



SUBMITTAL FORM

2 Crocker Blvd, Suite 303
Mount Clemens, MI 48043
(586) 468-1135 (586) 468-3456

(Project Title/Location 3 lines MAXIMUM)

To: (1) Jim Stockman Louis Stokes VA Medical Center 10701 East Boulevard Cleveland, OH 44106		Project Title: Renovate/Expand Palliative Care Ward		Submittal No.: 55	
		Submittal Date: October 27, 2014		Resubmittal No.:	

Specification Section No.	Product Manufacturer	Item Description	Number	Hard Copies	Electronic Copies	Product Data	Sample	Other	Approved	Disapproved	See Attached	Initial
		1_RB			1				<input checked="" type="checkbox"/>			
	Duke & Duke	2_RB			1				Approved as Noted			
		3_RB			1				Approved as Noted			
		141024_LEI Calculations			1				<input checked="" type="checkbox"/>			
		E1_RB			1				Approved as Noted			
<div style="text-align: center;"> LOUIS STOKES CLEVELAND VA MEDICAL CENTER <input type="checkbox"/> APPROVED AS SUBMITTED <input checked="" type="checkbox"/> APPROVED, EXCEPT AS NOTED <input type="checkbox"/> DISAPPROVED, REVISE AND RESUBMIT <input type="checkbox"/> RESUBMIT FOR RECORD <input type="checkbox"/> RECEIPT ACKNOWLEDGED <input type="checkbox"/> OTHER (SPECIFY) </div>												
Review is for conformance to general arrangement only subject to corrections and contract requirements. No responsibility assumed for quantities or dimensions. DATE: <u>Nov 12, 2014</u> BY: <u>[Signature]</u> PROJECT NO: <u>541-281-101</u>												

Remarks: Please return one stamped hard copy to STE.	The undersigned certifies that the above submitted items have been reviewed in detail, including materials, quantities, dimensions, specified performance criteria, installation requirements, catalog numbers and field conditions and are correct and in strict compliance with the Contract Documents, except as the undersigned has noted otherwise. Approval of items does not relieve the Contractor/Construction Manager from complying with all requirements of the Contract Documents. STE review does not relieve the contractor from responsibility for errors or omissions in this submittal. Contractor/Construction Manager: <u>Steve Reed</u> Signature: _____	Reviewed by:
		_____ Print Name _____ Sign Name Date

Larson Engineering, Inc.
1488 Bond Street, Suite 100
Naperville, IL 60563-6503
630.357.0540 Fax: 630.357.0164
www.larsonengr.com



**Louis Stokes Cleveland Veterans Affairs
Medical Center
Renovation/Expansion Palliative Care Unit
Cleveland, OH**

**Beam Splices
Structural Calculations**

Book 1 of 1
Calculation Release #1

Prepared for
Lincoln Engineering Group
Naperville, IL



Larson Engineering, Inc.
Illinois Office
Project Number 21140598.000
IL Design Firm No. 184-001442

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1488 Bond Street, Suite 100
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**Louis Stokes Cleveland Veterans Affairs
Medical Center
Renovation/Expansion Palliative Care Unit
Cleveland, OH**

Table of Contents

Section	Sheet No.
Splice Calculations	100 – 103

Prepared for
Lincoln Engineering Group
Naperville, IL

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**Louis Stokes Cleveland Veterans Affairs
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Cleveland, OH**

Splice Calculations

Prepared for
Lincoln Engineering Group
Naperville, IL



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W14x22 SPLICE $t_w = 0.23"$

100% UDL SHEAR LOAD = 44.2^k (ASD)

MOMENT IS FULLY-DEVELOPED w/ CJP'D FLANGES

SHEAR IS DEVELOPED w/ SHEAR R'S EACH SIDE OF WEB:

$\frac{1}{4}"$ R NS & FS

(2x3) $\frac{3}{4}" \phi$ A325N BOLTS EACH SIDE OF SPLICE

BOLTS

$$\frac{R_n}{\phi} = 21.2^k \text{ (DOUBLE SHEAR)}$$

$$\frac{r_v}{\phi} = \left. \begin{array}{l} 52.2^k/\text{IN IN R'S} \\ 58.5^k/\text{IN IN BEAM} \end{array} \right\} \begin{array}{l} \text{BOLT} \times 0.5" = 26.1^k \\ \text{SPACING} \times 0.23" = 13.4^k \end{array}$$

BOLT BEARING

$$\frac{r_v}{\phi} = \left. \begin{array}{l} 29.4^k/\text{IN IN R'S} \\ 32.9^k/\text{IN IN BEAM} \end{array} \right\} \begin{array}{l} \text{EDGE} \times 0.5" = 14.7^k \\ \text{DISTANCE} \times 0.23" = 7.5^k \end{array}$$

ECCENTRIC LOAD

$$\frac{R_n}{\phi} = C \times \frac{r_n}{\phi} \quad C = 2.25 \text{ (FOR } E = 6")$$

$$= 2.25 \times 21.2^k = 47.7^k > 44.2^k \quad \underline{\underline{OK}}$$

$$\frac{R_v}{\phi_{\text{BEAM}}} = 13.4^k \times 6 \text{ BOLTS} = 80.4^k > 44.2^k \quad \underline{\underline{OK}}$$

$$\frac{R_v}{\phi_{\text{R'S}}} = 26.1^k \times 4 \text{ BOLTS} + 14.7^k \times 2 \text{ BOLTS} = 133.8^k > 44.2^k \quad \underline{\underline{OK}}$$

BLOCK SHEAR

YIELDING & RUPTURE

$$\frac{R_n}{\phi_{\text{R'S}}} = 2 \times (78.3^k/\text{IN}) \times 0.5" = 78.3^k > 44.2^k \quad \underline{\underline{OK}}$$

$$\frac{R_n}{\phi_{\text{R'S}}} = 2 \times (88.1^k/\text{IN}) \times 0.5" = 88.1^k > 44.2^k \quad \underline{\underline{OK}}$$

$$\frac{R_n}{\phi_{\text{BEAM}}} = 2 \times (135^k/\text{IN}) \times 0.23" = 62.1^k > 44.2^k \quad \underline{\underline{OK}}$$

$$\frac{R_n}{\phi_{\text{BEAM}}} = 2 \times (133^k/\text{IN}) \times 0.23" = 61.1^k > 44.2^k \quad \underline{\underline{OK}}$$



Larson

W16x36 SPLICE $t_w = 0.295''$

100% UDL SHEAR LOAD = 51.0^k (ASD)

MOMENT IS FULLY-DEVELOPED W/ CJP'D FLANGES

SHEAR IS DEVELOPED W/ SHEAR PL'S EACH SIDE OF WEB:

1/4" PL NS + FS

(2x4) 3/4" ϕ A325N BOLTS EACH SIDE OF SPLICE

BOLTS

$$\frac{r_n}{\phi} = 21.2^k \text{ (DOUBLE SHEAR)}$$

BOLT BEARING

$$\frac{r_v}{\phi} = \left. \begin{array}{l} 52.2^k/\text{IN IN PL'S} \\ 58.5^k/\text{IN IN BEAM} \end{array} \right\} \begin{array}{l} \text{BOLT} \times 0.5'' = 26.1^k \\ \text{SPACING} \times 0.295'' = 17.2^k \end{array}$$

$$\frac{r_n}{\phi} = \left. \begin{array}{l} 29.4^k/\text{IN IN PL'S} \\ 32.9^k/\text{IN IN BEAM} \end{array} \right\} \begin{array}{l} \text{EDGE} \times 0.5'' = 14.7^k \\ \text{DISTANCE} \times 0.295'' = 9.7^k \end{array}$$

ECCENTRIC LOAD

$$\frac{R_n}{\phi} = C \times \frac{r_n}{\phi} \quad C = 3.69 \text{ (FOR } E=6'')$$

$$= 3.69 \times 21.2^k = 78.2^k > 51.0^k \quad \underline{\underline{OK}}$$

$$\frac{R_v}{\phi_{\text{BEAM}}} = 17.2^k \times 8 \text{ BOLTS} = 137.6^k > 51.0^k \quad \underline{\underline{OK}}$$

$$\frac{R_v}{\phi_{\text{PL'S}}} = 26.1^k \times 6 \text{ BOLTS} + 14.7^k \times 2 \text{ BOLTS} = 186^k > 51.0^k \quad \underline{\underline{OK}}$$

BLOCK SHEAR YIELDING & RUPTURE

$$\frac{R_n}{\phi_{\text{PL'S}}} = 2 \times (111^k/\text{IN}) \times 0.5'' = 111^k > 51.0^k \quad \underline{\underline{OK}}$$

$$\frac{R_n}{\phi_{\text{PL'S}}} = 2 \times (125^k/\text{IN}) \times 0.5'' = 125^k > 51.0^k \quad \underline{\underline{OK}}$$

$$\frac{R_n}{\phi_{\text{BEAM}}} = 2 \times (180^k/\text{IN}) \times 0.295'' = 106.2^k > 51.0^k \quad \underline{\underline{OK}}$$

$$\frac{R_n}{\phi_{\text{BEAM}}} = 2 \times (174^k/\text{IN}) \times 0.295'' = 102.6^k > 51.0^k \quad \underline{\underline{OK}}$$



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SPLICE
PLATE
BENDING

W14x22:

$$S_x = \frac{(2 \times 1/4") (8 1/2")^2}{6} = 6.0 \text{ IN}^3$$

$$Z_x = \frac{(2 \times 1/4") (8 1/2")^2}{4} = 9.0 \text{ IN}^3$$

$$\frac{L_b d}{t^2} = \frac{6" (8 1/2")}{(2 \times 1/4")^2} = 204 \therefore \frac{0.08E}{F_y} \leq \frac{L_b d}{t^2} \leq \frac{1.9E}{F_y}$$

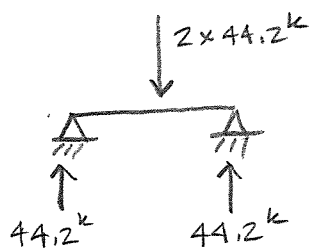
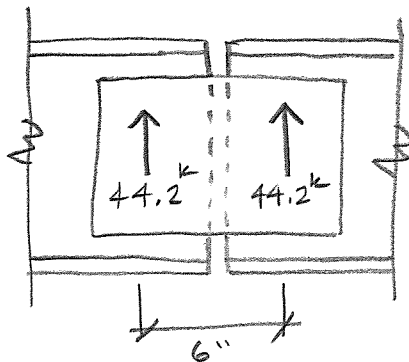
$$\frac{M_n}{\Omega} = \frac{F_y S_x}{\Omega} = \frac{36 \text{ ksi} \times 6.0 \text{ IN}^3}{1.67} = 10.7 \text{ K-FT}$$

$$V = 44.2 \text{ K}$$

$$M = \frac{PL}{4} = \frac{(2 \times 44.2 \text{ K}) \times 6 1/2"}{4} = 11.1 \text{ K-FT} > \frac{M_n}{\Omega}$$

⇒ INCREASE PLATE DEPTH TO 9"

$$\frac{M_n}{\Omega} = 12.1 \text{ K-FT} > 11.1 \text{ K-FT} \quad \underline{\underline{OK}}$$



