before yielding occurs

$$M_y := \gamma_{STI\_op_0} \cdot M_{DC1} + \gamma_{STI\_op_0} \cdot M_{DC2} + \gamma_{STI\_op_1} \cdot M_{DW} + \gamma_{STI\_op_2} \cdot M_{ad} = \left(3.467 \cdot 10^3\right)\ kip \cdot ft$$

Moment on girder when yielding occurs

$$M_n := min\left(M_{n\_pos}, 1.3 \cdot R_h \cdot M_y\right) = \left(4.483 \cdot 10^3\right)\ (kip \cdot ft)$$

Moment capacity of composite girder in positive bending

$$\varphi := 1$$

LRFD Resistance Factor

$$C := \varphi_c \cdot \varphi_c \cdot \varphi \cdot M_n = \left(4.483 \cdot 10^3\right)\ (kip \cdot ft)$$

Strength Limit State Capacity

$$RF_{posM\_int\_STI\_OP} := \frac{C - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 2.148$$

Rating Factor for positive bending of an interior girder in the STRENGTH I - OPERATING load case

Service II

$$C := f_{f\_bot\_pos} = 47.5\ ksi$$

Service Limit State Capacity - Allowable stress in tension flange

$$DC1 := \frac{M_{DC1}}{S_{x\_pos}} = 12.784\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{xLTC}} = 0.105\ ksi$$

Load Effects due to bridge moments

$$DW := \frac{M_{DW}}{S_{xLTC}} = 2.204\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{pos\_int}}{S_{xSTC}} = 15.046\ ksi$$

$$RF_{posM\_int\_SEII} := \frac{C - \gamma_{SEII_0} \cdot DC1 - \gamma_{SEII_0} \cdot DC2 - \gamma_{SEII_1} \cdot DW}{\gamma_{SEII_2} \cdot LL\_IM} = 1.657$$

Rating Factor for positive bending of an interior girder in the SERVICE II load case.

Exterior Girder - Positive Bending

$L := Span_{L1} = 98\ ft$ — Length of span in which moments are being evaluated

$M_{DC1\_ext} := 667 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using wt_{DC1_ext}

$M_{DC2} := 7.33 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using wt_{DC2}

$M_{DW} := 154 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using wt_{DW}

$M_{LL} := 1508 \cdot kip \cdot ft$ — Max Moment output from Bridge Load Analysis using HL-93

$IM := 33$ — Dynamic Load Allowance

$lever\_rule := .55$ — Distribution factor of Exterior Girder determined using the Lever Rule

$d_e := 1.5 \cdot ft$ — Horizontal Distance from web of exterior girder to interior edge of curb or traffic barrier. Taken as postivite if web is inboard of curb or traffic barrier.

$$e_{dis} := 0.77 + \frac{d_e}{9.1 \cdot ft} = 0.935$$

$$g_{pos\_ext} := \max\left(e_{dis} \cdot g_{pos\_int}, lever\_rule\right) = 0.55$$

Moment distribution factor for exterior steel girders

$DC1 := M_{DC1\_ext}$

$DC2 := M_{DC2}$

$DW := M_{DW}$

$$LL\_IM := M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{pos\_ext}$$

Load Effects due to bridge moments

Moment distribution factor for interior steel girders

Strength I - Inventory

$$F_{ad} := F_y - \gamma_{STI\_inv_0} \cdot \frac{M_{DC1\_ext}}{S_{x\_pos}} - \gamma_{STI\_inv_0} \cdot \frac{M_{DC2}}{S_{xLTC\_ext}} - \gamma_{STI\_inv_1} \cdot \frac{M_{DW}}{S_{xLTC\_ext}} = 30.716\ ksi$$

Additional stress in the girder before yielding occurs

$$M_{ad} := \frac{F_{ad} \cdot S_{xSTC\_ext}}{\gamma_{STI\_inv_2}} = \left(1.352 \cdot 10^3\right)\ kip \cdot ft$$

Additional moment on girder before yielding occurs

$$M_y := \gamma_{STI\_inv_0} \cdot M_{DC1\_ext} + \gamma_{STI\_inv_0} \cdot M_{DC2} + \gamma_{STI\_inv_1} \cdot M_{DW} + \gamma_{STI\_inv_2} \cdot M_{ad} = \left(3.439 \cdot 10^3\right)\ kip \cdot ft$$

Moment on girder when yielding occurs

$M_n := min(M_{n\_pos\_ext}, 1.3 \cdot R_h \cdot M_y) = (4.344 \cdot 10^3)\ (kip \cdot ft)$

Moment capacity of composite girder in positive bending

$\varphi := 1$

LRFD Resistance Factor

$C := \varphi_c \cdot \varphi_c \cdot \varphi \cdot M_n = (4.344 \cdot 10^3)\ (kip \cdot ft)$

Strength Limit State Capacity

$$RF_{posM\_ext\_STI\_INV} := \frac{C - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 1.694$$

Rating Factor for positive bending of an exterior girder in the STRENGTH I - INVENTORY load case

Strength I - Operating

$$F_{ad} := F_y - \gamma_{STI\_op_0} \cdot \frac{M_{DC1\_ext}}{S_{x\_pos}} - \gamma_{STI\_op_0} \cdot \frac{M_{DC2}}{S_{xLTC\_ext}} - \gamma_{STI\_op_1} \cdot \frac{M_{DW}}{S_{xLTC\_ext}} = 30.716\ ksi$$

$$M_{ad} := \frac{F_{ad} \cdot S_{xSTC\_ext}}{\gamma_{STI\_op_2}} = (1.752 \cdot 10^3)\ kip \cdot ft$$

$$M_y := \gamma_{STI\_op_0} \cdot M_{DC1\_ext} + \gamma_{STI\_op_0} \cdot M_{DC2} + \gamma_{STI\_op_1} \cdot M_{DW} + \gamma_{STI\_op_2} \cdot M_{ad} = (3.439 \cdot 10^3)\ kip \cdot ft$$

$M_n := min(M_{n\_pos\_ext}, 1.3 \cdot R_h \cdot M_y) = (4.344 \cdot 10^3)\ (kip \cdot ft)$

$\varphi := 1$

LRFD Resistance Factor

$C := \varphi_c \cdot \varphi_c \cdot \varphi \cdot M_n = (4.344 \cdot 10^3)\ (kip \cdot ft)$

Strength Limit State Capacity

$$RF_{posM\_ext\_STI\_OP} := \frac{C - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 2.196$$

Rating Factor for positive bending of an exterior girder in the STRENGTH I - OPERATING load case

Service II

$C := f_{f\_bot\_pos\_ext} = 47.5\ ksi$

Service Limit State Capacity - Allowable stress in tension flange

$$DC1 := \frac{M_{DC1\_ext}}{S_{x\_pos}} = 12.632\ ksi$$

M_{DC2}

$$DC2 := \frac{M_{DC2}}{S_{xLTC\_ext}} = 0.107\ ksi$$

Load Effects due to bridge moments

$$DW := \frac{M_{DW}}{S_{xLTC\_ext}} = 2.24\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{pos\_ext}}{S_{xSTC\_ext}} = 14.324\ ksi$$

$$RF_{posM\_ext\_SEII} := \frac{C - \gamma_{SEII_0} \cdot DC1 - \gamma_{SEII_0} \cdot DC2 - \gamma_{SEII_1} \cdot DW}{\gamma_{SEII_2} \cdot LL\_IM} = 1.746$$

Rating Factor for positive bending of an exterior girder in the SERVICE II load case.

Interior Girder - Negative Bending

$$L := \frac{Span_{L1} + Span_{L2}}{2} = 98\ ft$$

Length of span in which moments are being evaluated

$M_{DC1} := 1270 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using wt_{DC1}

$M_{DC2} := 13.8 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using wt_{DC2}

$M_{DW} := 291 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using wt_{DW}

$M_{LL} := 1302 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using HL-93

$IM := 33$ Dynamic Load Allowance

Moment distribution factor for interior steel girders

$$g_{neg\_int} := \max\left(0.06 + \left(\frac{S_{girders}}{14 \cdot ft}\right)^{0.4} \left(\frac{S_{girders}}{L}\right)^{0.3} \left(\frac{K_{g\_neg} \cdot ft}{12.0\ L \cdot Deck_T^{\ 3} \cdot in}\right)^{0.1}, 0.075 + \left(\frac{S_{girders}}{9.5 \cdot ft}\right)^{0.6} \left(\frac{S_{girders}}{L}\right)^{0.2} \left(\frac{K_{g\_neg} \cdot ft}{12.0\ L \cdot Deck_T^{\ 3} \cdot in}\right)^{0.1}\right) = 0.601$$

<u>Compression Flange</u>

$$DC1 := \frac{M_{DC1}}{S_{x\_comp\_neg\_bf}} = 13.093\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{x\_comp\_neg\_bf}} = 0.142\ ksi$$

Load Effects due to bridge moments

M_{DW}

$$DW := \frac{M_{DW}}{S_{x\_comp\_neg\_bf}} = 3\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{neg\_int}}{S_{x\_comp\_neg\_bf}} = 10.736\ ksi$$

Strength I - Inventory

$$RF_{negM\_CF\_int\_STI\_INV} := \frac{F_{nc} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 1.541$$

Rating Factor for allowable stress in the compression flange during negative bending of an interior girder in the STRENGTH I - INVENTORY load case

Strength I - Operating

$$RF_{negM\_CF\_int\_STI\_OP} := \frac{F_{nc} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 1.998$$

Rating Factor for allowable stress in the compression flange during negative bending of an interior girder in the STRENGTH I - OPERATING load case

Service II

$$RF_{negM\_CF\_int\_SEII} := \frac{f_{f\_bot\_neg} - \gamma_{SEII_0} \cdot DC1 - \gamma_{SEII_0} \cdot DC2 - \gamma_{SEII_1} \cdot DW}{\gamma_{SEII_2} \cdot LL\_IM} = 2.24$$

Rating Factor for allowable stress in the compression flange during negative bending of an interior girder in the SERVICE II load case

Tension Flange

$$DC1 := \frac{M_{DC1}}{S_{x\_comp\_neg\_tf}} = 9.902\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{x\_comp\_neg\_tf}} = 0.108\ ksi$$

Load Effects due to bridge moments

$$DW := \frac{M_{DW}}{S_{x\_comp\_neg\_tf}} = 2.269\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{neg\_int}}{S_{x\_comp\_neg\_tf}} = 8.12\ ksi$$

Strength I - Inventory

$$RF_{negM\_TF\_int\_STI\_INV} := \frac{F_{nt} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 2.399$$

Rating Factor for allowable stress in the tension flange during negative bending of an interior girder in the STRENGTH I - INVENTORY load case

Strength I - Operating

$$RF_{negM\_TF\_int\_STI\_OP} := \frac{F_{nt} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 3.11$$

Rating Factor for allowable stress in the tension flange during negative bending of an interior girder in the STRENGTH I - OPERATING load case

Service II

$$RF_{negM\_TF\_int\_SEII} := \frac{f_{f\_top\_neg} - \gamma_{SEII_0} \cdot DC1 - \gamma_{SEII_0} \cdot DC2 - \gamma_{SEII_1} \cdot DW}{\gamma_{SEII_2} \cdot LL\_IM} = 3.337$$

Rating Factor for allowable stress in the tension flange during negative bending of an interior girder in the SERVICE II load case

Reinforcing Steel

$$DC1 := \frac{M_{DC1}}{S_{x\_comp\_neg\_rt}} = 13.848\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{x\_comp\_neg\_rt}} = 0.15\ ksi$$

Load Effects due to bridge moments

$$DW := \frac{M_{DW}}{S_{x\_comp\_neg\_rt}} = 3.173\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{neg\_int}}{S_{x\_comp\_neg\_rt}} = 11.355\ ksi$$

Strength I - Inventory

$$RF_{negM\_RS\_int\_STI\_INV} := \frac{F_{y\_rebar} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 0.893$$

Rating Factor stress in the rebar during negative bending of an interior girder in the STRENGTH I - INVENTORY load case (not a requirement of AASHTO or MaineDOT load ratings)

Strength I - Operating

$$RF_{negM\_RS\_int\_STI\_OP} := \frac{F_{y\_rebar} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 1.157$$

Rating Factor for stress in the rebar during negative bending of an interior girder in the STRENGTH I - OPERATING load case (not a requirement of AASHTO or MaineDOT load ratings)

Exterior Girder - Negative Bending

$$L := \frac{Span_{L1} + Span_{L2}}{2} = 98\ ft$$

Length of span in which moments are being evaluated

$M_{DC1\ ext} := 1256 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using wt_{DC1_ext}

$M_{DC2} := 83 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using wt_{DC2}

$M_{DW} := 291 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using wt_{DW}

$M_{LL} := 1302 \cdot kip \cdot ft$ Max Moment output from Bridge Load Analysis using HL-93

$IM := 33$ Dynamic Load Factor

$lever\_rule := .55$ Distribution factor of Exterior Girder determined using the Lever Rule

$d_e := 4 \cdot ft$ Horizontal Distance from web of exterior girder to interior edge of curb or traffic barrier. Taken as postivite if web is inboard or curb or traffic barrier.

$$e_{dis} := 0.77 + \frac{d_e}{9.1 \cdot ft} = 1.21$$

$$g_{neg\_ext} := \max\left(e_{dis} \cdot g_{neg\_int}, lever\_rule\right) = 0.727$$

Moment distribution factor for exterior steel girders

Compression Flange

$$DC1 := \frac{M_{DC1\_ext}}{S_{x\_comp\_neg\_ext\_bf}} = 13.397\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{x\_comp\_neg\_ext\_bf}} = 0.885\ ksi$$

Load Effects due to bridge moments

$$DW := \frac{M_{DW}}{S_{x\_comp\_neg\_ext\_bf}} = 3.104\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{neg\_ext}}{S_{x\_comp\_neg\_ext\_bf}} = 13.436\ ksi$$

Strength I - Inventory

$$RF_{negM\_CF\_ext\_STI\_INV} := \frac{F_{nc\_ext} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 1.169$$

Rating Factor for allowable stress in the compression flange during negative bending of an exterior girder in the STRENGTH I - INVENTORY load case

Strength I - Operating

$$RF_{negM\_CF\_ext\_STI\_OP} := \frac{F_{nc\_ext} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 1.516$$

Rating Factor for allowable stress in the compression flange during negative bending of an exterior girder in the STRENGTH I - OPERATING load case

Service II

$$RF_{negM\_CF\_ext\_SEII} := \frac{f_{f\_bot\_neg\_ext} - \gamma_{SEII_0} \cdot DC1 - \gamma_{SEII_0} \cdot DC2 - \gamma_{SEII_1} \cdot DW}{\gamma_{SEII_2} \cdot LL\_IM} = 1.724$$

Rating Factor for allowable stress in the compression flange during negative bending of an exterior girder in the SERVICE II load case

Tension Flange

$$DC1 := \frac{M_{DC1}}{S_{x\_comp\_neg\_ext\_tf}} = 11.36\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{x\_comp\_neg\_ext\_tf}} = 0.742\ ksi$$

Load Effects due to bridge moments

M_{DW}

$$DW := \frac{M_{DW}}{S_{x\_comp\_neg\_ext\_tf}} = 2.603\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{neg\_ext}}{S_{x\_comp\_neg\_ext\_tf}} = 11.267\ ksi$$

Strength I - Inventory

$$RF_{negM\_TF\_ext\_STI\_INV} := \frac{F_{nt\_ext} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 1.571$$

Rating Factor for allowable stress in the tension flange during negative bending of an exterior girder in the STRENGTH I - INVENTORY load case

Strength I - Operating

$$RF_{negM\_TF\_ext\_STI\_OP} := \frac{F_{nt\_ext} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 2.036$$

Rating Factor for allowable stress in the tension flange during negative bending of an exterior girder in the STRENGTH I - OPERATING load case

Service II

$$RF_{negM\_TF\_ext\_SEII} := \frac{f_{f\_top\_neg\_ext} - \gamma_{SEII_0} \cdot DC1 - \gamma_{SEII_0} \cdot DC2 - \gamma_{SEII_1} \cdot DW}{\gamma_{SEII_2} \cdot LL\_IM} = 2.239$$

Rating Factor for allowable stress in the tension flange during negative bending of an exterior girder in the SERVICE II load case

Reinforcing Steel

$$DC1 := \frac{M_{DC1}}{S_{x\_comp\_neg\_ext\_rt}} = 15.634\ ksi$$

$$DC2 := \frac{M_{DC2}}{S_{x\_comp\_neg\_ext\_rt}} = 1.022\ ksi$$

Load Effects due to bridge moments

$$DW := \frac{M_{DW}}{S_{x\_comp\_neg\_ext\_rt}} = 3.582\ ksi$$

$$LL\_IM := \frac{M_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{neg\_ext}}{S_{x\_comp\_neg\_ext\_rt}} = 15.506\ ksi$$

Strength I - Inventory

$$RF_{negM\_RS\_ext\_STI\_INV} := \frac{F_{y\_rebar} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 0.509$$

Rating Factor for stress in the rebar during negative bending of an exterior girder in the STRENGTH I - INVENTORY load case (not a requirement of AASHTO or MaineDOT load ratings)

Strength I - Operating

$$RF_{negM\_RS\_ext\_STI\_OP} := \frac{F_{y\_rebar} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 0.66$$

Rating Factor for stress in the rebar during negative bending of an exterior girder in the STRENGTH I - OPERATING load case (not a requirement of AASHTO or MaineDOT load ratings)

Girder Shear - Interior Support

$L := Span_{L1} = 98\ ft$ Length of span in which moments are being evaluated

$V_{DC1} := 62 \cdot kip$ Max Shear output from Bridge Load Analysis using wt_{DC1}

$V_{DC2} := .685 \cdot kip$ Max Shear output from Bridge Load Analysis using wt_{DC2}

$V_{DW} := 14 \cdot kip$ Max Shear output from Bridge Load Analysis using wt_{DW}

$V_{LL} := 97 \cdot kip$ Max Shear output from Bridge Load Analysis using HL-93

$IM := 33$ Dynamic Load Factor

$$g_{shear\_int} := \max\left(0.36 + \left(\frac{S_{girders}}{25 \cdot ft}\right), 0.2 + \left(\frac{S_{girders}}{12 \cdot ft}\right) - \left(\frac{S_{girders}}{35 \cdot ft}\right)^2\right) = 0.796$$

Shear distribution factor for interior steel girders

$DC1 := V_{DC1}$

$DC2 := V_{DC2}$

$DW := V_{DW}$

$LL\_IM := V_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{shear\_int}$

Load Effects due to bridge shears

Strength I - Inventory

$$RF_{shear\_int\_STI\_INV} := \frac{V_{n\_int\_neg} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 3.998$$

Rating Factor for allowable shear of an interior web section STRENGTH I - INVENTORY load case

Strength I - Operating

$$RF_{shear\_int\_STI\_OP} := \frac{V_{n\_int\_neg} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 5.182$$

Rating Factor for allowable shear of an interior web section STRENGTH I - OPERATING load case

Girder Shear - End Support

$L := Span_{L1} = 98\ ft$ — Length of span in which moments are being evaluated

$V_{DC1\ ext} := 62 \cdot kip$ — Max Shear output from Bridge Load Analysis using wt_{DC1_ext}

$V_{DC2} := .685 \cdot kip$ — Max Shear output from Bridge Load Analysis using wt_{DC2}

$V_{DW} := 14 \cdot kip$ — Max Shear output from Bridge Load Analysis using wt_{DW}

$V_{LL} := 97 \cdot kip$ — Max Shear output from Bridge Load Analysis using HL-93

$IM := 33$ — Dynamic Impact Factor

$lever\_rule := .715$ — Distribution factor of Exterior Girder determined using the Lever Rule

$d_e := 4 \cdot ft$ — Horizontal Distance from web of exterior girder to interior edge of curb or traffic barrier. Taken as postivite if web is inboard or curb or traffic barrier.

$$e_{dis} := 0.6 + \frac{d_e}{10 \cdot ft} = 1$$

$$g_{shear\_ext} := \max\left(e_{dis} \cdot g_{shear\_int}, lever\_rule\right) = 0.796$$

Shear distribution factor for an exterior girder

$DC1 := V_{DC1}$

$DC2 := V_{DC2}$

$DW := V_{DW}$

$$LL\_IM := V_{LL} \cdot \left(1 + \frac{IM}{100}\right) \cdot g_{shear\_ext}$$

Load Effects due to bridge shears

Strength I - Inventory

$$RF_{shear\_end\_STI\_INV} := \frac{V_{n\_end} - \gamma_{STI\_inv_0} \cdot DC1 - \gamma_{STI\_inv_0} \cdot DC2 - \gamma_{STI\_inv_1} \cdot DW}{\gamma_{STI\_inv_2} \cdot LL\_IM} = 3.417$$

Rating Factor for allowable shear of an end web section STRENGTH I - INVENTORY load case

Strength I - Operating

$$RF_{shear\_end\_STI\_OP} := \frac{V_{n\_end} - \gamma_{STI\_op_0} \cdot DC1 - \gamma_{STI\_op_0} \cdot DC2 - \gamma_{STI\_op_1} \cdot DW}{\gamma_{STI\_op_2} \cdot LL\_IM} = 4.43$$

Rating Factor for allowable shear of an end web section STRENGTH I - OPERATING load case

APPENDIX D

STAAD Input Data and Moment/Shear Summary Report

Nodes

Node	X (ft)	Y (ft)	Z (ft)
1	0.000	0.000	0.000
2	69.500	0.000	0.000
3	97.500	0.000	0.000
4	125.500	0.000	0.000
5	196.250	0.000	0.000

Beams

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
1	1	2	69.500	1	0
2	2	3	28.000	2	0
3	3	4	28.000	2	0
4	4	5	70.750	1	0

Section Properties

Prop	Section	Area (in^2)	I_{yy} (in^4)	I_{zz} (in^4)	J (in^4)	Material
1	W36X182	53.600	347.000	11.3E+3	17.691	STEEL
2	W36X210	61.800	411.000	13.2E+3	27.159	STEEL

Materials

Mat	Name	E (kip/in^2)	ν	Density (kip/in^3)	α (1/°F)
1	STEEL	29E+3	0.300	0.000	6.5E -6
2	STAINLESSSTEEL	28E+3	0.300	0.000	9.9E -6
3	ALUMINUM	10E+3	0.330	0.000	12.8E -6
4	CONCRETE	3.15E+3	0.170	0.000	5.5E -6

Supports

Node	X (kip/in)	Y (kip/in)	Z (kip/in)	rX (kip˙ft/deg)	rY (kip˙ft/deg)	rZ (kip˙ft/deg)
1	Fixed	Fixed	Fixed	-	-	-
3	Fixed	Fixed	Fixed	-	-	-
5	Fixed	Fixed	Fixed	-	-	-

Basic Load Cases

Number	Name
1	DC1
2	DC2
3	DW
4	DC1_EXT
5	DESIGN LANE

Moving Load Definition : Type 1

Width (ft)
-

Force (kip)	Distance (ft)
32.000	-
32.000	14.000
8.000	14.000

Moving Load Definition : Type 2

Width (ft)
-

Force (kip)	Distance (ft)
32.000	-
32.000	22.000
8.000	14.000

Moving Load Definition : Type 3

Width (ft)
-

Force (kip)	Distance (ft)
32.000	-
32.000	30.000
8.000	14.000

Moving Load Definition : Type 4

Width (ft)
-

Force (kip)	Distance (ft)
25.000	-
25.000	4.000

Beam Maximum Forces by Section Property

		Axial	Shear		Torsion	Bending	
Section		Max Fx (kip)	Max Fy (kip)	Max Fz (kip)	Max Mx (kip-in)	Max My (kip-in)	Max Mz (kip-in)
W36X182	Max +ve	0.000	63.508	0.000	0.000	0.000	5.52E+3
	Max -ve	0.000	-50.170	0.000	0.000	0.000	-18.1E+3
W36X210	Max +ve	0.000	76.976	0.000	0.000	0.000	15.6E+3
	Max -ve	0.000	-91.770	0.000	0.000	0.000	-8.11E+3

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

				Axial	Shear		Torsion	Bending	
	L/C	Beam	d (ft)	Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip-in)	My (kip-in)	Mz (kip-in)
Max Fx	1:DC1	1	0.000	**0.000**	36.109	0.000	0.000	0.000	0.000
Min Fx	1:DC1	1	0.000	**0.000**	36.109	0.000	0.000	0.000	0.000
Max Fy	72:LOAD GENI	3	0.000	0.000	**76.976**	0.000	0.000	0.000	15.6E+3
Min Fy	40:LOAD GENI	2	28.000	-0.000	**-91.770**	-0.000	-0.000	-0.000	13.1E+3
Max Fz	1:DC1	1	0.000	0.000	36.109	**0.000**	0.000	0.000	0.000
Min Fz	1:DC1	1	0.000	0.000	36.109	**0.000**	0.000	0.000	0.000
Max Mx	1:DC1	1	0.000	0.000	36.109	0.000	**0.000**	0.000	0.000
Min Mx	1:DC1	1	0.000	0.000	36.109	0.000	**0.000**	0.000	0.000
Max My	1:DC1	1	0.000	0.000	36.109	0.000	0.000	**0.000**	0.000
Min My	1:DC1	1	0.000	0.000	36.109	0.000	0.000	**0.000**	0.000
Max Mz	72:LOAD GENI	2	28.000	-0.000	-36.803	-0.000	-0.000	-0.000	**15.6E+3**
Min Mz	77:LOAD GENI	4	28.300	0.000	10.248	0.000	0.000	0.000	**-17.9E+3**

Beam Maximum Moments

Distances to maxima are given from beam end A.

L/C	Beam	Node A	Length (ft)		d (ft)	Max My (kip-in)	d (ft)	Max Mz (kip-in)
1:DC1	1	1	69.500	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	34.750	-7.75E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	15.2E+3
				Max +ve	0.000	0.000	0.000	-901.621
	3	3	28.000	Max -ve	0.000	0.000	0.000	15.2E+3
				Max +ve	0.000	0.000	28.000	-1.06E+3
	4	4	70.750	Max -ve	0.000	0.000	70.750	-0.000
				Max +ve	0.000	0.000	35.375	-8.1E+3
2:DC2	1	1	69.500	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	34.750	-84.619
	2	2	28.000	Max -ve	0.000	0.000	28.000	166.377
				Max +ve	0.000	0.000	0.000	-9.839
	3	3	28.000	Max -ve	0.000	0.000	0.000	166.377
				Max +ve	0.000	0.000	28.000	-11.544
	4	4	70.750	Max -ve	0.000	0.000	70.750	-0.000
				Max +ve	0.000	0.000	35.375	-88.364
3:DW	1	1	69.500	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	34.750	-1.78E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	3.49E+3
				Max +ve	0.000	0.000	0.000	-206.621
	3	3	28.000	Max -ve	0.000	0.000	0.000	3.49E+3
				Max +ve	0.000	0.000	28.000	-242.430
	4	4	70.750	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	35.375	-1.86E+3
4:DC1_EXT	1	1	69.500	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	34.750	-7.67E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	15.1E+3
				Max +ve	0.000	0.000	0.000	-891.781
	3	3	28.000	Max -ve	0.000	0.000	0.000	15.1E+3
				Max +ve	0.000	0.000	28.000	-1.05E+3
	4	4	70.750	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	35.375	-8.01E+3
40:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	57.917	-9.17E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	13.1E+3
				Max +ve	0.000	0.000	0.000	-8.11E+3
	3	3	28.000	Max -ve	0.000	0.000	0.000	13.1E+3
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	3.68E+3
				Max +ve	0.000	0.000	47.167	-1.98E+3
50:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	0.000	0.000
				Max +ve	0.000	0.000	34.750	-3.91E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	10.3E+3
				Max +ve	0.000	0.000	0.000	-855.089

Beam Maximum Moments Cont...

L/C	Beam	Node A	Length (ft)		d (ft)	Max My (kip-in)	d (ft)	Max Mz (kip-in)
	3	3	28.000	Max -ve	0.000	0.000	0.000	10.3E+3
				Max +ve	0.000	0.000	28.000	-828.649
	4	4	70.750	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	35.375	-4.03E+3
72:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	69.500	5.52E+3
				Max +ve	0.000	0.000	23.167	-1.26E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	15.6E+3
				Max +ve	0.000	0.000		
	3	3	28.000	Max -ve	0.000	0.000	0.000	15.6E+3
				Max +ve	0.000	0.000	28.000	-7.98E+3
	4	4	70.750	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	23.583	-16.6E+3
77:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	69.500	5.22E+3
				Max +ve	0.000	0.000	23.167	-1.36E+3
	2	2	28.000	Max -ve	0.000	0.000	28.000	15.2E+3
				Max +ve	0.000	0.000		
	3	3	28.000	Max -ve	0.000	0.000	0.000	15.2E+3
				Max +ve	0.000	0.000	28.000	-5.83E+3
	4	4	70.750	Max -ve	0.000	0.000	70.750	-0.000
				Max +ve	0.000	0.000	29.479	-18.1E+3

Beam Maximum Shear Forces

Distances to maxima are given from beam end A.

L/C	Beam	Node A	Length (ft)		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
1:DC1	1	1	69.500	Max -ve	0.000	0.000	0.000	36.109
				Max +ve	0.000	0.000	69.500	-33.947
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-62.171
	3	3	28.000	Max -ve	0.000	0.000	0.000	62.636
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	34.412
				Max +ve	0.000	0.000	70.750	-36.904
2:DC2	1	1	69.500	Max -ve	0.000	0.000	0.000	0.394
				Max +ve	0.000	0.000	69.500	-0.370
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-0.678
	3	3	28.000	Max -ve	0.000	0.000	0.000	0.684
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	0.376
				Max +ve	0.000	0.000	70.750	-0.403
3:DW	1	1	69.500	Max -ve	0.000	0.000	0.000	8.275
				Max +ve	0.000	0.000	69.500	-7.780
	2	2	28.000	Max -ve	0.000	0.000		

Beam Maximum Shear Forces Cont...

L/C	Beam	Node A	Length (ft)		d (ft)	Max Fz (kip)	d (ft)	Max Fy (kip)
				Max +ve	0.000	0.000	28.000	-14.248
	3	3	28.000	Max -ve	0.000	0.000	0.000	14.354
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	7.886
				Max +ve	0.000	0.000	70.750	-8.457
4:DC1_EXT	1	1	69.500	Max -ve	0.000	0.000	0.000	35.715
				Max +ve	0.000	0.000	69.500	-33.576
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-61.492
	3	3	28.000	Max -ve	0.000	0.000	0.000	61.952
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	34.036
				Max +ve	0.000	0.000	70.750	-36.501
40:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	0.000	27.127
				Max +ve	0.000	0.000	69.500	-38.302
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-91.770
	3	3	28.000	Max -ve	0.000	0.000	0.000	34.821
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	21.353
				Max +ve	0.000	0.000	70.750	-12.677
50:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	0.000	17.740
				Max +ve	0.000	0.000	69.500	-15.689
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-61.157
	3	3	28.000	Max -ve	0.000	0.000	0.000	69.507
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	16.039
				Max +ve	0.000	0.000	70.750	-17.991
72:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	0.000	10.094
				Max +ve	0.000	0.000	69.500	-23.335
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-36.803
	3	3	28.000	Max -ve	0.000	0.000	0.000	76.976
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	63.508
				Max +ve	0.000	0.000	70.750	-42.523
77:LOAD GENI	1	1	69.500	Max -ve	0.000	0.000	0.000	10.455
				Max +ve	0.000	0.000	69.500	-22.975
	2	2	28.000	Max -ve	0.000	0.000		
				Max +ve	0.000	0.000	28.000	-36.443
	3	3	28.000	Max -ve	0.000	0.000	0.000	69.328
				Max +ve	0.000	0.000		
	4	4	70.750	Max -ve	0.000	0.000	0.000	55.860
				Max +ve	0.000	0.000	70.750	-50.170

APPENDIX E

Bridge Inspection Photos

Roadway looking North

Wearing Surface

West face

Looking West

1560	Brewer	Industrial Park Rd / I395	10-17-13

North joint seal sagging and leaking – Approach pavement and header have extensive moderate cracking

South approach pavement and header have extensive moderate cracking

South abutment

General view over I395 EB

1560	Brewer	Industrial Park Rd / I395	10-17-13

North abutment

General view over I395 WB

Moderate scaling rust at Exterior girder ends – East face – Both abutments

Moderate scaling at joint end and bridge seat – East corner of north abutment

1560	Brewer	Industrial Park Rd / I395	10-17-13

SW wing – Minor cracking at top

NE wing – Minor to moderate cracking at top

SE wing - Moderate cracking at top

NW wing - Moderate cracking at top

1560	Brewer	Industrial Park Rd / I395	10-17-13

Roadway looking north

South joint

WS view

North joint

1560	Brewer	Industrial Park Road/ I-395	1-5-2015

South abutment

South span view

Pier view

Heavy cracking & staining at South abutment wing turn

1560	Brewer	Industrial Park Road/ I-395	1-5-2015

North span view

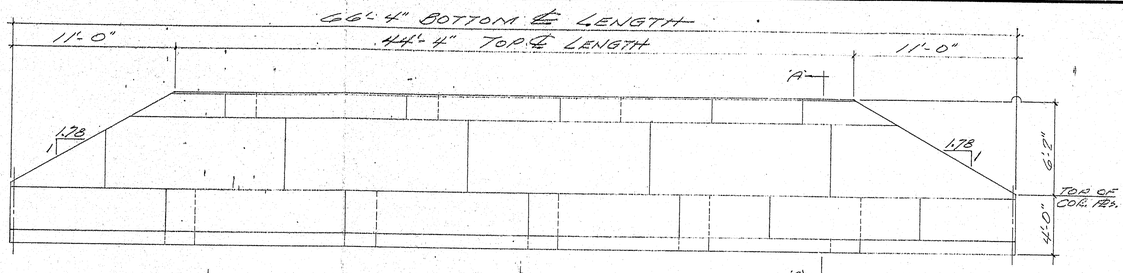
general

1560	Brewer	Industrial Park Road/ I-395	1-5-2015

North abutment		general	
1560	Brewer	Industrial Park Road/ I-395	1-5-2015

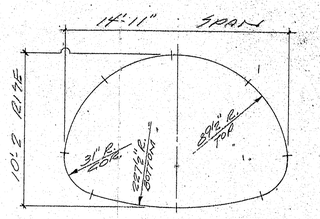
APPENDIX F

Original Plans and Drawings

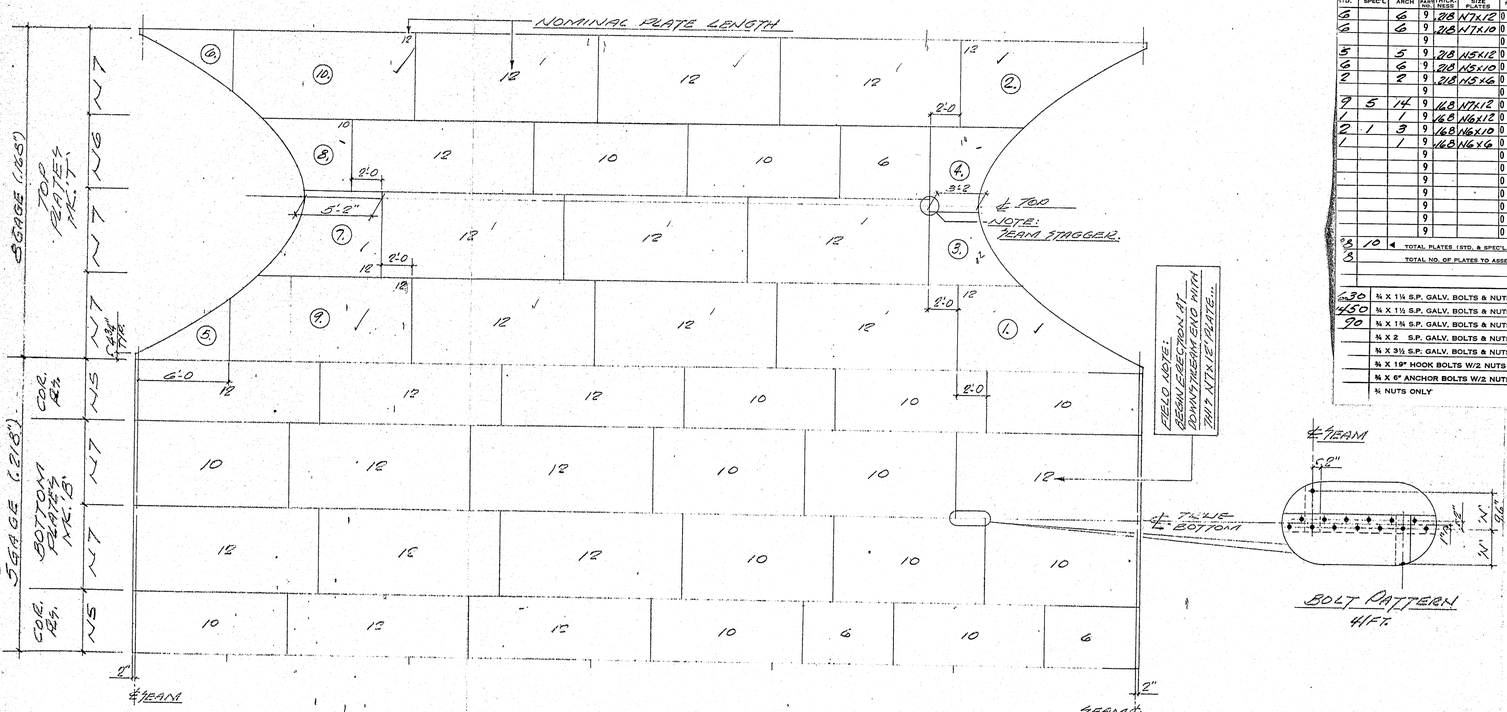


ELEVATION

FLOW



SECTION "A-A"



DEVELOPED PLAN — INSIDE VIEW

8 GAGE (.165") TOP PLATES

5 GAGE (.218") BOTTOM & CORNER PLATES

PLAIN GALVANIZED

(1.) — STRUCTURE

BOLT PATTERN
4 FT.

republicsteel — SECTIONAL PLATE PIPE ARCH

Republic Steel Corporation, Drainage Products Division, 4416 Louisville Road NE, Canton OH 44705

336 Rev. 1-74

BILL OF MATERIAL No. 3334

DESCRIPTION: 66'-4" Bottom ℄ 14'-11" x 10'-2", 8 @ 1.75:1 To T.C. Rds.

WING AS PER B. D-3334 PER MAINE SPECIFICATIONS

VISN 4 COPIES OF CERTIFIED ANALYSIS. ASPHALT COATED. ~~NO~~ NO FURNISH TEST SAMPLES. ~~YES~~ NO

REFERENCE NO. CREEK BRIDGE, LOVELL STATION NO.

SUBJECT NO. BRIDGE No. 3582 DATE DESIRED 4/6.11.13.82 OR SOONER

STD.	SPEC'L	ARCH	SIZE NO.	THICK-NESS	SIZE PLATES	SIZE NO.	SIZE NO.	RADIUS	HEAT NO.	MARK	PLATES SHIP'D	PLATES DUE	TOTAL WT.
6		6	9	.218	N7x12	0	0	227½"		B			1427
6		6	9	.218	N7x10	0	0	227½"		B			1024
			9			0	0						
5		5	9	.218	N5x12	0	0	31"					2949
6		6	9	.218	N5x10	0	0	31"					2951
2		2	9	.218	N5x6	0	0	31"					601
			9			0	0						
9	5	14	9	.165	N7x12	0	0	89½"					8431
1		1	9	.165	N6x12	0	0	89½"					537
2	1	3	9	.165	N6x10	0	0	89½"					1292
1		1	9	.165	N6x6	0	0	89½"					276
			9			0	0						
			9			0	0						
			9			0	0						
			9			0	0						
			9			0	0						
38	10		9			0	0						
38													

TOTAL PLATES (STD. & SPEC'L.)

TOTAL NO. OF PLATES TO ASSEMBLE — TOTAL WT. 27,048

530	¾ X 1¼ S.P. GALV. BOLTS & NUTS	9000901	.514	GALV.	324
1450	¾ X 1½ S.P. GALV. BOLTS & NUTS	9000902	.534	GREEN	774
90	¾ X 1¾ S.P. GALV. BOLTS & NUTS	9000903	.554	RED	50
	¾ X 2 S.P. GALV. BOLTS & NUTS	9000904	.574	BLACK	
	¾ X 3½ S.P. GALV. BOLTS & NUTS	9000905	.694	GALV.	
	¾ X 19" HOOK BOLTS W/2 NUTS	9000906	3.40	GALV.	
	¾ X 6" ANCHOR BOLTS W/2 NUTS	9000907	1.25	GALV.	
	¾ NUTS ONLY	9000908	0.25	GALV.	

QTY.	THICKNESS	SIZE & SHAPE
6	.218	N7x12'
6		N7x10'
5		N5x12'
6		N5x10'
2		N5x6'
14	.165	N7x12'
1		N6x12'
3		N6x10'
1		N6x6'

REPUBLIC ORDER No.	2445-23032
INVOICE NO.	
CUSTOMER NO.	1109
DATE SHIPPED	
SHIPPED FROM	
CUSTOMER'S NAME	E.M.P. SALES INC.
CAR NO.	
ROUTE	
CODE	2445
SPECIAL SHIPPING INSTRUCTIONS	DRO-TRUCK
REQ. NO.	1783-27
DATE	1-25-82
COMPLETE	
PARTIAL	
PAGE	1
OF	1

S H I P T O: MAINE D.O.T. HIGHWAY MAINTENANCE BLDG. FREYBURG, MAINE

NOTIFY KEN CROCKETT 24 HRS. PRIOR TO SHIPMENT @ 207-562-4228.

QUANTITY	DESCRIPTION	WEIGHT
PCS.	BENT STEEL PLATES	
PKGS.	1 & S BOLTS & NUTS	

Approved 1/12/82

Creek Bridge, Lovell

BIN 3334

GENERAL NOTE:

ISSUANCE OF THIS DRAWING FOR APPROVAL DOES NOT CONSTITUTE ACCEPTANCE OF CUSTOMER'S ORDER BY REPUBLIC STEEL CORPORATION.

THIS DRAWING TO BE USED IN PLACING MATERIALS SOLD UNDER THIS CONTRACT ONLY.

CONTRACTOR TO CHECK DIMENSIONS AT JOB AS REPUBLIC STEEL CORPORATION ASSUMES NO RESPONSIBILITY FOR GENERAL BUILDING DIMENSIONS.

THIS DRAWING IS LOANED WITH THE EXPRESSED AGREEMENT THAT THE DRAWING AND INFORMATION THEREON CONTAINED ARE THE PROPERTY OF REPUBLIC STEEL CORPORATION AND WILL NOT BE REPRODUCED, COPIED OR OTHERWISE USED, NOR DISCLOSED TO OTHERS, NOR USED IN WHOLE OR IN PART TO ASSIST IN MAKING OR TO FURNISH ANY INFORMATION FOR THE MAKING OF DRAWINGS, PATTERNS, OR OTHER REPRODUCTIONS HEREOF, OR FOR THE MAKING OF APPARATUS OR PARTS THEREOF, EXCEPT UPON WRITTEN PERMISSION OF REPUBLIC STEEL CORPORATION IS FIRST OBTAINED AND SPECIFIC AS TO EACH CASE.

APPROVAL OF THIS DRAWING BY THE ARCHITECT OR ENGINEER SHALL CONSTITUTE A FINAL INTERPRETATION OF ALL OTHER DOCUMENTS RELATING TO THE SUBJECT MATTER OF THIS DRAWING.

THE ACCEPTANCE OF THIS DRAWING WILL BE CONSTRUED AS AN ACCEPTANCE OF THE FOREGOING AGREEMENT.

REVISED

14'-11" SPAN x 10'-2" RISE
BEVEL ENDS TO FOR 8 CORNER PLATES
5 & 8 GA SIN
FOR: E.M.P. SALES INC.

REPUBLIC ORDER No. 2445-23032

CUSTOMER'S No. 1109

DRAWN BY WRON 10-27-82

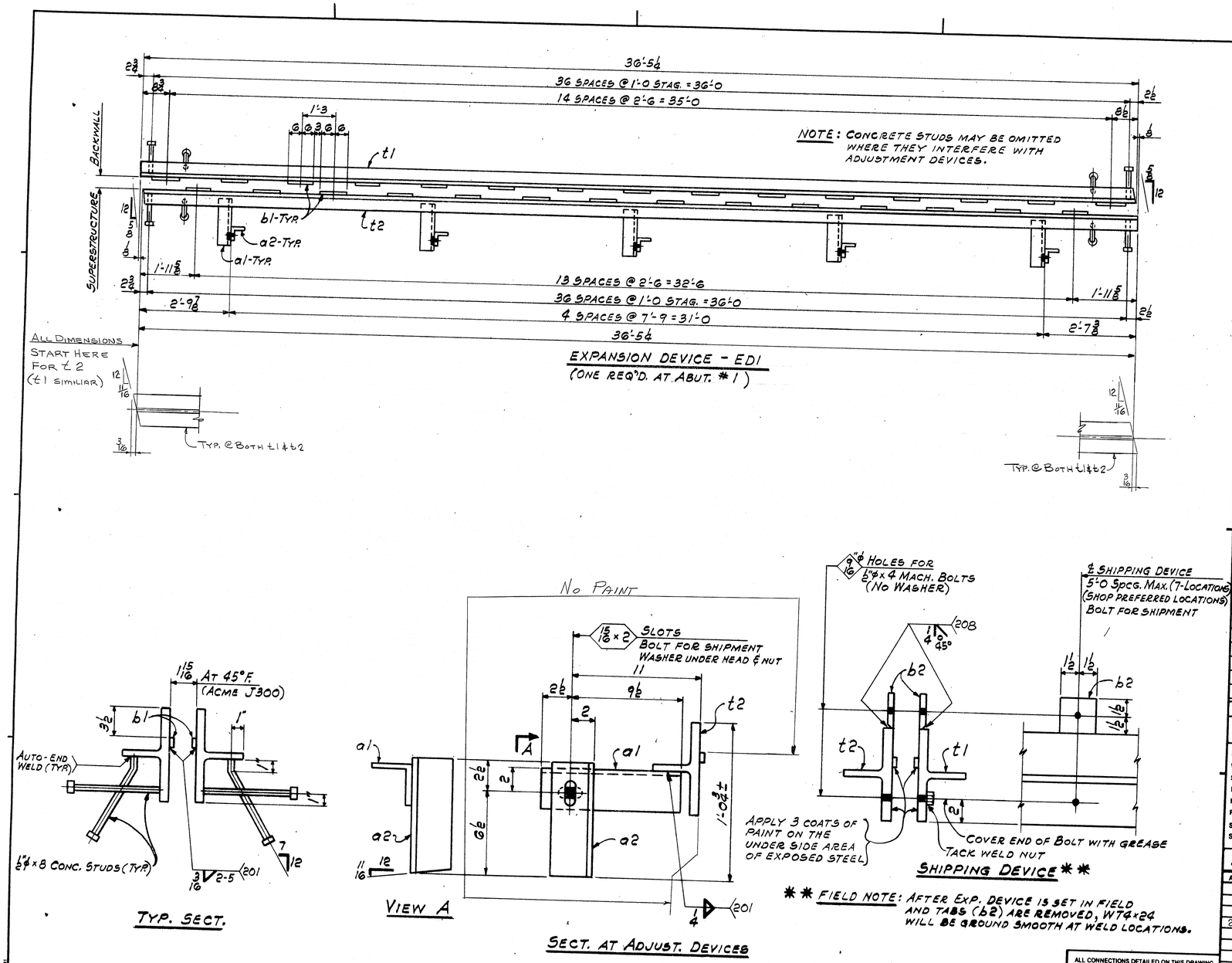
DRAWING No. D-3334

republic steel — SECTIONAL PLATE PIPE ARCH

INV. 1837

Br. # 3582

R88-58



** FIELD NOTE: AFTER EXP. DEVICE IS SET IN FIELD AND TABS (b2) ARE REMOVED, WT4x24 WILL BE GROUND SMOOTH AT WELD LOCATIONS.

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING, FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

Br.# 1560

HARLAN F. SPILLER CO. INC.

SHIP | **BILL OF MATERIAL** | JOB NO. 3-28 | DRAWING NO. 57-1 | REV. △

MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.		REMARKS
ED1	1		ASS'Y	36	5⅜				
	1	t1	WT4x24	36	5⅜	874	4/B		1 @ 46'0 PO. 31429
	1	t2	WT4x24	36	5⅜	874	4/B		ALSO CUTS 4/C
	29	b1	BAR 1"x⅜	1	0	37	4/D		Res. 1 @ 27'6
	14	b2	PL 3x½	0	3	18	4/G		3 @ 20'6 PO. 31445
									Res. 1 @ 15'-9 x 21'8"
	5	a1	L3½x3½x⅜	1	0	43	4/E	Res. 5/3 P	A588
	5	a2	L3½x3½x⅜	0	9	32	4/E		A588
	74	SHOP	⅝"φ CONC. STUD	0	8	37	4/F	SHP. 3/3/84	A108 36 BENT
	5	SHOP	⅞"φ H.S. BOLT	0	2½	4	4/U	Res. 3/3/84	W/ HHN A325 TYPE 1
	10	SHOP	⅞"φ H.S. WASHER			1	4/V		
	14	SHOP	⅝"φ MACH. BOLT	0	4	4	4/X	TYP. 3/14/84	A307 W/NUTS
	1	SHOP	COMPRESSION SEAL + ADHESIVE	37	0±	~	5/A		ACME J300
						1924 #			

IT. NO. 520.22 | BR. NO. | PROJ. NO. I-395-8(B3)178

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR1 [ ] A588 GR1 [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [X] Bolted [X] Welded [ ] None
FIELD CONN: [ ] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [ ] 15/16 [ ] [ ] Unless Noted [ ] None AS NOTED
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

EXPANSION DEVICE - ED1

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	1-31-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-7-83	JB

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVE I-395 BREWER, PENOBSCOT COUNTY, MAINE

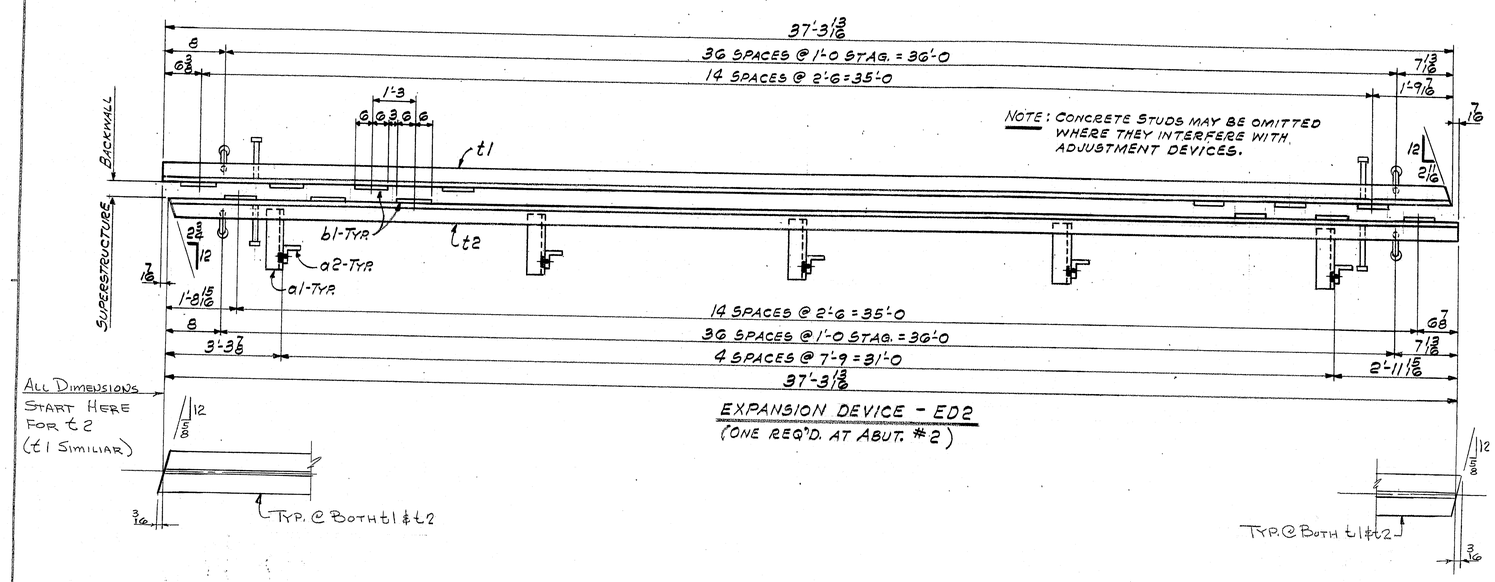
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS

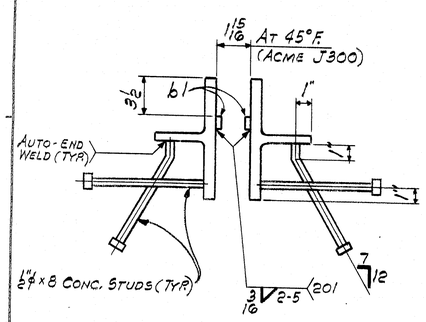
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-28	57-1	△

905-14

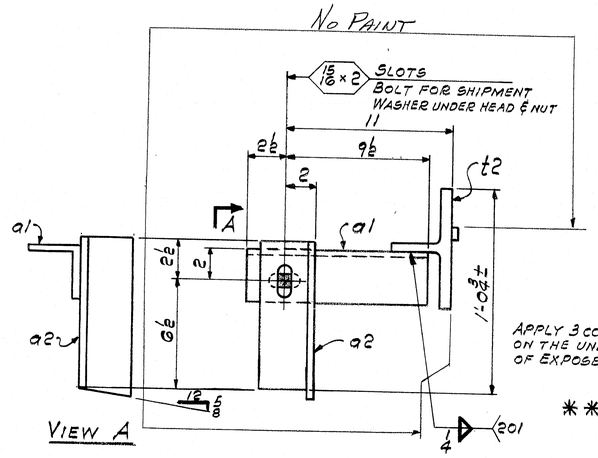
R88-59



EXPANSION DEVICE - ED2
(ONE REQ'D. AT ABUT. #2)

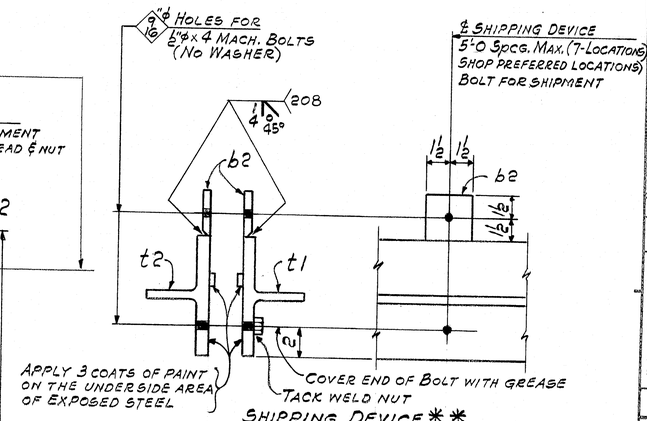


TYP. SECT.



VIEW A

SECT. AT ADJUST. DEVICES



SHIPPING DEVICE **

** FIELD NOTE: AFTER EXP. DEVICE IS SET IN FIELD AND TABS (b2) ARE REMOVED, WT4x24 WILL BE GROUND SMOOTH AT WELD LOCATIONS.

