



**REVIEW NOTES**  
**BRATTLEBORO BRO 1442(35) – BRIDGE NO. 7**  
**TEMPORARY BRIDGE DRAWINGS**  
**May 22, 2014**

**RE:** Temporary Bridge Drawings received from Renaud Bros. Inc on 5/22/2014.

**VHB Project No.:** 57428.00

*These notes accompany the review of the Temporary Bridge Drawings reviewed by VHB on 5/22/2014.*

General Notes:

1. Submittal is approved.

<b>SUBMITTAL REVIEW</b>	
<input checked="" type="checkbox"/>	Reviewed and approved but only for conformance to the Construction Contract Documents.
<input type="checkbox"/>	Revise and Resubmit
<p>Corrections or comments made during this review do not relieve the Contractor or his Designer from compliance with professional requirements or for responsibility for the adequacy of the submittal information. This check is only for review of general conformance with industry standards and general compliance with the information given in the Contract Documents. VHB has not conducted a detailed review of the submittal and has not performed calculations or assessed the adequacy of loads, design criteria, quantities, dimensions, etc. Approval of the submittal does not constitute VHB's approval of any construction means, methods or techniques. These remain the responsibility of the Contractor.</p>	
	<b>Vanasse Hangen Brustlin, Inc.</b> 7056 US Route 7 • Post Office Box 120 North Ferrisburgh, VT 05473 802.425.7788
	Job Number: 57428.00 Reviewed By: S.E. Burbank Date: May 22, 2014

This submittal review is for sheets 1-33, inclusive, of the “Brattleboro(35)-TempBypassRev2” submittal received on 5/22/2014.

**Vermont Agency of Transportation**

**RECEIVED**

Brattleboro BRO 1442(35) Temporary Bypass Review (Approved).pdf

**CK'D BY** MJC      **OK'D BY** TAS

**May 22, 2014**

**RESUBMIT** No      **Approved**  
**BY** M. J. Chenette      **DATE** 05/22/2014

# RENAUD BROS., INC.

283 Fort Bridgeman Road #2, Vernon, VT 05354

phone (802) 257-7383

fax (802) 257-7308

## Brattlboro BRO 1442 (35)

### Temporary Bridge Revision 2 Explanation

1. A formal letter from the Town (on Town letterhead, signed by some Town authority) that indicates the Town acknowledges and accepts the narrower temporary bridge and does not have concerns that the reduced width would prevent or significantly delay the movement of vehicles that the Town considers important to its citizens, or something to that effect.

Stephen Barrett, Brattleboro DPW director has supplied a letter and copied Brattleboro's Fire Chief, Police Chief and Town Manager. Letter is included.

2. Additional information on the method of erection (not just the sequence) of the temporary bridge that satisfies Specification Section 528.04(b)(3).

An erection plan has been included showing the crane placement, lifting capacities, radius, and rigging capacities.

3. Additional information on how drainage will be provided for on the bridge.

Sheets 6 and 8 show how the bridge drains with an inch of pavement tapered to the curb where the 1 ½" spacer is staggered so water can run off the bridge deck.

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## **Brattleboro BRO 1442 (35)**

### **Temporary Bridge Re-submittal**

This submittal is to explain how Renaud Brothers came up with the width of the temporary bridge. The contract documents do not have a plan or detail clearly identifying a width for the one way temporary bridge. When referencing the temporary bridge information on sheet 2 of the contract plans there is a minimum length and a clearance from the stream bed dimension but no width dimension. At the bottom of sheet 2 there is a temporary bridge profile that shows the bridge clear opening and the bottom of beam elevation. This information is in discrepancy to the above mentioned information. The traffic maintenance notes on sheet 6 make reference to specification section 528 which is the only place the minimum width is clearly depicted. The specification calls for a minimum 14'-6" clear dimension from rail to rail. With this information we utilized a bridge that is 15'-4" rail to rail. Renaud Brothers did not intend to install a bridge that was not the required width. Renaud Brothers did not see a defined width for the temporary bridge and consulted the specification to determine the width of the bridge.

We did install the temporary bridge without prior approval and recognize this as fault according to specification section 105.03 (b)(2)a.

We have test run the bridge with Brattleboro Fire Department's Ladder Truck and it passed through with no trouble. We also had a school bus drive through the bridge and it passed through as well with no trouble. We recognize the South West corner is tight and will address that by adding more square footage of roadway, the plans and details are included in this submittal.