W16x36

$$S_x = \frac{(2 \times 1/4") (11 1/2")^2}{6} = 11.0 \text{ IN}^3$$

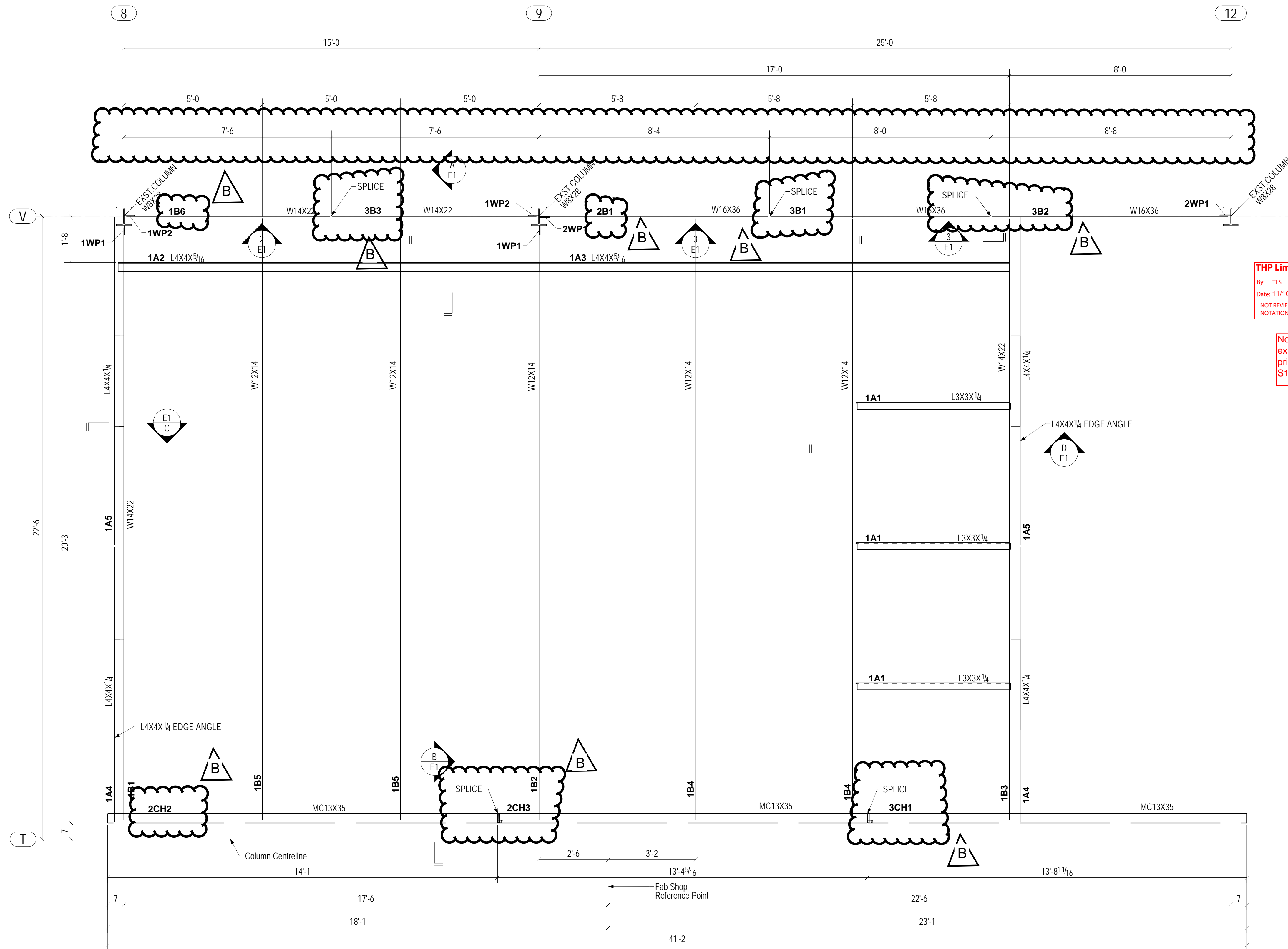
$$Z_x = \frac{(2 \times 1/4") (11 1/2")^2}{4} = 16.5 \text{ IN}^3$$

$$\frac{L_b d}{t^2} = \frac{6" (11 1/2")}{(2 \times 1/4")^2} = 276 \therefore \frac{0.08E}{F_y} \leq \frac{L_b d}{t^2} \leq \frac{1.9E}{F_y}$$

$$\frac{M_n}{\Omega} = \frac{F_y S_x}{\Omega} = \frac{36 \text{ ksi} \times 11.0 \text{ IN}^3}{1.67} = 19.7 \text{ K-FT}$$

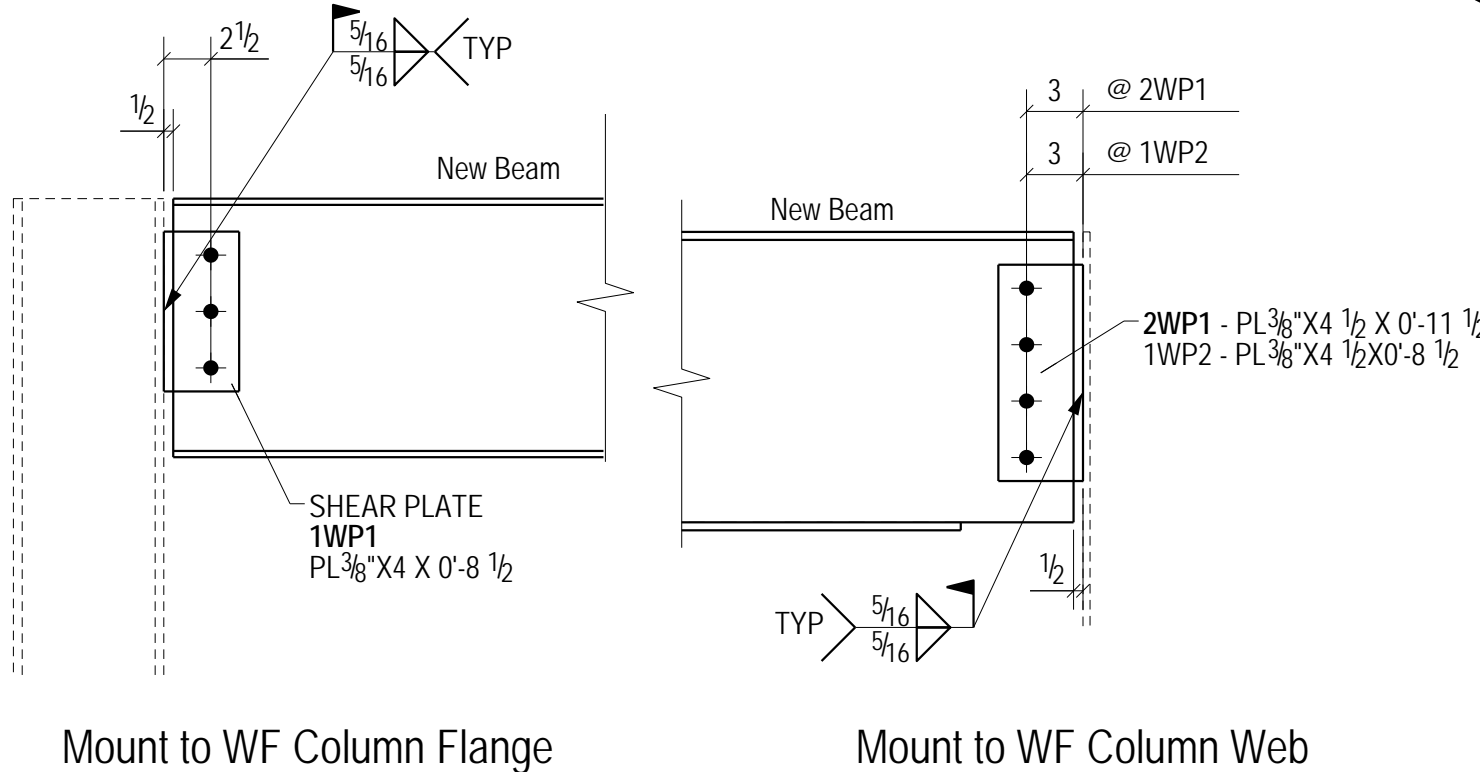
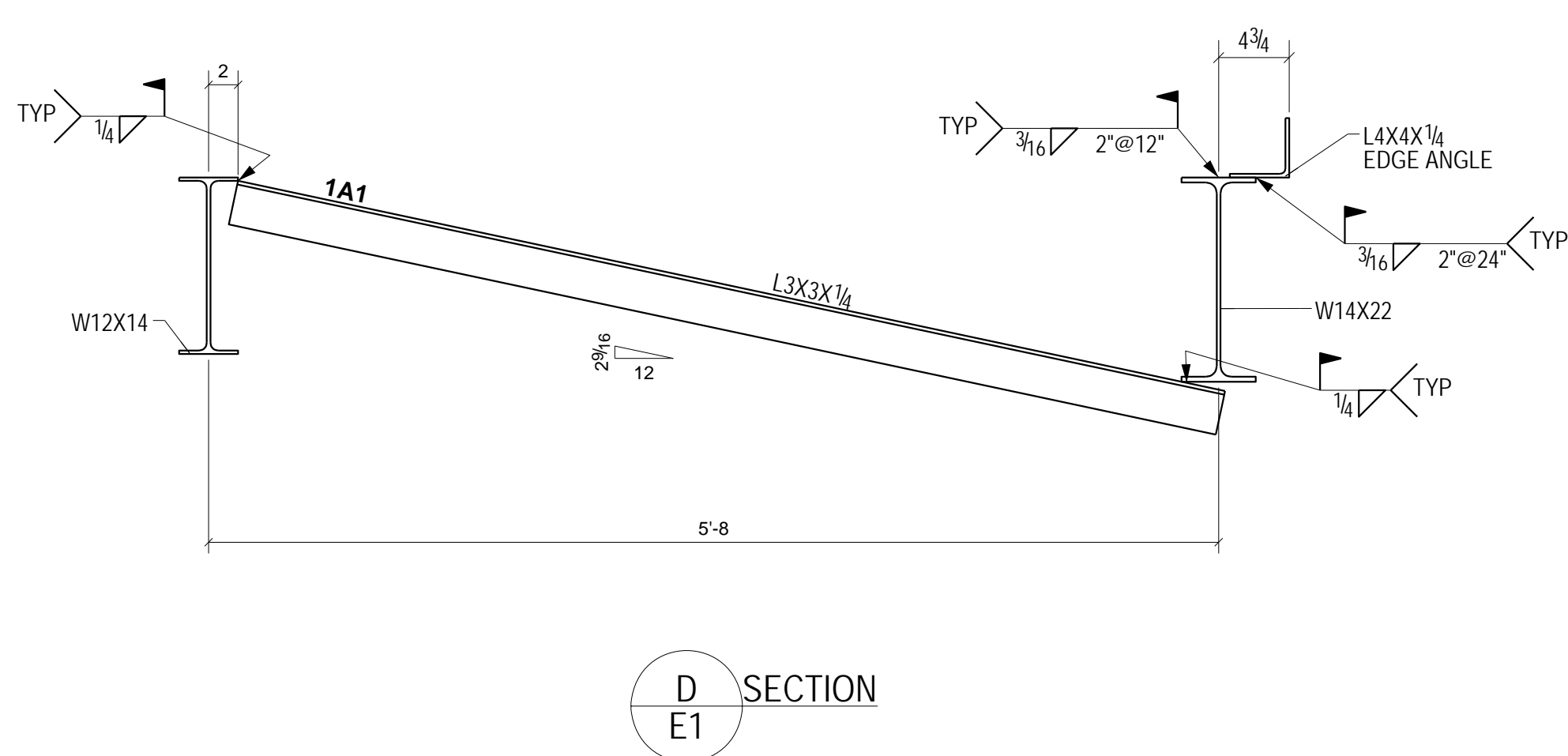
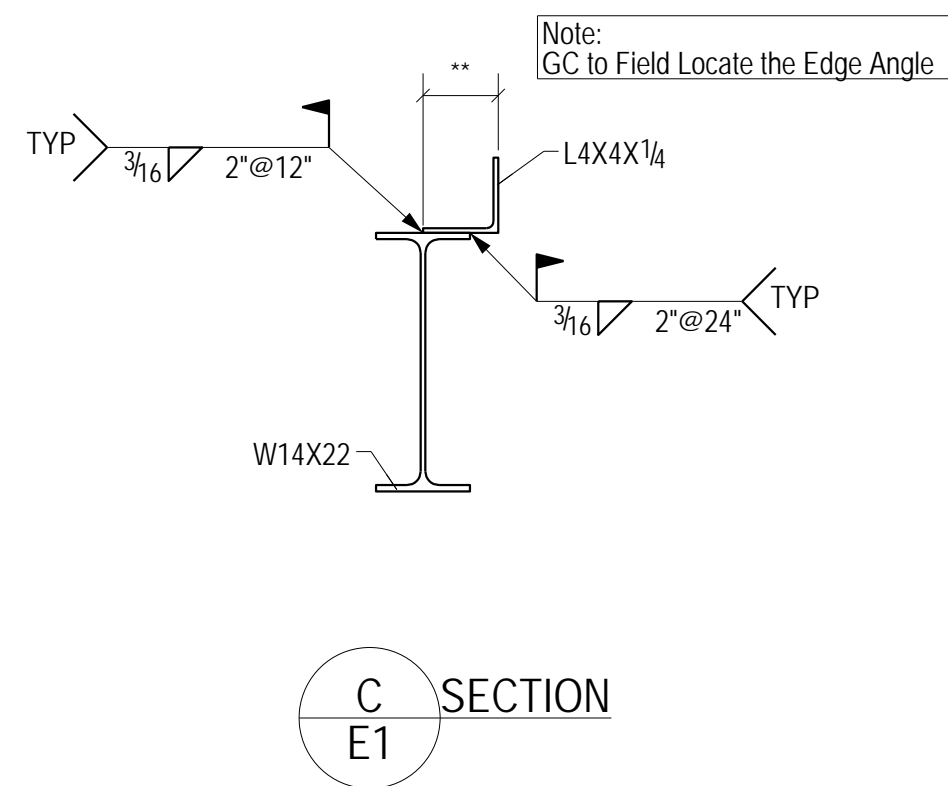
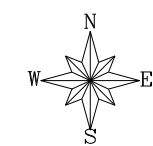
$$V = 51 \text{ K}$$

$$M = \frac{PL}{4} = \frac{(2 \times 51 \text{ K}) (6 1/2")}{4} = 12.8 \text{ K-FT} < \frac{M_n}{\Omega} \quad \underline{\underline{OK}}$$



