Iowa Department of Transportation

Letter of Transmittal

Office of Bridges and Structures
800 Lincoln Way (515)-233-7924
Ames, IA 50010 Fax (515)-239-1978

September 18, 2013

ID No	1256

To: HERBERGER CONSTRUCTION CO.,
2508 WEST 2ND
INDIANOLA, IA 50125

Design No.	113	Station	
File No.	30484	Section	
Job No.			
County	CASS		
Project	BRF-092-2(36)--38-15		
Project			
Location			

We are sending you

[X] *Attached* [ ] *Under Separate Cover*

[ ] Plans
[ ] Prints
[X] Shop Drawings
[ ] Falsework Plans

Item	Copies	Sheets	Description	1. No Exceptions Taken	2. Make Corrections Noted *	3. Amend and Resubmit	4. Rejected - See Remarks
1	1	38	ENGINEERING ANALYSIS "B" & PLAN DETAIL SHEETS -	X			
			ROLLING BRIDGE (BRIDGE SLIDE)				
			(6 Shts. S5-S10, Bridge Sliding Plan)				
			(32 Shts. Engineering Analysis-Superstructure Move)				

* No Resubmittal Necessary

Remarks:

Signed *Brett Kloss*
Brett Kloss
Office of Bridges and Structures

Cc:

W. SUNDAY-CONSTRUCTION
HERBERGER CONSTRUCTION CO., INC. (2 COPIES)
OFFICE COPY
S. NIXON-CRESTON RCE (2 COPIES)

REVIEWED BY OFFICE OF BRIDGES AND STRUCTURES
IOWA DEPARTMENT OF TRANSPORTATION

Reviewed in accordance with current policy

September 18, 2013

✓ NO EXCEPTIONS TAKEN
❑ MAKE CORRECTIONS NOTED (NO RESUBMITTAL NEC.)
❑ AMEND AND RESUBMIT

This review is for strength and arrangement of component parts. Any deviation from the plans or specifications not clearly noted by the Contractor has not been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility or any error or deviation from the contract requirements.

Appendix B

Engineering Analysis

Super Structure Move

Iowa Department of Transportation
Cass County Rolling Bridge
BRF-092-2(36)--38-15

for:

Herberger Construction
2508 West 2nd Ave.
Indianola, IA 50125

by:

Tometich Engineering, Inc.
10501 Buena Vista Court
Urbandale, Iowa 50322
Phone: (515) 280-8022
Fax (515) 727-9124

e-mail: tph@tometichengineering.com
web site: www.tometichengineering.com

15-Aug-13

Tometich Engineering, Inc.
Urbandale, Iowa 50322
Phone: (515) 280-8022
Fax: (515) 727-9124

Job Name: Iowa Department of p. 1/31
Job # U13-135 Date: 15-Aug-13
file: U13-135 calc1.xls

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Iowa Department of Transportation

Design Calculations:

Project : Iowa Department of Transportation
Cass County Rolling Bridge
BRF-092-2(36)--38-15

Submit to: Herberger Construction
2508 West 2nd Ave. Phone: 515-961-5564
Indianola, IA 50125 Fax: 515-962-1496
Attn: Dennis Herberger e-mail:

Design Review:
Theodore P Hoeger P.E.
Tometich Engineering, Inc. Iowa Reg. # 20812

References:
AASHTO LRFD Bridge Construction 3rd Ed. 2010
AISC Manual for Steel Construction , 9th Ed.
AISC Manual for Steel Construction , Load and Resistance Factor Design, 2nd Ed., 1994
American Concrete Institute; ACI 318-05
International Building Code (IBC) - 2009 Edition

Commentary:
This project consists of designing
Temporary construction pier for a new county bridge.

Certification:

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa

Signature: Ted Hoeger
Date: 19-Aug-2013
Registration #: 20812

My Registration Expires December 31, 2014

LICENSED PROFESSIONAL ENGINEER
THEODORE HOEGER 20812
IOWA

Revised- 10-sept-2013 Ted Hoeger
Revised- 17-sept-2013 Ted Hoeger

Tometich Engineering, Inc.
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Job Name: Cass Country Rolling Bridge
Job # U13-135
Born on Date:
Version #: 1

Date: 10-Sep-13

Table of Contents

Calculation Submittal Notes

1 Pulling load design does not include the weight of the barrier rails. The barrier rails will be cast after the bridge is rolled into its final position
2 Contractor will provide documentation to certify HP steel shapes are 50ksi steel.

REVIEWED BY OFFICE OF BRIDGES AND STRUCTURES
IOWA DEPARTMENT OF TRANSPORTATION

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September 18, 2013

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- ☐ **MAKE CORRECTIONS NOTED (NO RESUBMITTAL NEC.)**
- ☐ **AMEND AND RESUBMIT**

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PROJECT BRIDGE MOVING
SHEET NUMBER 3 OF 31
CALCULATED BY TPH DATE 8/19/13
CHECKED BY _____ DATE _____
FILE NUMBER 013-135

Bridge Weight

From Previous Temp Pier Submittal

Interior Beam With Deck Weight = 192.4^{K} each
Edge Beam Weight with Deck = 241.6^{K} − 55.6^{K} = 186^{K} each.
± Barrier Rail

End Beam = 112^{K} Each.

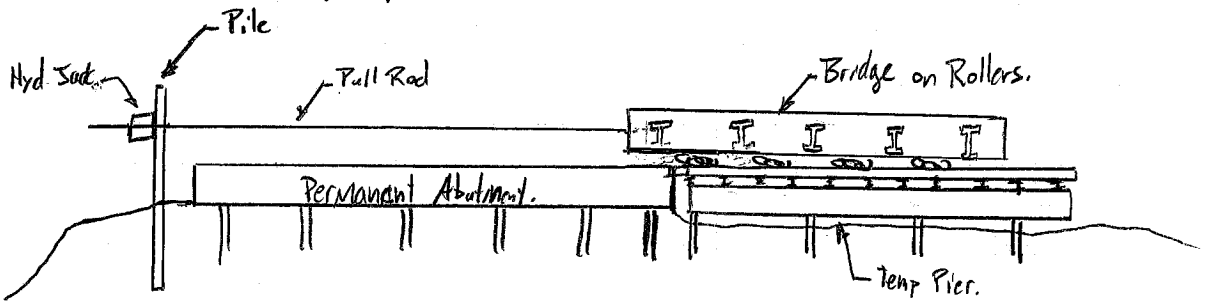
Total Bridge Weight = 192.4^{K}(4) + 186^{K}(2) + 112^{K}(2) = 1,365.6^{K} = 682.8 TONS.

- Bridge Will Be Pulled By 2 Hydraulic Rams, one on each End.
- Roller Resistance = 5% of Load.

Find Pulling Force Req By Each Hydraulic Ram.

Bridge Wt = 682.8 TONS ⇒ 682.8 Kips Per Side.

5% of 682.8^{K} = 34.14 Kips — Pulling Force Req. Per Side = 34.14 Tons.
10% = 68.2^{K} ← Design Capacity
15% = 102.42^{K}
20% = 136.4^{K}



Pull/Tension Rod = EFCO She-Bolts and Inner Rods.
Capacity = 38.5^{K} > 34.14^{K} (With 2:1 Safety Factor) Vok.

Hyd Jack/Ram = ENERPAC RR-5020 - Capacity = 55.3 tons (Push) > 34.14 Vok.

4-Sept-2013 - Tomdich Eng. Response to Questions.

4/31

DESIGN COMMENTS -- 1" DIA ROD AND SHE-BOLT EMBEDMENT

It is evident from the enclosed calculations that the designer attempted to use 10% of the dead load as the required pull load needed to safely move the bridge, as recommended in a previous response by the Iowa DOT. The following comments are made on this basis.

LOAD FACTORS:

In the first submittal of the bridge superstructure move, 1.6 multiplied by the bridge weight and the static friction coefficient (1.6 x DL x μ) was used to determine the required pull load to move the bridge for ACI 318 equations. The corrected calculations submitted did not include this factor with the dead load; therefore, this is not being consistent with the original analysis. It is up to the Engineer of Record to determine what is acceptable, but it is recommended that the load factors in ACI 318 be used when using the equations in Appendix D to determine the anchorage capacity. Comments for the calculations will be based on the 1.6 factor since this was previously used by the designer. 1.6 Factor Added to Pull out Calculations. TH

CONCRETE BREAK-OUT STRENGTH:

The calculations state that the #5 diaphragm bars are supplementary reinforcing for resisting the tension load, and per section D.5.2.9 the pull out capacity of the diaphragm bars can be substituted for the break-out strength of the anchor rod in concrete. This is acceptable per code. However, it seems the use of all ten-#5 longitudinal bars to resist the tension load is un-conservative and neglects the recommendations of commentary RD.5.2.9. Additional closed ties are recommended in ACI when counting on the strength from longitudinal steel. Please see comments enclosed and address the issue of concrete break-out strength. h_{ef} for RD.5.2.9 is Not Govern By h_{ef} of D.5.2.2. h_{ef} for D5.2.9 is at the Actual Failure Plane. Per D.5.2.9 "Strength of Anchor reinforcement shall be permitted to be used instead of the Concrete Breakout." TH

SIDE-FACE BLOW-OUT STRENGTH:

The designer addressed the issue of this failure mechanism in the calculations, but did not include the reduction factor, phi, to calculate the design strength. Please review comments in calculations and make adjustments. Added End Bearing Plate for Pull-out - Calculation Revised with Ø TH

PULL-OUT STRENGTH:

In the corrected calculations, the designer indicated that additional capacity is supplied by abutment diaphragm reinforcing. Per commentary RD.5.3.3 and RD.5.3.4, it is apparent that additional capacity can only be obtained unless the head or nut of the anchorage is reinforced with confinement steel or a type of washer plate for this type of loading mechanism. Please review comments in calculations and make adjustments if required.

Added End Bearing Plate - Calculation Revised. TH

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PROJECT Cass Co. Bridge Move.
SHEET NUMBER 5 OF 31
CALCULATED BY TYH DATE 4 Sep 2013
CHECKED BY _____ DATE _____
FILE NUMBER U13-135

4-Sept 2013 - Calculation Revision for she-Bold Embed.

- Added 1- 10"x4"x3/4" Bearing Plate to End of she-Bolts.

Revised Pullout strength = 896^k 896/(1.6)(682) = 82.1%

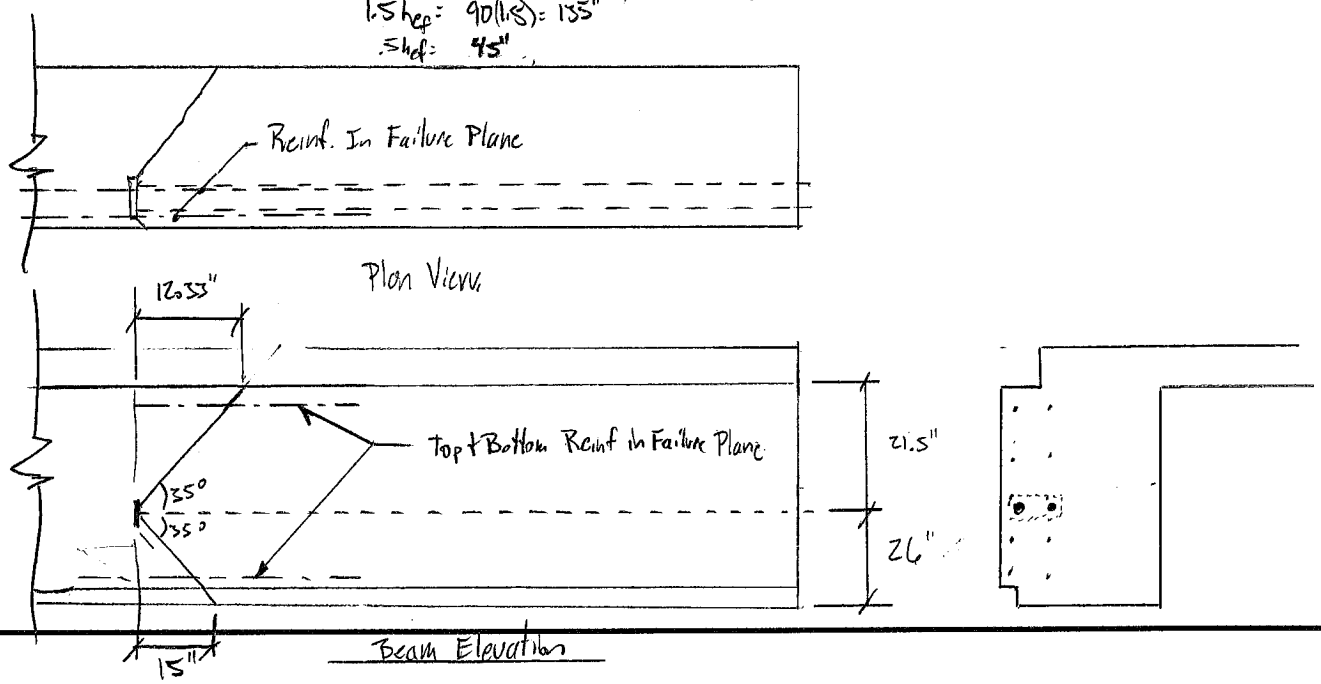
Revised Side Blow-out = 268^k 268/(1.6)(682) = 24.5%.

Concrete Breakout strength = 139.5^k (Previous)

- Section D.5.2.9 h_{ef} correlates to Actual Failure Plane - Not Assumed in Fig RD.5.2.3
  0.5h_{ef} = 0.5(90) = 45" > Beam Dimensions
  - All Reinforcing Can Be used
  - See DOT Drawing For Actual Failure Plane
  139.5^k/1.6(682) = 12.78%.

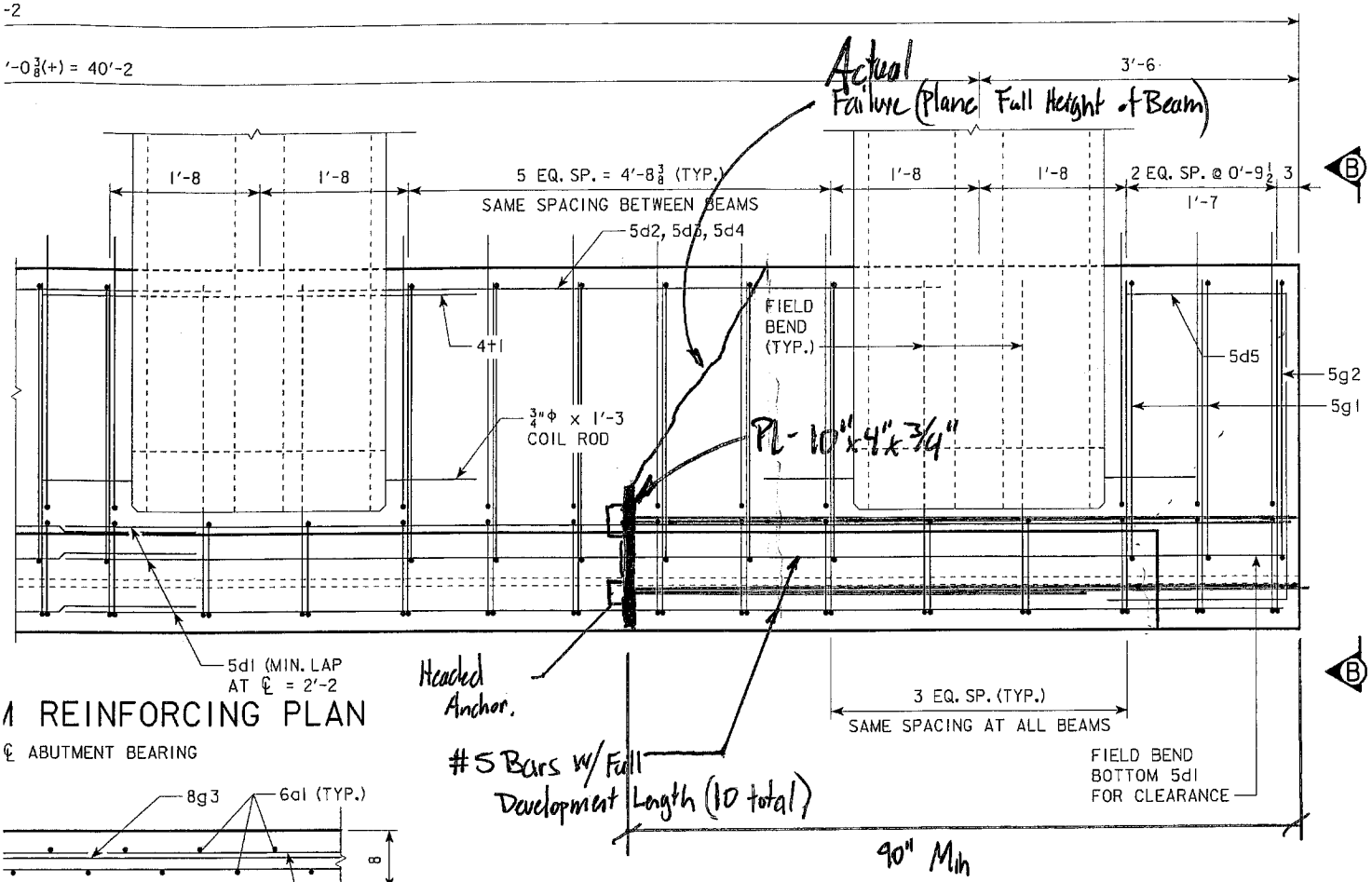
she-Bolt = 38.5^k(2) = 77^k (@ 2:1 SF) ⇒ 77/682^k = 11.2%

Concrete Break-out strength Views.
Concrete Will Break at about 35° Angle at Actual Failure Plane.



