Chapter 11 - Structural Repairs

SECTION 03

JACKING SYSTEMS (SR-JS)

Chapter 11 - Structural Repairs

Section 03 – Jacking Systems

SUB-SECTION **01**

JACKING BEAM (SR-JS(JB))

DESIGN GUIDELINES FOR JACKING BEAMS

1) The temporary jacking system is to be designed at operating stress levels.

2) A five percent increase to the dead load beam reaction is required for deck stiffness.

3) Bolts shall be ASTM A 325 with the threads included in the shear plane if possible. The connection shall be designed in bearing with the reduced root area. ASTM A 490 bolts are acceptable.

4) Minimum stiffener and connection plate thickness shall be $\frac{1}{2}$".

5) Designers should attempt to minimize the number of different jacking systems for the bridge by designing a system that will work in multiple locations.

6) Minimum fillet weld size shall be $\frac{5}{16}$".

7) Avoid bent connection plates where possible. If the skew angle does not allow placing straight connection plates from the existing stiffener to the web, attach the connection plate full height to the existing web and design it as a stiffener. Place it far enough from the existing stiffener to allow welding the connection plate to the web and still have full bearing under the jacking system.

8) The jack stand can only accomodate a jack with a diameter of 6" or less. Most jacks greater than 75 tons will require a different stand.

9) The possibility of shifting traffic off of the stringer to be jacked should be discussed with the ADE-Traffic. This would allow designing for only dead load.

10) When designing a jacking beam the designer may want to start with the following trial sections:

* LOAD (X)	BOLTS	BEAM	CONNECTION PLATE
$X \leq 35K$	3 - $\frac{7}{8}$"ΦA 325	W 12 x 26	$\frac{1}{2}$" x 9"
$35K < X \leq 45K$	3 - 1"ΦA 325	W 14 x 26	$\frac{1}{2}$" x 11"
$45K < X \leq 60K$	4 - 1"ΦA 325	W 18 x 35	$\frac{1}{2}$" x 14$\frac{1}{2}$"
$60K < X \leq 80K$	4 - 1"ΦA 490	W 18 x 35	$\frac{1}{2}$" x 18"

* Load (X) is dead load and live load plus impact at the bolts

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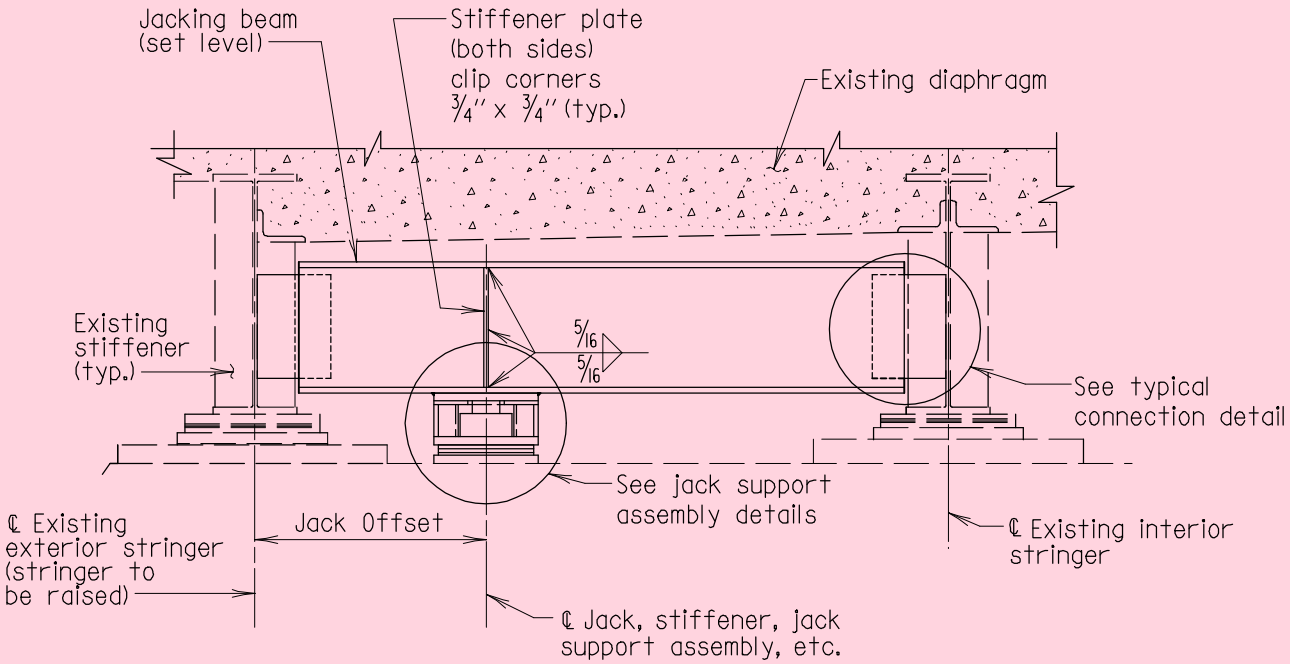
JACKING BEAM
DESIGN GUIDELINES

DETAIL NO. SR-JS(JB)-101 SHEET 1 OF 1

STRUCTURAL REPAIRS



EXTERIOR - JACKING BEAM

Scale : None

JACKING BEAM TABLE		
	Size:	Location:
Jacking Beam		
Steel Grade		
Stiffener Plate Size		
Jack Offset		
Maximum Jack Force		
Minimum Section Modulus		
Minimum Cross Sectional Web Area		
Minimum Web Thickness		

Notes:

1. Jacking beams do not have to be new, but shall be in good condition.
2. The jack shall not be used to support load during bearing repairs.
3. Jacking beams shall be placed level unless otherwise noted.
4. The Contractor has the option of submitting another method of jacking to the Engineer for approval. The design shall be done by a PE registered in Md.
5. Jacking beams shall be kept low to minimize height of stacked plates or the HP column jack support.
6. Anchor bolt nuts may need to be loosened at the exterior and adjacent interior stringers to allow the stringer to rise.
7. Stringers shall not be raised more than 1/8" above its existing elevation.

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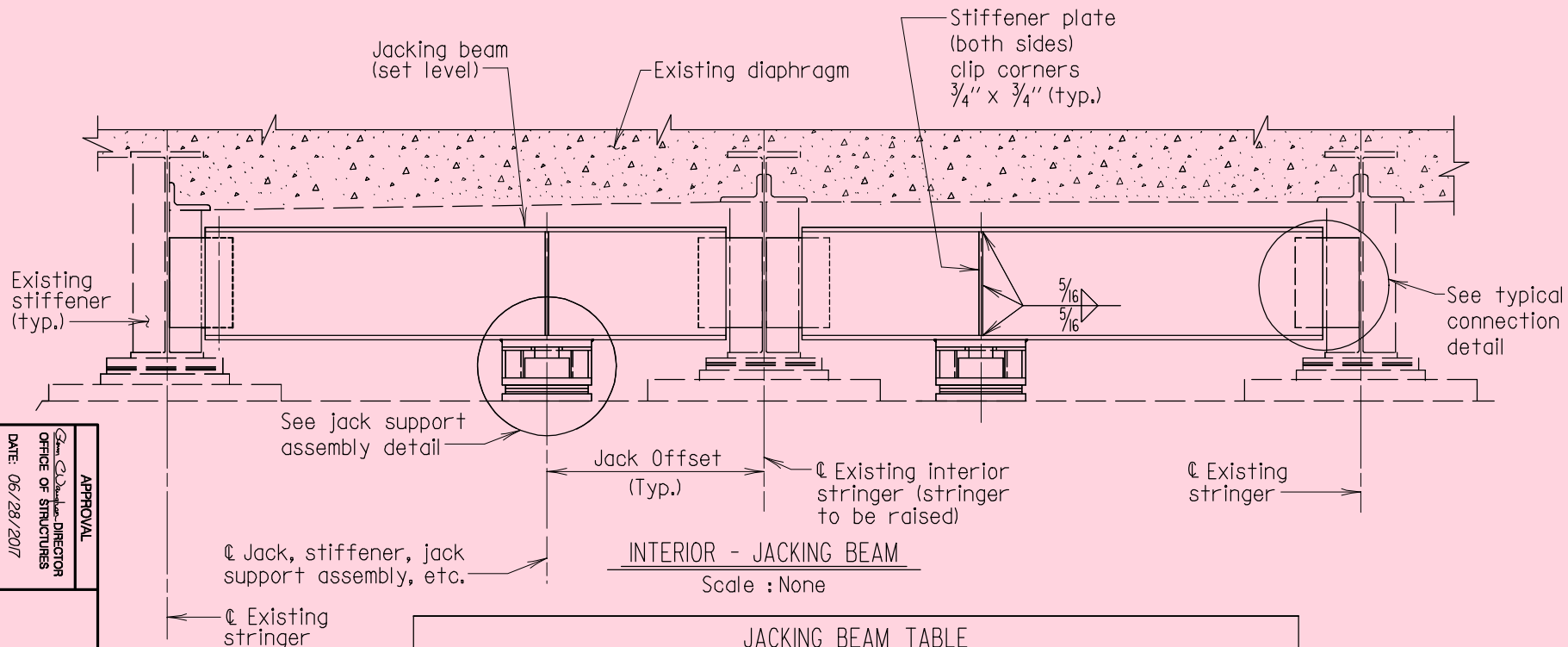
VERSION 1.0	DETAIL NO. SR-JS(JB)-102 SHEET 1 OF 6

STRUCTURAL REPAIRS



INTERIOR - JACKING BEAM

Scale : None

JACKING BEAM TABLE		
	Size:	Location:
Jacking Beam		
Steel Grade		
Stiffener Plate Size		
Jack Offset		
Maximum Jack Force		
Minimum Section Modulus		
Minimum Cross Sectional Web Area		
Minimum Web Thickness		

Notes:

1. Jacking beams do not have to be new, but shall be in good condition.
2. The jack shall not be used to support load during bearing repairs.
3. Jacking beams shall be placed level unless otherwise noted.
4. The Contractor has the option of submitting another method of jacking to the Engineer for approval. The design shall be done by a PE registered in Md.
5. Jacking beams shall be kept low to minimize height of stacked plates or the HP column jack support.
6. Anchor bolt nuts may need to be loosened at the exterior and adjacent interior stringers to allow the stringer to rise.
7. Stringers shall not be raised more than 1/8" above its existing elevation.

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INTERIOR BEAM JACKING DETAILS

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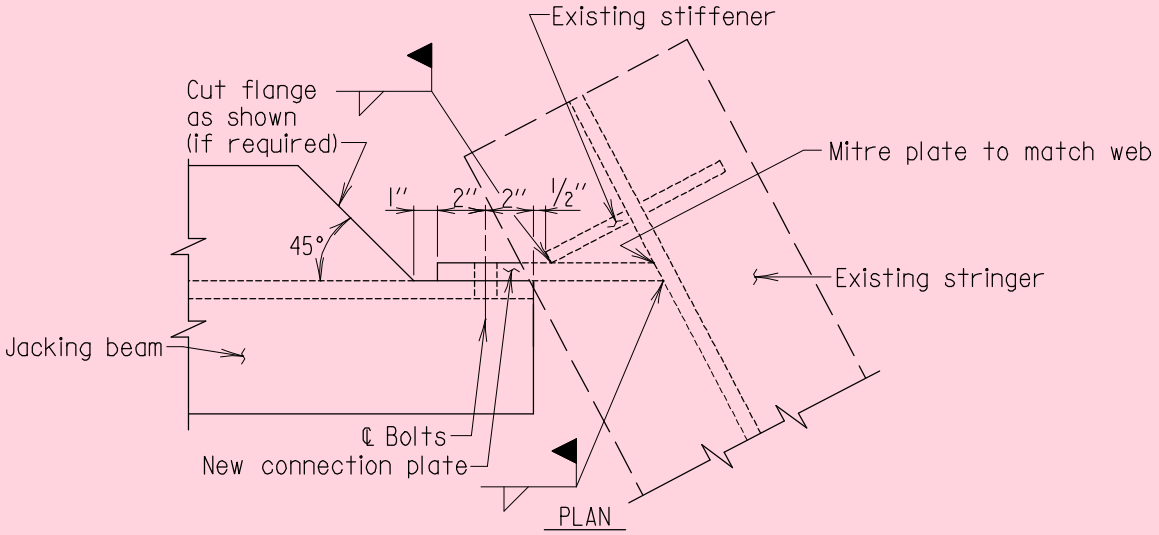
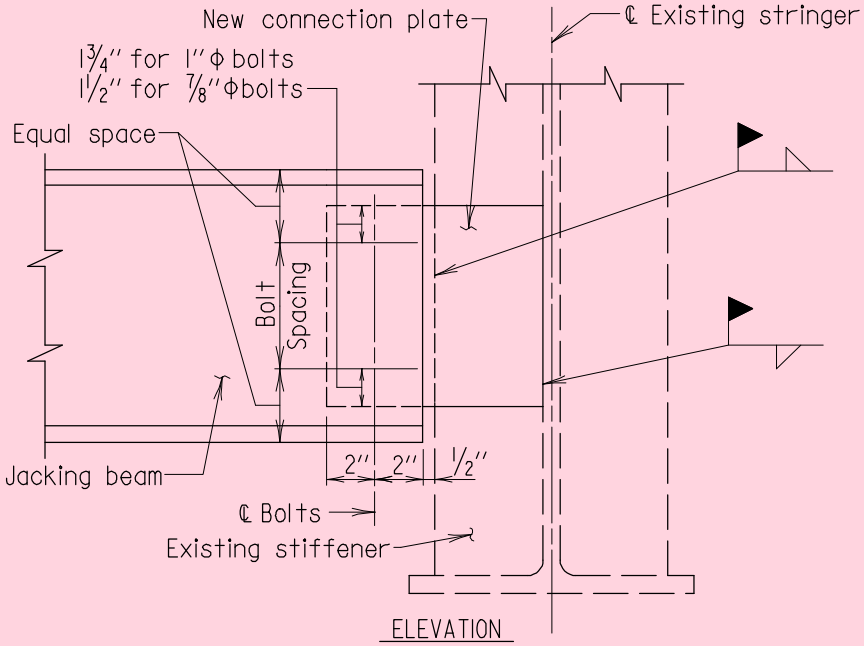
SHEET 2 OF 6

STRUCTURAL REPAIRS





TYPICAL SKEWED CONNECTION DETAIL

Scale : None

CONNECTION DETAILS		
	Materials:	Location:
Connection Plate Size		
Connection Plate Weld		
Number of Bolts		
Bolt (Type and Size)		
Bolt Spacing c/c		
Existing Stiffener Plate Size		
Steel Grade		

Notes:
Any steel that has been welded to the existing bridge shall remain in place. The repaired area and any other areas damaged shall be repaired in conformance with 430.