ERECTION PLAN

NOTE: TOS 69'1'-2 3/4" Above 3rd Finished Floor



Mount to WF Column Flange

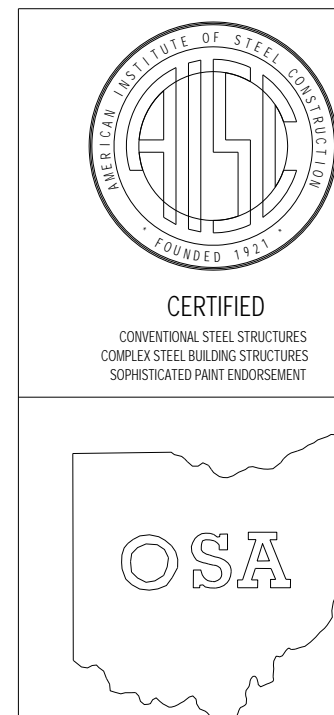
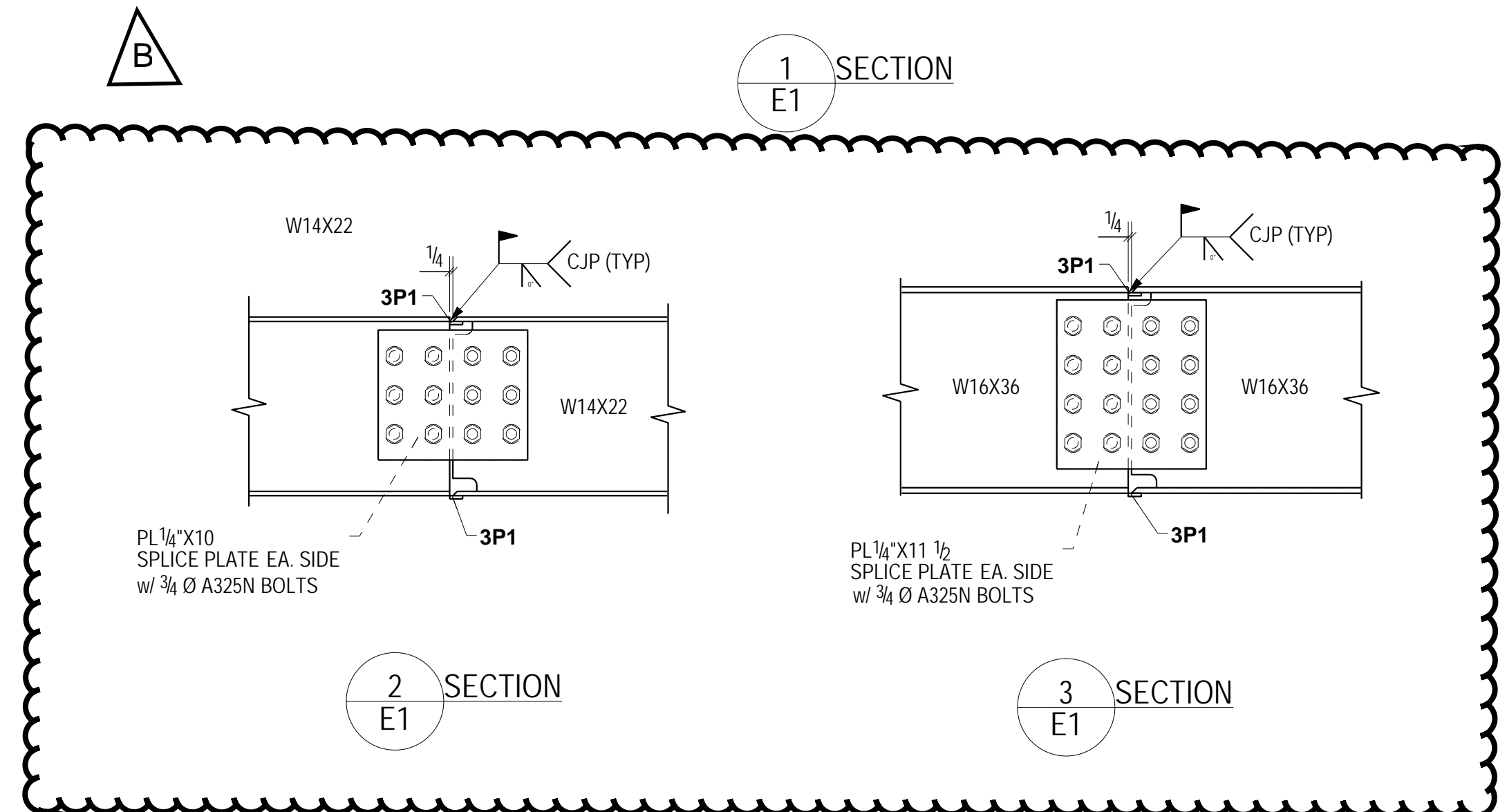
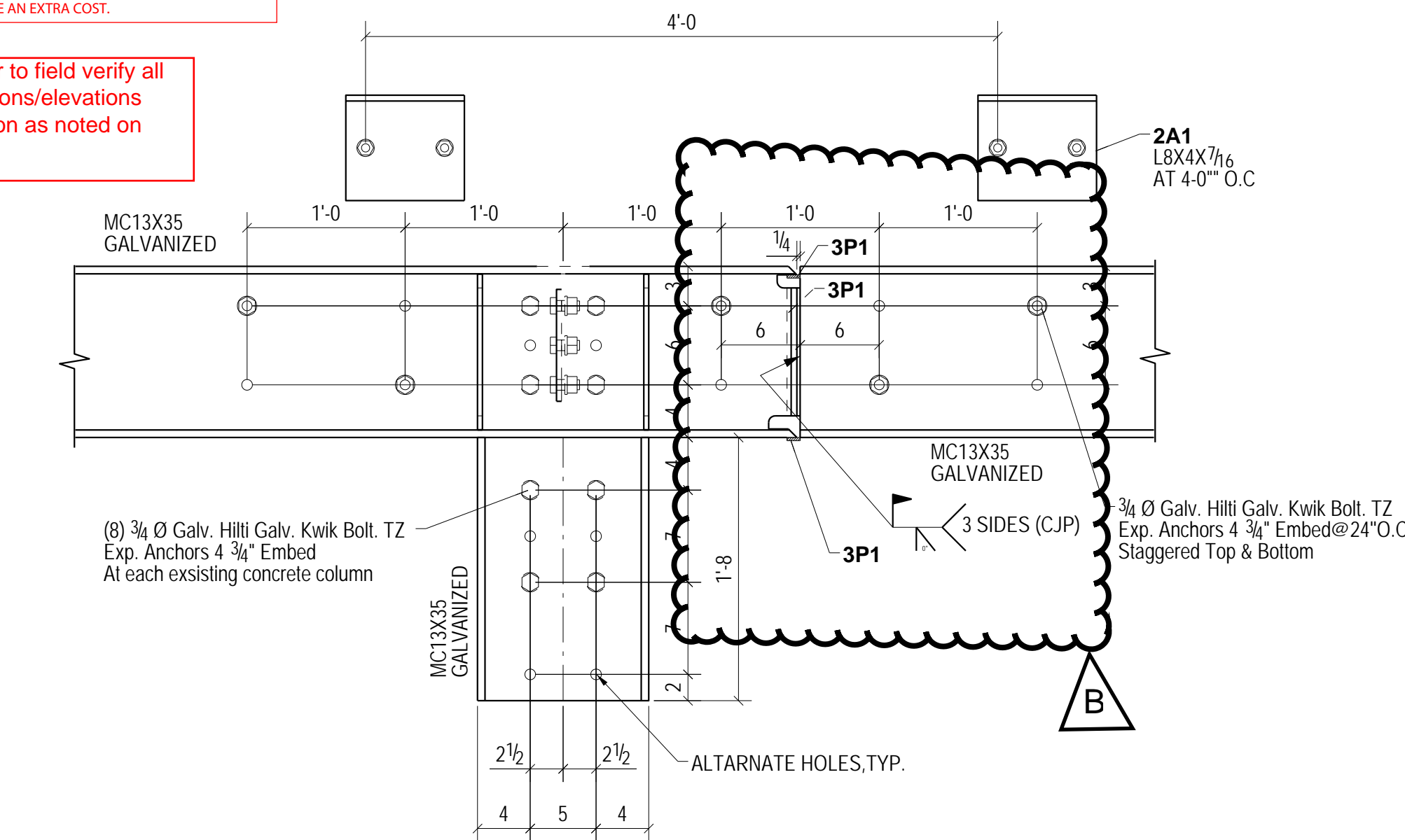
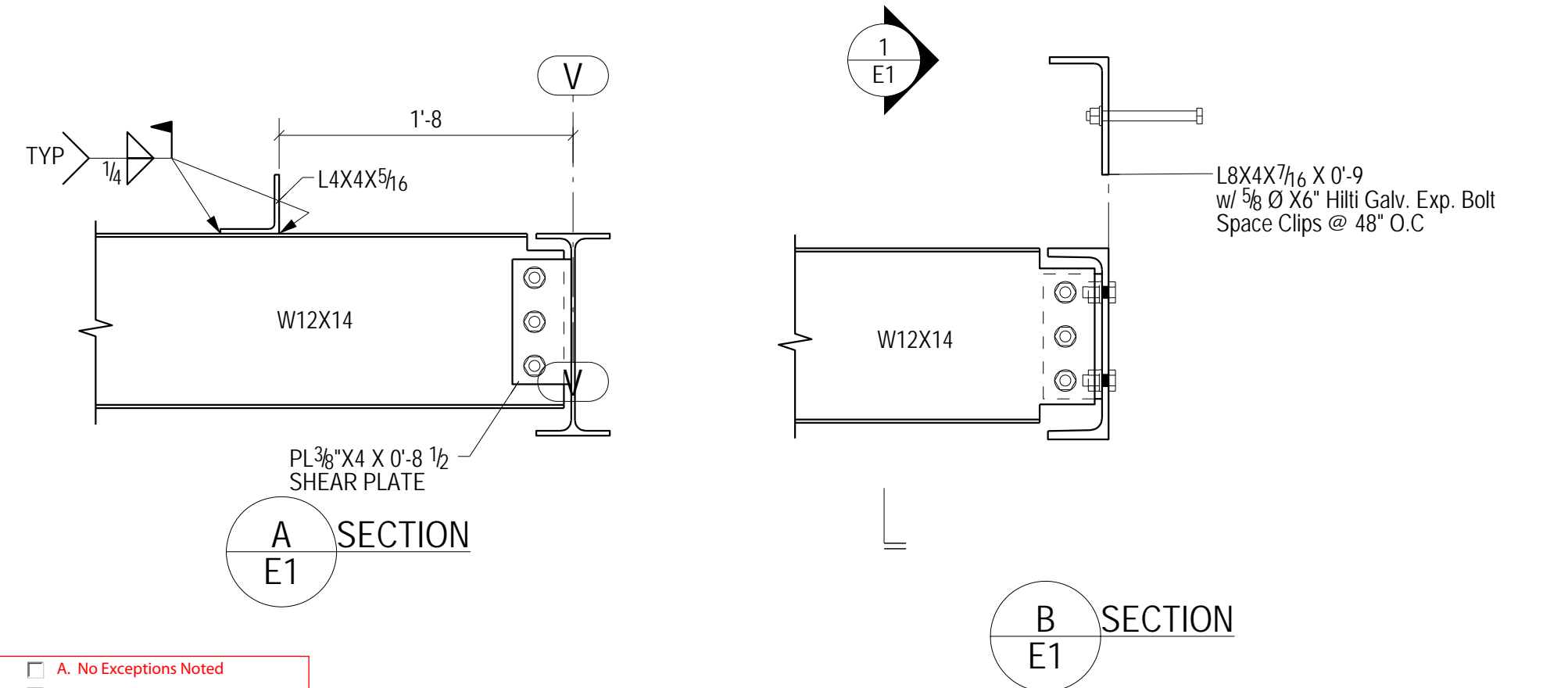
Mount to WF Column Web