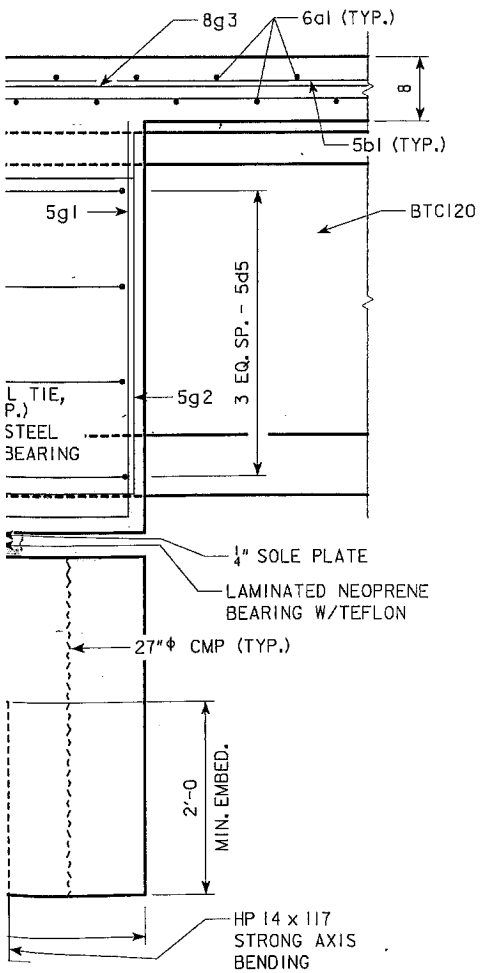
-2

'-0 3/8(+) = 40'-2



1 REINFORCING PLAN

℄ ABUTMENT BEARING



NG SECTION B-B

WN FOR CLARITY

** END OF BEAM TO ℄ BEAM BEARING DIMENSION

STEEL BEARING	
BEAM LINE	STEEL BEARING THICKNESS (T) (IN.)
C, D	4.5
B, E	2.5
A, F	0.5

STEEL BEARING - 3 x 2'-4 1/2 x T

WEIGHT OF THE STEEL BEARING INCLUDED IN THE BID ITEM "STRUCTURAL STEEL".

* OPTIONAL CONSTRUCTION JOINT ON EAST AND WEST ENDS ANI SOUTH SIDE OF PRECAST ABUTMENT FOOTING. INTENTIONALLY ROUGHEN OPTIONAL CONSTRUCTION JOINT SURFACE TO 1/4" AMPLITUDE. SEE KEEPER BLOCK DETAIL ON DESIGN SHEET 10 FOI ADDITIONAL INFORMATION.

SEE DESIGN SHEET 14 FOR BEARING PAD DETAILS.
SEE DESIGN SHEET 18 FOR COIL TIE LOCATION.

DESIGN FOR 0° SKEW

120'-0 x 44'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE

120'-0 SINGLE SPAN

ABUTMENT DIAPHRAGM DETAILS

STA. 1134+61.00 (IA 92) FEBRUARY, 2012

CASS COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION

DESIGN SHEET NO. 13 OF 25 FILE NO. 30484 DESIGN NO. 113

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PROJECT BRIDGE MOVING
SHEET NUMBER 7 OF 31
CALCULATED BY TPH DATE 8/19/13
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Pull Rod Design Cont.

Pull out

$N_p = 8 A_{brg} f'_c$ A_{brg} for 1"ϕ Bolt W/ Heavy Hex Head = 1.501 in² Per PCA Notes - table 34-2

$N_p = 8(1.501)4000 = 48,032\#$ → $\phi N_p = (.7)48,032 = 33,622\#$

$R_{eq} = 17.07(1.6) = 27.312^k < 33.6^k$ O.K.

Revised Pullout strength W/ 10"x 4"x 3/4" End Plate.

$N_p = 8 A_{brg} f'_c = 8(10)(4)4000 = 1,280,000\# = \phi N_p = .7(1,280) = 896^k$

$896^k / 682.8 = 1.31 \Rightarrow$ 131%

at 1.6L = 82.0%

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PROJECT Cass Co. Bridge Move
SHEET NUMBER 8 OF 31
CALCULATED BY TPH DATE 4 Sep 2013
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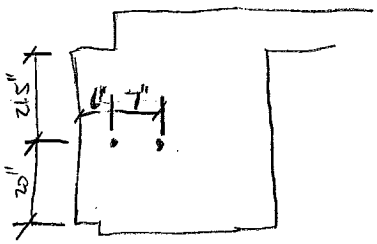
FILE NUMBER U13-135

Side-Face blowout strength. D.5.4

h_{af} = 40" > 2.5C_{a1} = 2.5(6) = 15"



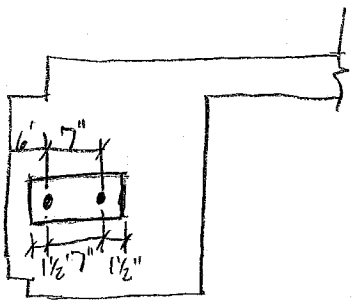
(D-17) $N_{sb} = (160 C_{a1}\sqrt{A_{rg}})\lambda\sqrt{f'_c}$

$= (160(6)\sqrt{1.501})(1)\sqrt{4000}$ = 74,386.0 lbs. for Outer Anchor

D.5.4.2 - Pertains to Anchor spaced parallel to Edge - Does Not Apply

Assume Inner Anchor = 74.386^k also ⇒ total Capacity without side-blowout
= 74^{k}x2 = 140^k > Breakout.

Raised - Side Face Blowout w/
Add 10"x 4"x ¾" End plate.



$N_{sb} = (160(C_{a1})\sqrt{A_{rg}})\lambda\sqrt{f'_c}$

$N_{sb} = (160(6)\sqrt{40})\lambda\sqrt{4000}$

N_{sb} = 384,000#

ϕN_{sb} = .7(384,000) 268,800# tension Allowable - Vok.

268/682.8 = 39.25%

@ 1.6L = 24.5%

CODE

D.5.2.7 — The modification factor for post-installed anchors designed for uncracked concrete in accordance with D.5.2.6 without supplementary reinforcement to control splitting, $\psi_{cp,N}$, shall be computed as follows using the critical distance c_{ac} as defined in D.8.6

If $c_{a,min} \geq c_{ac}$

$$\text{then } \psi_{cp,N} = 1.0 \qquad \text{(D-12)}$$

If $c_{a,min} < c_{ac}$

$$\text{then } \psi_{cp,N} = \frac{c_{a,min}}{c_{ac}} \qquad \text{(D-13)}$$

but $\psi_{cp,N}$ determined from Eq. (D-13) shall not be taken less than $1.5h_{ef}/c_{ac}$, where the critical distance c_{ac} is defined in D.8.6.

For all other cases, including cast-in anchors, $\psi_{cp,N}$ shall be taken as 1.0.

D.5.2.8 — Where an additional plate or washer is added at the head of the anchor, it shall be permitted to calculate the projected area of the failure surface by projecting the failure surface outward $1.5h_{ef}$ from the effective perimeter of the plate or washer. The effective perimeter shall not exceed the value at a section projected outward more than the thickness of the washer or plate from the outer edge of the head of the anchor.

D.5.2.9 — Where anchor reinforcement is developed in accordance with Chapter 12 on both sides of the breakout surface, the design strength of the anchor reinforcement shall be permitted to be used instead of the concrete breakout strength in determining ϕN_n. A strength reduction factor of 0.75 shall be used in the design of the anchor reinforcement.

Reduced h_{ef} for Concrete Breakout is For Fracture of Concrete at close Edge. In D.5.2.9 the Fracture Strength of the Concrete "Cone" is Ignored and only Reinforcing is used. The Assumed Failure Cone in RD.5.2.3 is Not Applicable with Reinforcing strength Only ∴ h_{ef} = Full Depth of Anchors

COMMENTARY

installed (25 percent higher for cast-in). This agrees with field observations and tests that show cast-in anchor strength exceeds that of post-installed for both cracked and uncracked concrete.

RD.5.2.7 — The design provisions in D.5 are based on the assumption that the basic concrete breakout strength can be achieved if the minimum edge distance, $c_{a,min}$, equals $1.5h_{ef}$. However, test results[D.22] indicate that many torque-controlled and displacement-controlled expansion anchors and some undercut anchors require minimum edge distances exceeding $1.5h_{ef}$ to achieve the basic concrete breakout strength when tested in uncracked concrete without supplementary reinforcement to control splitting. When a tension load is applied, the resulting tensile stresses at the embedded end of the anchor are added to the tensile stresses induced due to anchor installation, and splitting failure may occur before reaching the concrete breakout strength defined in D.5.2.1. To account for this potential splitting mode of failure, the basic concrete breakout strength is reduced by a factor $\psi_{cp,N}$ if $c_{a,min}$ is less than the critical edge distance c_{ac}. If supplementary reinforcement to control splitting is present or if the anchors are located in a region where analysis indicates cracking of the concrete at service loads, then the reduction factor $\psi_{cp,N}$ is taken as 1.0. The presence of supplementary reinforcement to control splitting does not affect the selection of Condition A or B in D.4.4 or D.4.5.

RD.5.2.9 — For conditions where the factored tensile force exceeds the concrete breakout strength of the anchor(s) or where the breakout strength is not evaluated, the nominal strength can be that of anchor reinforcement properly anchored as illustrated in Fig. RD.5.2.9. Care needs to be taken in the selection and positioning of the anchor reinforcement. The anchor reinforcement should consist of stirrups, ties, or hairpins placed as close as practicable to the anchor. Only reinforcement spaced less than $0.5h_{ef}$ from the anchor centerline should be included as anchor reinforcement. The research[D.14] on which these provisions is based was limited to anchor reinforcement with maximum diameter similar to a No. 5 bar. It is beneficial for the anchor reinforcement to enclose the surface reinforcement. In sizing the anchor reinforcement, use of a 0.75 strength reduction factor ϕ is recommended as is used for

→ Cont.

10/31

CODE

COMMENTARY

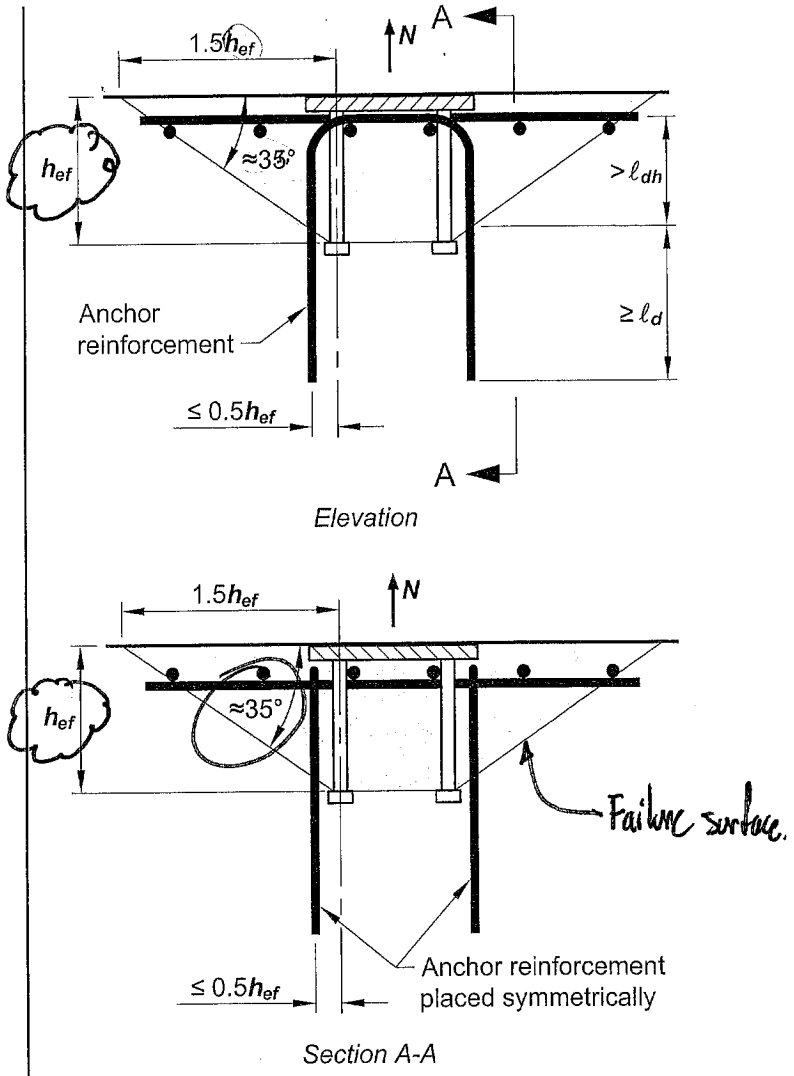


Fig. RD.5.2.9—Anchor reinforcement for tension.

strut-and-tie models. If the alternate load factors of Appendix C are used, the corresponding strength reduction factor of 0.85 for strut-and-tie models should be used. As a practical matter, use of anchor reinforcement is generally limited to cast-in-place anchors.

D.5.3 — Pullout strength of anchor in tension

RD.5.3 — Pullout strength of anchor in tension

D.5.3.1 — The nominal pullout strength of a single anchor in tension, N_{pn}, shall not exceed

$$N_{pn} = \psi_{c,P} N_p \quad \text{(D-14)}$$

where $\psi_{c,P}$ is defined in D.5.3.6.

D.5.3.2 — For post-installed expansion and undercut anchors, the values of N_p shall be based on the 5 percent fractile of results of tests performed and evaluated according to ACI 355.2. It is not permissible

RD.5.3.2 — The pullout strength equations given in D.5.3.4 and D.5.3.5 are only applicable to cast-in headed and hooked anchors;[D.8,D.23] they are not applicable to expansion and undercut anchors that use various mechanisms

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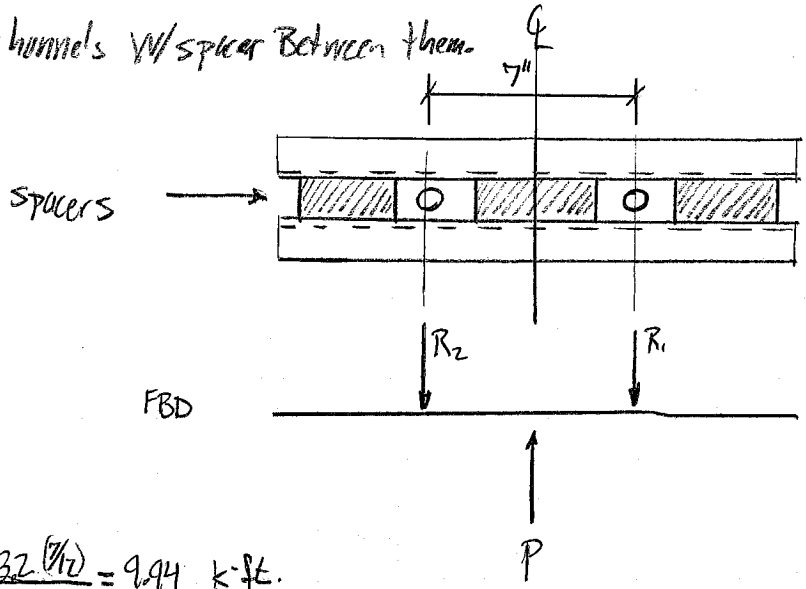
PROJECT BRIDGE MOVING
SHEET NUMBER 11 OF 31
CALCULATED BY TPH DATE 8/19/13
CHECKED BY _____ DATE _____
FILE NUMBER 013-135

9-Sept-13- Revised for 148 Pull Capacity (98K)

Ram Beam check.