**Town of Brattleboro**  
**DEPARTMENT OF PUBLIC WORKS**

211 Fairground Road, Brattleboro, Vermont 05301  
Tel: 802-254-4255 • Fax: 802-257-2316 • E-mail: brattdpw@sover.net

May 20, 2014

Charlie Ezequelle  
Renaud Brothers Construction  
PO Box 310  
Vernon, VT 05354

Re: Sunset Lake Bridge Project BRO 1442 (35)

Dear Charlie,

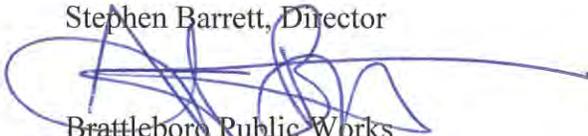
The Town of Brattleboro Department of Public Works, Fire Department and Police Department finds the Sunset Lake BRO 1442 (35) temporary bridge to be acceptable and meets the requirements requested by the Town.

The town had required that the temporary bridge be able to accommodate the Fire Department Ladder Truck turning radius and weight of 66,000 lb. The Brattleboro Fire Department has completed a "test run" with the Ladder Truck and confirmed that the temporary bridge has met the requirements.

Sunset Lake Road is class 3 gravel roadways with a weight limit of 24,000 lb., no tractor trailers will be issued permits by the town to travel over the temporary bridge. The temporary bridge will provide access for emergency service vehicles to Sunset Lake Road as requested by the town.

If you have any questions, please contact me.

Stephen Barrett, Director



Brattleboro Public Works

Cc: Mike Bucossi, Fire Chief  
Gene Wrinn, Police Chief  
Patrick Moreland, Town Manager  
Fred Ross, VTrans

## Charlie Ezequelle

---

**From:** Mike Bucossi [dbucossi@brattleboro.org]  
**Sent:** Thursday-May 01-2014 5-21 PM  
**To:** 'Stephen Barrett'; 'Charlie Ezequelle'  
**Cc:** Asst Chief Pete Lynch  
**Subject:** RE: Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

The driver that came up tells me the maneuver was easily done, he has no concerns and that he feels that the approach(s) are good. I will have each shift come take a look. Thank you for taking our input.

Michael Bucossi  
Fire Chief  
Town of Brattleboro  
103 Elliot St  
Brattleboro, VT 05301  
(802) 254-4831  
[www.brattleborofire.org](http://www.brattleborofire.org)

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**From:** Stephen Barrett [<mailto:sbarrett@brattleboro.org>]  
**Sent:** Thursday, May 01, 2014 4:27 PM  
**To:** 'Charlie Ezequelle'  
**Cc:** 'Mike Bucossi'  
**Subject:** RE: Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

Charlie,

The ladder truck had no problem making the turning radius onto the temporary bridge on Sunset Lake Road . The truck used 10 feet of the 15 foot deck on the north & south approach. The Fire Chief will report to you after he has discussed with the driver and officer that completed the test, he has the final say.  
You may want to have a school bus take a test run also. If you need assistance let me know.

Steve

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**From:** Charlie Ezequelle [<mailto:cezequelle@gmail.com>]  
**Sent:** Thursday, May 01, 2014 3:29 PM  
**To:** 'Stephen Barrett'  
**Subject:** RE: Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

Hi Steve,

Sounds like the truck already made it through the bridge. Could you and Chief Bucossi confirm the ladder truck made it through?

Thank you, Charlie

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**From:** Charlie Ezequelle [<mailto:cezequelle@gmail.com>]  
**Sent:** Thursday-May 01-2014 2-14 PM  
**To:** 'Stephen Barrett'  
**Subject:** RE: Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

Steve,

We are ready for the truck. I propose an 8am slot, let me know if the fire department can do that.

Thanks, Charlie

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**From:** Stephen Barrett [<mailto:sbarrett@brattleboro.org>]  
**Sent:** Thursday-May 01-2014 11-04 AM  
**To:** 'Charlie Ezequelle'  
**Subject:** FW: Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

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**From:** Chenette, Michael [<mailto:Michael.Chenette@state.vt.us>]  
**Sent:** Thursday, March 06, 2014 1:40 PM  
**To:** 'Stephen Barrett'  
**Cc:** Sumner, Todd; Ross, Fred; 'Burbank, Scott'  
**Subject:** FW: Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

Steve,

The ladder truck turning movements have been reviewed and it looks like it should be capable of maneuvering through the detour, as designed.

Let me or Todd know if you have any questions. FYI – I will be out on Vacation beginning tomorrow and will be back in the office on March 17<sup>th</sup>.