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC STANDARDS. IN APPROVING THIS DRAWING, FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

SHIP | BILL OF MATERIAL | JOB NO. 3-28 | DRAWING NO. 57-2 | REV. △

MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.			REMARKS
ED2	1		ASS'Y.	37	44					
	1	t1	WT4x24	37	4 3/16	896	4/C	1/B		A 6 46'
	1	t2	WT4x24	37	4 3/16	896	4/C	1/B		P.O. 51429
	30	b1	BAR 1"x3/8	1	0	38	4/D			3C2b's: 1 @ 16'-6
	14	b2	PL 3x1/2	0	3	18	4/G			Rev. 1 @ 15'-9 x 2 pl
	5	a1	L3 1/2x3 1/2x3/8	1	0	43	4/E			A588
	5	a2	L3 1/2x3 1/2x3/8	0	9 3/16	33	4/E			A588
	74	SHOP	1/2"φ CONC. STUD	0	8	37	4/F			A108 38 BENT
	5	SHOP	7/8"φ H.S. BOLT	0	24	4	4/L			A325 TYPE 1
	10	SHOP	7/8"φ H.S. WASHER			1	4/L			
	14	SHOP	1/2"φ MACH. BOLT	0	4	4	4/X			A307 W/NUTS
	1	SHOP	COMPRESSION SEAL + ADHESIVE	37	10±	~	5/B			ACME J300
						1470 #				

IT. NO. 520.22 | BR. NO. | PROJ. NO. I-395-8(85)178

FOR APPROVAL | FOR FILES & FIELD

STEEL: ASTM. [X] A36 [ ] A572 GR. [ ] A588 GR. [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [X] Bolted [X] Welded [ ] None
FIELD CONN: [ ] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [ ] 15/16 [ ] Unless Noted [ ] None AS NOTED
PAINT: [ ] None [X] Shopcoat [ ] Galv: After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

EXPANSION DEVICE - ED2

APPROVED:	PRINT DIST.	
3	12/27/83	APP.
8	1-31-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-7-83	JB

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVE I-395 BREWER, PENOBSCOT COUNTY, MAINE

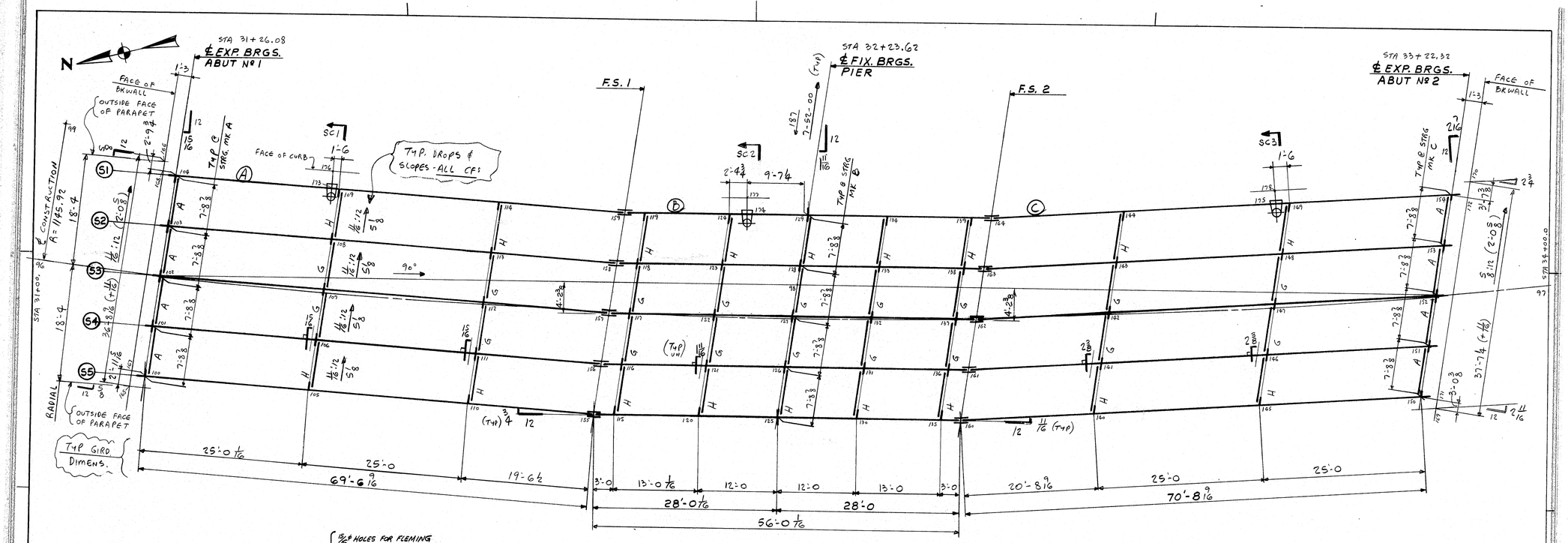
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS

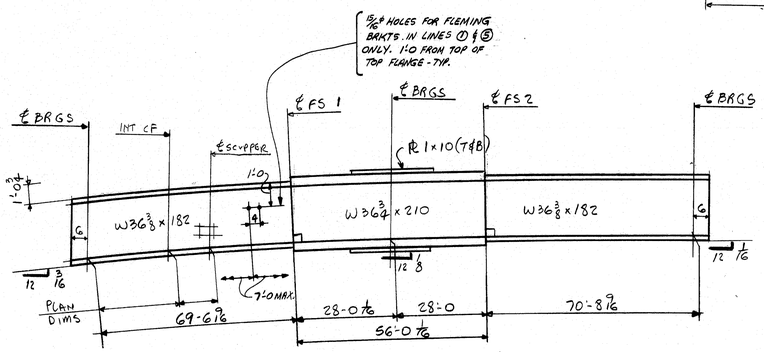
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-28	57-2	△

R88-60

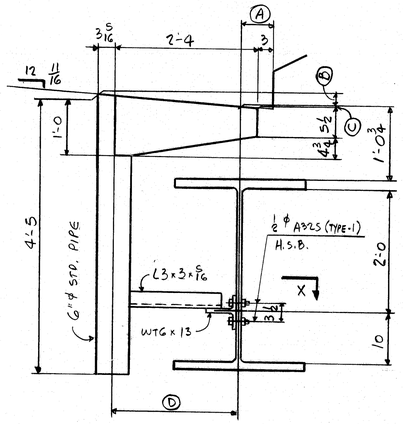
905-14



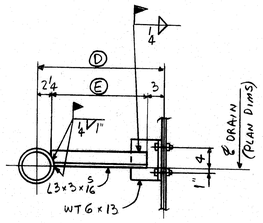
FRAMING PLAN



TYP. STRINGER ELEVATION



SECTION SC1, SC2, SC3



SECT X

SECT	A	B	C	D	E
SC1	8 1/2	1/2	1/4	1-10 1/2	1-5 1/4
SC2	1-2 3/8	1/8	5/8	1-4 5/8	1 1 5/8
SC3	1 1 5/16	1 5/16	7/16	1-7 11/16	1-2 7/16

NOTES:

1) ALL LONG. DIMS SLOPING ALONG BOTT OF WF.
2) ALL TRANSV. DIMS ARE HORIZ.
3) ALL ENDS, BRGS & CFs ARE VERTICAL.
4) ALL F.S. ARE NORMAL TO RIGHT F.S. CHORD.
5) ⟶ DENOTES DROP OR SLOPE. (ARROW POINTS TO LOW END.)
6) FOR LAYOUTS SEE SHT. E3.

IT. NO. 504.70	BR. NO.	PROJ. NO. I-395-8(85)176
FOR APPROVAL	FOR FILES & FIELD	

CALC. PLAN

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
3	2-2-84	FAB.
25	1-27-84	F&F.

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395
BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

REV. △		
CHECKED	11-19-83	FK
DRAWN	11/18/83	LT

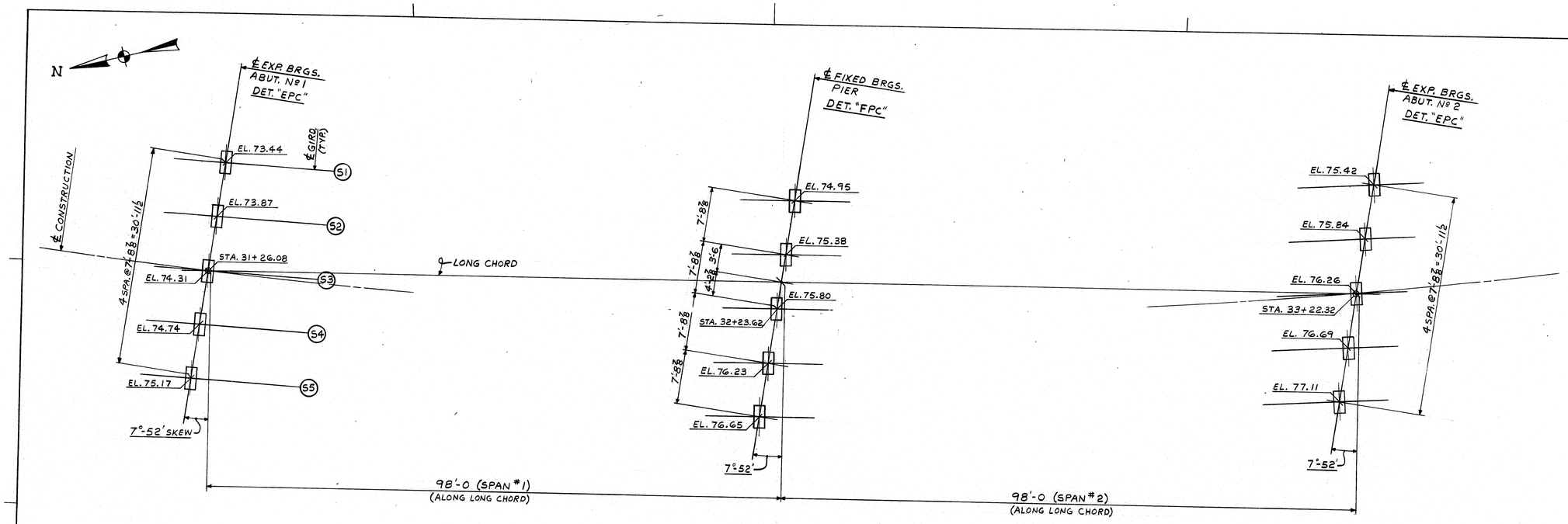
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	W-1	△

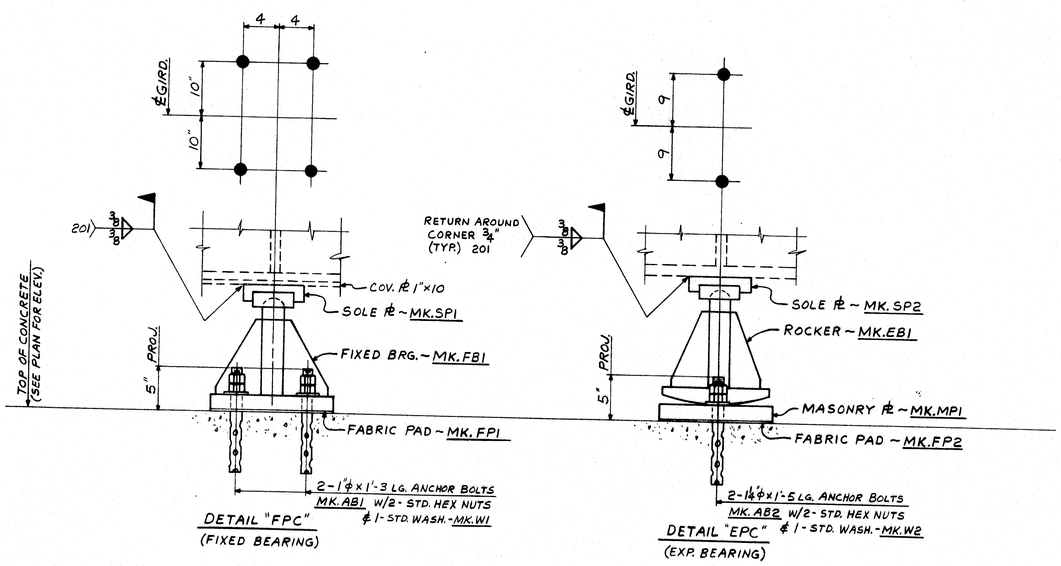
PTS 96-178
RUN 903

R88-61

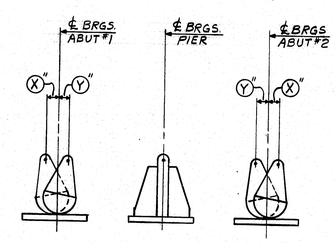
905-01

HARLAN F. SPILLER CO. INC





TEMP. °F	*X"	*Y"
+105	1/2	–
+90	3/8	–
+75	1/4	–
+60	1/8	–
+45	0	0
+30	–	1/8
+15	–	1/4
0	–	3/8
-15	–	1/2



BEARING SETTING DETAIL

* ADJUST X OR Y DIMENSION 1/4" TOWARD THE FIXED BRGS. FOR D.L. CAMBER (AT TIME OF ERECTION)

IT. NO. 504.70	BR. NO.	PROJ. NO. I-395-8(85)176
FOR APPROVAL	FOR FILES & FIELD	

ANCHOR BOLT PLAN

APPROVED:

PRINT DIST.		
3	12/28/83	APP.
8	2-2-84	FAB.
2S	1-27-84	F&F.

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

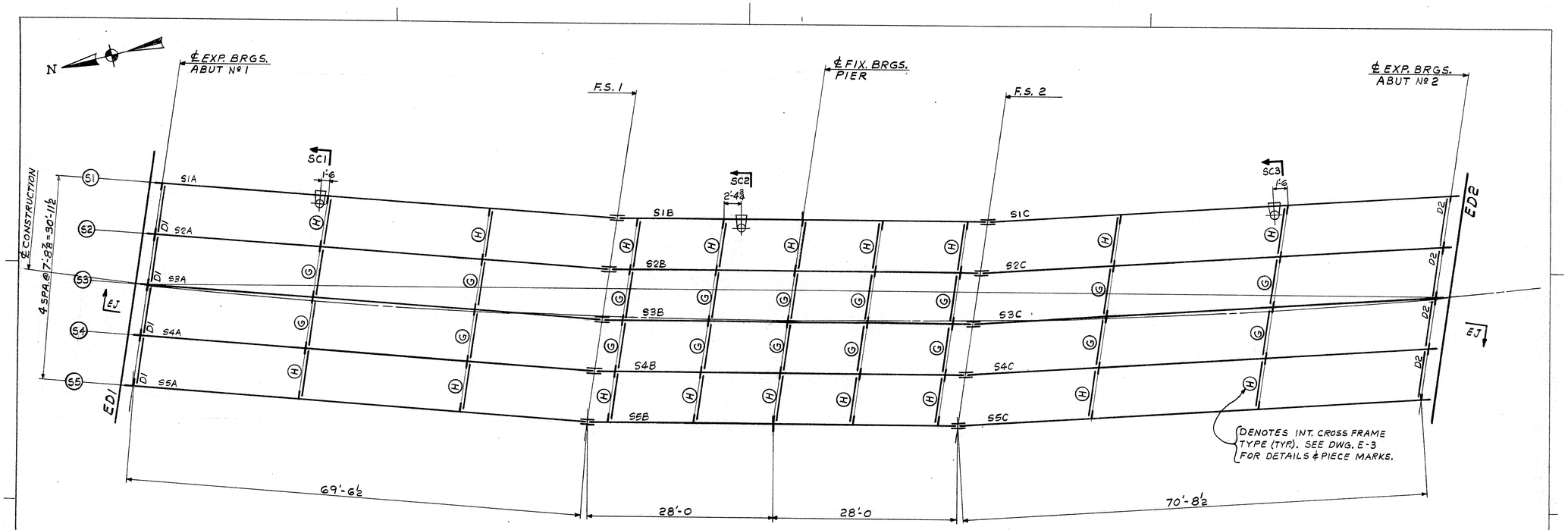
REV. △		
CHECKED	12-21-83	GK
DRAWN	11-15-83	RLA

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	E-1	△

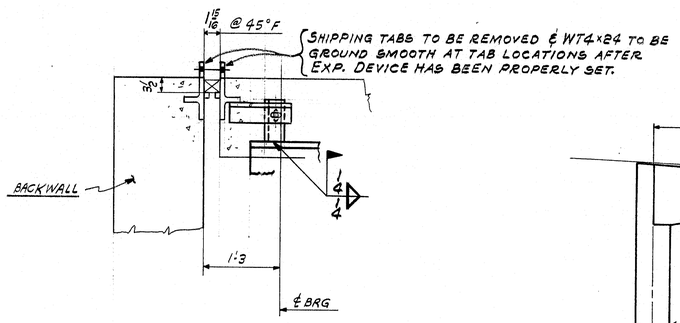
905-03

R88-62

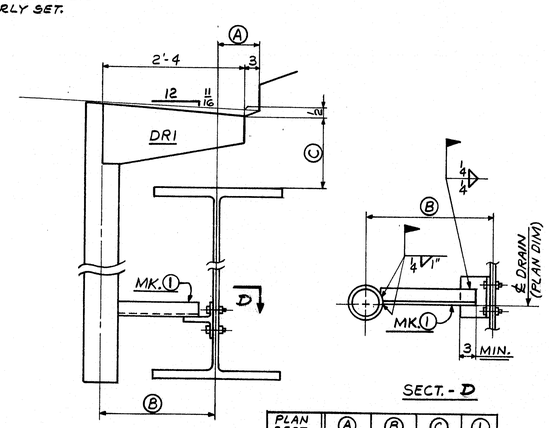
HARLAN F SPILLER CO. INC



FRAMING PLAN



SECT. EJ



SECT. - D

PLAN SECT.	Ⓐ	Ⓑ	Ⓒ	Ⓘ
SC1	8 1/2	1'-10 1/2	1'-0	A1
SC2	1'-2 3/8	1'-4 5/8	11 5/8	A2
SC3	11 5/16	1'-7 11/16	11 13/16	A3

FORM BRACKET HOLES

FORM BRACKET HOLES ARE TO BE PLUGGED WITH 5/8" ϕ x 1 1/2" CARRIAGE BOLTS. HEADS ARE TO BE ON OUTSIDE. HOLES TO BE COMPLETELY COVERED.

IT. NO. 504.70	BR. NO.	PROJ. NO. I-395-8(85)176
FOR APPROVAL	FOR FILES & FIELD	

FRAMING PLAN

APPROVED:		
PRINT DIST.		
3	12-28-83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	11-15-83	RLA

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

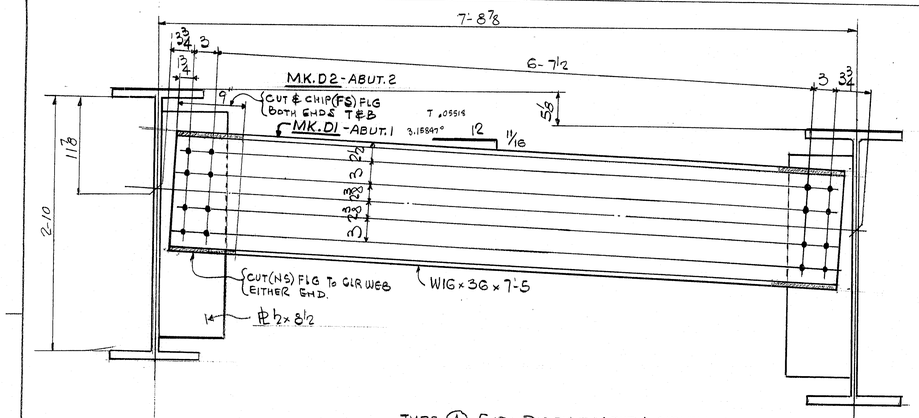
DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	E-2	△

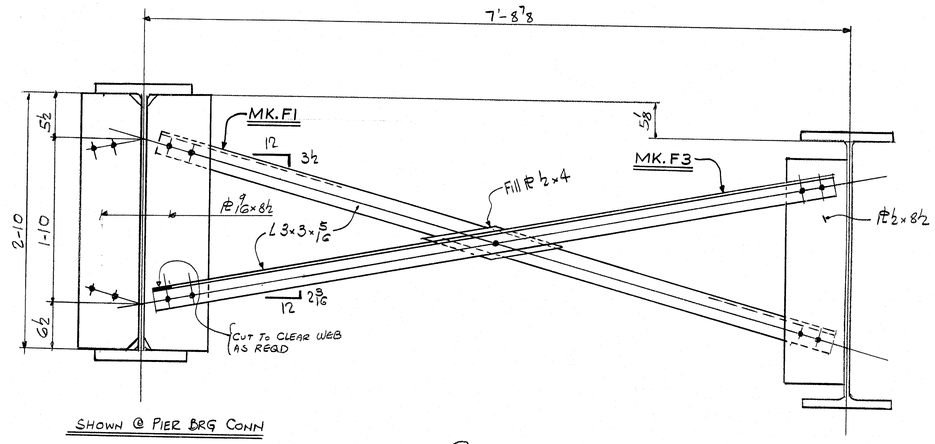
905-02

R88-63

HARLAN F. SPILLER CO. INC.



TYPE (A) END DIAPH - ABUT. 1 SHOWN



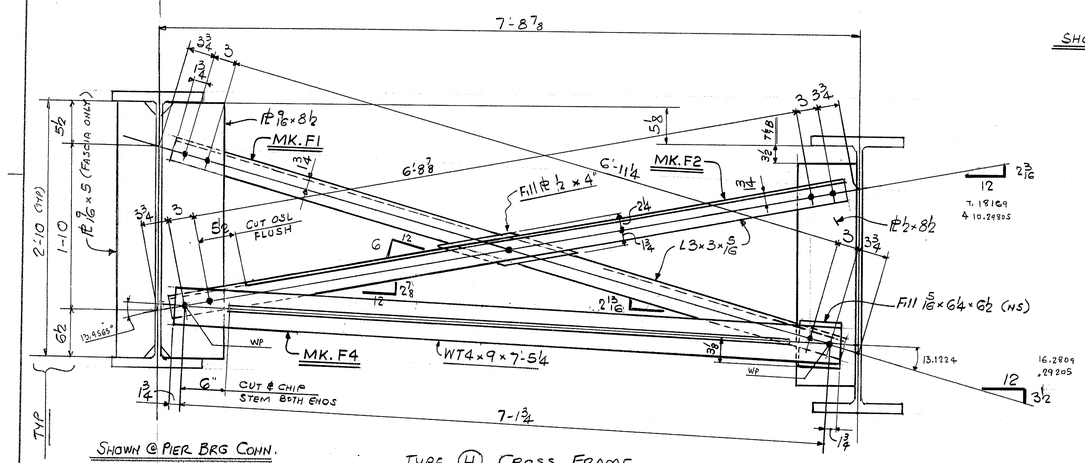
SHOWN @ PIER BRG CONN

SHOWN @ INT CONN PL

TYPE (G) CROSS FRAME

DIMENSIONS NOT SHOWN SAME AS TYPE (H)

LOOKING NORTH



SHOWN @ PIER BRG CONN.

TYPE (H) CROSS FRAME

LOOKING NORTH

SHOWN @ INT. CONN PL

NOTES

MATL: ASTM A36

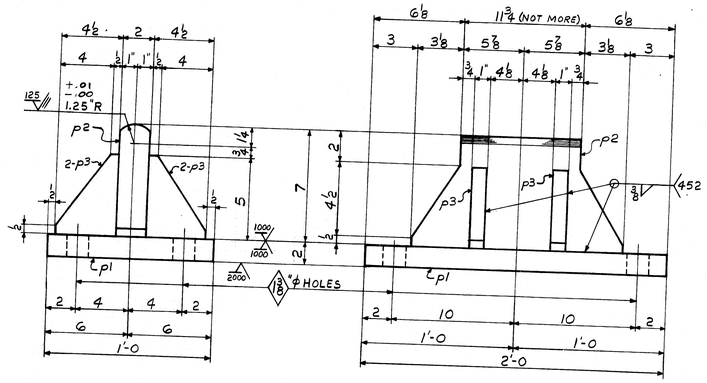
CONN: 7/8 ϕ HSB IN 15/16 ϕ HOLES

IT. NO. 504.70	BR. NO.		PROJ. NO. I-395-8(85) 176		
FOR APPROVAL	FOR FILES & FIELD				
CROSS FRAME & DIAPHRAGM LAYOUTS					
APPROVED:			Bancroft & Martin Inc. South Portland, Maine 04106		
PRINT DIST.					
3	12-28-83	APP.			
8	2-2-84	FAB.			
25	1-27-84	F&F.	JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE		
			CUSTOMER: REED & REED		
			DESIGNER: STATE OF MAINE, DEPT. OF TRANSP.		
REV. △			ORDER NO.	JOB NO.	DRAWING NO.	REV.
CHECKED	11-28-83	FK		3-27	E-3	△
DRAWN	11/21/83	WJG				

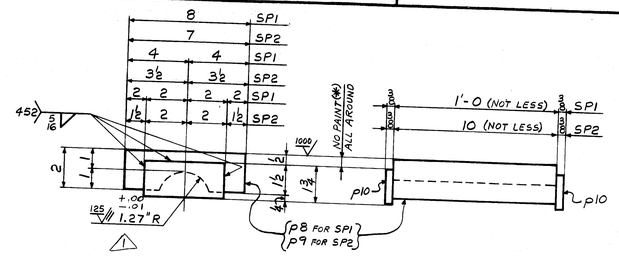
905-04

R88-64

HARLAN F. SPELLER CO. INC.

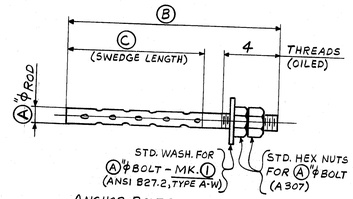


FPC-5 5 ~ FIXED BEARINGS ~ MK. FB1



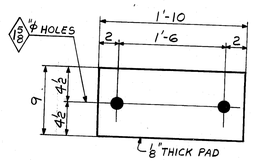
FPC-5 5 ~ SOLE PLATES ~ MK. SP1

EPC-3 (MOD) 10 ~ SOLE PLATES ~ MK. SP2

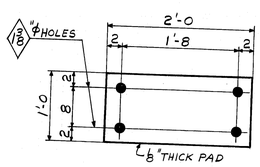


ANCHOR BOLTS

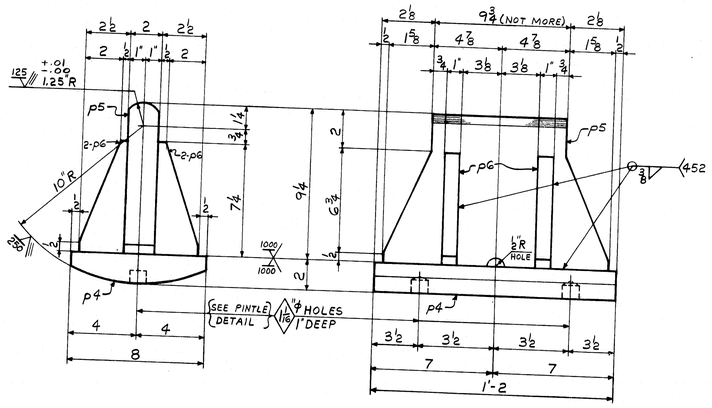
MARK	NS REQ'D	A	B	C	I
AB1	20	1"	1'-3	10	W1
AB2	20	1¼	1'-5	1'-0	W2



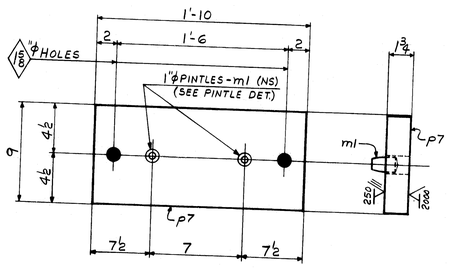
EPC-3 (MOD) 10 ~ FABRIC PADS ~ MK. FP2 (PREFORMED FABRIC PAD AS PER MAINE STD. SPEC. 713.03)



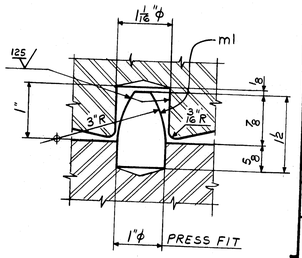
FPC-5 5 ~ FABRIC PADS ~ MK. FP1 (PREFORMED FABRIC PAD AS PER MAINE STD. SPEC. 713.03)



EPC-3 (MOD) 10 ~ ROCKERS ~ MK. EB1



EPC-3 (MOD) 10 ~ MASONRY PLATES ~ MK. MP1



PINTLE DETAIL

NOTES

1. (*) DENOTES SURFACE TO RECEIVE ONE COAT OF BOILED LINSEED OIL.
2. FINISHED SURFACES (125/) OF FB1, EB1, SP1 & SP2 TO RECEIVE ONE SHOPCOAT OF "NEVER SEIZ" LUBRICANT.
3. MASONRY PLATES MP1 & BEARING SURFACE OF ROCKERS EB1 TO RECEIVE 2 - SHOP COATS OF PAINT.

△ Toll

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-65

SHIP | BILL OF MATERIAL | JOB NO. 3-27 | DRAWING NO. 51-1 | REV △

MARK	NO.	MARK	SHAPE	LENGTH		WT.	MISC. NO.	WT.	REMARKS
FB1	5		FIXED BEARINGS						
	5	P1	PL 2 × 12	2	0	5@PL.	1/B	817	
	5	P2	PL 2 × 7	1	6	5@9¾ x 1/4	1/C	357	FIE
	20	P3	PL 1" × 4½	0	5	1" x 2'-0	1/D	99	
EB1	10		ROCKERS						
	10	P4	PL 2 × 8	1	2	10@PL.	1/F	635	FIS
	10	P5	PL 2 × 9¼	1	1	10@9¾ x 1/4	1/G	682	FIE
	40	P6	PL 1" × 2½	0	7¼	4"x4" 1/4	1/H	144	
MP1	10		MASONRY PLATES						
	10	P7	PL 1¾ × 9	1	10	10@PL.	1/I	983	FIS
	20	M1	ROD 1"ϕ	0	1½	1@2'-1 CUT 1/8	1/J	7	FINISH
SP1	5		SOLE PLATES						
	5	P8	PL 2 × 8	1	0	5@PL.	1/K	272	
	10	P10	PL ⅜ × 1¾	0	4	Rec. ¾/32" Rec'd	1/M	7	
SP2	10		SOLE PLATES						
	10	P9	PL 2 × 7	0	10	10@PL.	1/L	397	
	20	P10	PL ⅜ × 1¾	0	4	Rec. 18.4" Rec'd	1/M	15	
			FABRIC PADS						
FP1	5		PAD 12 × ⅛	2	0	2 pc.	1/W	~	PREF. FAB. PAD AS PER MAINE STD. SPEC. 713.03
FP2	10		PAD 9 × ⅛	1	10	3/4 43	1/X	~	
			ANCHOR BOLTS						
AB1	20		ROD 1"ϕ	1	3	1'-3" Above	1/O	67	SWEDGED
	40		1"ϕ HEX NUT			AP 22.23C	1/Q	30	A307
W1	20		1"ϕ STD. WASHER			Rec. 20	1/S	2	ANSI B27.2 TYPE A-W 1 1/16"ϕ HOLE
AB2	20		ROD 1¼"ϕ	1	5	Rec. 39.45 or 20.20	1/P	119	SWEDGED
	40		1¼"ϕ HEX NUT			Rec. 40	1/R	40	A307
W2	20		1¼"ϕ STD. WASHER			Rec. 20	1/T	3	ANSI B27.2 TYPE A-W 1 5/16"ϕ HOLE
								4676	#

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR. [ ] A588 GR. [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [ ] Bolted [X] Welded [ ] None
FIELD CONN: [ ] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [ ] 15/16 [ ] [X] As Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT: —
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC - SP6

BRIDGE SHOES

APPROVED:

PRINT DIST.		
JP	12/27/83	APP.
B	2-2-84	FAB.
JS	1-27-84	F&F.
B	2-16-84	FAB
REV. △	2-16-84	JCM
CHECKED	12-21-83	GK
DRAWN	11-16-83	RLA

Bancroft & Martin Inc.
South Portland, Maine 04106

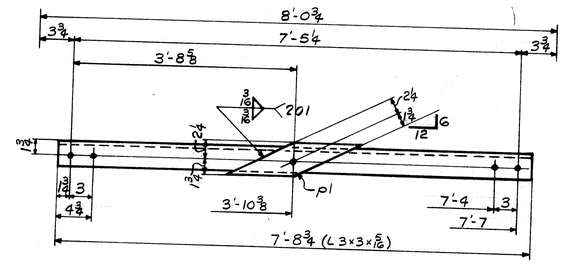
JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

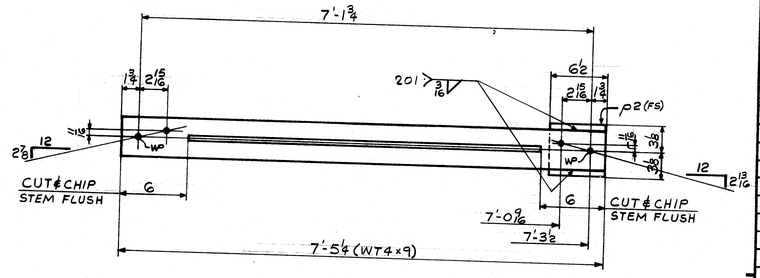
DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	51-1	△

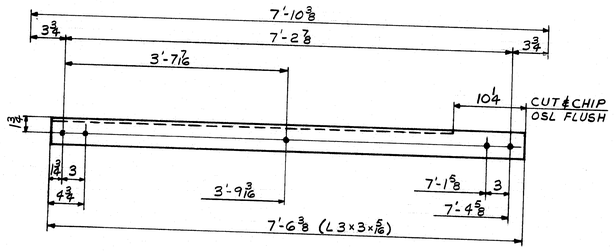
905-07



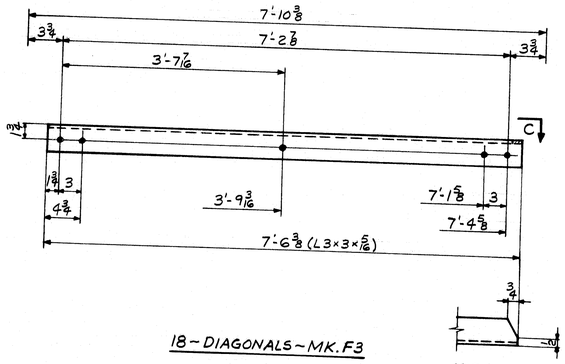
36 ~ DIAGONALS ~ MK. F1



18 ~ STRUTS ~ MK. F4



18 ~ DIAGONALS ~ MK. F2



18 ~ DIAGONALS ~ MK. F3

VIEW-C

NOTE: NO PAINT WITHIN 2" OF OPEN HOLES

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-66

HARLAN F. SPILLER CO. INC. 34595

SHIP	BILL OF MATERIAL				JOB NO. 3-27		DRAWING NO. 53-1	REV. △
MARK	NO.	MARK	SHAPE	LENGTH	WT.	FTBM BOX	WT	REMARKS
			CROSSFRAME PARTS					
F1	36		L 3×3×5/16	7	8 3/4	PID 31944 15 @ 36'0	3/L	1697	ALSO CUTS 3/M
	36	P1	PL 1/2 × 4	1	4 15/16	REQ. AS PER	3/O	346	
F2	18		L 3×3×5/16	7	6 3/8	FROM 3L ABOVE	3/M	827	
F3	18		L 3×3×5/16	7	6 3/8	FROM 3L ABOVE	3/M	827	
F4	18		WT 4×9	7	54	PID 31944 9 @ 36'0	3/K	1205	
	18	P2	PL 5/16 × 6 1/4	0	6 1/2	REQ. 10 @ 32'x3'0	3/N	65	
								4967	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-B(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR. [ ] A588 GR. [ ] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [ ] Bolted [X] Welded [ ] None
FIELD CONN: [X] Bolted [ ] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT: —
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

CROSSFRAME PARTS

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-13-83	RLA

Bancroft & Martin Inc.
South Portland, Maine 04106

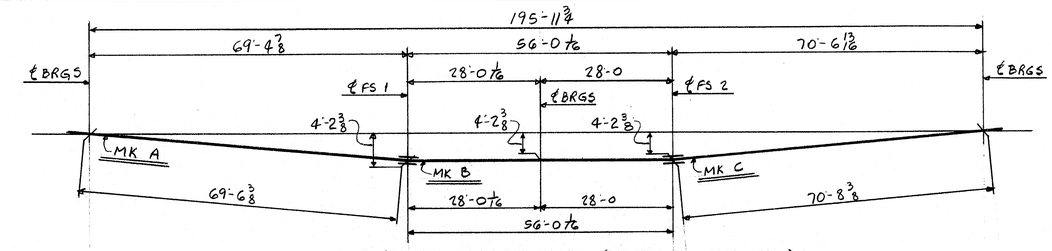
JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

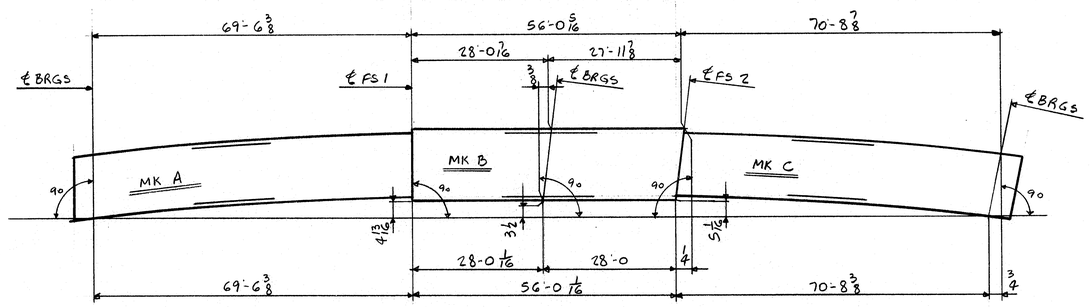
DESIGNER: STATE OF MAINE DEPT. OF TRANS

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	53-1	△

905-13

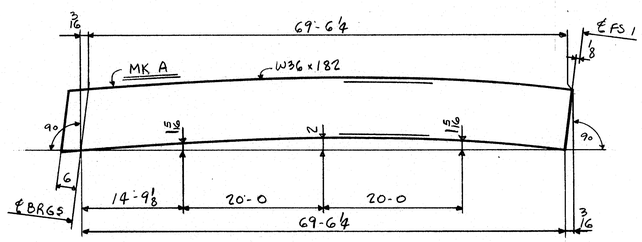


PLAN VIEW OF ASSEMBLY (TAKEN AT BOTT FLG)

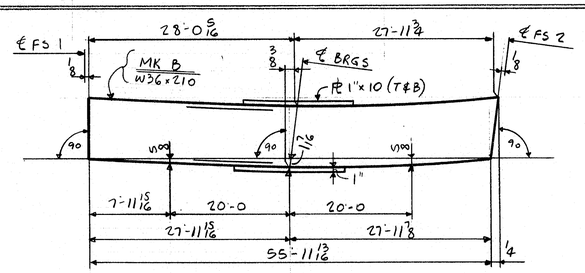


TYPICAL STRINGER ASSEMBLY DIAGRAM - LINES 1 TO 5

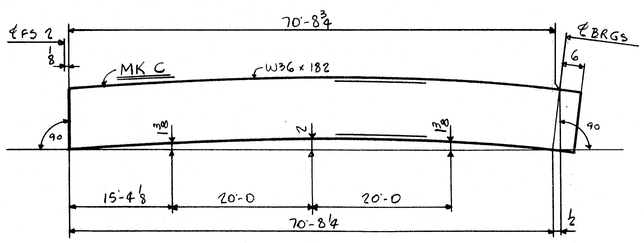
LINE	MK A	MK B	MK C
1	S1A	S1B	S1C
2	S2A	S2B	S2C
3	S3A	S3B	S3C
4	S4A	S4B	S4C
5	S5A	S5B	S5C



CAMBER DIAGRAM - S1A, S2A, S3A, S4A, S5A



CAMBER DIAGRAM - S1B, S2B, S3B, S4B, S5B



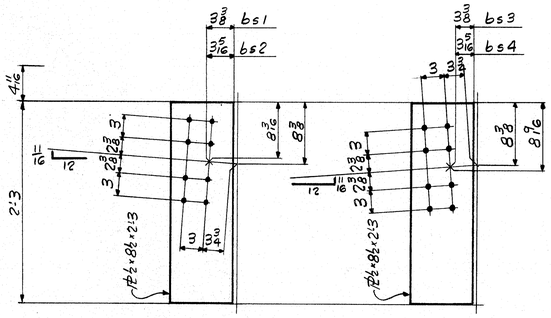
CAMBER DIAGRAM - S1C, S2C, S3C, S4C, S5C

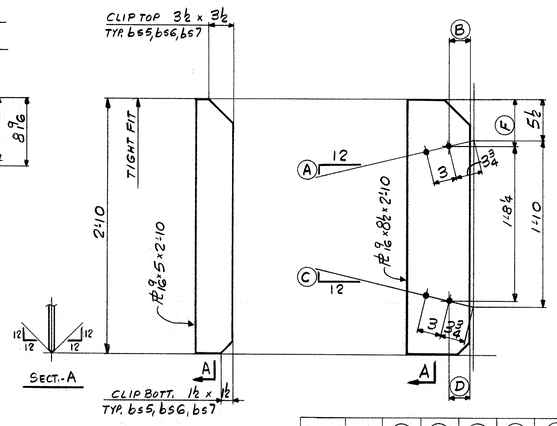
IT. NO. 504.70	BR. NO.	PROJ. NO. I-395-8(85)176	
FOR APPROVAL	FOR FILES & FIELD		
SHOP ASSEMBLY & CAMBER DIAGRAMS			
APPROVED:	Bancroft & Martin Inc. South Portland, Maine 04106		
PRINT DIST. 3 12/27/83 APP.			
8 2-2-84 FAB.			
25 1-27-84 F&F.	JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE		
	CUSTOMER: REED & REED		
	DESIGNER: STATE OF MAINE, DEPT. OF TRANS.		
REV. △	ORDER NO.	JOB NO.	DRAWING NO. / REV.
CHECKED 11-29-83 FK		3-27	55-1 △
DRAWN 11-28-83 LT			

905-05

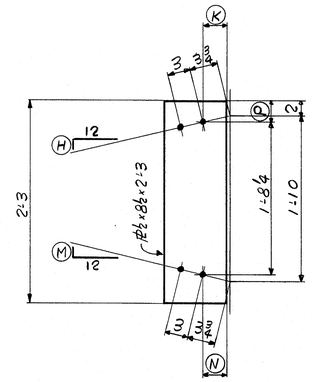
R88-67

HARLAN F. SPILLER CO. INC.

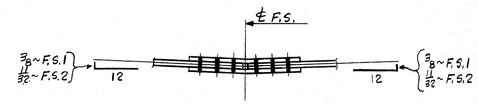


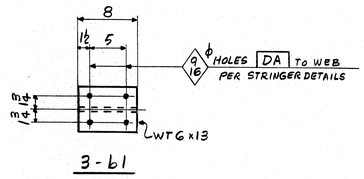


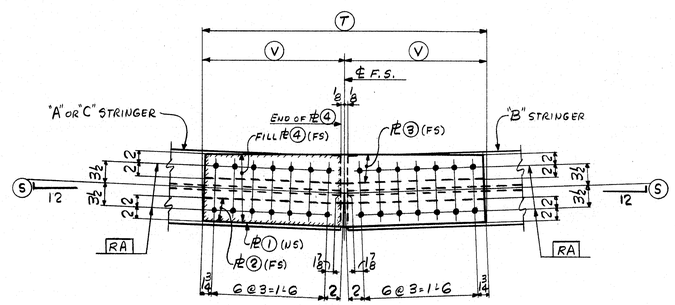
MARK	REQ'D	(A)	(B)	(C)	(D)	(F)
bs6	4	2 3/16	3 3/16	3½	3⅛	6 3/16
bs7	4	3½	3⅛	2 3/16	3 3/16	6 9/16



MARK	REQ'D	(H)	(K)	(M)	(N)	(P)
sf1	8	2 3/16	3 5/16	3½	3¼	2 11/16
sf2	16	2 3/16	3 3/16	3½	3⅛	2 11/16
sf3	8	2 3/16	3¼	3½	3 3/16	2 11/16
sf4	8	3½	3¼	2 3/16	3 5/16	3 7/16
sf5	16	3½	3⅛	2 3/16	3 3/16	3 7/16
sf6	8	3½	3 3/16	2 3/16	3¼	3 7/16







FIELD FLANGE SPLICE DETAIL

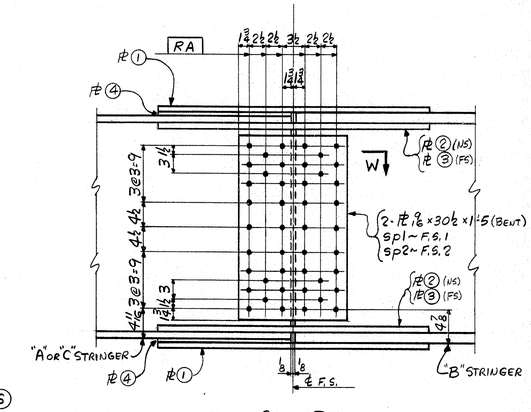
MAT'L - SPLICE PL ¾ A572 (CVN), FILLS A36

FIELD SPLICE	(S)	(T)	(V)	PL (1)	PL (2)	PL (3)	PL (4)
F.S.1	3/8	3'-7⅞	1'-9 15/16	PL ¾ x 11 11/16 x 3'-7⅞ MK-SP3	PL 1" x 4½ x 3'-7⅞ MK-SP5	PL 1" x 4 11/16 x 3'-7⅞ MK-SP7	PL ⅞ x 11 11/16 x 1'-9 13/16 MK-SP9
F.S.2	11/32	3'-7⅞	1'-9 15/16	PL ¾ x 11⅞ x 3'-7⅞ MK-SP4	PL 1" x 4⅞ x 3'-7⅞ MK-SP6	PL 1" x 4⅞ x 3'-7 7/16 MK-SP8	PL ⅞ x 11⅞ x 1'-9 13/16 MK-SP10

NOTE:

MAT'L: ASTM A36 (U.N.)

HOLES: 15/16 ϕ FOR ⅞ ϕ BOLTS (U.N.)



FIELD SPLICE DETAIL

SPLICE MAT'L - ASTM A572 (CVN) (U.N.)

SHOP NOTE:

HOLES NOTED RA TO BE SUB-PUNCHED OR SUB-DRILLED 15/16 ϕ AND REAMED TO 15/16 ϕ WITH ALL PARTS ASSEMBLED OR DRILLED FULL SIZE (15/16 ϕ) FROM THE SOLID WITH ALL PARTS ASSEMBLED, ALL STRINGERS MUST BE ASSEMBLED PER SHOP ASSEMBLY DIAGRAM (BS-1) PRIOR TO REAMING OR DRILLING.

IT. NO. 504.70	BR. NO.	PROJ. NO. I-395-8(88)176
FOR APPROVAL	FOR FILES & FIELD	

STRINGER COMPONENTS

APPROVED:			
	PRINT DIST.		
3	12/27/83	APP.	
8	2-2-84	FAB.	
25	1-27-84	F&F.	
REV. △			
CHECKED	12-22-88	GK	
DRAWN	12-8-83	ELC	

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395
BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

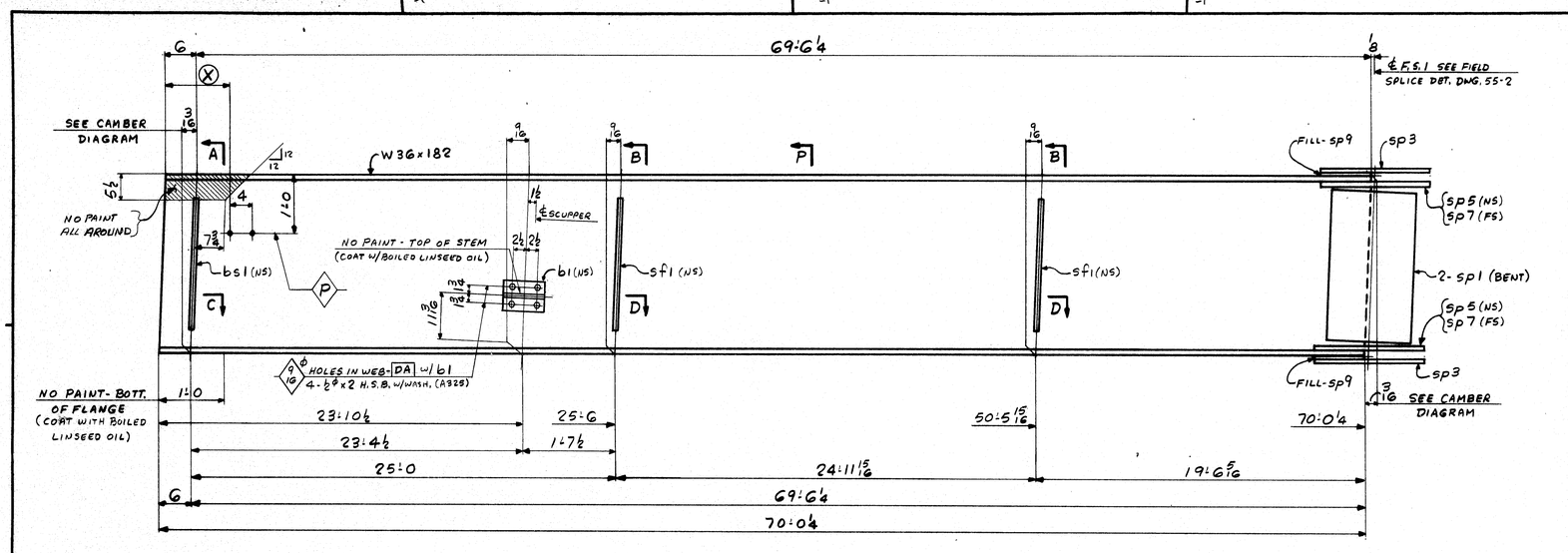
DESIGNER: STATE OF MAINE DEPT. OF TRANS

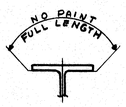
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-2	△

905-10

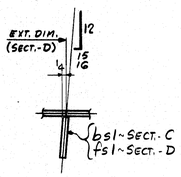
R88-68

HARLAN F. SPILLER CO. INC





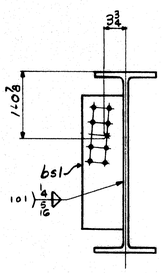
SECT.-P



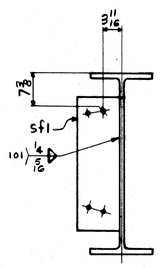
SECT.-C&D

ONE - STRINGER - S1A

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUT SEE DWG 55-2
NO PAINT WITHIN 2" OF OPEN HOLES UNLESS NOTED (P).

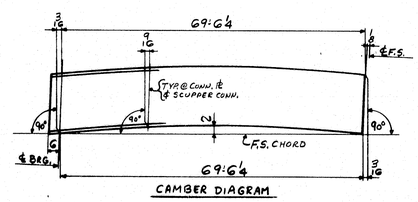


SECT.-A



SECT.-B

(X)
1'-0
7'-9
14'-6
21'-3
28'-0
34'-9
41'-6
48'-3
55'-0
61'-9
68'-6



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-69

HARLAN F. SPILLER CO. INC. 34595

SHIP	BILL OF MATERIAL									JOB NO. 3-27	DRAWING NO. 55-3	REV. △
MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT.	REMARKS			
			STRINGER									
S1A	1		W 36 x 182	70	0 7/16	1@24'-4	2/B	12,744	A572 CVN			
	1	bs1	PL ½ x 8½	2	3	1@26'-7 2@0	3/D	33				
	2	sf1	PL ½ x 8½	2	3	1@26'-7 2@0	3/D	65				
	2	sp1	PL 9/16 x 30½	1	5	Reg. 1@35'-11 1/2" x 2@1'-2½"	2/H	165	A588 BENT CVN			
	2	sp3	PL ¾ x 11 11/16	3	7⅞	Reg. 1@ 23'-6 1/2" x 1@ 23'-6 1/2"	2/I	218	A588 CVN			
	2	sp5	PL 1" x 4 11/16	3	7⅞	1@ 7'-8" 2@ 7'-8"	2/J	117	A572			
	2	sp7	PL 1" x 4 11/16	3	7⅞	" "	2/J	115	A572			
	2	sp9	PL 9/16 x 11 11/16	1	9 13/16	Reg. 1@ 26'-7" x 1@ 2'-1"	3/B	27				
	1	b1	WT 6 x 13	0	8	Reg. 1@ 25'-9"	3/H	9				
	4		½ϕ H.S. BOLT	0	2	2@ 2"	4/Q	1	W/H.H.NUT, A325 TYPE-1			
	4		½ϕ HD. FLAT WASHER			2@ 1¼"	4/R	—				
								13,994 #				

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 [GR] [ ] A588 [GR] [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [X] Bolted [X] Welded [ ] None
FIELD CONN: [X] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] [X] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

STRINGER - S1A

APPROVED:		
PRINT DIST.		
3P	12/21/83	APP.
8	2-2-84	FAB.
2S	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	SK
DRAWN	12-9-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

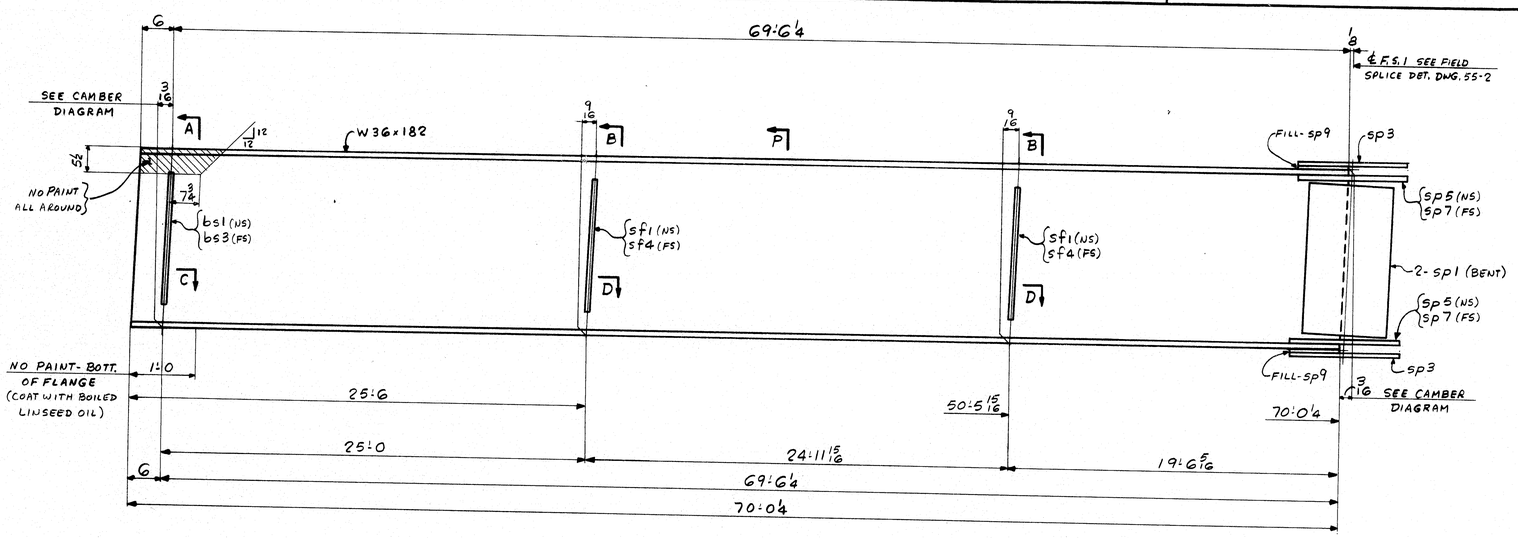
JOB: INDUSTRIAL PARK ROAD OVER I-395
BREWER, PENOBSCOT COUNTY, MAINE

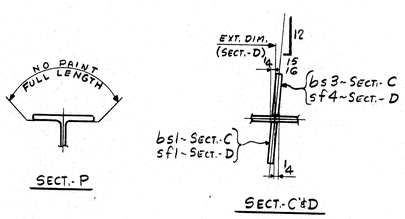
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-3	△

905-10

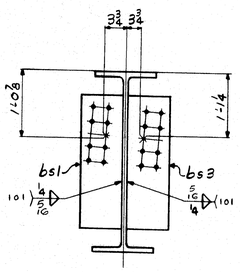


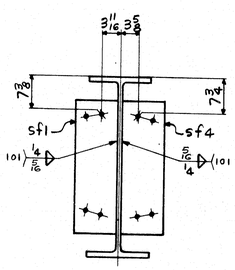


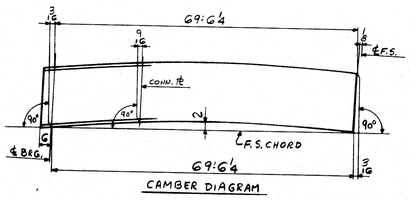
ONE - STRINGER - S2A
ONE - STRINGER - S3A
ONE - STRINGER - S4A
} ALIKE UNTIL REAMED

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUT SEE DWG 55-2

NO PAINT WITHIN 2" OF OPEN HOLES.







ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-70

HARLAN F. SPILLER CO. INC. 54595

SHIP	BILL OF MATERIAL					JOB NO. 3-27		DRAWING NO. 55-4	REV. △
MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT.	REMARKS
			STRINGERS						
S2A	1		W36x182	70	0 1/16	A.O. 5/14/15	2/B	12744	A572 CVN
S3A	1		W36x182	70	0 1/16	73 @	2/B	12744	A572 CVN
S4A	1		W36x182	70	0 1/16	70'-4"	2/B	12744	A572 CVN
	3	bs1	PL ½ x 8½	2	3	A.O. 3/14/49	3/D	98	
	3	bs3	PL ½ x 8½	2	3	1 @	3/D	98	
	6	sf1	PL ½ x 8½ •	2	3	96 X	3/D	195	
	6	sf4	PL ½ x 8½	2	3	24'-0"	3/D	195	
						Rec.- 1'-0"x2'-x1/8" 10'-3"x2'-x3/8"			
	6	sp1	PL 9/16 x 30½	1	5	Rec. 5'-0 x 3'-2'-0	2/H	496	A588 BENT CVN
	6	sp3	PL ¾ x 11 1/16	3	7⅞	1'-0"x6" 4'-9"x	2/I	654	A588 CVN
	6	sp5	PL 1" x 4 1/16	3	7⅞	Rec. 1'-0 1/16 x 2'-2'-0	2/J	350	A572
	6	sp7	PL 1" x 4 1/16	3	7⅞		2/J	346	A572
	6	sp9	PL 3/16 x 11 1/16	1	9 13/16		3/B	81	
								49,745 #	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 | A572 GR. | A588 GR. | [X] Unless Noted
WELDING ELECTRODE: E70 | [X] See Welding Proc. | None
SHOP CONN: Bolted | [X] Welded | None
FIELD CONN: [X] Bolted | [X] Welded | None
HOLES: 13/16 | [X] 15/16 | Unless Noted | None
PAINT: None | [X] Shopcoat | Galv. After Fab. | [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean | None SSPC-SP6

STRINGERS - S2A, S3A & S4A

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-9-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

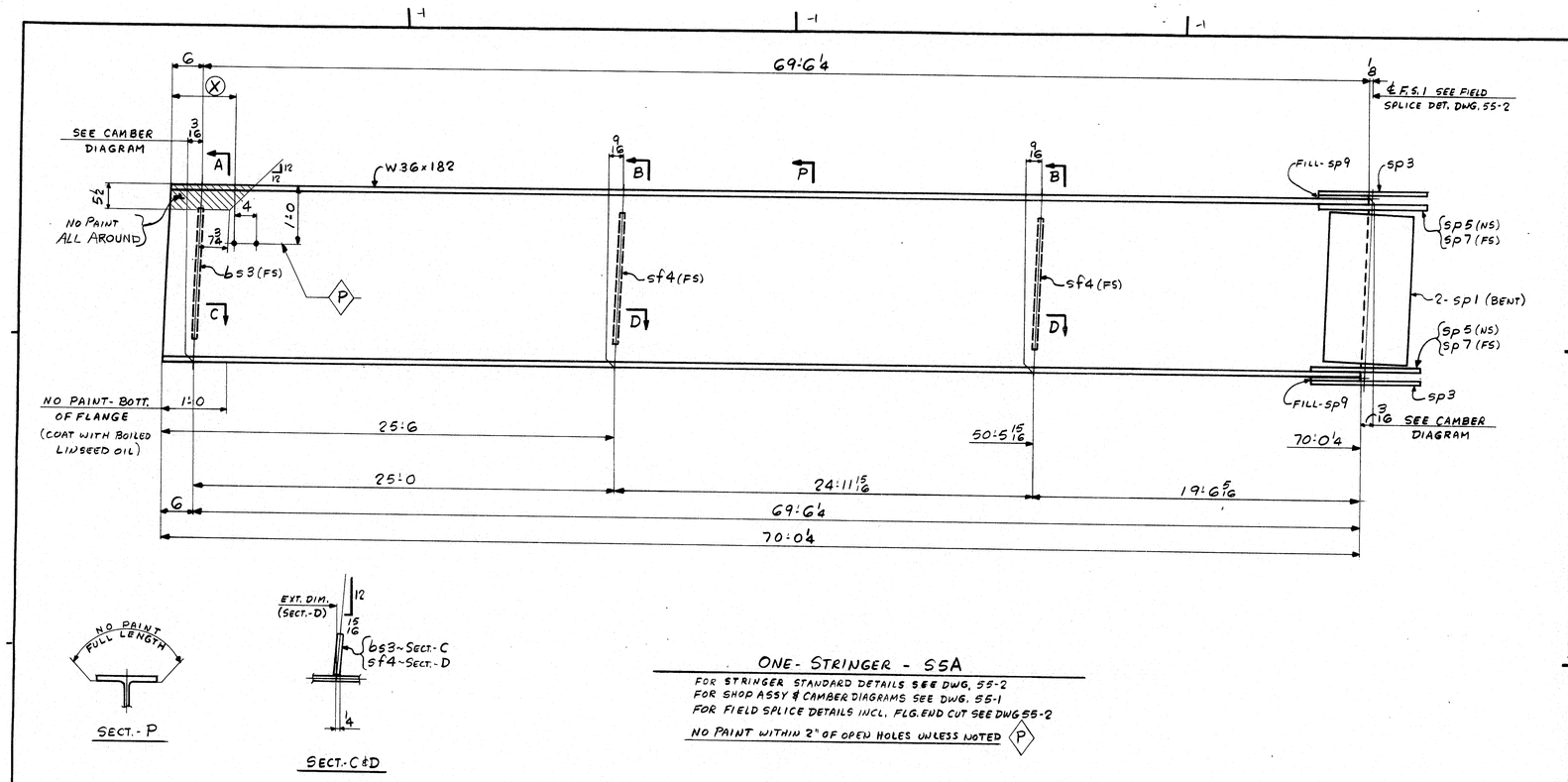
JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-4	△

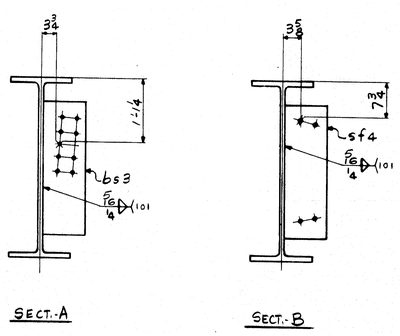
905-10



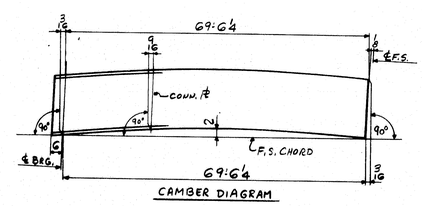
ONE-STRINGER - SSA

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUT SEE DWG 55-2

NO PAINT WITHIN 2" OF OPEN HOLES UNLESS NOTED (P)



(X)
1:0
7:9
14:6
21:3
28:0
34:9
41:6
48:3
55:0
61:9
68:6



ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-71

SHIP MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT	REMARKS
			STRINGER						
SSA	1		W36x182	70	0 7/16	12'-3"x11'	2/B	12744	A572 CVN
	1	bs3	PL ½ x 8½	2	3	1'-9¾" x 2'-3"	3/D	33	
	2	sf4	PL ½ x 8½	2	3	1'-9¾" x 2'-3"	3/D	65	
	2	sp1	PL 9/16 x 30½	1	5	Pos.- 1'-9 35x10 1'-8¾ x 22'-0	2/H	165	A588 BENT CVN
	2	sp3	PL ¾ x 11 1/16	3	7⅞	Pos.-1'-8 22'-0"x 1'-0	2/I	218	A588 CVN
	2	sp5	PL 1" x 4 1/16	3	7⅞	1'-10¼"x 19'-0	2/J	117	A572
	2	sp7	PL 1" x 4 1/16	3	7⅞	Pos.-1'-0 1'-5 2.5	2/J	115	A572
	2	sp9	PL 3/16 x 11 1/16	1	9 13/16	Pos.-1'-0 1'-6 x 8'-0	3/B	27	
								13,484	#

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR. [ ] A588 GR. [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [ ] Bolted [X] Welded [ ] None
FIELD CONN: [X] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] [ ] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

STRINGER - SSA

APPROVED:

PRINT DIST.		
JP	12/27/83	APP.
B	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-9-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

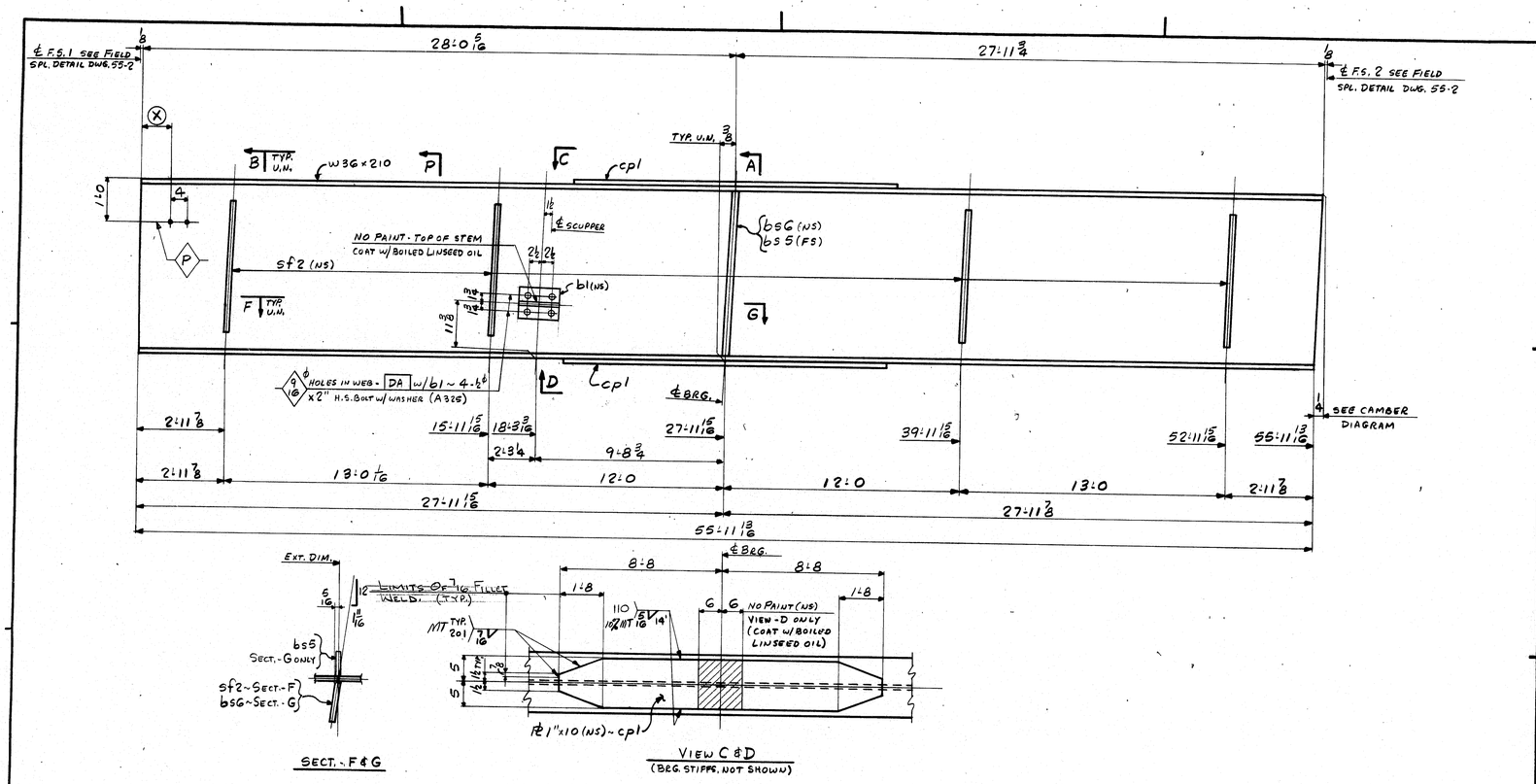
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-5	△

905-10

HARLAN F. SPILLER CO. INC. 24195

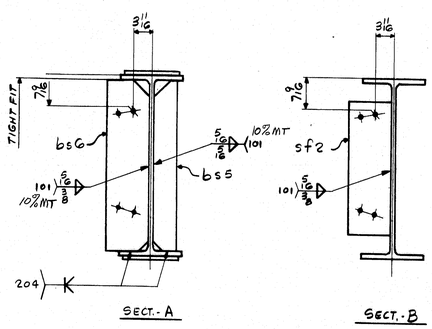


SECT.-F & G

VIEW C & D
(BRG. STIFFS. NOT SHOWN)

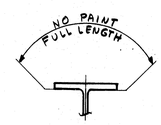
ONE - STRINGER - S1B

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUTS SEE DWG. 55-2
NO PAINT WITHIN 2" OF OPEN HOLES UNLESS NOTED (P).



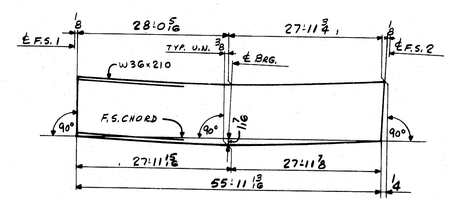
SECT.-A

SECT.-B



SECT.-P

(X)
1'-2
8'-2
15'-2
22'-2
29'-2
36'-2
43'-2
50'-2
54'-6



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-72

SHIP	BILL OF MATERIAL					JOB NO. 3-27		DRAWING NO. 55-6	REV. △
MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT	REMARKS
			STRINGER						
S1B	1		W36×210	56	0 1/16	1/C 55.3	3/C	11,759	A572 CVN
	2	cpl	PL 1"×10	17	4	1/C 94.4 1/R. FOR 25	2/F	1100	A572 CVN
	1	bs6	PL 9/16×8½	2	10	3/C 1/R. 1/C	3/E	46	FIE
	1	bs5	PL 9/16×5	2	10	1/C 94.4 20'-0	3/F	27	FIE
	4	sf2	PL ½×8½	2	3	1/C 94.4 X 24'-0	3/D	130	
	1	bl	WT 6×13	0	8	1/R. 1/C 32.9	3/H	9	
	4		2ϕ H.S. BOLT	0	2	2 NF	4/Q	1	w/H.H.NUT A325 TYPE 1
	4		2ϕ HD FLAT WASHER			204SC	4/R	—	
								13072 #	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR. [ ] A588 GR. [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [X] Bolted [X] Welded [ ] None
FIELD CONN: [X] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] [X] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

STRINGER - S1B

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-12-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

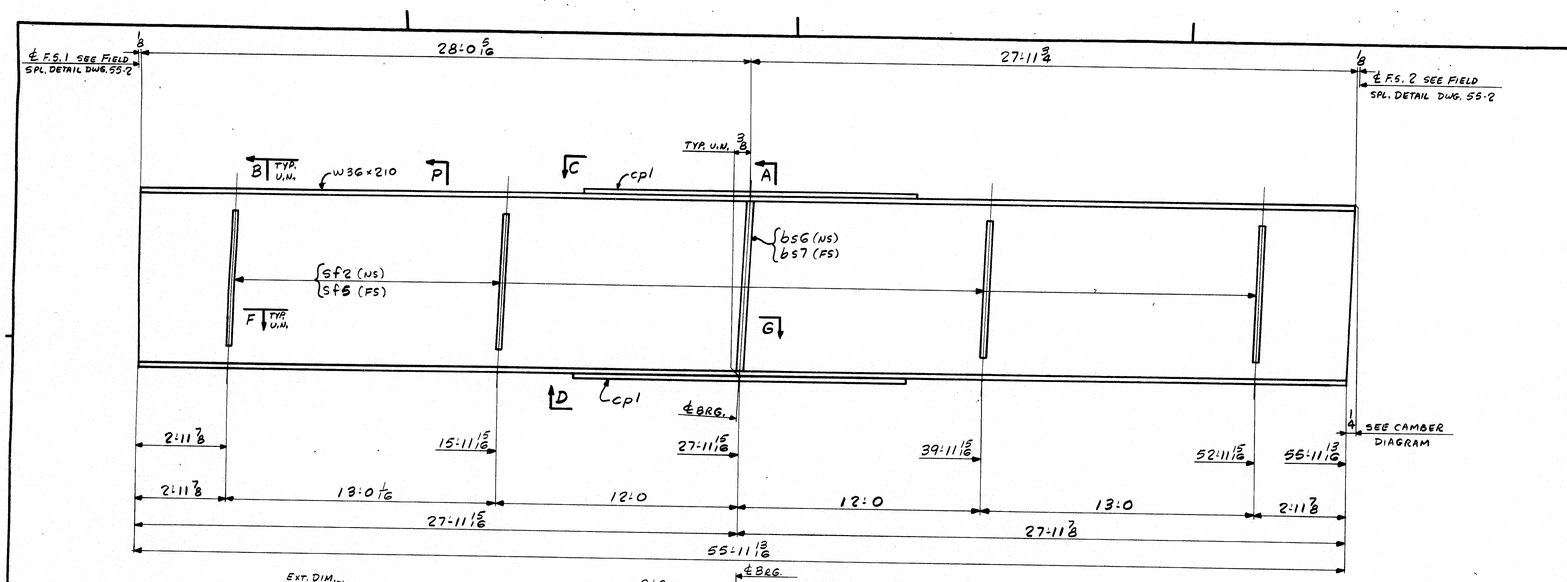
JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

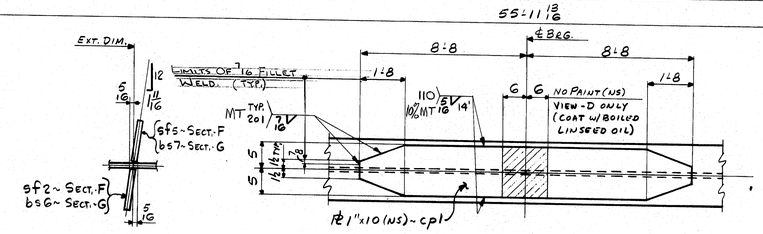
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-6	△

905-10



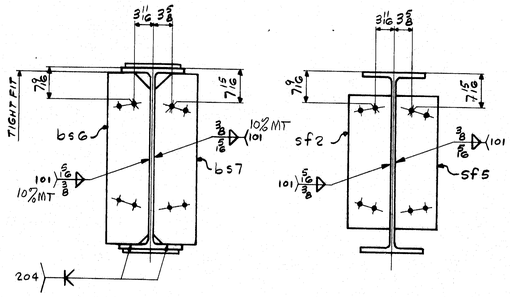


SECT. - F & G

VIEW C & D
(BRG. STIFFS. NOT SHOWN)

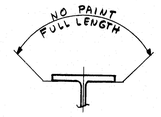
ONE - STRINGER - S2B
ONE - STRINGER - S3B
ONE - STRINGER - S4B
} ALIKE UNTIL REAMED

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUTS SEE DWG. 55-2
NO PAINT WITHIN 2" OF OPEN HOLES

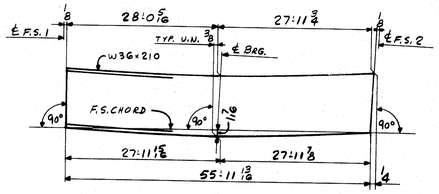


SECT. - A

SECT. - B



SECT. - P



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING, FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-73

SHIP	BILL OF MATERIAL										JOB NO. 3-27	DRAWING NO. 55-7	REV. △
MARK	NO.	MARK	SHAPE	LENGTH			WT.	ITEM NO.	WT	REMARKS			
			STRINGERS										
S2B	1		W36×210	56	0	1/16	3@	2/C	11,789	A572	CVN		
S3B	1		W36×210	56	0	1/16	56'3	2/C	11,789	A572	CVN		
S4B	1		W36×210	56	0	1/16	Rev. 3-29-85	2/C	11,789	A572	CVN		
	6	cpl	PL 1"×10	17	4		10-25-79 Rev. from 3-27	2/F	3300	A572	CVN		
	3	bs6	PL 9/16×8 1/2	2	10		3/C Rev. 1 @ 7'-4 & 26'6	3/E	138	FIE			
	3	bs7	PL 9/16×8 1/2	2	10		1-29-86 & 2-3-86	3/E	138	FIE			
	12	sf2	PL 1/2×8 1/2	2	3		Rev. 3/1/89	3/D	390				
	12	sf5	PL 1/2×8 1/2	2	3			3/D	390				
								39	633	#			

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR. [ ] A588 GR. [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [ ] Bolted [X] Welded [ ] None
FIELD CONN: [X] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean. [ ] None SSPC-SP6

STRINGERS - S2B, S3B, S4B

APPROVED:		
PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
2	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-12-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

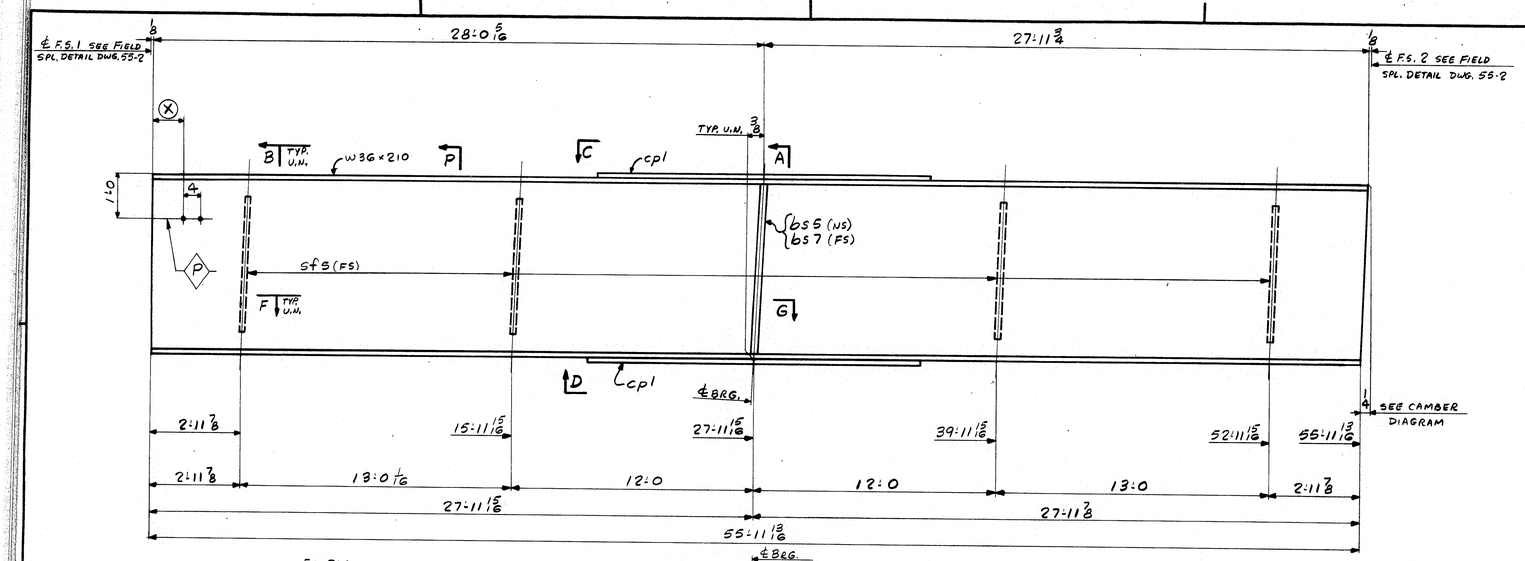
JOB: INDUSTRIAL PARK ROAD over I-395
BREWER, PENOBSCOT COUNTY, MAINE

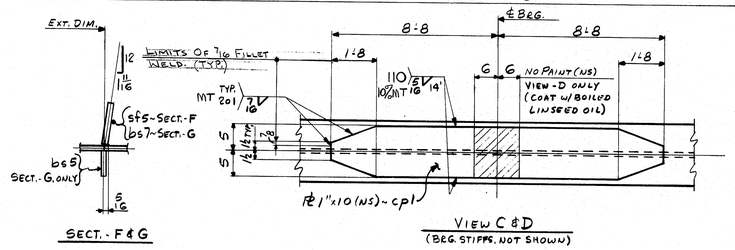
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-7	△

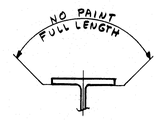
905-10





SECT.-F&G

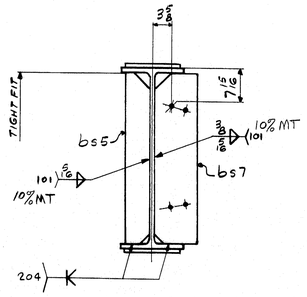
VIEW C&D
(BRG. STIFFS. NOT SHOWN)



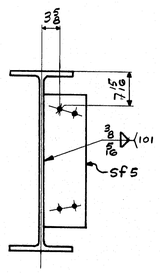
SECT.-P

ONE - STRINGER - 55B

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUTS SEE DWG. 55-2
NO PAINT WITHIN 2" OF OPEN HOLES UNLESS NOTED (P)

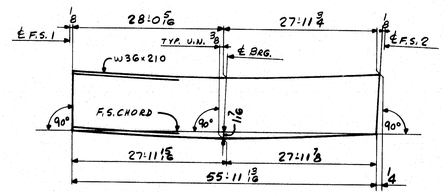


SECT.-A



SECT.-B

(X)
1:2
8:2
15:2
22:2
29:2
36:2
43:2
50:2
54:6



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-74

SHIP	BILL OF MATERIAL					JOB NO. 3-27		DRAWING NO. 55-8		REV. △
MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT	REMARKS	
			STRINGER							
55B	1		W36×210	56	0 1/16	7/16 55:3 1/8×7:4 1/16 from 32	3/C	11759	A572	CVN
	2	cpl	PL 1"×10	17	4		3/F	1100	A572	CVN
	1	bs7	PL 9/16×8 1/2	2	10	3/8 Pos. 18 7/8×20 5	3/E	46	FIE	
	1	bs5	PL 9/16×5	2	10		3/F	27	FIE	
	4	sf5	PL 1/2×8 1/2	2	3	7/8 Dia. X 2 1/4 U	3/D	130		
								13062	#	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR1 [ ] A588 GR1 [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [ ] Bolted [X] Welded [ ] None
FIELD CONN: [X] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

STRINGER - 55B

APPROVED:		
PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-12-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

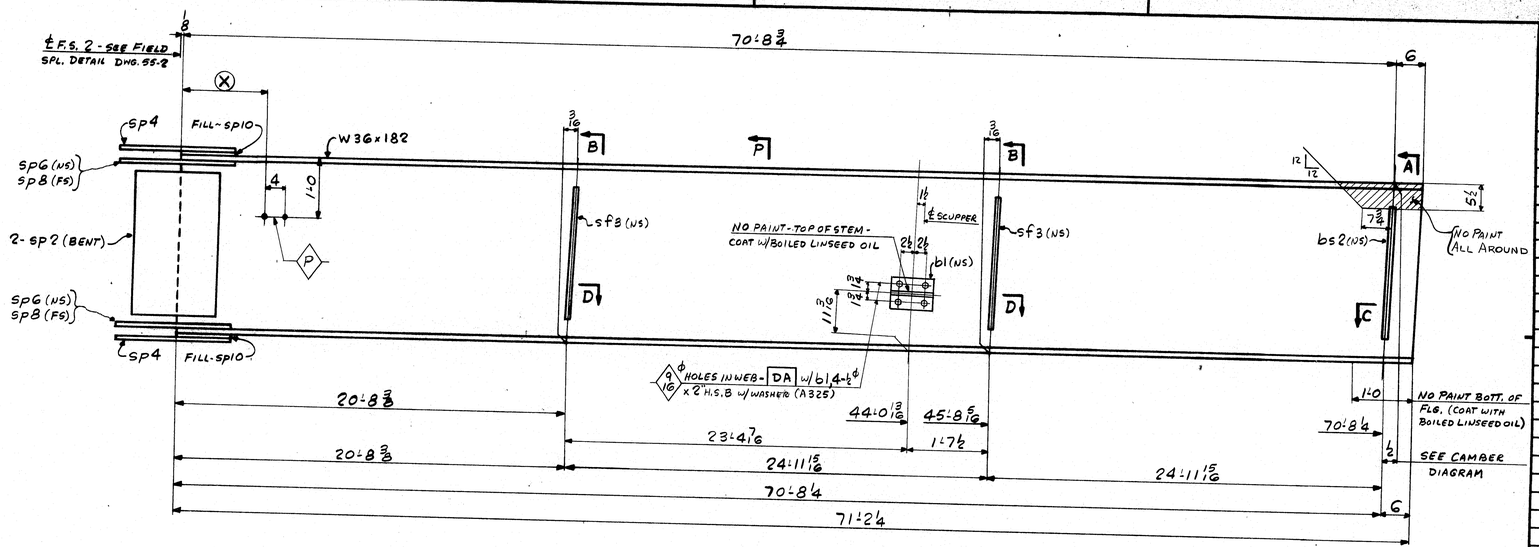
JOB: INDUSTRIAL PARK ROAD OVER I-395
BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

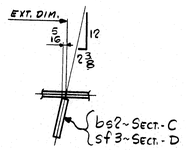
DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-8	△

905-10



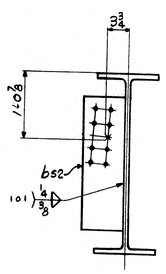
SECT.- P



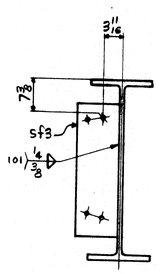
SECT.- C & D

ONE - STRINGER - S1C

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUT SEE DWG 55-2
NO PAINT WITHIN 2" OF OPEN HOLES UNLESS NOTED (P).

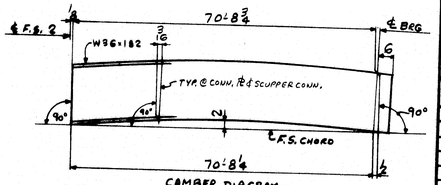


SECT.- A



SECT.- B

(X)
1'-2
8'-2
15'-2
22'-2
29'-2
36'-2
43'-2
50'-2
57'-2
64'-2
69'-10 3/4



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-75

HARLAN F SPILLER CO INC 34595

SHIP

BILL OF MATERIAL

JOB NO. 3-27 | DRAWING NO. 55-9 | REV. △

MARK	NO.	MARK	SHAPE	LENGTH		WT.	FIELD WT.	WT.	REMARKS
			STRINGER						
S1C	1		W 36 x 182	71	2 3/4	1/8 7/16	2/D	12,910	A572 CVN
	1	bs2	PL 1/2 x 8 1/2	2	3	1/8 1/2 x 2'-1/2	3/D	33	
	2	sf3	PL 1/2 x 8 1/2	2	3	1/8 1/2 x 2'-1/2	3/D	65	
	2	sp2	PL 9/16 x 30 1/2	1	5	Rel.- 1/8 36x11'-8 1/8 36x3'-6	2/H	165	A588 BENT CVN
	2	sp4	PL 3/4 x 11 5/8	3	7 7/8	Rel. 2/8 23x14'-0	2/I	217	A588 CVN
	2	sp6	PL 1" x 4 5/8	3	7 7/8	1/8 60 x 18'-3	2/J	116	A572
	2	sp8	PL 1" x 4 5/8	3	7 1/6	CVN 1/8	2/J	114	A572
	2	sp10	PL 9/16 x 11 5/8	1	9 15/16	Rel. 1/8 PL x 8'-0	3/B	27	
	1	bl	WT 6 x 13	0	8	Rel. 1/8 25'-2	3/H	9	
	4		1/2ϕ H.S. BOLT	0	2	NP	4/Q	1	w/H.H.NUT A325 TYPE 1
	4		1/2ϕ HD. FLAT WASHER			22 VAC	4/R	—	
							13	707	#

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 | A572 [GR] | A588 [GR] | [X] Unless Noted
WELDING ELECTRODE: E70 | [X] See Welding Proc. | None
SHOP CONN: [X] Bolted | [X] Welded | None
FIELD CONN: [X] Bolted | [X] Welded | None
HOLES: 13/16 | [X] 15/16 | [X] Unless Noted | None
PAINT: None | [X] Shopcoat | Galv. After Fab. | [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean | None | SSPC-SP6

STRINGER - S1C

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
2S	1-27-84	F&F.

REV. △
CHECKED 12-22-83 GK
DRAWN 12-12-83 ELC

Bancroft & Martin, Inc.
South Portland, Maine 04106

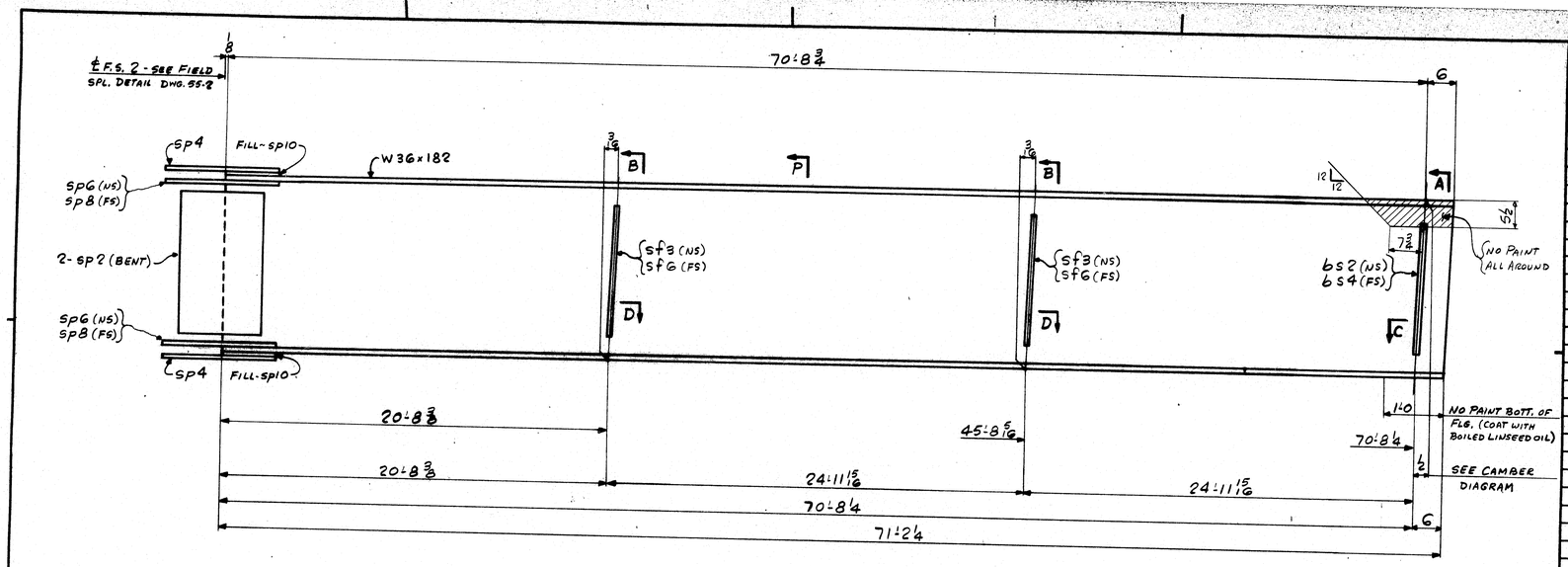
JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

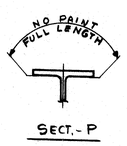
CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

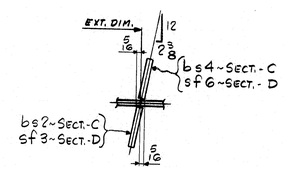
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-9	△

905-10





SECT.- P

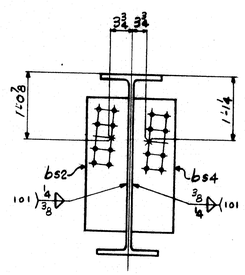


SECT.-C&D

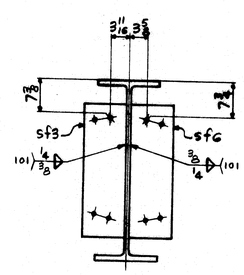
ONE - STRINGER - S2C
ONE - STRINGER - S3C
ONE - STRINGER - S4C
} ALIKE UNTIL REAMED

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUT SEE DWG 55-2

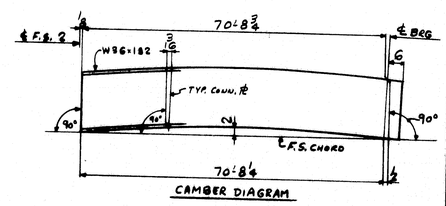
NO PAINT WITHIN 2" OF OPEN HOLES



SECT.-A



SECT.- B



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

SHIP	BILL OF MATERIAL									JOB NO. 3-27	DRAWING NO. 55-10	REV. △
MARK	NO.	MARK	SHAPE	LENGTH			WT.	PIECE MARK	WT.	REMARKS		
			STRINGERS									
S2C	1		W36x182	71	2 3/4		S@ 2'-6	2/D	12,960	A572	CVN	
S3C	1		W36x182	71	2 3/4		R.O.	2/D	12,960	A572	CVN	
S4C	1		W36x182	71	2 3/4		3/4/15	2/D	12,960	A572	CVN	
	3	bs2	PL 1/2 x 8 1/2	2	3		1/@	3/D	98			
	3	bs4	PL 1/2 x 8 1/2	2	3		9C X	3/D	98			
	6	sf3	PL 1/2 x 8 1/2	2	3		2/@	3/D	195			
	6	sf6	PL 1/2 x 8 1/2	2	3		PB 3/4/49	3/D	195			
							Rev. 10/26/83 10/26/83					
	6	sp2	PL 9/16 x 30 1/2	1	5		R.O. 5/8 8/23/83	2/H	496	A588	BENT CVN	
	6	sp4	PL 3/4 x 11 3/8	3	7 7/8		7/8/80 8/23/83	2/I	651	A588	CVN	
	6	sp6	PL 1" x 4 5/8	3	7 7/8		CUT 2/4	2/J	345	A572		
	6	sp8	PL 1" x 4 5/8	3	7 7/16		R.O. 7/8	2/J	342	A572		
	6	sp10	PL 9/16 x 11 3/8	1	9 15/16		8/8/83	3/B	81			
								41	3811	#		

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(88)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 | A572 GR. | A588 GR. | [X] Unless Noted
WELDING ELECTRODE: E70 | [X] See Welding Proc. | None
SHOP CONN: Bolted | [X] Welded | None
FIELD CONN: [X] Bolted | [X] Welded | None
HOLES: 13/16 | [X] 15/16 | Unless Noted | None
PAINT: None | [X] Shopcoat | Galv. After Fab. | As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean | None | SSPC-SP6

STRINGERS - S2C, S3C, S4C

APPROVED:

PRINT DIST.		
5	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-12-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

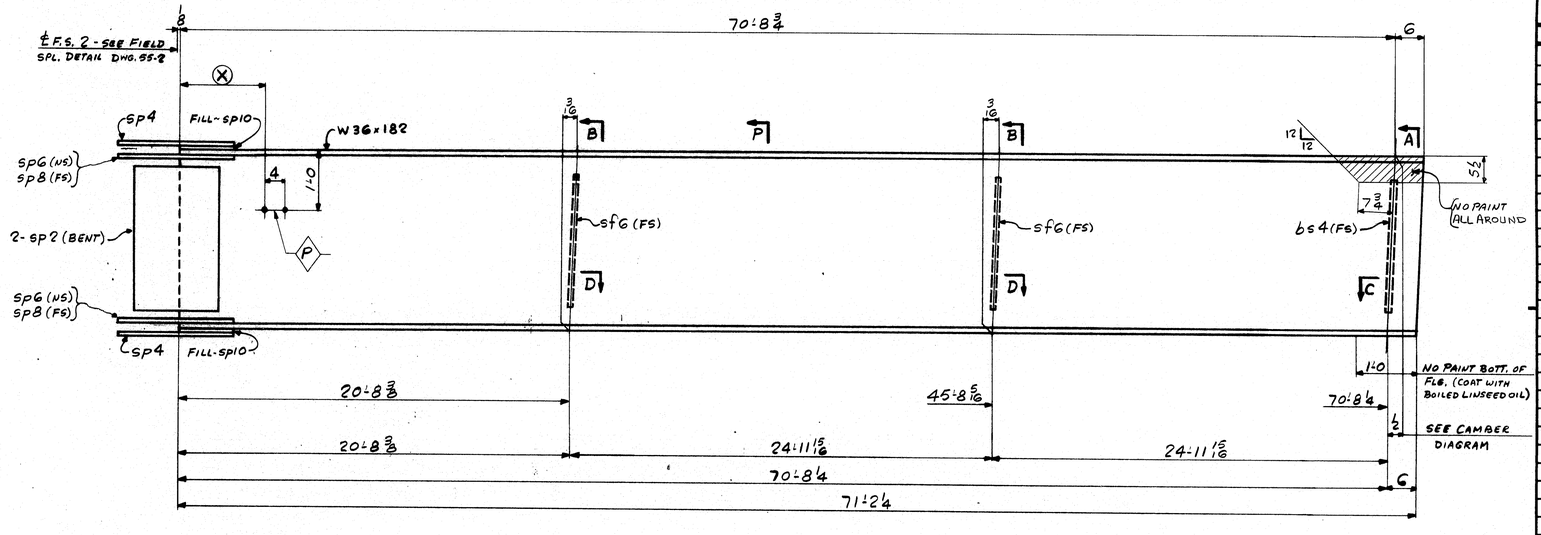
DESIGNER: STATE OF MAINE DEPT. OF TRANS.

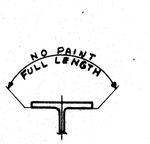
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-10	△

905-10

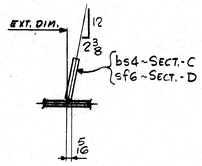
R88-76

HARLAN F. SPILLER CO. INC. 34595





SECT.-P

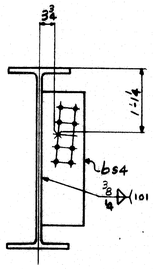


SECT.-C & D

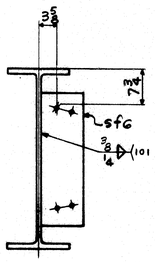
ONE - STRINGER - S5C

FOR STRINGER STANDARD DETAILS SEE DWG. 55-2
FOR SHOP ASSY & CAMBER DIAGRAMS SEE DWG. 55-1
FOR FIELD SPLICE DETAILS INCL. FLG. END CUT SEE DWG 55-2

NO PAINT WITHIN 2" OF OPEN HOLES UNLESS NOTED (P).

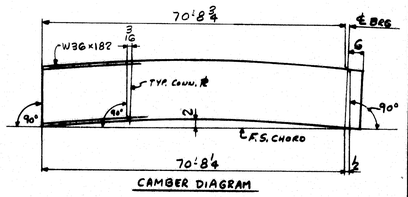


SECT.-A



SECT.-B

⊗
1'-2
8'-2
15'-2
22'-2
29'-2
36'-2
43'-2
50'-2
57'-2
64'-2
69'-10 3/4



CAMBER DIAGRAM

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-77

SHIP	BILL OF MATERIAL						JOB NO. 3-27		DRAWING NO. 55-11	REV. △
MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT.	REMARKS	
			STRINGER							
S5C	1		W36x182	71	2 3/4	1071'6	2/D	12,960	A572	CVN
	1	bs4	PL 1/2 x 8 1/2	2	3	1@ 9'6 x 2'6	3/D	33		
	2	sfG	PL 1/2 x 8 1/2	2	3	1@ 9'6 x 2'6	3/D	65		
	2	sp2	PL 9/16 x 30 1/2	1	5	Rec. 1@ 36'11 1/8 1@ 35'2 1/8	2/H	165	A588	BENT CVN
	2	sp4	PL 3/4 x 11 5/8	3	7 7/8	Rec. 5@ 22'x 2'0	2/I	217	A588	CVN
	2	spG	PL 1" x 4 5/8	3	7 7/8	2/1@ 6'0 x 1'8'0	2/J	116	A572	
	2	sp8	PL 1" x 4 5/8	3	7 7/8	Cut to size	2/J	114	A572	
	2	sp10	PL 9/16 x 11 5/8	1	9 13/16	Rec. 1@ 8'x 1'0	3/B	27		
								13,697	#	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 | A572 GR | A588 GR | [X] Unless Noted
WELDING ELECTRODE: E70 | [X] See Welding Proc. | None
SHOP CONN: Bolted | [X] Welded | None
FIELD CONN: [X] Bolted | [X] Welded | None
HOLES: 13/16 | [X] 15/16 | Unless Noted | None
PAINT: None | [X] Shopcoat | Galv. After Fab. | [X] As Noted
SPECIAL PAINT:
SPECIAL CLEANING: [X] Blast Clean | None SSPC-SP6

STRINGER - S5C

APPROVED:		
PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-13-83	ELC

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395
BREWER, PENOBSCOT COUNTY, MAINE

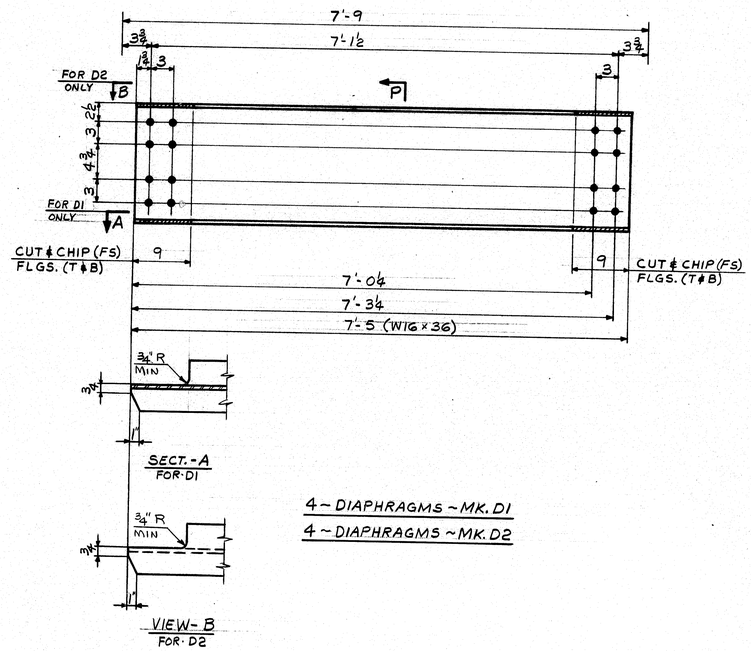
CUSTOMER: REED & REED

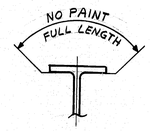
DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	55-11	△

905-10

MARCH & SPILLER CO. INC. 34088





4 ~ DIAPHRAGMS ~ MK. D1
4 ~ DIAPHRAGMS ~ MK. D2

NOTE: NO PAINT WITHIN 2" OF OPEN HOLES

SHIP	BILL OF MATERIAL	JOB NO. 3-27	DRAWING NO. 56-1	REV. △

MARK	NO.	MARK	SHAPE	LENGTH		WT.	ITEM NO.	WT.	REMARKS
			DIAPHRAGMS						
D1	4		W16×36	7	5	1 @ 30'0	3/J	1068	
D2	4		W16×36	7	5	1 @ 33'10	3/J	1068	
								2136 #	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 GR [ ] A588 GR [ ] Unless Noted
WELDING ELECTRODE: [ ] E70 [ ] See Welding Proc. [X] None
SHOP CONN: [ ] Bolted [ ] Welded [X] None
FIELD CONN: [X] Bolted [ ] Welded [ ] None
HOLES: [ ] 13/16 [X] 15/16 [ ] Unless Noted [ ] None
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT: —
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

DIAPHRAGMS

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395 BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

REV. △		
CHECKED	12-22-83	GK
DRAWN	12-13-83	RLA

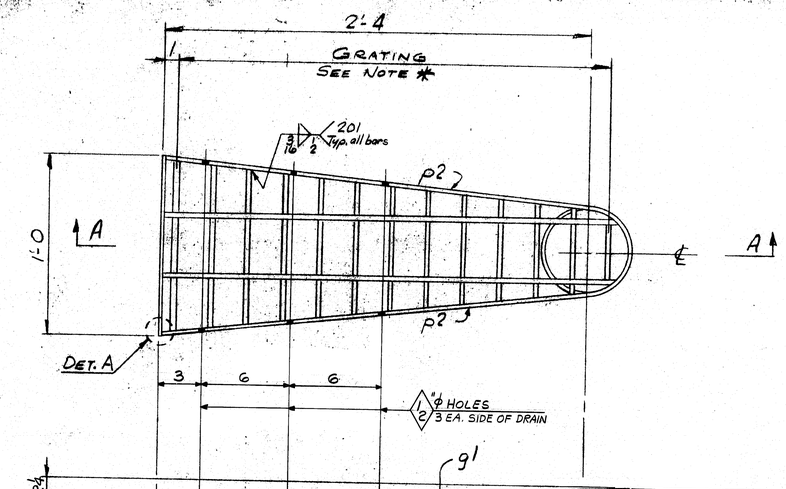
ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	56-1	△

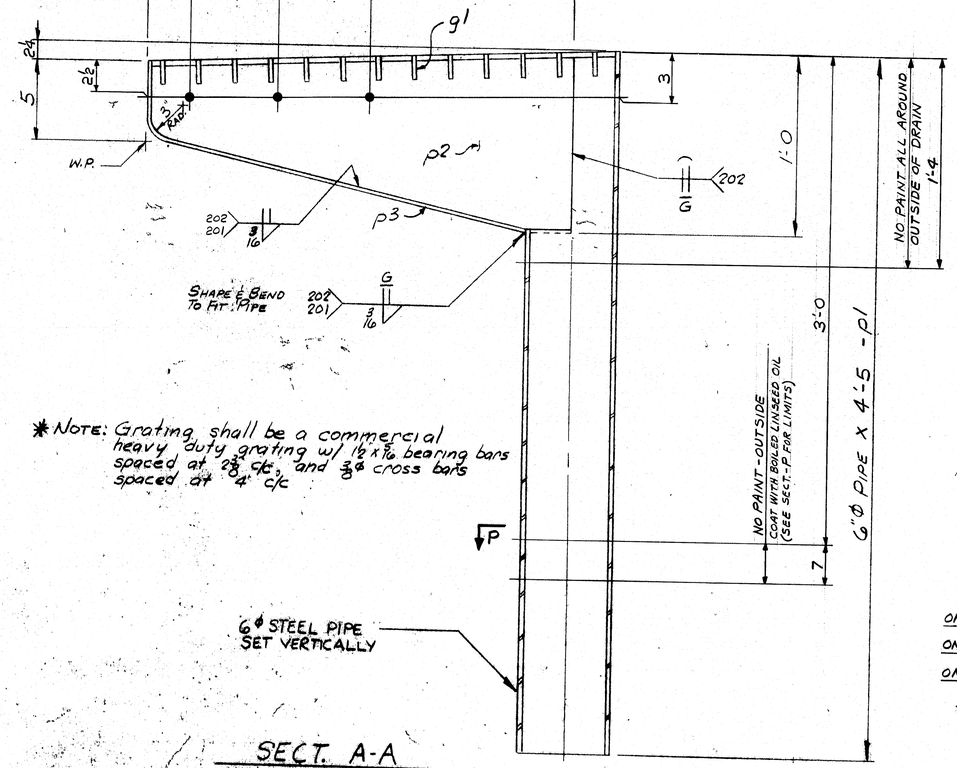
905-12

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-78

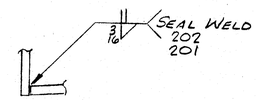
HARLAN F. SPILLER CO. INC. 34595



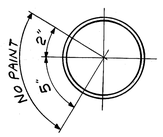


SECT. A-A

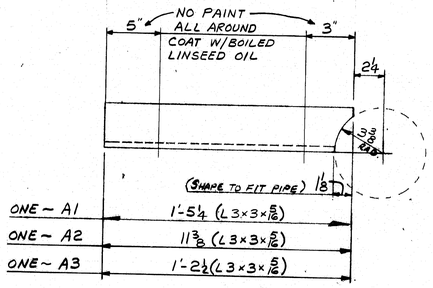
DRAIN - DR1
(3-REQ'D)



DETAIL-A



SECT.-P



* NOTE: Grating shall be a commercial heavy duty grating w/ 1½ x 5/16 bearing bars spaced at 2⅜ c/c, and ⅜ϕ cross bars spaced at 4" c/c

ALL CONNECTIONS DETAILED ON THIS DRAWING REPRESENT BANCROFT & MARTIN INC. STANDARDS. IN APPROVING THIS DRAWING FOR FABRICATION, THE ARCHITECT AND/OR ENGINEER ASSUMES THE RESPONSIBILITY FOR THE STRUCTURAL INTEGRITY OF ALL CONNECTIONS SHOWN.

R88-79

SHIP MARK	NO.	MARK	SHAPE	LENGTH		WT.	PER M	WT.	REMARKS
DR1	3		Ass'y	—	—				
	3	p1	6"ϕ Std. Pipe	4	5	3@22'0 Ass. Fab. 3@3'-25. Sram Yd	4/M	251	A53, Sched. 40
	6	p2	PL ¼ x 12	2	3⅞	Ass. Fab 12@1'-10'0 Cut Yd	4/K	142	L.O. & Cut
	3	p3	PL ¼ x 12	2	9±	N/R have	4/D	84	Bend L.O. & Cut
	3	g1	Grating 12x	2	7	Fab. @ 4/53	4/0	74	1½x⅜ Bearing Bars ⅜ Cross Bars 4" Reg. No.
A1	1		L 3×3×5/16	1	5¼	From 3L	4/L	9	
A2	1			0	11⅜	15@ 40'0	4/L	6	
A3	1			1	2½	Fab. 3@4'45	4/L	7	
								573 #	

IT. NO. 504.70 | BR. NO. | PROJ. NO. I-395-8(85)176

FOR APPROVAL | **FOR FILES & FIELD**

STEEL: ASTM. [X] A36 [ ] A572 Gr. [ ] A588 Gr. [X] Unless Noted
WELDING ELECTRODE: [ ] E70 [X] See Welding Proc. [ ] None
SHOP CONN: [ ] Bolted [X] Welded [ ] None
FIELD CONN: [ ] Bolted [X] Welded [ ] None
HOLES: [ ] 13/16 [ ] 15/16 [ ] [ ] Unless Noted [ ] None AS NOTED
PAINT: [ ] None [X] Shopcoat [ ] Galv. After Fab. [X] As Noted
SPECIAL PAINT: —
SPECIAL CLEANING: [X] Blast Clean [ ] None SSPC-SP6

DRAIN - DR1

APPROVED:

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
25	1-27-84	F&F.
REV. △		
CHECKED	12-22-83	GK
DRAWN	12-14-83	RLA

Bancroft & Martin Inc.
South Portland, Maine 04106

JOB: INDUSTRIAL PARK ROAD OVER I-395
BREWER, PENOBSCOT COUNTY MAINE

CUSTOMER: REED & REED

DESIGNER: STATE OF MAINE DEPT. OF TRANS.

ORDER NO.	JOB NO.	DRAWING NO.	REV.
	3-27	59-1	△

905-18

FIELD BOLTS

JOB NO.
DWG. NO.

SPECIFICATIONS:

CONNECTION	LENGTH
LENGTH	
SUBTOTAL ADD 2%	
TOTAL:	
WASHERS:	PLAIN / CLIPPED / BEVELED
TOTAL WEIGHT:	

FIELD BOLTS

JOB NO.
DWG. NO.

SPECIFICATIONS:

CONNECTION	LENGTH
LENGTH	
SUBTOTAL ADD 2%	
TOTAL:	
WASHERS:	PLAIN / CLIPPED / BEVELED
TOTAL WEIGHT:	

FIELD BOLTS

JOB NO. 3-27
DWG. NO. 62-1

SPECIFICATIONS: 5/8"φ STD. CARRIAGE BOLTS W/NUTS

CONNECTION	LENGTH 1 1/2"
TO FILL 15/16φ FORM BRACKET HOLES	124
	(24#)
LENGTH	1 1/2
SUBTOTAL ADD 2%	124 +3
TOTAL:	127
WASHERS:	PLAIN 127 (9#) / CLIPPED / BEVELED
TOTAL WEIGHT:	(33#)

FIELD BOLTS

JOB NO. 3-27
DWG. NO. 62-1

SPECIFICATIONS: 7/8"φ ASTM, A325-TYPE 1 H.S.B. (HHH&HHN)

CONNECTION	LENGTH 2 1/4	2 1/2	2 3/4	3 1/4	4 1/2
END DIAPH. (16×8)	128				
TYPE (H) CROSSFRAME TOP (4×18)	72				
CENT. & BOTT. (3×18)		54			
BOTT. @ FILL (2×18			36		
TYPE (G) CROSSFRAME (8×18)	144				
@ CENTER (1×18)		18			
FIELD SPL. 1&2 - WEB (44×10)				440	
-T.&B. FLG. (28×20)					560
	(317#)	(70#)	(37#)	(480#)	(731#)
LENGTH	2 1/4	2 1/2	2 3/4	3 1/4	4 1/2
SUBTOTAL ADD 2%	344 +7	72 +2	36 +1	440 +9	560 +11
TOTAL:	351	74	37	449	571
WASHERS:	PLAIN 1482 (101#)			CLIPPED	BEVELED
TOTAL WEIGHT:	(1736#)				

NP 2246 & STK. RES.

FIELD BOLTS

PRINT DIST.		
3	12/27/83	APP.
8	2-2-84	FAB.
2S	1-27-84	F&F
JB	12-21-83	CHKD
RLA	12-14-83	DRAWN

TITLE:

BANCROFT & MARTIN INC.
27 MAIN STREET
SO. PORTLAND, MAINE 04106
TEL. 207-799-8571

PROJECT: INDUSTRIAL PARK ROAD OVER I-395
STREET:
CITY: BREWER, PENOBSCOT COUNTY, MAINE

CUSTOMER: REED & REED

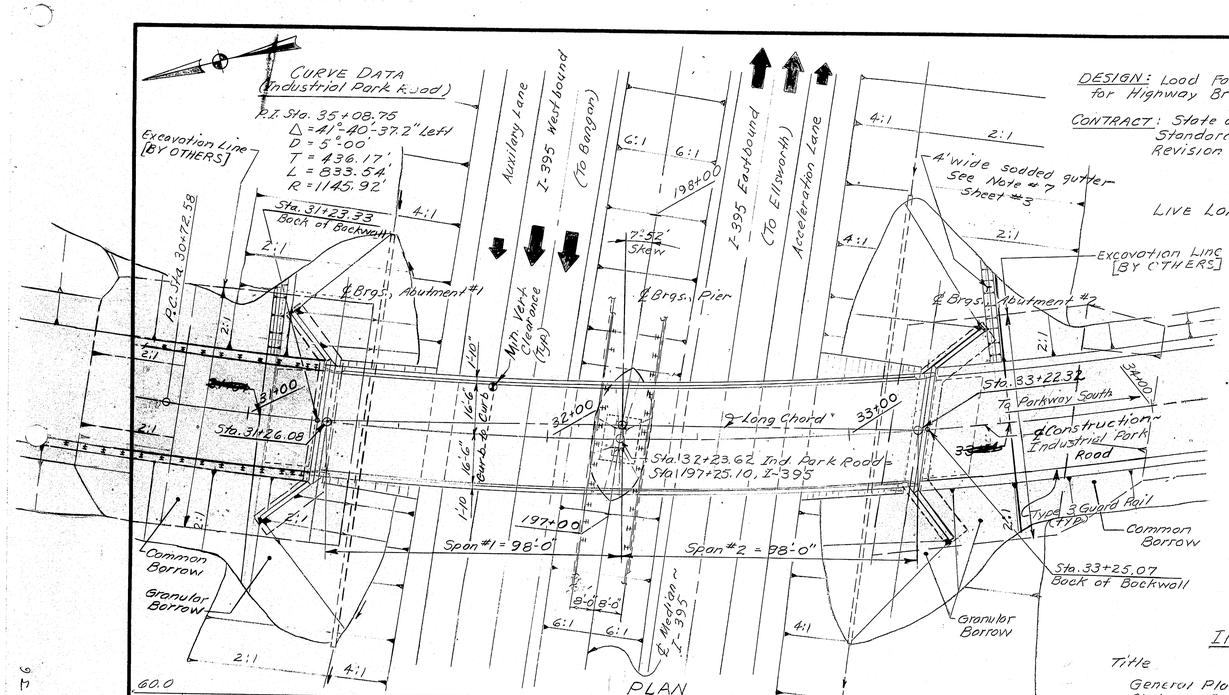
DESIGNER: STATE OF MAINE DEPT. OF TRANS.

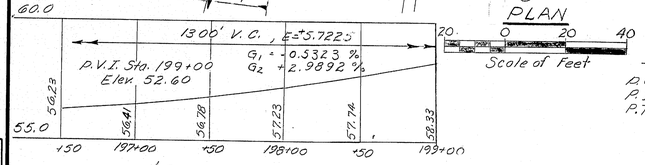
JOB NO.	PHASE	DRAWING NO.	REV. NO.
3-27		62-1	△

905-24

R88-80

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	4	66





PROFILE (Mainline I-395)

Scale of Feet

CURVE DATA (I-395)

P.C. Sta. 186+85.49
P.I. Sta. 206+09.48
P.T. Sta. 224+76.98
Δ = 24°-00'-45.97" Right
D = 0°-38'-00"
T = 1923.99'
L = 3791.49'
R = 9046.71'

SPECIFICATIONS

DESIGN: Load Factor Design per AASHTO Standard Specifications for Highway Bridges 1977 and Interim Specifications thru 1982.

CONTRACT: State of Maine, Department of Transportation, Standard Specifications, Highways and Bridges, Revision of June 1981.

DESIGN LOADING

LIVE LOAD = HS 25

MATERIALS

Concrete
Abutments
Piers to bottom of Box Girder } Class "A"

Multi-cell Box Girders ____ Class "A" (modified)

Reinforcing Steel _____ ASTM A615 Grade 60

Structural Steel _____ ASTM A36

BASIC DESIGN STRESSES

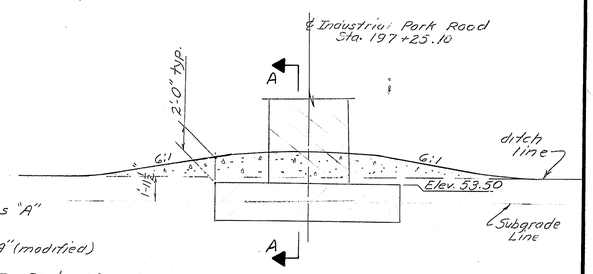
Concrete
Class "A" _____ f'c = 3000 psi.
Class "A" (modified) _____ f'c = 4000 psi.

Reinforcing Steel _____ fy = 60,000 psi.

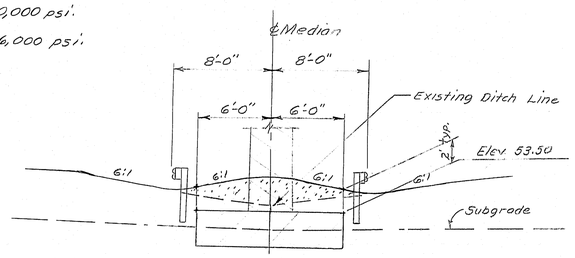
Structural Steel _ ASTM A36 _ fy = 36,000 psi.