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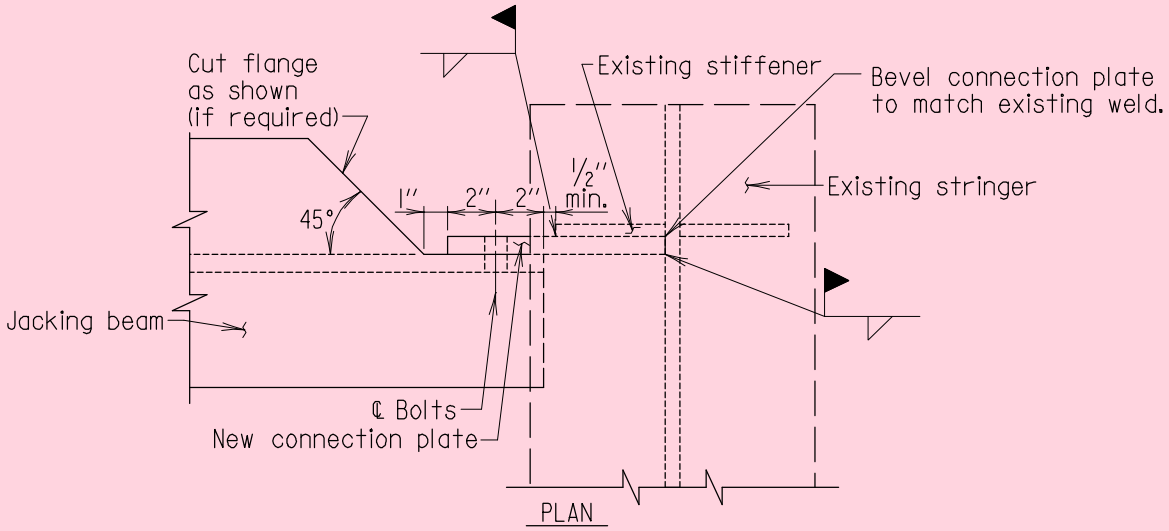
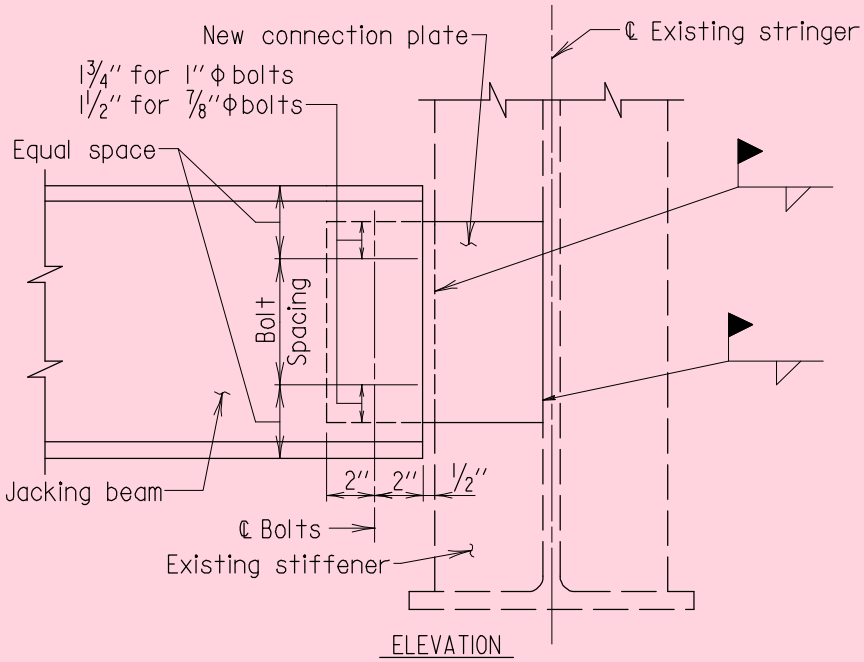
SKEWED CONNECTION DETAILS

DETAIL NO. SR-JS(JB)-102 SHEET 3 OF 6

STRUCTURAL REPAIRS



PLAN



ELEVATION

TYPICAL 90° CONNECTION DETAIL

Scale : None

CONNECTION DETAILS		
	Materials:	Location:
Connection Plate Size		
Connection Plate Weld		
Number of Bolts		
Bolt (Type and Size)		
Bolt Spacing c/c		
Existing Stiffener Plate Size		
Steel Grade		

Notes:
Any steel that has been welded to the existing bridge shall remain in place. The repaired area and any other areas damaged shall be repaired in conformance with 430.

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90° CONNECTION DETAILS

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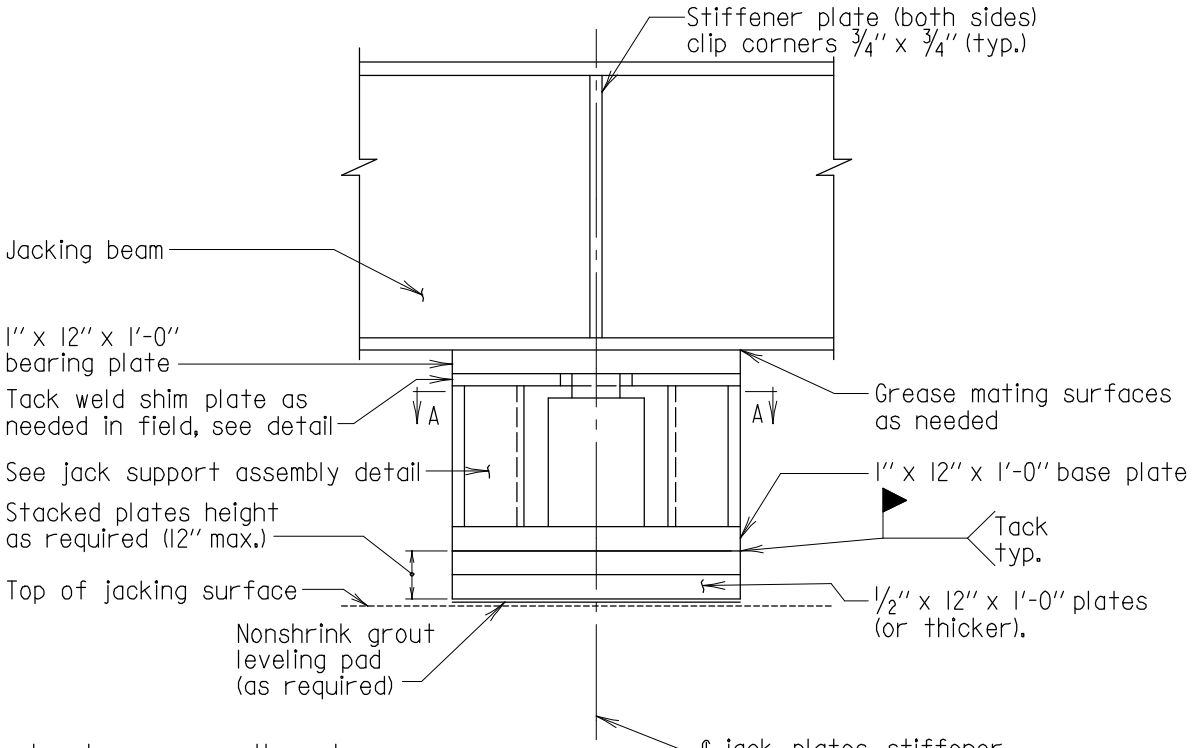
STRUCTURAL REPAIRS

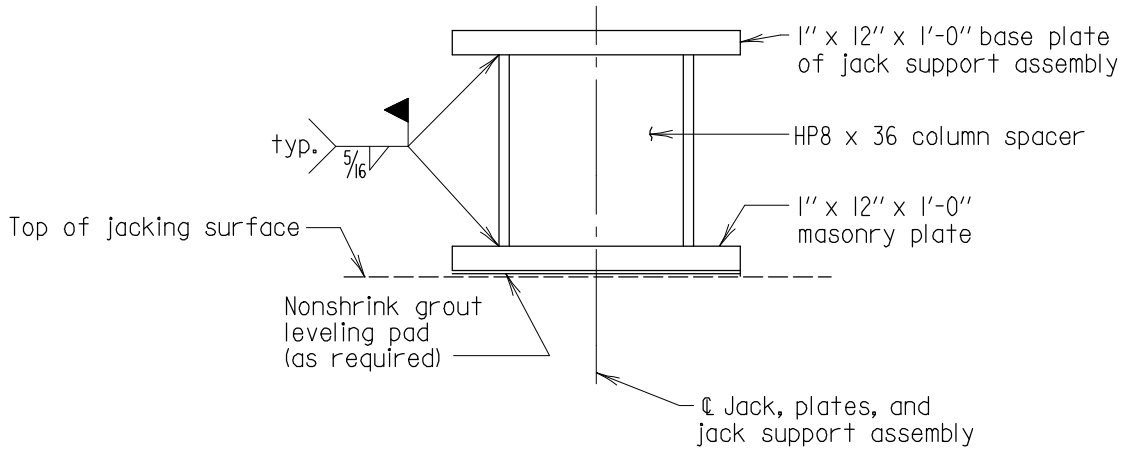


Note:
The contractor may use the column spacer instead of stacked plates. The column spacer shall be used for heights greater than 12" to a maximum of 5'-0" high.

ELEVATION

JACK SUPPORT USING STACKED PLATES

Scale : None



ELEVATION

ALTERNATE COLUMN SPACER DETAIL

Scale : None

Notes:
1. Minimum thickness of the grout leveling pad shall be as recommended by manufacturer.
2. Jack shall be centered under jacking beam web and stiffeners.
3. Stacked plates shall not exceed 12" high.
4. HP8 x 36 column spacer shall not exceed 5'-0" high.
5. All material to be ASTM A 709 Grade 36 or Grade 50 as approved by the engineer.

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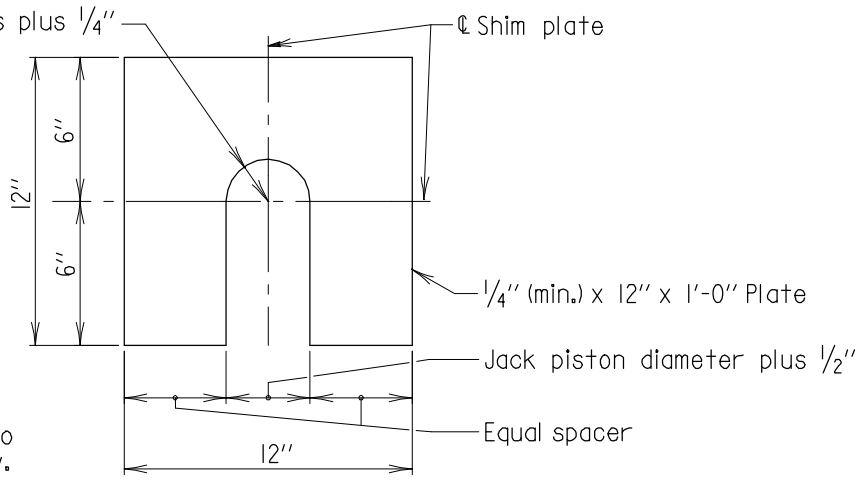
JACK SUPPORT ASSEMBLY

DETAIL NO. SR-JS(JB)-102 SHEET 5 OF 6

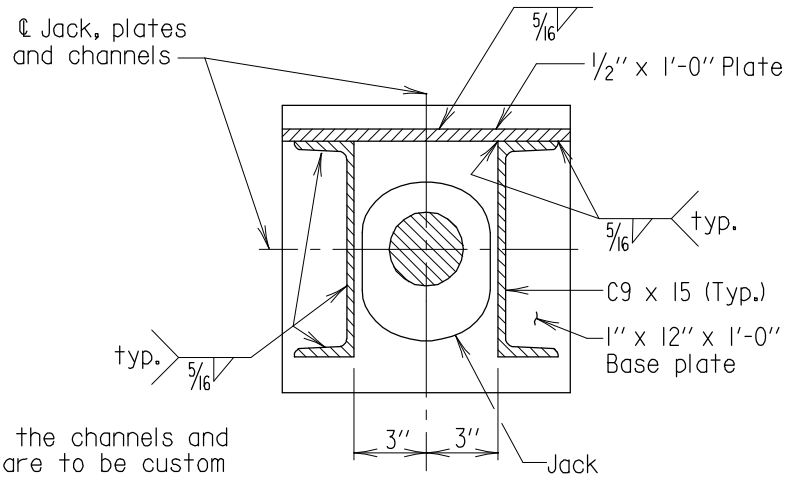
STRUCTURAL REPAIRS



Note:
This plate is not welded to the jack support assembly.

SHIM PLATE DETAIL

Scale : None



Note:
The length of the channels and the 1/2" plate are to be custom fit to the jack being used.