FOR RE-APPROVAL

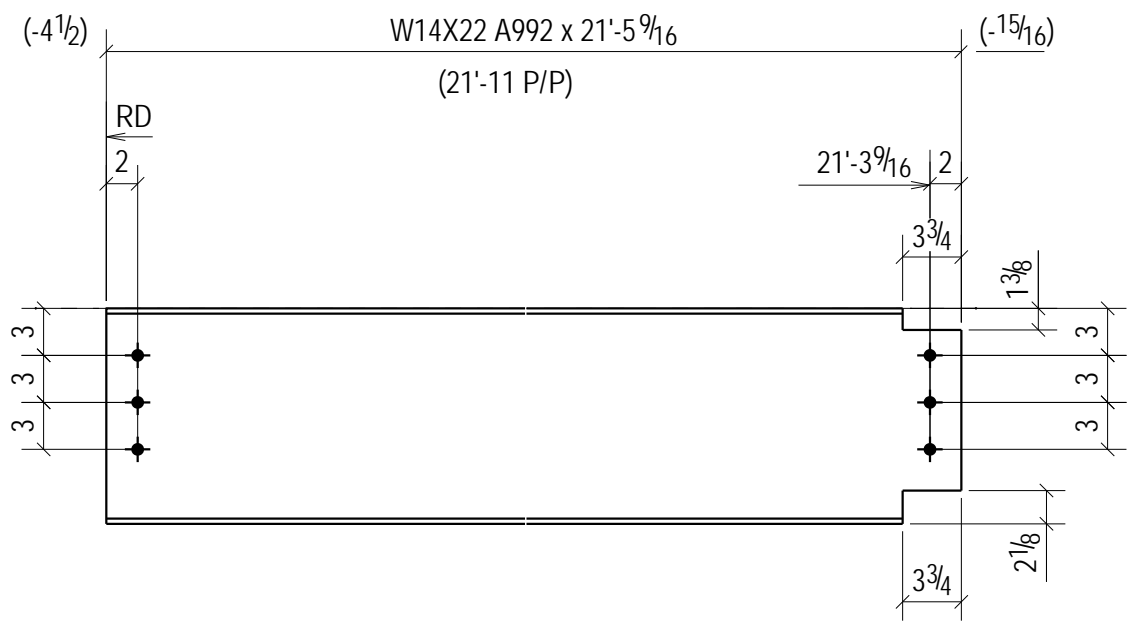
THP Limited, Inc.
By: TJS
Date: 11/10/14
NOT REVIEWED FOR DIMENSIONS, QUANTITIES OR OTHER TRADES.
NOTATIONS DO NOT AUTHORIZE AN EXTRA COST.

☐ A. No Exceptions Noted
☐ B. Exceptions Noted
☐ C. Revise and Resubmit
☐ D. Received for Record

Note: Contractor to field verify all existing dimensions/elevations prior to fabrication as noted on S1.01.

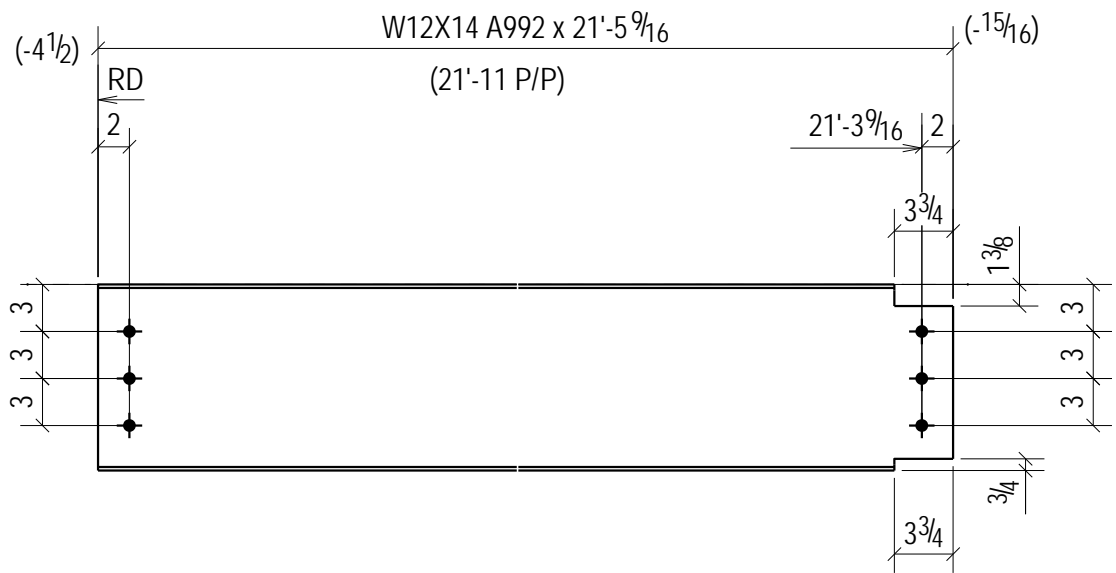


MAT'L (U.N.)	HOLES (U.N.)	10/23/2014	ISSUED FOR RE-APPROVAL	NAP	
---	---	10/01/2014	ISSUED FOR APPROVAL	NAS	KNP
SHOP WELD (U.N.)		DATE	REV	DESCRIPTION	BY
---		ISSUE		THOMAS STEEL, INC.	
FIELD CONN. (U.N.)		FOR	NO.	DATE	CONSTRUCTION CONSULTANTS
---		APP	1	10/01/2014	BELLEVUE, OHIO
SURFACE PREPARATION		RE-APP	2	10/23/2014	PALLIATIVE CARE UNIT
SHOP PAINT (U.N.)					---
SPECIAL					Framing Plan
		JOB NO.	DRAWN	CHECKED	APPROVED
		J-6605	NAS	KNP	E1
		10/01/2014	10/01/2014		



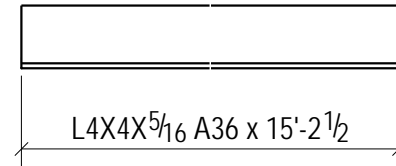
ONE - BEAM - 1B1

W
F 13 3/4" x 114"
5' x 5'16"

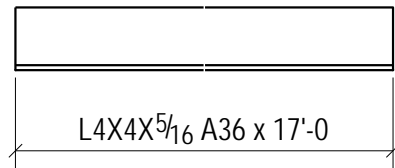


ONE - BEAM - 1B2

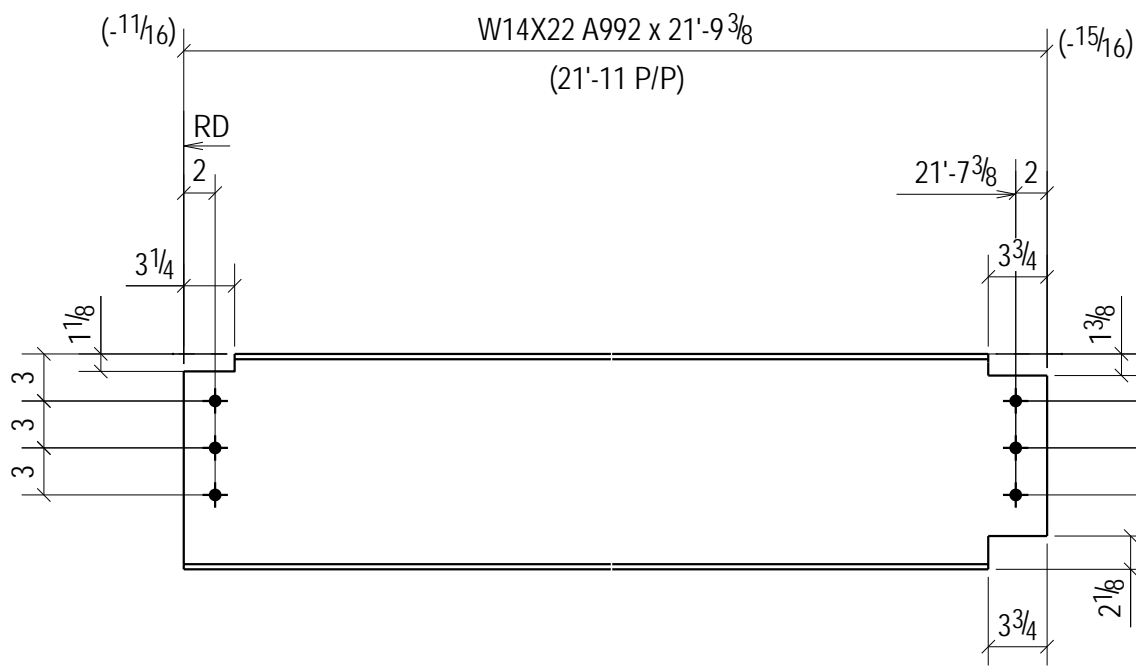
W
F 11 7/8" x 3716"
4' x 114"



ONE - ANGLE - 1A2

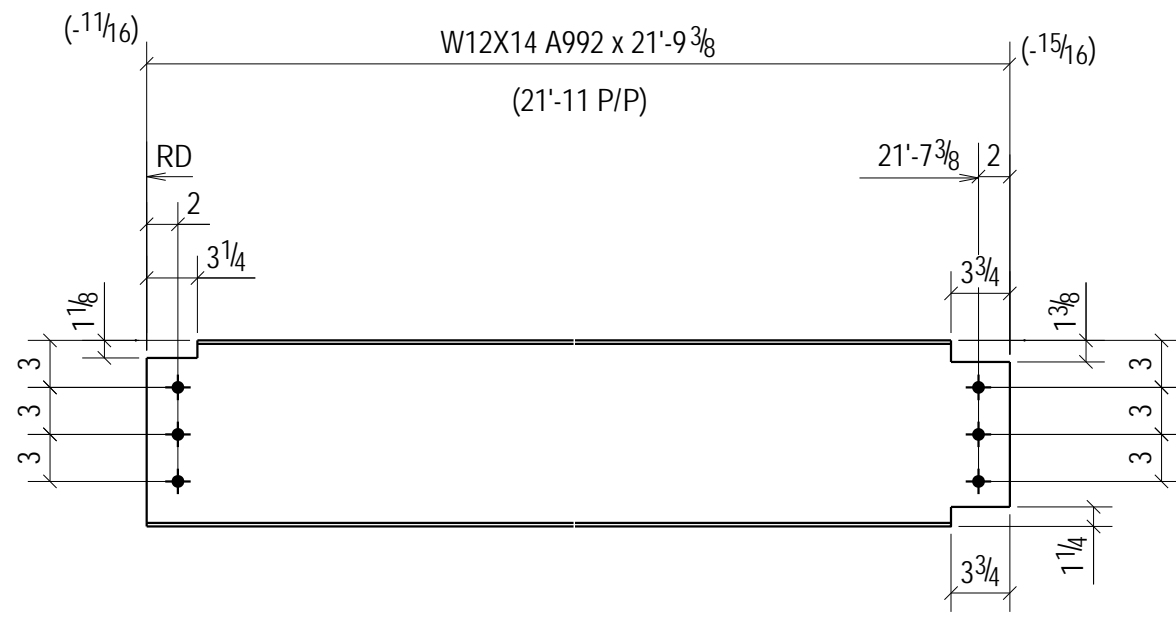


ONE - ANGLE - 1A3



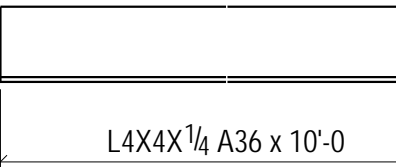
ONE - BEAM - 1B3

W
F 13 3/4" x 114"
5' x 5'16"

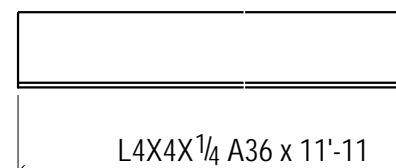


2 - BEAMS - 1B4

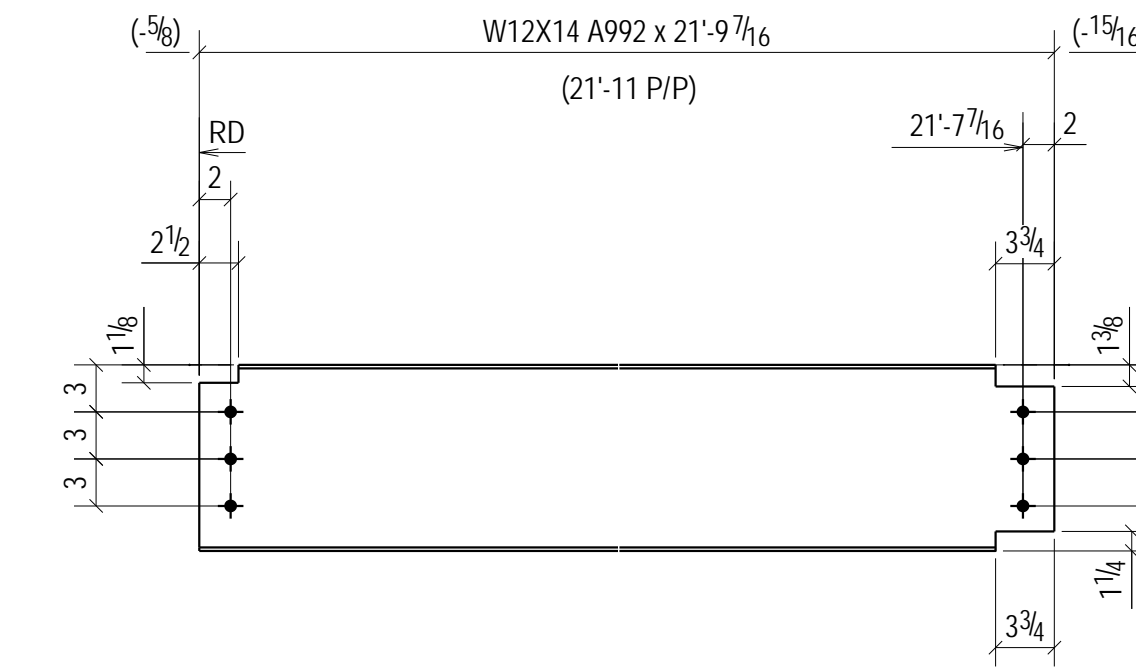
W
F 11 7/8" x 3716"
4' x 114"