2- Back to Back channels W/spacer Between them.



P: 68.2 K
$R_1 = R_2 = 34.1^K$
Moment: $\frac{PL}{4} = \frac{68.2(7/12)}{4} = 9.94$ k-ft.

Per AISC Table 3-8 - C7x9.8 $M_{P/SL_b} = 12.9$ k-ft. (2) = 25.8 k-ft > 9.94 | ok.
$V_{W/SL_V} = 19$ kips. (2) = 38 k > 34.1 ok.

- Web Crippling Will Not Occure Due to Webs Being stiffened By solid steel spacers.

Use (2) C7x9.8 channels W/ Web spacers

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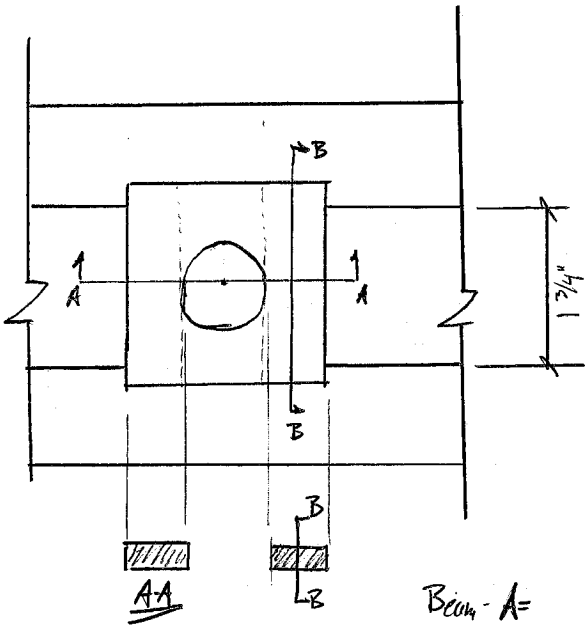
PROJECT Cass Co Move DOT
SHEET NUMBER 12 OF 31
CALCULATED BY TPH DATE 10-Sept-2013
CHECKED BY _____ DATE _____
FILE NUMBER U13-135

Plate Washer Check/Design

Rod/Bolt: 3/4"ϕ
Hole size: 13/16"ϕ



AISC 14-12 (rational analysis.)
Design Assumption - Plate Washer Has support on 2 sides only.

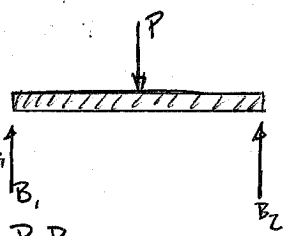
Applied Bolt Load = 68.2^k/2 (Bolts) = 34.1^k

Applied Load @ B-B = 34.1^k/2 = 17.05^k

Bending: $\frac{Pl}{4} = \frac{17.05\ 1.75}{4} = 7.45^{k\text{-in.}}$

Beam - A=

Req $S_x = M/.6f_y = 7.45/.6(36) = 0.3449 in^3$



Shear = $P/2$ = 8.5^k Each End. ⇒ A_s Req = 8.5/.6(36) = 0.393$^{in^2}$

B-B

Δ allowable = 1/16" = .0625"

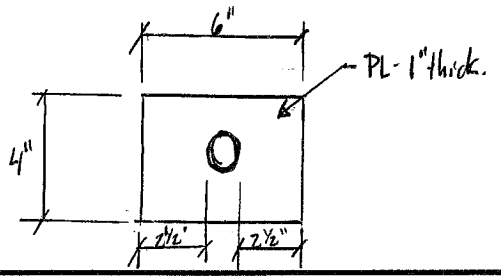
$\Delta = \frac{Pl^3}{48EI} \Rightarrow I_{xreq} = \frac{Pl^3}{48E\Delta} = \frac{17.05(1.75)^3}{48(29000)(.0625)} = 0.00105\ in^4$

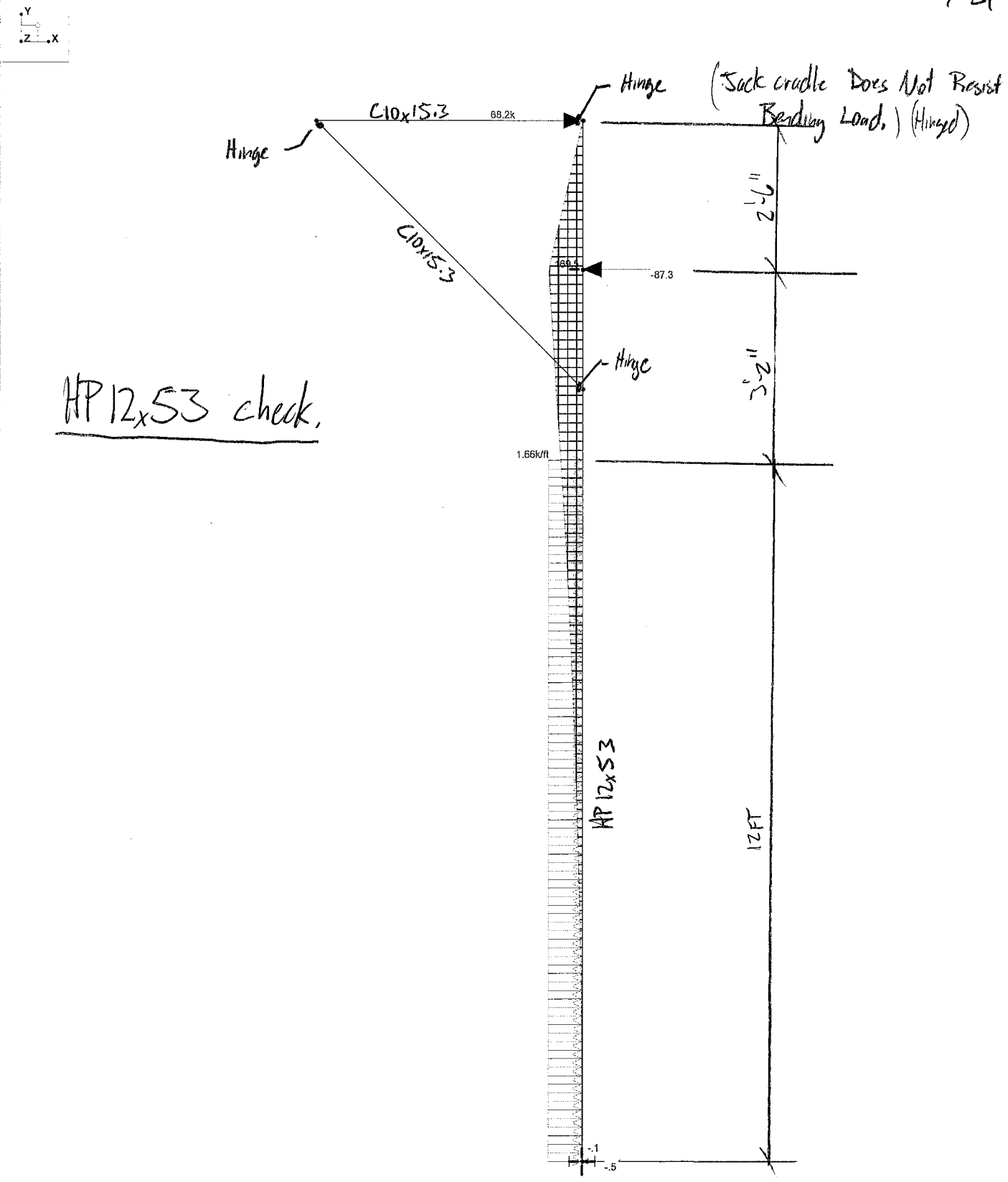
I_x for Rectangle = $\frac{bd^3}{12} = .00105 \Rightarrow b = 1" \Rightarrow d = .232"$ ←
$b = 1\frac{1}{4} \Rightarrow d = .216"$

S_x for Rectangle = $\frac{bd^2}{6} = 0.3449 \Rightarrow b = 1" \Rightarrow d = 1.438"$
$b = 2" \Rightarrow d = 1.01"$
$b\ 2\frac{1}{2} \Rightarrow d = 0.9098"$ ← Governs.

Area for shear Req = .393" = bd ⇒ b = 2½" ⇒ d = 0.157"

Use 6" x 4" x 1" thick Plate.





HP12x53 check.

Loads: BLC 1, Jack Load
Results for LC 1, Jacking Load
Member z Bending Moments (k-ft)
X-direction Reaction units are k and k-ft

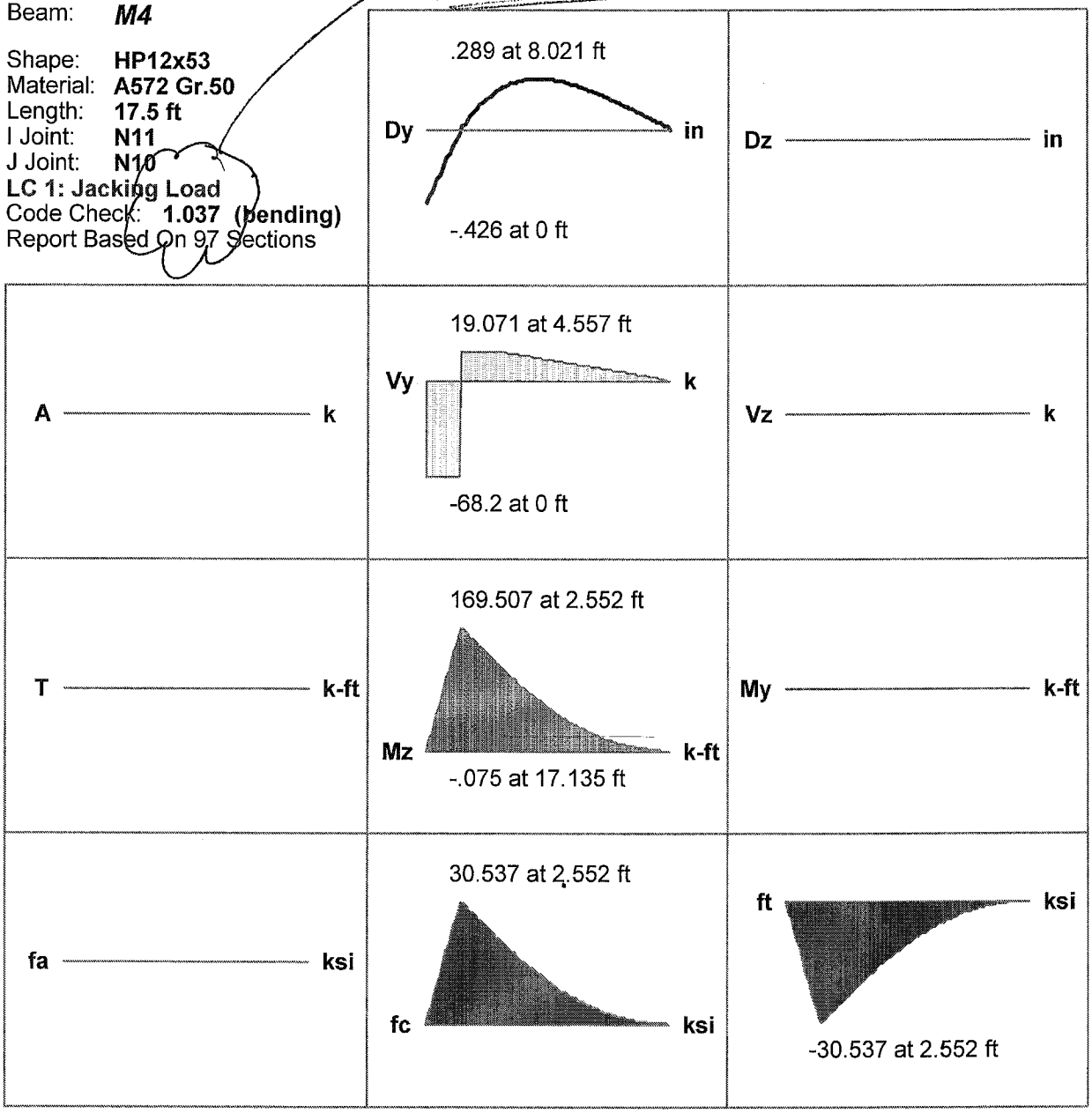
Tometich Engineering		SK - 1
CJS	Jack Support Pile	Sept 10, 2013 at 9:50 AM
U13-135	Pile Member Deisgn	Jack Support Pile Ted.r3d

OK By EOR

14/31

Beam: ***M4***

Shape: **HP12x53**
Material: **A572 Gr.50**
Length: **17.5 ft**
I Joint: **N11**
J Joint: **N10**
LC 1: Jacking Load
Code Check: **1.037 (bending)**
Report Based On 97 Sections



AISC 14th(360-10): ASD Code Check

Direct Analysis Method

Max Bending Check	**1.037**	Max Shear Check	**0.664 (y)**	
Location	**2.552 ft**	Location	**0 ft**	
Equation	**H1-1b**	Max Defl Ratio	**L/389**	
Bending Flange	**Non-Compact**	Compression Flange	**Slender**	**Qs=.991**
Bending Web	**Compact**	Compression Web	**Non-Slender**	**Qa=1**

Fy	**50 ksi**
Pnc/om	**311.411 k**
Pnt/om	**464.072 k**
Mny/om	**66.857 k-ft**
Mnz/om	**163.401 k-ft**
Vny/om	**102.66 k**
Vnz/om	**187.545 k**
Cb	**1**

	y-y	z-z
Lb	**17.5 ft**	**17.5 ft**
KL/r	**73.364**	**41.705**

L Comp Flange	**5.5 ft**
Warp Length	**17.5 ft**
L-torque	**17.5 ft**
Tau_b	**1**

Tometich Engineering, Inc.
10501 Buena Vista Court
Urbandale, Iowa 50322
(515) 280-8022
fax: (515) 727-9124
www.tometichengineering.com

PROJECT Coss Co. Move DOT.
SHEET NUMBER 15 OF 31
CALCULATED BY TPH DATE 10 Sept 13
CHECKED BY _____ DATE _____
FILE NUMBER 613-135

Concrete Bearing Area

Allowable Lateral Load (Bearing) on Concrete Abutment.

Bearing Area = 12" x 12" (HP12x53 w/ Plate) = 144" □

Bearing strength = 2500 psi

Allowable Reaction = 144 (2.5^K) = 360^K total.

Expected Reaction = 87.3^K @ 10% of Bridge Dead Load. Ok.

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PROJECT Cass Co. Move DOT.
SHEET NUMBER 16 OF 31
CALCULATED BY TPH DATE 10-Sept-2013
CHECKED BY _____ DATE _____
FILE NUMBER 413-135

Check Web Loading for "Pull" Pile.

HP12x53 Pile.

Jack: ENERPAC RR-5020 (150 ton Cap.)

Jack ϕ = 5" - N

A = 15.5
d = 11.8
t_w = 0.435
b_f = 12
t_f = 0.435
k = 1.125

(36 KSI)

AISC - J10.2 - Web Yielding.

(J10-2) $R_n = (5k + N) F_{yw} t_w$

$R_n = (5(1.125) + 5)(50)(0.435) = 231.0^k$

$R_n/\Omega = 231.5^k / 1.5 = 154.0^k$ 154 / 682.8^k = 22 % ok.

J10.3 Web Crippling

(J10-4) $R_n = 0.80 t_w^2 \left[1 + 3\left(\frac{N}{d}\right)\left(\frac{t_w}{t_f}\right)^{1.5}\right]\sqrt{\frac{E F_{yw} t_f}{t_w}}$

$R_n = 0.80(.435)^2 \left[1 + 3\left(\frac{5}{12}\right)\left(\frac{.435}{.435}\right)^{1.5}\right]\sqrt{\frac{29{,}000(50).435}{.435}}$

$R_n = (0.1513) \quad 2.25 \quad 120.61$

$R_n = 410.14$

$R_n/\Omega = 410.14/2 = 205.0^k \Rightarrow 205/682.8^k = 30\%$ ok.