INDEX TO BRIDGE PLANS
CONCRETE ALTERNATE

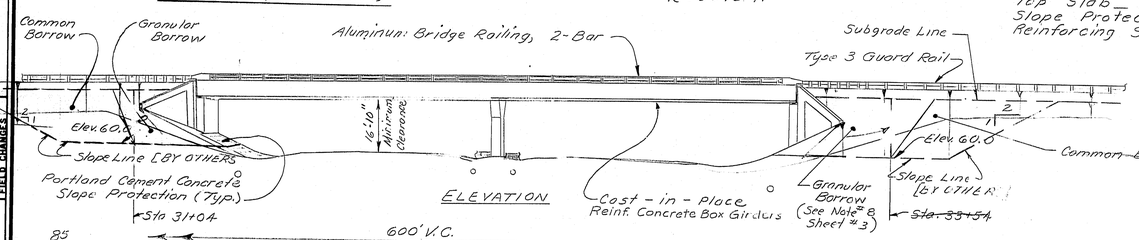
Title	Sheet No.
General Plan	1
Abutment Footings and Pile Layout	2
Abutment Notes and Details	3
Abutment #1	4
Abutment #2	5
Integral Pier	6
Integral Pier Cap Details	7
Superstructure Plan and Section	8
Superstructure End Diaphragms	9
Bottom of Slab Elevations, drains, etc.	10
Bottom Slab	11
Girder Web Details	12
Top Slab	13
Slope Protection	14
Reinforcing Steel Schedule	15, 16



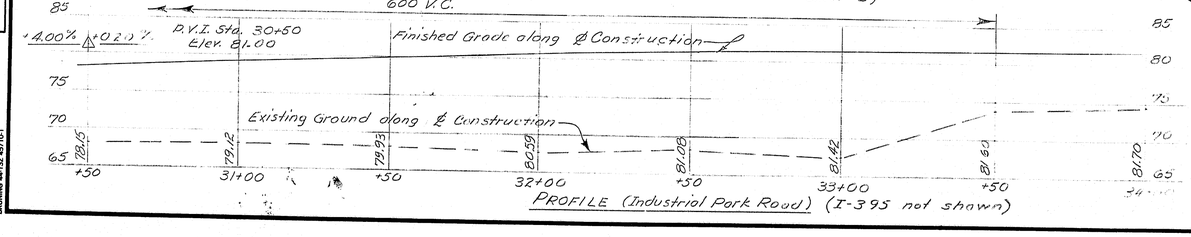
PIER EMBANKMENT ALONG MEDIAN [BY OTHERS]



SECTION A-A
(40 ft. Median)



ELEVATION



PROFILE (Industrial Park Road) (I-395 not shown)

Conc. Alt. (Not Used)

STANDARD SHEETS

BD	114-81	Aluminum Bridge Railing
BD	120-81	Concrete End Post
BD	125-82	Expansion Device
BD	126-81	Curb Section; Approach Slab
BD	127-81	Substructure Details

THIS ALT NOT USED

Br. #1560

R88-418

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	PJM	6/88
CHECKED	RWD	
REVIEWED		
FIELD CHANGES		

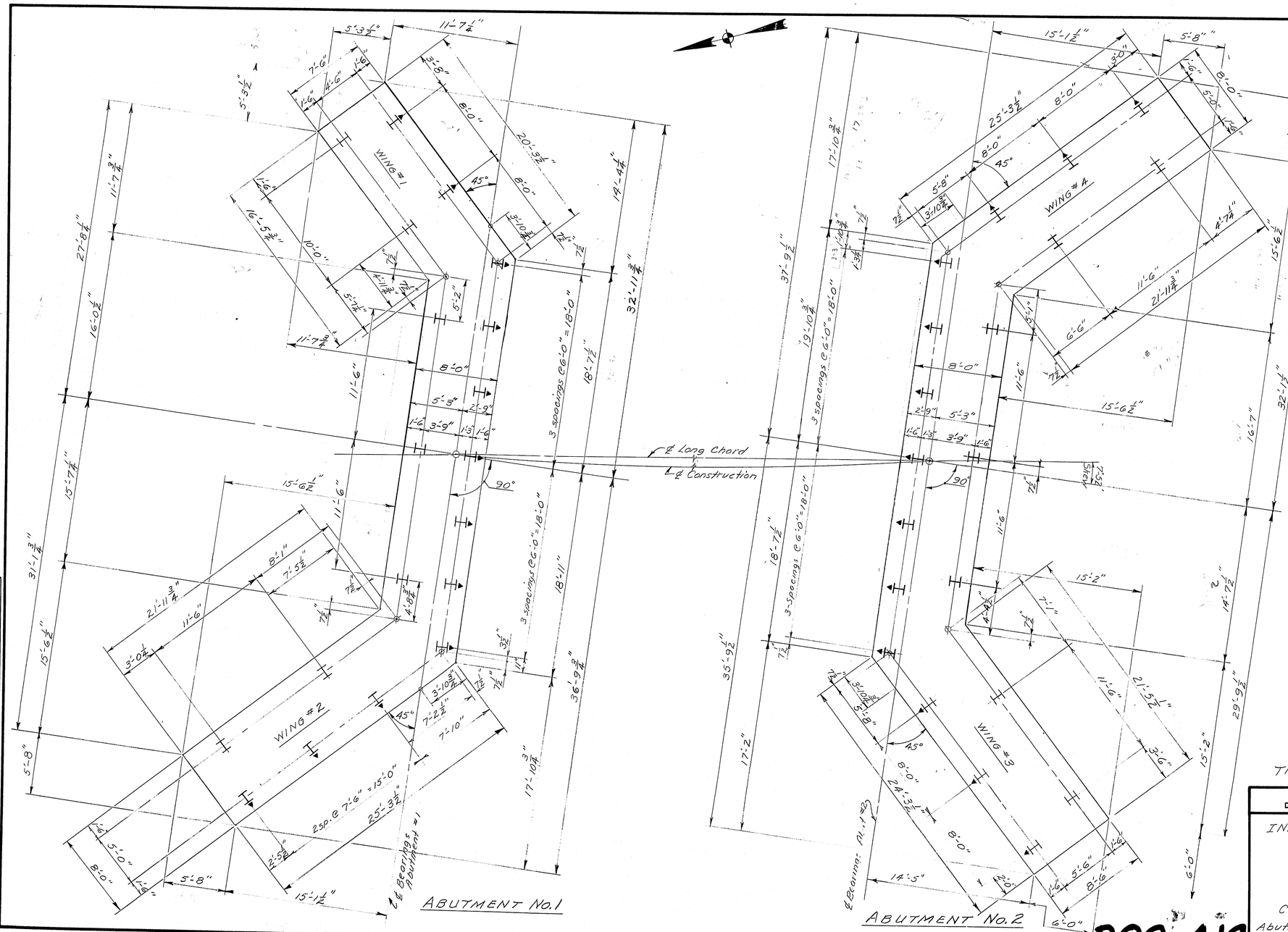
BRUNING 44-132 45710-1

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
General Plan

SHEET 1 OF 16 AUGUSTA, MAINE

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	5	66



THIS ALT. NOT USED

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Abutment Footings & Pile Layout

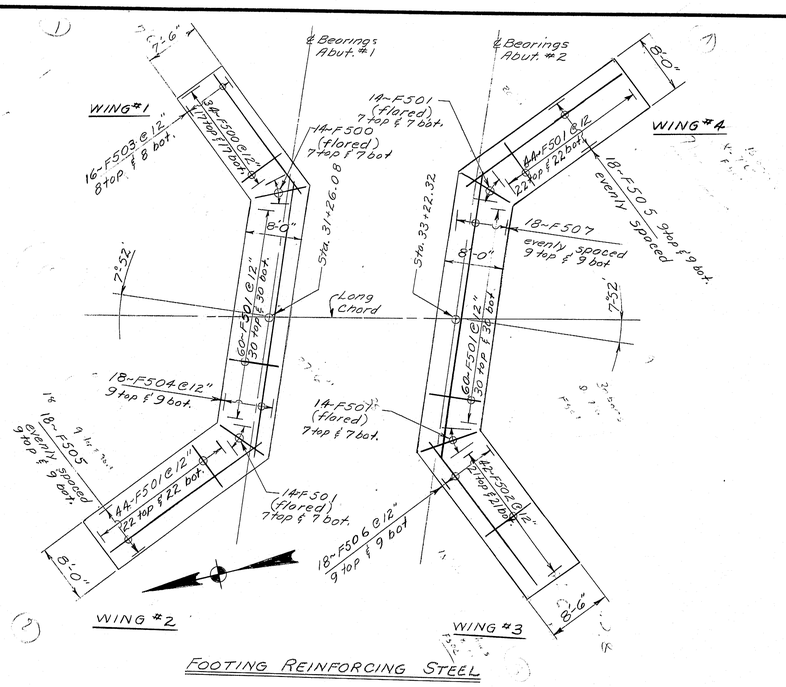
SHEET 2 OF 16 AUGUSTA, MAINE

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	PJM	6/83
CHECKED	RVP	
REVISIONS		
FIELD CHANGES		

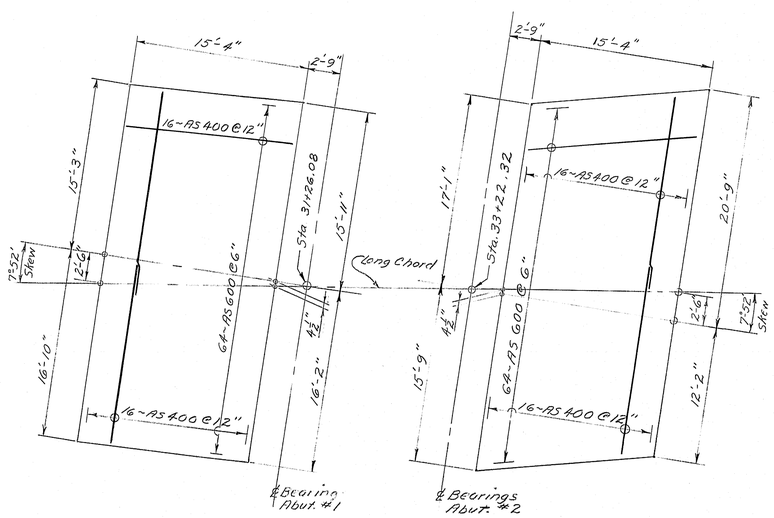
BRUNING 44-132 4571D-1

R88-419

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	6	66



FOOTING REINFORCING STEEL

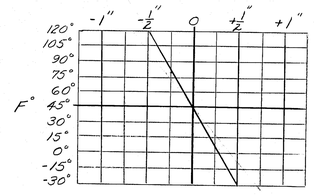


APPROACH SLABS

RECESSED AREA NOTES

1.) Special care shall be exercised so that form joints of the exposed face of concrete shall be kept tight.

2.) In the recessed recessed areas, all fins and projections in the concrete shall be removed and all holes patched to create a surface of uniform texture.



COMPRESSION SEAL ADJUSTMENT CHART

1.) The seals to be furnished shall have a minimum Movement Rating of 0.56 inch for both abutments.

2.) The seal shall be approved by the Engineer prior to fabrication of the joint armor.

3.) The joint opening will vary depending on the dimensions of the seal selected by the Contractor. The joint opening shall be set according to the opening shown on the approved shop detail drawings.

4.) It is anticipated that the slab and backwall concrete will be in place before the final adjustment to the joints is made and no allowance for movement due to dead load deflections is needed.

5.) The Compression Seal adjustment chart shows the adjustment necessary to adjust the joint opening shown on the shop detail drawings for temperatures other than 45° F. Adjustment is to be measured parallel to the centerline of construction.

ABUTMENT NOTES

1.) Reinforcing steel shall have 2 inches minimum cover unless otherwise noted, except footing reinforcing shall have 3 inches minimum cover.

2.) Protective coating for concrete surfaces shall be applied to the following areas:
- Face and top of concrete curbs
- Top of backwall to 1'-0" below finished grade on back

3.) Place 4" diameter drains in breastwall and wings at 20 feet maximum spacing. Exact location to be determined by the Engineer in the field.

4.) Piles marked thus ⊢▶ shall be battered 3 inches per foot in the direction of the arrow.

5.) Maximum calculated pile loads: 98.2 tons

6.) Estimate of piles required:

Abutment #1 — 19 ~ HP 14X73 @ 56 feet
Abutment #2 — 20 ~ HP 14X73 @ 49 feet

7.) Sodded gutters shall be constructed, after paving and shoulder work is completed, where it is apparent that runoff will cause continual erosion.

8.) Granular borrow shall meet the requirements of subsection 703.19, material for underwater backfill.

THIS ALT NOT USED

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	PJM	7/83
CHECKED	RVD	
REVISIONS		
FIELD CHANGES		

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

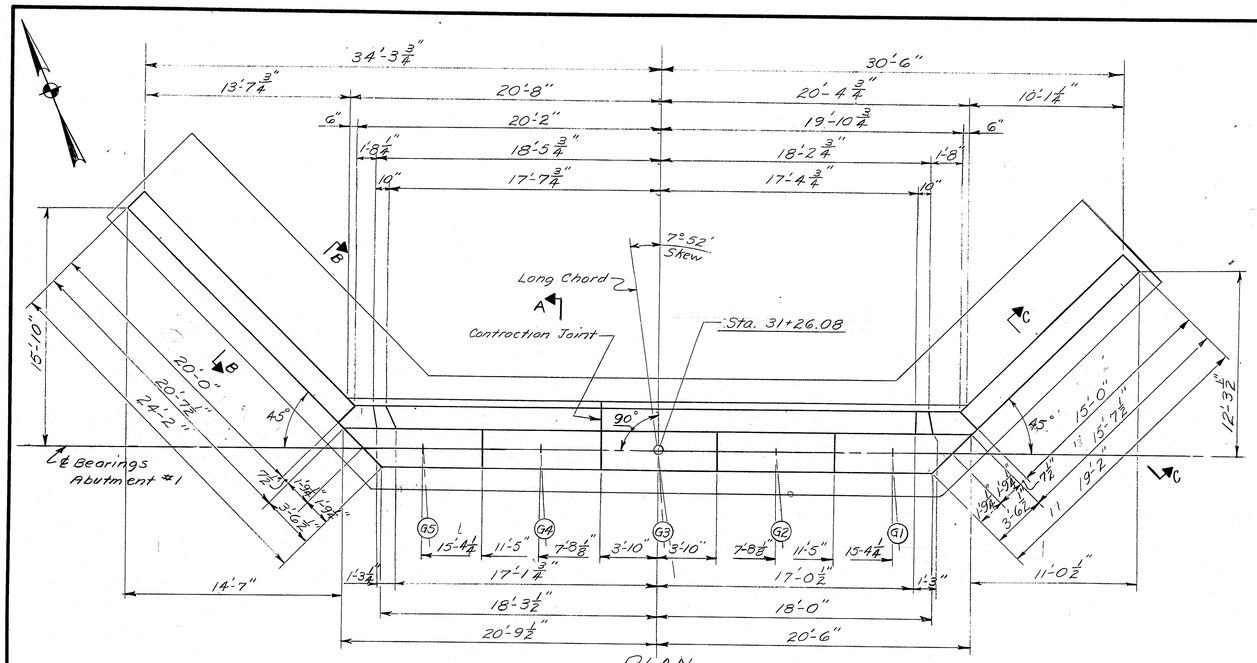
INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Abutment Notes & Details

SHEET 3 OF 16 AUGUSTA, MAINE

R88-420

BRUNING 44-132 45710-1

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	F395-B(BS)176	7	66

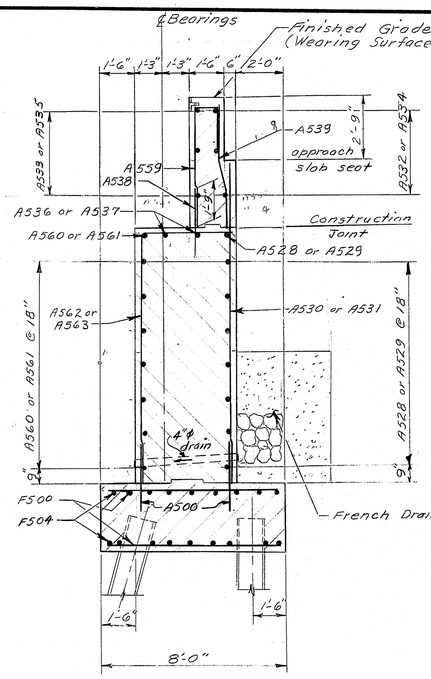


PLAN

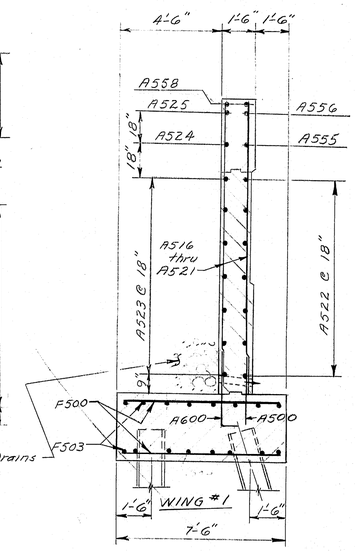
WING #2

WING #1

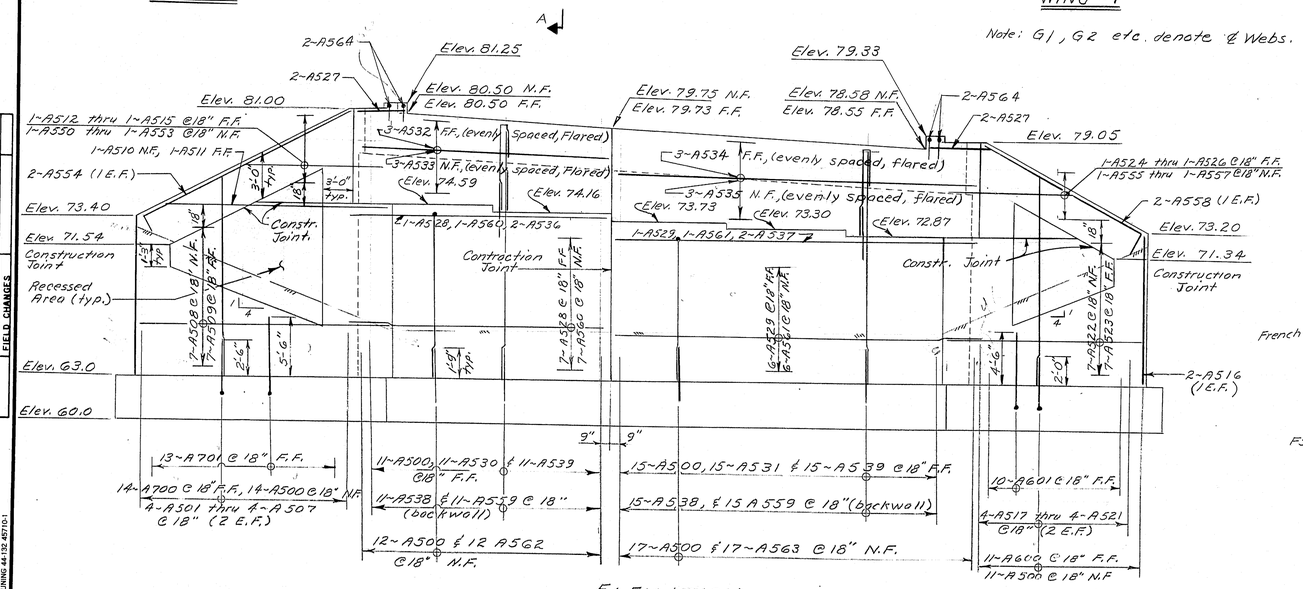
Note: G1, G2 etc. denote ℄ Webs.



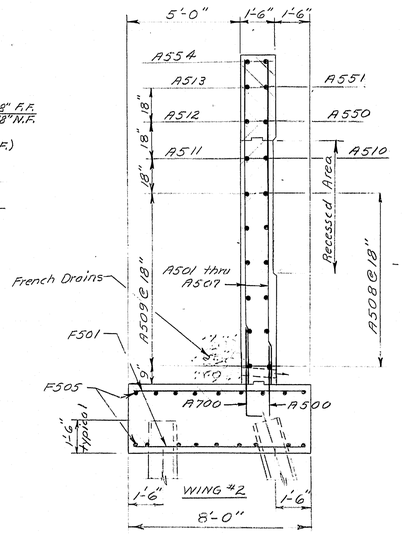
SECTION A-A



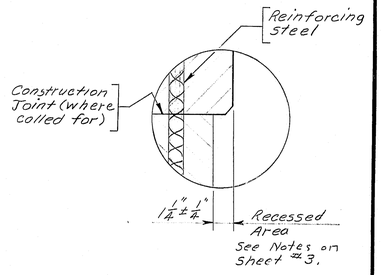
SECTION C-C



ELEVATION



SECTION B-B



PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN - DETAILED	P.J.M.	6/88
CHECKED	R.V.D.	
REVISIONS		
FIELD CHANGES		

THIS ALT. NOT USED RMK

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

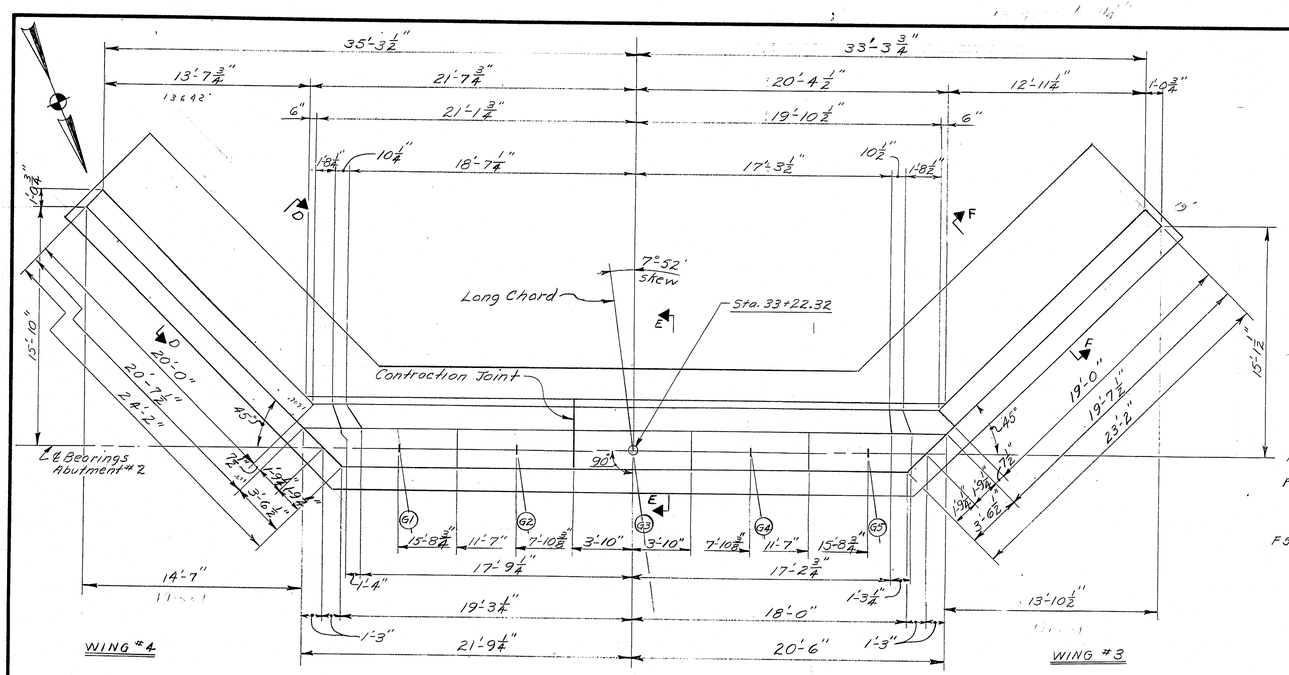
INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Abutment #1

SHEET 4 OF 16 AUGUSTA, MAINE

R88-421

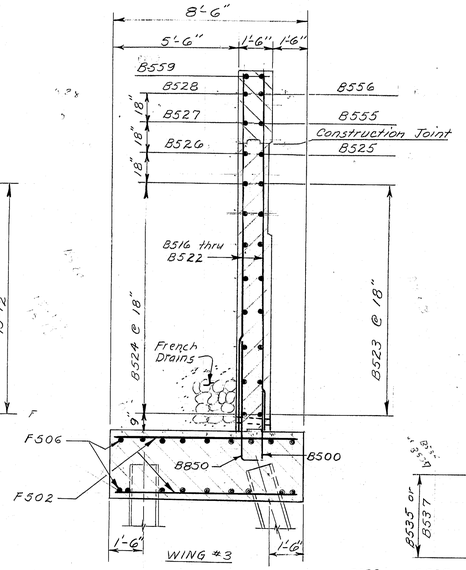
BRUNING 44-132 45710-1

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-B(83)176	8	66

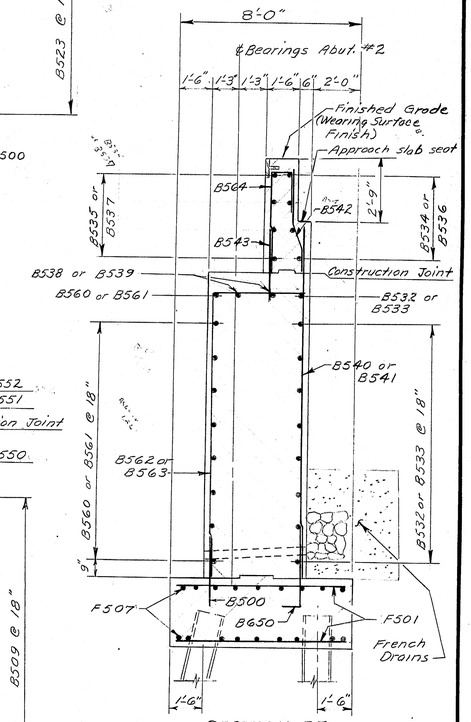


PLAN

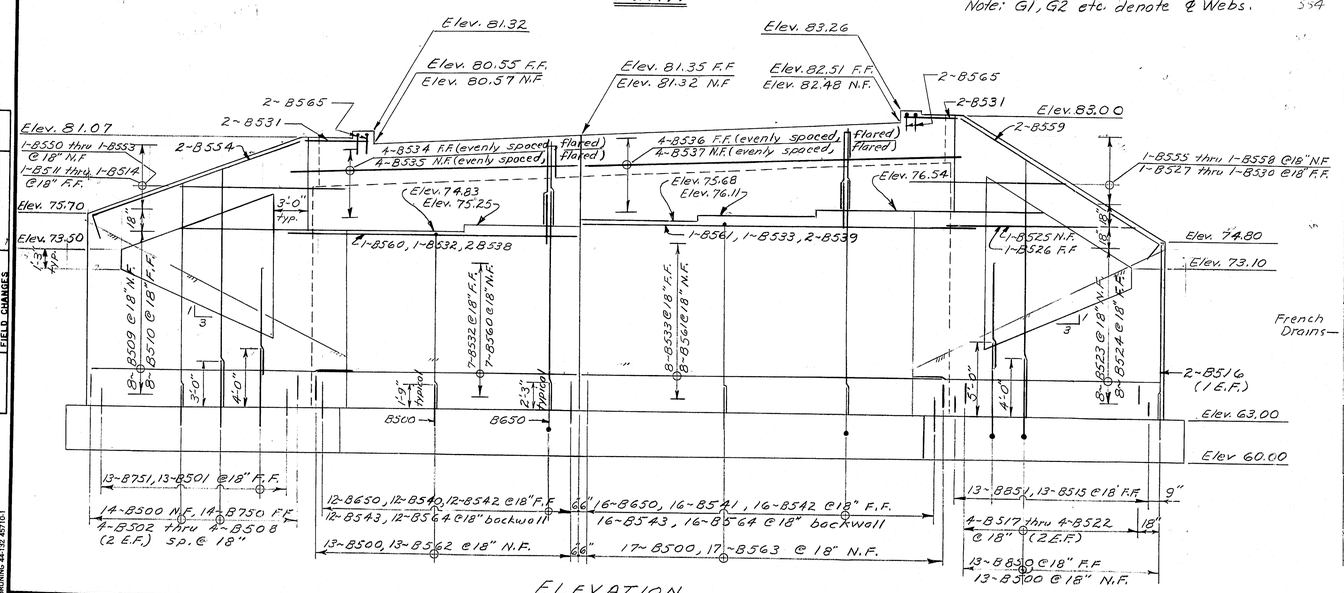
Note: G1, G2 etc. denote ℄ Webs.



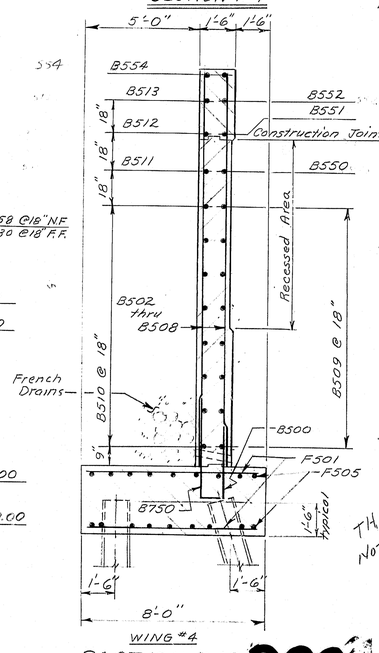
SECTION F-F



SECTION EE



ELEVATION



SECTION D-D

THIS Alt. NOT USED

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	RJM	6/85
CHECKED	RVD	
REVISIONS		
FIELD CHANGES		

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

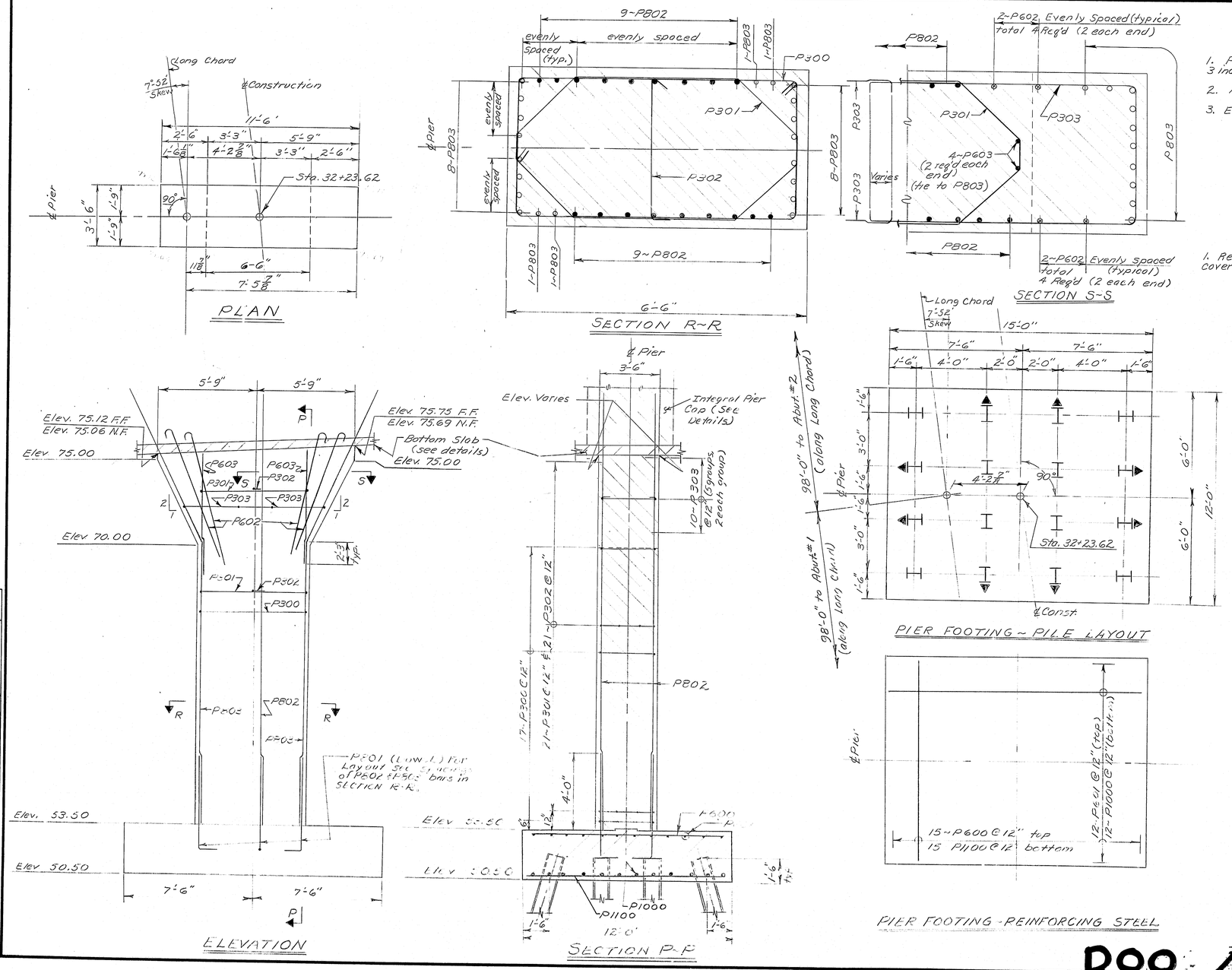
INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Abutment #2

SHEET 5 OF 16 AUGUSTA, MAINE

R88-422

BRUNING 44-132 45710-1

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	9	66



PILE NOTES

1. Piles marked thus ⊢▶ shall be battered 3 inches per foot in the direction of the arrow.
2. Maximum calculated pile loads: 131 tons.
3. Estimate of piles required at pier: HP14X89 16 required @ 47 feet long = 752 L.F. TOTAL

PIER NOTES

1. Reinforcing steel shall have 3 inches minimum cover unless otherwise indicated.

THIS ALT. NOT USED

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Integral Pier

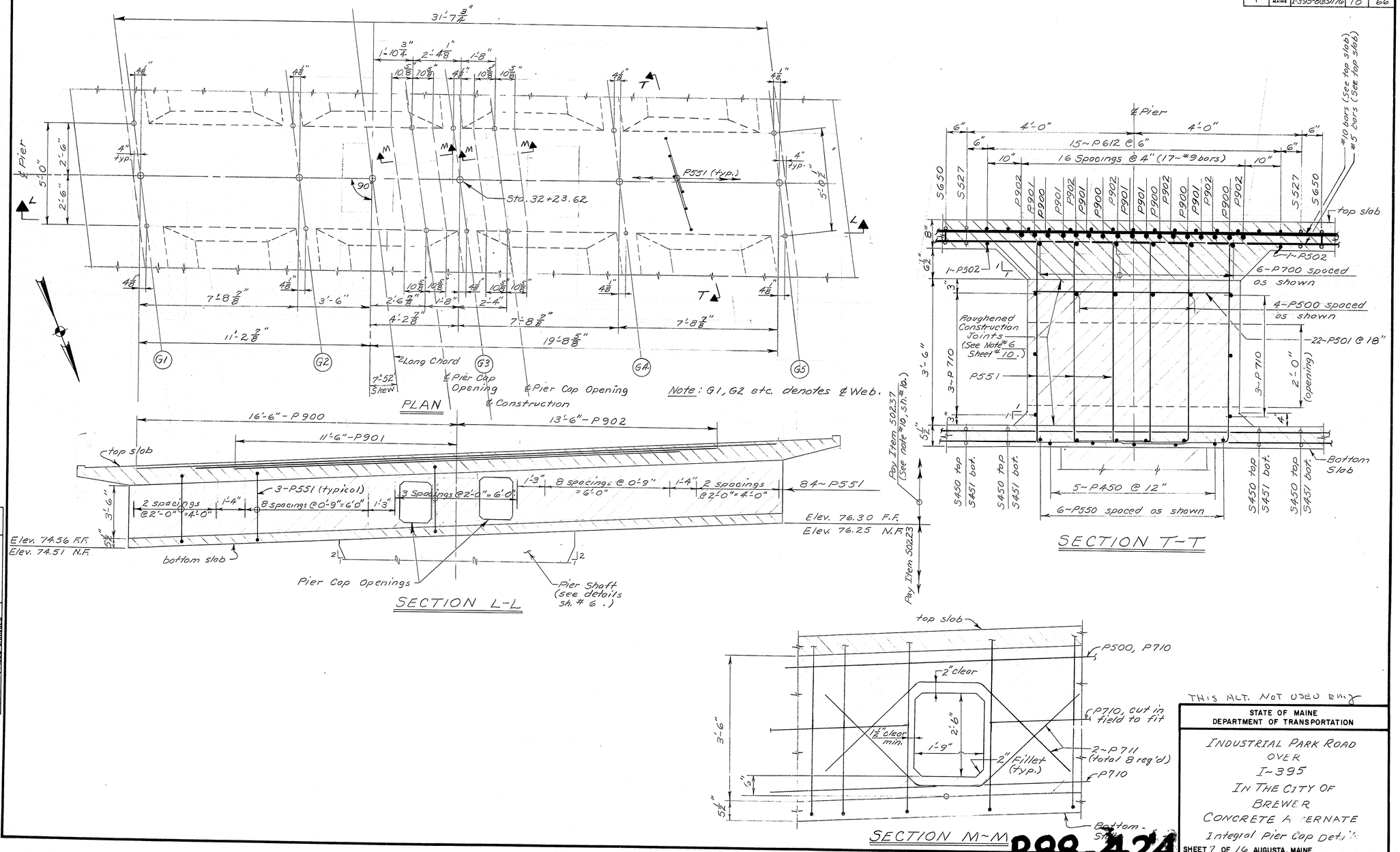
SHEET 6 OF 16 AUGUSTA, MAINE

R88-423

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	PJM J.Marsh	Jan. 1983
CHECKED	RVD	6/83
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 45710

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	I-395-8(85)176	10	66



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STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Integral Pier Cap Details

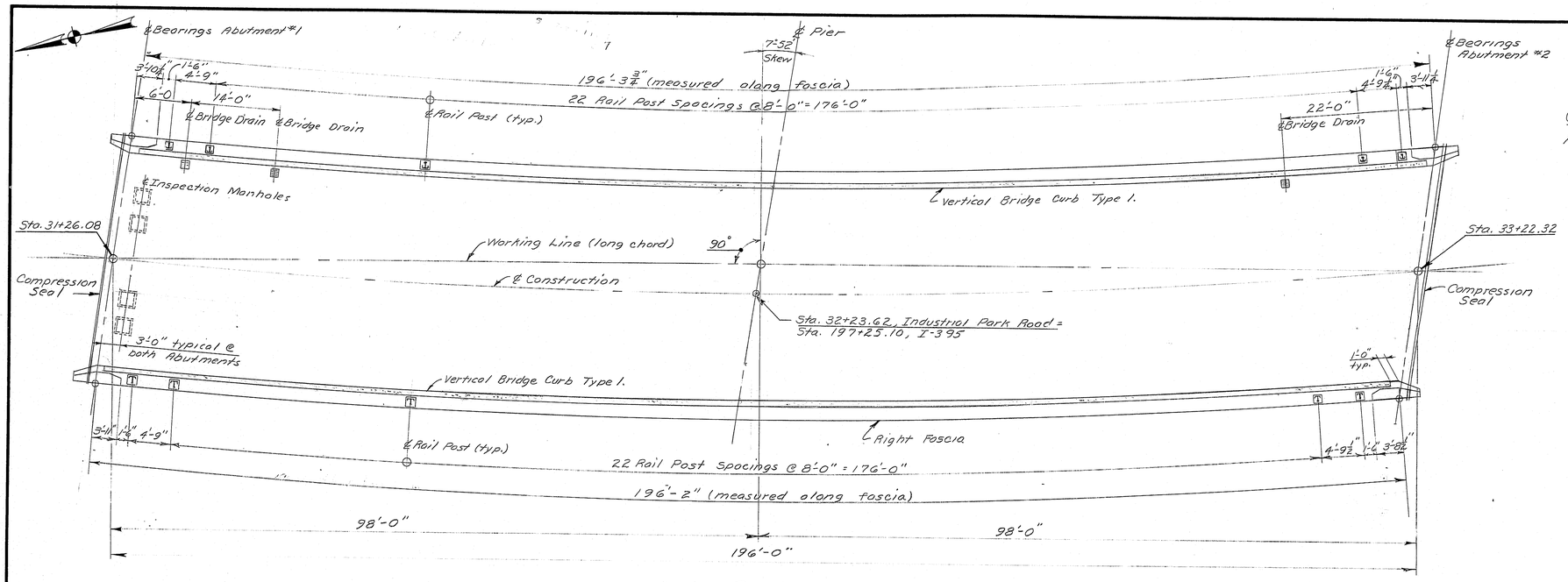
SHEET 7 OF 16 AUGUSTA, MAINE

R88-424

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	PJM J. Monsir	Jan. 1983
CHECKED	RVD	6/83
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 45710

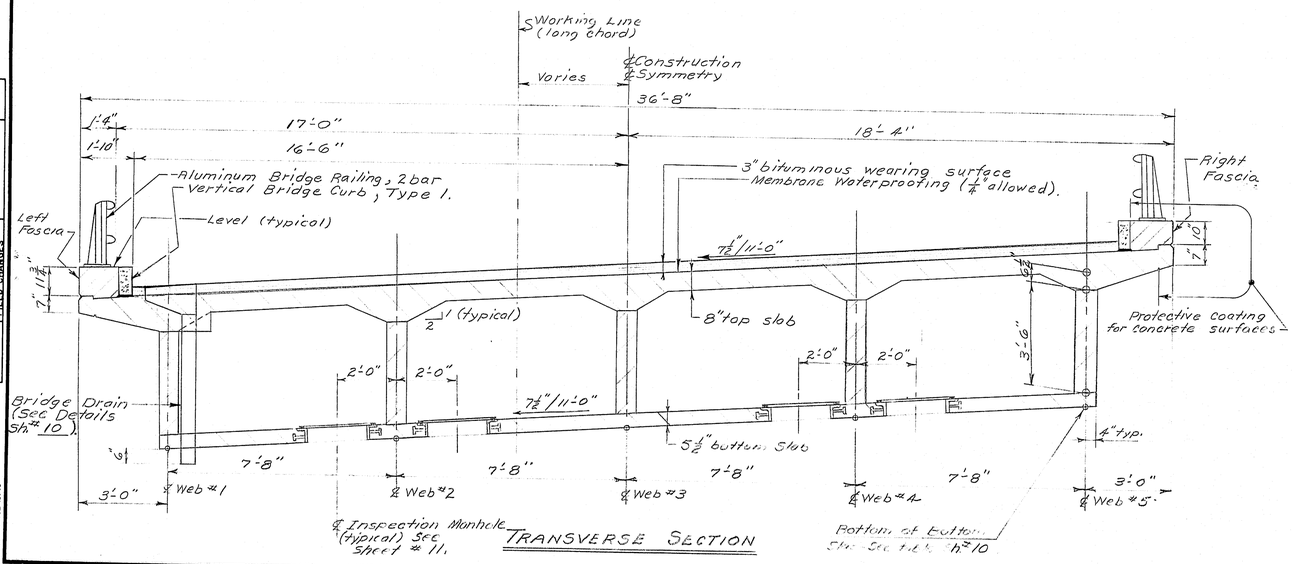
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	I-395-8(085)196	11	66



PLAN

CURVE DATA (Industrial Park Road)

P.I. Sta. 35+08.75
Δ = 41°-40'-37.2" Left
D = 5°-00'
T = 436.17'
L = 833.54'
R = 1145.92'



TRANSVERSE SECTION

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	PJM	5/83
CHECKED	EVD	
REVISIONS		
FIELD CHANGES		

BRUNING 44-132-6710

THIS ALT. NOT USED BHZ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

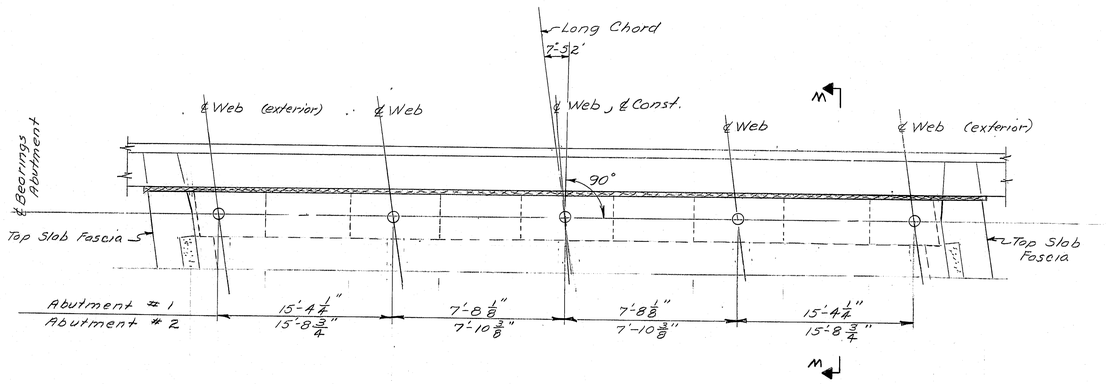
INDUSTRIAL PARK ROAD
OVER
INTERSTATE ROUTE I395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Superstructure Plan & Section

SHEET 8 OF 16 AUGUSTA, MAINE

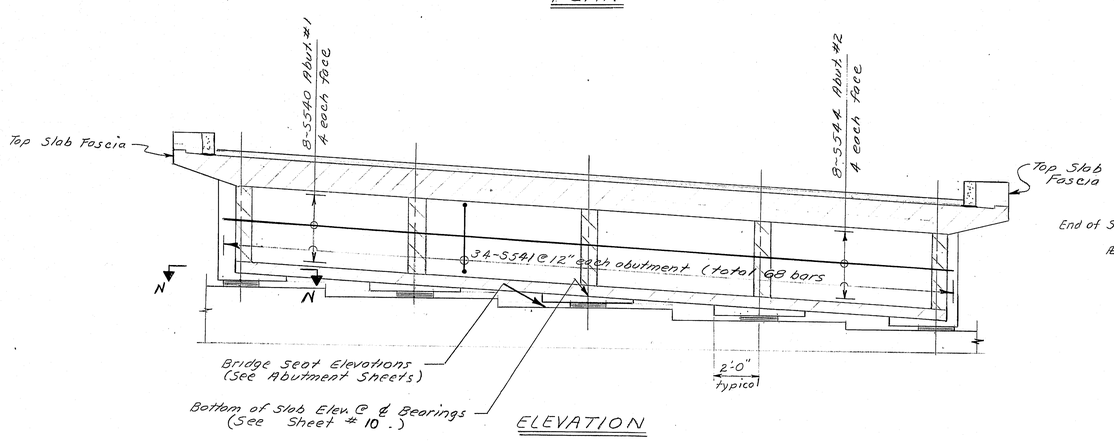
R88-425

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	12	66

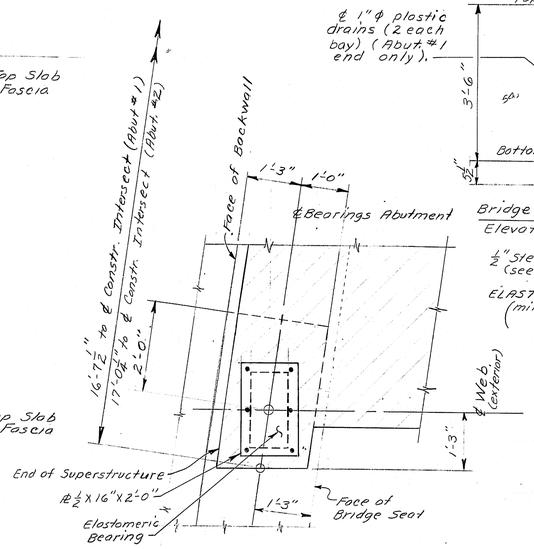
For Seal Adjustment Chart and Seal Notes See Sheet # 3.



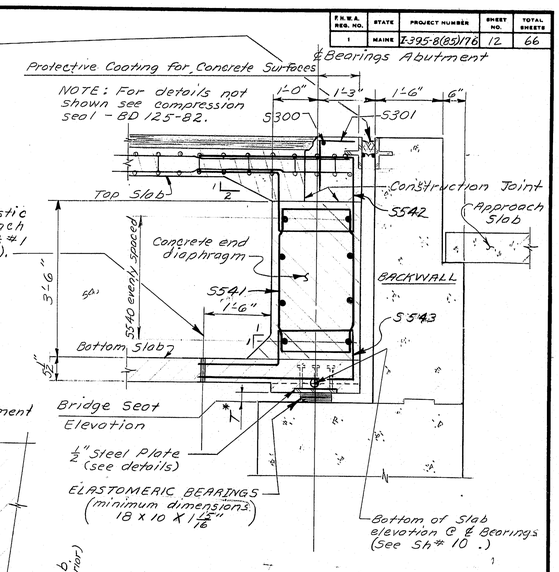
PLAN



ELEVATION



SECTION N-N

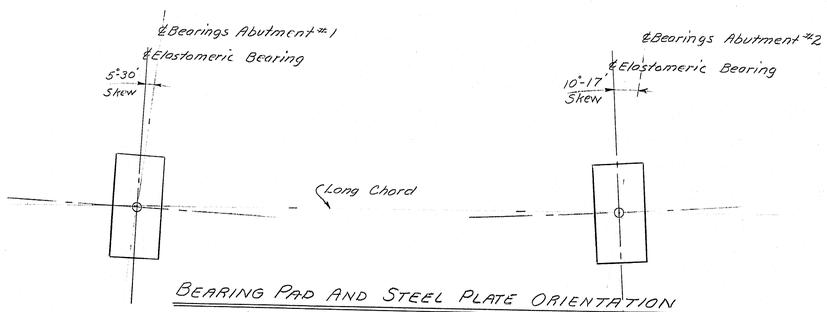


SECTION M-M

T* - The full thickness of the elastomeric bearing chosen (2 1/2" maximum).

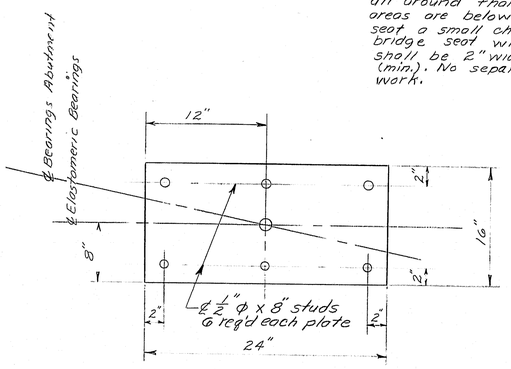
Note: Elastomeric bearing dimmensions are minimum. Laminated bearings of other dimensions may be used subject to the approval of the Engineer.

At the location of the elastomeric bearings the concrete bridge seats shall be dressed one inch larger all around than the elastomeric bearing. If dressed areas are below the surface of the surrounding bridge seat a small channel shall be cut to the edge of the bridge seat where required by the Engineer. The channel shall be 2" wide (min.) and have a slope of 1/2" / ft. (min.). No separate payment shall be made for this work.



BEARING PAD AND STEEL PLATE ORIENTATION

(Typical all 5 girders.)



STEEL PLATE DETAIL

THIS ALT. NOT USED RMZ

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	RJH	3/1/93
CHECKED	MWP	6/93
REVISIONS	RVD	
FIELD CHANGES		

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Superstructure End Diaphragms

SHEET 9 OF 16 AUGUSTA, MAINE

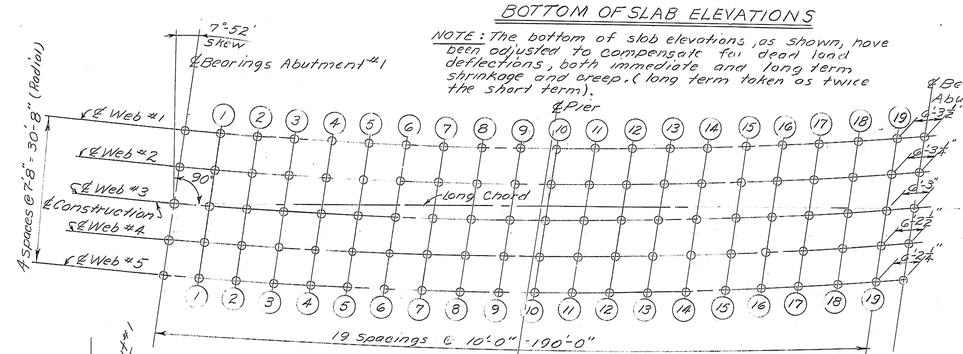
R88-426

BRUNING 44-132 4570-1

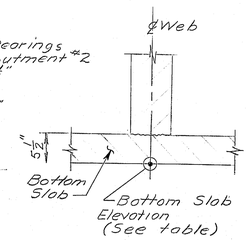
	℄ Brgs. Abut. #1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	℄ Brgs. Abut. #2
Web #1	73.27	73.56	73.81	74.04	74.22	74.35	74.42	74.48	74.50	74.52	74.58	74.74	74.90	75.07	75.21	75.33	75.40	75.42	75.38	75.32	75.23
Web #2	73.70	73.99	74.24	74.47	74.65	74.77	74.85	74.90	74.93	74.94	75.00	75.16	75.33	75.49	75.64	75.76	75.83	75.85	75.81	75.76	75.65
Web #3	74.13	74.42	74.67	74.90	75.08	75.20	75.28	75.33	75.35	75.37	75.43	75.59	75.75	75.92	76.06	76.18	76.26	76.27	76.23	76.18	76.08
Web #4	74.56	74.84	75.10	75.32	75.50	75.62	75.70	75.75	75.78	75.79	75.86	76.01	76.18	76.34	76.49	76.61	76.68	76.70	76.66	76.61	76.51
Web #5	74.99	75.27	75.52	75.75	75.93	76.05	76.13	76.18	76.20	76.22	76.28	76.44	76.60	76.77	76.91	77.04	77.11	77.13	77.09	77.04	76.94

BOTTOM OF SLAB ELEVATIONS

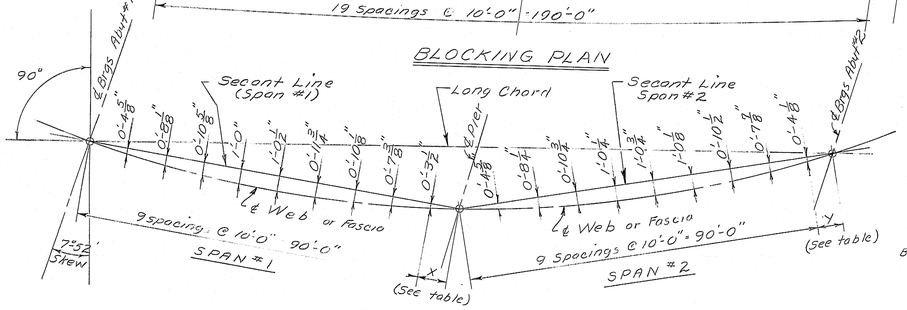
NOTE: The bottom of slab elevations, as shown, have been adjusted to compensate for dead load deflections, both immediate and long term shrinkage and creep. (long term taken as twice the short term).



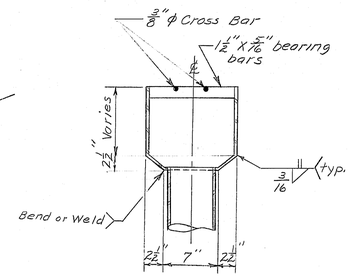
BLOCKING PLAN



BLOCKING DETAIL



TYPICAL GIRDER AND FASCIA LAYOUT

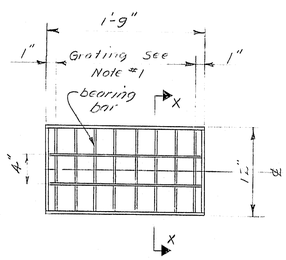


SECTION X-X

TABLE	X	Y
Left Fascia	7'-6 1/4"	8'-8 3/4"
Girder #1	7'-6 1/4"	8'-8 1/2"
Girder #2	7'-6 1/4"	8'-8 1/4"
Girder #3	7'-6	8'-8"
Girder #4	7'-6"	8'-7 3/4"
Girder #5	7'-6"	8'-7 1/2"
Right Fascia	7'-6"	8'-7 1/2"

NOTES

1. Grating shall be a commercial heavy duty grating with 1 1/2" x 3/16" bearing bars spaced at 2 3/8" c.t.c., and 3/16" ϕ Cross bars spaced at 4" c.t.c.
2. Plates shall be A.S.T.M. A 36, 1/4" thick.



SUPERSTRUCTURE NOTES

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	13	66

1.) Reinforcing steel shall have a minimum cover of 2 inches unless otherwise indicated

2.) Adjust reinforcing steel to fit around the drains in a manner approved by the Engineer. Do not cut reinforcing bars.

3.) Mortar for bedding and for joints in the granite curb shall contain an approved non-shrink additive.

4.) Protective coating for concrete surfaces shall be applied to the following areas:
Top of concrete curbs and end diaphragms
Fascias down to the drip notch
Concrete end posts.

5.) Welding to the stirrups in the top of the concrete end diaphragms and in the abutment backwall will be allowed, as approved by the Engineer.

6.) The roughened construction joints, where called for on the plans, shall have clean contact surfaces free of laitance and shall be intentionally roughened to a full magnitude of approximately 0.25 inch, in a manner approved by the Engineer.

7.) Where approved by the Engineer, the Contractor may use stay-in-place galvanized metal forms. All other forms shall be removed in their entirety.

8.) The concrete superstructure shall be supported by falsework until the entire superstructure has been substantially completed and in accordance with Section 502.10. The Contractor shall submit plans of the supporting forms and falsework to the Engineer for approval prior to their construction.

9.) In removing the supporting falsework, the Contractor shall take special care that the dead loading of the concrete will be done gradually using sand boxes or other methods as specified under section 502.10(d). The method used by the Contractor shall be subject to the approval of the Engineer.

10.) Payment for superstructure concrete will be made to the bottom of bottom slab under Item 502.37. Such payment will include the integral pier cap and the concrete end diaphragms.