2 - EDGE ANGLES - 1A4

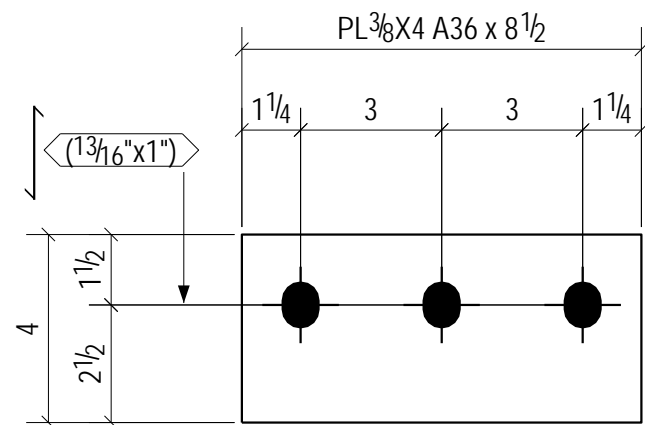


2 - EDGE ANGLES - 1A5

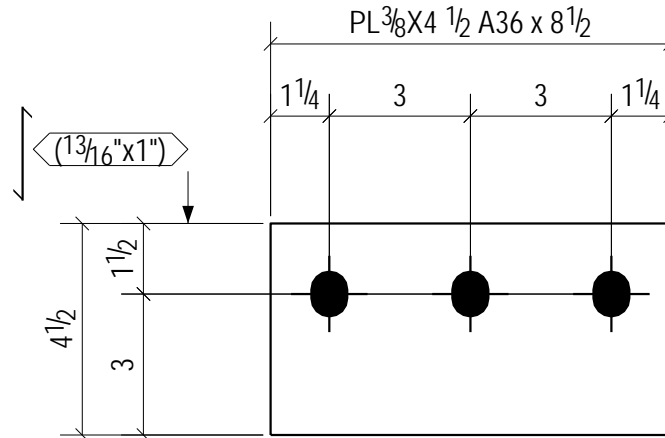


2 - BEAMS - 1B5

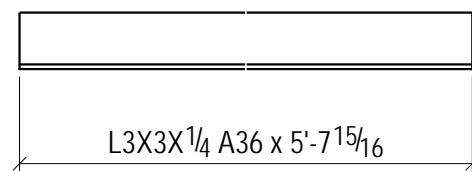
W
F 11 7/8" x 3716"
4' x 114"



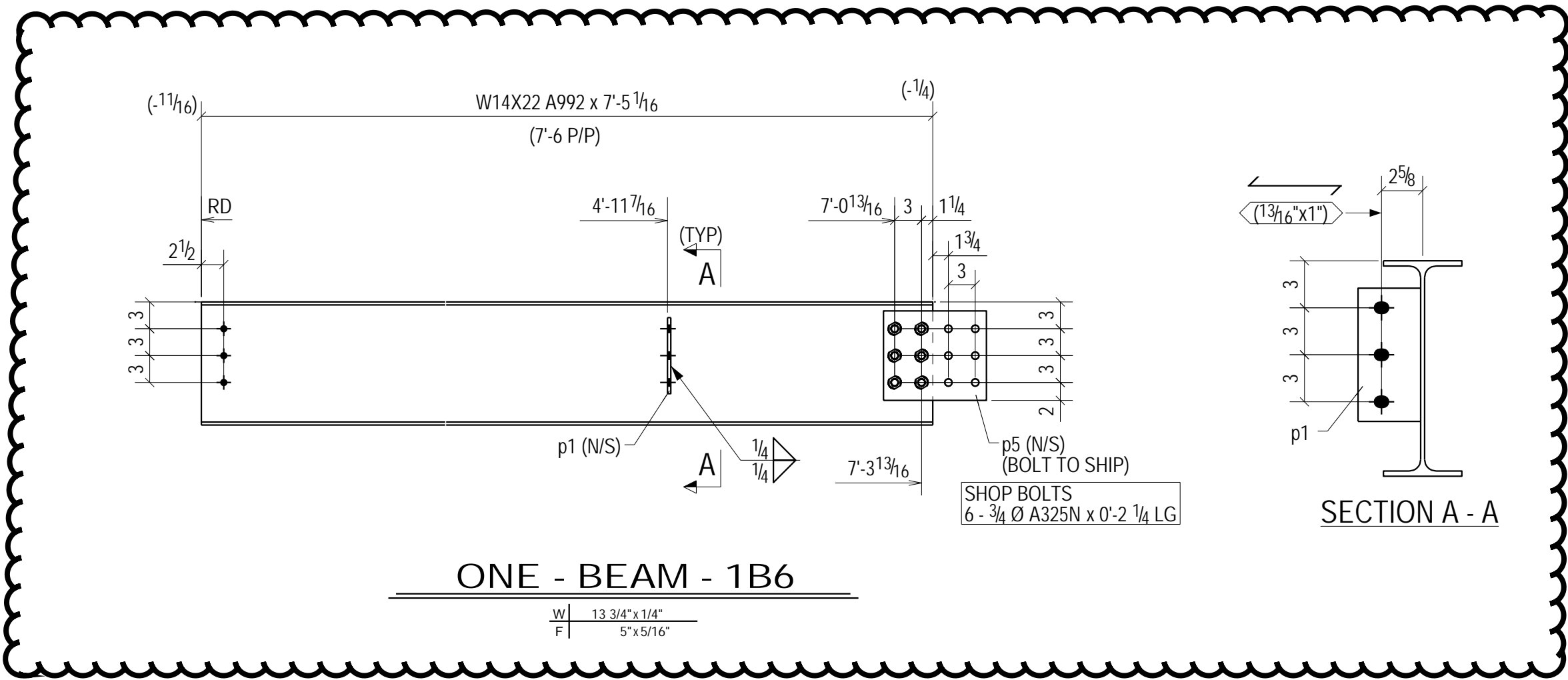
2 - SHEAR PLATES - 1WP1



2 - SHEAR PLATES - 1WP2

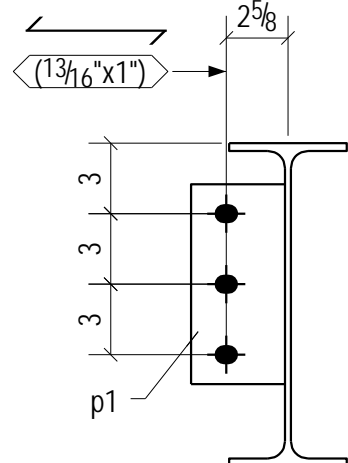


3 - KICKERS - 1A1



ONE - BEAM - 1B6

W
F 13 3/4" x 114"
5' x 5'16"



SECTION A - A

FOR RE-APPROVAL

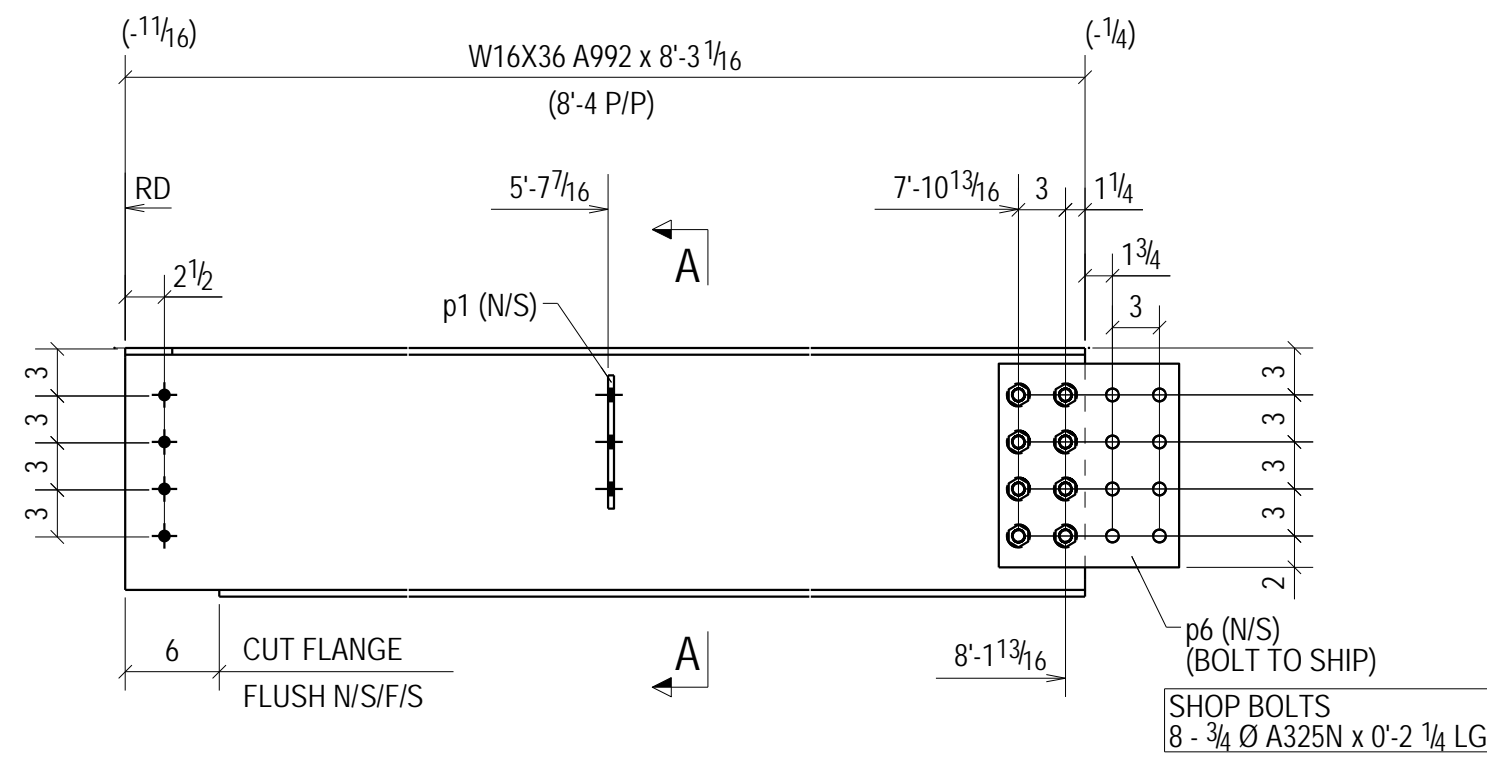
BILL OF MATERIAL							
MARK	QTY TOTAL	MATERIAL	LENGTH	STEEL GRADE	WEIGHT TOTAL	ADVANCE MILL#	REMARKS
1A1	3	KICKER			83.23		
1A1	3	L3X3X1/4	5'-7 15/16"	A36	83.23		
1A2	1	ANGLE			124.22		
1A2	1	L4X4X5/16	15'-2 1/2"	A36	124.22		
1A3	1	ANGLE			138.85		
1A3	1	L4X4X5/16	17'-0"	A36	138.85		
1A4	2	EDGE ANGLE			132.06		
1A4	2	L4X4X1/4	10'-0"	A36	132.06		
1A5	2	EDGE ANGLE			157.34		
1A5	2	L4X4X1/4	11'-11"	A36	157.34		
1B1	1	BEAM			474.06		
1B1	1	W14X22	21'-5 9/16"	A992	474.06		
		FIELD BOLT					
	6	3/4"Ø A325N BOLT	0'-1 3/4"				1-DTI, 2-HD WASH.
1B2	1	BEAM			303.87		
1B2	1	W12X14	21'-5 9/16"	A992	303.87		
		FIELD BOLT					
	6	3/4"Ø A325N BOLT	0'-1 3/4"				1-DTI, 2-HD WASH.
1B3	1	BEAM			481.08		
1B3	1	W14X22	21'-9 3/8"	A992	481.08		
		FIELD BOLT					
	6	3/4"Ø A325N BOLT	0'-1 3/4"				1-DTI, 2-HD WASH.
1B4	2	BEAM			616.73		
1B4	2	W12X14	21'-9 3/8"	A992	616.73		
		FIELD BOLT					
	12	3/4"Ø A325N BOLT	0'-1 3/4"				1-DTI, 2-HD WASH.
1B5	2	BEAM			616.87		
1B5	2	W12X14	21'-9 7/16"	A992	616.87		
		FIELD BOLT					
	12	3/4"Ø A325N BOLT	0'-1 3/4"				1-DTI, 2-HD WASH.
1B6	1	BEAM			175.69		
1B6	1	W14X22	7'-5 1/16"	A992	163.92		
p1	1	PL3/8"X4"	0'-8 1/2"	A36	3.62		
p5	1	PL1/4"X10"	1'-0 1/4"	A36	8.15		
	6	3/4"Ø A325N BOLT	0'-2 1/4"				1-DTI, 2-HD WASH.
		FIELD BOLT					
	3	3/4"Ø A325N BOLT	0'-1 3/4"				1-DTI, 2-HD WASH.
1WP1	2	SHEAR PLATE			7.23		
1WP1	2	PL3/8"X4"	0'-8 1/2"	A36	7.23		
1WP2	2	SHEAR PLATE			8.14		
1WP2	2	PL3/8"X4 1/2"	0'-8 1/2"	A36	8.14		
TOTAL WEIGHT					3319.36		