No Web Reinforcement Req By Code - if Load is Applied > 12" From End.

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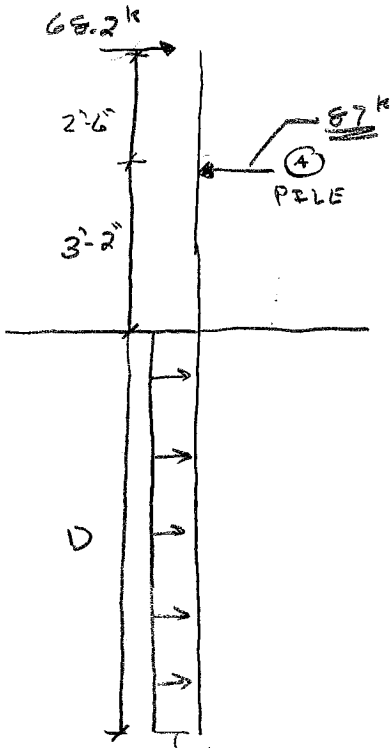
PROJECT SUPER STRUCTURE MOVG
SHEET NUMBER 17 OF 31
CALCULATED BY CJS DATE 8/16/13
CHECKED BY _____ DATE _____
FILE NUMBER 013-135

JACK SUPPORT PILE

Pile Depth Design



$$w = 4C(B_{eff}) = 4(200\,psf)\left(\frac{12"}{1'}\right)(2)$$

(C: 200 psf; HP12x?; B_{eff}: 2)

$$w = 1.6\ ^{k}/_{ft}$$

Dreq) ε_{MOA}

$$68.2^{k}(2.5') = 1.6/_{ft}(D)(D/2 + 3.17')$$

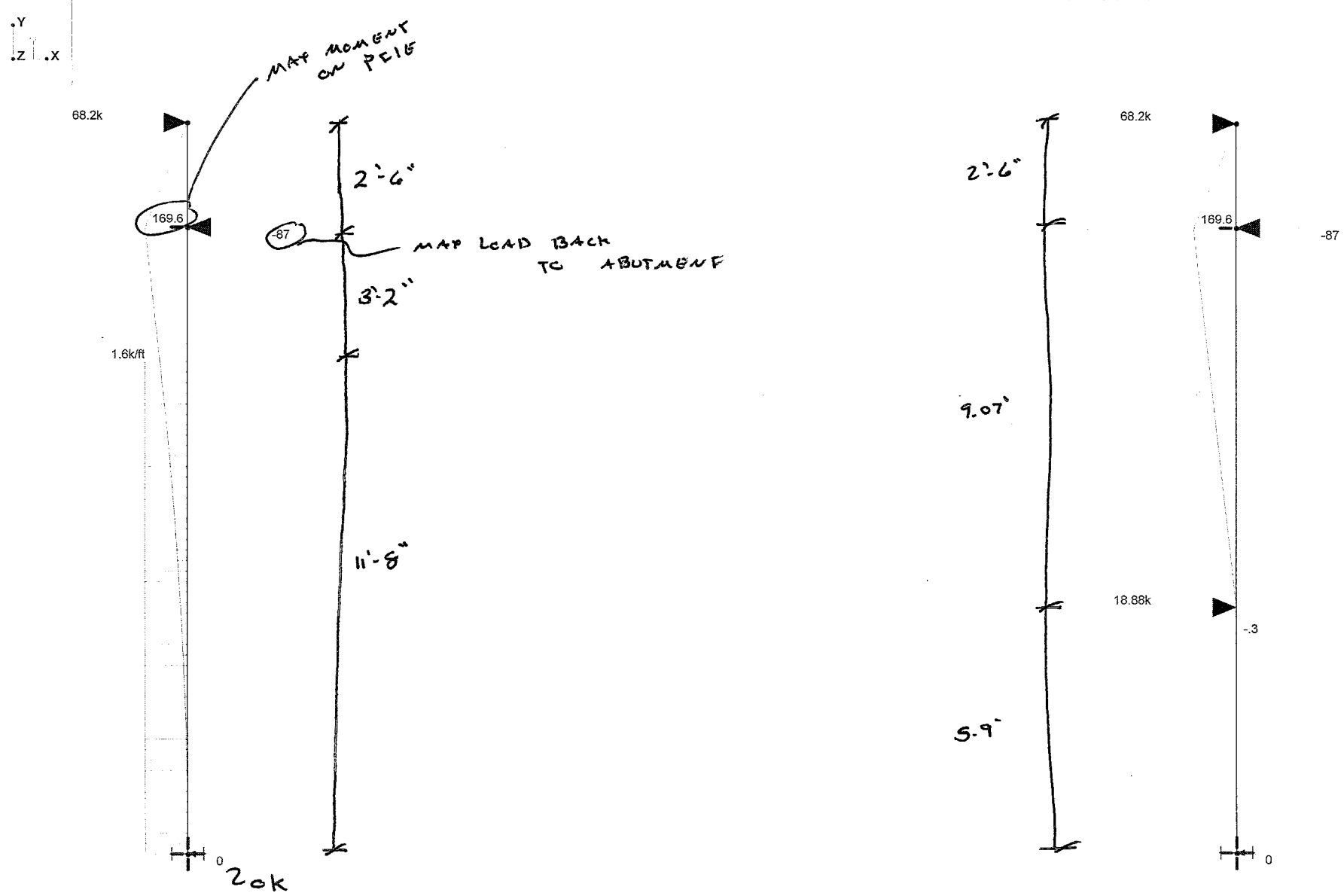
$$D \geq 11.8'$$

w/ F.S. = 2

$$2(68.2^{k})(2.5') = 1.6\ ^{k}/_{ft}(D)(D/2 + 3.17')$$

$$D \geq 17.8'$$

USE MIN EMBED OF 18'



Loads: BLC 1, Jack Load
Results for LC 1, Jacking Load
Member z Bending Moments (k-ft)
Z-direction Reaction units are k and k-ft

Tometich Engineering		SK - 1
CJS	Jack Support Pile	Sept 10, 2013 at 8:56 AM
U13-135		Jack Support Pile.r3d

12/81

Tometich Engineering, Inc.
10501 Buena Vista Court
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fax: (515) 727-9124
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PROJECT BRIDGE MOVING
SHEET NUMBER 19 OF 31
CALCULATED BY ETS DATE 8/19/13
CHECKED BY _____ DATE _____
FILE NUMBER 013-135

+ CHECK LOAD BACK TO ABUTMENT

$P = 87^k$ HP 14x117 (WEAK) $I_y = 443\ in^4$

NEW ABUTMENT

HAVE 7 + 19 = PILES

TEMP ABUTMENT

HP10x42 (STRONG) $I_y = 210\ in^4$

$$AVG\ I = \frac{7(443\ in^4) + 19(210\ in^4)}{26} = 272\ in^4$$

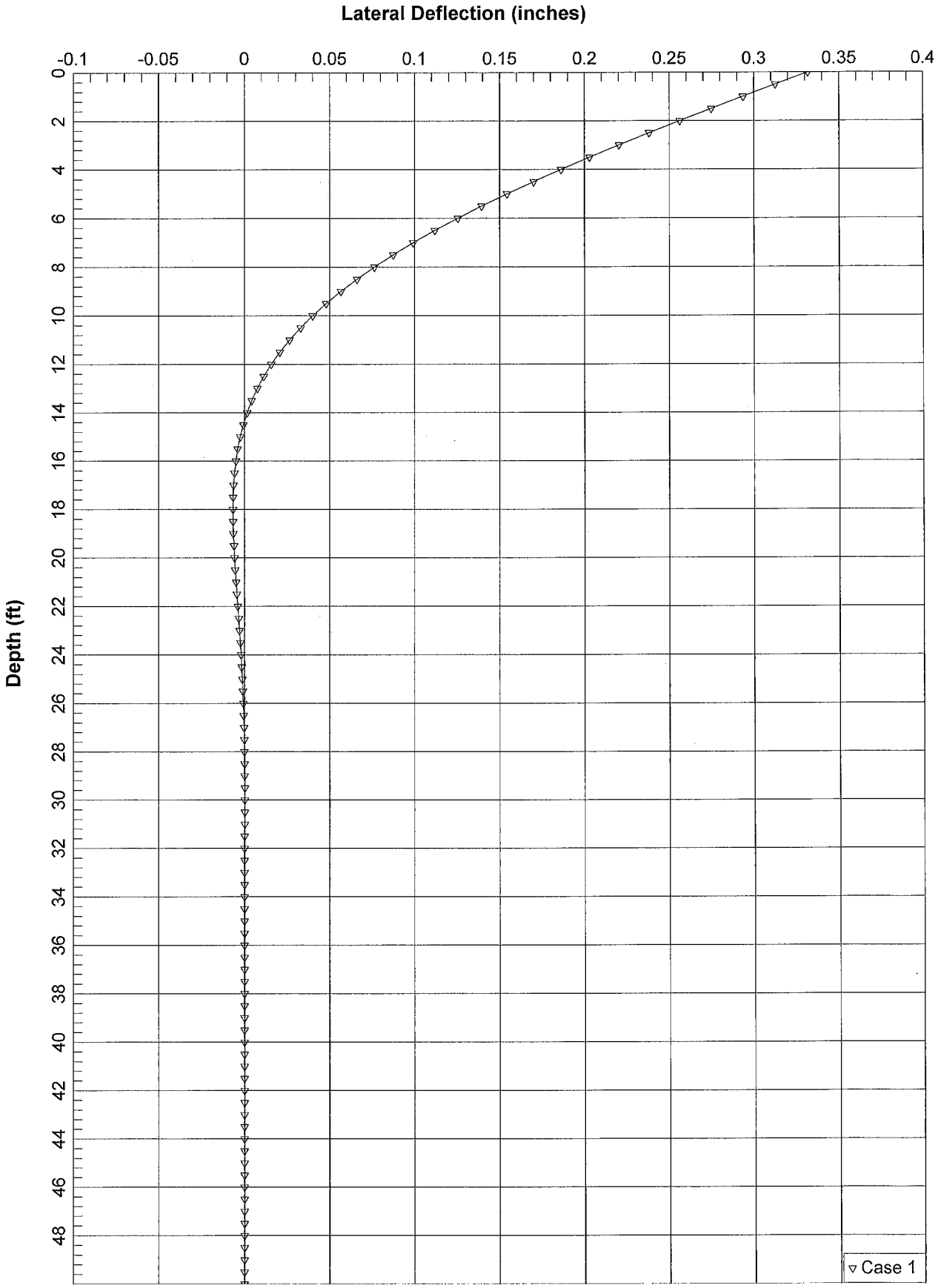
LOAD TO EACH PILE = $87^k/26 = 3.35^k$

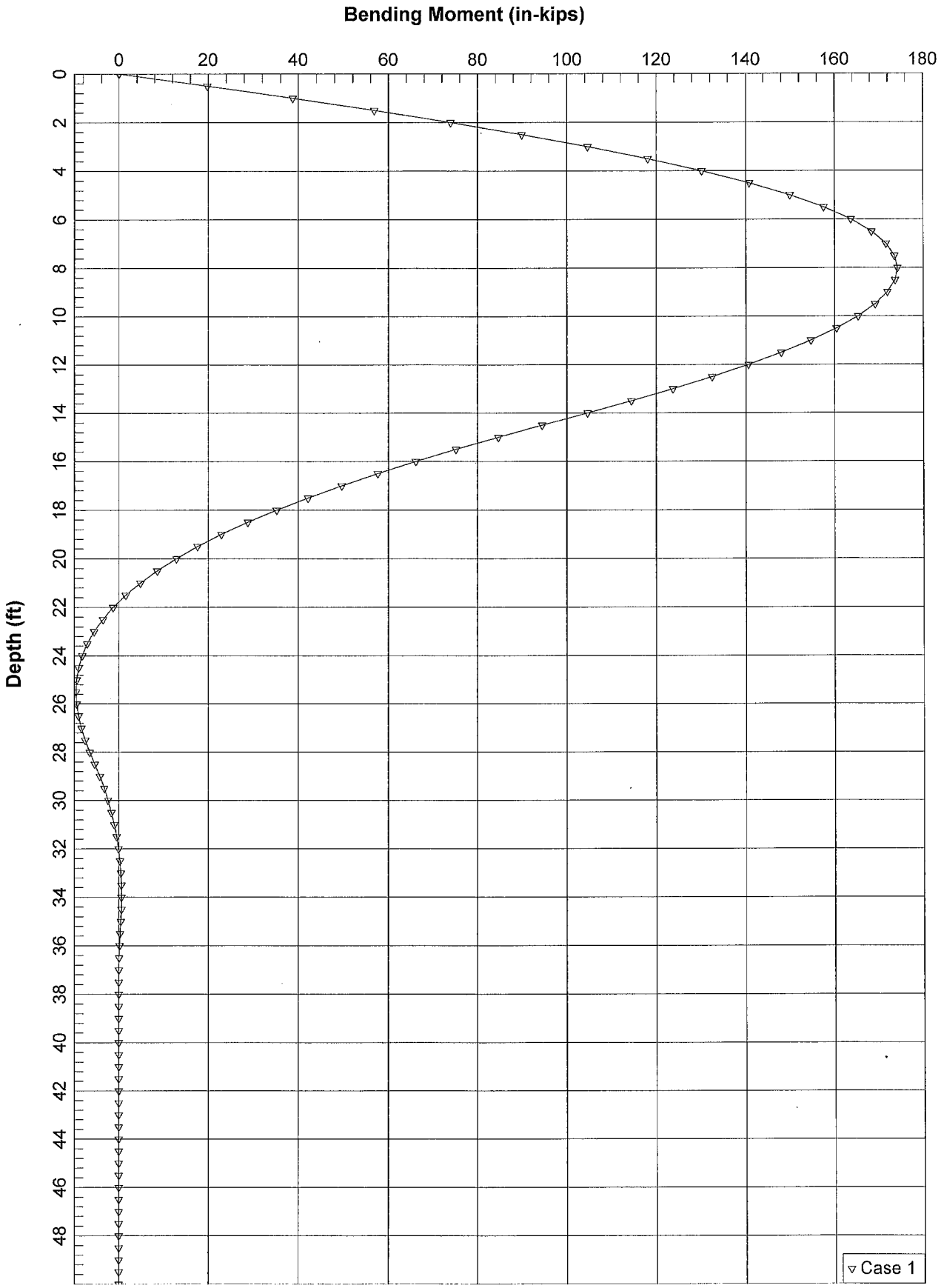
SEE ATTACHED SHEETS

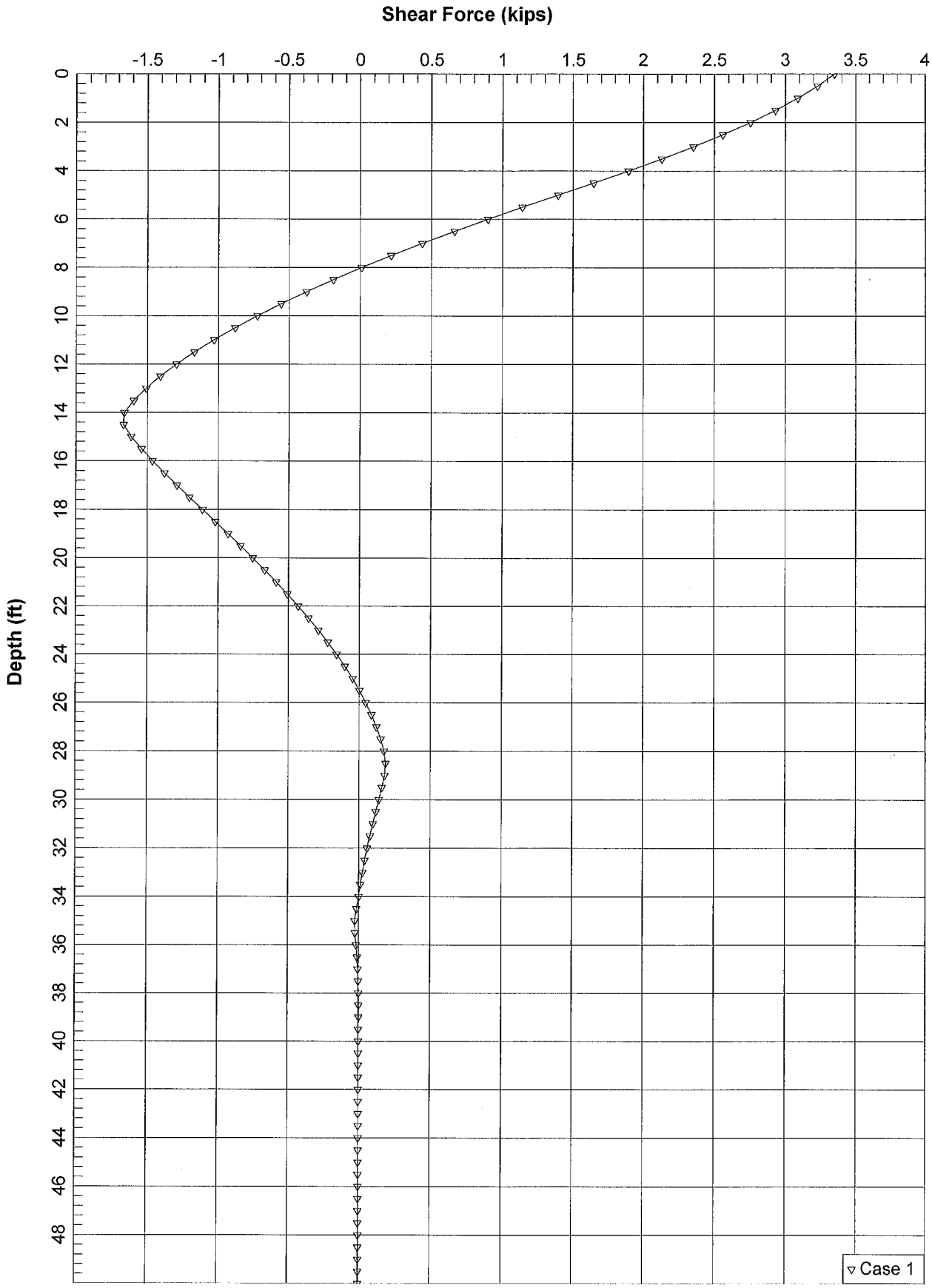
MAX Δ OF PILES = .34"

MAX WEAK AXIS MOMENT = $15^{k\text{-}ft}$ → ok

HP10x42 and HP14x117 PILES ok w/ BRACE LOAD.