SECTION A-A

Scale : None

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VERSION 1.0	DETAIL NO. SR-JS(JB)-102 SHEET 6 OF 6

STRUCTURAL REPAIRS

JACKING CHART

SUPPORT & SPAN	MEMBER	EXPECTED MINIMUM FORCE (LBS)	EXPECTED MAXIMUM FORCE (LBS)	JACK PISTON DIAMETER (IN)	RECORDED LIFT PRESSURE READING (PSI)	RECORDED MAXIMUM PRESSURE READING (PSI)	CALCULATED MAXIMUM FORCE (LBS)
ENG.	ENG.	ENG.	ENG.	INSPECTOR	INSPECTOR	INSPECTOR	INSPECTOR

CALCULATED MAXIMUM FORCE = [RECORDED MAXIMUM PRESSURE READING] * [0.785 * JACK PISTON DIAMETER^2]

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VERSION 1.0	DETAIL NO. SR-JS(JB)-103 SHEET 1 OF 1

Chapter 11 - Structural Repairs

Section 03 – Jacking Systems

SUB-SECTION **02**

PRESTRESSING BAR (SR-JS(PSB))

DESIGN GUIDELINES FOR JACKING BEAMS USING PRESTRESSING BARS

1. A five percent increase to the dead load beam reaction is required for deck stiffness.
2. Prestressing Bars (i.e. Dywidags or All-Thread Bars) shall have an ultimate tensile strength of 150KSI (fpu) and have a diameter of 1⅜".
3. The prestressing load (i.e. the resulting tensile force required to counter the DL + LL + Impact loads) of the prestressing steel shall be 60% of the specified minimum tensile strength (fpu).
4. The ultimate strength in shear shall be evaluated at 60% of the ultimate tensile strength (fpu).
5. The lock-off load should not exceed 70% of the specified minimum tensile strength of the prestressing steel. This accounts for a 10% relaxation of the prestressing steel.
6. Each Bracket shall be connected to the Pier Cap with a minimum of 4-prestressing bars.
7. Once the number of prestressing bars have been selected, the designer shall place the bars on the Pier Cap is such a way to avoid all primary reinforcing steel as based on existing plans. The designer shall add a note to the plans requiring the contractor to verify the location of the primary reinforcing steel prior to drilling for any prestressing bars.
8. The minimum edge distance for the placement of the brackets shall be 12" from the edge of the nearest drilled hole.
9. The Jack Support Assembly, Brackets, and Cap Plates have been designed for a maximum design load (i.e. DL + LL + Impact loads) of 220-KIPS.
10. For design loads greater than 220-KIPS, the designer shall consider the possibility of shifting traffic off of the member to be jacked to remove the LL+Impact loads. This option shall be discussed with the Division Chief before discussing with the ADE of Traffic.
11. The Jack Support Assembly has been fabricated to accommodate standard jack and pancake jack diameters up to 9.5".
12. The exterior flange of the Brackets have been designed for a maximum lock-off load of 136-kips.
13. The designer shall evaluate the compressive capacity of the Pier Cap with respect to the group prestressing lock-off load. The compressive capacity of the Pier Cap shall be taken as 0.3fc'.

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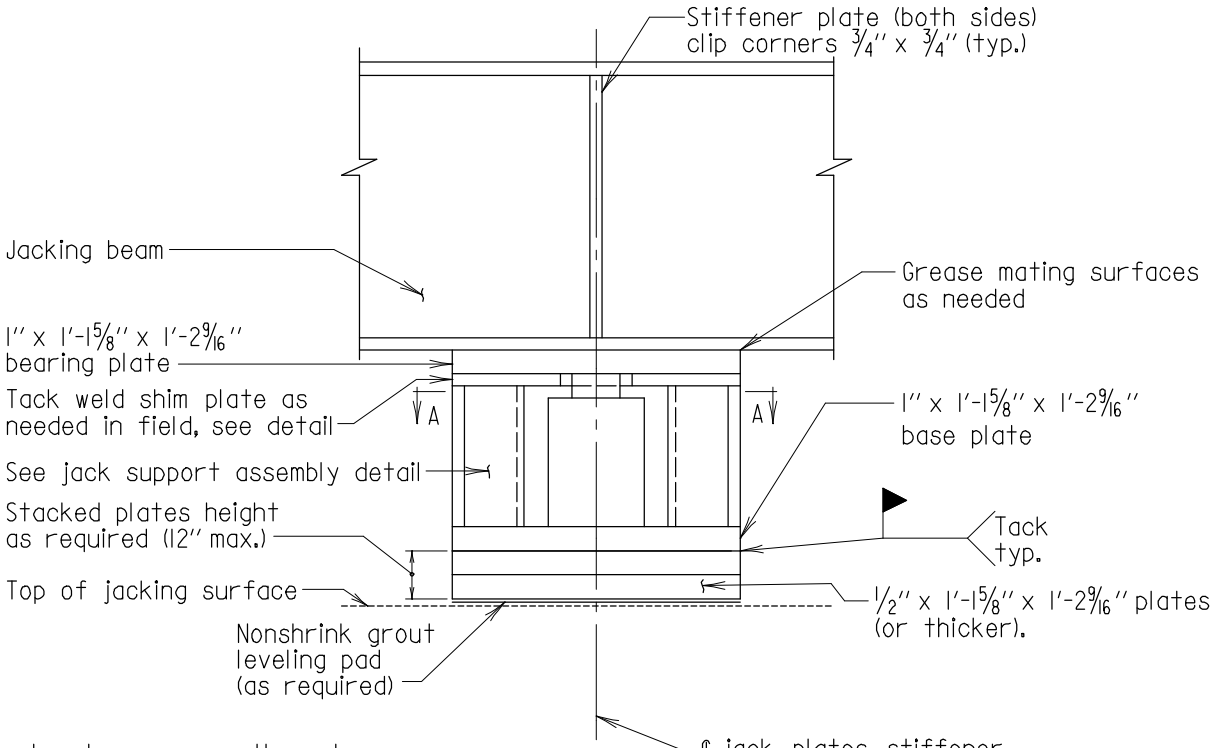
VERSION 1.0	DETAIL NO. SR-JS(PSB)-101 SHEET 1 OF 1

STRUCTURAL REPAIRS

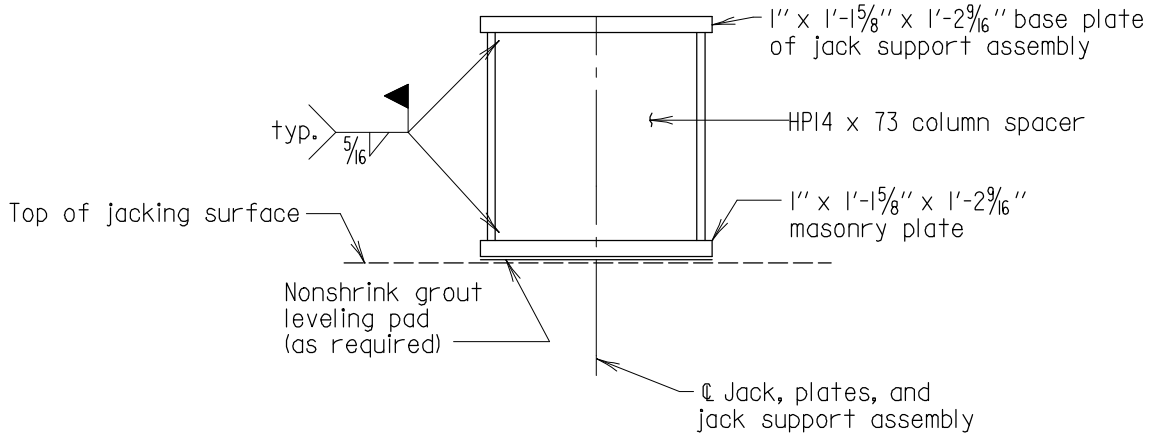


Note:
The contractor may use the column spacer instead of stacked plates. The column spacer shall be used for heights greater than 12" to a maximum of 5'-0" high.

ELEVATION

JACK SUPPORT USING STACKED PLATES

Scale : None



ELEVATION

ALTERNATE COLUMN SPACER DETAIL

Scale : None

Notes:
1. Minimum thickness of the grout leveling pad shall be as recommended by manufacturer.
2. Jack shall be centered under jacking beam web and stiffeners.
3. Stacked plates shall not exceed 12" high.
4. HP14x73 column spacer shall not exceed 5'-0" high.
5. All material to be ASTM A 709 Grade 50.

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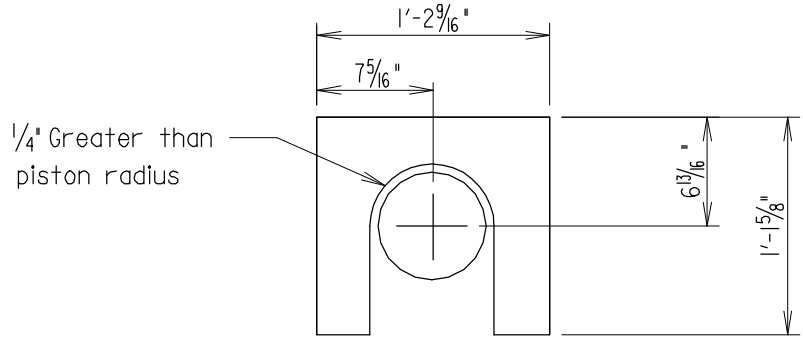
JACK SUPPORT ASSEMBLY
FOR PRESTRESSING BAR BRACKETS

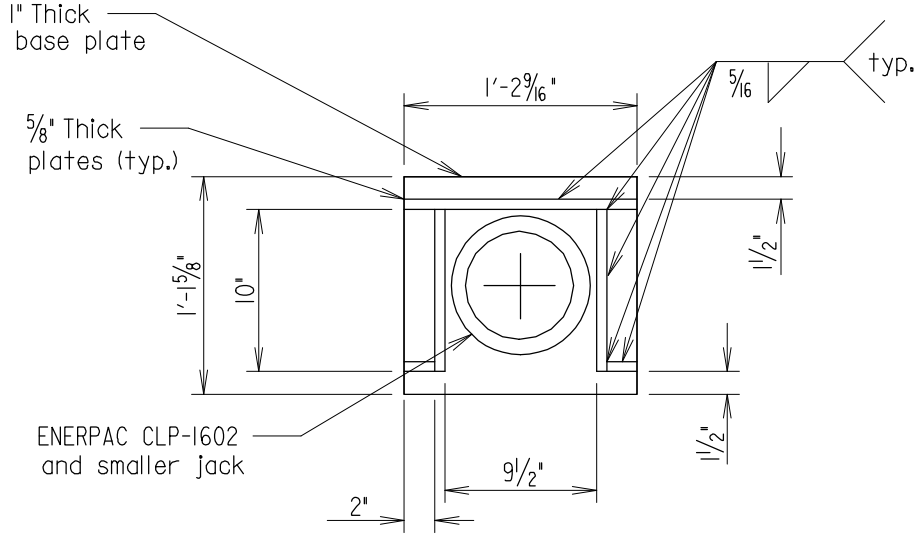
DETAIL NO. SR-JS(PSB)-102 SHEET 1 OF 2

STRUCTURAL REPAIRS



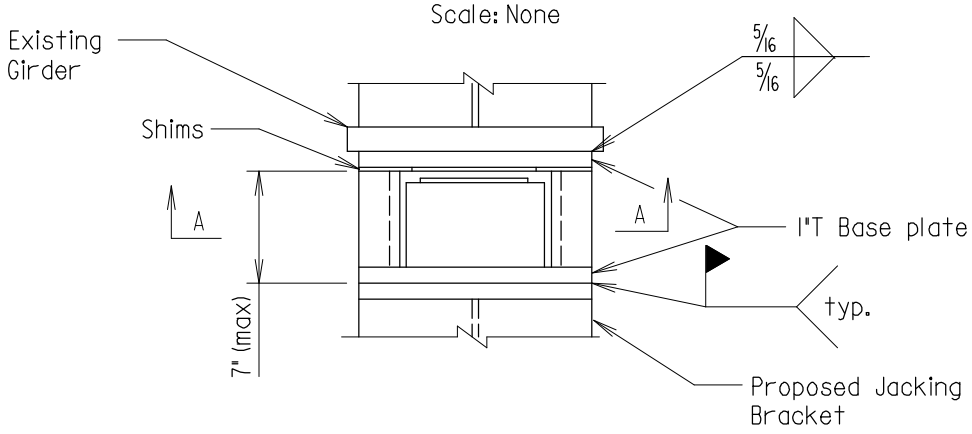
SHIM PLATE DETAIL

Scale: None



SECTION A-A

Scale: None



JACKING ASSEMBLY ELEVATION

Scale: None

NOTES:

1. All steel shall be ASTM A709, Grade 50.
2. For skewed members and/or substructure units. Refer to the Cap Supplement Detail.

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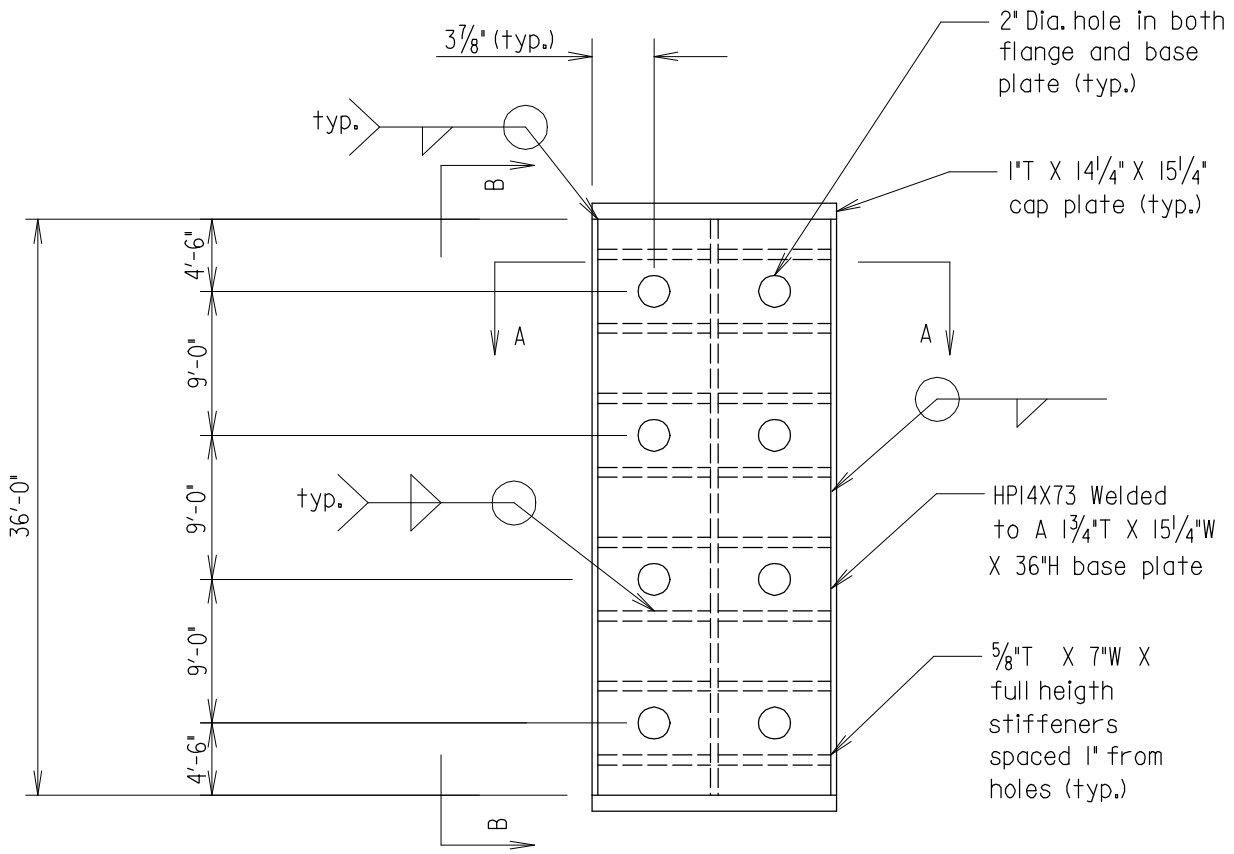
JACK SUPPORT ASSEMBLY FOR PRESTRESSING BAR BRACKETS