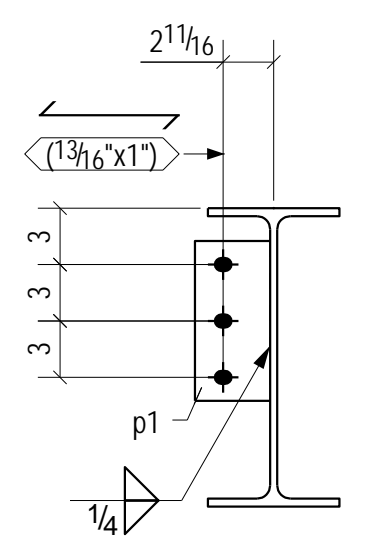
MAT'L (U.N)	HOLES (U.N)	10/23/2014	△	ISSUED FOR RE-APPROVAL	NP	
---	---	10/01/2014	△	ISSUED FOR APPROVAL	NP	
SHOP WELD (U.N)		DATE	REV	DESCRIPTION	BY	CH.BY
---				ISSUE		
FIELD CONN. (U.N)		FOR	NO.	DATE		
---		△	APP	1	10/01/2014	
SURFACE PREPARATION		△	RE-APP	2	10/23/2014	
SSPC-SP1						
SHOP PAINT (U.N)						
NO PAINT						
SPECIAL						