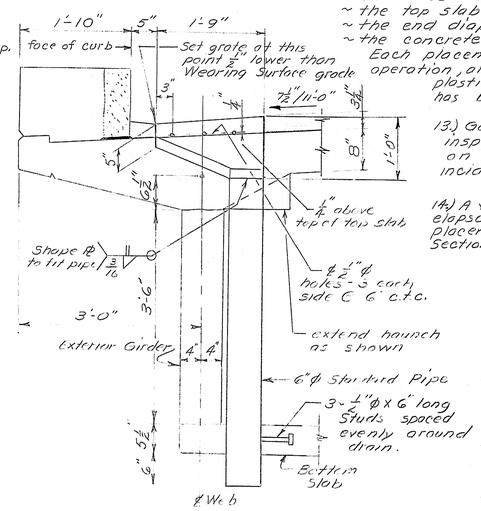
11.) The 1/2 inch steel plate and stud anchors at the abutment ends will be considered incidental to Item 502.37.

12.) The superstructure concrete shall be constructed in placements as follows:
- the bottom slab
- the webs and integral pier cap
- the top slab and haunches
- the end diaphragms
- the concrete curbs

Each placement shall be made in continuous operation, and the concrete shall be kept plastic until the entire placement has been completed.

13.) Galvanized bridge drains and the inspection manholes, as shown on the plans, will be considered incidental to Item 502.37.

14.) A waiting period of 7 days shall elapse between Superstructure Concrete placements and as specified in Section 502.16.



BRIDGE DRAIN

THIS MAT. NOT USED HERE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE ROUTE I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE

Bottom of Slab Elevation & Details

SHEET 13 OF 16 AUGUSTA, MAINE

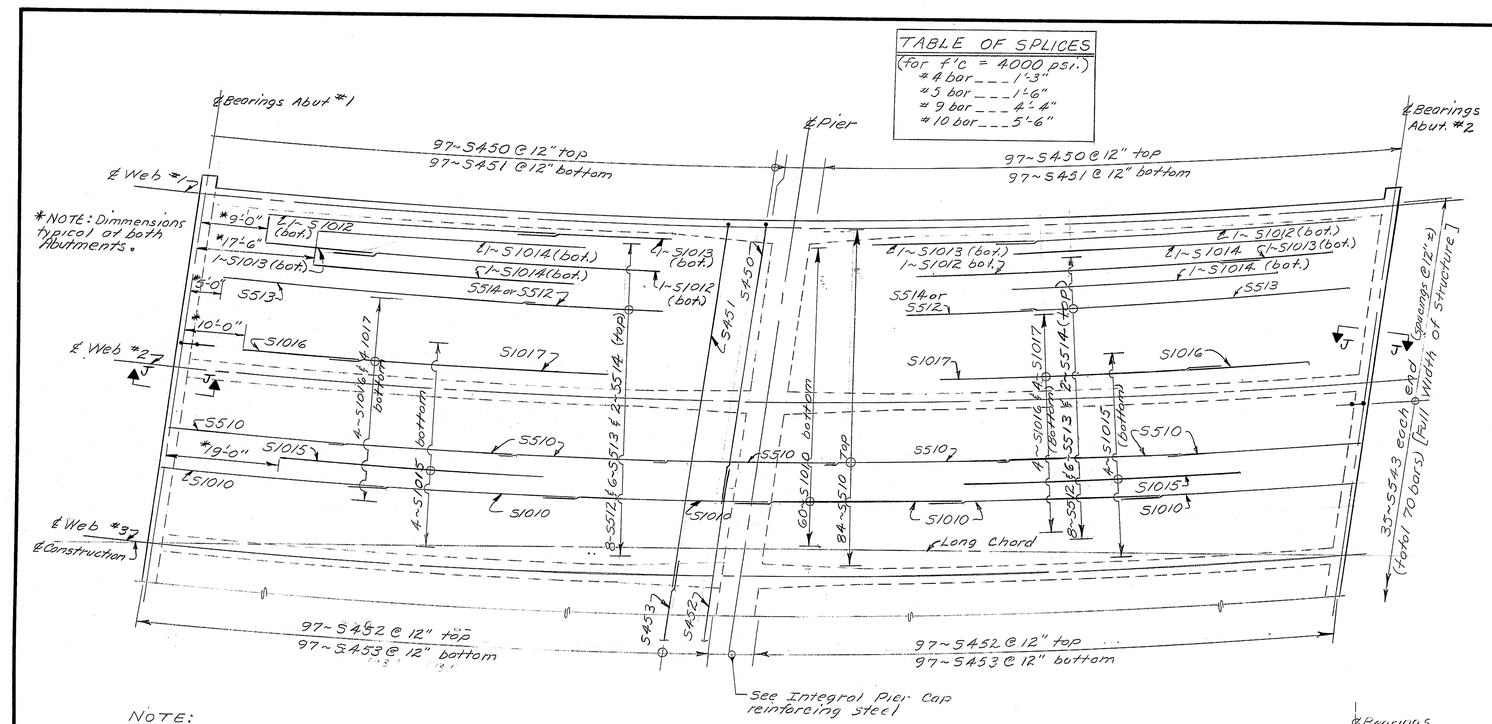
PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	PJM	5/83
CHECKED	RVD	
REVISIONS FIELD CHANGES		

BRUNING 44-132-4570

R88-427

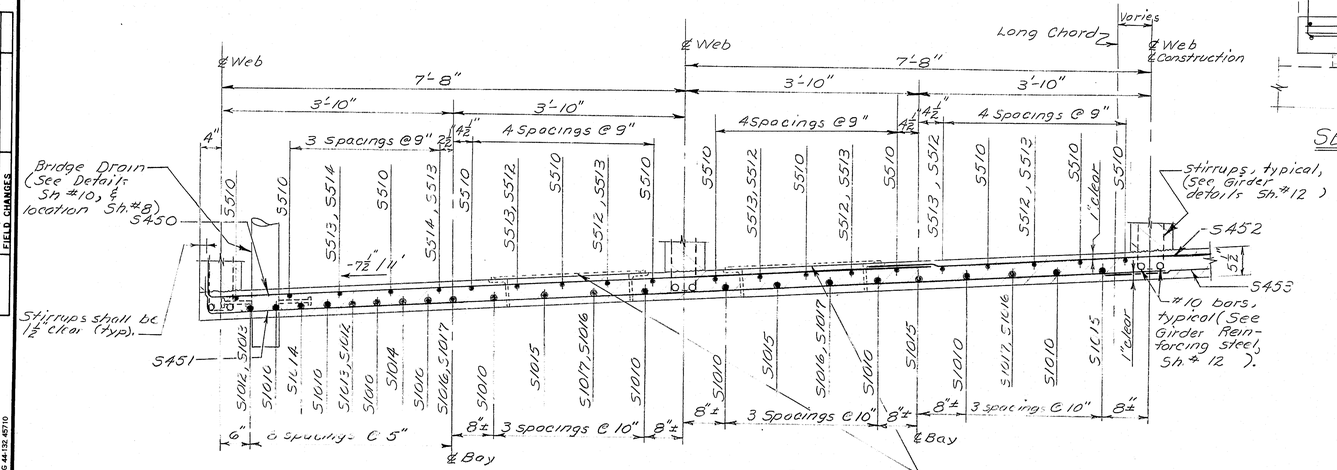
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(B5)176	14	66

TABLE OF SPLICES (for f'c = 4000 psi.)	
#4 bar	1'-3"
#5 bar	1'-6"
#9 bar	4'-4"
#10 bar	5'-6"

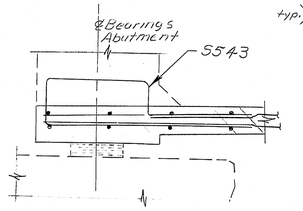


ONE HALF PLAN

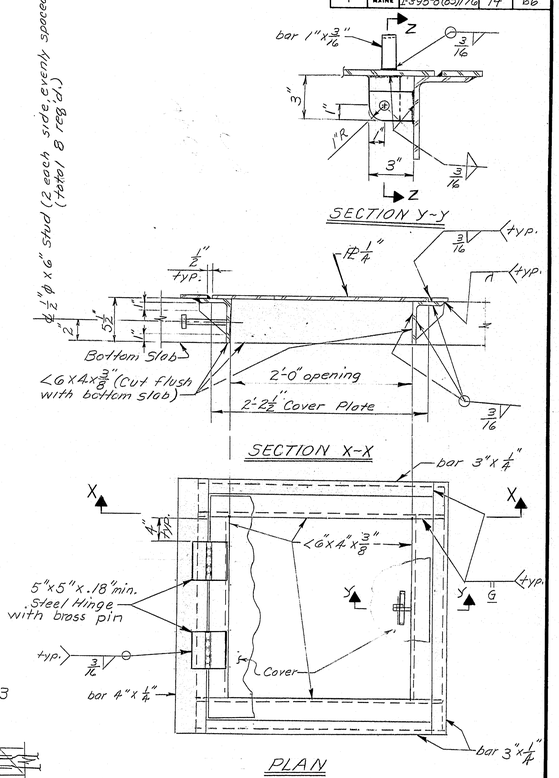
NOTE:
The amount of longitudinal reinforcing steel shown is for one half of structure. The structure is symmetrical about ℄ construction.



ONE HALF TRANSVERSE SECTION

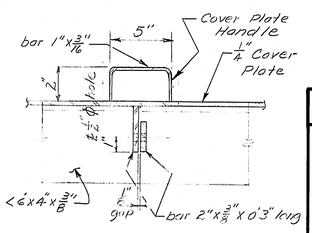


SECTION J-J



INSPECTION MANHOLE

NOTE: The inspection manhole assembly shall be hot-dipped galvanized after fabrication.



SECTION Z-Z

THIS ALT NOT USED Rm 2

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE ROUTE I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Bottom Slab

SHEET 11 OF 16 AUGUSTA, MAINE

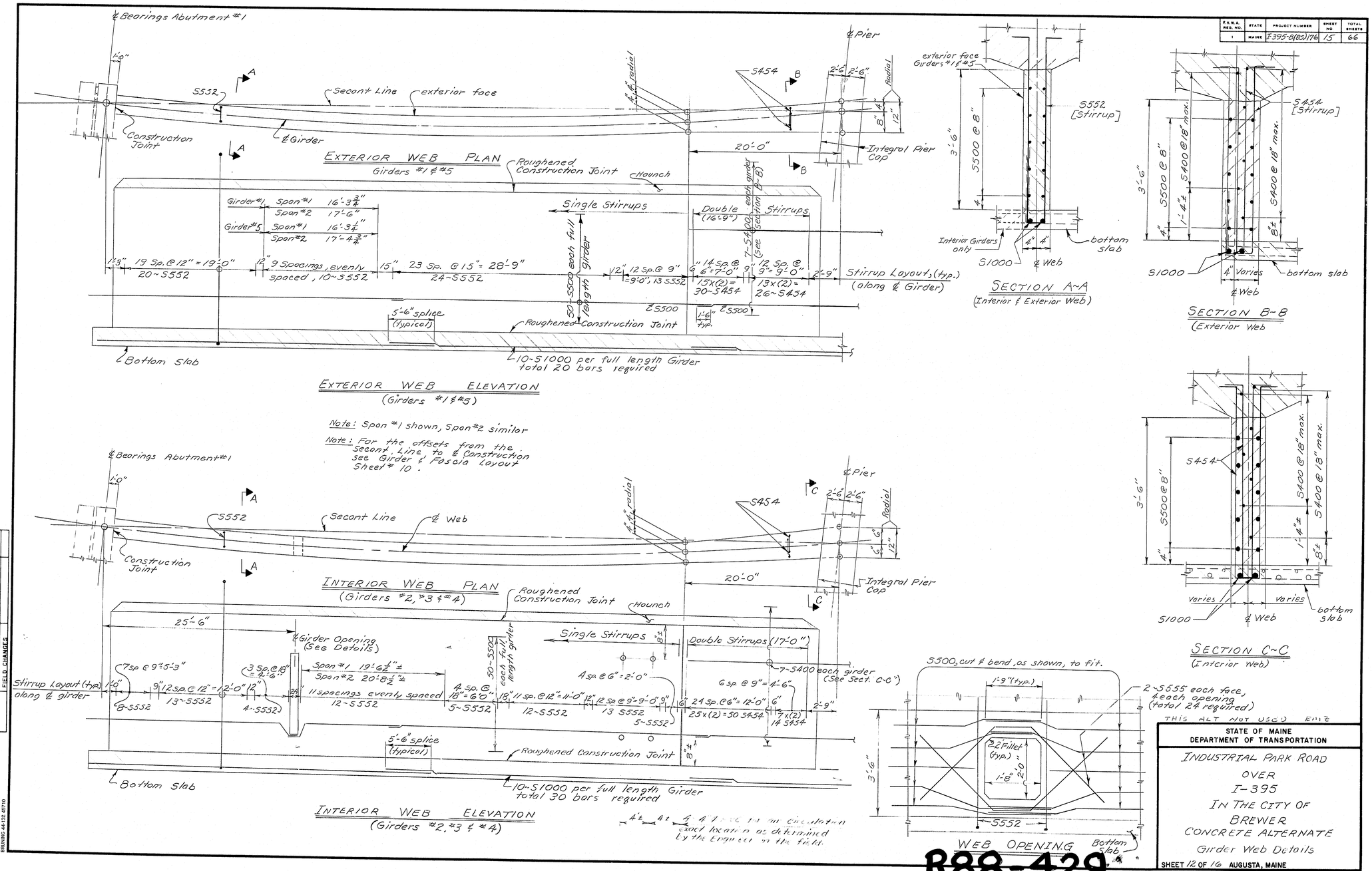
PROJECT DESIGN ENGINEER	BY	DATE
DESIGN - DETAILED	PJW	2/83
CHECKED	J.Mazzi	2/83
REVISIONS	RVD	5/83
FIELD CHANGES		

PLANS

BRUNING 44.132 4570

R88-428

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)176	15	66



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STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Girder Web Details

SHEET 12 OF 16 AUGUSTA, MAINE

PROJECT DESIGN ENGINEER

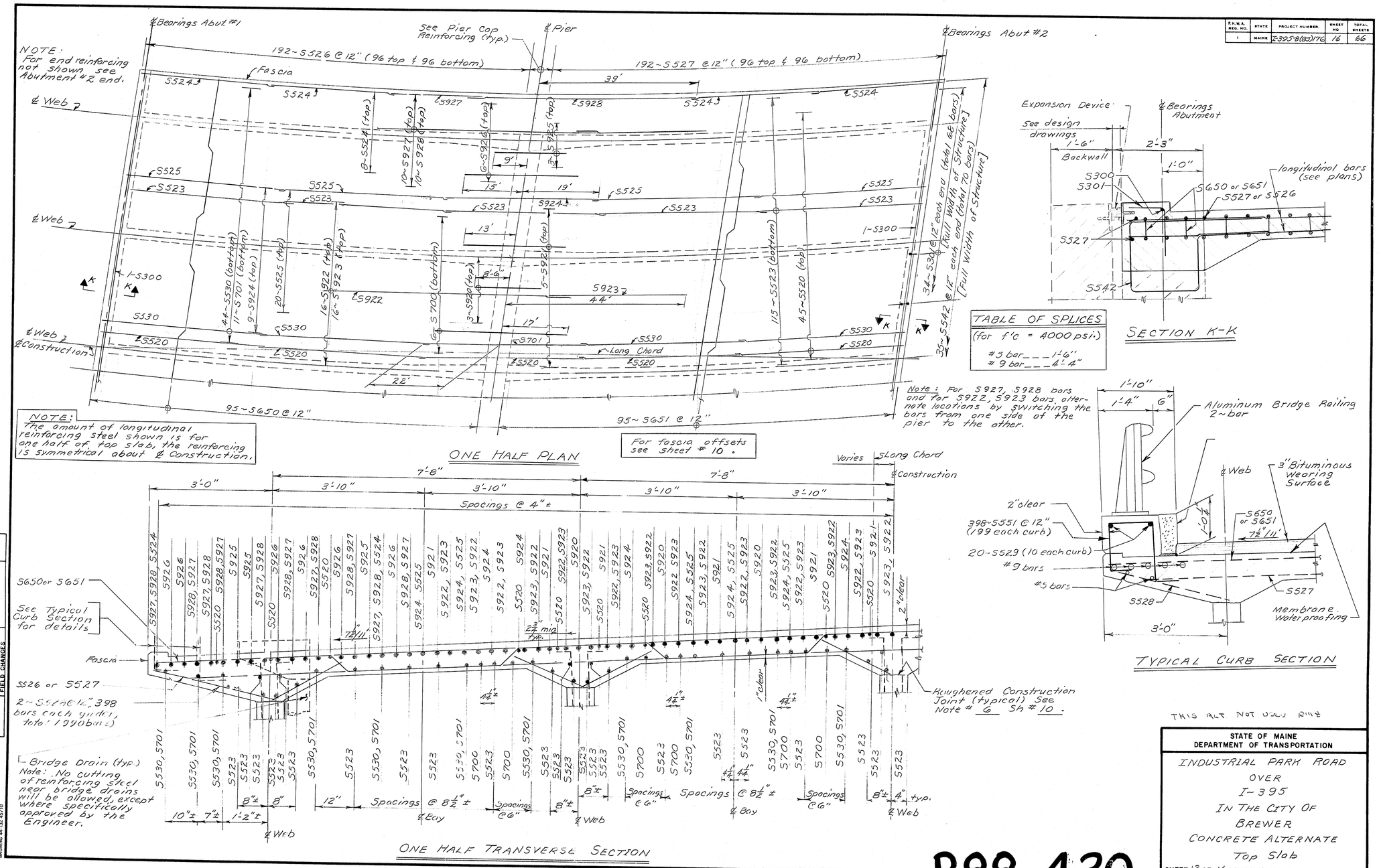
	BY	DATE
DESIGN - DETAILED	PJM	Feb. 1983
CHECKED	J. Mansir	5/83
REVISIONS	RVD	
FIELD CHANGES		

PLANS

BRUNING 44-132 45710

R88-429

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	I-395-8(85)176	16	66



PROJECT DESIGN ENGINEER		BY	DATE
PLANS	DESIGN-DETAILED	PJM	J. Mansir Feb 1983
	CHECKED	RVD	5/83
	REVISIONS		
	FIELD CHANGES		

BRUNING 44-132 45710

THIS ALT. NOT USED RMZ

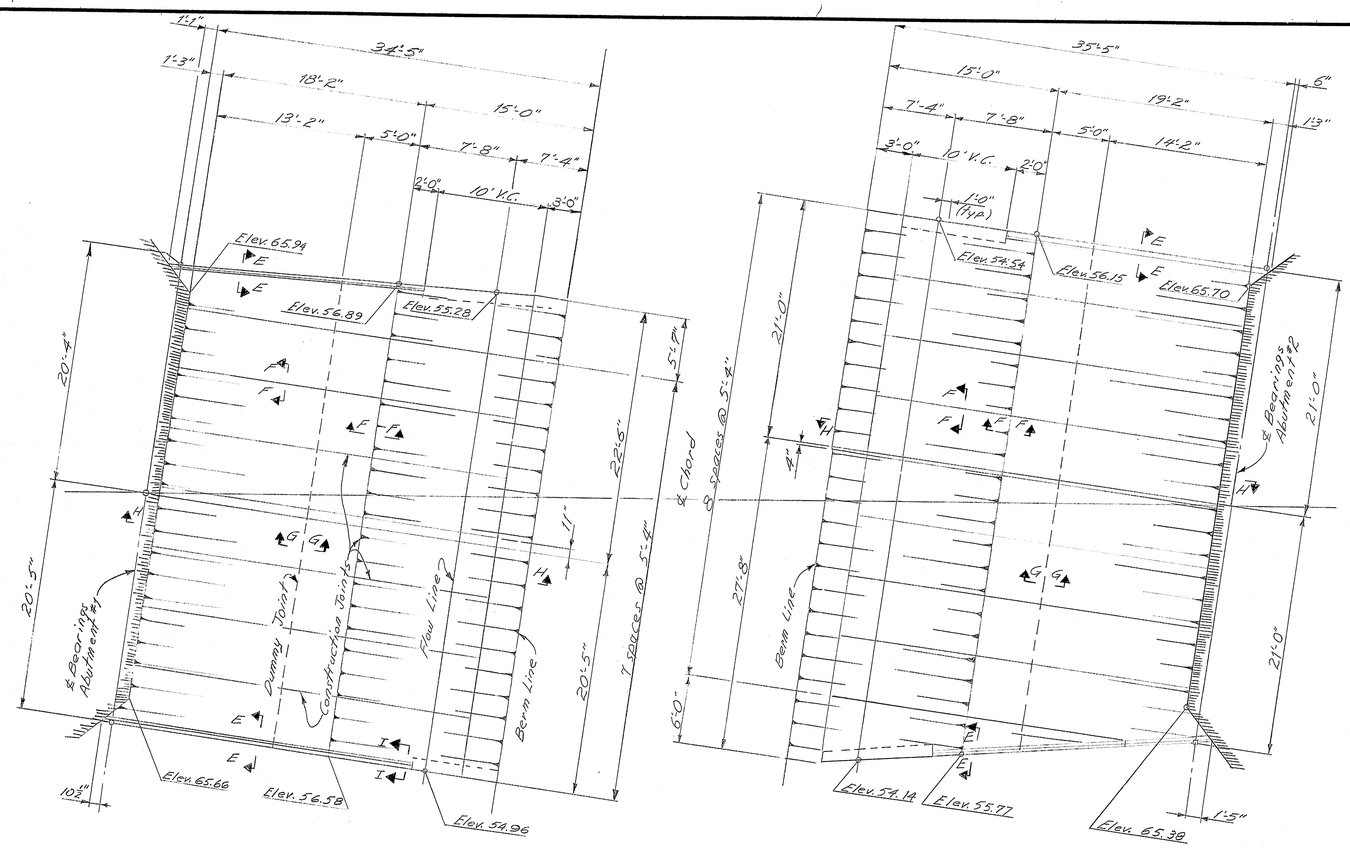
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Top Slab

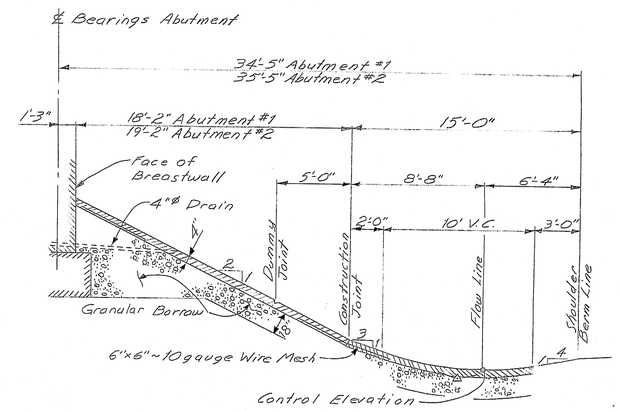
SHEET 13 OF 16 AUGUSTA, MAINE

R88-430

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(83)176	17	66



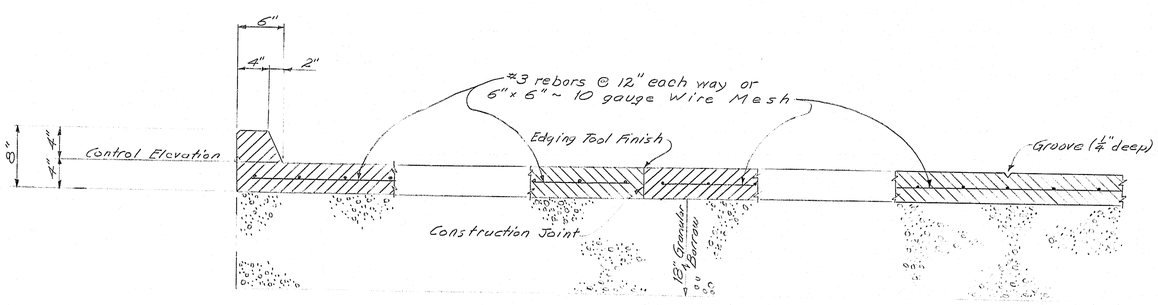
PLAN



SECTION H-H

NOTES

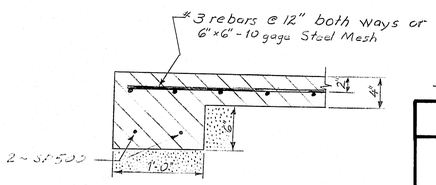
1. The Steel Mesh shall not pass through any contraction joints.
2. At all contraction joints, break bond between sections by a method approved by the engineer.
3. Do not excavate for granular borrow where the existing material is found suitable in the opinion of the engineer.



SECTION E-E

SECTION F-F
Typical at all Construction Joints

SECTION G-G



SECTION I-I

THIS ALT. NOT USED RMZ

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN-DETAILED	K.D.R.	7/83
CHECKED	RWD	
REVISIONS		
FIELD CHANGES		

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE

CONCRETE SLOPE PROTECTION

SHEET 14 OF 16 AUGUSTA, MAINE

R88-431

BRUNING 44-132 45710

FHWA REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	F-395-B(BD)1776	18	66

REINFORCING STEEL SCHEDULE

STRAIGHT BARS

MARK	NO.	LENGTH	LOCATION
	ABUTMENT	FOOTINGS	
F500	48	7'-0"	Wing #1 transv.
F501	250	7'-6"	Tronsverse
F502	42	8'-0"	Wing #3 transv.
F503	16	20'-0"	Wing #1 longi.
F504	18	37'-6"	Abut. #1 longi.
F505	36	25'-0"	Wing #2, #4, longi.
F506	18	24'-0"	Wing #3 longi.
F507	18	38'-6"	Abut. #2 longi.
	ABUTMENT #1		
A500	80	3'-0"	Dowels
A501	4	10'-1"	Wing #2, Vert., E.F.
A502	4	11'-9"	" " "
A503	4	12'-6"	" " "
A504	4	13'-8"	Wing #2, Vert., E.F.
A505	4	14'-8"	" " "
A506	4	15'-11"	" " "
A507	4	17'-1"	" " "
A508	7	23'-9"	Wing #2, Horiz., N.F.
A509	7	21'-6"	Wing #2, Horiz., F.F.
A510	1	21'-6"	Wing #2, Horiz., N.F.
A511	1	19'-3"	Wing #2, Horiz., F.F.
A512	1	15'-1"	Wing #2, Horiz., F.F.
A513	1	11'-0"	" " "
A514	1	7'-3"	" " "
A515	1	3'-0"	" " "
A516	2	10'-0"	Wing #1, Vert., E.F.
A517	4	10'-7"	" " "
A518	4	11'-8"	" " "
A519	4	12'-11"	" " "
A520	4	14'-2"	Wing #1, Vert., E.F.
A521	4	15'-4"	" " "
A522	7	18'-9"	Wing #1, Horiz., N.F.
A523	7	16'-6"	Wing #1, Horiz., F.F.
A524	1	12'-4"	Wing #1, Horiz., F.F.
A525	1	8'-6"	" " "
A526	1	4'-8"	" " "

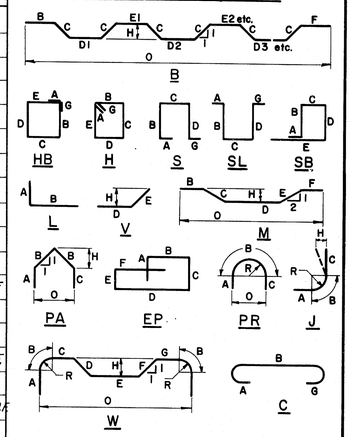
MARK	NO.	LENGTH	LOCATION
A527	4	3'-3"	Horiz., Parapet, E.F.
A528	7	18'-9"	Horiz., F.F.
A529	6	25'-3"	" "
A530	11	13'-10"	Vert., F.F.
A531	15	12'-8"	Vert., F.F.
A532	3	17'-10"	Horiz., F.F., B'wall
A533	3	16'-8"	Horiz., N.F., B'wall
A534	3	25'-3"	Horiz., F.F., B'wall
A535	3	24'-1"	Horiz., N.F., B'wall
A536	2	15'-4"	Horiz., Br., Seat
A537	2	22'-9"	Horiz., Br., Seat
A538	26	3'-0"	Vert., Backwall
A539	26	5'-4"	Vert., Backwall
	ABUTMENT #2		
B500	57	3'-0"	Dowels
B501	13	7'-0"	Vert., F.F., wing #4
B502	4	12'-6"	Vert., E.F., wing #4
B503	4	13'-4"	" " " "
B504	4	14'-2"	Vert., E.F., wing #4
B505	4	15'-0"	" " " "
B506	4	15'-10"	" " " "
B507	4	16'-7"	" " " "
B508	4	17'-5"	" " " "
B509	8	23'-8"	Horiz., N.F., wing #4
B510	8	21'-8"	Horiz., F.F., wing #4
B511	1	21'-0"	Horiz., F.F., wing #4
B512	1	15'-2"	" " " "
B513	1	9'-7"	" " " "
B514	1	4'-3"	" " " "
B515	13	7'-0"	Vertical, F.F., wing #3
B516	2	11'-8"	Vertical, E.F., wing #3
B517	4	12'-4"	Vert., E.F., wing #3
B518	4	13'-7"	" " " "
B519	4	14'-11"	Vert., E.F., wing #3
B520	4	16'-2"	" " " "
B521	4	17'-6"	" " " "
B522	4	18'-9"	" " " "

MARK	NO.	LENGTH	LOCATION
B523	8	22'-9"	Horiz., N.F., wing #3
B524	8	20'-10"	Horiz., F.F., wing #3
B525	1	20'-3"	Horiz., N.F., wing #3
B526	1	18'-0"	Horiz., F.F., wing #3
B527	1	14'-4"	Horiz., F.F., wing #3
B528	1	11'-0"	" " " "
B529	1	7'-4"	" " " "
B530	1	3'-11"	" " " "
B531	4	3'-3"	Wing Parapets, E.F.
B532	8	19'-2"	Breastwall, F.F., Horiz.
B533	9	25'-8"	" " "
B534	4	18'-8"	Backwall, F.F., Horiz.
B535	4	17'-8"	Backwall, N.F., Horiz.
B536	4	25'-0"	Backwall, F.F., Horiz.
B537	4	24'-0"	Backwall, N.F., Horiz.
B538	2	16'-4"	Bridge Seat Horiz.
B539	2	22'-10"	" " "
B540	12	14'-5"	Vert., F.F., backwall
B541	16	15'-5"	" " "
B542	28	5'-5"	Vert., F.F., Backwall
B543	28	3'-0"	N.F., Backwall
	APPROACH SLAB		
AS400	64	16'-8"	Transverse
AS600	128	15'-0"	Longitudinal

BENT BARS

MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION
				ABUTMENT #1										
A600	11	4'-0"	L	1'-0"	3'-0"									Wing #1, F.F., Vert.
A601	10	6'-6"	L	1'-0"	5'-6"									" " "
A700	14	4'-9"	L	1'-2"	3'-7"									Wing #2, F.F., Vert.
A701	13	7'-10"	L	1'-2"	6'-8"									" " "
A550	1	15'-8"	V				13'-8"	2'-0			1'-5"			Wing #2, Horiz, N.F.
A551	1	11'-11"	V				9'-11"	2'-0"			1'-5"			" " "
A552	1	8'-1"	V				6'-1"	2'-0"			1'-5"			" " "
A553	1	5'-7"	V				2'-3"	2'-0"			1'-5"			" " "
A554	2	22'-9"	L	1'-9"	21'-0"									Wing #2, Horiz., E.F.
A555	1	14'-1"	V				12'-1"	2'-0"			1'-5"			Wing #1, Horiz, N.F.
A556	1	10'-2"	V				8'-2"	2'-0"			1'-5"			" " "
A557	1	6'-3"	V				4'-3"	2'-0"			1'-5"			" " "
A558	2	17'-9"	L	1'-9"	16'-0"									Wing #1, Horiz, E.F.
A559	26	8'-6"	S		5'-4"	1'-2"	2'-0"							Vert, backwall
A560	8	16'-4"	V				14'-4"	2'-0"			1'-5"			Horiz., breastwall, N.F.
A561	7	23'-7"	V				21'-7"	2'-0"			1'-5"			" " "
A562	12	15'-2"	L	11'-0"	4'-2"									Vert., breastwall
A563	17	13'-10"	L	9'-8"	4'-2"									" "
A564	4	4'-8"	S		1'-9"	1'-2"	1'-9"							Vert., Parapet
				ABUTMENT #2										
B550	1	21'-6"	V				19'-6"	2'-0"			1'-5"			Wing #4, Horiz., N.F.
B551	1	16'-0"	V				14'-0"	2'-0"			1'-5"			" " "
B552	1	10'-6"	V				8'-6"	2'-0"			1'-5"			" " "
B553	1	4'-8"	V				2'-8"	2'-0"			1'-5"			" " "
B554	2	22'-0"	L	1'-6"	20'-6"									Top wing #4, E.F.
B555	1	4'-10"	V				2'-10"	2'-0"			1'-5"			Wing #3, Horiz. N.F.
B556	1	8'-3"	V				6'-3	2'-0"			1'-5"			" " "
B557	1	11'-9"	V				9'-9"	2'-0"			1'-5"			" " "
B558	1	15'-3"	V				13'-3"	2'-0"			1'-5"			" " "
B559	2	21'-9"	L	1'-8"	20'-1									Top wing #3, E.F.
B560	8	17'-3"	V				15'-3"	2'-0"			1'-5"			Horiz., N.F., breastwall
B561	9	23'-7"	V				21'-7"	2'-0"			1'-5"			" " "
B562	13	15'-10"	L	4'-2"	11'-8"									Vert, N.F., breastwall
B563	17	16'-8"	L	4'-2"	12'-6"									" " "
B564	28	8'-6"	S	—	5'-4"	1'-2"	2'-0"			—				Backwall, Vert.
B565	4	4'-8"	S	—	1'-9"	1'-2"	1'-9"			—				Parapet, Vert.
B650	28	4'-6"	L	1'-0"	3'-6"									Backwall F.F Vert.
B750	14	5'-6"	L	1'-2"	4'-4"									Wing #4, F.F., dowels
B751	13	6'-6"	L	1'-2"	5'-4"									" " "
B850	13	6'-10"	L	1'-4"	5'-6"									Wing #3, F.F., dowels
B851	13	7'-10"	L	1'-4"	6'-6"									" " "
MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION

TYPE-BENDING DIAGRAMS



All dimensions are out to out of reinf. bar

Bending details and hooks shall conform to the recommendations of ACI Standard 315-65.

Reinforcing Bar: ASTM A615 Grade 60

GENERAL NOTES

1. First digit(s) following the letter of the Mark indicates size of reinf. bar.
   Mark (A502) bar size - #5
   Mark (P1001) bar size - #10
   Mark (S603) bar size - #6
2. Letter of Marks A, P & S locates bars of Abutments, Piers, and Superstructure parts respectively.

THIS ALT. NOT USED BMJ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Reinforcing Steel Schedule

SHEET 15 OF 16 AUGUSTA, MAINE

PLANS

	BY	DATE
DESIGN - DETAIL	RJM	6/83
CHECKED	RVD	
REVISIONS		
FIELD CHANGES		

R88-432

FHWA REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(89)176	19	66

REINFORCING STEEL SCHEDULE

STRAIGHT BARS

MARK	NO.	LENGTH	LOCATION
			PIER SHAFT
P600	15	11'-6"	Footing transv.
P601	12	14'-6"	Footing longi.
P603	4	7'-3"	Vertical Shaft
P802	18	25'-0	Shaft Vert.
P1000	12	14'-6"	Bot. ftg. longi.
P1100	15	11'-6"	Bot. ftg. transv.
			INTEGRAL PIER CAP
P500	4	31'-3"	Longi.
P501	22	4'-8"	Transverse
P502	2	36'-8"	Longi.
P612	15	36'-8"	Longi.
P700	6	36'-0"	Longi.
P710	6	31'-3"	Longi.
P900	5	33'-0"	Longi, top of cap
P901	6	23'-0"	" " " "
P902	6	27'-0"	" " " "
			BOTTOM SLAB
S510	168	29'-8"	Longi., top
S512	24	23'-0"	" "
S513	32	50'-0"	" "
S514	8	40'-0"	" "
S1010	120	37'-8"	Longi., bottom
S1012	8	60'-0"	" "
S1013	8	12'-2"	" "
S1014	8	46'-0"	" "
S1015	16	43'-0"	" "
S1016	16	20'-0"	" "
S1017	16	47'-0"	" "
			GIRDER WEB
S400	35	40'-0"	Longi. over Pier
S500	250	41'-0"	Longi.
S1000	50	44'-0"	Longi., bottom

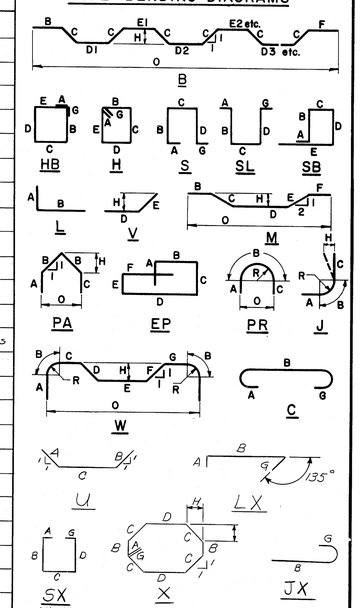
MARK	NO.	LENGTH	LOCATION
			TOP SLAB
S300	2	36'-4"	longi., Abuts.
S520	90	40'-10"	longi., Tops
S523	230	40'-10"	longi., Bottom
S524	16	31'-6"	longi., Top
S525	40	42'-0"	" "
S526	192	36'-4"	Transverse
S527	192	36'-9"	"
S528	1990	2'-3"	"
S529	20	40'-10"	longi., Curb
S530	88	40'-0"	longi., bottom
S700	12	34'-0"	longi., bottom
S701	22	44'-0"	" "
S920	6	17'-0"	longi., top
S921	12	26'-0"	" "
S922	32	60'-0"	" "
S923	32	32'-0"	" "
S924	18	38'-0"	longi. top
S925	6	18'-0"	" "
S926	12	30'-0"	" "
S927	20	27'-0"	" "
S928	20	55'-0"	" "

MARK	NO.	LENGTH	LOCATION
			END DIAPHRAGM
S540	8	32'-10"	Horiz, Ab. #1
S544	8	33'-8"	Horiz., Ab. #2
			END POSTS
EP401	24	1'-10"	End post dowels
EP405	16	1'-5"	End post
EP508	16	4'-0"	"

BENT BARS

MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION
				PIER SHAFT										
P300	17	18'-8"	H	0'-4"	3'-0"	6'-0"	3'-0"	6'-0"		0'-4"				Horiz. Shaft
P301	21	16'-0"	X	0'-4"	(2x) 0'-8"	(4x) 1'-8"	(2x) 3'-8"			0'-4"	1'-2"			" "
P302	21	4'-0"	LX	0'-6"	3'-0"					0'-6"				" "
P303	10	16'-4"	SX	0'-8"	6'-0"	3'-0"	6'-0"			0'-8"				" "
P602	8	9'-0"	JX		8'-4"					0'-8"				Vertical, Shaft
P801	38	6'-7"	L	1'-4"	5'-3'									Dowel
P803	20	26'-6"	V				16'-6"	10'-0"			4'-6"			Vertical, Shaft
				INTEGRAL PIER CAP										
P450	5	33'-3"	SL	—	1'-0"	31'-3"	1'-0"			—				Longitudinal
P550	6	33'-3"	SL	—	1'-0"	31'-3"	1'-0"			—				Lonigitudinal
P551	84	12'-4"	S	0'-5"	4'-5"	2'-8"	4'-5"			0'-5"				Vertical
P711	8	8'-0"	U		3'-0"	2'-0"	3'-0"							At pier cap openings
				BOTTOM SLAB										
S450	194	13'-0"	L	1'-0"	12'-0"									Transverse
S451	194	17'-0"	L	1'-0"	16'-0									"
S452	194	22'-6"	L	1'-0"	21'-6"									"
S453	194	18'-6"	L	1'-0"	17'-6"									"
S543	70	8'-9"	SB	2'-0"	0'-8"	1'-8"	0'-11"	3'-6"						End of Slab
				GIRDER WEB										
S454	224	10'-4"	SL	0'-5"	4'-6½"	0'-5"	4'-6½"			0'-5"				Vertical
S552	674	10'-4"	SL	0'-5"	4'-6½"	0'-5"	4'-6½"			0'-5"				"
S555	24	8'-0"	U	3'-6"	1'-0"	3'-6"								At girder openings
				TOP SLAB										
S301	68	1'-6"	L	0'-9"	0'-9"									End of Slab
S542	70	9'-8"	SB	1'-9"	1'-2"	1'-8"	1'-6"	3'-8"						" " "
S551	398	5'-2"	S	1'-0"	1'-2"	1'-0"	1'-6"			0'-6"				Curbs
S650	95	37'-8"	B		4'-6"	(8x) 0'-7"	(4x) 3'-6"	(3x) 3'-4"	4'-6"		0'-5"	36'-4"		Transverse
S651	95	38'-1'	B		4'-7"	(8x) 0'-7"	(4x) 3'-6"	(3x) 3'-5"	4'-7"		0'-5"	36'-9"		"
				END DIAPHRAGM										
S541	68	11'-0"	H	0'-6"	1'-8"	3'-4"	1'-8"	3'-4"		0'-6"				Vertical
				END POSTS										
EP402	16	4'-9"	S	—	2'-1"	0'-7"	2'-1"			—				Endpost
EP403	16	4'-9"	H	0'-4"	1'-0"	1'-0"	1'-0"	1'-0"		0'-4"				"
EP404	16	3'-1"	S	—	1'-3"	0'-7"	1'-3"			—				"
EP408	12	4'-3"	S	—	1'-10"	0'-7"	1'-10"			—				"
EP409	8	4'-2"	S	—	1'-10"	0'-6"	1'-10"			—				"
EP410	4	4'-6"	S	—	1'-10"	0'-10"	1'-10"			—				"
EP501	16	5'-3"	V				3'-0"	2'-3"			0'-4"			"
EP502	12	4'-11"	S	—	1'-11"	0'-7"	1'-11"			0'-6"				"
EP503	8	4'-10"	S	—	1'-11"	0'-6"	1'-11"			0'-6"				"
EP504	4	6'-5"	H	0'-5"	1'-11"	0'-10"	1'-11'	0'-10"		0'-5"				"
MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION

TYPE-BENDING DIAGRAMS



All dimensions are out to out of reinf. bar

Bending details and hooks shall conform to the recommendations of ACI Standard 315-65.

Reinforcing Bar: ASTM A615 Grade 60

GENERAL NOTES

1. First digit(s) following the letter of the Mark indicates size of reinf. bar.
   Mark (A502) bar size - #5
   Mark (P1001) bar size - #10
   Mark (S603) bar size - #6
2. Letter of Marks A, P & S locates bars of Abutments, Piers, and Superstructure parts respectively.

THIS ALT. NOT USED

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

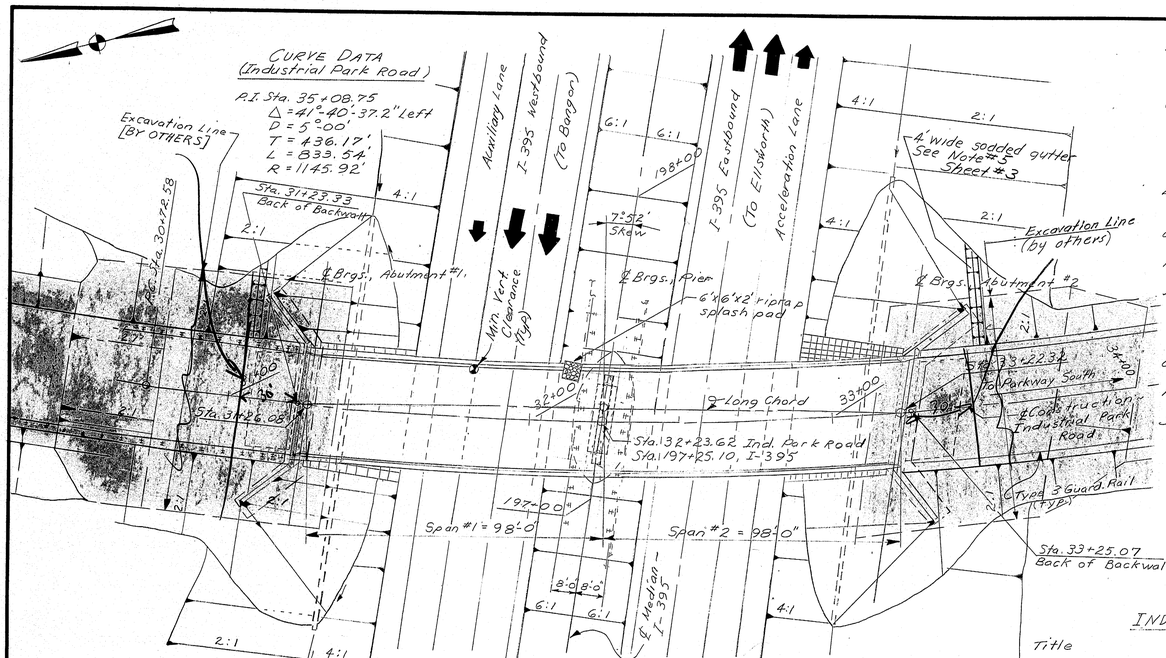
INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
CONCRETE ALTERNATE
Reinforcing Steel Schedule

SHEET 16 OF 16 AUGUSTA, MAINE

PLANS	BY	DATE
DESIGN - DETAIL	RJM	6/83
CHECKED	RVD	
REVISIONS		
FIELD CHANGES		

R88-433

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)176	20	66



SPECIFICATIONS

DESIGN..... Load Factor Design per AASHTO Standard Specifications for Highway Bridges 1977 and Interim specifications thru 1982.

CONTRACT.... State of Maine Department of Transportation, Standard Specifications, Highways and Bridges, Revision of June 1981.

DESIGN LOADING

LIVE LOAD....HS 25....Stress Cycles 500,000

MATERIALS

CONCRETE..... Class "A"

REINFORCING STEEL...ASTM A615 Grade 60

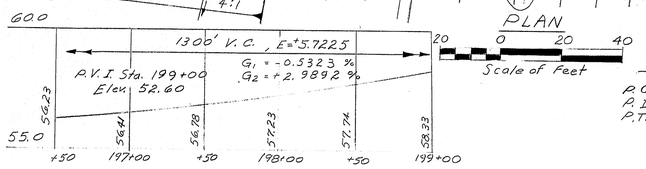
STRUCTURAL STEEL.....ASTM A36
ASTM A572
High Strength Bolts ASTM A325, Type 1

BASIC DESIGN STRESSES

CONCRETE..... $f'c$ = 3,000 psi.

REINFORCING STEEL....Fy = 60,000 psi.

STRUCTURAL STEEL....ASTM A572...Fy = 50,000 psi.
ASTM A36...Fy = 36,000 psi.
ASTM A325...Fv = 25,000 psi.



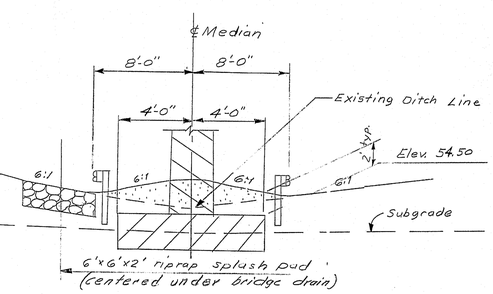
PROFILE (Mainline I-395)

CURVE DATA (I-395)

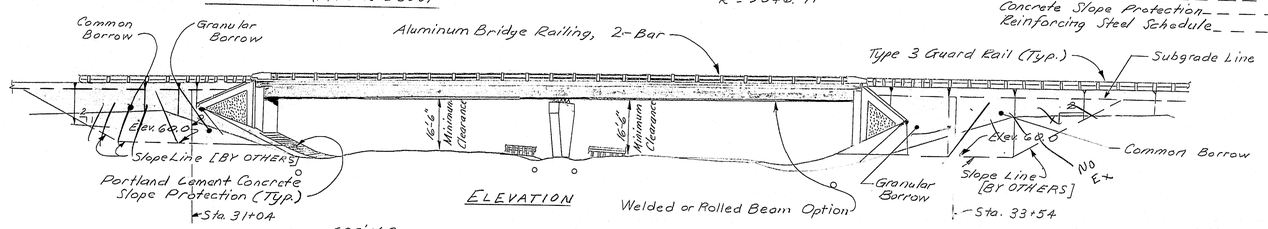
P.C. Sta. 186+85.49
P.I. Sta. 206+09.49
P.T. Sta. 224+76.98
Δ = 24°-00'-45.97" Right
D = 0°-38'-00"
T = 192.51.99'
L = 3791.49'
R = 9046.71'

INDEX TO BRIDGE PLANS
STEEL ALTERNATE

Title	Sheet No.
General Plan	1
Abutment Footings and Pile Layout	2
Abutment #1	3
Abutment #2	4
Pier	5
Structural Steel (Rolled Beam Option)	6
Structural Steel (Welded Beam Option	7
Bottom of Slab Elevations (Welded Beam Option)	8
Superstructure	9
Concrete Slope Protection	10
Reinforcing Steel Schedule	11 & 12



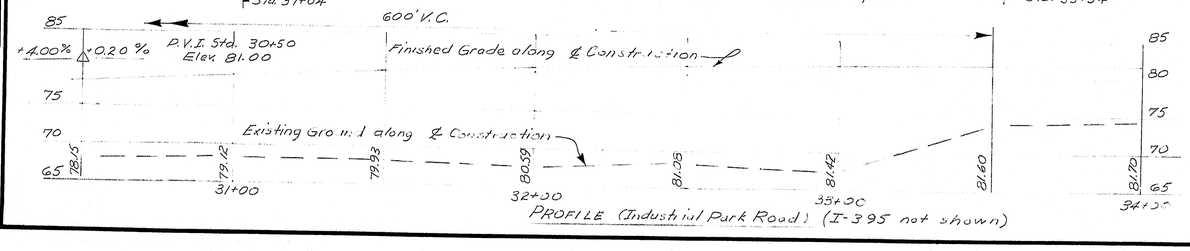
MOUNDED MEDIAN
(40' Median)



ELEVATION

STANDARD SHEETS

BD	100-81	Bearing Pedestals
BD	101-81	Bearing Pedestals
BD	103-81	Beam Splices
BD	113-81	Diaphragms and Crossframes
BD	114-81	Aluminum Bridge Railing
BD	120-81	Concrete End Post
BD	125-82	Expansion Device
BD	126-81	Bridge Drain; Shear Connectors; Curb Section; Approach Slab
BD	127-81	Substructure Details



PROFILE (Industrial Park Road) (I-395 not shown)

As Built 1984 emy

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE CITY OF
BREWER
STEEL ALTERNATE
General Plan

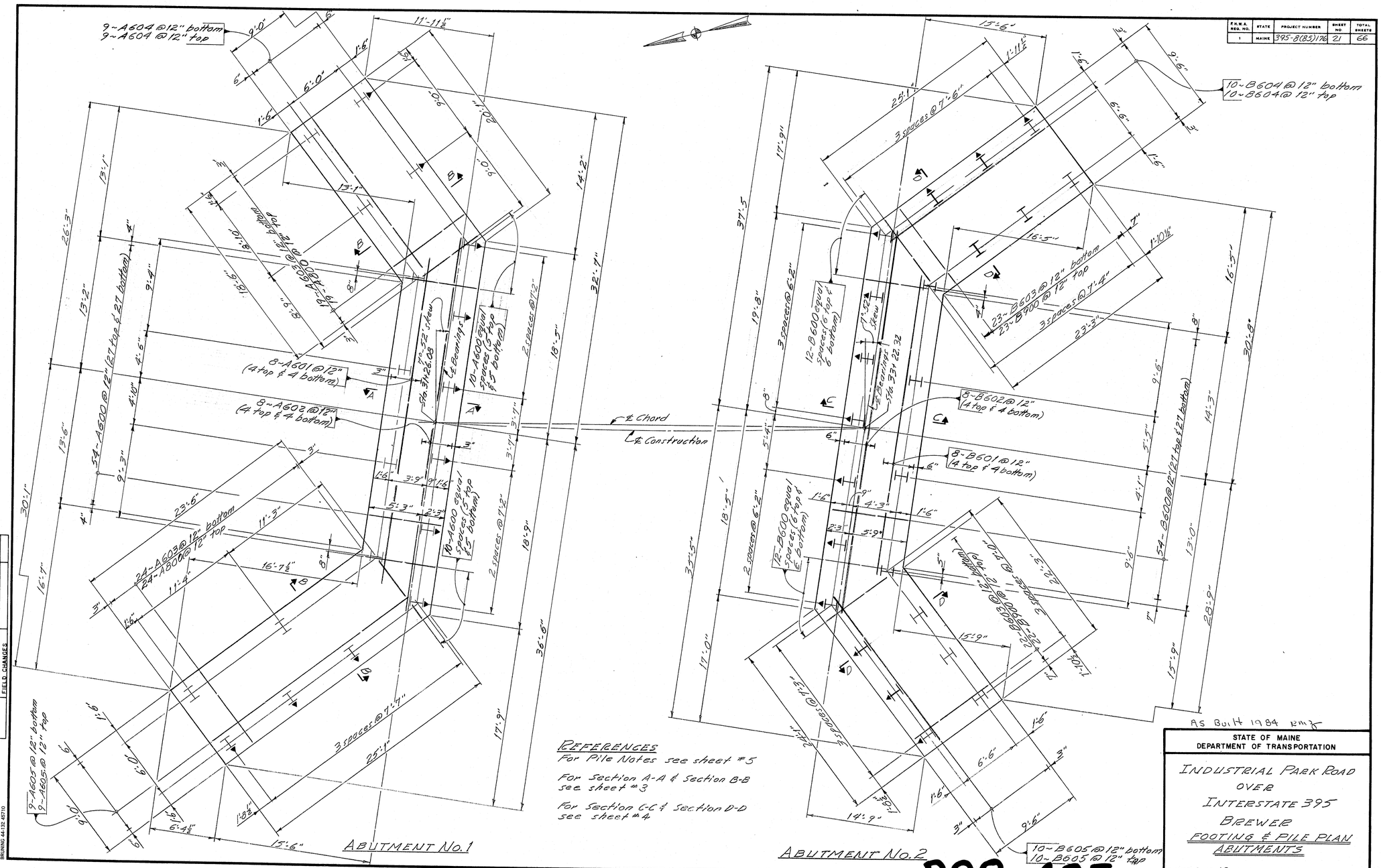
SHEET 1 OF 12 AUGUSTA, MAINE

R88-434

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	RWM / K.O.P.	8/83
CHECKED		
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 4S710-1

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)176	21	66



ABUTMENT No. 1

ABUTMENT No. 2

REFERENCES

For Pile Notes see sheet #5

For Section A-A & Section B-B see sheet #3

For Section C-C & Section D-D see sheet #4

PROJECT DESIGN ENGINEER		BY		DATE
PLANS	DESIGN - DETAILED	RWM	RTA	9-82
	CHECKED	J.E. Bussard		8/83
	REVISIONS			
	FIELD CHANGES			

BRUNING 44-132 45710

AS Built 1984 RMZ

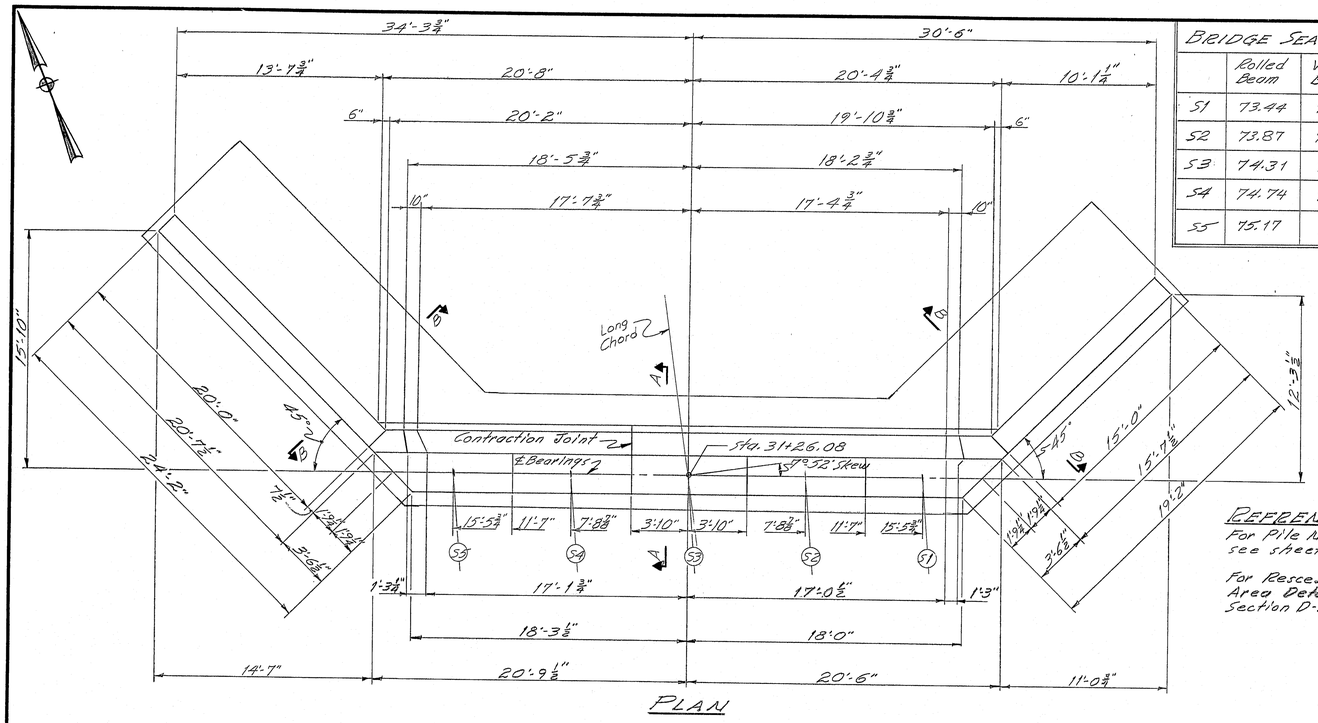
STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
FOOTING & PILE PLAN
ABUTMENTS

SHEET 2 OF 12 AUGUSTA, MAINE

R88-435

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-B(85) 176	22	66

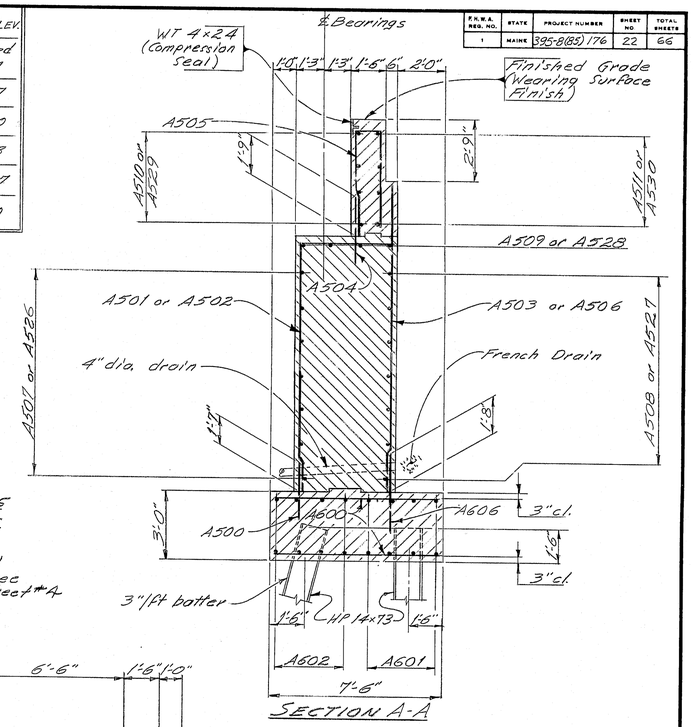


PLAN

BRIDGE SEAT ELEV.	Rolled Beam	Welded Beam
S1	73.44	72.27
S2	73.87	72.70
S3	74.31	73.13
S4	74.74	73.57
S5	75.17	74.0

REFERENCES
For Pile Notes see sheet #5

For Recessed Area Detail see Section D-D sheet #4



SECTION A-A

NOTES

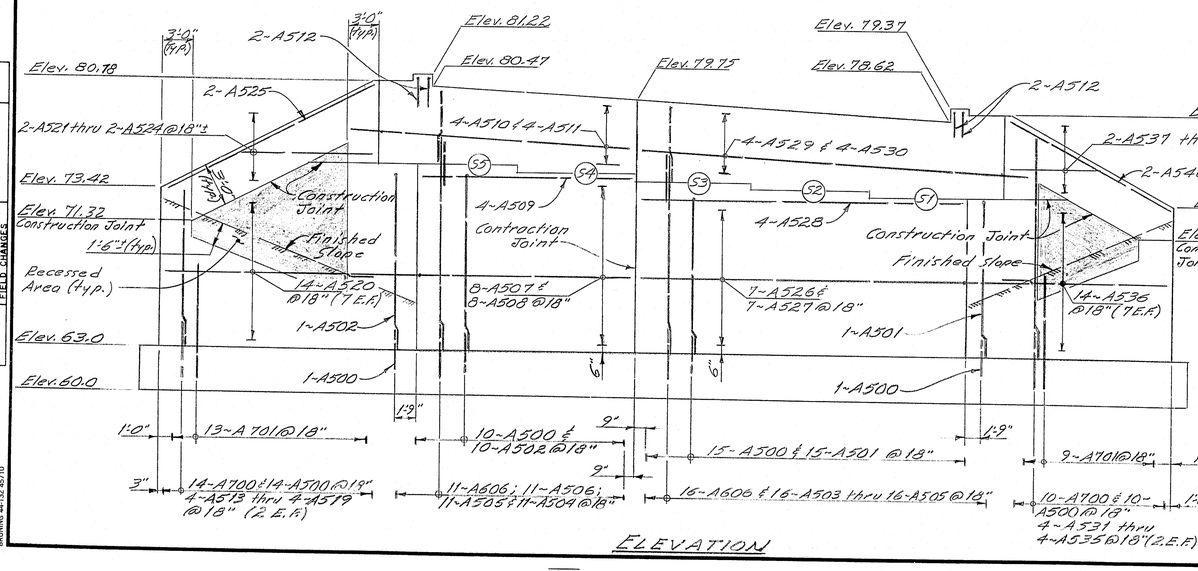
1. Reinforcing steel shall have 2 inches cover unless otherwise indicated.