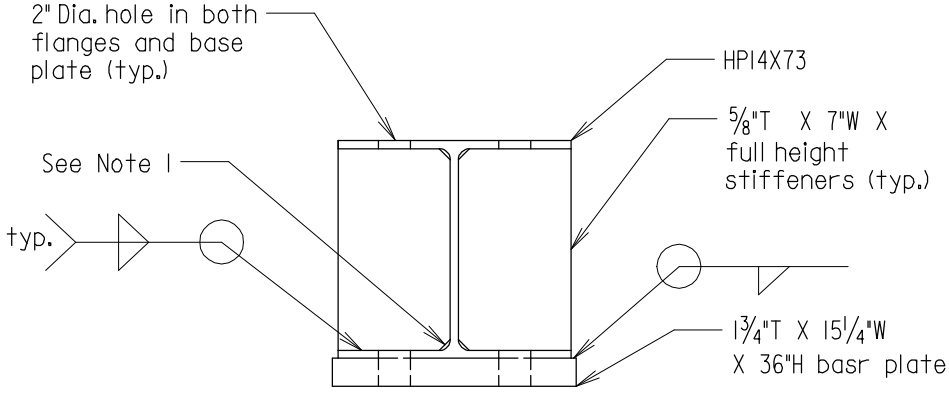
DETAIL NO. SR-JS(PSB)-102 SHEET 2 OF 2

STRUCTURAL REPAIRS



PIER FACE BRACKET DETAIL

Scale: 1" = 1'-0"



SECTION A-A

Scale: 1" = 1'-0"

Note:
Cap plates not shown for clarity.

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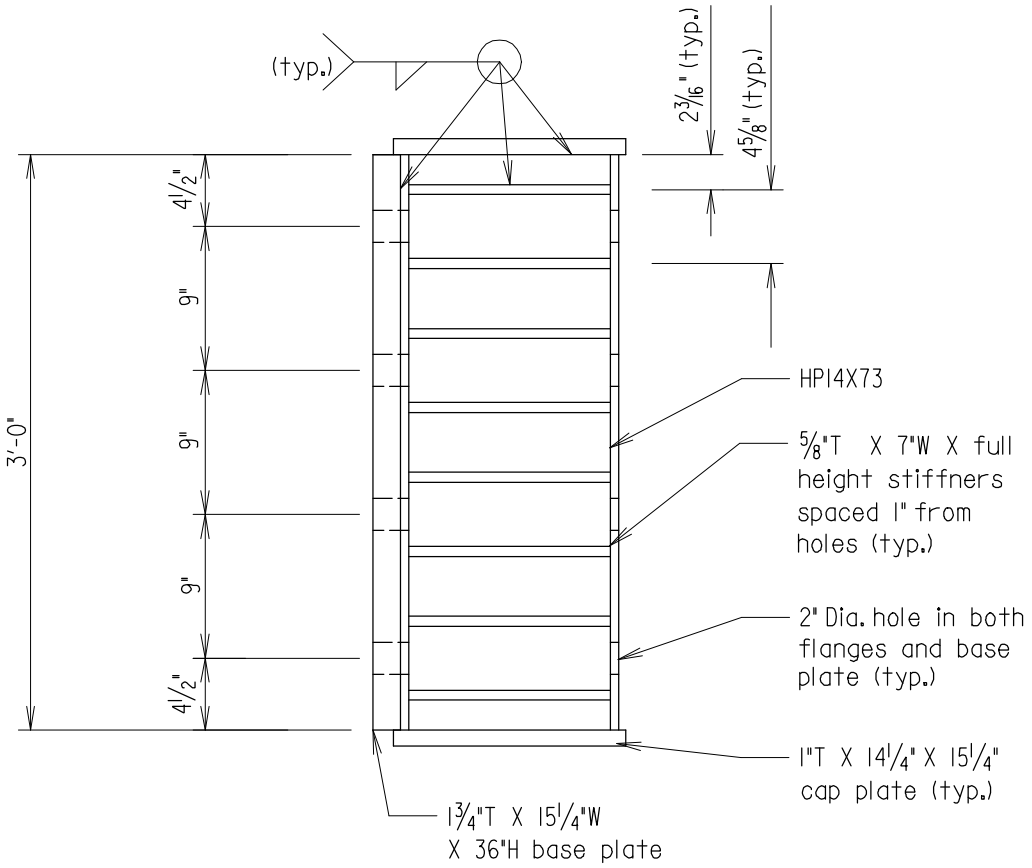
VERSION 1.0	DETAIL NO. SR-JS(PSB)-103 SHEET 1 OF 3

STRUCTURAL REPAIRS



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

Notes:
1. Chamfer new plate as shown to clear fillet so that edges of plate fit flush against flange and web of HP Section.
2. All steel shall be ASTM A709, GRADE 50.
3. For skewed members and/or substructure units, refer to The Cap Supplement Detail.

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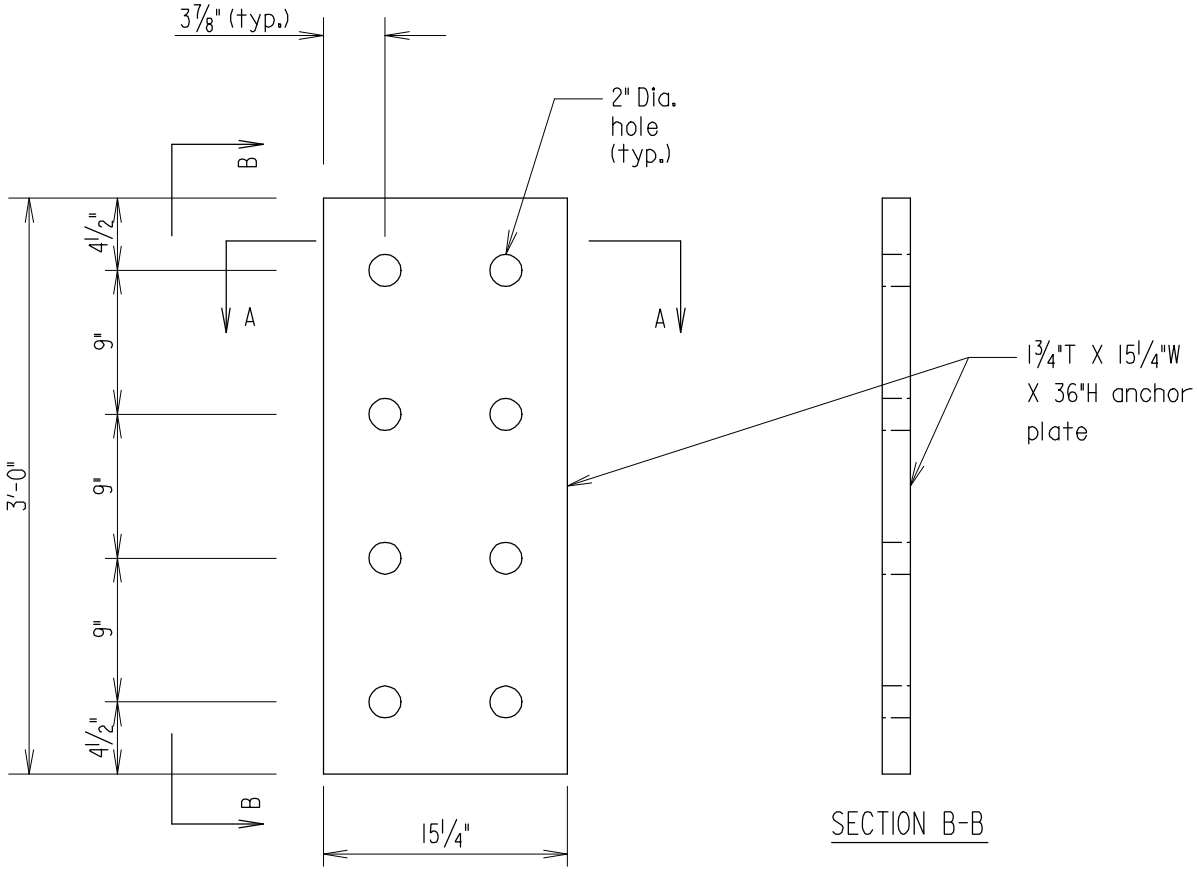
VERSION 1.0	DETAIL NO. SR-JS(PSB)-103 SHEET 2 OF 3

STRUCTURAL REPAIRS



SECTION B-B

SECTION A-A

ANCHOR PLATE DETAIL
SCALE: 1" = 1'-0"

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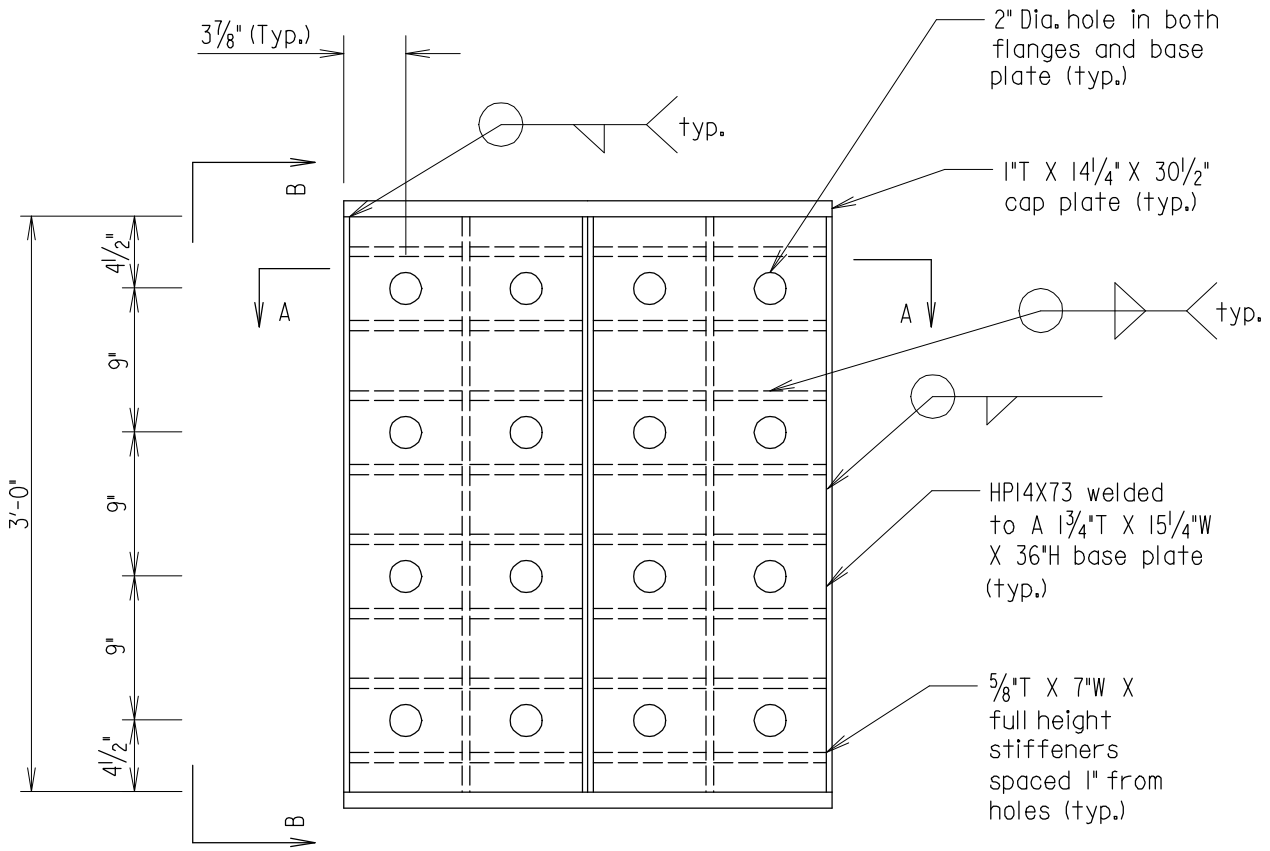
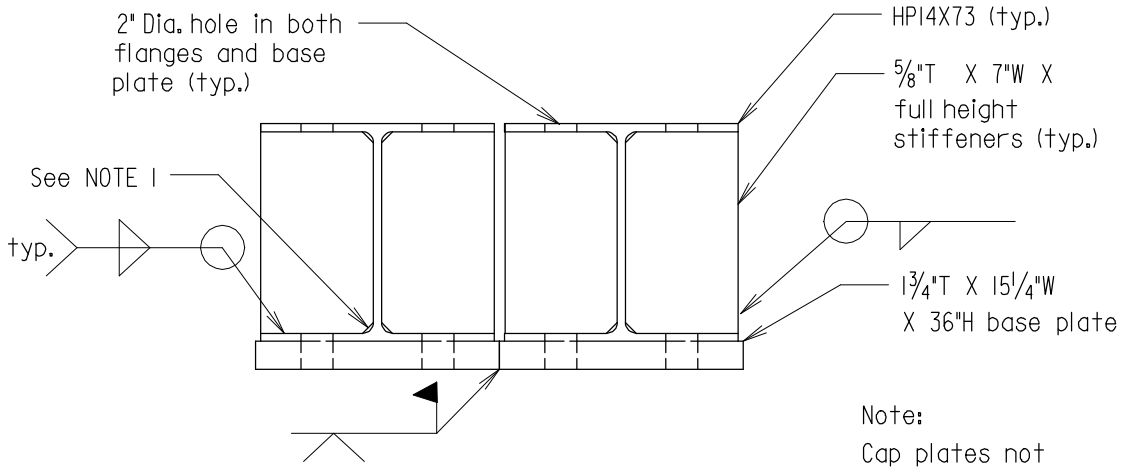
STRUCTURAL REPAIRS



PIER FACE BRACKET DETAIL

SCALE: 1" = 1'-0"



Note:
Cap plates not shown for clarity.