Lateral Deflection (inches)
-0.1
-0.05
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Case 1


Bending Moment (in-kips)
0
20
40
60
80
100
120
140
160
180
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Case 1


Shear Force (kips)
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
3
3.5
4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
Case 1

Abutment Piles.lp6o

LPile Plus for Windows, Version 2012-06.037

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This copy of LPile is licensed to:

Carl Stump
Tometich Engineering

Serial Number of Security Device: 565623334
Company Name Stored in Security Device: Tometich Engineering, Inc.

Files Used for Analysis

Path to file locations: Z:\2013-U\U13-135-Herberger-Cass Co Bridge\Calcs - Moving\
Name of input data file: Abutment Piles.lp6d
Name of output report file: Abutment Piles.lp6o
Name of plot output file: Abutment Piles.lp6p
Name of runtime messeage file: Abutment Piles.lp6r

Date and Time of Analysis

Date: September 10, 2013 Time: 9:27:40

Problem Title

Project Name:

Job Number:

Client:

Engineer:

Description:

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for section types with nonlinear properties.

Computation Options:
- Analysis does not use p-y multipliers (individual pile or shaft only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix values
- Report pile response for full length of pile
- Analysis assumes no loading by soil movements acting on pile
- No p-y curves to be computed and reported for user-specified depths

Solution Control Parameters:

- Number of pile increments	=	100	
- Maximum number of iterations allowed	=	750	
- Deflection tolerance for convergence	=	1.0000E-05	in
- Maximum allowable deflection	=	300.0000	in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total number of pile sections = 1

Total length of pile = 50.00 ft

Depth of ground surface below top of pile = 0.00 ft

Pile diameter values used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	10.2000000
2	50.000000	10.2000000

Input Structural Properties:

Pile Section No. 1:

Section Type	=	Elastic with Specified Moment Capacity
Cross-sectional Shape	=	Strong H-Pile
Section Length	=	50.00000000 ft
Flange Width	=	10.20000000 in
Section Depth	=	9.99000000 in
Flange Thickness	=	0.56500000 in
Web Thickness	=	0.56500000 in
Section Area	=	16.80000000 Sq. in
Moment of Inertia	=	272.00000000 in^4
Elastic Modulus	=	29000000. lbs/in^2
Plastic Moment Capacity	=	1764000. in-lb

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer	=	0.0000 ft
Distance from top of pile to bottom of layer	=	50.00000 ft
Effective unit weight at top of layer	=	130.00000 pcf
Effective unit weight at bottom of layer	=	130.00000 pcf
Undrained cohesion at top of layer	=	200.00000 psf
Undrained cohesion at bottom of layer	=	200.00000 psf
Epsilon-50 at top of layer	=	0.0000
Epsilon-50 at bottom of layer	=	0.0000

NOTE: Internal default values for Epsilon-50 will be computed for the above soil layer.

(Depth of lowest soil layer extends 0.00 ft below pile tip)

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Strain Factor Epsilon 50

1 default	Soft Clay	0.00	130.000	200.000
default		50.000	130.000	200.000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Compute Type	Condition 1	Condition 2	Axial Thrust Force, lbs
	Top y vs. Pile Length			
1	1 Yes	V = 3350.00000 lbs	M = 0.0000 in-lbs	0.0000000

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-curvature properties were derived from elastic-plastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 3350.000 lbs

27/31

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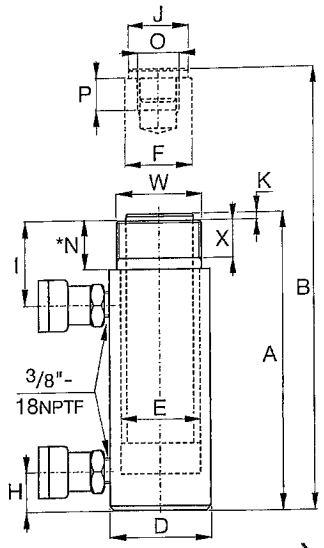
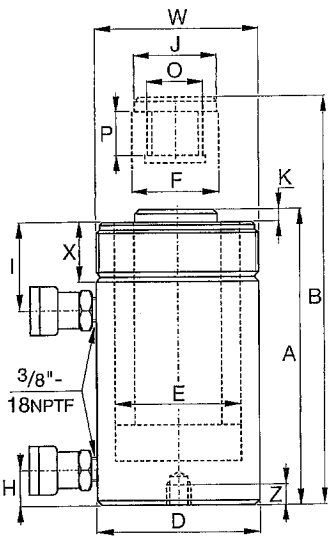
INDUSTRIAL TOOLS

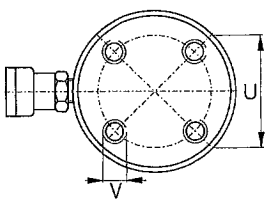


RR-1010 to RR-3014 models

* For RR-1010 and RR-1012: N = 1.26 inch; for RR-308 and RR-3014: N = 2.20 inch.



RR-506 to RR-50048 models



RR-1006 to RR-30048

No mounting holes:
RR-506, 5013
RR-756, 7513
RR-1502, 15032

Cylinder retract capacity for certain RR cylinders may be less than theoretical values, as a result of reduced relief valve pressure settings:

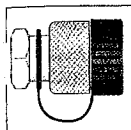
RR-308/3014: 4000 psi
RR-506/5013/5020: 6950 psi
RR-756/7513: 7200 psi

◀ For full features see page 32.

Cylinder Capacity (ton)	Stroke (in)	Model Number	Max. Cylinder Capacity (tons) Push	Max. Cylinder Capacity (tons) Pull	Cylinder Effective Area (in^2) Push	Cylinder Effective Area (in^2) Pull	Oil Capacity (in^3) Push	Oil Capacity (in^3) Pull	Collap. Height A (in)	Ext. Height B (in)	Outside Diam. D (in)
10	10.00	RR-1010*	11.1	4.0	2.23	.80	22.33	8.00	16.13	26.13	2.88
	12.00	RR-1012*	11.1	4.0	2.23	.80	26.80	9.00	18.00	30.00	2.88
30	8.25	RR-308*	32.5	6.0	6.51	3.00	53.67	25.00	15.25	23.50	4.00
	14.50	RR-3014*	32.5	6.0	6.51	3.00	92.70	43.00	21.63	36.13	4.00
50	6.13	RR-506	55.3	11.8	11.06	3.40	67.77	21.00	13.06	19.19	5.00
	13.13	RR-5013	55.3	11.8	11.06	3.40	145.17	44.00	20.06	33.19	5.00
	20.13	RR-5020	55.3	11.8	11.06	3.40	222.56	68.00	28.88	49.00	5.00
75	6.13	RR-756	79.6	17.6	15.92	4.90	97.58	29.00	13.69	19.81	5.75
	13.13	RR-7513	79.6	17.6	15.92	4.90	209.00	64.00	20.69	33.81	5.75
100	6.63	RR-1006	103.2	48.0	20.65	9.60	136.93	63.00	14.06	20.69	7.00
	13.13	RR-10013	103.2	48.0	20.65	9.60	271.17	126.00	20.63	33.75	7.00
	18.13	RR-10018	103.2	48.0	20.65	9.60	374.44	174.00	27.06	45.19	7.00
150	2.25	RR-1502	153.5	30.0	30.71	14.80	69.11	33.00	7.19	9.44	8.00
	6.13	RR-1506	153.5	74.0	30.71	14.80	188.28	91.00	15.19	21.31	8.00
	13.13	RR-15013	153.5	74.0	30.71	14.80	403.27	194.00	22.20	35.31	8.00
	32.13	RR-15032	153.5	74.0	30.71	14.80	986.84	475.00	43.94	76.06	8.00
200	6.00	RR-2006	221.0	112.5	44.21	22.50	265.28	135.00	16.94	22.94	9.75
	13.00	RR-20013	221.0	112.5	44.21	22.50	574.78	293.00	23.94	36.94	9.75
	18.00	RR-20018	221.0	112.5	44.21	22.50	795.85	396.00	30.13	48.13	9.75
	24.00	RR-20024	221.0	112.5	44.21	22.50	1,061	528.00	36.13	60.13	9.75
	36.00	RR-20036	221.0	112.5	44.21	22.50	1,592	792.00	48.13	84.13	9.75
	48.00	RR-20048	221.0	112.5	44.21	22.50	2,122	1,056	60.13	108.13	9.75
300	6.00	RR-3006	354.6	190.0	70.93	38.00	425.56	228.00	19.13	25.13	12.25
	12.00	RR-30012	354.6	190.0	70.93	38.00	851.12	456.00	25.13	37.13	12.25
	18.00	RR-30018	354.6	190.0	70.93	38.00	1,277	684.00	31.13	49.13	12.25
	24.00	RR-30024	354.6	190.0	70.93	38.00	1,702	912.00	37.13	61.13	12.25
	36.00	RR-30036	354.6	190.0	70.93	38.00	2,553	1368	49.13	85.13	12.25
	48.00	RR-30048	354.6	190.0	70.93	38.00	3,405	1824	61.13	109.13	12.25
400	6.00	RR-4006	475.4	255.0	95.09	51.00	570.51	306.00	21.19	27.19	14.13
	12.00	RR-40012	475.4	255.0	95.09	51.00	1,141	612.00	27.19	39.19	14.13
	18.00	RR-40018	475.4	255.0	95.09	51.00	1,712	918.00	33.19	51.19	14.13
	24.00	RR-40024	475.4	255.0	95.09	51.00	2,282	1224	39.19	63.19	14.13
	36.00	RR-40036	475.4	255.0	95.09	51.00	3,423	1836	51.19	87.19	14.13
	48.00	RR-40048	475.4	255.0	95.09	51.00	4,564	2448	63.19	111.19	14.13
500	6.00	RR-5006	565.7	315.0	113.15	63.00	678.92	378.00	22.75	28.75	15.63
	12.00	RR-50012	565.7	315.0	113.15	63.00	1,358	756.00	28.75	40.75	15.63
	18.00	RR-50018	565.7	315.0	113.15	63.00	2,037	1134	34.75	52.75	15.63
	24.00	RR-50024	565.7	315.0	113.15	63.00	2,716	1512	40.75	64.75	15.63
	36.00	RR-50036	565.7	315.0	113.15	63.00	4,074	2268	52.75	88.75	15.63
	48.00	RR-50048	565.7	315.0	113.15	63.00	5,431	3024	64.75	112.75	15.63

* For RR-1010 and RR-1012: N = 1.26 inch; for RR-308 and RR-3014: N = 2.20 inch.

Double-Acting Long Stroke Cylinders



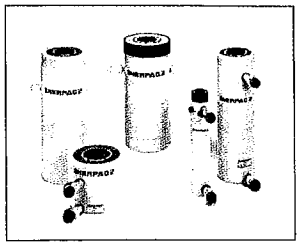
Couplers Included!
CR-400 couplers included on all models. Fits all HC-Series hoses.