				THOMAS STEEL, INC. CONSTRUCTION CONSULTANTS BELLEVUE, OHIO		
				PALLIATIVE CARE UNIT ---		

				BEAM		
				JOB NO.	DRAWN	CHECKED
				J-6605	NAS	KNP
				10/01/2014		
				APPROVED		
						1

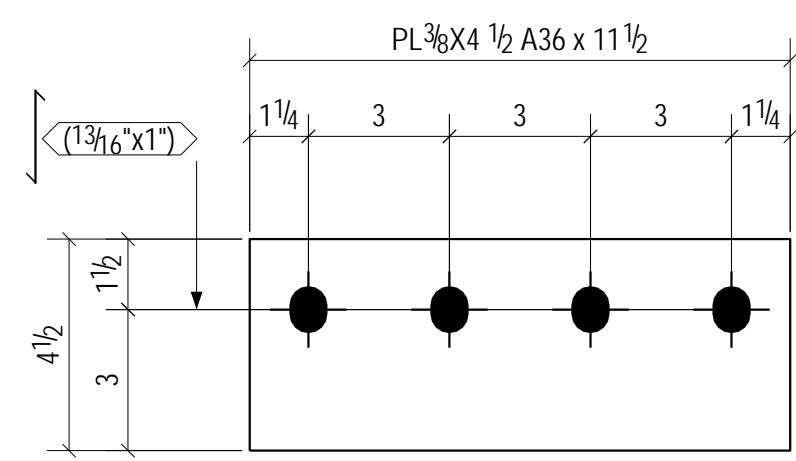


ONE - BEAM - 2B1

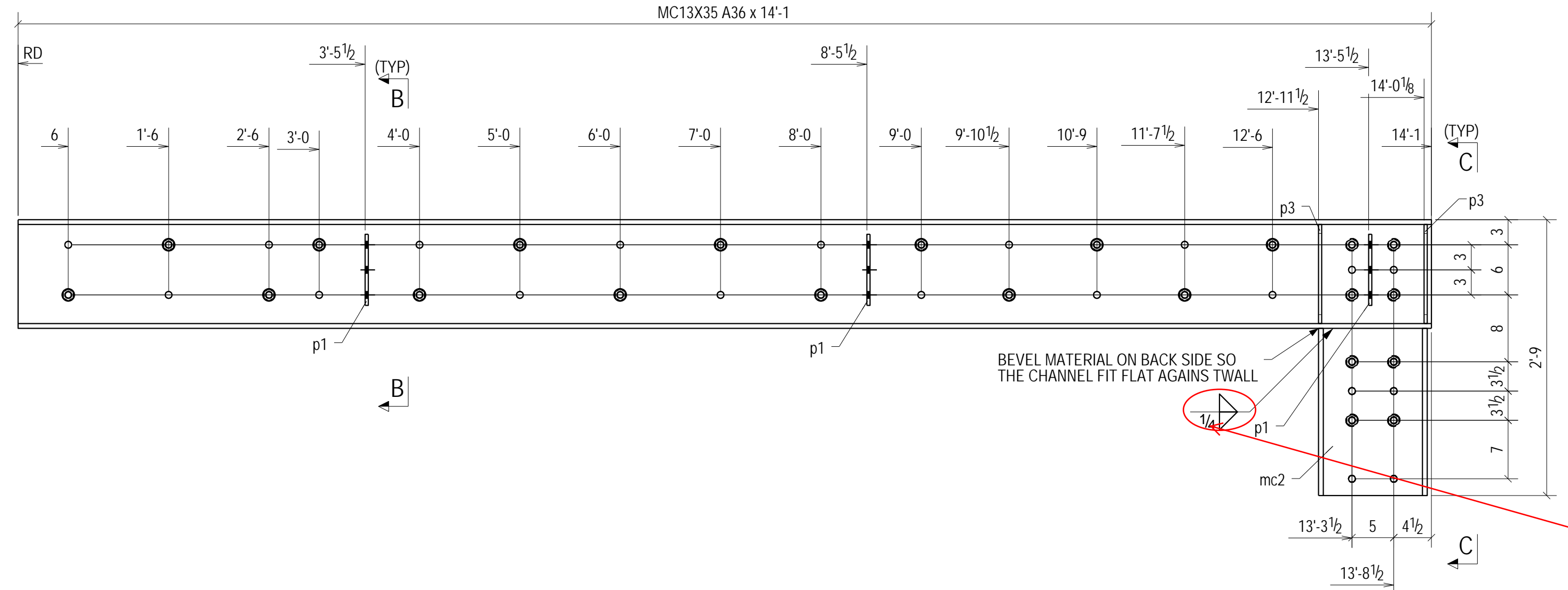


SECTION A - A

B

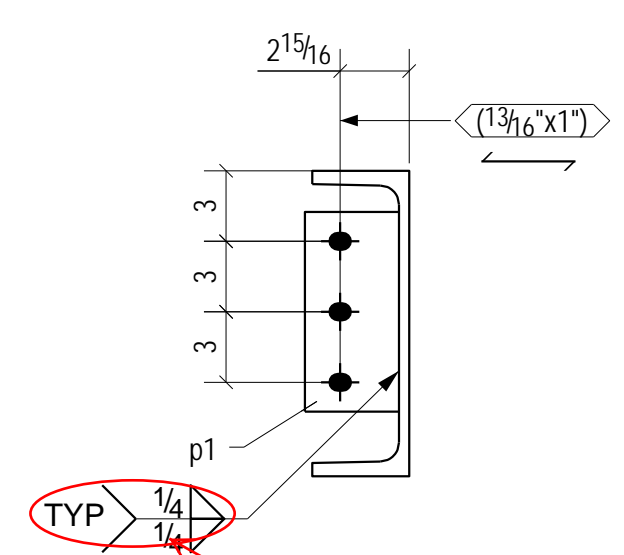


2 - SHEAR PLATES - 2WP1

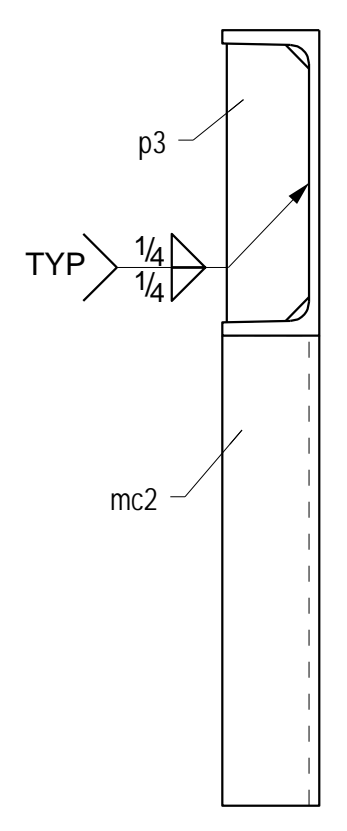


ONE - CHANNEL - 2CH2

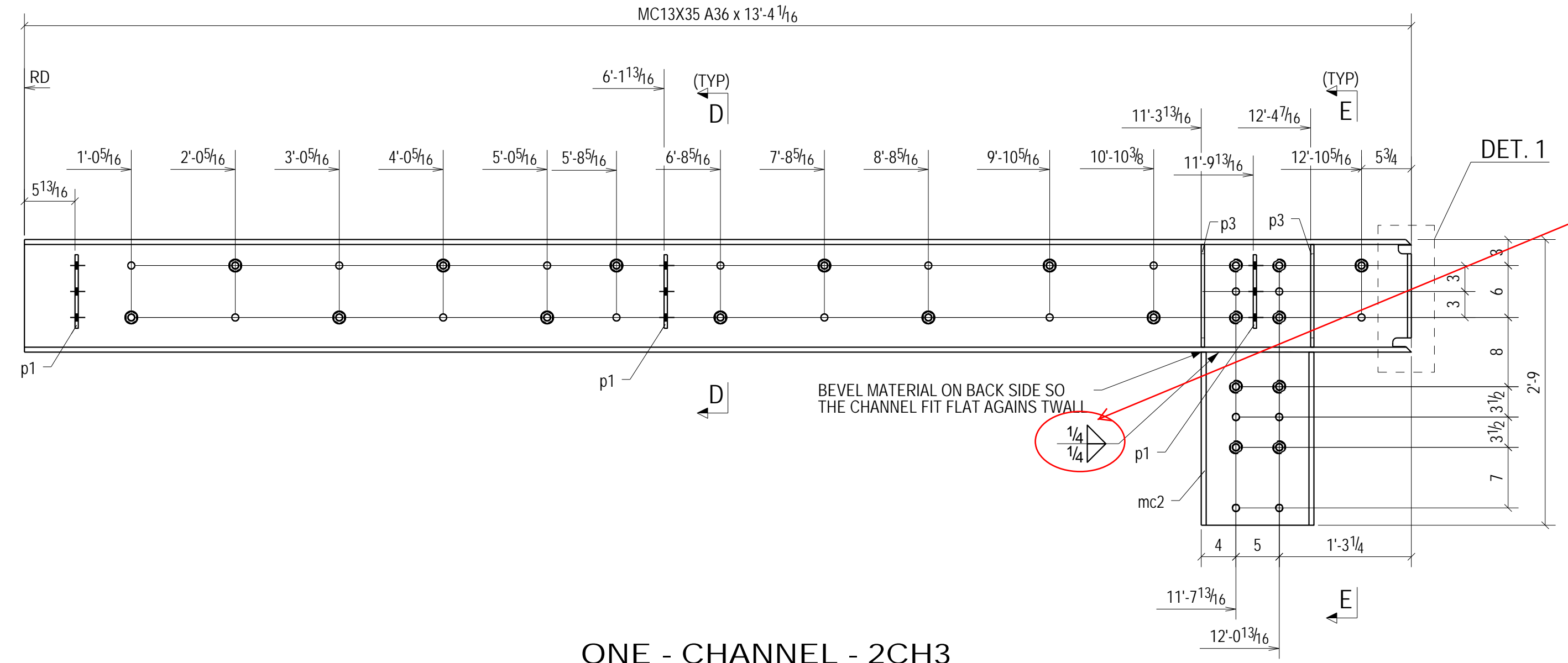
Paint Note: Galvanized per ASTM 123



SECTION B - B

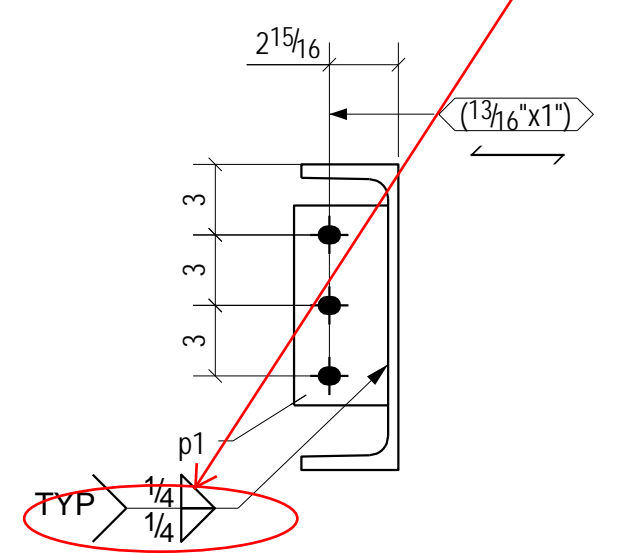


SECTION C - C

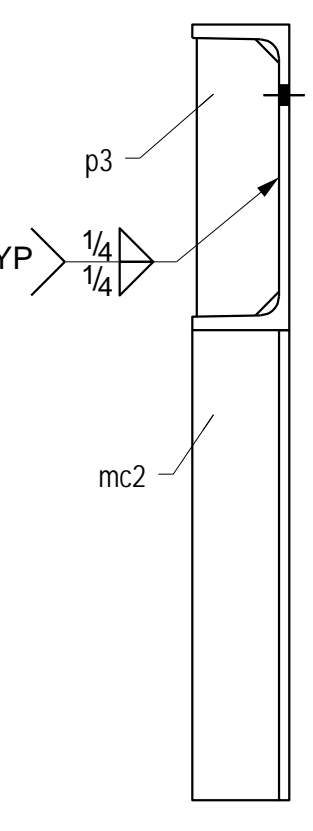


ONE - CHANNEL - 2CH3

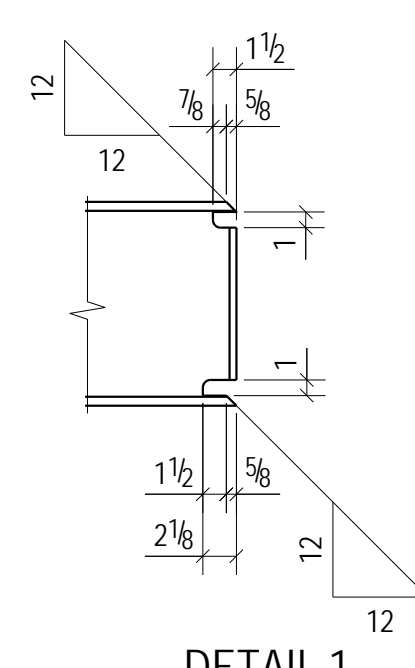
Paint Note: Galvanized per ASTM 123



SECTION D - D

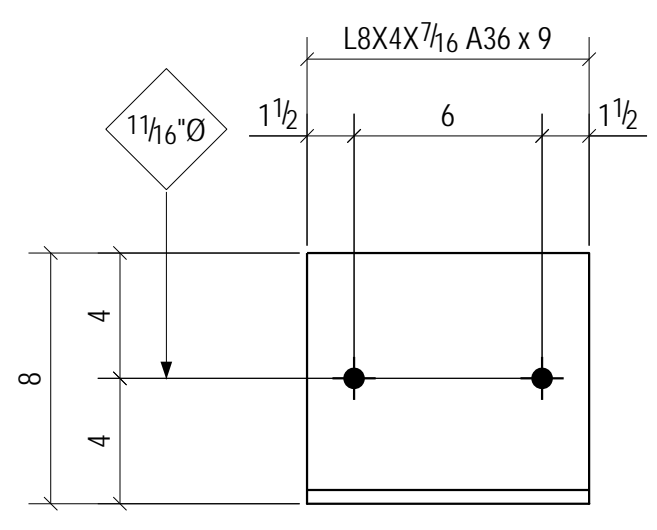


SECTION E - E



DETAIL 1

Weld all around,
web and flanges.



11 - COPING SUPPORT ANGLES - 2A1

BILL OF MATERIAL							
MARK	QTY TOTAL	MATERIAL	LENGTH	STEEL GRADE	WEIGHT TOTAL	ADVANCE MILL#	REMARKS
2A1	11	COPING SUPPORT ANGLE			142.07		
2A1	11	L8X4X7/16	0'-9"	A36	142.07		
		FIELD BOLT					
	22	5/8" Hilti Galv Exp. Bolts	0'-7 1/2"				Galv.
2B1	1	BEAM			312.01		
2B1	1	W16X36	8'-3 1/16"	A992	297.80		
p1	1	PL3/8"X4"	0'-8 1/2"	A36	3.62		
p6	1	PL1/4"X 12 1/4"	1'-1"	A36	10.60		
	8	3/4"Ø A325N BOLT	0'-2 1/4"				
		FIELD BOLT					
	4	3/4"Ø A325N BOLT	0'-2"				
2CH2	1	CHANNEL			571.50		
2CH2	1	MC13X35	14'-1"	A36	493.67		
mc2	1	MC13X35	1'-8"	A36	58.42		
p1	3	PL3/8"X4"	0'-8 1/2"	A36	10.85		
p3	2	PL3/8"X3 1/2"	0'-11 7/8"	A36	8.56		
		FIELD BOLT					
	22	3/4"Ø Hilti Kwik Bolt TZ					Galv.
2CH3	1	CHANNEL			545.44		
2CH3	1	MC13X35	13'-4 1/16"	A36	467.61		
mc2	1	MC13X35	1'-8"	A36	58.42		
p1	3	PL3/8"X4"	0'-8 1/2"	A36	10.85		
p3	2	PL3/8"X3 1/2"	0'-11 7/8"	A36	8.56		
		FIELD BOLT					
	20	3/4"Ø Hilti Kwik Bolt TZ					Galv.
2WP1	2	SHEAR PLATE			11.01		
2WP1	2	PL3/8"X4 1/2"	0'-11 1/2"	A36	11.01		
TOTAL WEIGHT					1582.02		