SECTION A-A

SCALE: 1" = 1'-0"

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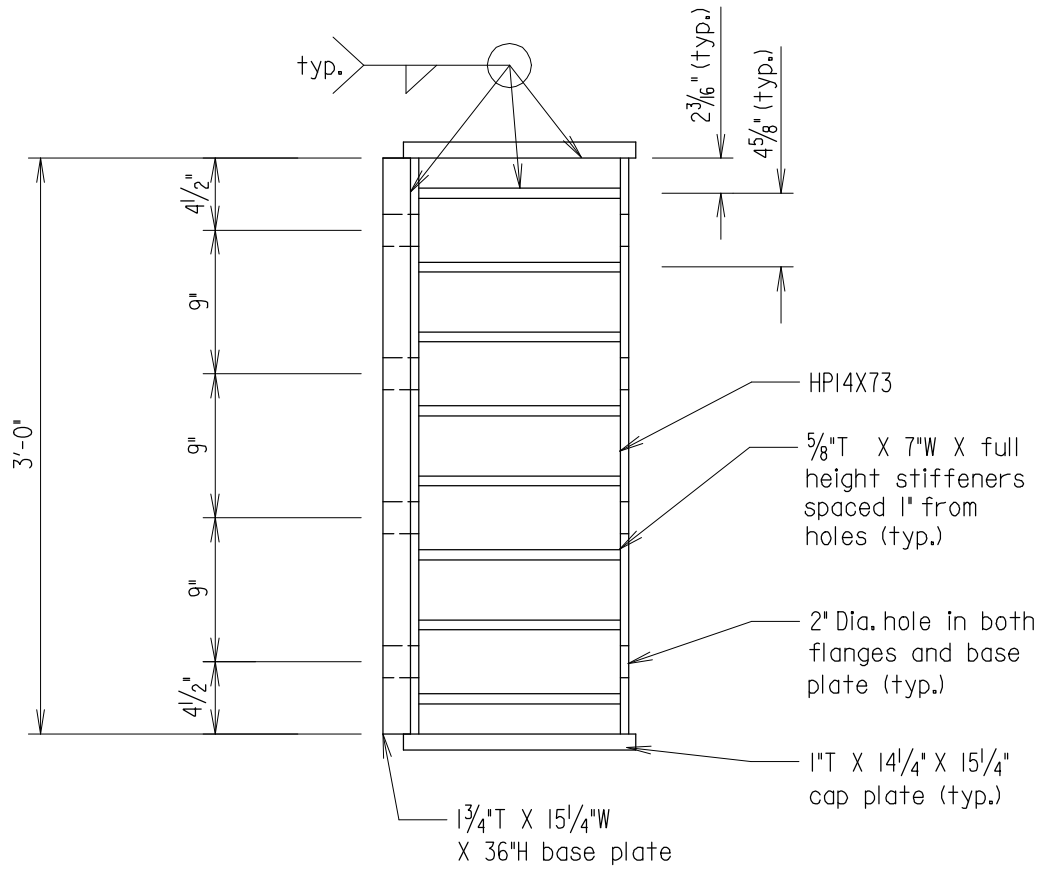
VERSION 1.0	DETAIL NO. SR-JS(PSB)-104 SHEET 1 OF 3

STRUCTURAL REPAIRS



SECTION B-B

SCALE: 1" = 1'-0"

Notes:

1. Chamfer new plate as shown to clear fillet so that edges of plate fit flush against flange and web of HP Section.
2. All steel shall be ASTM A709, GRADE 50.
3. For skewed members and/or substructure units, refer to the cap supplement detail.

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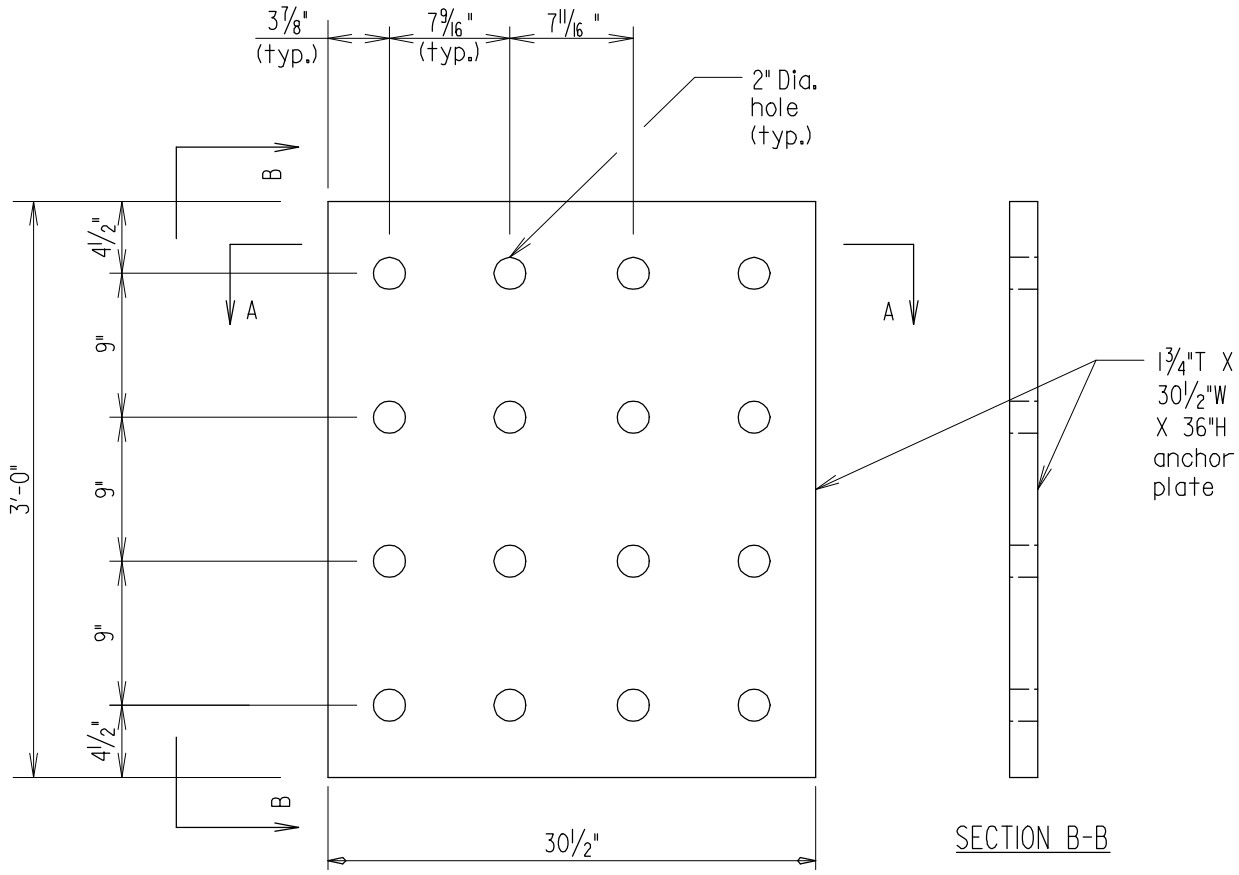
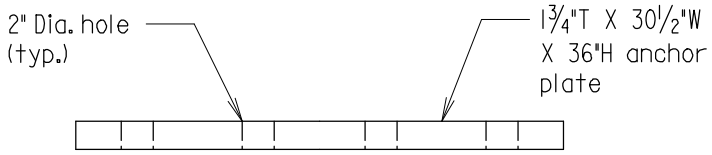
STRUCTURAL REPAIRS



SECTION B-B



SECTION A-A

ANCHOR PLATE DETAIL

SCALE: 1" = 1'-0"

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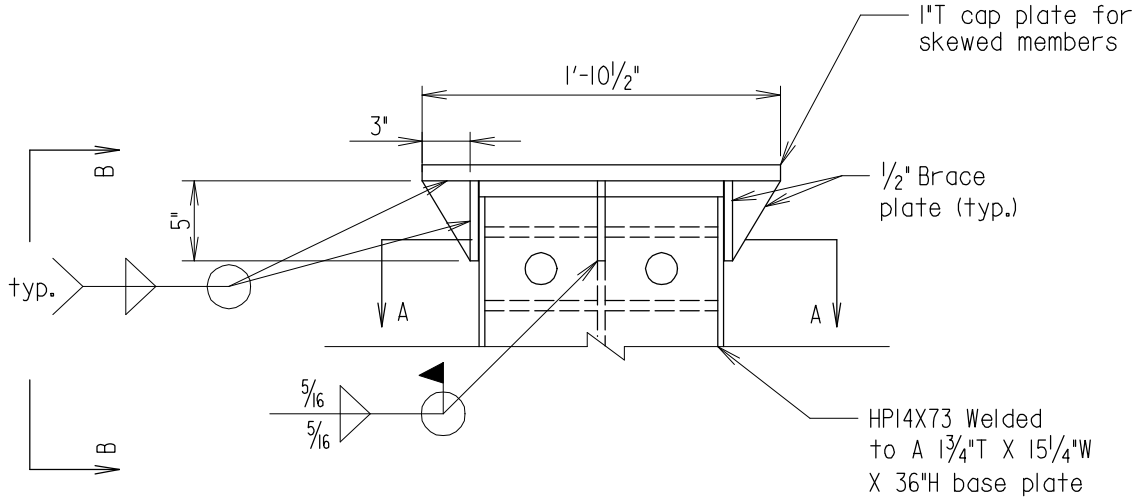
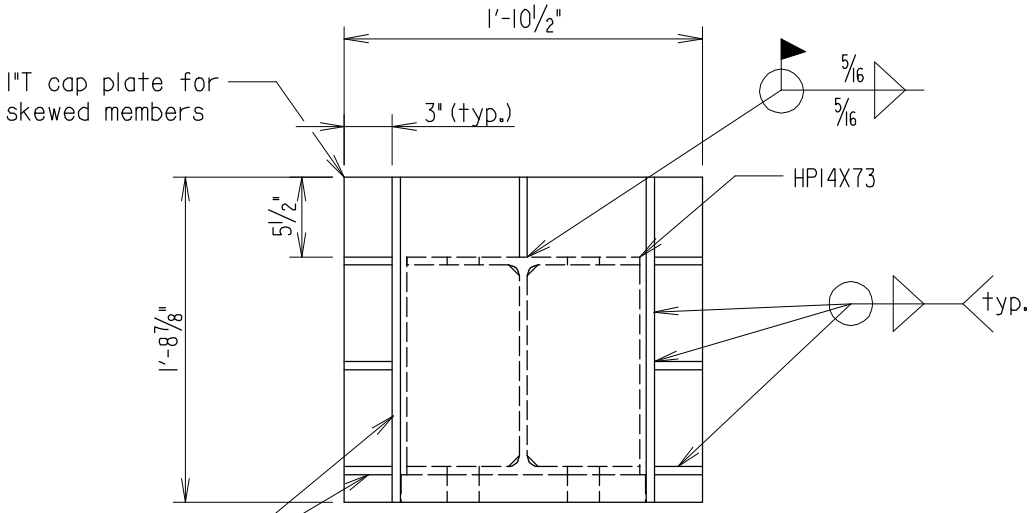
STRUCTURAL REPAIRS



CAP SUPPLEMENT DETAIL

ELEVATION

SCALE: 1" = 1'-0"