Capacity:
10-500 tons

Stroke:
2.25-48.00 inches

Maximum Operating Pressure:
10,000 psi

RR Series

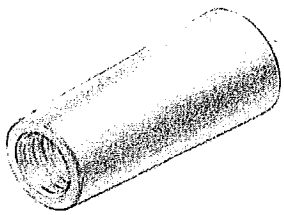


Cylinder Bore Diameter E (in)	Plunger Diameter F (in)	Base to Adv. Port H (in)	Top to Return Port I (in)	Saddle Diameter J (in)	Saddle Protrusion from Plngr. K (in)	Plunger Internal Thread O (in)	Plunger Thread Length P (in)	Base Mounting Holes Bolt Cir. Diam. U (in)	Base Mounting Holes Thread V (in)	Base Mounting Holes Thread Depth Z (in)	Collar Thread W (in)	Collar Thread Length X (in)	Weight (lbs)	Model Number
1.69	1.38	1.44	2.25	1.38	.24	1-8	1.00	–	–	–	2¼-14	1.06	28	**RR-1010***
1.69	1.38	1.44	2.25	1.38	.24	1-8	1.00	–	–	–	2¼-14	1.06	31	**RR-1012***
2.88	2.13	1.44	3.19	2.00	.41	1½-16	1.00	–	–	–	3⁵⁄₁₆-12	1.94	40	**RR-308***
2.88	2.13	1.56	3.19	2.00	.41	1½-16	1.00	–	–	–	3⁵⁄₁₆-12	1.94	64	**RR-3014***
3.75	3.13	1.13	3.00	2.81	.11	1-12	1.00	–	–	–	5-12	2.00	67	**RR-506**
3.75	3.13	1.13	3.00	2.81	.11	1-12	1.00	–	–	–	5-12	2.00	115	**RR-5013**
3.75	3.13	2.25	3.00	2.81	.11	1-12	1.00	3.00	–	–	5-12	2.00	150	**RR-5020**
4.50	3.75	1.19	3.00	2.81	.25	1-12	1.50	–	–	–	5¾-12	1.50	92	**RR-756**
4.50	3.75	1.19	3.19	2.81	.25	1-12	1.50	–	–	–	5¾-12	1.50	150	**RR-7513**
5.13	3.75	1.50	2.81	3.00	.13	1¾-12	1.38	5.50	¾-10	1.00	6⅞-12	2.00	135	**RR-1006**
5.13	3.75	1.50	2.81	3.00	.13	1¾-12	1.38	5.50	¾-10	1.00	6⅞-12	2.00	205	**RR-10013**
5.13	3.75	1.63	3.63	3.00	.13	1¾-12	1.38	5.50	¾-10	1.00	6⅞-12	2.00	260	**RR-10018**
6.25	4.50	.88	2.63	3.67	.06	–	–	–	–	–	–	–	110	**RR-1502**
6.25	4.50	1.94	3.31	4.49	.75	3⅜-16	1.38	6.25	¾-16	1.00	8-12	2.36	205	**RR-1506**
6.25	4.50	1.94	3.31	4.49	.75	3⅜-16	1.38	6.25	¾-16	1.00	8-12	2.36	275	**RR-15013**
6.25	4.50	3.31	3.31	4.49	.75	3⅜-16	1.38	–	–	–	8-12	2.36	525	**RR-15032**
7.50	5.25	2.25	3.81	5.25	.88	–	–	5.00	1-8	1.00	–	–	325	**RR-2006**
7.50	5.25	2.25	3.81	5.25	.88	2½-12	2.50	5.00	1-8	1.00	9¾-12	2.13	440	**RR-20013**
7.50	5.25	3.38	4.00	5.25	.88	2½-12	2.50	5.00	1-8	1.00	9¾ -12	2.13	450	**RR-20018**
7.50	5.25	3.38	4.00	5.25	.88	2½-12	2.50	5.00	1-8	1.00	9¾ -12	2.13	616	**RR-20024**
7.50	5.25	3.38	4.00	5.25	.88	2½ -12	2.50	5.00	1-8	1.00	9¾ -12	2.13	845	**RR-20036**
7.50	5.25	3.38	4.00	5.25	.88	2½-12	2.50	5.00	1-8	1.00	9¾ - 12	2.13	1065	**RR-20048**
9.50	6.50	3.50	4.50	6.50	1.13	2½-12	3.25	6.25	1¼-7	1.75	12¼-12	2.31	441	**RR-3006**
9.50	6.50	3.50	4.50	6.50	1.13	2½-12	3.25	6.25	1¼-7	1.75	12¼-12	2.31	608	**RR-30012**
9.50	6.50	3.50	4.50	6.50	1.13	2½-12	3.25	6.25	1¼-7	1.75	12¼-12	2.31	776	**RR-30018**
9.50	6.50	3.50	4.50	6.50	1.13	2½-12	3.25	6.25	1¼-7	1.75	12¼-12	2.31	1034	**RR-30024**
9.50	6.50	3.50	4.50	6.50	1.13	2½-12	3.25	6.25	1¼-7	1.75	12¼-12	2.31	1385	**RR-30036**
9.50	6.50	3.50	4.50	6.50	1.13	2½-12	3.25	6.25	1¼-7	1.75	12¼-12	2.31	1720	**RR-30048**
11.00	7.50	4.25	5.25	7.50	1.13	3-12	3.75	8.00	1½-6	2.00	14⅛-8	2.56	670	**RR-4006**
11.00	7.50	4.25	5.25	7.50	1.13	3-12	3.75	8.00	1½-6	2.00	14⅛-8	2.56	880	**RR-40012**
11.00	7.50	4.25	5.25	7.50	1.13	3-12	3.75	8.00	1½-6	2.00	14⅛-8	2.56	1000	**RR-40018**
11.00	7.50	4.25	5.25	7.50	1.13	3-12	3.75	8.00	1½-6	2.00	14⅛-8	2.56	1317	**RR-40024**
11.00	7.50	4.25	5.25	7.50	1.13	3-12	3.75	8.00	1½-6	2.00	14⅛-8	2.56	1746	**RR-40036**
11.00	7.50	4.25	5.25	7.50	1.13	3-12	3.75	8.00	1½-6	2.00	14⅛-8	2.56	2162	**RR-40048**
12.00	8.00	4.75	6.00	8.00	1.13	3¼-12	4.25	8.00	1¾-5	2.12	15⅝-8	3.13	953	**RR-5006**
12.00	8.00	4.75	6.00	8.00	1.13	3¼-12	4.25	8.00	1¾-5	2.12	15⅝-8	3.13	1300	**RR-50012**
12.00	8.00	4.75	6.00	8.00	1.13	3¼-12	4.25	8.00	1¾-5	2.12	15⅝-8	3.13	1500	**RR-50018**
12.00	8.00	4.75	6.00	8.00	1.13	3¼-12	4.25	8.00	1¾-5	2.12	15⅝-8	3.13	1800	**RR-50024**
12.00	8.00	4.75	6.00	8.00	1.13	3¼-12	4.25	8.00	1¾-5	2.12	15⅝-8	3.13	2210	**RR-50036**
12.00	8.00	4.75	6.00	8.00	1.13	3¼-12	4.25	8.00	1¾-5	2.12	15⅝-8	3.13	2700	**RR-50048**

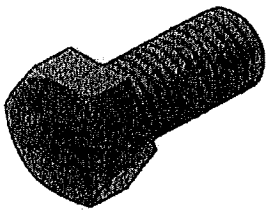
She-Bolt Inner Rod 3/4" x 132"	33246	13.70 lbs	35.90 ea (s)
She-Bolt Inner Rod 3/4" x 136"	34246	14.20 lbs	36.95 ea (s)
She-Bolt Inner Rod 3/4" x 140"	35246	14.60 lbs	37.85 ea (s)
She-Bolt Inner Rod 3/4" x 144"	36246	14.90 lbs	39.00 ea (

TIES: She-Bolts: 1" Inner Rods

Used with Crimped Tie Anchors.

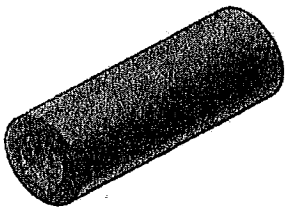


Description	Item #	Weight	Price in US$
She-Bolt Dummy 1"	86242	2.73 lbs	64.10 ea

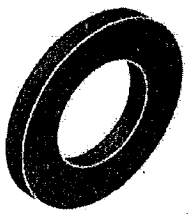


Description	Item #	Weight	Price in US$
Machine Bolt 3/4" x 1 1/2" (Left-Hand)	00868	0.40 lbs	7.70 ea

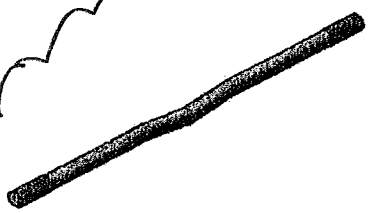
Couplers are a mechanical splice between (2) Inner Rods.



Description	Item #	Weight	Price in US$
Inner Rod Coupler 1" x 4"	81242	1.32 lbs	26.85 ea (s)



Description	Item #	Weight	Price in US$
Inner Rod Waterstop 1"	90247	0.01 lbs	0.93 ea (s)



She-Bolts and Inner Rods are recommended for wall greater than 4'-0" thick or when Taper Ties cannot be used. The Inner Rods are crimped so they will not turn in the concrete and can also be made with a Waterstop. The She-Bolt is tapered to allow a minimum 2" BB and up to 4" BB. (38.5 Kip capacity with 2:1 safety factor)

Description	Item #	Weight	Price in US$
She-Bolt Inner Rod 1" x 8"	02247	1.50 lbs	6.85 ea (s)
She-Bolt Inner Rod 1" x 12"	03247	2.20 lbs	7.50 ea (s)
She-Bolt Inner Rod 1" x 16"	04247	3.00 lbs	8.75 ea (s)
She-Bolt Inner Rod 1" x 20"	05247	3.70 lbs	10.05 ea (s)
She-Bolt Inner Rod 1" x 24"	06247	4.50 lbs	11.70 ea (s)
She-Bolt Inner Rod 1" x 28"	07247	5.20 lbs	13.35 ea (s)
She-Bolt Inner Rod 1" x 32"	08247	6.50 lbs	15.35 ea (s)
She-Bolt Inner Rod 1" x 36"	09247	6.80 lbs	17.10 ea (s)
She-Bolt Inner Rod 1" x 40"	10247	6.60 lbs	18.55 ea (s)
She-Bolt Inner Rod 1" x 44"	11247	8.30 lbs	20.00 ea (s)
She-Bolt Inner Rod 1" x 48"	12247	9.00 lbs	22.10 ea (
She-Bolt Inner Rod 1" x 52"	13247	9.80 lbs	23.65 ea (s)
She-Bolt Inner Rod 1" x 56"	14247	10.50 lbs	24.90 ea (s)
She-Bolt Inner Rod 1" x 60"	15247	11.15 lbs	26.40 ea (s)

Confidential Material. Do Not Copy

31/31

Curtis Brown

From: Stanford, Brent <Brent.Stanford@efcoforms.com>
Sent: Friday, August 30, 2013 2:22 PM
To: cbrown@herbergerconstruction.com
Cc: Boetger, Eric
Subject: RE: Innerrod and coupler

Curt,
EFCO's 1" diameter inner rod all thread has an ultimate capacity of 76,0000 lbs. That capacity is not reduced when rods are coupled with our 1"x4" coupler providing the couple uses the full 2" thread engagement per side. Thanks.

Brent Stanford
EFCO Corp - 515.645.7305

From: Boetger, Eric
Sent: Friday, August 30, 2013 1:26 PM
To: Stanford, Brent
Subject: Innerrod and coupler

Brent Curt @ Herberger says that all he should need is an email that states that 1" all thread used in conjunction with EFCO 1" couple does not reduce the capacity of the all thread.

cbrown@herbergerconstruction.com

Eric

TEMPORARY BRIDGE PIER
HWY 92 - CASS CO. IOWA
D.O.T.# BRF-092-2(36)--38-15
"SUPER STRUCTURE MOVE"

REVIEWED BY OFFICE OF BRIDGES AND STRUCTURES
IOWA DEPARTMENT OF TRANSPORTATION

Reviewed in accordance with current policy

September 18, 2013

- ✓ **NO EXCEPTIONS TAKEN**
- ❑ **MAKE CORRECTIONS NOTED (NO RESUBMITTAL NEC.)**
- ❑ **AMEND AND RESUBMIT**

This review is for strength and arrangement of component parts. Any deviation from the plans or specifications not clearly noted by the Contractor has not been reviewed. Review by the Engineer shall not serve to relieve the Contractor of the contractual responsibility or any error or deviation from the contract requirements.

ALL STRUCTURAL STEEL REQUIRING Fy=50ksi, SUCH AS THE HP12x53 IN DETAIL 1/S8, SHALL MEET STANDARD SPECIFICATION 4152 AND CERTIFICATION REQUIREMENTS OF IM562

NOTES:
1. THIS FALSEWORK AND SUPERSTRUCTURE MOVE DESIGN IS BASE ON NO BARRIER RAIL LOAD ON THE DECK. BARRIER RAIL TO BE CAST ON THE BRIDGE AFTER THE BRIDGE SUPERSTRUCTURE HAS BEEN LATERALLY MOVED.
2. PERMANENT BRIDGE ABUTMENTS WILL BE 1/2" HIGHER THAN SHOWN IN IOWA D.O.T. DRAWINGS TO MAKE UP FOR DELETION OF 1/4" SLIDE PLATE AND 1/4" OF PTEE BEARING PAD

SEE APPENDIX 'B' FOR SUPER STRUCTURE MOVE CALCULATIONS

LICENSED PROFESSIONAL ENGINEER
THEODORE HOEGER
20812
IOWA

I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.
THIS NOTICE COVERS DRAWINGS S5-S10

SIGNATURE:
NAME: THEODORE HOEGER, P.E.
DATE: 17-Sept-2013 20812

MY REGISTRATION EXPIRES ON 31-DECEMBER-2013

DRAWING INDEX:

TOMETICH ENGINEERING, INC.
10501 Buena Vista Court Urbandale, IA 50322
(p) 515.280.8022 (f) 515.727.9124
http://www.tometichengineering.com

IDOT PROJ. # BRF-092-2(36)--38-15
BRIDGE SLIDING PLAN
CASS CO. IOWA

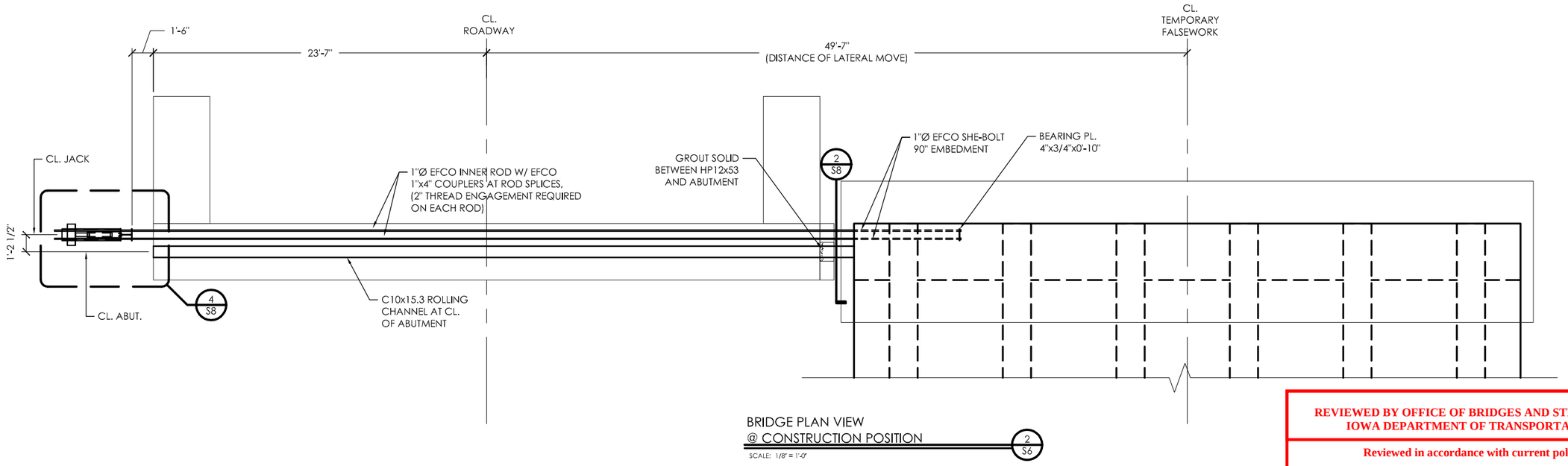
ISSUE / REVISION

No.	Description	Date
	ORIGINAL ISSUE	8-19-13
	REVISED	9-10-13
	CORRECTED	9-17-13

SITUATION PLAN

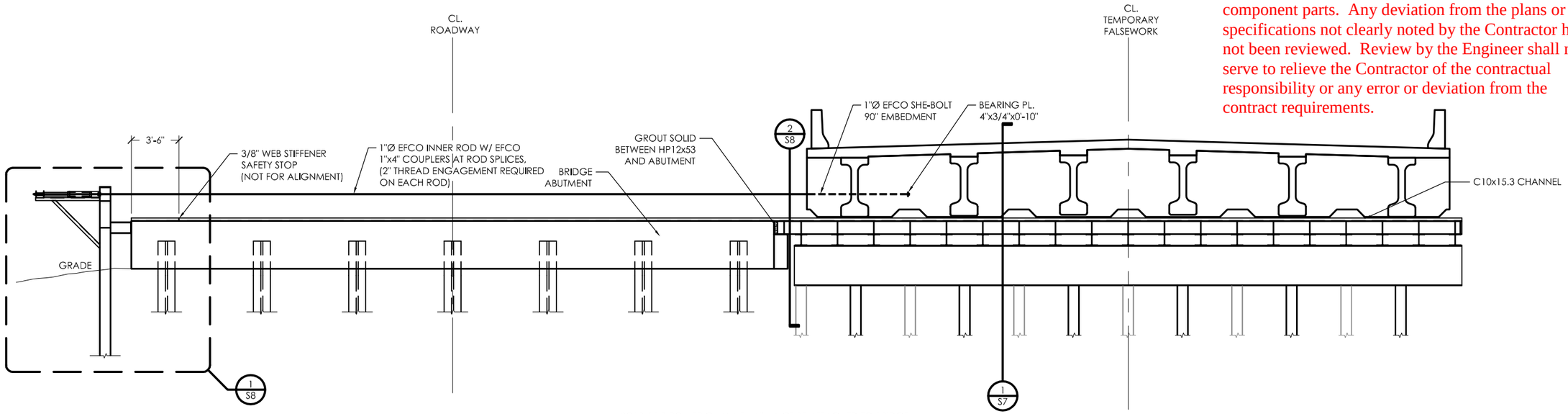
DATE: 9-17-13
FILE: U13-135
ENG: TPH DSN: WDM

S5
1 OF 6



BRIDGE PLAN VIEW
@ CONSTRUCTION POSITION 2/S6

SCALE: 1/8" = 1'-0"



*C10x15.3 ROLLER CHANNEL WILL NOT BE ATTACHED TO BRIDGE ABUTMENT, TO ALLOW RE-ALIGNMENT AS NEEDED DURING ROLLING

BRIDGE
SECTION @ CONSTRUCTION POSITION 1/S6

SCALE: 1/8" = 1'-0"

REVIEWED BY OFFICE OF BRIDGES AND STRUCTURES
IOWA DEPARTMENT OF TRANSPORTATION

Reviewed in accordance with current policy

September 18, 2013

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IDOT PROJ. # BRF-092-2(36)--38-15
BRIDGE SLIDING PLAN
CASS CO. IOWA

ISSUE / REVISION

No.	Description	Date
	ORIGINAL ISSUE	8-19-13
	REVISED	9-10-13
	CORRECTED	9-17-13

BRIDGE
CONSTRUCTION
SECTION

DATE: 9-17-13
FILE: U13-135
ENG: TPH DSN: WDM

S6
2 OF 6

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IOWA DEPARTMENT OF TRANSPORTATION