2. Protective coating for concrete surfaces shall be applied to the following areas:
   - Face & Top of concrete curbs
   - Top of backwall to 1'-0" below finished grade on back.

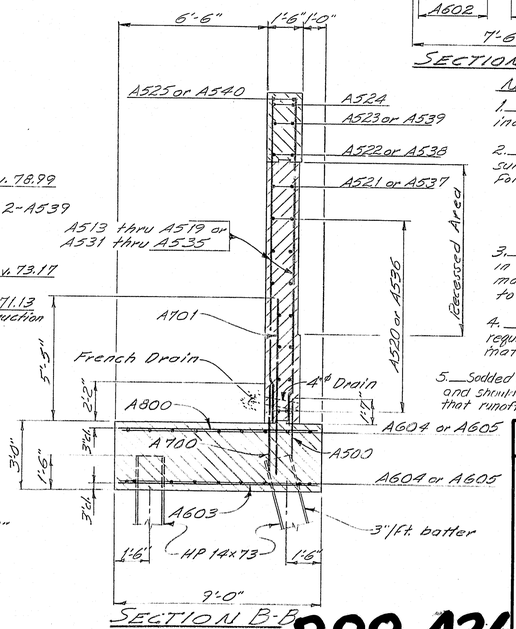
3. Place 4 inch diameter drain in breastwall and wings at 20 feet maximum spacing. Exact location to be determined by the Engineer.

4. Granular borrow shall meet the requirements of subsection 703.19, material for underwater backfill.

5. Sodded gutters shall be constructed after paving and shoulder work is completed, where it is apparent that runoff will cause continual erosion.



ELEVATION



SECTION B-B

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN - DETAILED	RJM	8-79
CHECKED		9-82
REVISED	JE Blackwood	6-86
FIELD CHANGES		

BRUNING 44-132 45710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

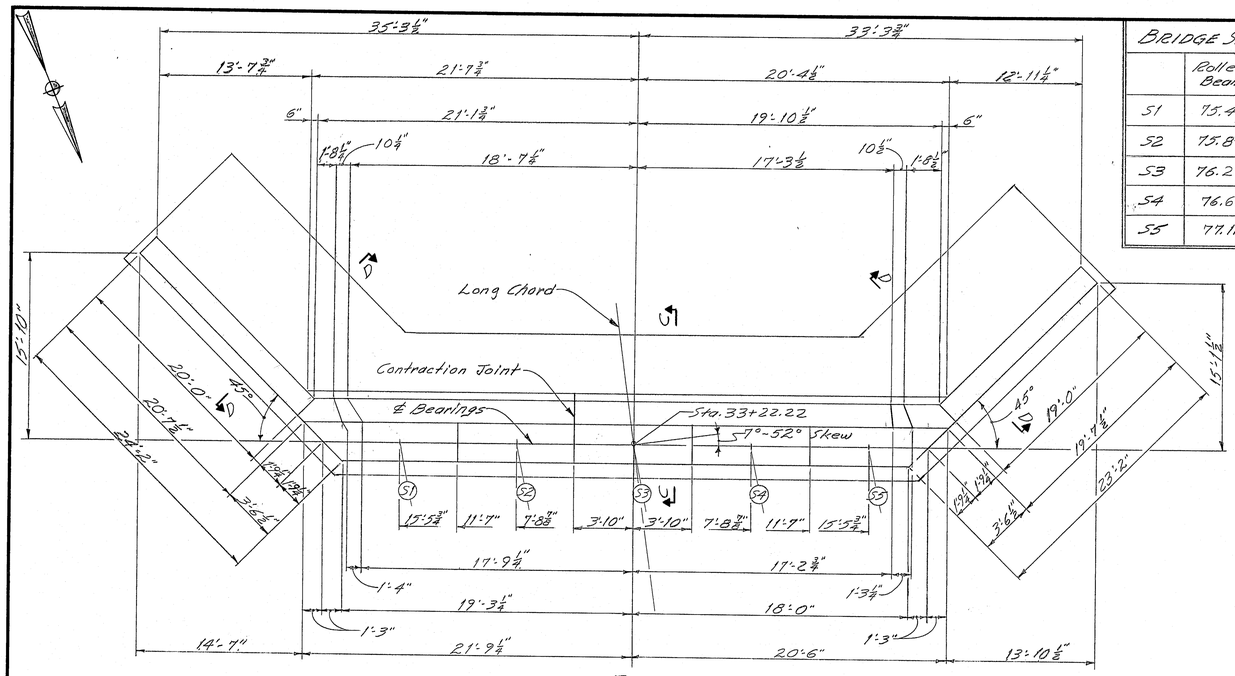
As Built Dwg 1984

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
ABUTMENT No. 1

SHEET 3 OF 12 AUGUSTA, MAINE

R88-436

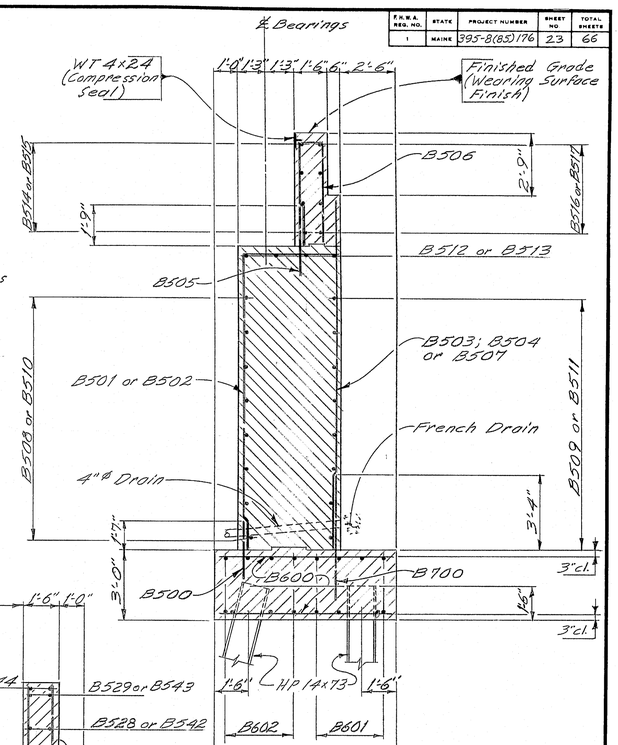
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)176	23	66



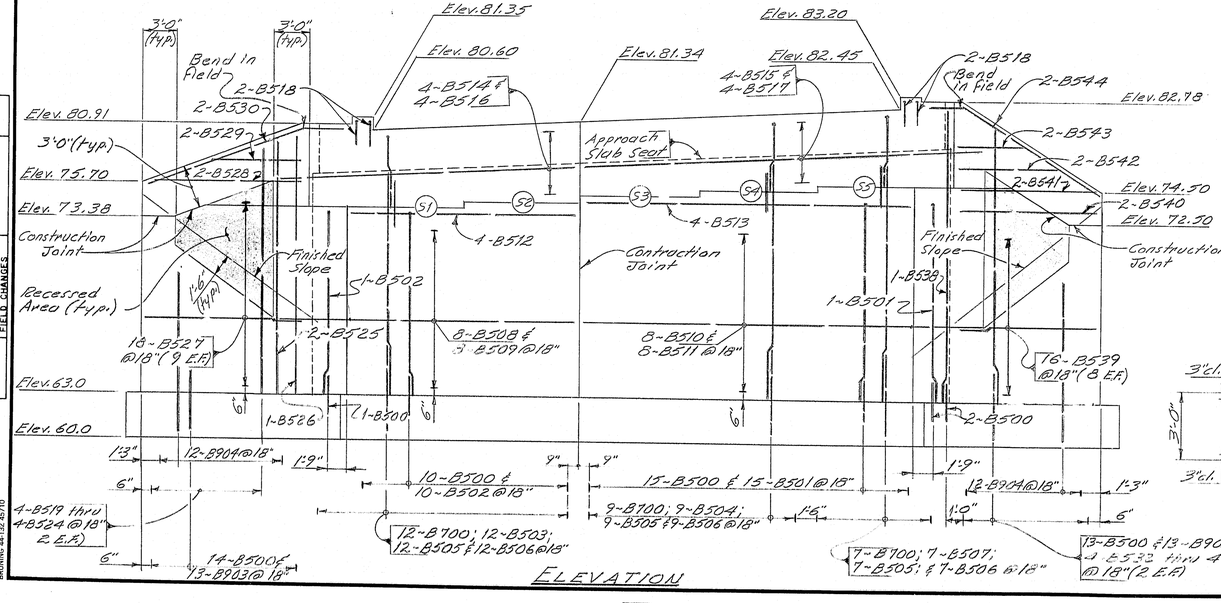
PLAN

BRIDGE SEAT ELEV.	Rolled Beam	Welded Beam
S1	75.42	74.24
S2	75.84	74.67
S3	76.26	75.09
S4	76.69	75.51
S5	77.11	75.93

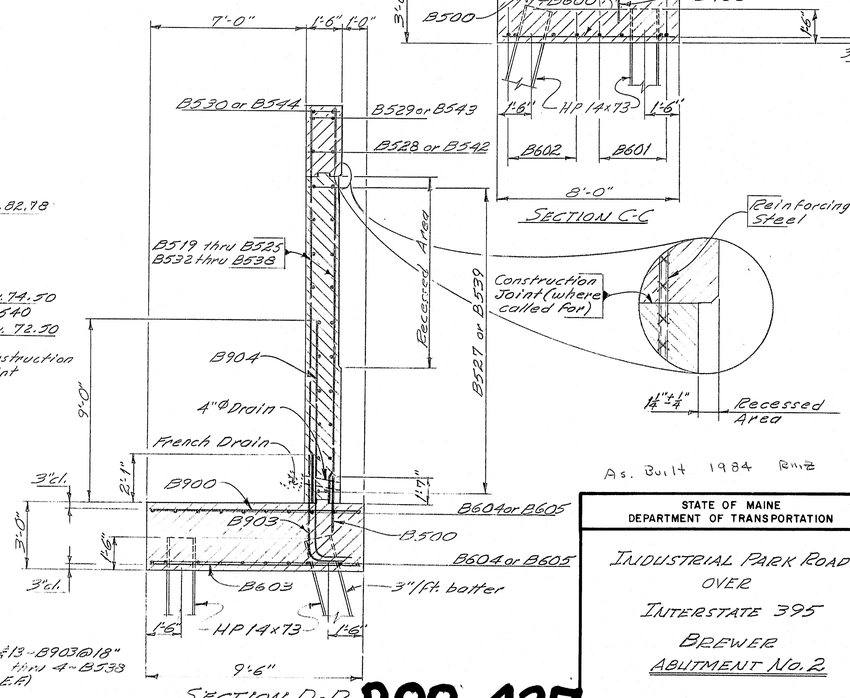
REFERENCES
For Abutment Notes see sheet # 3
For Pile Notes see sheet # 5



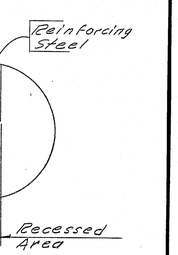
SECTION C-C



ELEVATION



SECTION D-D



As. Built 1984 RMZ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
ABUTMENT No. 2

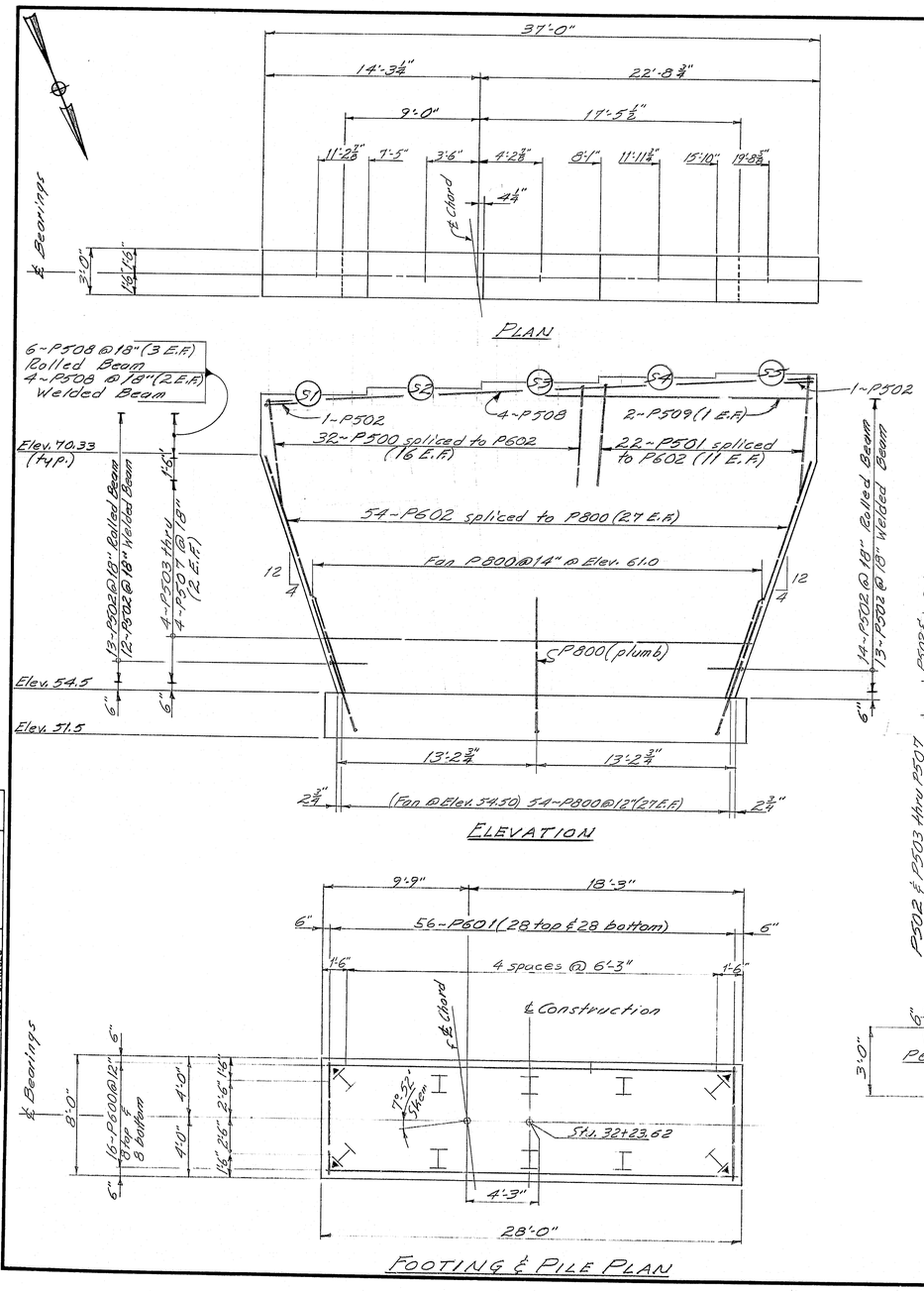
SHEET 4 OF 12 AUGUSTA, MAINE

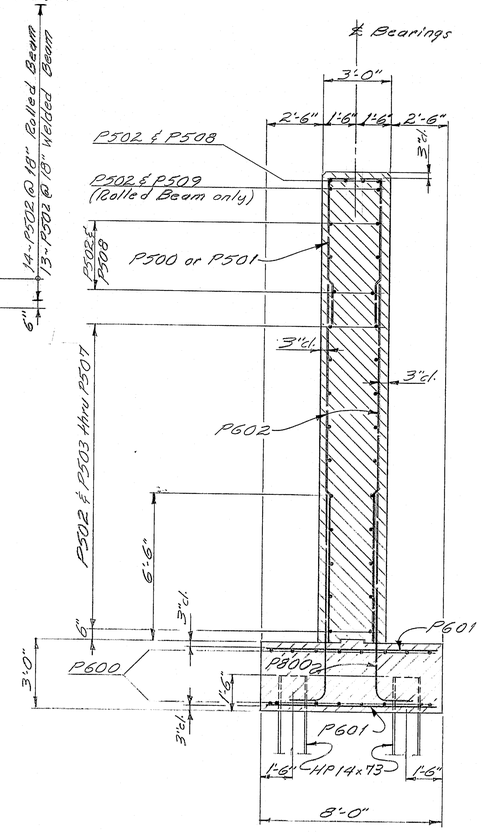
R88-437

PROJECT DESIGN ENGINEER — PLANS
DESIGN-DETAILED — RWM — RTA — 9-82
CHECKED — JE Burton — 8/83
REVISIONS
FIELD CHANGES

BRUNING 44-132 45710

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	395-8(85)176	24	66





BRIDGE SEAT ELEVATIONS		
	Rolled Beam	Welded Beam
S1	74.95	73.72
S2	75.38	74.15
S3	75.80	74.57
S4	76.23	75.00
S5	76.65	75.42

PILE NOTES

1. Piles marked thus ⊢▶ shall be battered 3 inches per foot in the direction of the arrow.
2. Maximum calculated pile loads: 118 tons.
3. Estimate of piles required:
   Abutment No. 1
   21~HP 14 x 73 x 56 feet
   Pier
   10~HP 14 x 89 x 33 feet
   Abutment No. 2
   21~HP 14 x 73 x 49 feet

PIER NOTES

1. Reinforcing steel shall have 2" inches minimum cover unless otherwise indicated.
2. Critical AASHTO Loading-Group III
3. Wind - 100 mph.

As Built 1984 RMZ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
PIER

SHEET 5 OF 12 AUGUSTA, MAINE

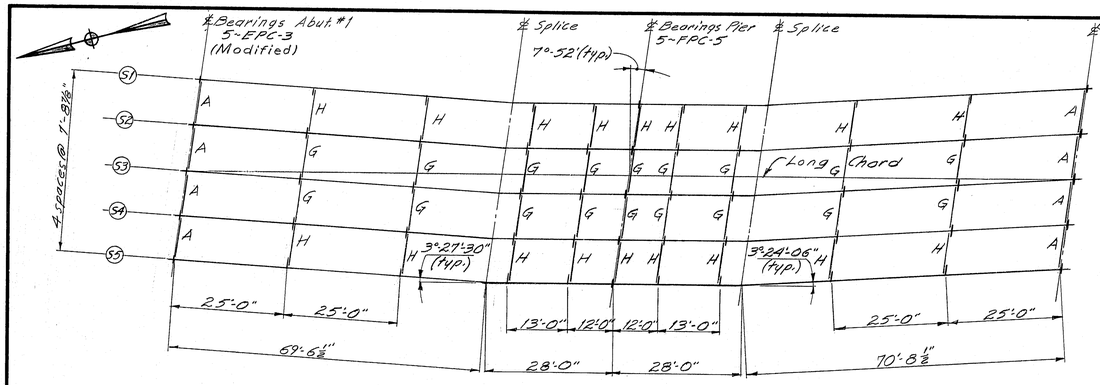
R88-438

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	RWM R.T.H.	8-82
CHECKED	JE Burton	8/83
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 45710

122

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-B(85)176	25	66

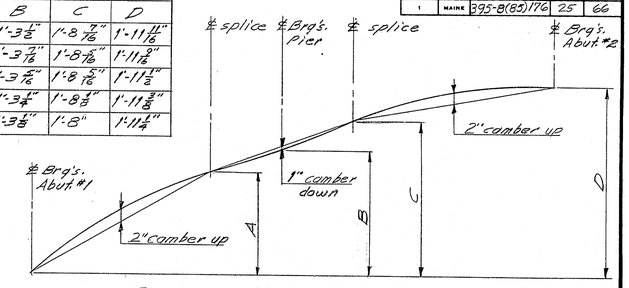


FRAMING PLAN

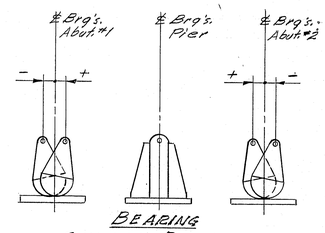
CAMBER TABLE	A	B	C	D
S1	1'-1 1/2"	1'-3 1/2"	1'-8 7/16"	1'-11 11/16"
S2	1'-1 7/16"	1'-3 7/16"	1'-8 5/16"	1'-11 9/16"
S3	1'-1 3/8"	1'-3 5/16"	1'-8 1/16"	1'-11 1/2"
S4	1'-1 5/16"	1'-3 1/4"	1'-8 1/8"	1'-11 3/8"
S5	1'-1 1/4"	1'-3 1/8"	1'-8"	1'-11 1/4"

MODIFIED EPC-3			
C	D	H	J
10"	1'-10"	3 1/2"	3 1/2"

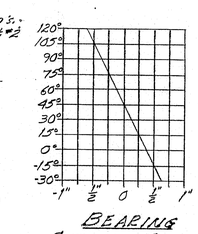
Note: Anchor bolts shall be 1 1/4" Ø with 12" embedment (20 req'd.)



CAMBER DIAGRAM

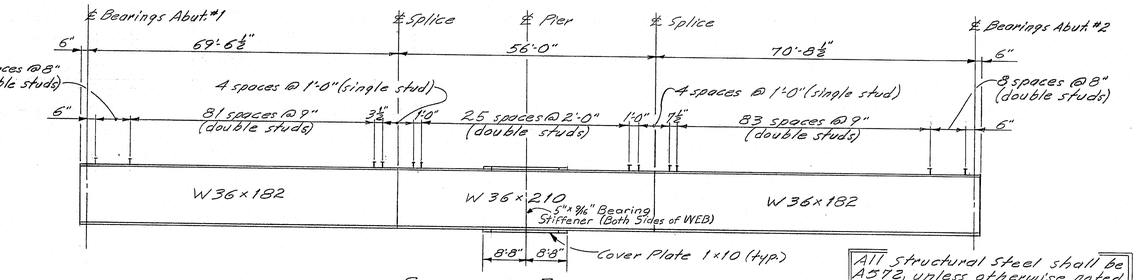


BEARING SETTING DETAILS



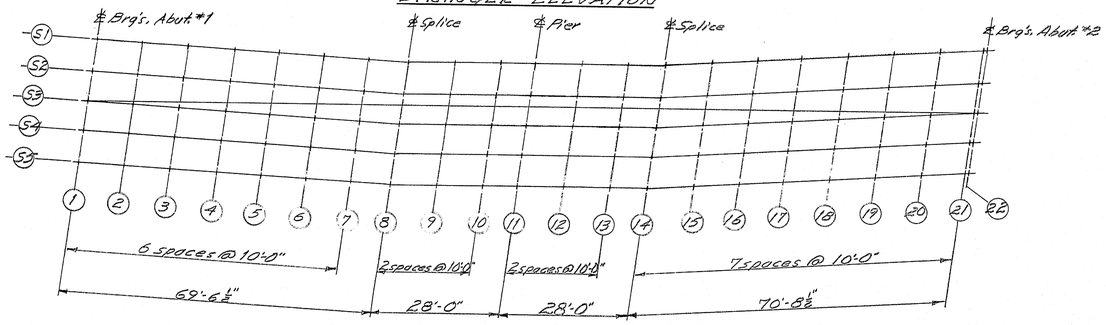
BEARING SETTING CHART

NOTE:
The Bearing Setting Chart indicates the final position of the bearing. It is anticipated that the bearings will move 1/4" during the placement of the superstructure concrete. No separate payment will be made for resetting bearings to the final position if an adjustment is required.



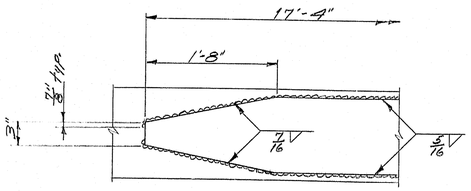
STRINGER ELEVATION

All structural steel shall be A572, unless otherwise noted



BLOCKING POINT DIAGRAM

BOTTOM OF SLAB ELEVATIONS																							
Points	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
S1	77.76	77.99	78.20	78.39	78.55	78.68	78.78	78.87	78.92	78.98	79.05	79.17	79.32	79.44	79.56	79.66	79.73	79.77	79.79	79.77	79.74	79.74
S2	78.19	78.42	78.63	78.82	78.98	79.11	79.21	79.29	79.34	79.41	79.48	79.60	79.74	79.87	79.98	80.08	80.15	80.20	80.21	80.19	80.16	80.16
S3	78.63	78.85	79.06	79.25	79.41	79.54	79.64	79.72	79.77	79.83	79.90	80.02	80.17	80.29	80.41	80.51	80.58	80.62	80.63	80.62	80.59	80.58
S4	79.06	79.28	79.49	79.68	79.84	79.96	80.07	80.15	80.20	80.26	80.33	80.45	80.59	80.71	80.83	80.93	81.00	81.04	81.05	81.04	81.01	81.01
S5	79.49	79.72	79.93	80.11	80.27	80.39	80.49	80.58	80.62	80.68	80.75	80.87	81.02	81.14	81.25	81.35	81.42	81.46	81.48	81.46	81.43	81.43



COVER PLATE DETAIL

NOTES

1. Camber ordinates, as shown, are computed to compensate for dead load deflections and for the curvature of the finished grade profile.

2. Bearing stiffeners shall be plumb after erection and dead loading of the structure.

3. Cross-frame or diaphragm connection plates may be either plumb or normal to the top flange.

4. Filler plates may be ASTM A36 steel and mill tests for filler plate material will not be required.

5. The theoretical blocking of the 2 bearings Abut's. and Pier shall be 2 inches (not to be used for formwork).

ULTIMATE STRENGTH
Structural Steel:
ASTM A572 F_y = 50,000 psi
ASTM A36 F_y = 36,000 psi
ASTM A325 F_v = 25,000 psi

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	J.C. Burns	10-82
CHECKED	R.T.H.	
REVISIONS	G.D.	
FIELD CHANGES		

BRUNING 44-132 45710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

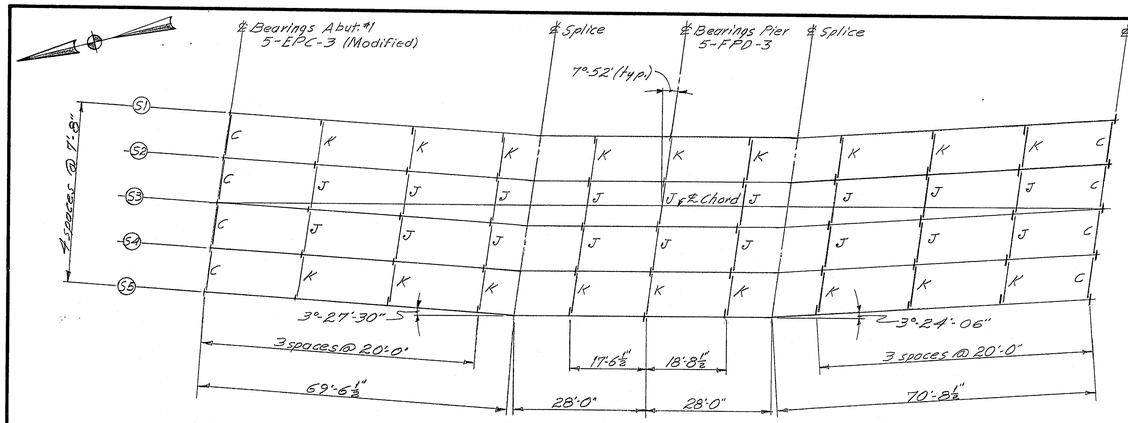
As Built 1984 Rnt 2

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
STRUCTURAL STEEL
(Rolled Beam)

SHEET 6 OF 12 AUGUSTA, MAINE

R88-439

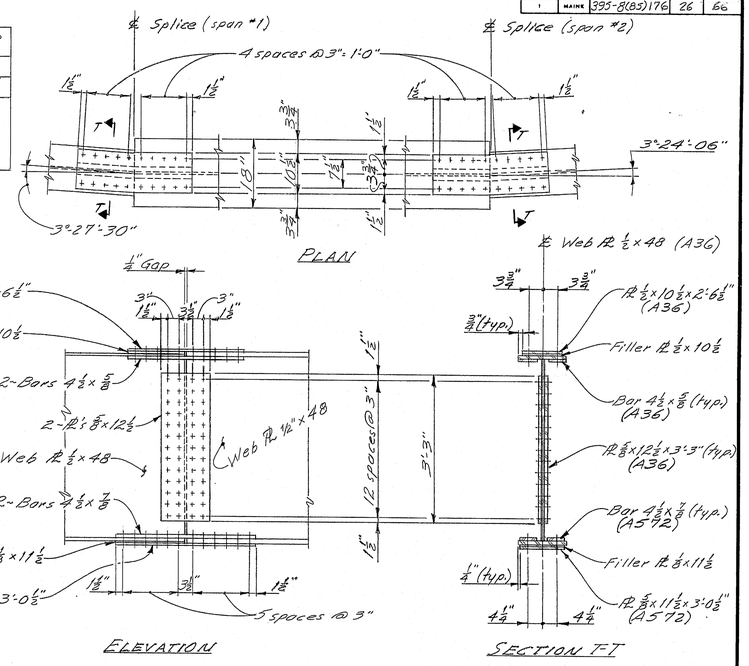
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	395-8(83)176	26	66



FRAMING PLAN

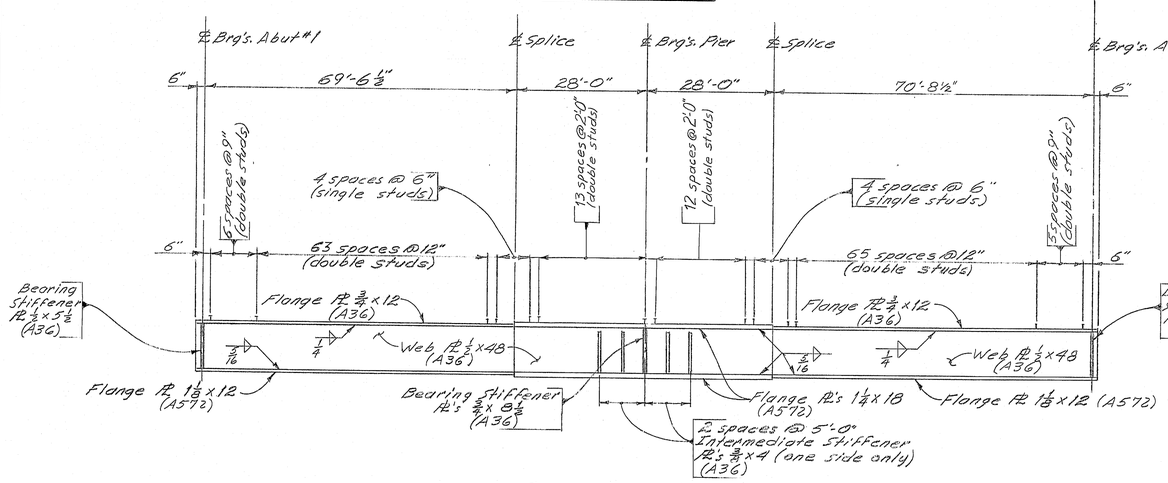
MODIFIED EPC-3			
C	D	H	J
10"	1'-10"	3⅝"	3⅝"

Note: Anchor bolts shall be 1¼" ø with 12" embedment (20 req'd)



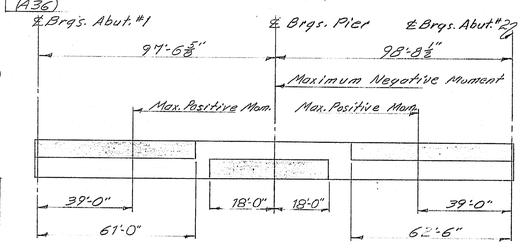
SPLICE DETAIL

Splice connections shall be made with ¾" ø ASTM A325 high tensile strength bolts. Holes shall be 13/16" ø. Splice plates shall be ASTM A572



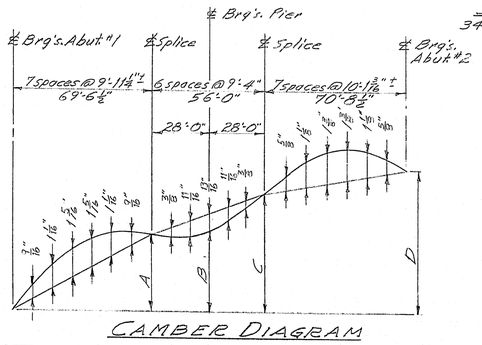
STRINGER ELEVATION

346 studs per stringer (1,730 studs total)



BEAM STRESS DIAGRAM

NOTE: Shaded areas are always in compression, other areas are in tension or have stress reversal.



CAMBER DIAGRAM

CAMBER TABLE	A	B	C	D
S1	1'-0⅞"	1'-3½"	1'-7⅜"	1'-11 11/16"
S2	1'-0 13/16"	1'-3 7/16"	1'-7⅝"	1'-11⅝"
S3	1'-0¾"	1'-3 5/16"	1'-7½"	1'-11⅜"
S4	1'-0 11/16"	1'-3¼"	1'-7 7/16"	1'-11⅜"
S5	1'-0⅝"	1'-3⅛"	1'-7 5/16"	1'-11¼"

	+	Fixed	+
Temp. F.	Abut #1	Pier	Abut #2
0	-⅜"		-⅜"
15	-¼"		-¼"
30	-⅛"		-⅛"
45	0	Fixed	0
60	⅛"		⅛"
75	¼"		¼"
90	⅜"		⅜"

BEARING SETTING CHART

NOTE

The Bearing Setting Chart indicates the final position of the bearing. It is anticipated that the bearings at the abutments will move 7/16 inch away from the fixed bearings due to the placement of the superstructure concrete. No separate payment will be made for resetting bearings to the final position if an adjustment is required.

REFERENCES

For Structural Steel Notes see sheet #8

For Bottom of Slab Elevations see sheet #8

Used Rolled Beam

~~As Built 12-24-84~~

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN-DETAILED	RWM	11-82
CHECKED	J.E. Barnes	
REVISIONS		
FIELD CHANGES		

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
STRUCTURAL STEEL
(Welded Beam)

R88-440

SHEET 7 OF 12 AUGUSTA, MAINE

BRUNING 44-132 45710

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)176	27	66

STRUCTURAL STEEL NOTES

1. Camber ordinates, as shown, are computed to compensate for all dead load deflections and for the curvature of the finished grade profile.

2. No transverse butt weld splices will be allowed in the flange plates or web plates within 10 feet from the points of maximum negative moment or maximum positive moment.

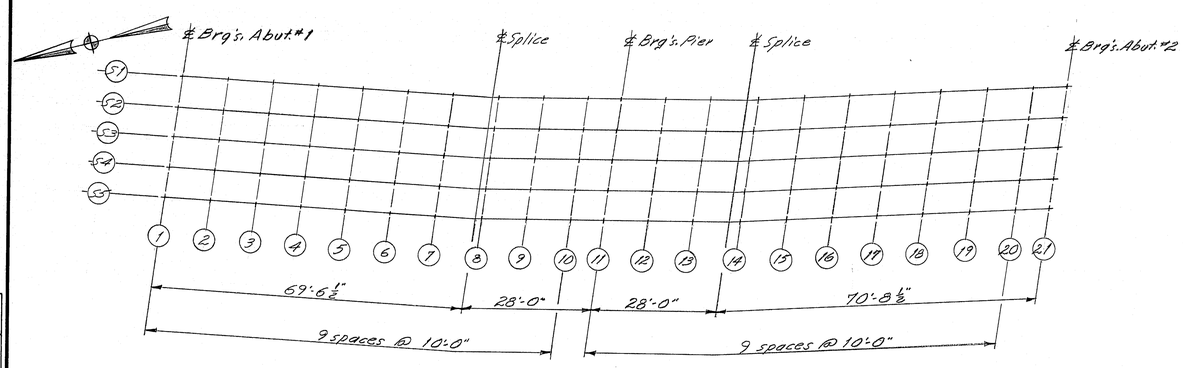
3. Sections of flange plates or web plates between transverse shop splices or between a transverse shop splice and a field splice shall be not less than 20 feet in length unless otherwise shown on the plans.

4. Butt weld splices in flanges shall not be less than one foot from transverse welds in the web plates.

5. Bearing stiffeners shall be plumb after erection and dead loading of the structure. Intermediate web stiffeners may be either plumb or normal to the top flange.

6. Cross-frame or diaphragm connection plates may be either plumb or normal to the top flange.

7. Filler plates may be ASTM A588 (A36) steel and mill tests for filler plate material will not be required.



BLOCKING POINT DIAGRAM

BOTTOM OF SLAB ELEVATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
S1	77.76	77.96	78.15	78.31	78.48	78.61	78.73	78.83	78.91	78.98	79.05	79.17	79.30	79.42	79.52	79.60	79.65	79.71	79.73	79.74	79.74
S2	78.19	78.39	78.58	78.75	78.89	79.04	79.15	79.26	79.33	79.40	79.47	79.59	79.72	79.84	79.94	80.02	80.07	80.13	80.15	80.16	80.16
S3	78.62	78.82	79.01	79.18	79.32	79.47	79.58	79.69	79.75	79.83	79.90	80.01	80.14	80.27	80.36	80.43	80.51	80.55	80.58	80.59	80.59
S4	79.06	79.25	79.44	79.61	79.76	79.88	80.01	80.11	80.18	80.26	80.32	80.44	80.57	80.69	80.79	80.87	80.93	80.98	81.00	81.01	81.01
S5	79.49	79.69	79.87	80.04	80.19	80.32	80.44	80.54	80.61	80.68	80.75	80.86	80.99	81.12	81.21	81.29	81.34	81.40	81.42	81.43	81.43

ULTIMATE STRENGTH

Structural Steel:

ASTM A572 F_y = 50,000 p.s.i.
ASTM A36 F_y = 36,000 p.s.i.
ASTM A325 F_v = 25,000 p.s.i.

As Built 1984 RMZ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER
BOTTOM OF SLAB ELEVATIONS
(Welded Beam)

SHEET 8 OF 12 AUGUSTA, MAINE

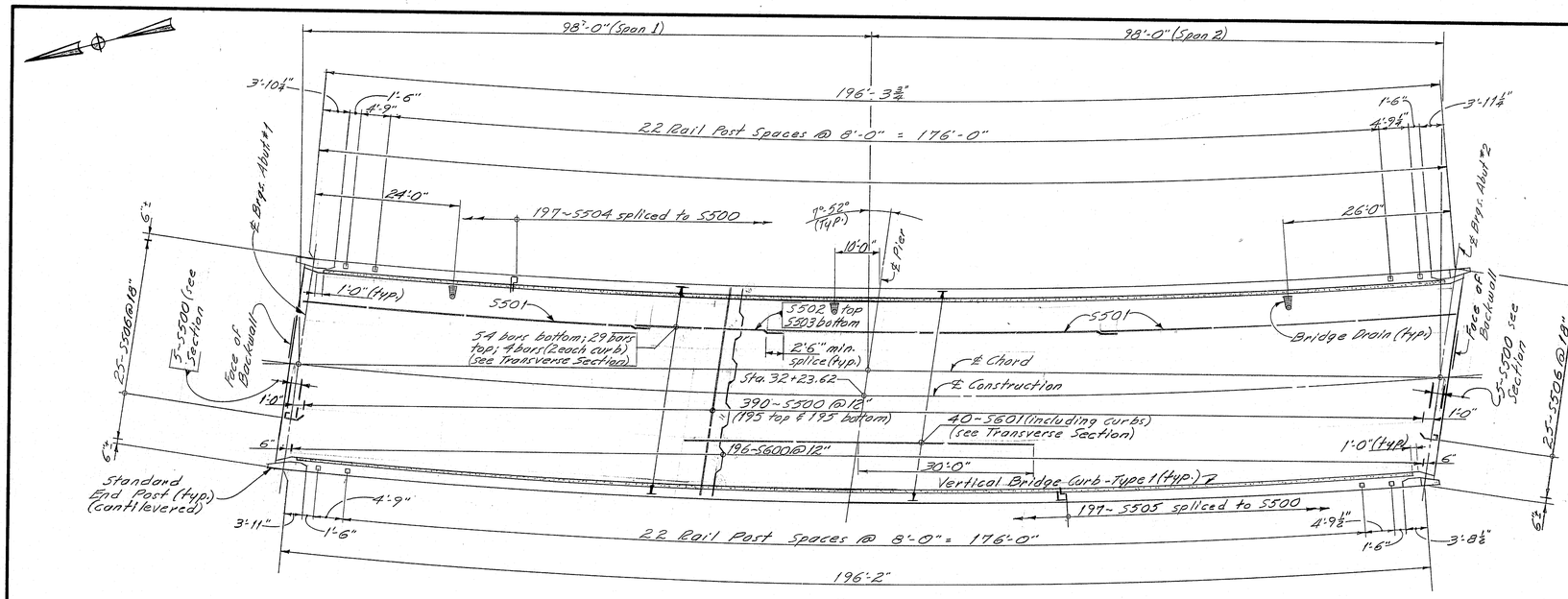
PROJECT DESIGN ENGINEER
PLANS
DESIGN - DETAILED
CHECKED
REVISIONS
FIELD CHANGES
BY RWM RTA
DATE 11-82 8/83

BRUNING 44-132 45710

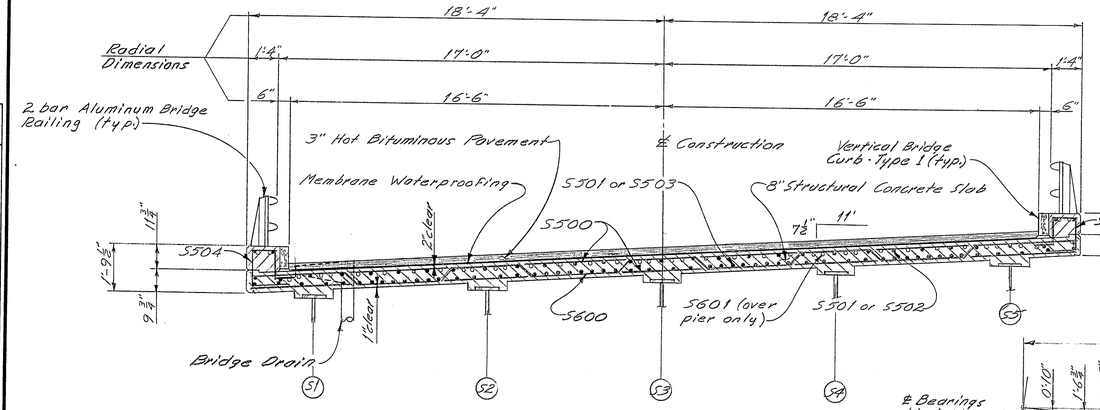
R88-441

125

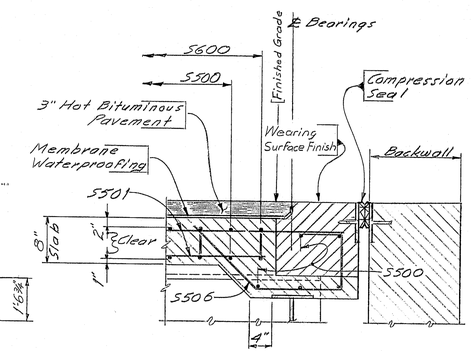
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)176	28	66



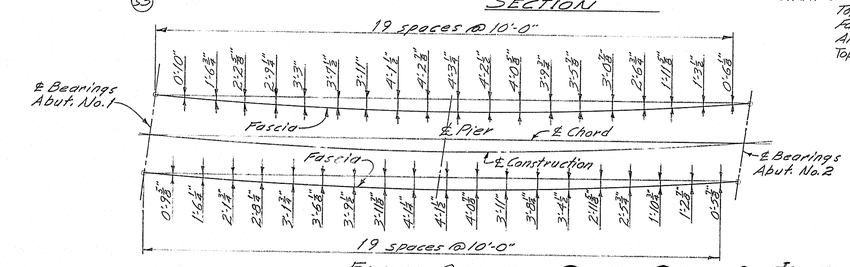
PLAN



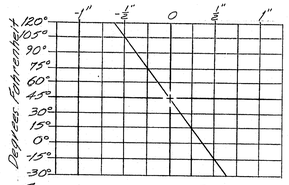
TRANSVERSE SECTION



SECTION



FASCIA OFFSETS



COMPRESSION SEAL ADJUSTMENT CHART

NOTES:

1. The seals to be furnished shall have a minimum Movement Rating of 1¼ inches at each abutment.

2. The seal shall be approved by the Engineer prior to fabrication of the joint armor.

3. The joint opening will vary depending on the dimensions of the seal selected by the Contractor. The joint opening shall be set according to the opening shown on the approved shop detail drawings.

4. It is anticipated that the slab and backwall concrete will be in place before the final adjustment to the joints is made and no allowance for movement due to dead load deflections is needed.

5. The Compression Seal adjustment chart shows the adjustment necessary to adjust the joint opening shown on the shop detail drawings for temperatures other than 45°F. Adjustment is to be measured parallel to the centerline of construction.

SUPERSTRUCTURE NOTES

1. Form a 1" V-groove on the fascias at the horizontal joint between the curb and the slab

2. Reinforcing steel shall have a minimum cover of 2" unless otherwise indicated.

3. Adjust reinforcing steel to fit around drains in a manner approved by the Engineer. Do not cut transverse reinforcing bars.

4. The superstructure slab concrete shall be placed in one continuous operation and the concrete shall be kept plastic one complete span behind the span being placed.

5. Mortar for bedding and for joints in the granite curb shall contain an approved non-shrink additive.

6. Protective coating for concrete surfaces shall be applied to the following areas:
Top of concrete curbs.
Fascia down to drip notch.
All exposed surfaces of concrete end posts.
Top and back of backwall to within 1'-0" of finished grade.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
As Built 1984 RMZ OVER
INTERSTATE 395
BREWER
SUPERSTRUCTURE

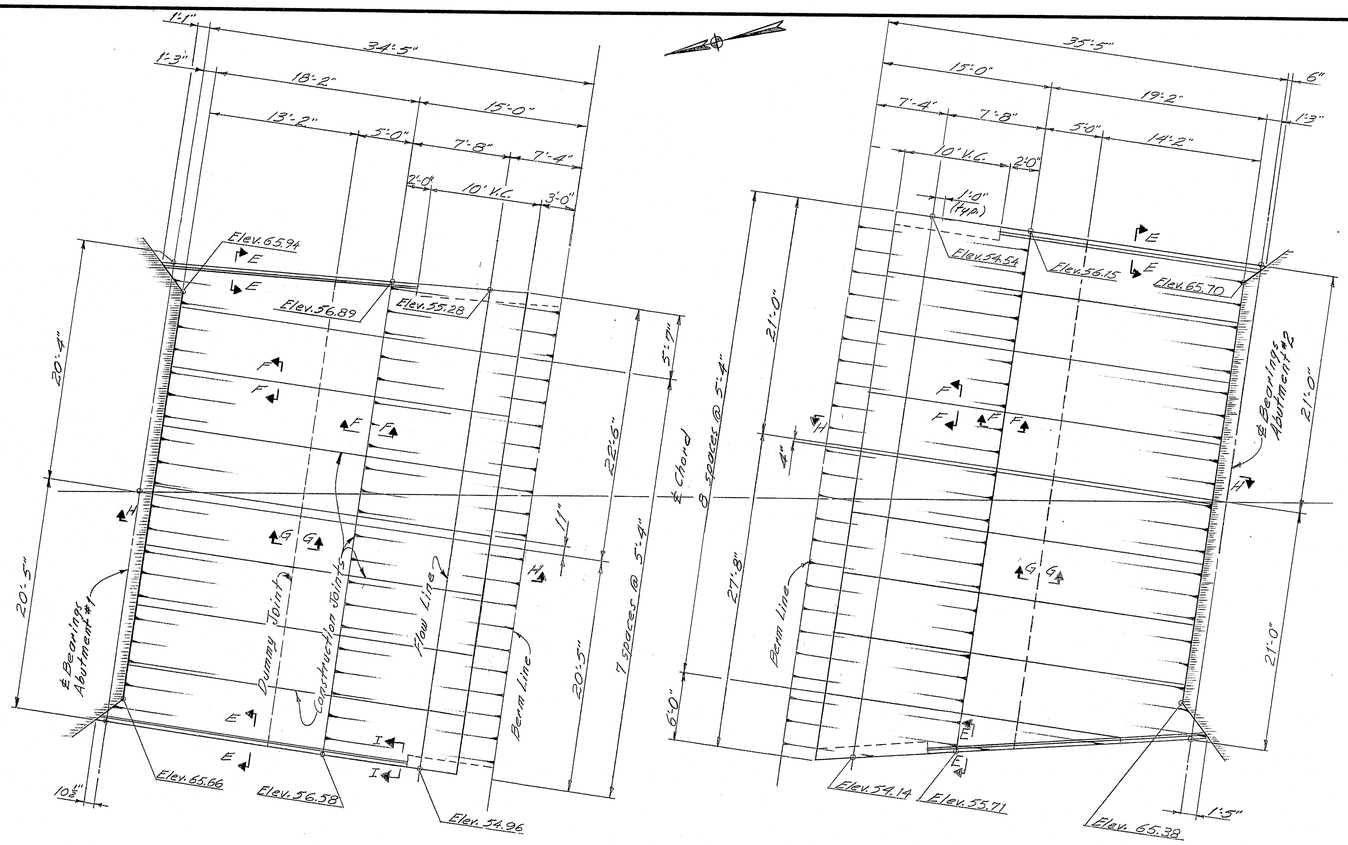
SHEET 9 OF 12 AUGUSTA, MAINE

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED	RWM / R.T.A.	8-82
CHECKED	J.E. Burton	8/83
REVISIONS		
FIELD CHANGES		

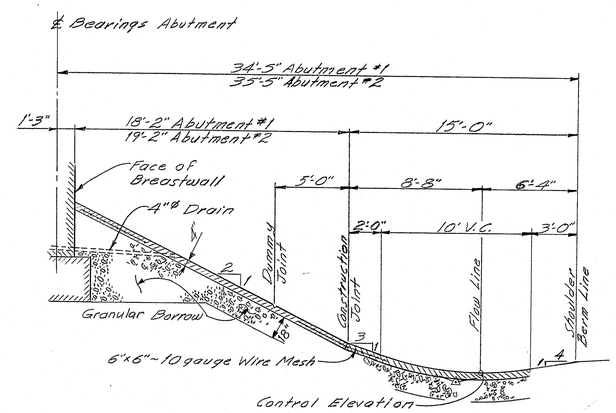
BRUNING 44-132 45710

R88-442

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	395-B(83)176	29	66



PLAN



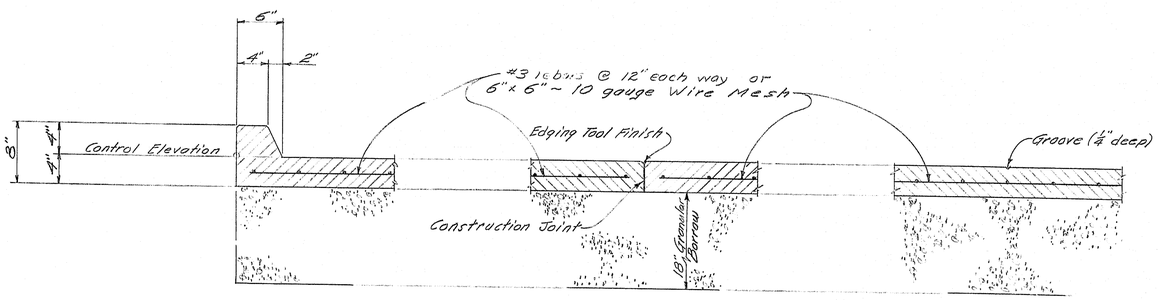
SECTION H-H

NOTES:

1. The Steel Mesh shall not pass through any construction joints.

2. At all construction joints, break bond between sections by a method approved by the Engineer.

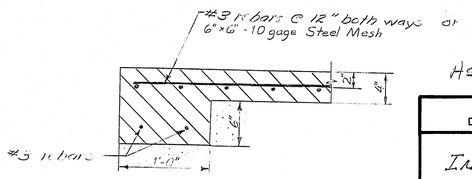
3. Do not excavate for granular borrow where the existing material is found suitable in the opinion of the Engineer.