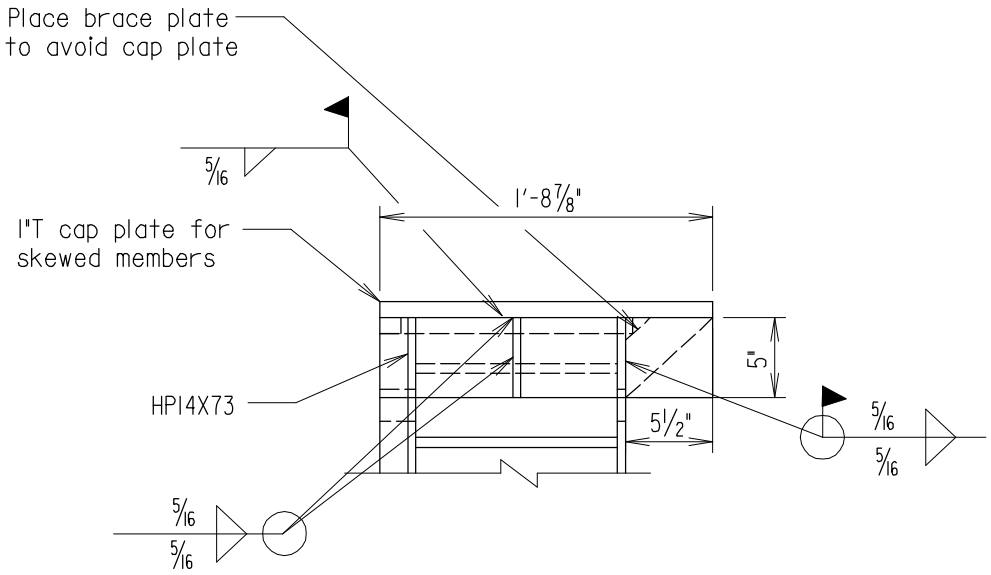


SECTION A-A

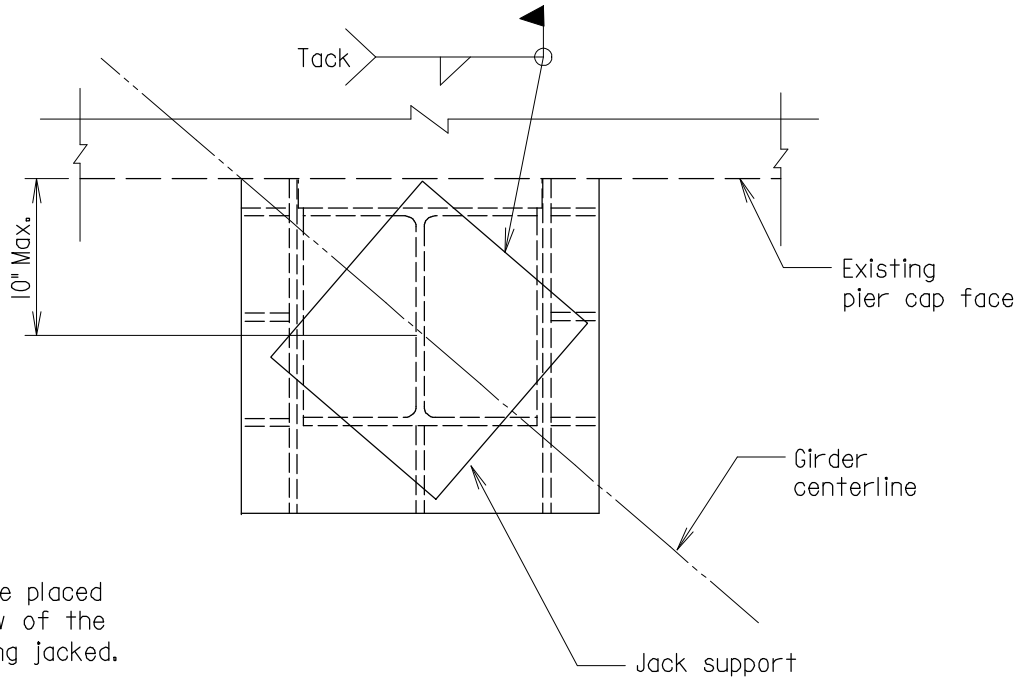
SCALE: 1" = 1'-0"

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
Jason C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	CAP PLATE FOR SINGLE PRESTRESSING BAR BRACKETS DETAILS SKEWED ALIGNMENTS
VERSION 1.0	DETAIL NO. SR-JS(PSB)-105 SHEET 1 OF 2

STRUCTURAL REPAIRS



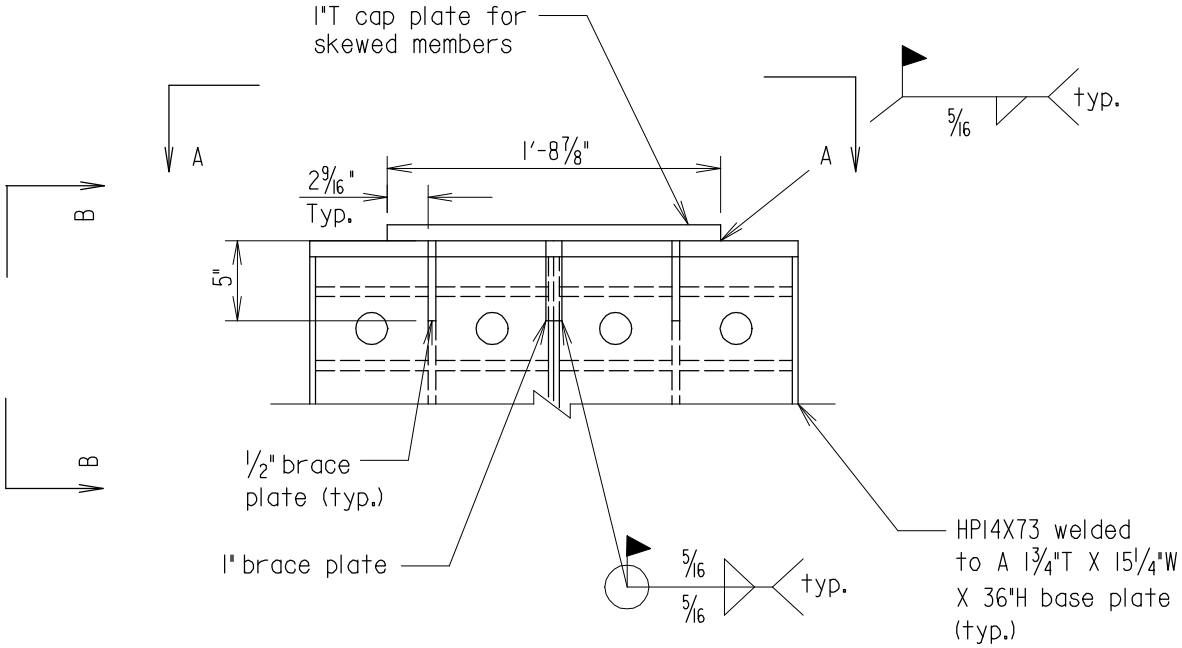
SECTION B-B
SCALE: 1" = 1'-0"



Note:
Jack support shall be placed along the same skew of the existing member being jacked.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES CAP PLATE FOR SINGLE PRESTRESSING BAR BRACKETS DETAILS SKEWED ALIGNMENTS
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	
VERSION	
1.0	
	DETAIL NO. SR-JS(PSB)-105 SHEET 2 OF 2

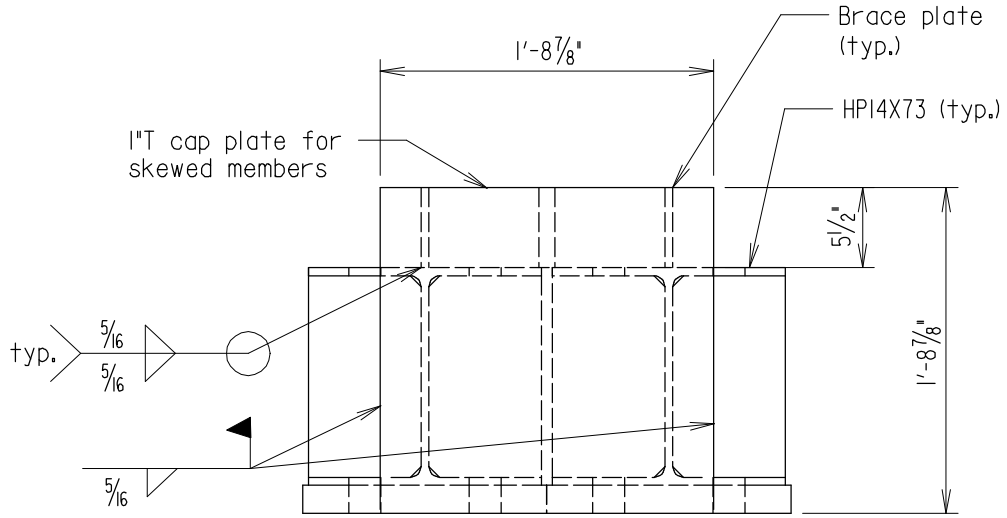
STRUCTURAL REPAIRS



CAP SUPPLEMENT DETAIL

ELEVATION

SCALE: 1" = 1'-0"

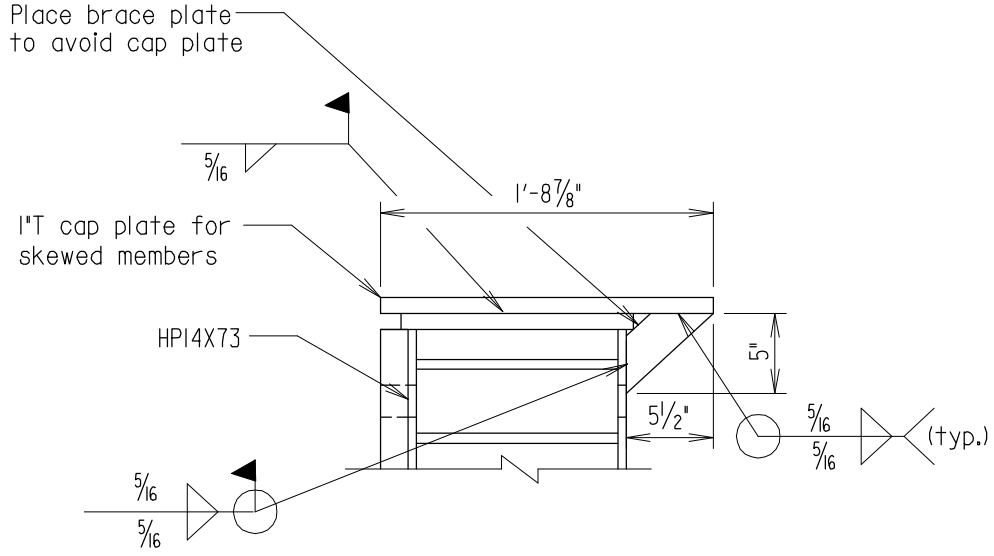


SECTION A-A

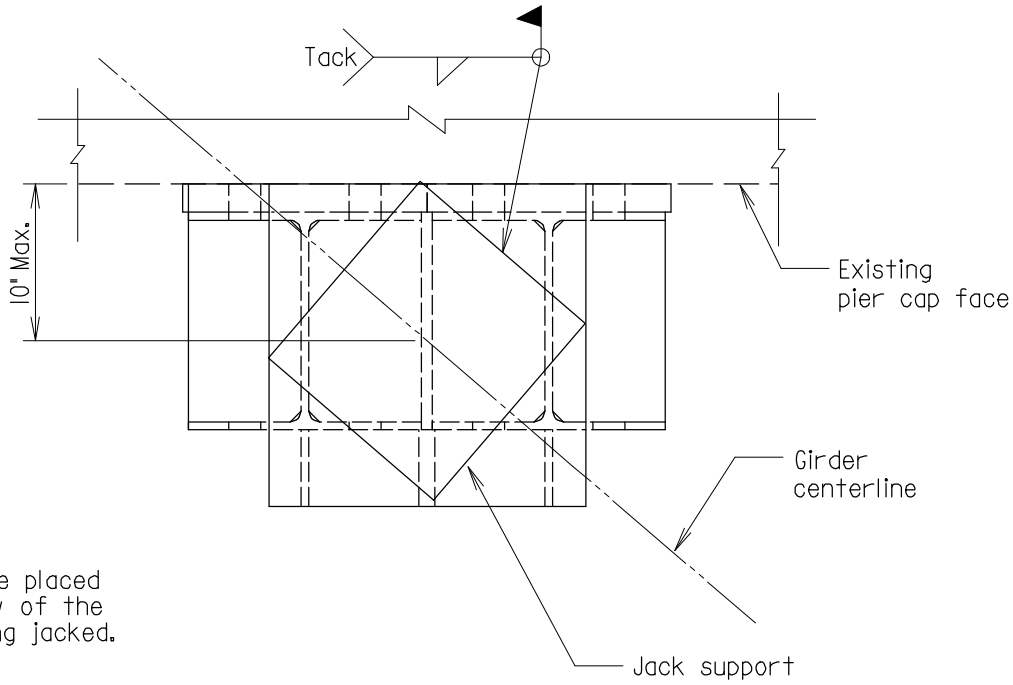
SCALE: 1" = 1'-0"

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	CAP PLATE FOR DOUBLE PRESTRESSING BAR BRACKETS DETAILS SKEWED ALIGNMENTS
VERSION 1.0	DETAIL NO. SR-JS(PSB)-106 SHEET 1 OF 2

STRUCTURAL REPAIRS



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



Note:
Jack support shall be placed along the same skew of the existing member being jacked.

MAX JACK SUPPORT OFFSET
SCALE: 1" = 1'-0"

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	CAP PLATE FOR DOUBLE PRESTRESSING BAR BRACKETS DETAILS SKEWED ALIGNMENTS
VERSION	
1.0	DETAIL NO. SR-JS(PSB)-106 SHEET 2 OF 2

STRUCTURAL REPAIRS

PRESTRESSING BAR TENSIONS AND JACKING CHART

		PRESTRESSING BAR		JACKS						
SUPPORT & SPAN	BRACKET NO.	NO. 1 3/8" DIA. BARS	REQUIRED TENSION (LBS)*	MEMBER	EXPECTED MINIMUM FORCE (LBS)	EXPECTED MAXIMUM FORCE (LBS)	JACK PISTON DIAMETER (IN)	RECORDED LIFT PRESSURE READING (PSI)	RECORDED MAXIMUM PRESSURE READING (PSI)	CALCULATED MAXIMUM FORCE (LBS)
ENG.	ENG.	ENG.	ENG.	ENG.	ENG.	ENG.	INSPECTOR	INSPECTOR	INSPECTOR	INSPECTOR

CALCULATED MAXIMUM FORCE = [RECORDED MAXIMUM PRESSURE READING] * [0.785 * JACK PISTON DIAMETER^2]

* PRESTRESSED BAR TENSION ACCOUNTS FOR A 10% RELAXATION OF THE BAR. THE TENSION SHOWN IN THE CHART ABOVE IS THE MAXIMUM TENSION TO BE APPLIED IN THE FIELD.

APPROVAL

Glenn D. Pascale - DIRECTOR
OFFICE OF STRUCTURES

DATE: 06/28/2017

VERSION

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STATE OF MARYLAND
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OFFICE OF STRUCTURES

PRESTRESSING BAR TENSIONING AND JACKING CHART

DETAIL NO. SR-JS(PSB)-107

SHEET 1 OF 1

Chapter 11 - Structural Repairs

Section 03 – Jacking Systems

SUB-SECTION **03**

CHANNEL BRACKET (SR-JS(CB))

DESIGN GUIDELINES FOR DOUBLE CHANNEL JACKING BRACKETS

1) The temporary jacking system has been designed at operating stress levels.

2) Bolts shall be ASTM A 490 with the threads included in the shear plane if possible. The connection has been designed as a slip-critical connection.

3) Designers should attempt to minimize the number of different jacking systems for the bridge by designing a system that will work in multiple locations.

4) Only the members shown below are to be selected for the jacking member(s).