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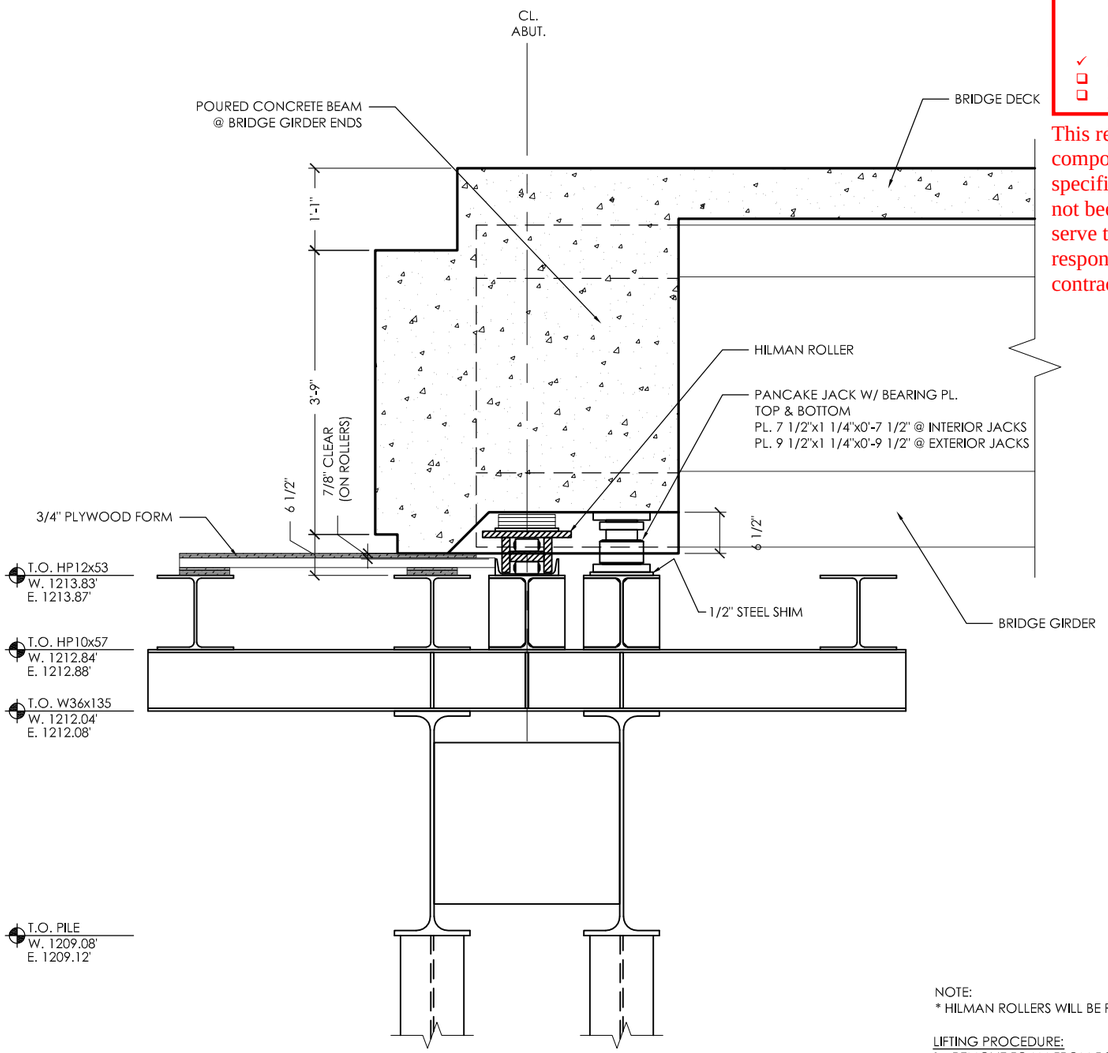

SECTION W/ REMOVABLE FORM
REMOVED & ROLLERS INSTALLED — 1/S7

SCALE: 1/2" = 1'-0"

NOTE:
E. = EAST ABUTMENT
W. = WEST ABUTMENT

NOTE:
* HILMAN ROLLERS WILL BE PLACED BEFORE CONSTRUCTION OF CONCRETE BEAM

LIFTING PROCEDURE:
1. REMOVE FOAM FROM ROLLER BLOCK-OUT
2. REMOVE PLYWOOD FROM UNDER FOAM BLOCK-OUT LOCATIONS, AND CLEAN ROLLER CHANNEL WITH COMPRESSED AIR
3. PLACE 1/2" SHIM PL. ON TOP OF EACH HILMAN ROLLER
4. PLACE 1/2" STEEL SHIM AND PANCAKE JACK W/ BEARING PLATES, AT EACH JACKING LOCATION
5. LIFT END OF BRIDGE
6. REMOVE PLYWOOD FORMS, AND INSTALL LAMINATED NEOPRENE BEARING PADS ON EACH ROLLER (LAMINATED NEOPRENE PADS ARE THOSE USED FOR PERMANENT BEARING ON ABUTMENT)
7. COLLAPSE JACK UNTIL BRIDGE IS FULLY RESTING ON HILMAN ROLLERS; REMOVE JACKS
8. START ROLLING PROCEDURE

SPEC. ROLLER = HILMAN INC. 100-XOT, 100 METRIC TON CAPACITY
PANCAKE JACK = ENERPAC CLP-1002, 100 TON CAPACITY @ INTERIOR JACKS
ENERPAC CLP-1602, 160 TON CAPACITY @ EXTERIOR JACKS

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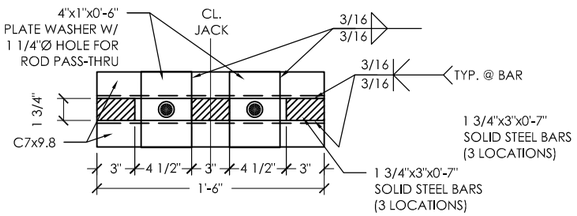
IDOT PROJ. # BRF-092-2(36)--38-15
BRIDGE SLIDING PLAN
CASS CO. IOWA

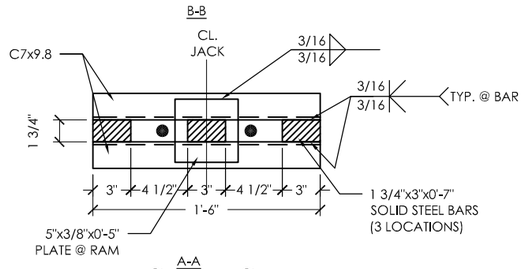
ISSUE / REVISION

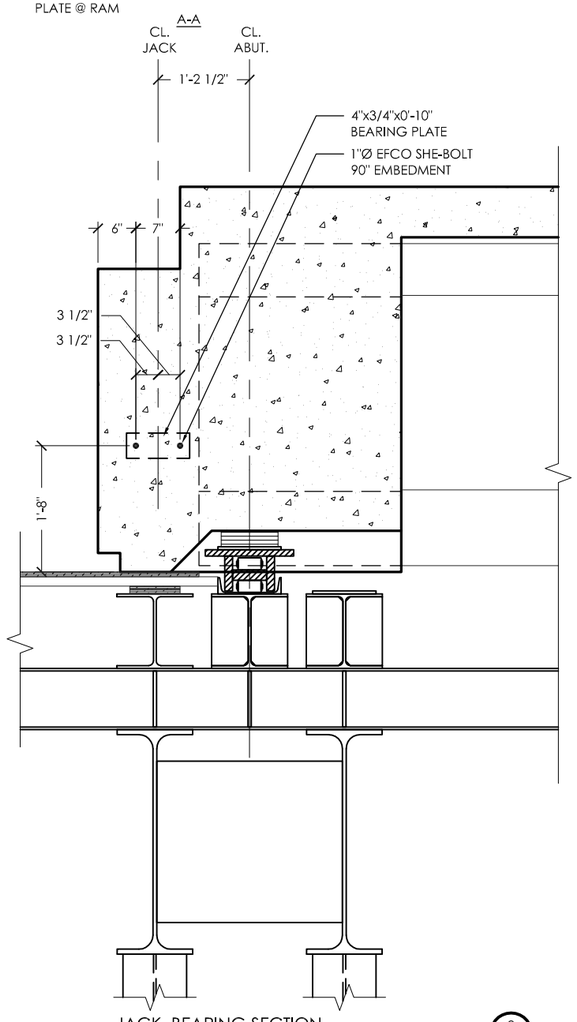
No.	Description	Date
	ORIGINAL ISSUE	8-19-13
	REVISED	9-10-13
	CORRECTED	9-17-13

LIFTING PROCEDURE & DETAILS
DATE: 9-17-13
FILE: U13-135
ENG: TPH DSN: WDM

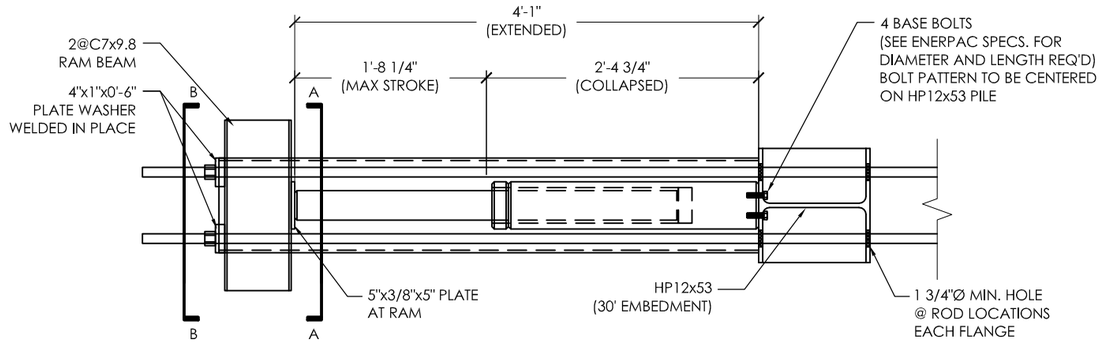
S7



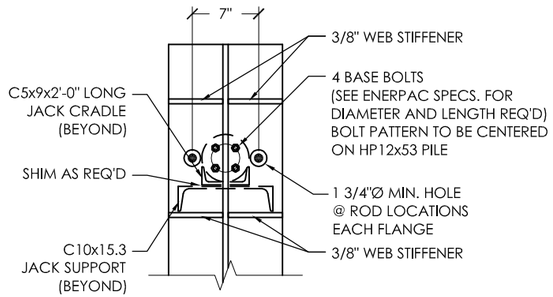




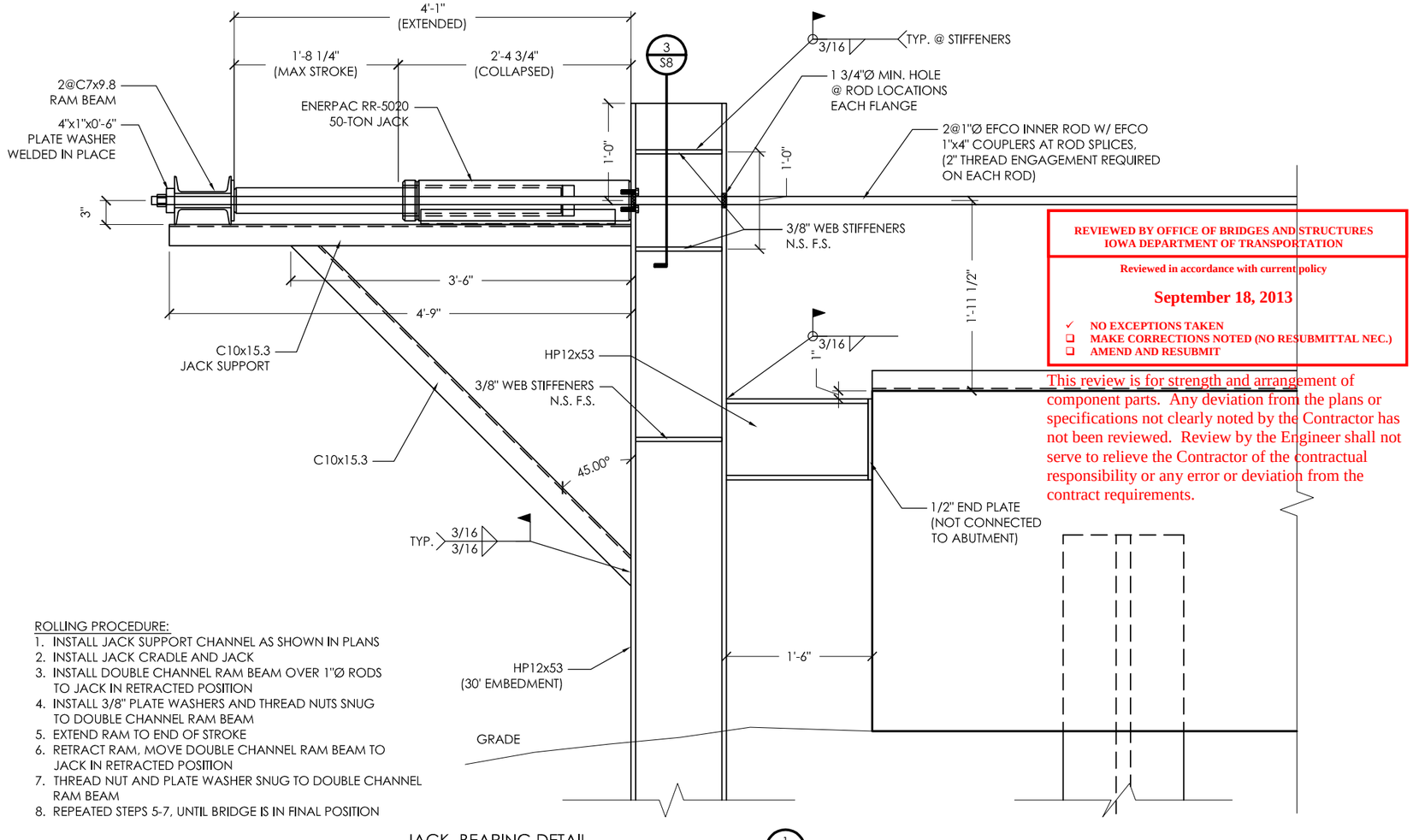
JACK BEARING SECTION — 2 / S8
SCALE: 1/2" = 1'-0"



JACK BEARING PLAN VIEW — 4 / S8
SCALE: 3/4" = 1'-0"



JACK CONNECTION SECTION — 3 / S8
SCALE: 3/4" = 1'-0"



JACK BEARING DETAIL — 1 / S8
SCALE: 3/4" = 1'-0"

ROLLING PROCEDURE:

1. INSTALL JACK SUPPORT CHANNEL AS SHOWN IN PLANS
2. INSTALL JACK CRADLE AND JACK
3. INSTALL DOUBLE CHANNEL RAM BEAM OVER 1"Ø RODS TO JACK IN RETRACTED POSITION
4. INSTALL 3/8" PLATE WASHERS AND THREAD NUTS SNUG TO DOUBLE CHANNEL RAM BEAM
5. EXTEND RAM TO END OF STROKE
6. RETRACT RAM, MOVE DOUBLE CHANNEL RAM BEAM TO JACK IN RETRACTED POSITION
7. THREAD NUT AND PLATE WASHER SNUG TO DOUBLE CHANNEL RAM BEAM
8. REPEATED STEPS 5-7, UNTIL BRIDGE IS IN FINAL POSITION

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IOWA DEPARTMENT OF TRANSPORTATION

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- ☐ MAKE CORRECTIONS NOTED (NO RESUBMITTAL NEC.)
- ☐ AMEND AND RESUBMIT