Thanks,  
Mike

Michael J. Chenette, P.E.  
Structures Section  
Vermont Agency of Transportation  
One National Life Drive  
Montpelier, Vermont 05633-5001  
[michael.chenette@state.vt.us](mailto:michael.chenette@state.vt.us)  
PH 802-828-5367

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**From:** Burbank, Scott [<mailto:SBurbank@VHB.com>]  
**Sent:** Wednesday, March 05, 2014 5:36 PM  
**To:** Chenette, Michael  
**Cc:** [mike.chenette@stantec.com](mailto:mike.chenette@stantec.com); Sumner, Todd  
**Subject:** Brattleboro BRO 1442(35) - Ladder Truck Turning Movements

Hi Mike,

Based on the attached information provided by Michael Bucossi, Town of Brattleboro Fire Chief, we developed a model of the Brattleboro Ladder Truck in AutoTurn which we “drove” through the detour using the AutoTurn program. As noted in the attached PDF the Brattleboro Ladder Truck is capable of maneuvering through the detour.

Please feel free to contact us if you have any questions.

Thanks,  
Scott

**Scott E. Burbank, P.E.**  
Project Manager

**VHB | Vanasse Hangen Brustlin, Inc.**  
Transportation | Land Development | Environmental Services

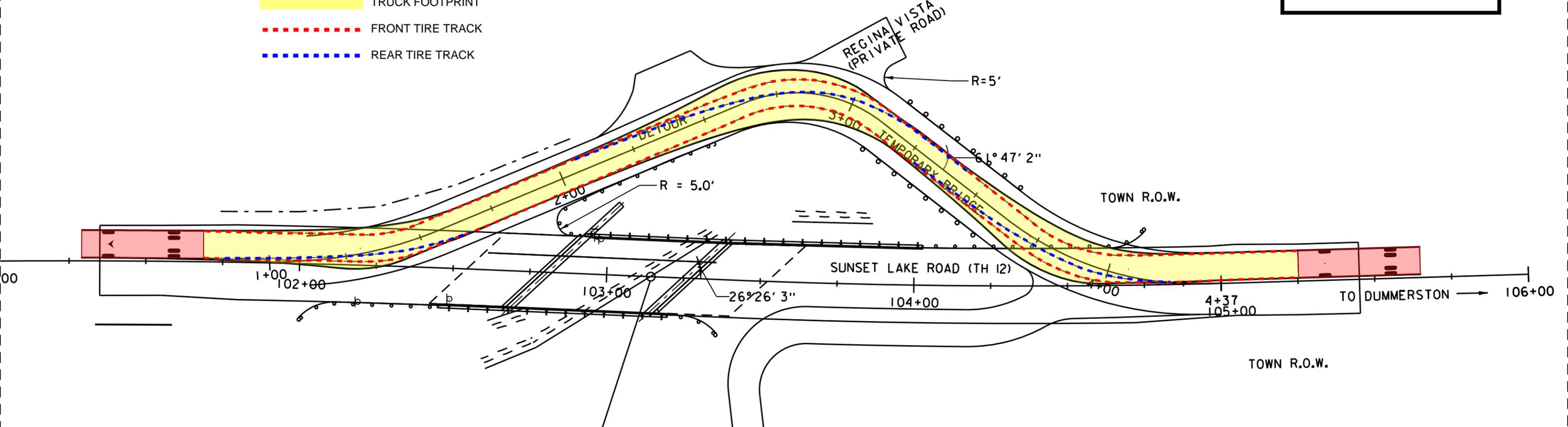
7056 US Route 7  
Post Office Box 120  
North Ferrisburgh, VT 05473  
Direct Line: 802.497.6157 | Fax: 802.425.7799  
Mobile: 802.324.3055  
sburbank@vhb.com