5) Members sizes, allowable loads, maximum lifting capacity, and off sets shall be shown in the standards.

6) Designers shall evaluate the adjacent member for uplift. If uplift occurs, either eliminate uplift or account for uplift by jacking the adjacent member or by other means approved by the SRED Team Leader and/or the SRED Division Chief.

7) Once jacking repairs are complete, install beam end retrofit plates as per the Bearing Stiffener Plating Detail (SR-ST-30X) or the Girder End Plating Detail (SR-ST-40X or SR-ST-50X).

Bracket Member	2 - C8x18.75	2 - C10x30	2 - C12x30	2 - C15x50		2 - C8x18.75	2 - C10x30	2 - C12x30	2 - C15x50
Off Set (ft)	Max Jack Load (kips)					Max Combined Lifting Capacity (kips)			
1.5ft	22.00	34.00	49.00	60.00		44.00	68.00	98.00	120.00
2ft	16.00	28.00	36.00	50.00		16.00	28.00	36.00	100.00
2.5ft	NG, Deflection	NG, Deflection	NG, Deflection	42.00		NG, Deflection	NG, Deflection	NG, Deflection	85.00
3ft	NG, Deflection	NG, Deflection	NG, Deflection	NG, Deflection		NG, Deflection	NG, Deflection	NG, Deflection	NG, Deflection
Fillet Weld	7/16''	5/8''	7/16''	5/8''		7/16''	5/8''	7/16''	5/8''
Stiffener Width	2''	2 3/8''	2 5/8''	3''		2''	2 3/8''	2 5/8''	3''
Total No. Bolts- Existing Web	4/Conn. Plate =8	4/Conn. Plate =8	6/Conn. Plate =12	8/Conn. Plate =16		4/Conn. Plate =8	4/Conn. Plate =8	6/Conn. Plate =12	8/Conn. Plate =16
Total No. Bolts- Existing Stiffener	2/Stiffener =4	2/Stiffener =4	3/Stiffener =6	4/Stiffener =8		2/Stiffener =4	2/Stiffener =4	3/Stiffener =6	4/Stiffener =8

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DATE: 06/28/2017
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STATE OF MARYLAND
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STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

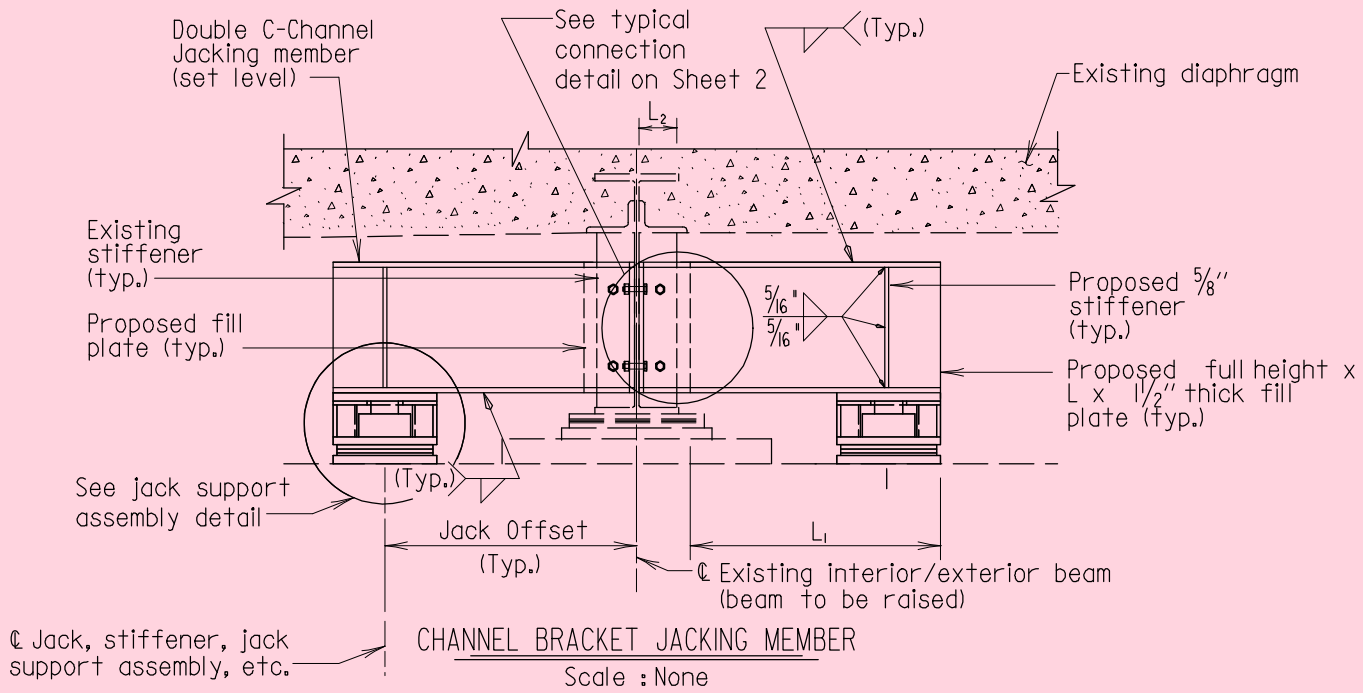
DOUBLE CHANNEL BRACKET DESIGN GUIDELINES

DETAIL NO. SR-JS(CB)-101 SHEET 1 OF 1

FOR OFFICE USE ONLY

* GUIDE SHEET FOR PLAN DEVELOPMENT ONLY – DO NOT INCLUDE THIS SHEET IN CONTRACT PLANS *

STRUCTURAL REPAIRS



CHANNEL BRACKET JACKING MEMBER

Scale : None

JACKING MEMBER TABLE		
	Size:	Location:
Double C-Channel Jacking Member		
L_1, Length of fill plate along bracket		
Proposed Bracket Stiffener Plate Size		
L_2, Length of fill plate at ext. stiffener		
Jack Offset		
Maximum Jack Force		
Required Jack Capacity		

Notes:

1. Only A709 Grade 50 steel shall be used.
2. Jacking members do not have to be new, but shall be in good condition.
3. The jack shall not be used to support load during bearing repairs.
4. Jacking members shall be placed level unless otherwise noted.
5. The Contractor has the option of submitting another method of jacking to the Engineer for approval. The design shall be done by a PE registered in Md.
6. Jacking member shall be kept low to minimize height of stacked plates or the HP column jack support.
7. Anchor bolt nuts may need to be loosened at the exterior and adjacent interior beams to allow the beam to rise.
8. Beams shall not be raised more than 1/8" above its existing elevation.
9. Proposed stiffener plates shall be fabricated to bear directly on and match the slope of the flanges of the proposed channel sections.
10. Chipping of the existing concrete is not required for the jack stand leveling pad unless approved by the engineer.
11. The entire procedure (jacking, debris removal, shim installation, lowering, and bracket removal) shall completed in a timely manner as approved by the Engineer.
12. Once jacking repairs are complete, install beam end retrofit plates as the Bearing Stiffener Plating Standard or the Girder End Plating Standards as attached. Retrofit bolt spacing shall incorporate all bolt holes used for jacking.

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Kevin C. Vaughan DIRECTOR OFFICE OF STRUCTURES
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STATE OF MARYLAND
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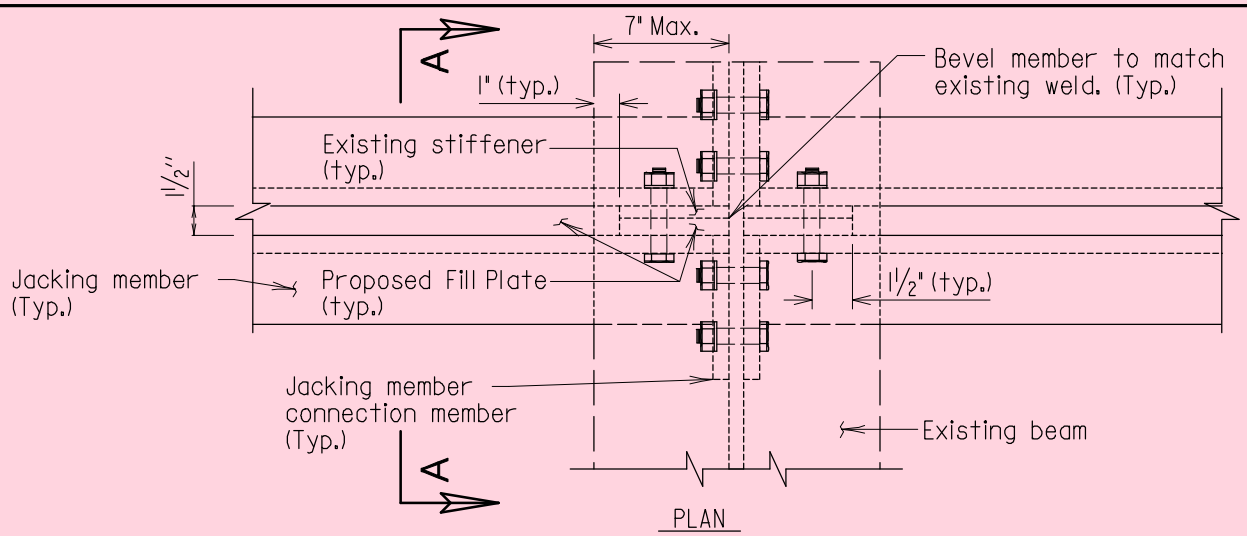
OFFICE OF STRUCTURES

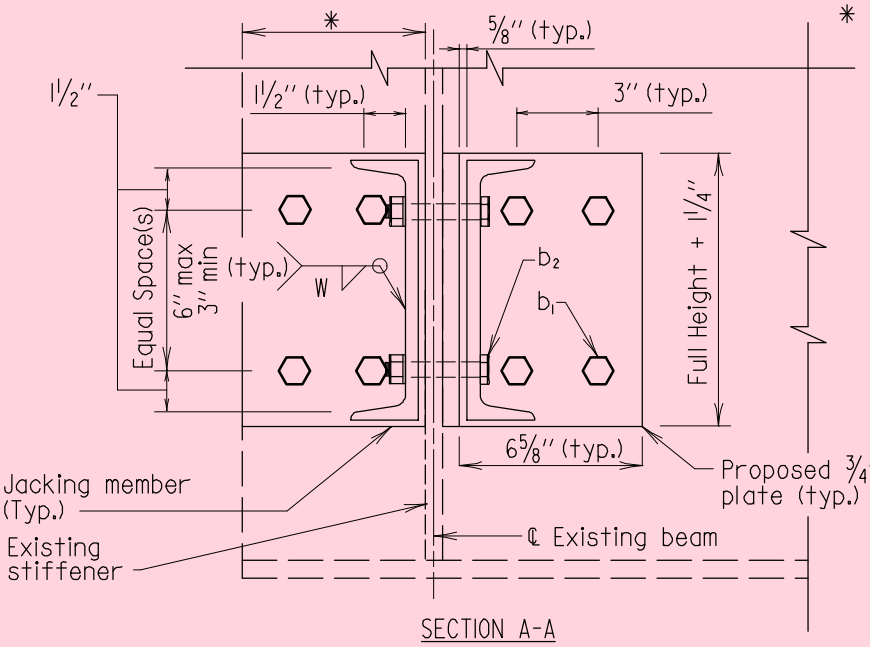
CHANNEL BRACKET JACKING DETAILS

DETAIL NO. SR-JS(CB)-102 SHEET 1 OF 5

STRUCTURAL REPAIRS



PLAN



SECTION A-A

* Length will vary and requires field verification. If the bracket connection plate overhangs the end of the existing beam, fill plates shall be installed to establish bearing. Refer to Sheet 3 for details.

TYPICAL 90° CONNECTION DETAIL

Scale : None

CONNECTION DETAILS		
	Materials:	Location:
Double C-Channel Jacking Member		
W - Connection plate weld size		
Connection Bolts	A490, ⅞" dia.	
b_1 - No. Bracket Connection Plate Bolts	_ per side = _ total	
b_2 - No. Connection Bolts in existing stiffener	_ per side = _ total	
No. Bracket Connection Bolt Rows		

Notes:
1. Minimum height of connection plate: 9¼" for C8x18.75; 11¼" for C10x30; 13¼" for C12x30; & 16¼" for C15x50.
2. b - Number of ⅞" dia. A490 Bolts required on each bracket connection plate and existing stiffener.
3. W - Connection plate weld size, E70 electrodes.
4. The gap between the channel webs shall be located at the span side of the stiffener.
5. Jacking members shall be placed as close as possible to the end diaphragm.
6. New bolts to be reinstalled in bolt holes after jacking unless otherwise stated in the plans.