SECTION E-E

SECTION F-F
Typical at all Construction Joints

SECTION G-G



SECTION I-I

As Built 1984 BMZ

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN-DETAILED	RWA / RTG	12-82
CHECKED — REVISIONS	J.E. Barrow	8/83
FIELD CHANGES		

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER

CONCRETE SLOPE PROTECTION

SHEET 10 OF 12 AUGUSTA, MAINE

R88-443

BRUNING 44-32 4570

REINFORCING STEEL SCHEDULE

FHWA REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)176	30	66

STRAIGHT BARS

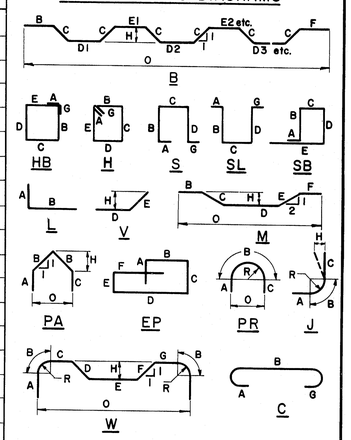
MARK	NO.	LENGTH	LOCATION	MARK	NO.	LENGTH	LOCATION	MARK	NO.	LENGTH	LOCATION
ABUTMENT No. 1				ABUTMENT No. 2							
A500	51	2'-10	Dowel	B500	55	2'-10"	Dowel				
A503	16	12'-6"	Breastwall	B503	12	14'-6"	Breastwall				
A504	27	3'-0"	Dowel	B504	9	15'-3"	Breastwall				
A506	11	13'-9"	Breastwall	B505	28	3'-0"	Dowel				
A509	4	18'-0"	Bridge Seat	B507	7	16'-0	Breastwall				
A513	4	10'-3"	West Wing	B512	4	15'-3"	Bridge Seat				
A514	4	11'-3"	West Wing	B513		21'-8"	Bridge Seat				
A515	4	12'-6"	West Wing	B519		12'-2"	East Wing				
A516	4	13'-6"	West Wing	B520		13'-0"					
A517	4	14'-6"	West Wing	B521		13'-8"					
A518	4	15'-6"	West Wing	B522		14'-8"					
A519	4	16'-8"	West Wing	B523		15'-8"					
A520	14	19'-6"	West Wing	B524	4	16'-6"					
A521	2	18'-0"	West Wing	B525	2	17'-4"					
A522	2	13'-9"	West Wing	B526	1	17'-8"					
A523	2	9'-10"	West Wing	B527	18	20'-0"					
A524	2	5'-6"	West Wing	B528	2	14'-0"					
A525	2	21'-0"	West Wing	B529	2	7'-9"					
A528	4	21'-7"	Bridge Seat	B530	2	22'-0"	East Wing				
A531	4	10'-5"	East Wing								
A532	4	11'-6"	East Wing	B532	2	11'-8"	West Wing				
A533	4	12'-8"	East Wing	B533		13'-0"					
A534	4	13'-10"	East Wing	B534		14'-0"					
A535	4	15'-0"	East Wing	B535		15'-4"					
A536	14	15'-0"	East Wing	B536		16'-9"					
A537	2	13'-0"	East Wing	B537	2	17'-8"					
A538	2	9'-3"	East Wing	B538	3	19'-0"					
A539	2	5'-3"	East Wing	B539	16	19'-0"					
A540	2	16'-0"	East Wing	B540	2	17'-0"					
				B541		13'-6"					
				B542		9'-6"					
A600	74	7'-2"	Footing	B543		6'-6"					
A601	8	30'-0"	Footing	B544	2	22'-0"	West Wing				
A602	8	37'-0"	Footing								
A603	43	8'-8"	Footing								
A604	18	20'-0"	Footing	B600	78	7'-8"	Footing				
A605	18	25'-0"	Footing	B601	8	33'-0"					
A606	27	2'-11"	Dowel	B602	8	38'-0"					
				B603	45	9'-2"					
				B604	20	24'-6"					
				B605	20	23'-6"	Footing				
A700	24	4'-0"	Dowel								
A701	22	7'-7"	Dowel	B700	28	5'-1"	Dowel				
A800	43	8'-8"	Footing	B800	45	9'-2"	Footing				

BENT BARS

MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION
ABUTMENT No. 1														
*A501	16	14'-5"	L	4'-2"	10'-3"	—	Rolled Beam				—	—	—	Breastwall
**A501	16	13'-2"	L	4'-2"	9'-0"	—	Welded Beam				—	—	—	Breastwall
*A502	11	15'-9"	L	4'-2"	11'-7"	—	Rolled Beam				—	—	—	Breastwall
**A502	11	14'-5	L	4'-2"	10'-3"	—	Welded Beam				—	—	—	Breastwall
*A505	27	10'-2"	S	O	4'-6"	1'-2"	4'-6"	—	—	O	Rolled Beam			Backwall
**A505	27	12'-6"	S	O	5'-8"	1'-2"	5'-8"	—	—	O	Welded Beam			Backwall
A507	8	20'-2"	V	—	—	—	14'-2"	6'-0"	—	—	4'-3"	—	—	Breastwall
A508	8	18'-7"	V	—	—	—	16'-9"	2'-2"	—	—	1'-6"	—	—	Breastwall
A510	4	19'-3"	V	—	—	—	16'-9"	2'-6"	—	—	1'-9"	—	—	Backwall
A511	4	18'-5"	V	—	—	—	16'-3"	2'-2"	—	—	1'-6"	—	—	Backwall
A512	4	4'-2"	S	O	1'-6"	1'-2"	1'-6"	—	—	O	—	—	—	Curbs
A526	7	27'-6"	V	—	—	—	21'-6"	6'-0"	—	—	4'-3"	—	—	Breastwall
A527	7	26'-2"	V	—	—	—	24'-3"	2'-2"	—	—	1'-6"	—	—	Breastwall
A529	4	26'-6"	V	—	—	—	24'-0"	2'-6"	—	—	1'-9"	—	—	Backwall
A530	4	25'-9"	V	—	—	—	23'-7"	2'-2"	—	—	1'-6"	—	—	Backwall
ABUTMENT No. 2														
*B501	16	17'-3"	L	4'-2"	13'-1"	—	—	Rolled Beam				—	—	Breastwall
**B501	16	16'-1"	L	4'-2"	11'-11"	—	—	Welded Beam				—	—	Breastwall
*B502	11	16'-5"	L	4'-2"	12'-3"	—	—	Rolled Beam				—	—	Breastwall
**B502	11	15'-3"	L	4'-2"	11'-1"	—	—	Welded Beam				—	—	Breastwall
*B506	28	10'-4"	S	O	4'-7"	1'-2"	4'-7"	—	—	O	Rolled Beam			Backwall
**B506	28	12'-8"	S	O	5'-9"	1'-2"	5'-9"	—	—	O	Welded Beam			Backwall
B508	8	20'-8"	V	—	—	—	15'-2"	5'-6"	—	—	3'-11"	—	—	Breastwall
B509	8	19'-2"	V	—	—	—	17'-6"	1'-8"	—	—	1'-2"	—	—	Breastwall
B510	8	27'-0"	V	—	—	—	21'-6"	5'-6"	—	—	3'-11"	—	—	Breastwall
B511	8	25'-8"	V	—	—	—	24'-0"	1'-8"	—	—	1'-2"	—	—	Breastwall
B514	4	20'-4"	V	—	—	—	17'-10"	2'-6"	—	—	1'-9"	—	—	Backwall
B515	4	26'-6"	V	—	—	—	24'-0"	2'-6"	—	—	1'-9"	—	—	Backwall
B516	4	19'-0"	V	—	—	—	17'-0"	2'-0"	—	—	1'-5"	—	—	Backwall
B517	4	25'-5"	V	—	—	—	23'-5"	2'-0"	—	—	1'-5"	—	—	Backwall
B518	4	4'-2"	S	O	1'-6"	1'-2"	1'-6"	—	—	O	—	—	—	Curbs
B903	26	6'-0"	J	1'-0"	9½"	4'-2"	—	—	—	—	O	—	6"	Dowel
B904	17	12'-11	J	1'-0"	9½"	11'-1"	—	—	—	—	O	—	6"	Dowel

MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION

TYPE-BENDING DIAGRAMS



All dimensions are out to out of reinf. bar

Bending details and hooks shall conform to the recommendations of ACI Standard 315-65;

Reinforcing Bar: ASTM A615 Grade 60

GENERAL NOTES

1. First digit(s) following the letter of the Mark indicates size of reinf. bar.
   Mark (A502) bar size - #5
   Mark (P1001) bar size - #10
   Mark (S603) bar size - #6
2. Letter of Marks A, P & S locates bars of Abutments, Piers, and Superstructure parts respectively.

* indicates rolled beam option
** ~~indicates welded beam option~~

As built 1984 RMZ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER

REINFORCING STEEL SCHEDULE

SHEET 11 OF 12 AUGUSTA, MAINE

PLANS	BY	DATE
DESIGN - DETAIL	J.E. Bastnel	8/84
CHECKED		
REVISIONS		
FIELD CHANGES		

R88-444

REINFORCING STEEL SCHEDULE

FHWA REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(83)176	31	66

STRAIGHT BARS

MARK	NO.	LENGTH	LOCATION
PIER			
P503	4	26'-0"	Shaft
P504	4	28'-0"	Shaft
P505	4	30'-0"	Shaft
P506	4	32'-0"	Shaft
P507	4	34'-0"	Shaft
* P508	10	36'-8"	Rolled Beam
** P508	8	36'-8"	Welded Beam
P509	2	22'-0"	Shaft
P600	16	27'-8"	Footing
P601	56	7'-8"	Footing
P602	54	15'-10"	Shaft

MARK	NO.	LENGTH	LOCATION
SUPERSTRUCTURE			
S500	400	36'-8"	Transverse
S501	261	60'-0"	Longitudinal
S502	29	25'-6"	Longitudinal
S503	54	22'-6"	Longitudinal
S601	40	60'-0"	Over Pier

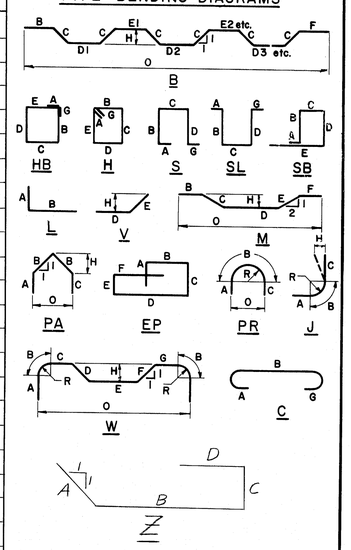
MARK	NO.	LENGTH	LOCATION
END POSTS			
EP407	24	1'-10"	Dowel *
EP405	8	1'-5"	Vertical **
			*
			**
EP508	16	5'-3"	Horizontal *
			**
APPROACH SLAB			
AS400	32	15'-0"	Transverse
AS401	32	18'-3"	Transverse
AS600	124	15'-0"	Longitudinal

BENT BARS

MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION
PIER														
P500	32	16'-6"	S	0	7'-0"	2'-6"	7'-0"	—	—	0	Rolled Beam			Shaft
P500	32	14'-2"	S	0	5'-10"	2'-6"	5'-10"	—	—	0	Welded Beam			Shaft
P501	22	18'-2"	S	0	7'-10"	2'-6"	7'-10"	—	—	0	Rolled Beam			Shaft
P501	22	16'-0"	S	0	6'-9"	2'-6"	6'-9"	—	—	0	Welded Beam			Shaft
P502	29	8'-6"	S	0	3'-0"	2'-6"	3'-0"	—	—	0	Rolled Beam			Shaft
P502	27	8'-6"	S	0	3'-0"	2'-6"	3'-0"	—	—	0	Welded Beam			Shaft
P800	54	10'-5"	J	1'-0"	9½"	8'-7"	—	—	—	—	—	—	6"	Dowel
SUPERSTRUCTURE														
S504	197	6'-0"	SB	1'-0"	1'-1"	1'-2"	1'-6"	1'-3"	—	—	—	—	—	Left Curb
S505	197	5'-10"	SB	1'-0"	1'-1"	1'-2"	1'-4"	1'-3"	—	—	—	—	—	Right Curb
S506	50	4'-3"	Z	1'-1"	1'-5"	9"	1'-0"	—	—	—	—	—	—	End Slab
S600	196	38'-0"	B		4'-6"	7" x 8	3'-7⅞" x 4	3'-3½" x 3	4'-6"	—	—	36'-8"	—	Transverse
END POSTS														
EP402	16	4'-9"	S	0	2'-1"	7"	2'-1"	—	—	0	—	—	—	Horizontal
EP403	16	4'-8"	H	4"	1'-0"	1'-0"	1'-0"	—	—	4"	—	—	—	Horizontal
EP404	16	3'-1"	S	0	1'-3"	7"	1'-3"	—	—	0	—	—	—	Vertical
EP408	12	4'-3"	S	0	1'-10"	7"	1'-10"	—	—	0	—	—	—	Vertical
EP409	8	4'-2"	S	0	1'-10"	6"	1'-10"	—	—	0	—	—	—	Vertical
EP410	4	4'-6"	S	0	1'-10"	10"	1'-10"	—	—	0	—	—	—	Vertical
EP501	16	5'-3"	V	—	—	—	3'-0"	2'-3"	—	—	4"	—	—	Horizontal
EP502	12	4'-11"	S	0	1'-11"	7"	1'-11"	—	—	6"	—	—	—	Vertical
EP503	8	4'-10"	S	0	1'-11"	6"	1'-11"	—	—	6"	—	—	—	Vertical
EP504	4	6'-5"	H	5"	1'-11"	10"	1'-11"	10"	—	—	5"	—	—	Vertical

MARK	NO.	LENGTH	TYPE	A	B	C	D	E	F	G	H	O	R	LOCATION

TYPE-BENDING DIAGRAMS



All dimensions are out to out of reinf. bar.

Bending details and hooks shall conform to the recommendations of ACI Standard 315-65.

Reinforcing Bar: ASTM A615 Grade 60

GENERAL NOTES

1. First digit(s) following the letter of the Mark indicates size of reinf. bar.
   Mark (A 502) bar size - #5
   Mark (P 1001) bar size - #10
   Mark (S 603) bar size - #6
2. Letter of Marks A, P & S locates bars of Abutments, Piers, and Superstructure parts respectively.

* indicates rolled beam option

** indicates welded beam option

As Built 1984 Rmy

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
INTERSTATE 395
BREWER

REINFORCING STEEL SCHEDULE

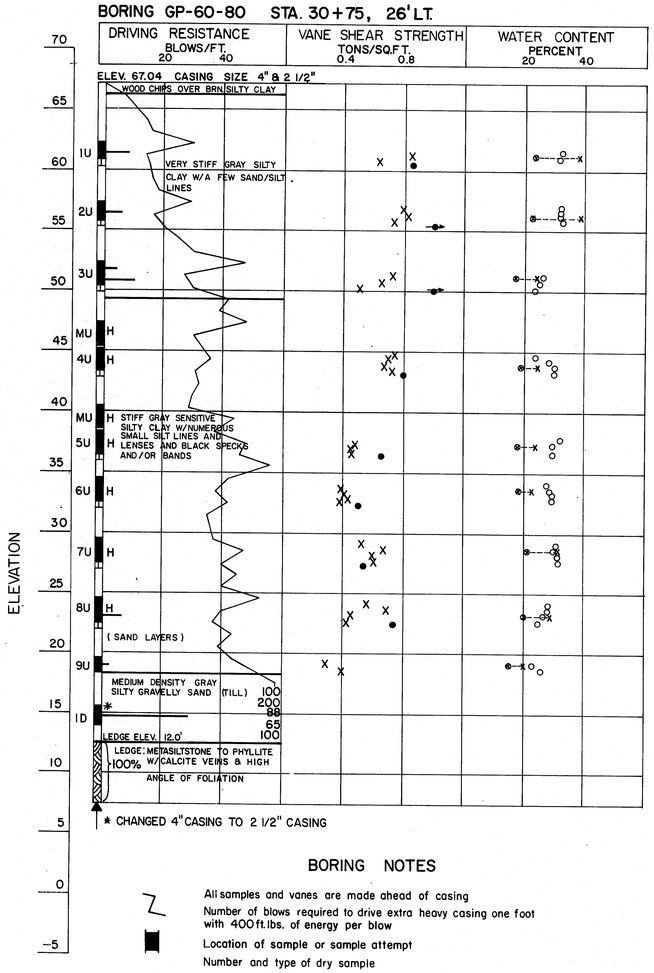
SHEET 12 OF 12 AUGUSTA, MAINE

PLANS	BY	DATE
DESIGN - DETAIL	J.E. Bastro	8/83
CHECKED		
REVISIONS		
FIELD CHANGES		

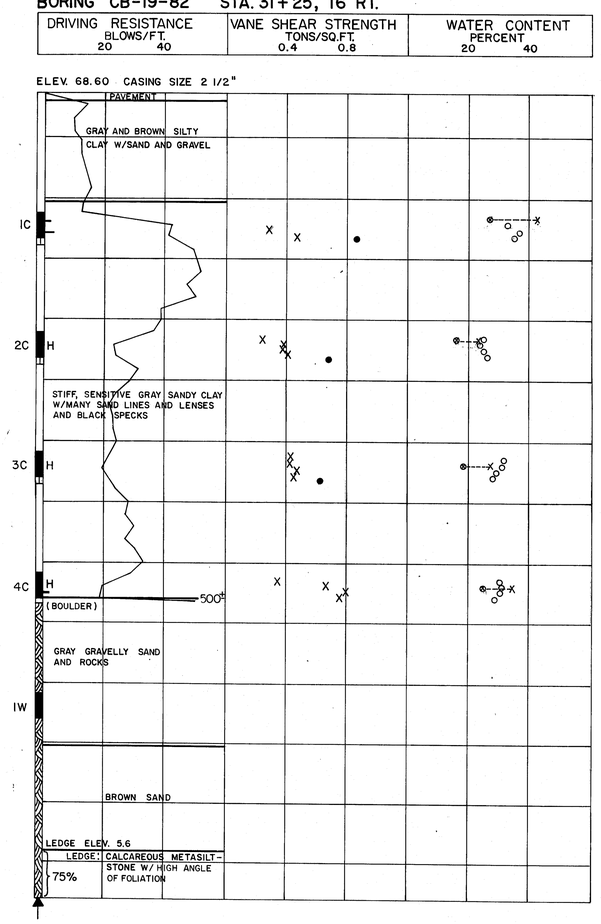
R88-445

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)	47	66

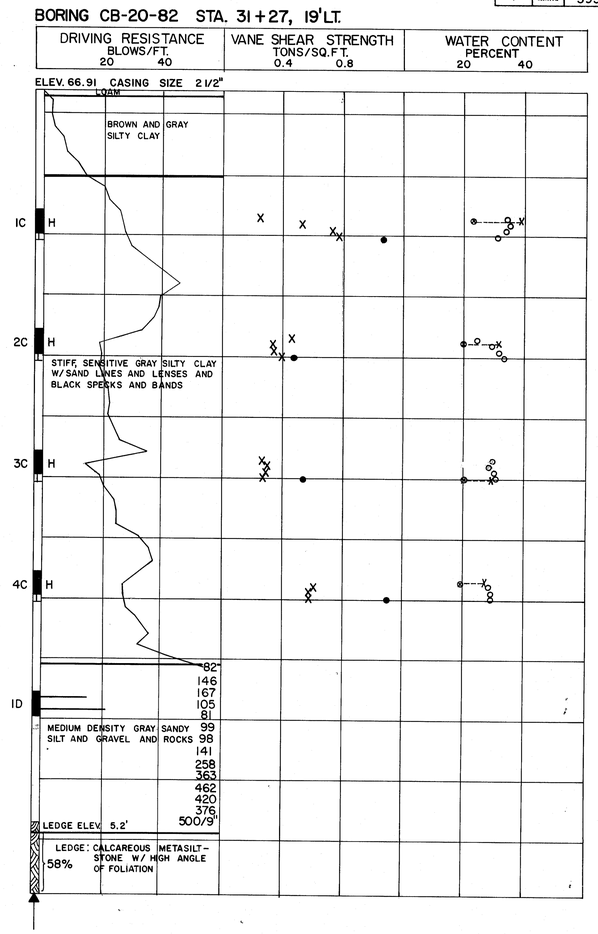
BORING GP-60-80 STA. 30+75, 26' LT.



BORING CB-19-82 STA. 31+25, 16' RT.



BORING CB-20-82 STA. 31+27, 19' LT.



BORING NOTES

- All samples and vanes are made ahead of casing
- Number of blows required to drive extra heavy casing one foot with 400 ft.lbs. of energy per blow
- Location of sample or sample attempt
- Number and type of dry sample
  - I D — S & H Sampler #1290's
  - I C — 2" O.D. 16 ga. seamless tubing
  - I U — 3 1/2" O.D. 16 ga. seamless tubing
  - I W — Wash sample and number
  - MD — Unsuccessful sample attempt and type of sampler
- Number of blows required to drive spoon or tubing one foot with 350 ft.lbs. of energy per blow
- H — Sampling spoon or seamless tubing driven by static weight of drill rods and hammer
- Field vane test
- Bottom of boring (may not be bottom of soil strata)
- 71% — Locations cored by diamond bit and percent recovery of rock

SHEAR NOTES

- ● Field vane shear strengths
- X Laboratory vane shear strengths
- → Shear strengths in excess of capacity of equipment
- ○ One half unconfined compressive strengths

WATER CONTENT NOTES

- ○ Natural water contents given as percent of dry weight
- ⊗---X Plastic and liquid limits
- Ignition losses are given as percent of dry weight

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN-DETAILED		
PLANS — DESIGN-REVISIONS		
PLANS — FIELD CHANGES		

BRUNING 44-132 45710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE TOWN OF
BREWER
PENOBSCOT COUNTY

BORING DETAILS

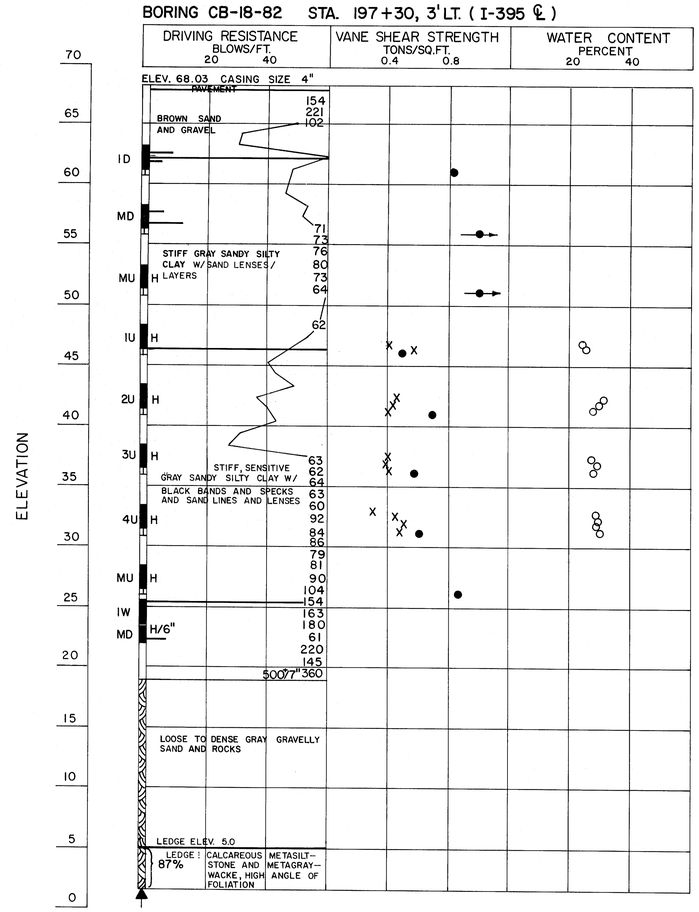
SHEET OF AUGUSTA, MAINE

R88-446

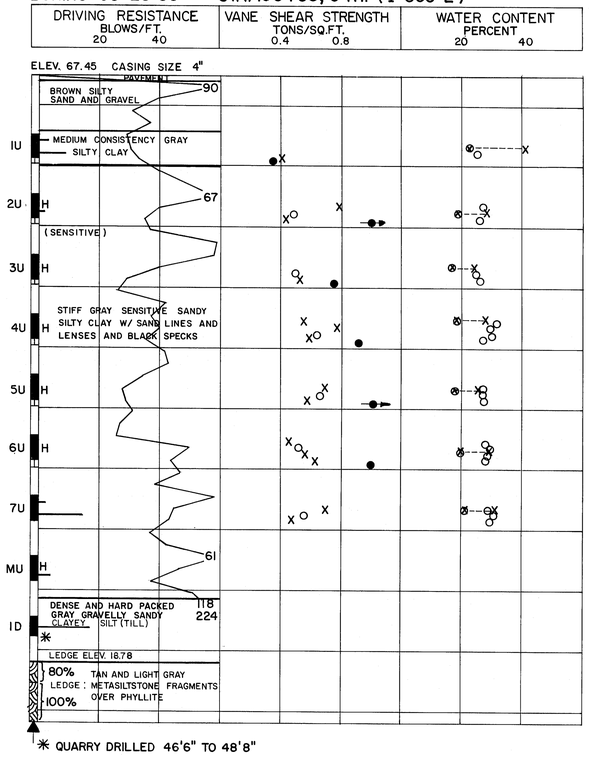
130

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)	48	66

BORING CB-18-82 STA. 197+30, 3' LT. (I-395 ℄)



BORING JC-28-80 STA. 196+58, 9' RT. (I-395 ℄)



* QUARRY DRILLED 46'6" TO 48'8"

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN-DETAILED		
CHECKED		
REVISIONS		
FIELD CHANGES		

BRUNING 44-132-45710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

INDUSTRIAL PARK ROAD
OVER
I-395
IN THE TOWN OF
BREWER
PENOBSCOT COUNTY

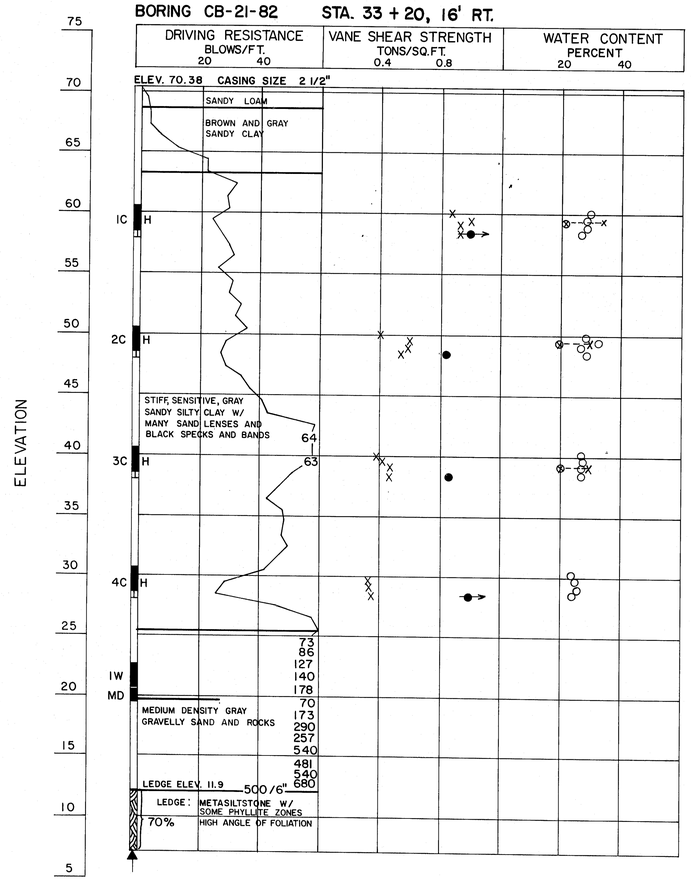
BORING DETAILS

SHEET OF AUGUSTA, MAINE

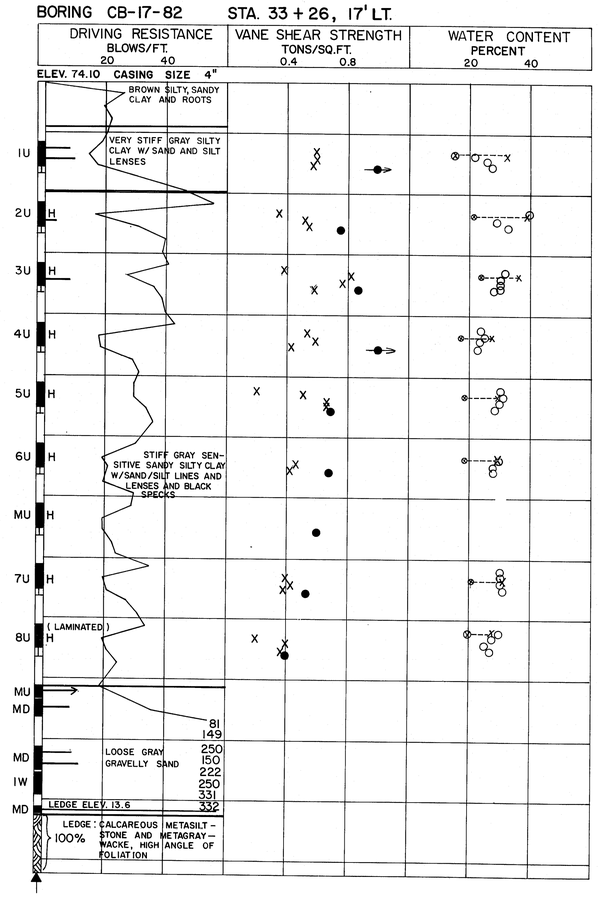
R88-447

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8(85)	49	66

BORING CB-21-82 STA. 33 + 20, 16' RT.



BORING CB-17-82 STA. 33 + 26, 17' LT.



PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN - DETAILED		
CHECKED		
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 43710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

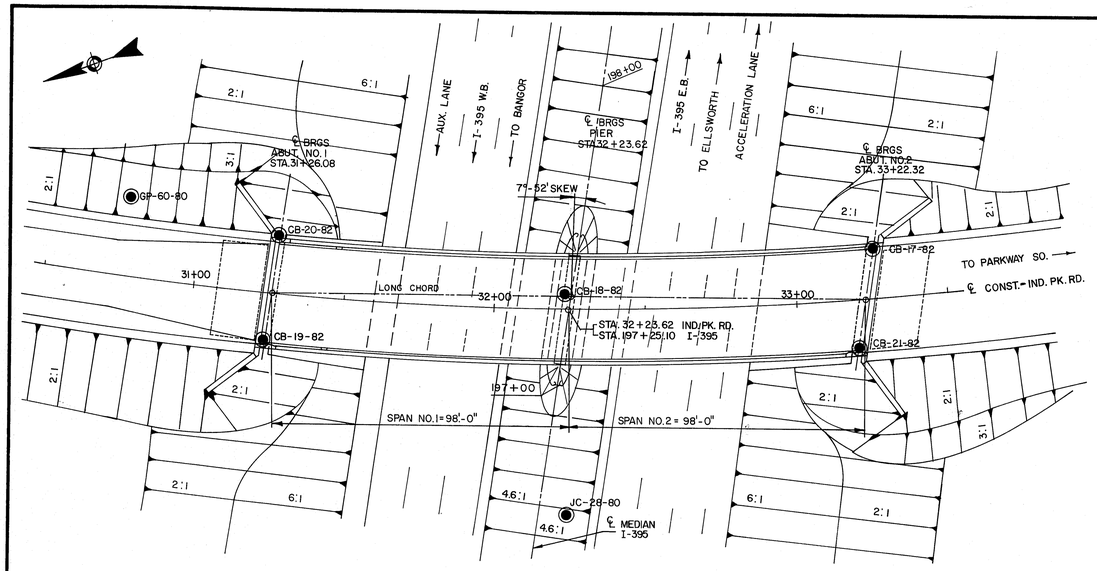
INDUSTRIAL PARK ROAD
OVER
I-395
IN THE TOWN OF
BREWER
PENOBSCOT COUNTY

BORING DETAILS

SHEET OF AUGUSTA, MAINE

R88-448

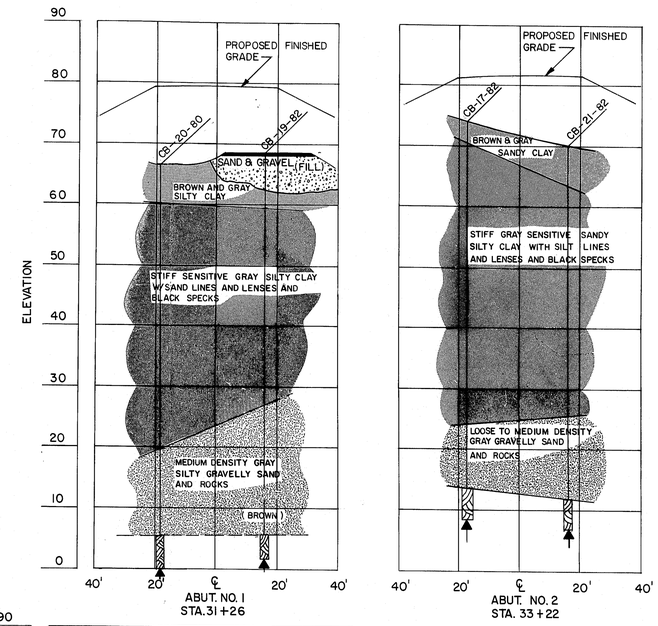
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	395-8 (85)	50	66

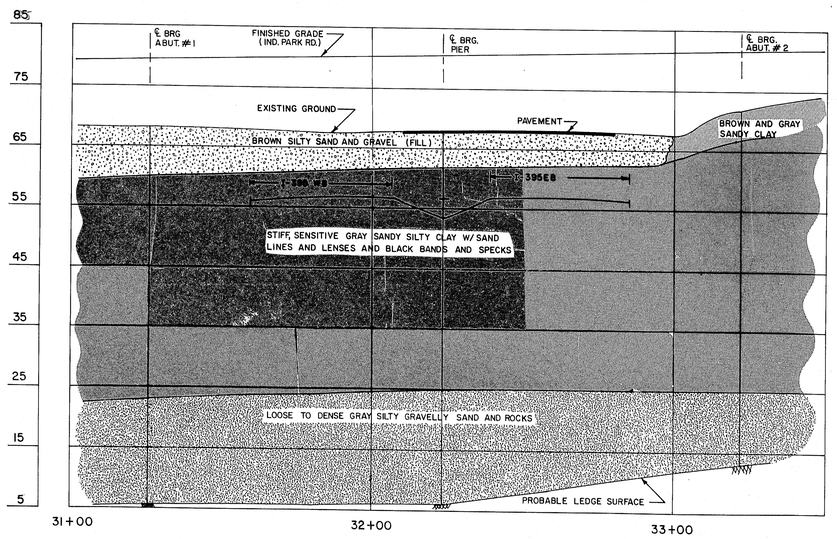


PLAN

20' 0 20' 40'

SCALE

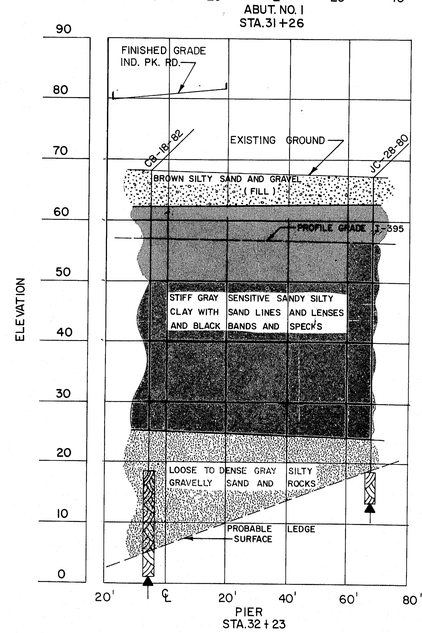




PROFILE

HORIZ. 20' 0 20' 40'
VERT. 10' 0 10' 20'

SCALE



TRANSVERSE SECTIONS

HORIZ. 20' 0 20' 40'
VERT. 10' 0 10' 20'

SCALE

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN - DETAILED		
CHECKED		
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 45710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

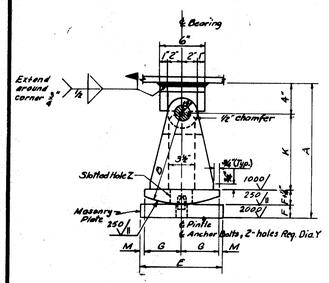
INDUSTRIAL PARK ROAD
OVER
I-395
IN THE TOWN OF
BREWER
PENOBSCOT COUNTY

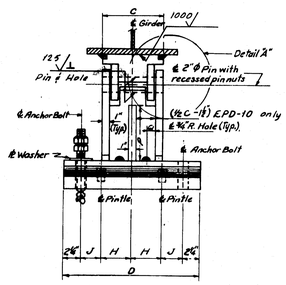
FOUNDATION SURVEY

SHEET OF AUGUSTA, MAINE

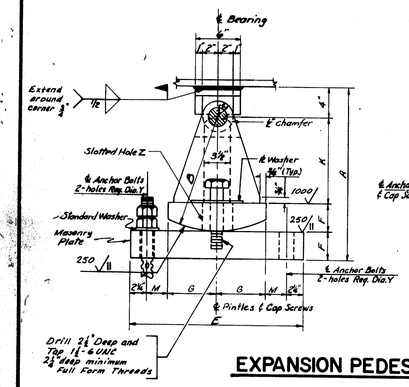
R88-449

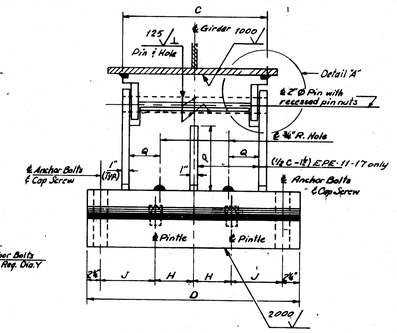
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-2(85)	51	66



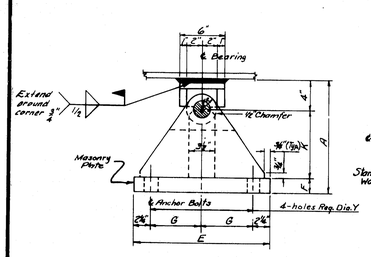


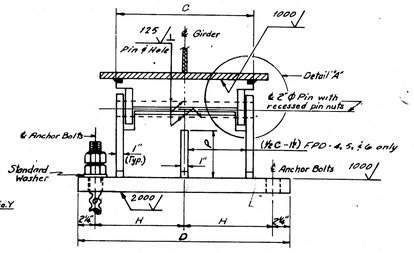
EXPANSION PEDESTAL — EPD



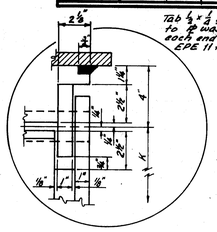


EXPANSION PEDESTAL — EPE

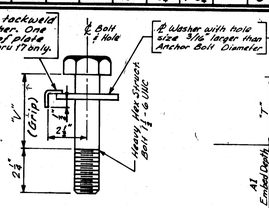




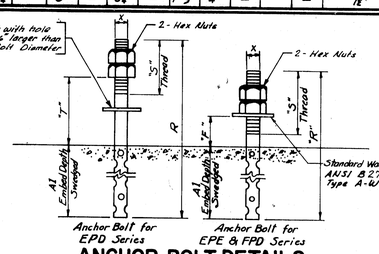
FIXED PEDESTAL — FPD



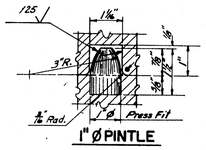
DETAIL "A"



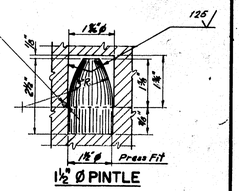
CAP SCREW DETAIL



ANCHOR BOLT DETAILS



1" Ø PINTLE



1½" Ø PINTLE

PINTLE DETAILS

NOTE:
Use 1" Ø Pintles with 1" Ø Anchor Bolts & 1½" Ø Pintles with 1½" Ø Anchor Bolts.

MARK	LOAD	A	B	C	D	E	F	G	H	J	K	M	P	Q	R	S	T		V	X-Anchor Bolt Diameter	Y-Masonry Plate Hole Size	Number Anchor Bolts Required	Z-Slotted Hole for Anchor Bolts or Cap Screws	Washer Size for Anchor Bolts or Cap Screws	A1 Embedment Depth	MARK
EPD-1	100K	1'-2 3/8"	9"	8"	1'-6"	8"	1 3/8"	3 1/8"	4"	2 3/8"	7"	1/2"	–	3"	1'-4 1/2"	3"	4 1/2"		–	1"	1 1/8"	2	3" x 1 1/8"	3" x 5" x 1/2"	10"	EPD-1
EPD-2	100K	1'-2 3/8"	9"	8"	1'-6"	9"	1 3/8"	4"	4"	2 3/8"	7"	1/2"	–	3"	1'-4 1/2"	3"	4 1/2"		–	1"	1 1/8"	2	3" x 1 1/8"	3" x 5" x 1/2"	10"	EPD-2
EPD-3	100K	1'-2 3/8"	9"	8"	1'-6"	10"	1 3/8"	4 1/2"	4"	2 3/8"	7"	1/2"	–	3"	1'-4 1/2"	3"	4 1/2"		–	1"	1 1/8"	2	3" x 1 1/8"	3" x 5" x 1/2"	10"	EPD-3
EPD-4	100K	1'-3 3/8"	1'-0"	8"	1'-6"	11"	1 3/8"	5"	4"	2 3/8"	10"	1/2"	–	3"	1'-5"	3"	4 1/2"		–	1"	1 1/8"	2	3" x 1 1/8"	3" x 5" x 1/2"	10"	EPD-4
EPD-5	200K	1'-9 1/2"	1'-3"	10"	1'-8"	1'-0"	2 1/2"	5 1/2"	4"	3 1/2"	1'-0 1/2"	1/2"	–	4"	2'-0 1/4"	4"	6 1/2"		–	1 1/2"	1 1/2"	2	4" x 1 1/8"	4" x 7" x 1/2"	1'-3"	EPD-5
EPD-6	200K	1'-9 1/2"	1'-3"	10"	1'-8"	1'-1"	2 1/2"	6"	4"	3 1/2"	1'-0 1/2"	1/2"	–	4"	2'-1"	4"	6 1/2"		–	1 1/2"	1 1/2"	2	4" x 1 1/8"	4" x 7" x 1/2"	1'-3"	EPD-6
EPD-7	200K	1'-9 1/2"	1'-3"	10"	1'-8"	1'-2"	2 1/2"	6 1/2"	4"	3 1/2"	1'-0 1/2"	1/2"	–	4"	2'-1"	4"	6 1/2"		–	1 1/2"	1 1/2"	2	4" x 1 1/8"	4" x 7" x 1/2"	1'-3"	EPD-7
EPD-8	200K	1'-9 1/2"	1'-3"	10"	1'-8"	1'-3"	2 1/2"	7"	4"	3 1/2"	1'-0 1/2"	1/2"	–	4"	2'-1"	4"	6 5/8"		–	1 1/2"	1 1/2"	2	4" x 1 1/8"	4" x 7" x 1/2"	1'-3"	EPD-8
EPD-9	300K	1'-10"	1'-3"	1'-2"	2'-0"	1'-4"	3"	7 1/2"	5"	4 1/2	1 1/2"	1/2"	–	6"	2'-2 1/4"	4"	8"		–	1 1/2"	1 1/2"	2	5" x 1 1/8"	4" x 8" x 1/2"	1'-3"	EPD-9
EPD-10	400K	1'-10 1/2"	1'-3"	1'-6"	2'-4"	1'-6"	3 1/2"	8 1/2"	6"	5 1/2"	1 1/2"	1/2"	3 1/2"	3 1/2"	2'-3"	4"	8 5/8"		–	1 1/2"	1 1/2"	2	5" x 1 1/8"	4" x 8" x 1/2"	1'-3"	EPD-10
EPE-1	200K	1'-10"	1'-3"	10"	1'-7"	1'-6"	3"	4"	4"	3 1/2"	1'-0"	2 1/2"	–	4"	1'-10"	4 1/2"	–		3 1/2"	1 1/2"	1 1/2"	4	3" x 1 5/8"	3 1/2" x 4" x 1/2"	1'-3"	EPE-1
EPE-2	200K	1'-10"	1'-3"	11"	1'-8"	1'-9"	3"	5 1/2"	4 1/2"	3 1/2"	1'-0"	2 1/2"	–	4 1/2"	1'-10"	4 1/2"	–		4"	1 1/2"	1 1/2"	4	3 1/2" x 1 5/8"	3 1/2" x 5" x 1/2"	1'-3"	EPE-2
EPE-3	200K	1'-10"	1'-3"	11"	1'-8"	1'-10"	3"	6"	4 1/2"	3 1/2"	1'-0"	2 1/2"	–	4 1/2"	1'-10"	4 1/2"	–		4 1/2"	1 1/2"	1 1/2"	4	3 1/2" x 1 5/8"	3 1/2" x 5 1/2" x 1/2"	1'-3"	EPE-3
EPE-4	200K	1'-10"	1'-3"	11"	1'-8"	1'-11"	3"	6 1/2"	4 1/2"	3 1/2"	1'-0"	2 1/2"	–	4 1/2"	1'-10"	4 1/2"	–		4 1/2"	1 1/2"	1 1/2"	4	4" x 1 5/8"	3 1/2" x 6" x 1/2"	1'-3"	EPE-4
EPE-5	200K	1'-10"	1'-3"	11"	1'-8"	2'-0"	3"	7"	4 1/2"	3 1/2"	1'-0"	2 1/2"	–	4 1/2"	1'-10"	4 1/2"	–		4 1/2"	1 1/2"	1 1/2"	4	4" x 1 5/8"	3 1/2" x 6" x 1/2"	1'-3"	EPE-5
EPE-6	300K	1'-10"	1'-3"	1'-2"	1'-11"	1'-6"	3"	4"	5"	4 1/2"	1'-0"	2 1/2"	–	6"	1'-10"	4 1/2"	–		3 1/2"	1 1/2"	1 1/2"	4	3" x 1 5/8"	3 1/2" x 4" x 1/2"	1'-3"	EPE-6
EPE-7	300K	1'-10 1/2"	1'-3"	1'-2"	1'-11"	1'-8"	3 1/2"	5"	5"	4 1/2"	1 1/2"	2 1/2"	–	6"	1'-10"	4 1/2"	–		4"	1 1/2"	1 1/2"	4	3" x 1 5/8"	3 1/2" x 4 1/2" x 1/2"	1'-3"	EPE-7
EPE-8	300K	1'-10 1/2"	1'-3"	1'-2"	1'-11"	1'-10"	3 1/2"	6"	5"	4 1/2"	1 1/2"	2 1/2"	–	6"	1'-10 1/2"	4 1/2"	–		4 3/4"	1 1/2"	1 1/2"	4	4" x 1 5/8"	3 1/2" x 6" x 1/2"	1'-3"	EPE-8
EPE-9	300K	1'-10 1/2"	1'-3"	1'-2"	1'-11"	2'-0"	3 1/2"	7"	5"	4 1/2"	1 1/2"	2 1/2"	–	6"	1'-10 1/2"	4 1/2"	–		5"	1 1/2"	1 1/2"	4	4 1/2" x 1 5/8"	3 1/2" x 6 1/2" x 1/2"	1'-3"	EPE-9
EPE-10	300K	1'-10 1/2"	1'-3"	1'-2"	1'-11"	2'-3"	3 1/2"	8"	5"	4 1/2"	1 1/4"	3 1/2"	–	6"	1'-10 1/2"	4 1/2"	–		6"	1 1/2"	1 1/2"	4	5 1/2" x 1 5/8"	3 1/2" x 8 1/2" x 1/2"	1'-3"	EPE-10
EPE-11	400K	1'-10 1/2"	1'-3"	1'-7"	2'-4"	1'-7"	3 1/2"	4 1/2"	5"	6 1/2"	1 1/2"	2 1/2"	9"	4"	1'-10"	4 1/2"	–		4"	1 1/2"	1 1/2"	4	3" x 1 5/8"	3 1/2" x 4" x 1/2"	1'-3"	EPE-11
EPE-12	400K	1'-10 1/2"	1'-3"	1'-7"	2'-4"	1'-11"	3 1/2"	6 1/2"	5"	6 1/2"	1 1/2"	2 1/2"	8 1/2"	4"	1'-10 1/2"	4 1/2"	–		5"	1 1/2"	1 1/2"	4	4 1/2" x 1 5/8"	3 1/2" x 6 1/2" x 1/4"	1'-3"	EPE-12
EPE-13	400K	1'-11"	1'-3"	1'-7"	2'-4"	2'-4"	4"	8 1/2"	5"	6 1/2"	1"	3 1/2"	8 1/2"	4"	1'-11"	4 1/2"	–		6 1/2"	1 1/2"	1 1/2"	4	6" x 1 5/8"	3 1/2" x 10 1/2" x 1/2"	1'-3"	EPE-13
EPE-14	600K	2'-1 1/2"	1'-6"	1'-11"	3'-0"	1'-10"	3 1/2"	6"	7"	8 1/2"	1'-2 1/2"	2 1/2"	11 1/2"	5"	1'-10 1/2"	4 1/2"	–		5"	1 1/2"	1 1/2"	4	4" x 1 5/8"	4" x 3 1/2" x 1/2"	1'-3"	EPE-14
EPE-15	600K	2'-2 1/2"	1'-6"	1'-11"	3'-0"	2'-3"	4 1/2"	9"	7"	8 1/2"	1'-1 1/2"	3 1/2"	11"	5"	1'-11"	4 1/2"	–		6 1/2"	1 1/2"	1 1/2"	4	6" x 1 5/8"	4" x 9 1/2" x 1/2"	1'-3"	EPE-15
EPE-16	800K	2'-2"	1'-6"	2'-6"	3'-10"	1'-11"	4"	6 1/2"	10"	10 1/2"	1'-2"	2 1/2"	11 1/2"	6 1/2"	1'-11"	4 1/2"	–		5 1/2"	1 1/2"	1 1/2"	4	4" x 1 5/8"	4" x 6" x 1/2"	1'-3"	EPE-16
EPE-17	800K	2'-2 1/2"	1'-6"	2'-6"	3'-10"	2'-5"	4 1/2"	9"	10"	10 1/2"	1'-1 1/2"	3 1/2"	10 1/2"	6 1/2"	1'-11 1/2"	4 1/2"	–		7"	1 1/2"	1 1/2"	4	6" x 1 5/8"	4" x 9 1/2" x 1/2"	1'-3"	EPE-17
FPD-1	100K	1'-0"	–	8"	1'-6"	9"	2"	2 1/2"	6 1/2"	–	6"	–	–	–	1'-3"	3 1/2"	–		–	1"	1 1/8"	4	–	Standard	10"	FPD-1
FPD-2	200K	1'-0"	–	10"	1'-8"	1'-2"	2"	4 1/2"	7 1/2"	–	6"	–	–	–	1'-8"	4"	–		–	1 1/2"	1 1/2"	4	–	Standard	1'-3"	FPD-2
FPD-3	300K	1'-0"	–	1'-2"	2'-0"	1'-4"	2"	3 1/2"	9 1/2"	–	6"	–	–	–	1'-8"	4"	–		–	1 1/2"	1 1/2"	4	–	Standard	1'-3"	FPD-3
FPD-4	400K	1'-3"	–	1'-6"	2'-4"	1'-6"	2"	6 3/4"	11 1/2"	–	9"	–	6 1/2"	–	1'-8"	4"	–		–	1 1/2"	1 1/2"	4	–	Standard	1'-3"	FPD-4
FPD-5	600K	1'-3"	–	1'-11"	3'-0"	1'-10"	3"	8 1/2"	1'-3 1/2"	–	8"	–	3 1/2"	–	1'-9"	4"	–		–	1 1/2"	1 1/2"	4	–	Standard	1'-3"	FPD-5
FPD-6	800K	1'-3"	–	2'-6"	3'-10"	1'-11"	3"	9 1/2"	1'-8 1/2"	–	8"	–	3 1/2"	–	1'-9"	4"	–		–	1 1/2"	1 1/2"	4	–	Standard	1'-3"	FPD-6

GENERAL NOTES

At the location of bearing pedestals the concrete bridge seats shall be dressed one inch larger all around than size of masonry plates and to exact elevations shown on the plans. If dressed areas are below the surface of the surrounding bridge seat a small channel shall be cut to edge of the bridge seat for drainage where required by the Engineer. Channels shall have a min. width of 2" and a min. slope of ¼ inch per foot. No separate payment for this work will be made as it shall be considered incidental to contract items.

Fabricate pedestals with ¼" fillet welds. The diameter of the pin hole shall not exceed that of the pin by more than 1/16 inch.

Pedestals EPD and EPE without center stiffeners have only one drainage hole.

Pedestals FPD have no drainage holes.

A.S.T.M. STEEL CLASSIFICATION

1. Charpy V-notch tests are not required for steel in bearing pedestals.
2. When structural steel is specified to be unpainted, all steel including anchor bolts and 2" Ø pins shall be A588 unpainted, except cap screws for EPE pedestals shall be A.S.T.M. A325, Type 3.
3. When structural steel is specified to be painted, all steel including anchor bolts shall be A36, except the following: 2" Ø pin - A36, A668, Class D or A108, Grade 1016-1030 inclusive; cap screws for EPE pedestals shall be A.S.T.M. A325, Type 1.

As Built 1984 12 12

REVISIONS	DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

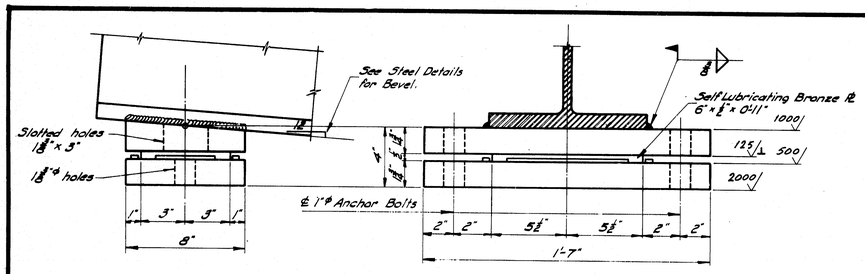
STANDARD DETAILS
(BD 100-81)

BEARING PEDESTALS

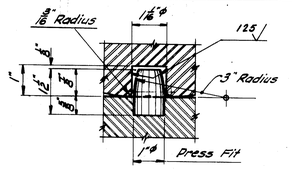
SHEET OF AUGUSTA, MAINE JUNE 1981

R88-450

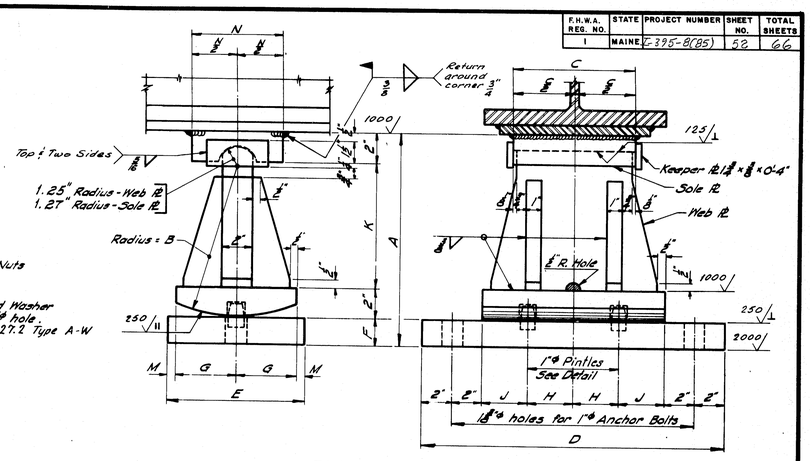
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	F-395-8(85)	52	66



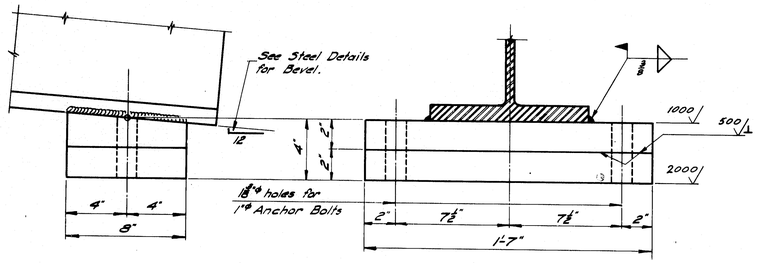
EXPANSION PEDESTAL - EPA



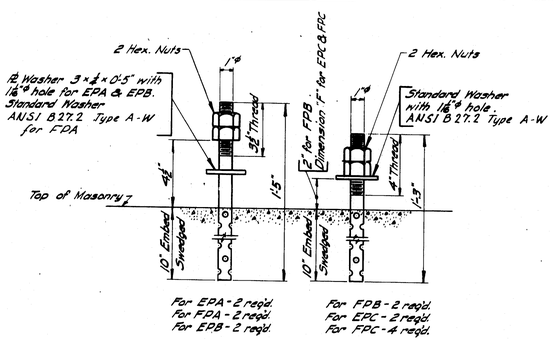
PINTLE DETAIL



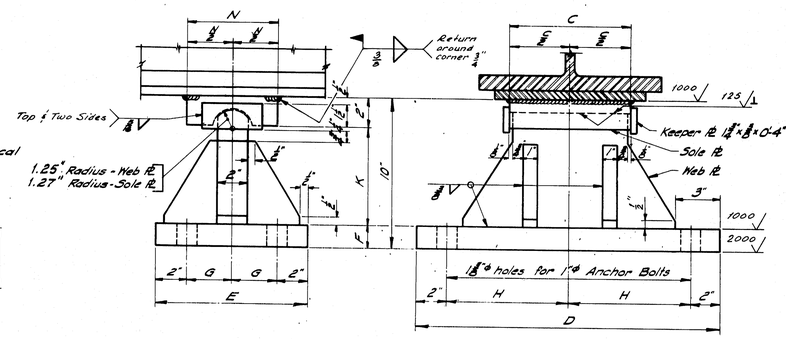
EXPANSION PEDESTAL - EPC



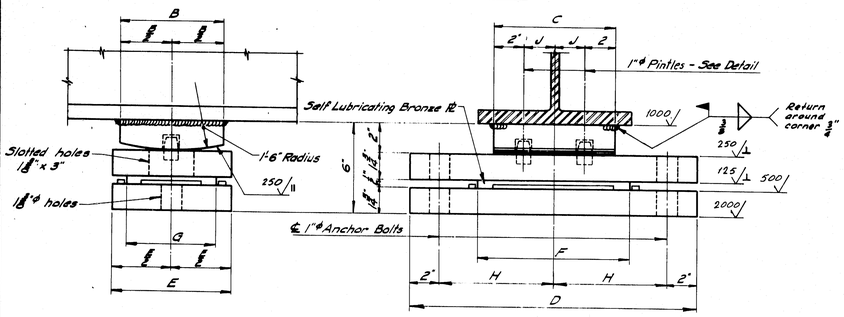
FIXED PEDESTAL - FPA



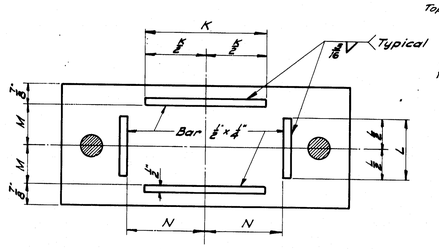
ANCHOR BOLT DETAIL



FIXED PEDESTAL - FPC

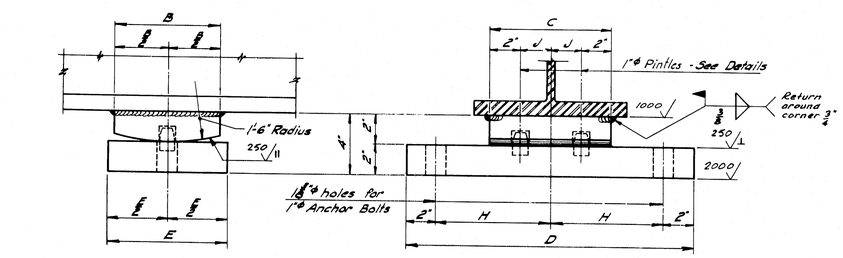


EXPANSION PEDESTAL - EPB



For EPA & EPB

MASONRY PLATE



FIXED PEDESTAL - FPB

PEDESTALS — ALLOWABLE LOADS & DIMENSIONS

Pedestal	Load	A	B	C	D	E	F	G	H	J	K	L	M	N
EPA	132 K	—	—	—	—	—	—	—	—	—	8"	4"	3⅜"	5⅜"
FPA	130 K	—	—	—	—	—	—	—	—	—	—	—	—	—
EPB-1	120 K	—	6"	8"	1'-7"	8"	10"	6"	7½"	2"	8"	4"	3⅜"	5⅜"
EPB-2	165 K	—	7"	10"	1'-8"	9"	1'-0"	7"	8"	3"	10"	5"	3⅜"	6⅜"
EPB-3	224 K	—	8"	1'-1"	2'-0"	10"	1'-4"	8"	10"	4½"	1'-2"	5"	4⅜"	8⅜"
FPB-1	120 K	—	6"	8"	1'-7"	8"	—	—	7½"	2"	—	—	—	—
FPB-2	165 K	—	7"	10"	1'-8"	9"	—	—	8"	3"	—	—	—	—
FPB-3	224 K	—	8"	1'-2"	2'-0"	10"	—	—	10"	5"	—	—	—	—
EPC-1	70 K	9⅜"	6"	8"	1'-8"	8"	1¼"	3½"	3"	3"	4½"	—	½"	6"
EPC-2	100 K	11⅜"	8"	8"	1'-8"	8"	1¼"	3½"	3"	3"	6½"	—	½"	6"
EPC-3	130 K	1'-2"	10"	8"	1'-8"	9"	1¼"	4"	3"	3"	8½"	—	½"	7"
EPC-4	160 K	1'-2"	10"	8"	1'-10"	9"	1¼"	4"	4"	3"	8½"	—	½"	7"
EPC-5	190 K	1'-2½"	10"	9"	2'-0"	10"	2"	4½"	5"	3"	8½"	—	½"	8"
EPC-6	220 K	1'-4½"	1'-0"	10"	2'-0"	1'-0"	2½"	5"	5"	3"	10½"	—	1"	8"
EPC-7	250 K	1'-4½"	1'-0"	1'-0"	2'-2"	1'-0"	2½"	5"	5"	4"	10½"	—	1"	8"
FPC-1	100 K	—	—	8"	1'-8"	9"	1¼"	2½"	8"	—	6½"	—	—	6"
FPC-2	160 K	—	—	8"	1'-8"	10"	1½"	3"	8"	—	6½"	—	—	7"
FPC-3	190 K	—	—	9"	2'-0"	10"	1½"	3"	10"	—	6½"	—	—	8"
FPC-4	220 K	—	—	10"	2'-0"	1'-0"	1¾"	4"	10"	—	6½"	—	—	8"
FPC-5	250 K	—	—	1'-0"	2'-0"	1'-0"	2"	4"	10"	—	6"	—	—	8"

NOTE: At the location of bearing pedestals the concrete bridge seats shall be dressed one inch larger all around than size of masonry plates and to exact elevations shown on the plans. If dressed areas are below the surface of the surrounding bridge seat a small channel shall be cut to the edge of the bridge seat for drainage where required by the Engineer. Channels shall have a min. width of 2", and min. slope of ⅛ inch per foot. No separate payment for this work will be made as it shall be considered incidental to contract items.