**[www.vhb.com](http://www.vhb.com)**

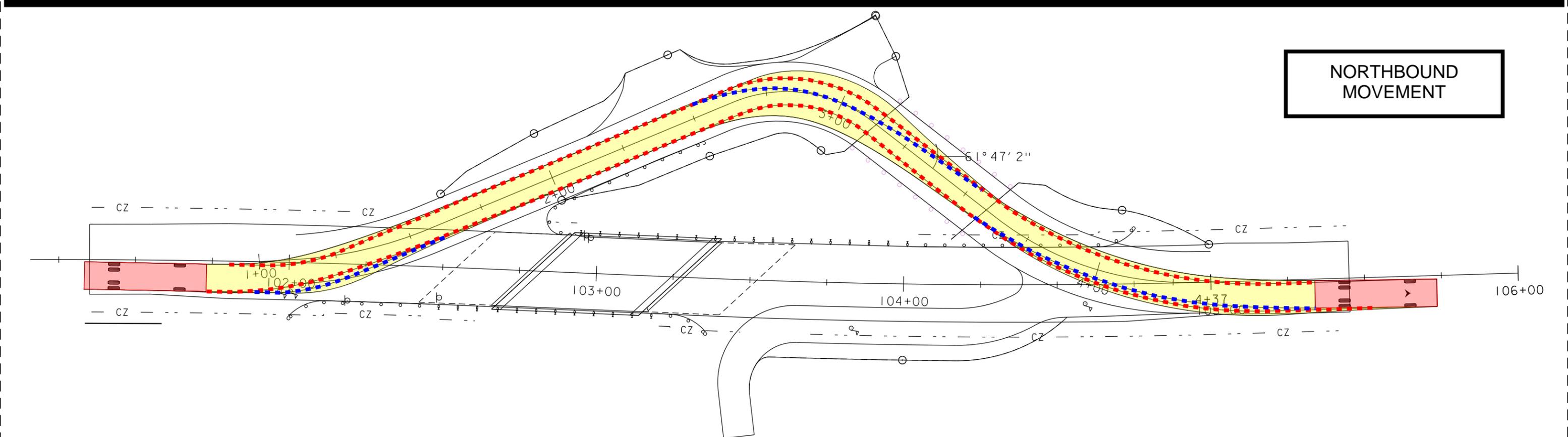
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Vanasse Hangen Brustlin, Inc. | [info@vhb.com](mailto:info@vhb.com)