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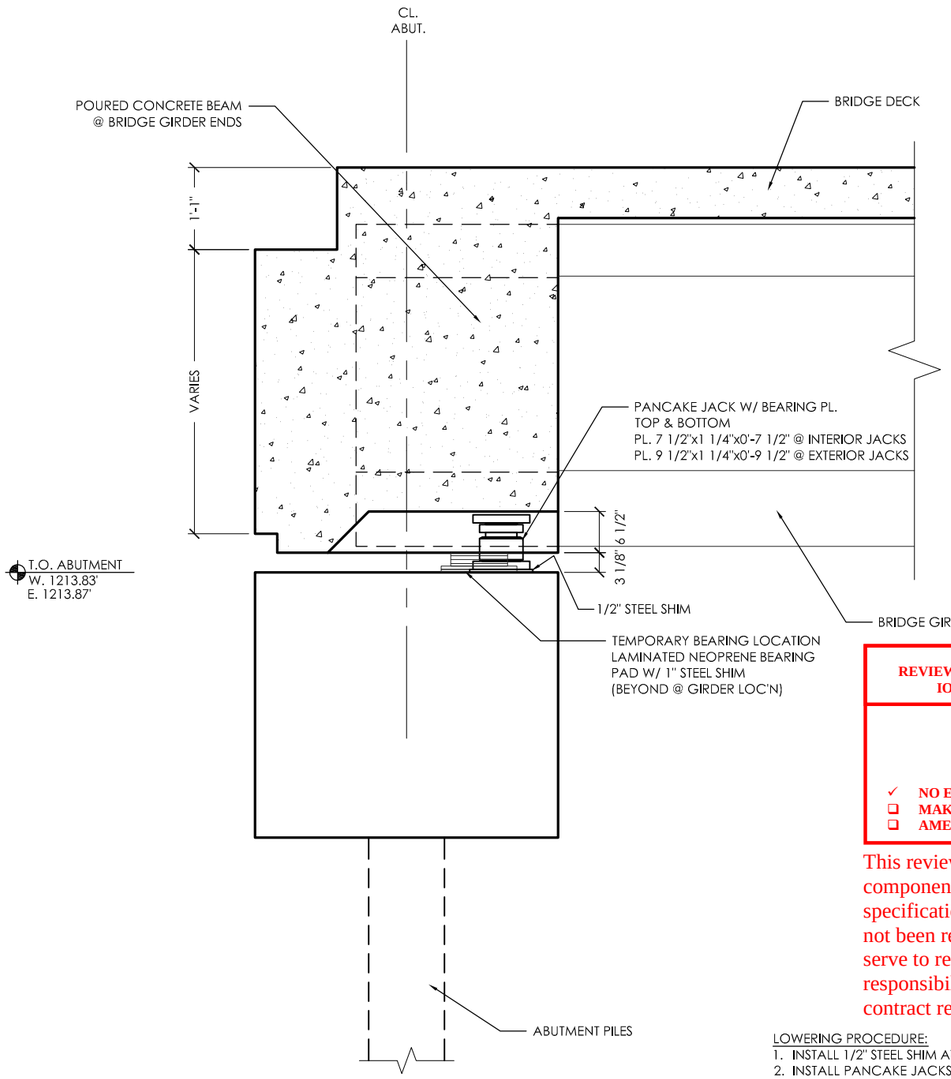
IDOT PROJ. # BRF-092-2(36)--38-15
BRIDGE SLIDING PLAN
CASS CO. IOWA

ISSUE / REVISION

No.	Description	Date
	ORIGINAL ISSUE	8-19-13
	REVISED	9-10-13
	CORRECTED	9-17-13

ROLLING PROCEDURE & DETAILS

DATE: 9-17-13
FILE: U13-135
ENG: TPH DSN: WDM



SECTION W/ ROLLERS REMOVED (STEPS 4-7) 2/S9

SCALE: 1/2" = 1'-0"

NOTE:
E. = EAST ABUTMENT
W. = WEST ABUTMENT

REVIEWED BY OFFICE OF BRIDGES AND STRUCTURES
IOWA DEPARTMENT OF TRANSPORTATION

Reviewed in accordance with current policy

September 18, 2013

- ✓ **NO EXCEPTIONS TAKEN**
- ❑ **MAKE CORRECTIONS NOTED (NO RESUBMITTAL NEC.)**
- ❑ **AMEND AND RESUBMIT**

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LOWERING PROCEDURE:

1. INSTALL 1/2" STEEL SHIM AT ALL PANCAKE JACK LOCATIONS
2. INSTALL PANCAKE JACKS W/ BEARING PADS
3. LIFT BRIDGE END TO RELIEVE BRIDGE WEIGHT FROM HILMAN ROLLERS
4. REMOVE LAMINATED NEOPRENE BEARING PADS & 1/2" STEEL SHIM FROM TOP OF ROLLERS
5. INSTALL 1" STEEL SHIMS & LAMINATED NEOPRENE BEARING PADS AT TEMPORARY BEARING LOCATION UNDER BRIDGE GIRDERS
6. COLLAPSE PANCAKE JACK UNTIL BRIDGE IS BEARING ON TEMPORARY LAMINATED NEOPRENE BEARING PADS
7. REMOVE PANCAKE JACKS AND STEEL SHIM
8. REMOVE HILMAN ROLLERS AND ROLLING CHANNEL

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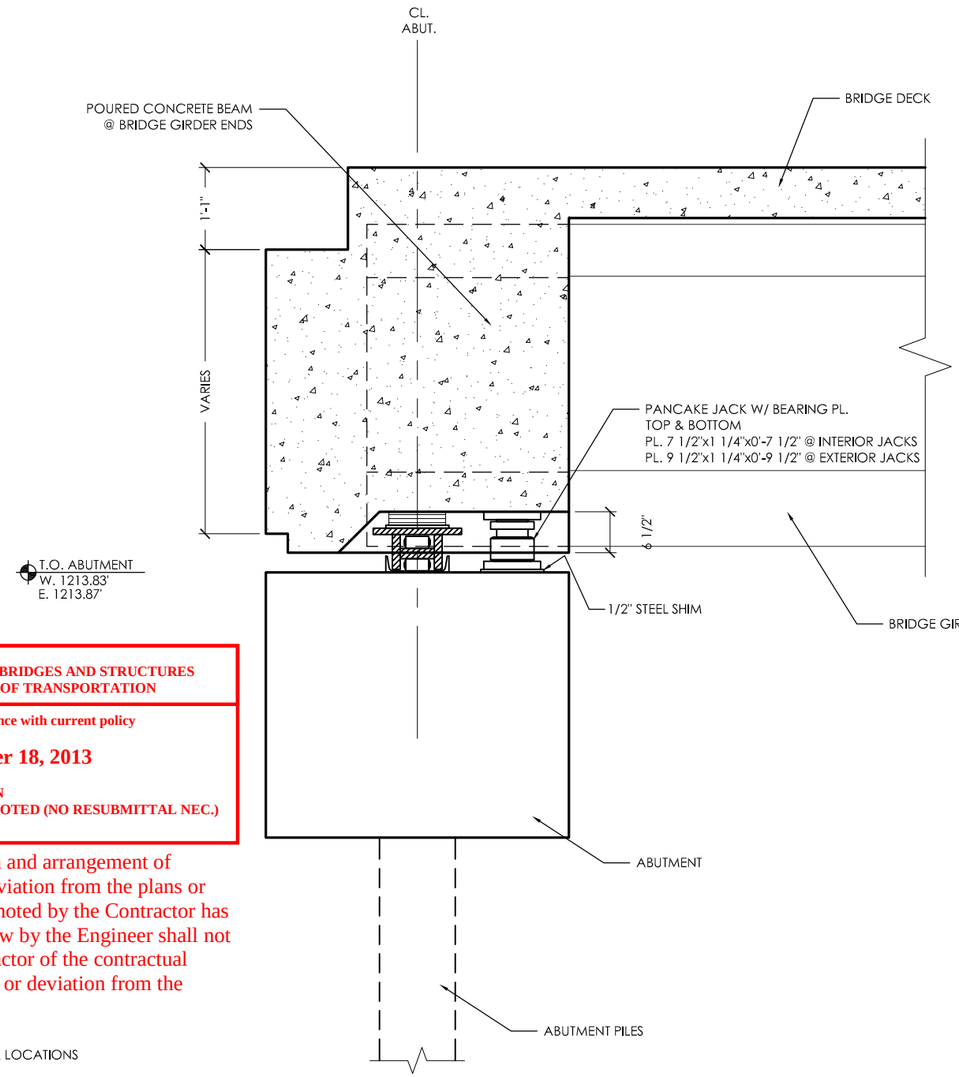

SECTION W/
BRIDGE ROLLED INTO POSITION (STEPS 1&2) 1/S9

SCALE: 1/2" = 1'-0"

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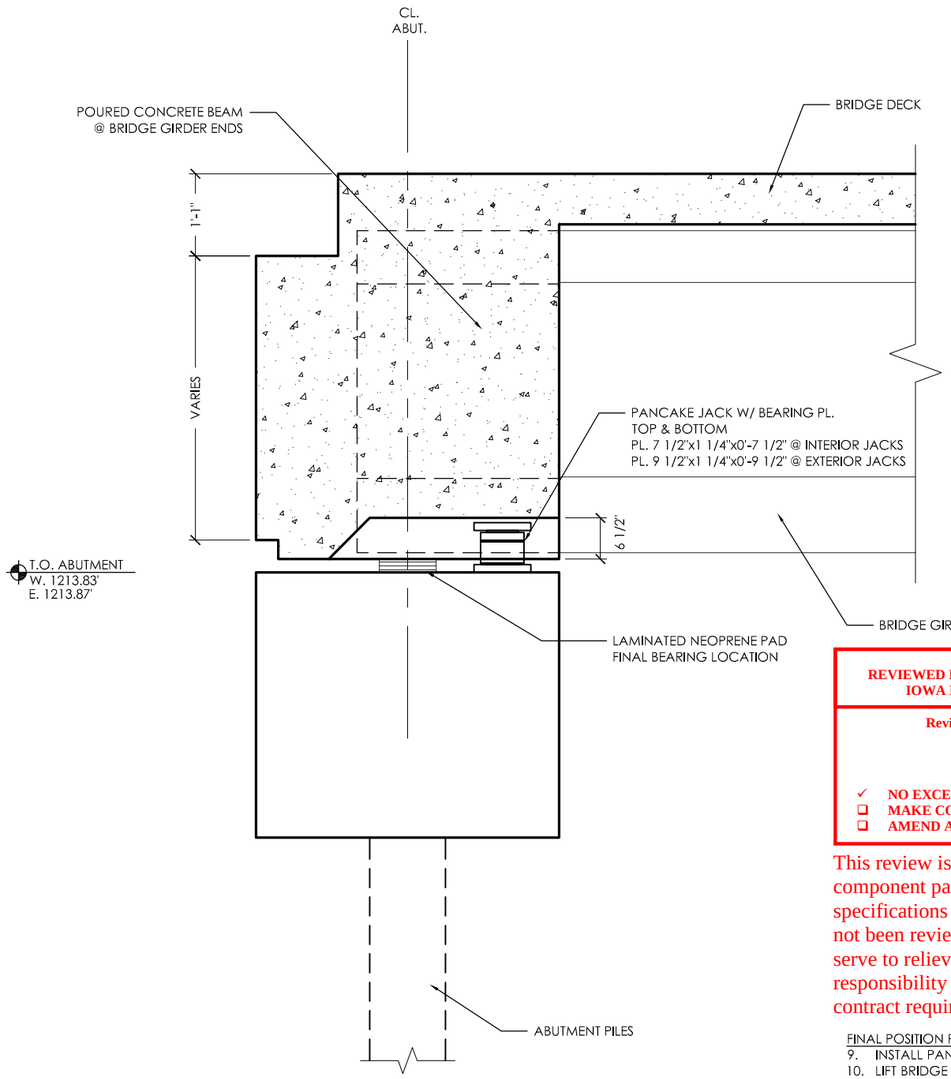
S9



SECTION W/
BRIDGE IN FINAL POSITION (STEP 11-12) 2/S10

SCALE: 1/2" = 1'-0"

NOTE:
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W. = WEST ABUTMENT

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IOWA DEPARTMENT OF TRANSPORTATION

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September 18, 2013

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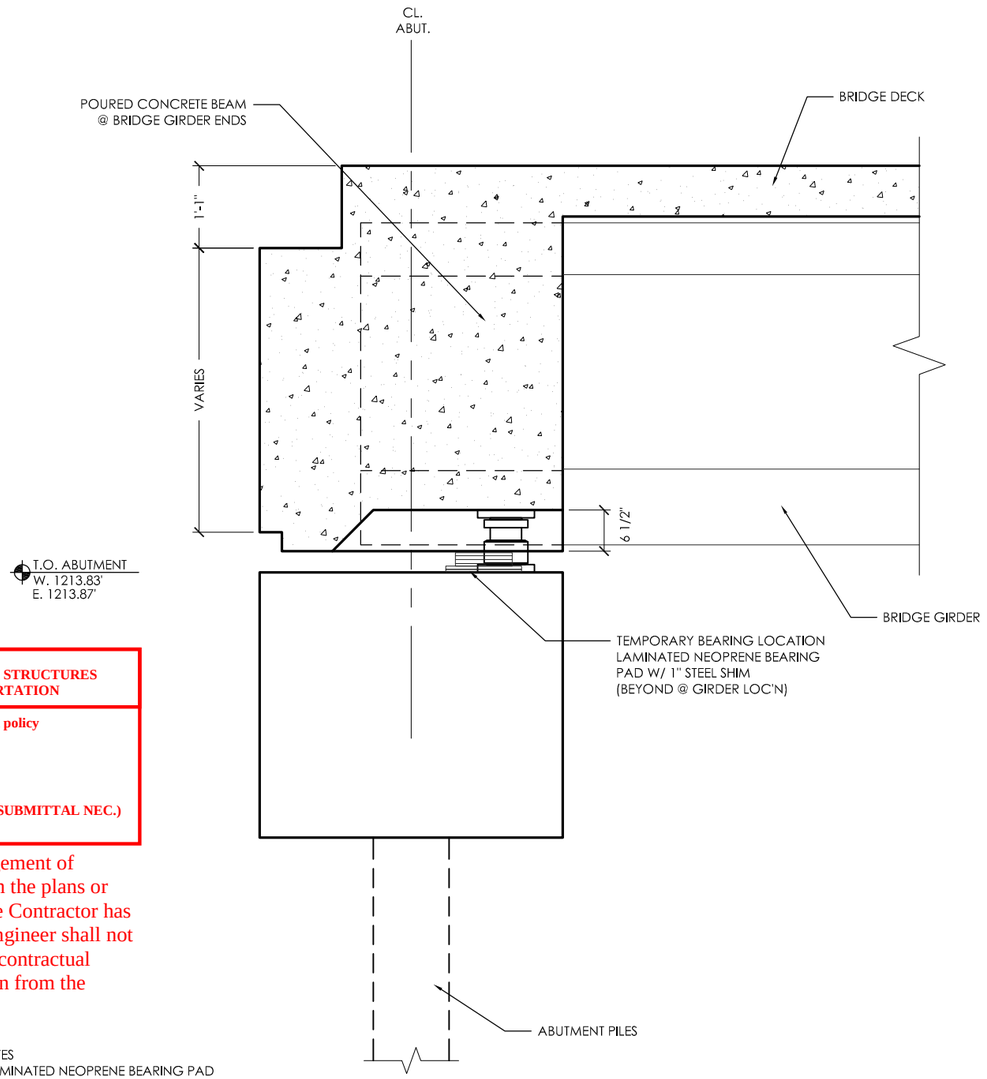
FINAL POSITION PROCEDURE (CONT.):

9. INSTALL PANCAKE JACKS W/ BEARING PLATES
10. LIFT BRIDGE TO RELIEVE PRESSURE FROM LAMINATED NEOPRENE BEARING PAD
11. REMOVE LAMINATED NEOPRENE BEARING PAD & STEEL SHIM FROM TEMPORARY BEARING LOCATION
12. POSITION LAMINATED NEOPRENE BEARING PAD INTO FINAL BEARING LOCATION (ALL LAMINATED NEOPRENE BEARING PADS USED DURING THE BRIDGE MOVE SHALL BE INSPECTED FOR EXCESSIVE WEAR OR DAMAGE BY IOWA D.O.T. PROJECT INSPECTOR BEFORE BEING INSTALLED IN FINAL BEARING LOCATION. DAMAGED BEARING PADS TO BE REPLACED AT THE COST TO THE CONTRACTOR.)
13. COLLAPSE PANCAKE JACK UNTIL ALL BRIDGE WEIGHT IS BEARING ON LAMINATED NEOPRENE BEARING PAD IN FINAL BRIDGE LOCATION
14. REMOVE PANCAKE JACK W/ BEARING PLATES



SECTION W/
PARTIAL SHIM STACK REMOVED (STEPS 8-10) 1/S10

SCALE: 1/2" = 1'-0"

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