A.S.T.M. STEEL CLASSIFICATION

1. Charpy V-Notch tests are not required for steel used in bearing pedestals.
2. When structural steel is specified to be unpainted, all steel including anchor bolts shall be A588 unpainted.
3. When structural steel is specified to be painted, all steel including anchor bolts shall be A36.

As Built 1984 KHZ

REVISIONS	DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

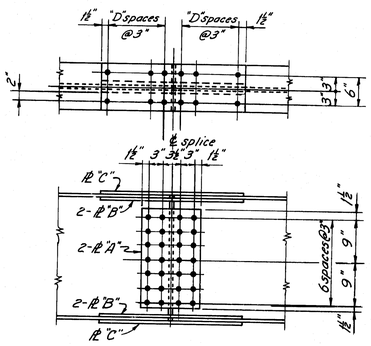
STANDARD DETAILS
(BD 101 - 81)

BEARING PEDESTALS

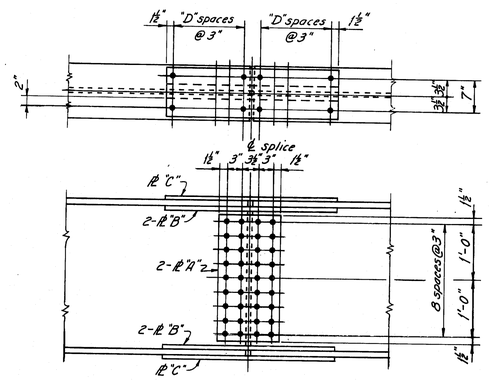
SHEET OF AUGUSTA, MAINE JUNE 1981

R88-451

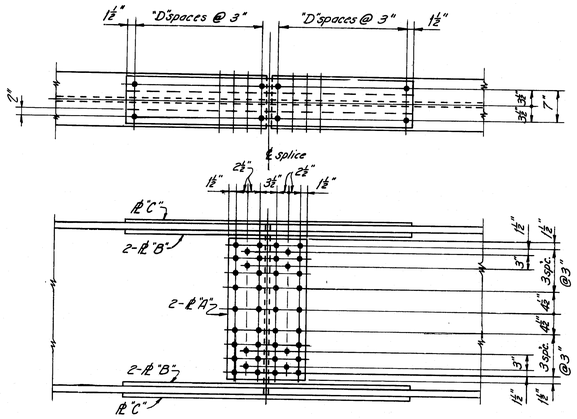
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)	53	66



W27 x 84,94,102,114

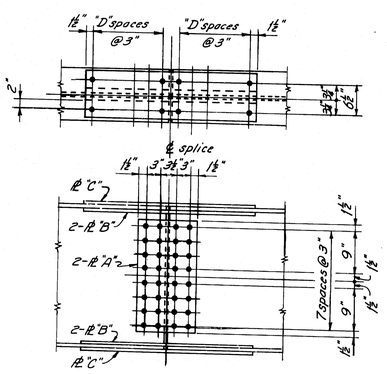


W33 x 118,130,141,152

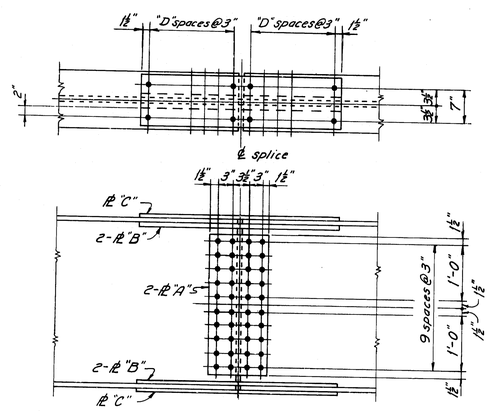


W36 x 182,194,210

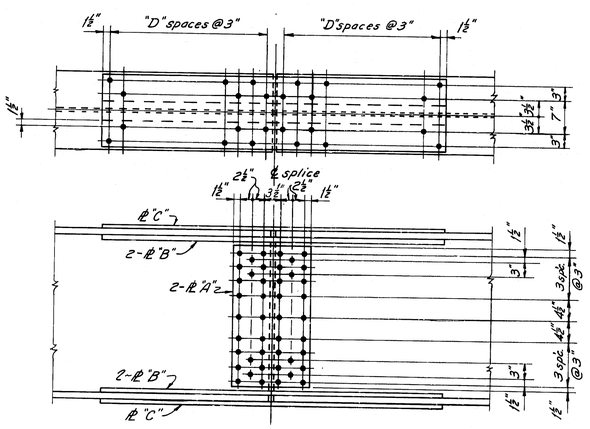
SPLICE PLATES AND FLANGE HOLES				
BEAM	PLATE "A"	PLATE "B"	PLATE "C"	"D"
W 27 x 84	12⅝" x ½"	4" x ½"	10" x ½"	3
x 94	12⅝" x ½"	4" x ½"	10" x ½"	3
x 102	12⅝" x ½"	4" x 7/16"	10" x ½"	3
x 114	12⅝" x 9/16"	4" x ⅝"	10" x ½"	4
W 30 x 99	12⅝" x ½"	4" x ½"	10" x ½"	3
x 108	12⅝" x ½"	4" x 9/16"	10" x ½"	3
x 116	12½" x ½"	4" x ⅝"	10" x ½"	3
x 124	12½" x ½"	4" x 11/16"	10" x ½"	4
x 132	12½" x 9/16"	4" x 13/16"	10" x ½"	4
W 33 x 118	12⅝" x ½"	4" x 9/16"	11" x ½"	3
x 130	12⅝" x ½"	4" x ⅝"	11" x ½"	4
x 141	12⅝" x ½"	4" x 13/16"	11" x ½"	4
x 152	12½" x ½"	4" x ¾"	11" x 9/16"	5
W 36 x 135	12⅝" x ½"	4" x 11/16"	11" x ½"	4
x 150	12⅝" x ½"	4" x 13/16"	11" x ½"	5
x 160	12⅝" x ½"	4" x 15/16"	11" x 9/16"	5
x 170	12½" x ½"	4" x 15/16"	11" x ⅝"	6
x 182	16½" x 9/16"	4" x 1"	11" x 11/16"	6
x 194	16½" x 9/16"	4" x 1 1/16"	11" x 11/16"	6
x 210	16½" x ⅝"	4" x 1 1/16"	11" x ⅝"	7
x 230	16½" x 9/16"	6" x 1"	16" x ⅝"	9
x 245	16½" x 9/16"	6" x 1"	16" x 11/16"	9
x 260	16½" x ⅝"	6" x 1 1/16"	16" x ⅝"	11
x 280	16½" x ⅝"	6" x 1 1/16"	16" x 13/16"	11
x 300	16½" x 11/16"	6" x 1 1/8"	16" x ⅝"	13



W30 x 99,108,116,124,132



W36 x 135,150,160,170



W36 x 230,245,260,280,300

GENERAL NOTES ⚠

1.) Splice connections shall be made with $\frac{7}{8}$"Ø ASTM A325 high tensile strength bolts. Holes shall be $\frac{15}{16}$"Ø.

2.) Web and flange filler plates shall be used as required when splicing beams of different sizes. Filler plates of $\frac{1}{16}$" or less in thickness are not required.

3.) If beams of different sizes are to be spliced, use splice details shown for the smaller of the beams being spliced unless otherwise directed by design drawings.

4.) For material specifications and details not shown, refer to design drawings.

PROJECT DESIGN ENGINEER	BY	DATE
PLANS	DESIGN - DETAILED	
	CHECKED	
	REVISIONS	
	FIELD CHANGES	

JANUARY 1988

As built 1984 RMJ

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS
(BD 103 - 81)

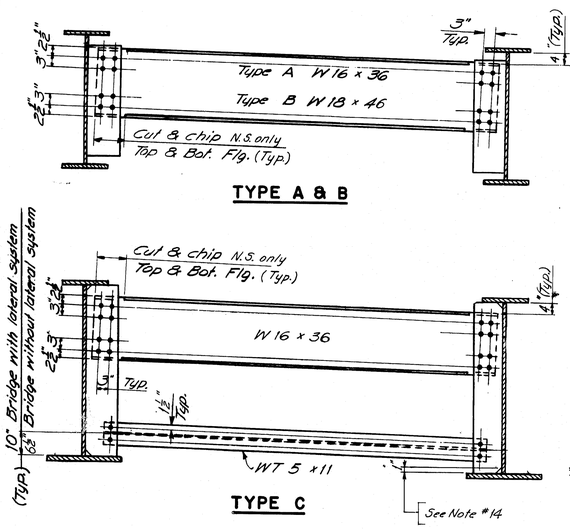
BEAM SPLICES
ROLLED BEAMS

⚠	General Notes #3 & #4	1-83
	REVISIONS	DATE

SHEET OF AUGUSTA, MAINE JUNE 1981

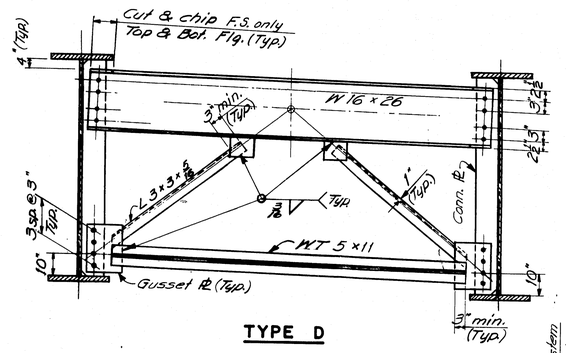
R88-452

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-2(13)	54	56

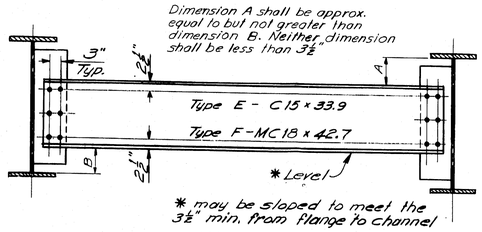


TYPE A & B

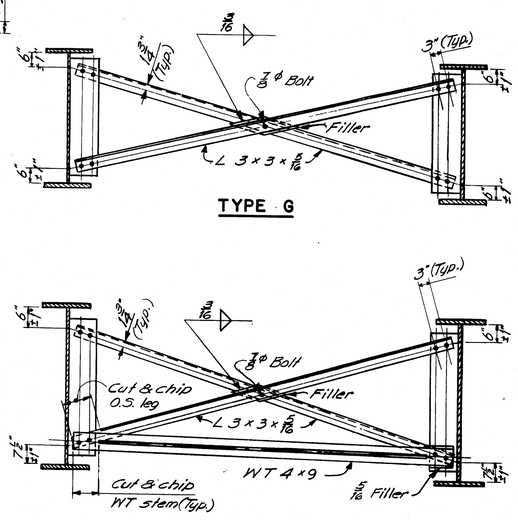
TYPE C



TYPE D



TYPE E & F



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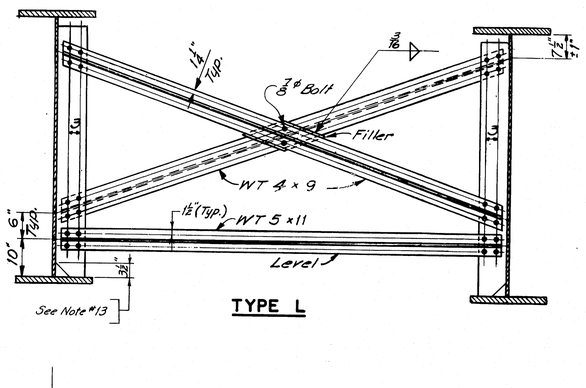
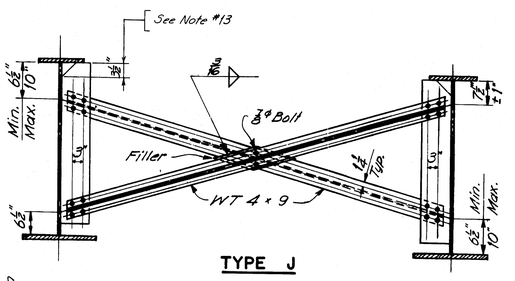


TYPE L



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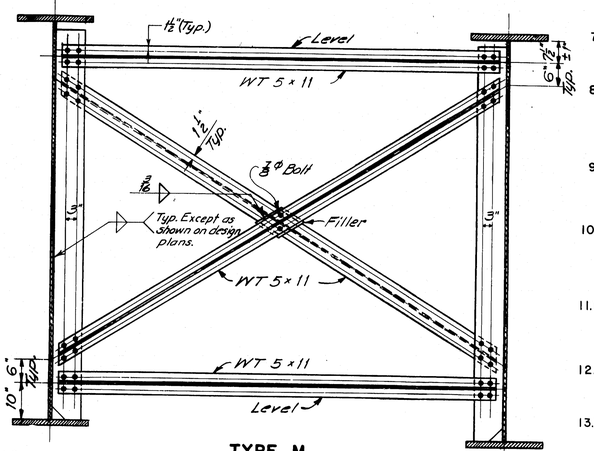
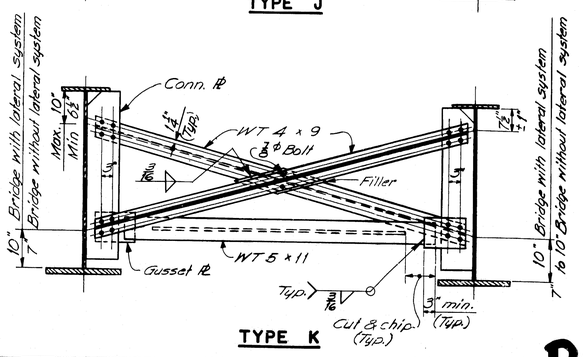


TYPE M



TYPE K

FABRICATION NOTES ⚠

1.) All bolts shall be $\frac{7}{8}$" ϕ H.S. Bolts. Hole sizes for bolts shall conform to Section 504.23 of the Standard Specifications, and edge-distances shall be $1\frac{1}{2}$" min. unless otherwise shown.

2.) Connection Plates and gusset plates shall have a minimum thickness of $\frac{3}{8}$" and shall have sufficient width to provide erection clearances. For bearing stiffeners or intermediate stiffeners and for bent connection plates the plate size will be given on the design drawings.

3.) Connection Plates shall be fastened to web plates by fillet welds as shown. All fillet welds shall be the minimum size as specified in A.A.S.H.T.O. Standard Specifications for Highway Bridges, Art. 1.7.21, unless otherwise shown on design drawings.

4.) Connection Plates shall be $3\frac{1}{2}$" clear from flanges, except as indicated by notes 5 & 6.

5.) Connection Plates on welded beams and girders shall extend to the top flange in areas where the top flange is always in compression.

6.) Connection Plates shall extend to the bottom flange at points where lateral bracing is attached and on welded beams and girders in areas where the bottom flange is always in compression.

7.) When a connection plate is extended to a flange it shall fit within $\frac{1}{16}$" except if the design drawings show it is to be welded.

8.) Bearing Stiffeners at end bearings shall extend to both top and bottom flanges and shall be welded to both flanges. Weld at bottom flange shall be a full penetration weld. Weld at top flange shall be a fillet weld both sides (see Note 3).

9.) Bearing Stiffeners at other than end bearings shall extend to both top and bottom flanges, shall be welded to the bottom flange with a full penetration weld and shall fit within $\frac{1}{16}$" at top flange.

10.) Intermediate Stiffeners shall extend to both top and bottom flanges, shall be welded to the compression flange with a fillet weld on both sides (see Note 3) and shall fit within $\frac{1}{16}$" at the tension flange.

11.) Use only those items called for on the design drawings. In case of conflict between these standard details and design drawings, the design drawings shall be followed.

12.) All dimensions shown as "__ ± 1" are variable in order to allow a series of crossframes to have the same slopes and/or dimensions.

13.) All connection plates and stiffeners that are extended to a flange shall be clipped $3\frac{1}{2}$", except as indicated by note 14.

14.) Bearing stiffeners at end bearings shall be clipped $1\frac{1}{2}$" at top and bottom. Bearing stiffeners at all other bearings shall be clipped $1\frac{1}{2}$" at the compression flange.

15.) For unpainted applications all steel for diaphragms and crossframes shall be A.S.T.M.-A588. For bridges specified to be painted the steel for diaphragms and connection plates shall be A.S.T.M.-A36, except other steel classifications may be used subject to the approval of the Engineer.

PLANS	BY	DATE
DESIGN - DETAILED		
CHECKED		
REVISIONS		
FIELD CHANGES		

REVISIONS	DATE
⚠ Revised notes 2, 3, 7, & 11	1-88

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

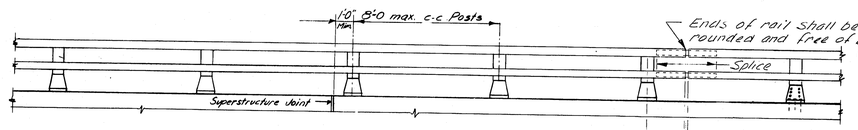
STANDARD DETAILS
(BD 113 - 81)

DIAPHRAGMS & CROSSFRAMES

SHEET OF AUGUSTA, MAINE JUNE 1981

R88-453

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	U-395-B(BS)	55	66

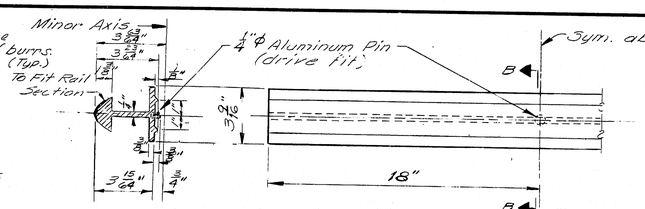


RAILING - ELEVATION

Lengths of rail shall be attached to a minimum of four (4) rail posts wherever possible, and in any case never less than two (2). Rail posts are to be set normal to grade unless otherwise shown on the Bridge Plans.

2'-0"
Exp. Joint
Typ. Joint
See Design Drawings for Joint Dimension

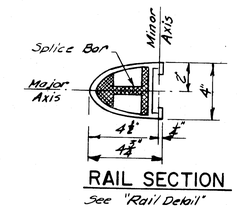
Top edges of post shall be rounded and free of burrs. Typical all posts.



SECTION B-B

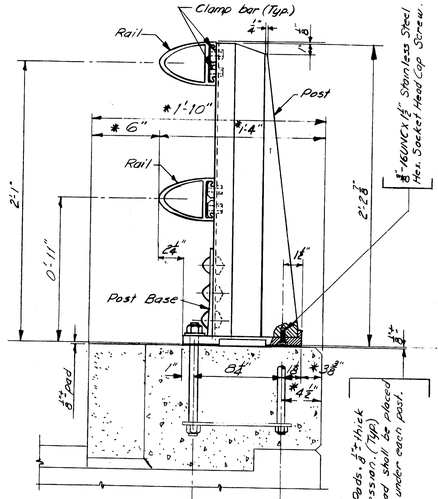
SPLICE BAR

Alternate splice bars may be substituted if approved by the Engineer



RAIL SECTION

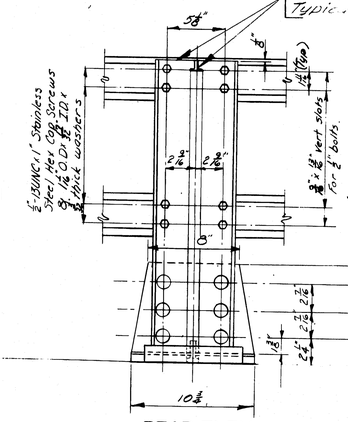
See "Rail Detail"



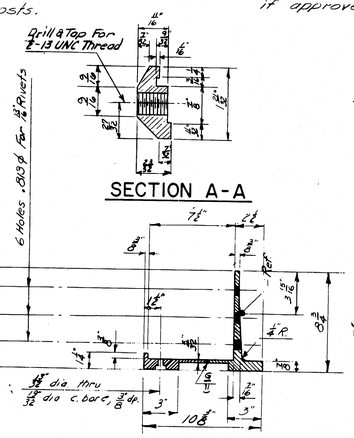
BRIDGE RAILING

(Assembly)

* Preferable minimum dimensions. For actual dimensions see Bridge Plan.

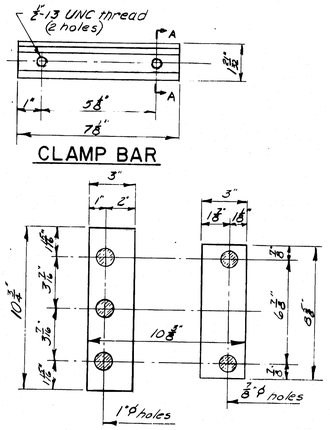


REAR ELEV.



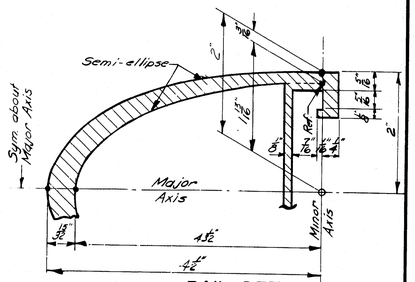
SECTION A-A

POST BASE SECTION

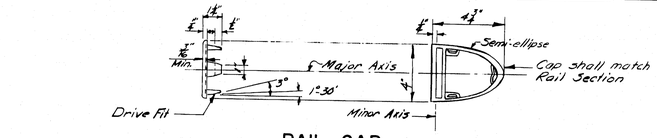


CLAMP BAR

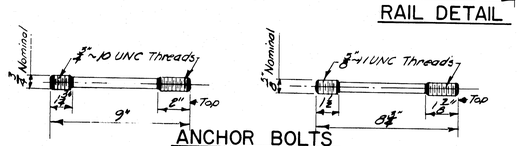
PREFORMED PADS



RAIL DETAIL

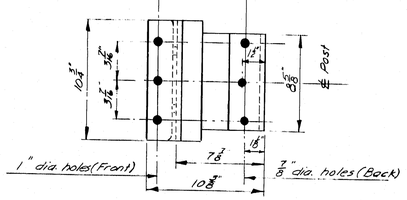


RAIL CAP



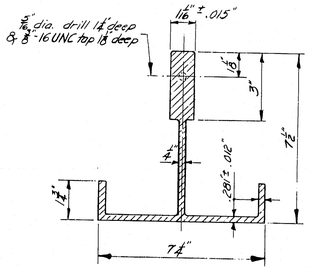
ANCHOR BOLTS

If cut threads are used, body diameter shall be not less than nominal diameter.
If rolled threads are used, body diameter shall be not less than pitch diameter of the threads.

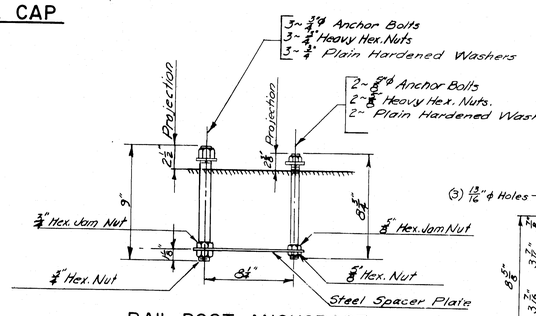


POST BASE

(Bottom View)

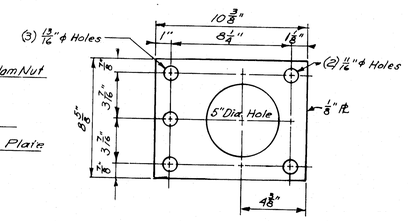


POST SECTION



RAIL POST ANCHORAGE

(Assembly)



STEEL SPACER PLATE

(For Anchorage)

PLANS	BY	DATE
DESIGN - DETAILED	K. Leach	Nov. 1980
CHECKED		
REVISIONS		
FIELD CHANGES		

REVISIONS	DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS

(BD 114 - 81)

ALUMINUM BRIDGE RAILING

2 - BAR (SEMI-ELLIPSE)

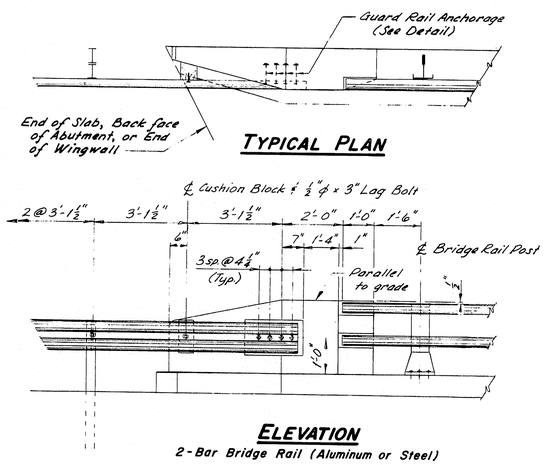
SHEET OF AUGUSTA, MAINE JUNE 1981

R88-454

JANUARY 1988

203-1 2080

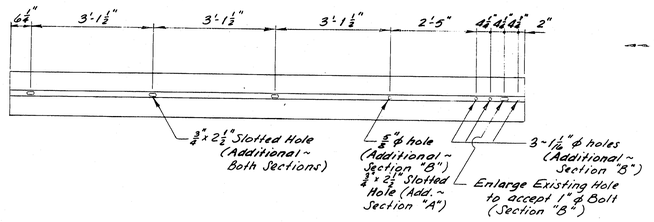
F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	Z-395-8(BS)	56	66



TYPICAL PLAN

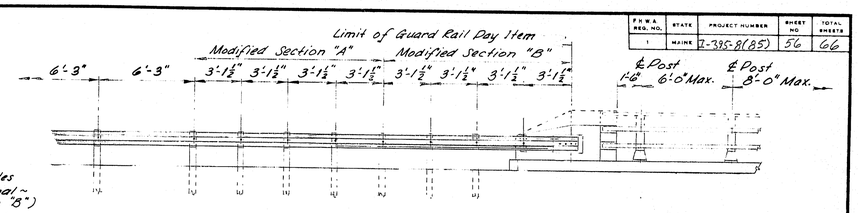
ELEVATION

2-Bar Bridge Rail (Aluminum or Steel)

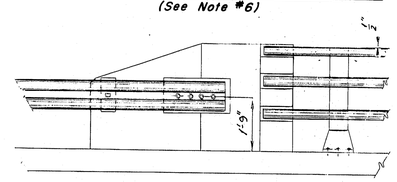


MODIFIED GUARD RAIL SECTIONS

(See Note #6)

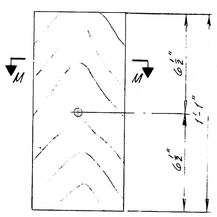


RAILING - ELEVATION



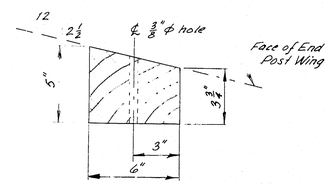
ELEVATION

3-Bar Bridge Rail (Aluminum or Steel)

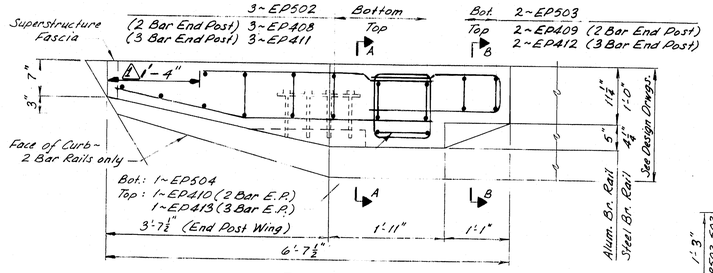


CUSHION BLOCK

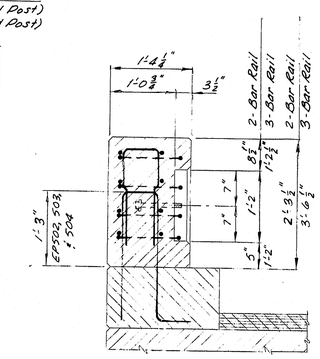
(See Note #7)



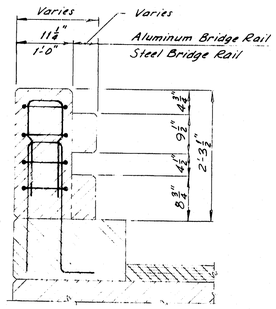
SECTION M-M



PLAN

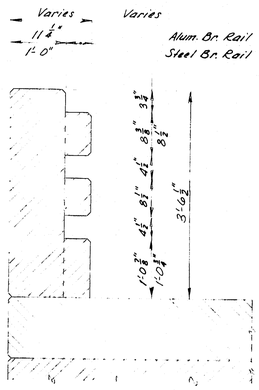


SECTION A-A



SECTION B-B

2-Bar Bridge Rail (Aluminum or Steel)

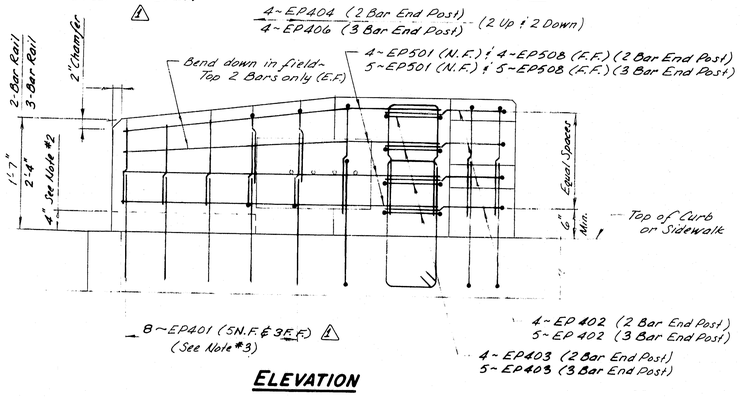


SECTION B-B

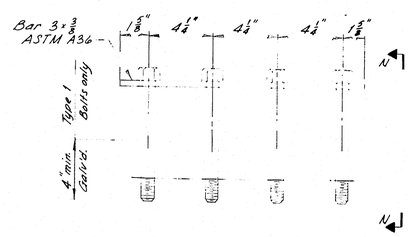
3-Bar Bridge Rail (Aluminum or Steel)

2 Bar End Post 4 ~ EP405
3 Bar End Post 4 ~ EP407 (3 N.F. & 1 F.F. ~ Cut to length in field) △1

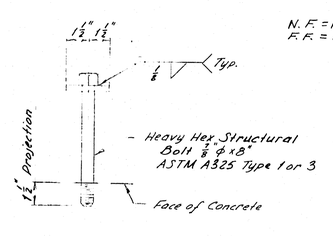
4 ~ EP404 (2 Bar End Post)
4 ~ EP406 (3 Bar End Post) (2 Up & 2 Down) △1



ELEVATION



GUARD RAIL ANCHORAGE



VIEW N-N

NOTES

1. For locations of End Posts on the structure, see Design Drawings.
2. At times, an End Post Wing may be cantilevered for all or part of its length. For details, see Design Drwgs.
3. If an End Post Wing is cantilevered, bars EP401 to be omitted as needed.
4. When End Post Wing is cantilevered more than 2'-0", all #5 bars shall be replaced by #7 bars.
5. Nuts for ⅞"ϕ anchor bolts shall be incidental to Guard Rail Pay Items. Nuts shall conform to A.S.T.M. A563, Grade DH, galvanized in accordance with A.S.T.M. A153, or Grade C3, plain.
6. Additional holes in the Modified Guard Rail Sections may be made by drilling, punching, or any other method that produces a neat, clean hole of the required size. Burning of holes will not be allowed.
7. Cushion Block material shall be as specified for Wood Posts in Subsection 710.07 (a). Payment for Cushion Blocks and Lag Bolts shall be incidental to the Guard Rail Pay Items.
8. Reinforcing Steel shall have 2" min. concrete cover.
9. After installation of Guard Rail is complete, upset the thread on the anchor bolts in three places around each bolt, at the junction of the nut and the exposed thread, with a center punch or similar tool.
10. Guard Rail Anchorage shall be incidental to the applicable concrete pay item.
11. End Posts shall be constructed normal to grade unless otherwise shown on Design Drawings.

LEGEND △1

N.F. = Near Face E.F. = Each Face
F.F. = Far Face

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	D. Damron	Nov. '81
CHECKED		
REVISIONS		
FIELD CHANGES		

REVISIONS	DATE
△1 General Revisions	1-83

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS

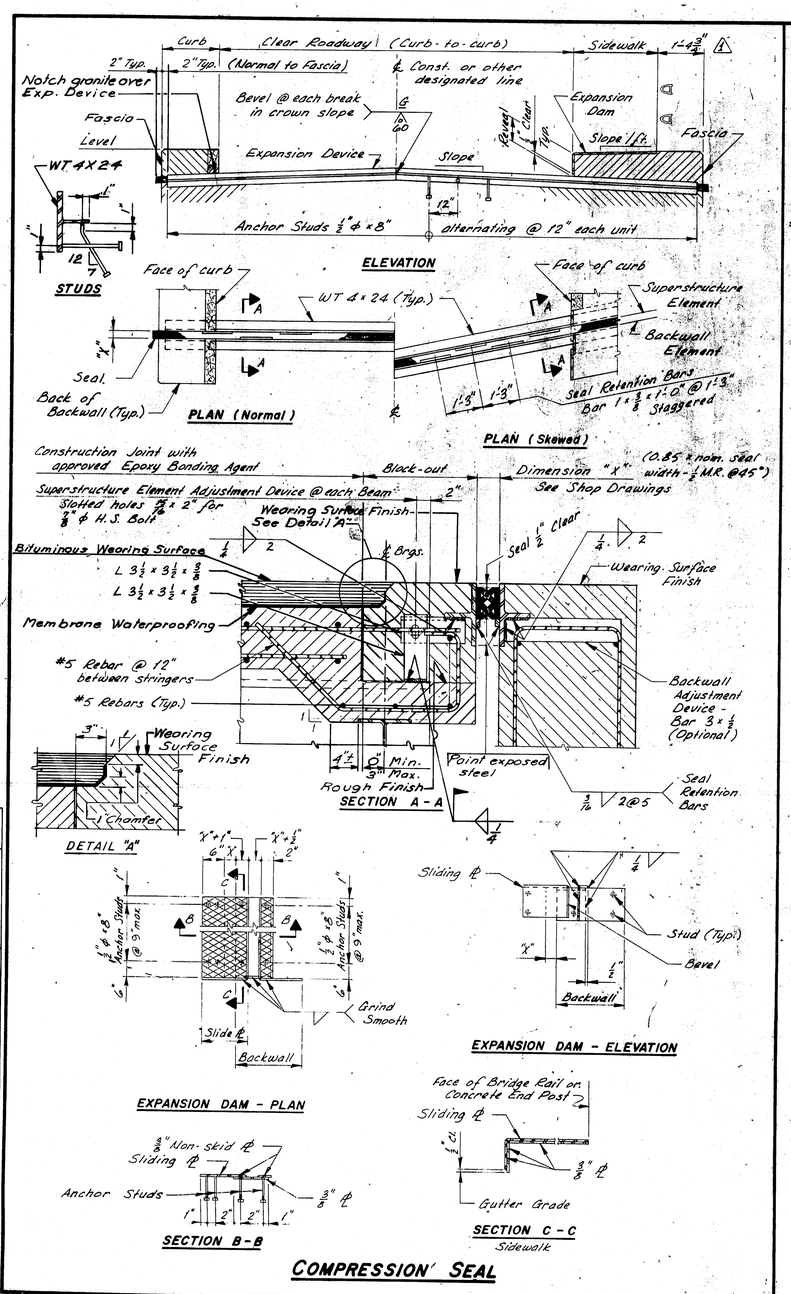
(BD 120-81)

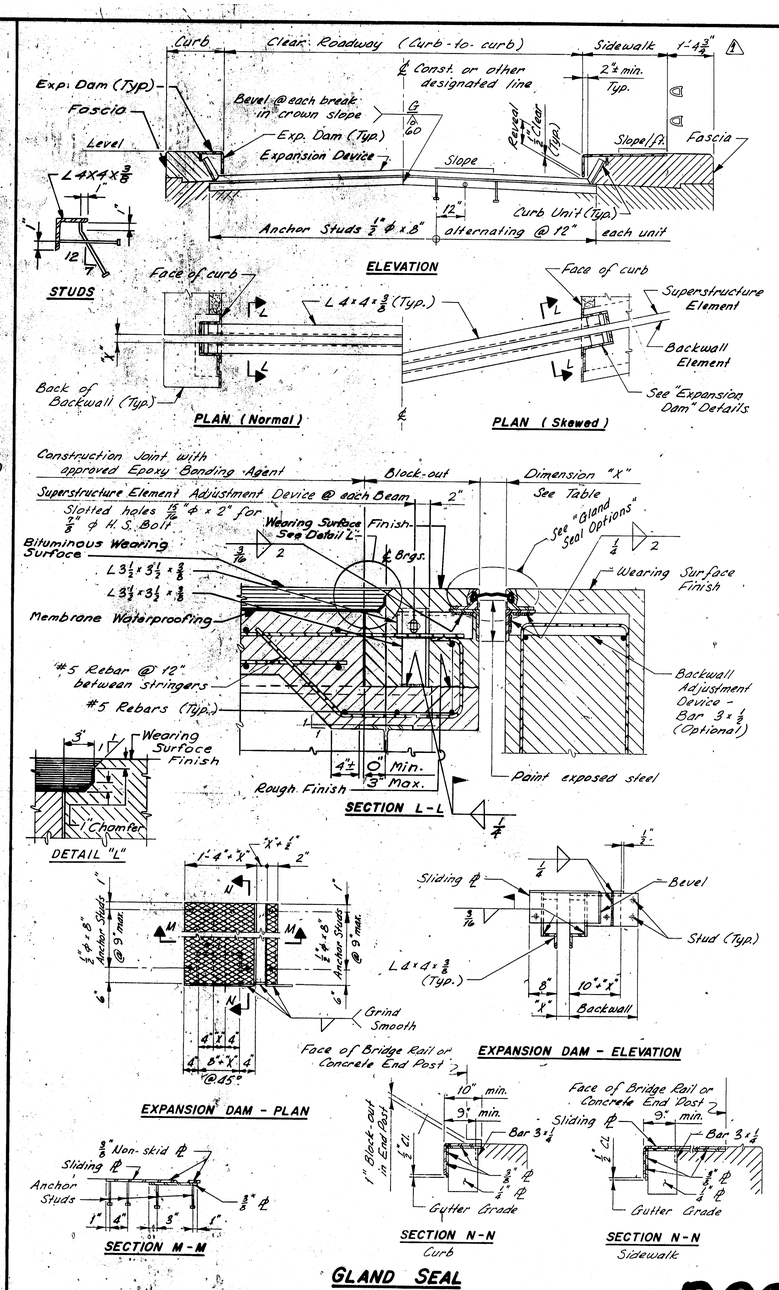
CONCRETE END POSTS

SHEET OF AUGUSTA, MAINE JUNE 1981

R88-455

BRUNNE 44-132-45710

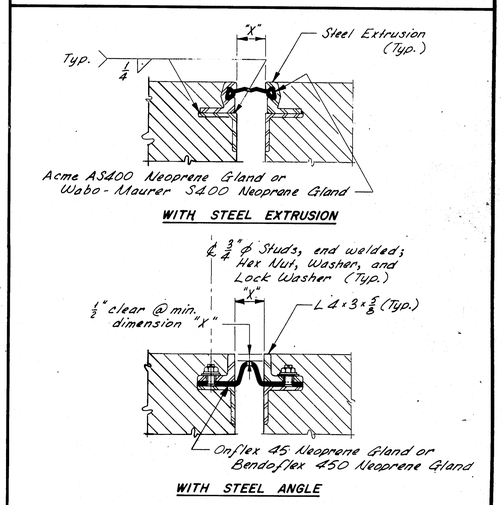




NOTES: 1

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	I-395-8(805)	57	66

1. Each Expansion Device Unit consists of one pair of matching Elements and Expansion Dams as required. At joints over Piers, two Superstructure Elements shall be used.
2. Welding to reinforcing steel will be allowed in the top 1'-6" of the Abutment backwall.
3. See Design Drawings for dimensions, slopes, skew, and all other information necessary to fabricate and install the units. Expansion Devices shall be installed normal to grade.
4. The concrete in the Superstructure Adjustment Device Block-out may be placed with the Sidewalk, and Curb Concrete.



GLAND SEAL OPTIONS

GLAND SEAL SETTING TABLE

Total Movement Required *	Dim. "X" (Measured parallel to ℄ of Roadway) TEMPERATURE (°F) 120°	105°	90°	75°	60°	45°	30°	15°	0°	-15°	-30°
1 1/2"	1"	1 1/8"	1 1/4"	1 1/2"	1 5/8"	1 3/4"	1 7/8"	2"	2 1/4"	2 3/8"	2 1/2"
2"	3/4"	1"	1 1/8"	1 3/8"	1 1/2"	1 5/8"	2"	2 1/8"	2 3/8"	2 1/2"	2 3/4"
2 1/2"	1/2"	3/4"	1"	1 1/8"	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"
3"	1/4"	1/2"	3/4"	1 1/8"	1 3/4"	2"	2 1/4"	2 3/8"	2 5/8"	3 1/8"	3 1/2"

* Multiply expanding length of Superstructure, in feet, by 0.125 in./ft.
Max. Dimension "X" allowed = 3 1/2" @ -30°F

REVISIONS	DATE
1 General Revisions	1-83

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS

(BD 125 - 82)

(FOR USE WITH BITUMINOUS WEARING SURFACE)

EXPANSION DEVICE

COMPRESSION SEAL
GLAND SEAL

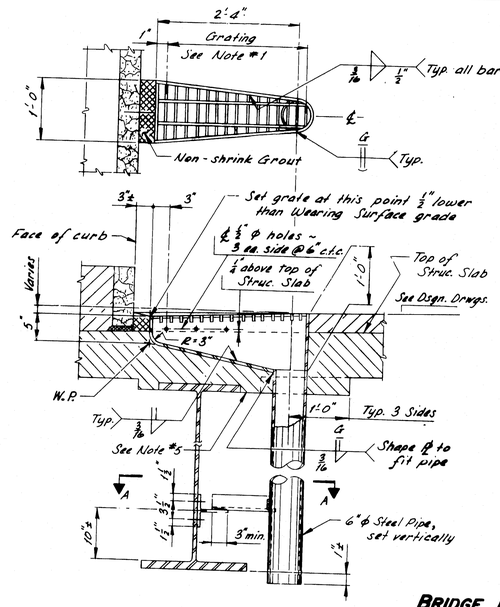
SHEET OF AUGUSTA, MAINE AUGUST 1982

PROJECT DESIGN ENGINEER	BY	DATE
PLANS — DESIGN-DETAILED	D. Dimmick	Aug. 81
CHECKED		
RED STOCKS		
FIELD CHANGES		

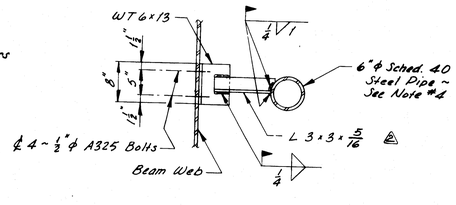
BRUNING 44-132 45710

R88-456

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO	TOTAL SHEETS
1	MAINE	F-395-A(B5)	58	66



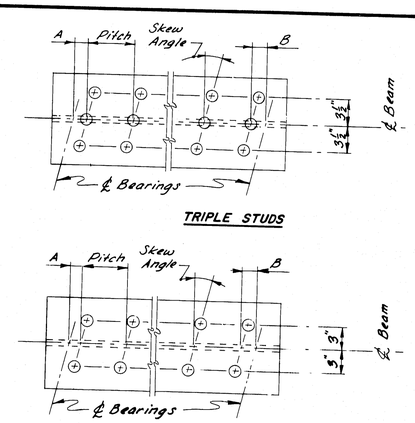
BRIDGE DRAIN



SECTION A-A

NOTES:

1. Grating shall be a commercial heavy-duty grating with 1 1/16" x 3/16" bearing bars spaced at 2 3/8" c.t.c., and 3/8" ϕ cross bars spaced at 4" c.t.c.
2. Plates shall be A.S.T.M. A36, ¼" thick.
3. WT 6x13 shall be of the same material as the beam web.
4. At the option of the Contractor, the Bridge Drain may be modified to allow the use of T.S. 6x6x¼ conforming to A.S.T.M. A501 or A.S.T.M. A500, Gr. "A", in place of the 6" ϕ steel pipe.
5. If the minimum thickness of concrete below the Drain is 2" or less, the haunch shall be extended as shown.
6. Painting will not be required when the structural steel is specified to be unpainted.
7. Payment for Bridge Drain shall be as specified under subsection 502.19 of the Standard Specifications.

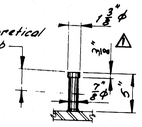


TRIPLE STUDS

DOUBLE STUDS

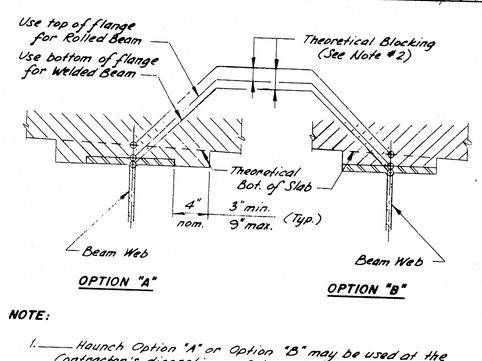
NOTE:

1. See Design Drawings for Dim's. "A" & "B", stud pitch, and skew angle.



SHEAR CONNECTORS

STUD DETAIL

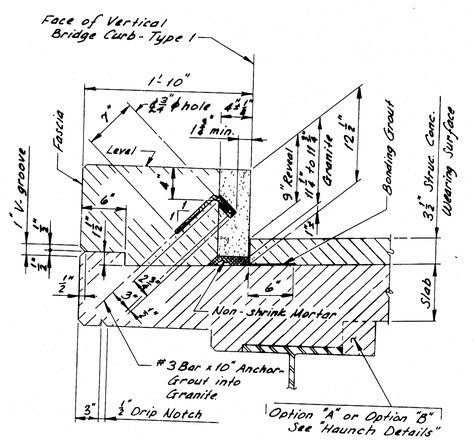


OPTION "A" OPTION "B"

NOTE:

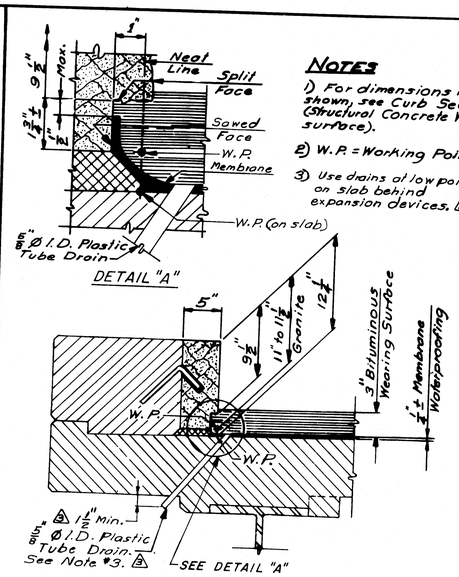
1. Haunch Option "A" or Option "B" may be used at the Contractor's discretion. Only one option shall be used on each structure, except that Option "A" must always be used on the fascia side of all fascia beams and on beams designed without shear connectors.
2. Theoretical Blocking shall be as indicated on Design Drawings.
3. Do not use Theoretical Blocking for setting of formwork.

HAUNCH DETAILS



CURB SECTION

(STRUCTURAL CONCRETE WEARING SURFACE)

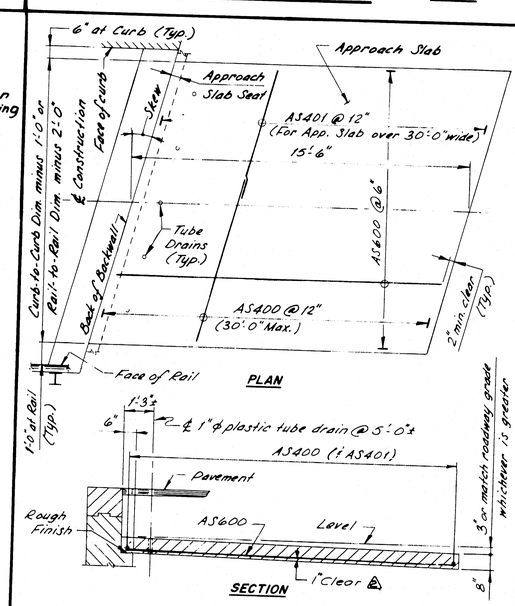


NOTES

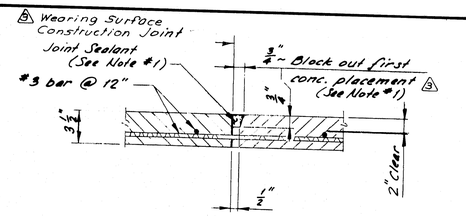
1) For dimensions not shown, see Curb Section (Structural Concrete Wearing Surface).
2) W.P. = Working Point.
3) Use drains at low points on slab behind expansion devices.

CURB SECTION

(BITUMINOUS WEARING SURFACE)



APPROACH SLAB



WEARING SURFACE DETAIL

NOTE:

1. Use Block-out and Sealant only at Wearing Surface Construction Joints over Structural Slab Construction Joints. At all other joints, brush joint with neat cement paste before making adjacent concrete placement.

STRUCTURAL CONCRETE WEARING SURFACE

REVISIONS		DATE
1	Revised Stud Detail	3-82
2	Added Curb Section	7-82
3	Added Plastic Tube Drain & modified Structural Concrete Wearing Surface.	11-82
4	Revise Curb Anchorage	2-83

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS

(BD 126-81)

MISCELLANEOUS DETAILS

BRIDGE DRAIN - SHEAR CONNECTORS
STRUC. CONC. WEAR. SURFACE
CURB SECTION - APPROACH SLAB
HAUNCH DETAILS

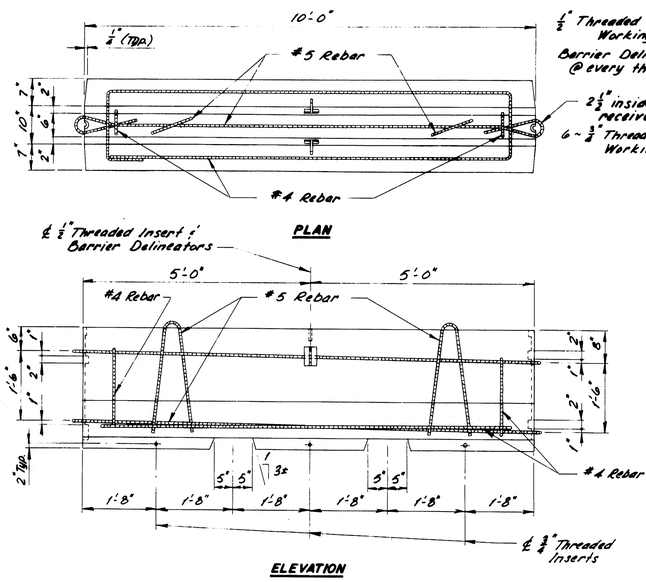
SHEET OF AUGUSTA, MAINE JUNE 1981

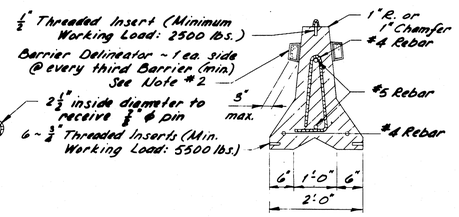
PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED	D.R. Stevens	Apr. 81
CHECKED		
REVISIONS		
FIELD CHANGES		

BRUNING 44-132 42710

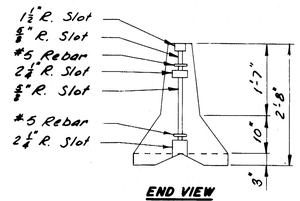
R88-457

F.H.W.A. REG. NO.	STATE	PROJECT NUMBER	SHEET NO.	TOTAL SHEETS
1	MAINE	I-395-8(85)	59	66

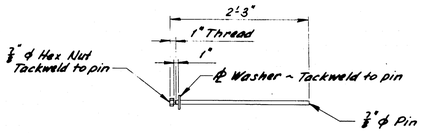




TYPICAL SECTION



END VIEW



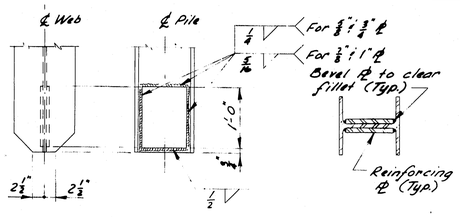
CONNECTING PIN

NOTES:

1. The reinforcing steel, end connections, lifting arrangement, and sizes and locations of hold-down inserts are advisory only. It shall be the Contractor's responsibility to provide adequate reinforcing, end connections, lifting points, and hold-down arrangements.

2. Barrier Delineators shall be bi-directional with a minimum effective reflex area of 8.0 square inches as approved by the Engineer. The Reflector shall preferably be of Methyl Methacrylate, and the Housing of Acrylonitrile Butadiene Styrene.

TEMPORARY CONCRETE BARRIER - TYPE 1



Pile Size	Reinf. ℄ Size
HP 10 x 42	8 3/4" x 5/8" x 1'-0"
HP 10 x 57	8 3/4" x 7/8" x 1'-0"
HP 12 x 53	10 3/4" x 5/8" x 1'-0"
HP 12 x 63	10 3/4" x 3/4" x 1'-0"
HP 12 x 74	10 3/4" x 7/8" x 1'-0"
HP 14 x 73	12 1/4" x 5/8" x 1'-0"
HP 14 x 89	12 1/4" x 1" x 1'-0"

NOTES:

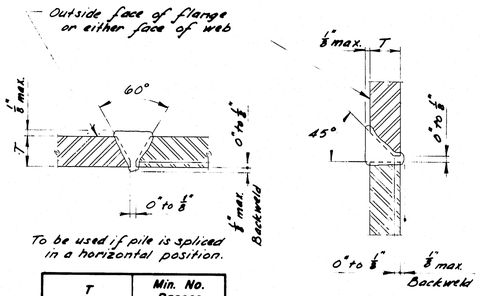
1. Alternate Pointed Reinforced Pile Tips may be used if they have at least the cross-sectional area of the pile tip shown and are approved by the Engineer.

2. Plates may be shop or field welded.

3. Use Manual Shielded Metal-Arc Process and 6010, 6011, or 6012 electrodes, unless a different process has been approved by the Engineer.

4. Electrodes shall be dry when used, in accordance with the provisions of A.W.S. Spec. D1.1, as amended by AASHTO.

POINTED REINFORCED PILE TIP



T	Min. No. Passes
7/16	3
1/2 ~ 9/16 ~ 5/8	4
11/16 ~ 13/16	5

NOTES:

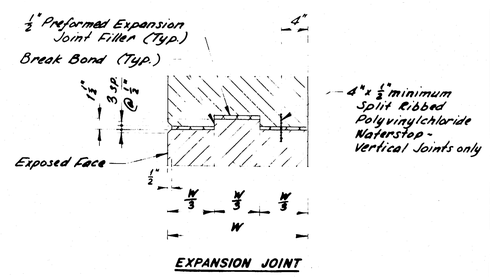
1. All cutting shall be done with the use of a mechanical guide.

2. Use Manual Shielded Metal-Arc Process and 6010, 6011, or 6012 electrodes, unless a different process has been approved by the Engineer.

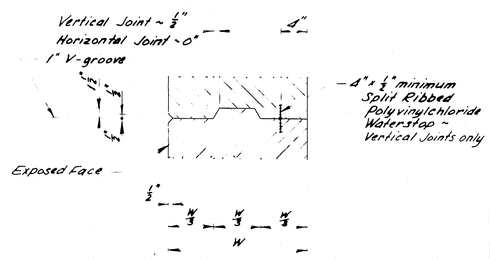
3. Electrodes shall be dry when used, in accordance with the provisions of A.W.S. Spec. D1.1, as amended by AASHTO.

4. Gouge root before welding second side.

PILE SPLICE

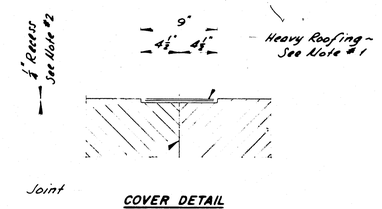


EXPANSION JOINT



CONSTRUCTION OR CONTRACTION JOINTS

CONCRETE JOINTS



COVER DETAIL

NOTES:

1. Where called for, cover horizontal and vertical construction, contraction, or expansion joints with two (2) 9" wide layers of heavy roofing felt. Coat the concrete and back of each layer as applied with plastic roofing cement.

2. Recess the covered area 1/4" unless otherwise indicated on Design Drawings.

CONCRETE JOINT COVER

PROJECT DESIGN ENGINEER	BY	DATE
PLANS DESIGN - DETAILED		
CHECKED		
REVISIONS		
FIELD CHANGES		

BRUNING 44-132-45710

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS
(BD 127-81)

MISCELLANEOUS DETAILS

TEMP. CONC. BARRIER - TYPE 1
POINTED REINF. PILE TIP
PILE SPLICE - CONC. JOINTS
CONCRETE JOINT COVER

SHEET OF AUGUSTA, MAINE JUNE 1981

R88-458