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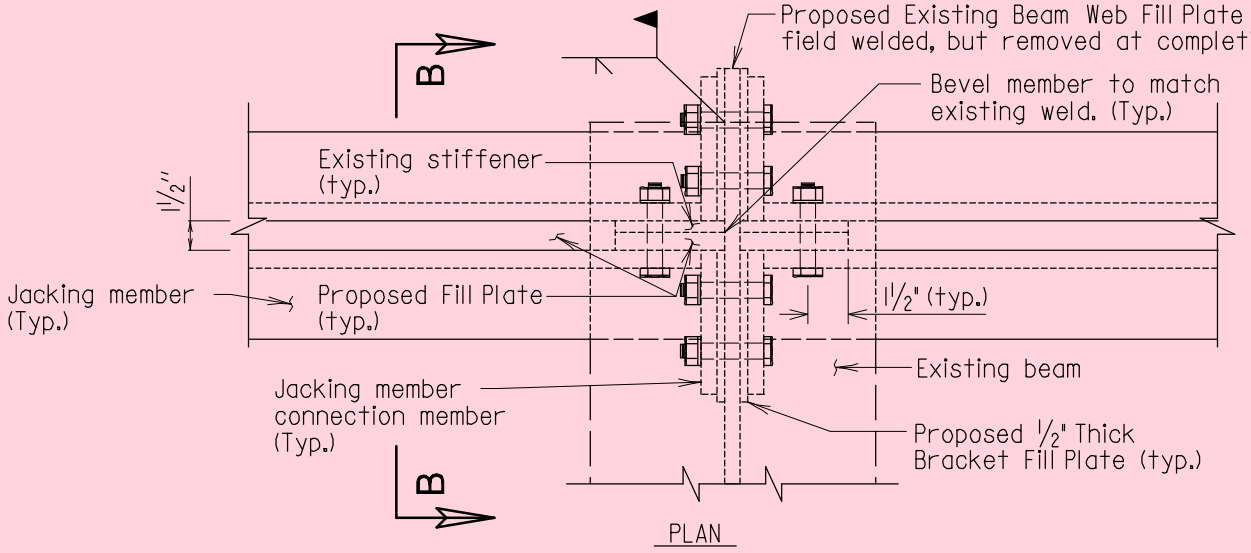
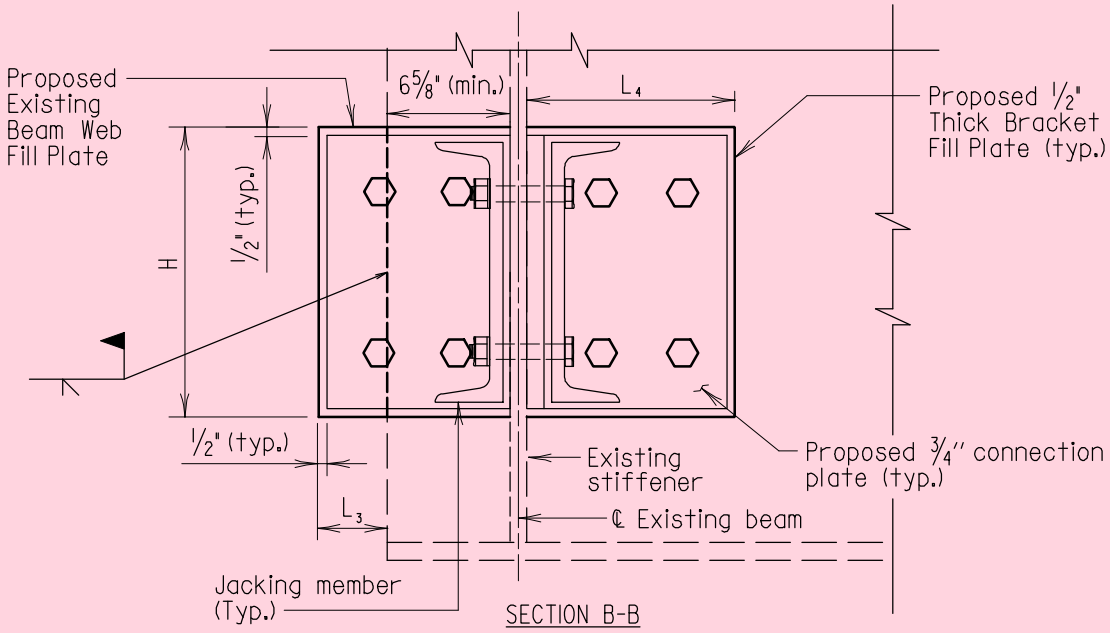
CHANNEL BRACKET JACKING DETAILS

DETAIL NO. SR-JS(CB)-102 SHEET 2 OF 5

STRUCTURAL REPAIRS





EXISTING BEAM WEB FILL PLATE DETAIL

Scale : None

CONNECTION DETAILS		
	Materials:	Location:
Approximate Existing Beam Web Thickness		
H, Height of Proposed Web/Bracket Fill Plates		
L_3, Length of Web Fill Plate		
L_4, Length of Bracket Fill Plate		

Notes:
1. This sheet shall be used if the end of the Existing Beam is less than 6⅝" long.
2. The Contractor may be required to tighten bolts using wrenches and other similar hand tools due to space limitations. If bolts cannot be tightened to the Engineer's approval, work shall cease and the Engineer shall contact SIRE for direction.
3. All existing beam dimensions shall be field verified before any matieral is ordered, fabricated, or installed.

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Sean C. Vaughan DIRECTOR OFFICE OF STRUCTURES
DATE: 06/28/2017
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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
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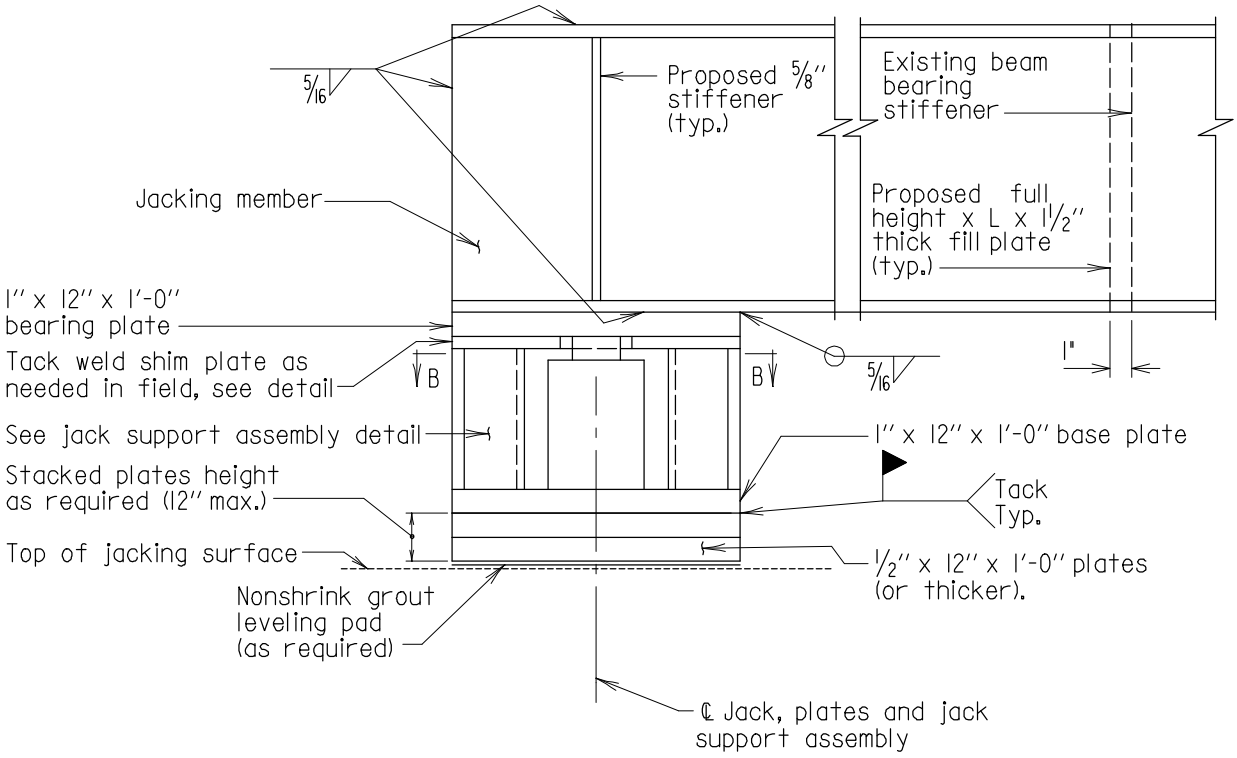
CHANNEL BRACKET JACKING DETAILS

DETAIL NO. SR-JS(CB)-102 SHEET 3 OF 5

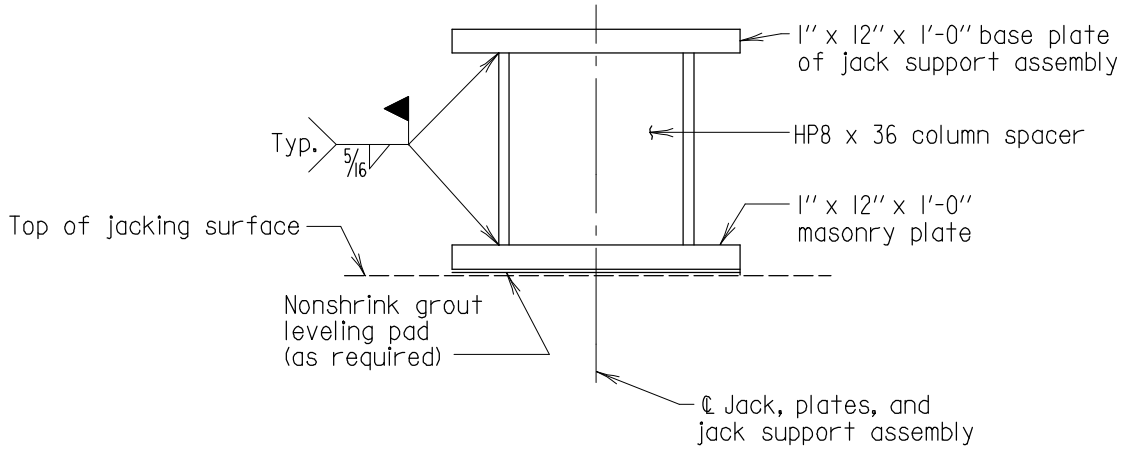
STRUCTURAL REPAIRS



ELEVATION

JACK SUPPORT USING STACKED PLATES

Scale : None



ELEVATION

ALTERNATE COLUMN SPACER DETAIL

Scale : None

Notes:

1. Minimum thickness of the grout leveling pad shall be as recommended by manufacturer.
2. Jack shall be centered under jacking beam web and stiffeners.
3. Stacked plates shall not exceed 12" high.
4. HP8 x 36 column spacer shall not exceed 5'-0" high.
5. All material for the Jack Support and Column Spacer to be ASTM A 709 Grade 50. Grade 36 is also acceptable with the approval of the Engineer.

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DATE: 06/28/2017
VERSION
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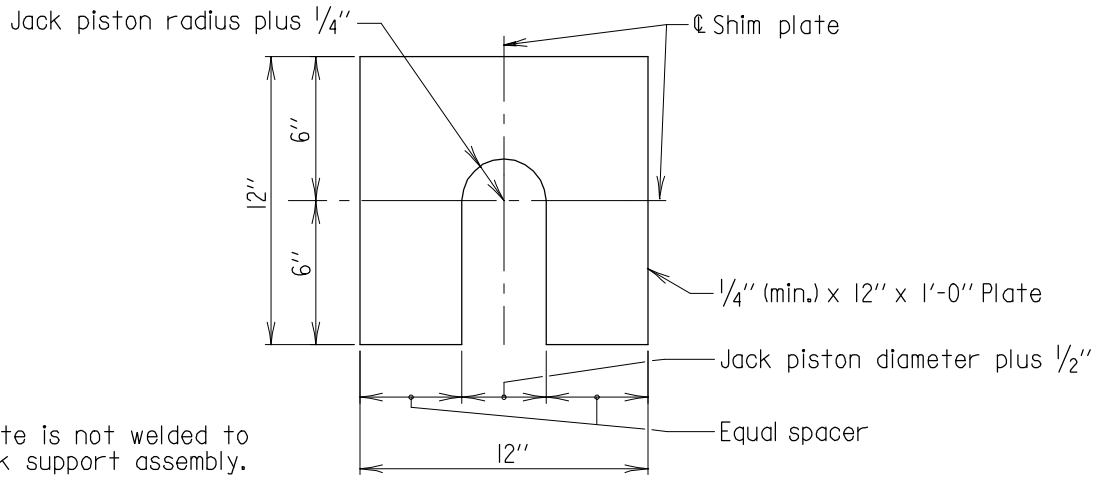
OFFICE OF STRUCTURES

CHANNEL BRACKET JACKING DETAILS

DETAIL NO. SR-JS(CB)-102 SHEET 4 OF 5

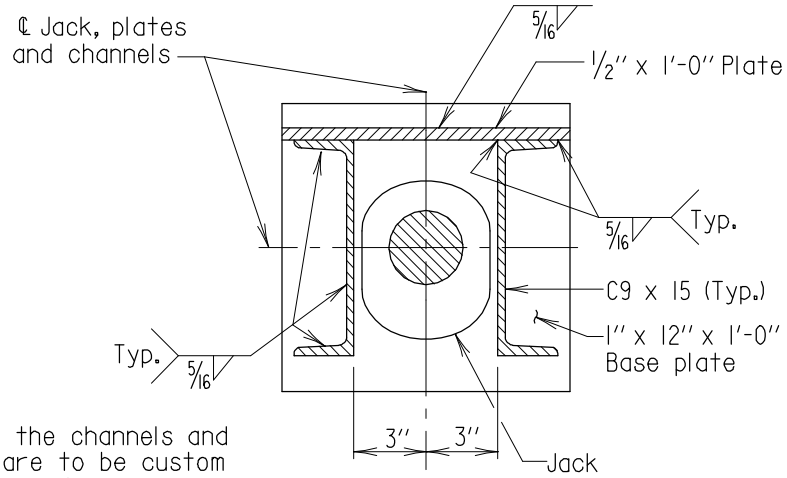
STRUCTURAL REPAIRS



Note:
This plate is not welded to the jack support assembly.

SHIM PLATE DETAIL

Scale : None



Note:
The length of the channels and the 1/2" plate are to be custom fit to the jack being used.

SECTION B-B

Scale : None

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	CHANNEL BRACKET JACKING DETAILS
VERSION 1.0	DETAIL NO. SR-JS(CB)-102 SHEET 5 OF 5

STRUCTURAL REPAIRS

JACKING CHART

SUPPORT & SPAN	MEMBER	EXPECTED MINIMUM FORCE (LBS)	EXPECTED MAXIMUM FORCE (LBS)	JACK PISTON DIAMETER (IN)	RECORDED LIFT PRESSURE READING (PSI)	RECORDED MAXIMUM PRESSURE READING (PSI)	CALCULATED MAXIMUM FORCE (LBS)
ENG.	ENG.	ENG.	ENG.	INSPECTOR	INSPECTOR	INSPECTOR	INSPECTOR

CALCULATED MAXIMUM FORCE = [RECORDED MAXIMUM PRESSURE READING] * [0.785 * JACK PISTON DIAMETER^2]

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
Glenn C. Vaughan DIRECTOR OFFICE OF STRUCTURES DATE: 06/28/2017	DOUBLE CHANNEL BRACKET JACKING CHART
VERSION	
1.0	DETAIL NO. SR-JS(CB)-103 SHEET 1 OF 1