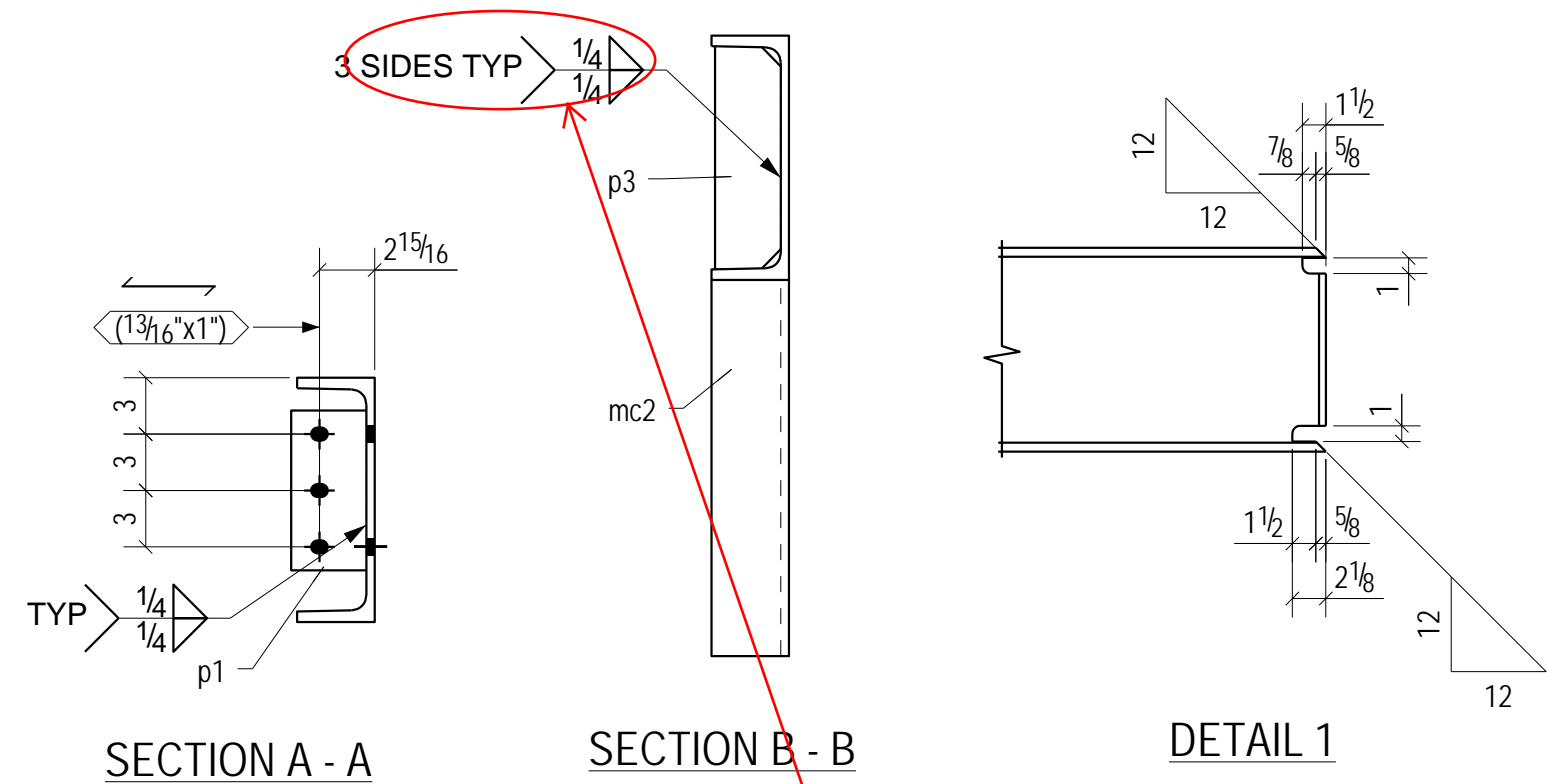


CERTIFIED
CONVENTIONAL STEEL STRUCTURES
COMPLEX STEEL BUILDING STRUCTURES
SUPERSECTED PARTS INDEPENDENT

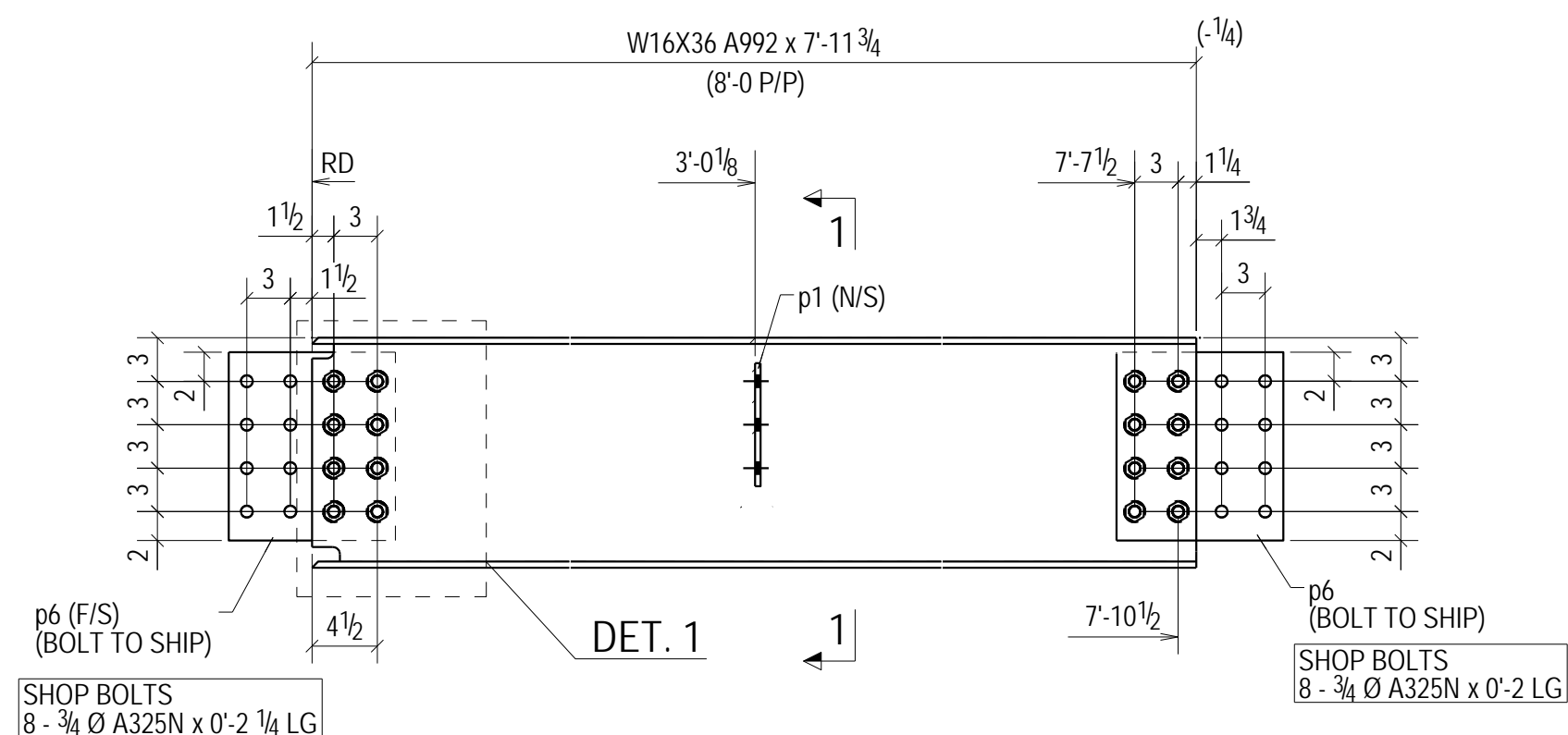


FOR RE-APPROVAL

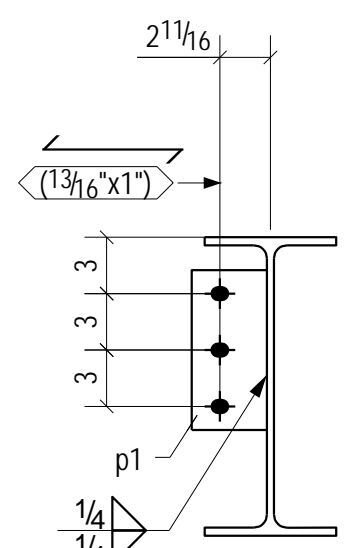
MAT'L (U.N)	HOLES (U.N)	10/23/2014	△B	ISSUED FOR RE-APPROVAL		NP	
---	---	10/01/2014	△A	ISSUED FOR APPROVAL		NP	
SHOP WELD (U.N)		DATE	REV	DESCRIPTION		BY	CH.BY
---		ISSUE		THOMAS STEEL, INC. CONSTRUCTION CONSULANTS BELLEVUE, OHIO			
FIELD CONN. (U.N)		FOR	NO.				
---		△A	APP	1	10/01/2014	PALLIATIVE CARE UNIT ---	
SURFACE PREPARATION SSPC-SP1		△B	RE-APP	2	10/23/2014		
SHOP PAINT (U.N) NO PAINT						---	
						BEAM	
SPECIAL -----				JOB NO.	DRAWN NAS	CHECKED KNP	APPROVED
				J-6605	10/01/2014		
							2



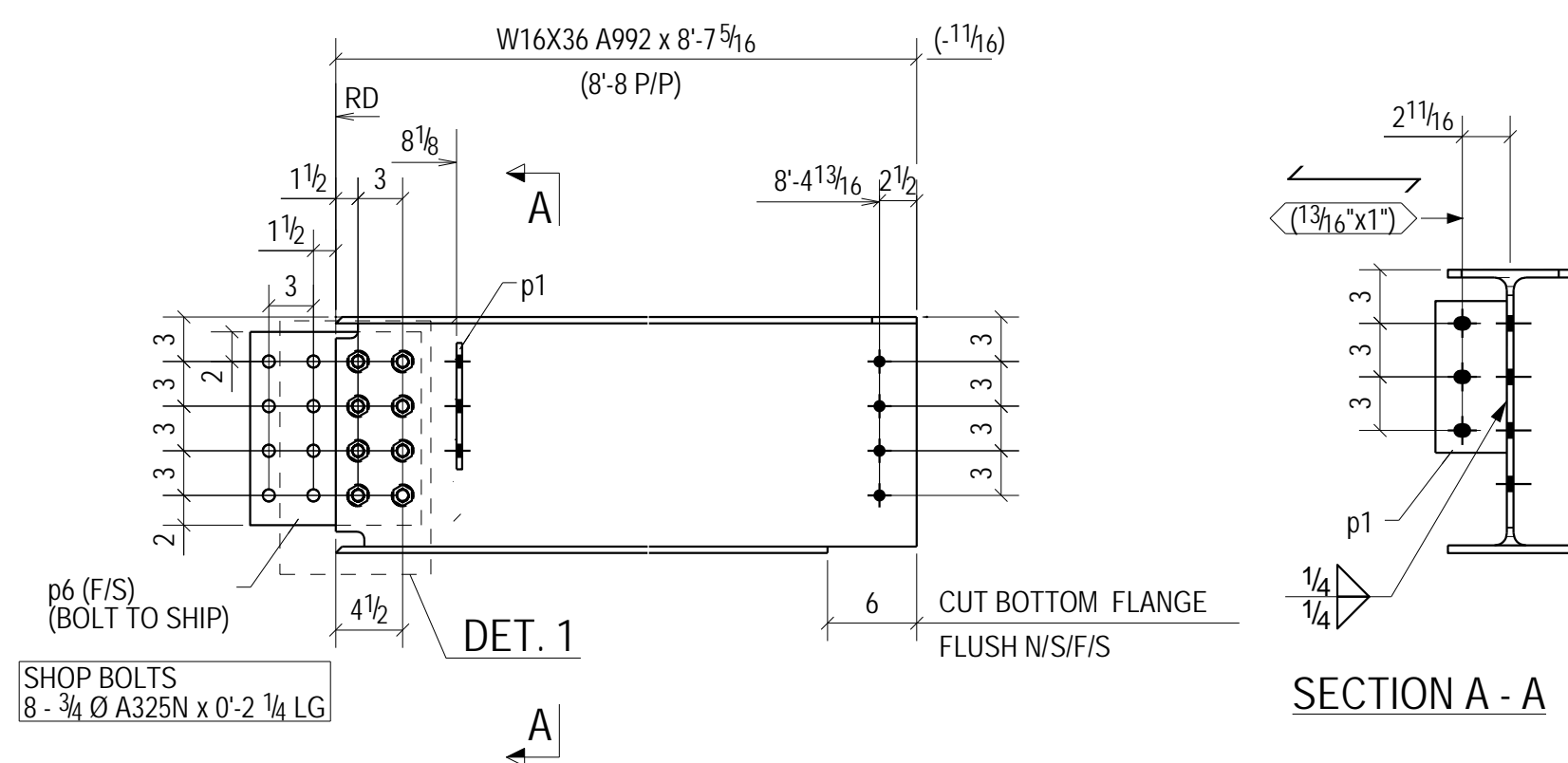
Paint Note: Galvanized per ASTM 123



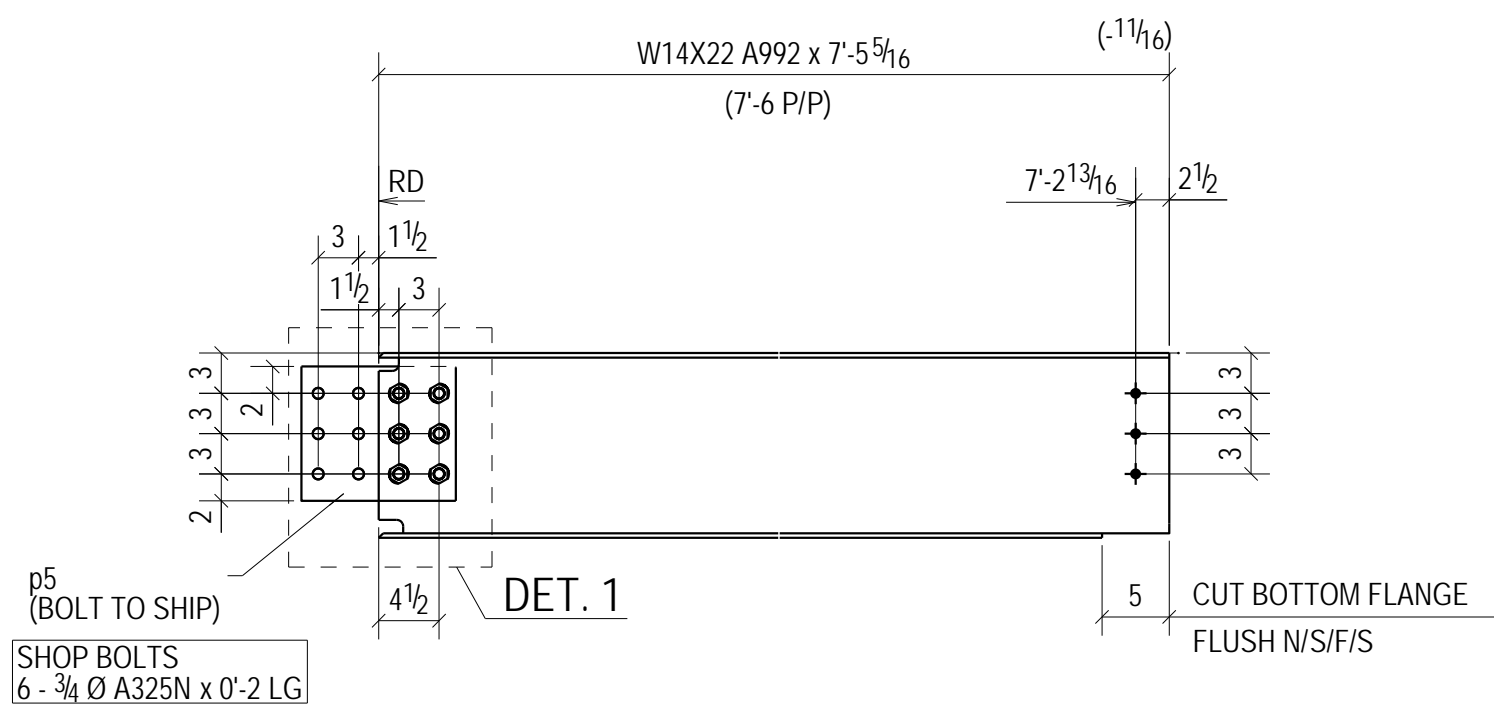
W	15 7/8"x1/4"
F	7"x7/16"



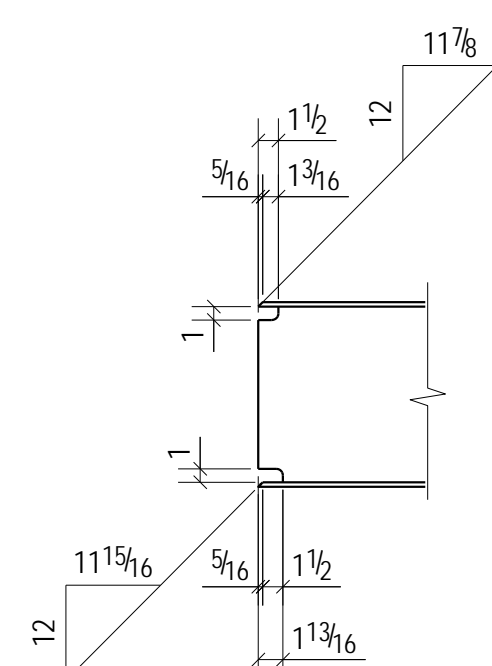
SECTION 1 - 1





W	15 7/8" x 1/4"
F	7" x 7/16"



W	13 3/4" x 1/4"
F	5" x 5/16"



DETAIL 1

MAT'L (U.N)	HOLES (U.N)										
---	---	10/24/14		ISSUED FOR APPROVAL					DST	VAG	
SHOP WELD (U.N)		DATE	REV	DESCRIPTION					BY	CH.BY	
---		ISSUE			THOMAS STEEL, INC. CONSTRUCTION CONSULTANTS BELLEVUE, OHIO						
FIELD CONN. (U.N)		FOR	NO.	DATE							
---		 APP	1	10/24/14							
SURFACE PREPARATION					PALLIATIVE CARE UNIT ---						
SSPC-SP1											
SHOP PAINT (U.N)					---						
NO PAINT											
					BEAM						
SPECIAL					JOB NO.	DRAWN NAS	CHECKED KNP	APPROVED	3		
-----					J-6605	10/21/2014					



FOR RE-APPROVAL



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COMPLEX STEEL BUILDING STRUCTURES
SOPHISTICATED PAINT ENDORSEMENT