SOUTHBOUND MOVEMENT

- TRUCK FOOTPRINT
- FRONT TIRE TRACK
- REAR TIRE TRACK



NORTHBOUND MOVEMENT



**Setting Temporary Abutment 1 in place on a foot of compacted crushed stone on 4-23-14**



**Setting Temporary Abutment 2 in place on a foot of compacted crushed stone 4-24-14**



**Swinging the Temporary Bridge into place 4-28-14**

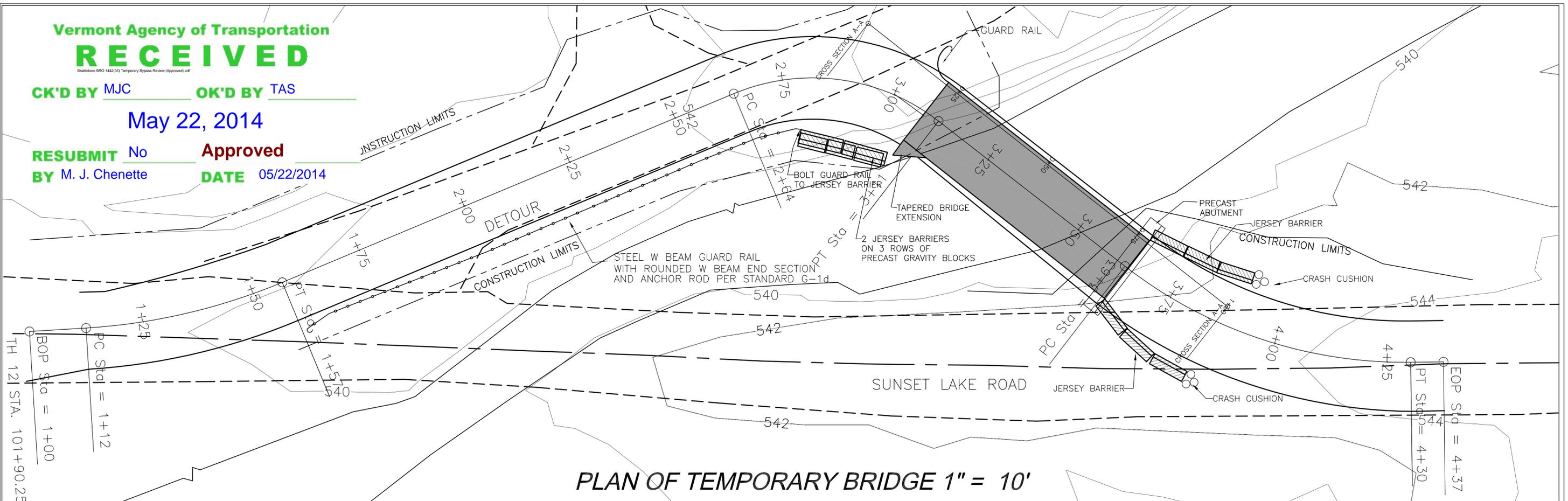


**Misc pictures through 4-29-14**

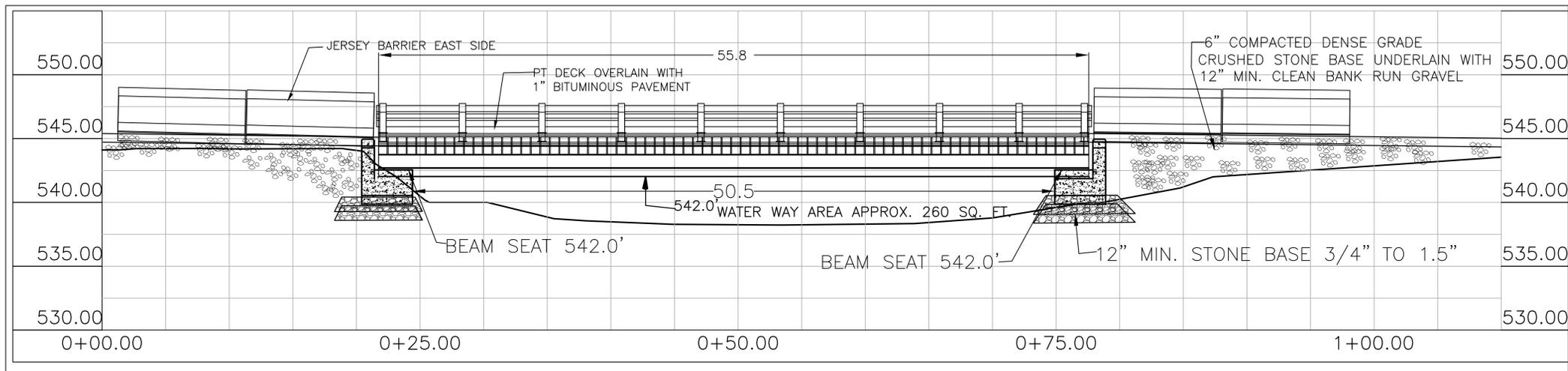
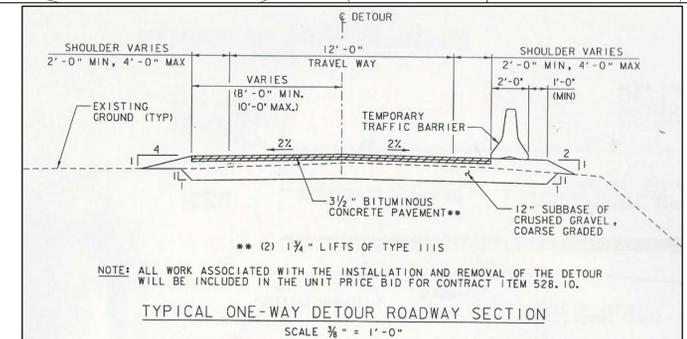




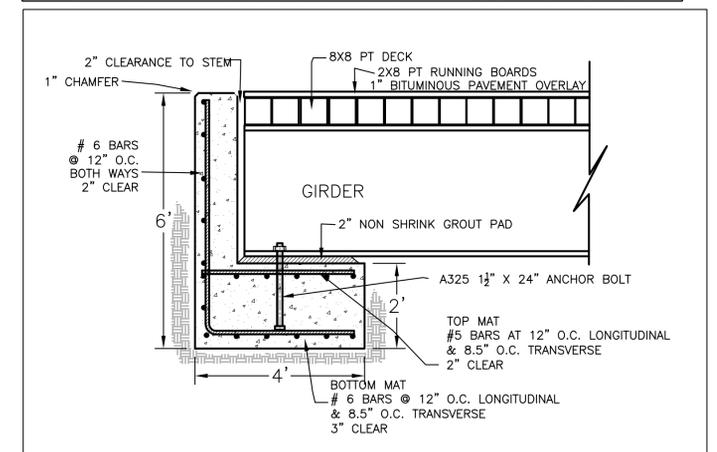




PLAN OF TEMPORARY BRIDGE 1" = 10'



PROFILE OF TEMPORARY BRIDGE 1" = 5'  
SECTION A-A



ABUTMENT CROSS SECTION 1" = 2'



PLAN AND PROFILE OF TEMPORARY BRIDGE,  
ABUTMENTS & BYPASS ROAD

RENAUD BROS. INC.  
BR0 1444 (35)  
SUNSET LAKE ROAD  
BRATTLEBORO, VT

DATE: 3-2-2014  
AMENDED: 5-08-2014  
AMENDED: 5-05-2014

BELL ENGINEERING  
CIVIL & ENVIRONMENTAL  
17 ECHO COVE WAY-SPOFFORD, NH 03462  
(603) 363-9966

SHEET

1

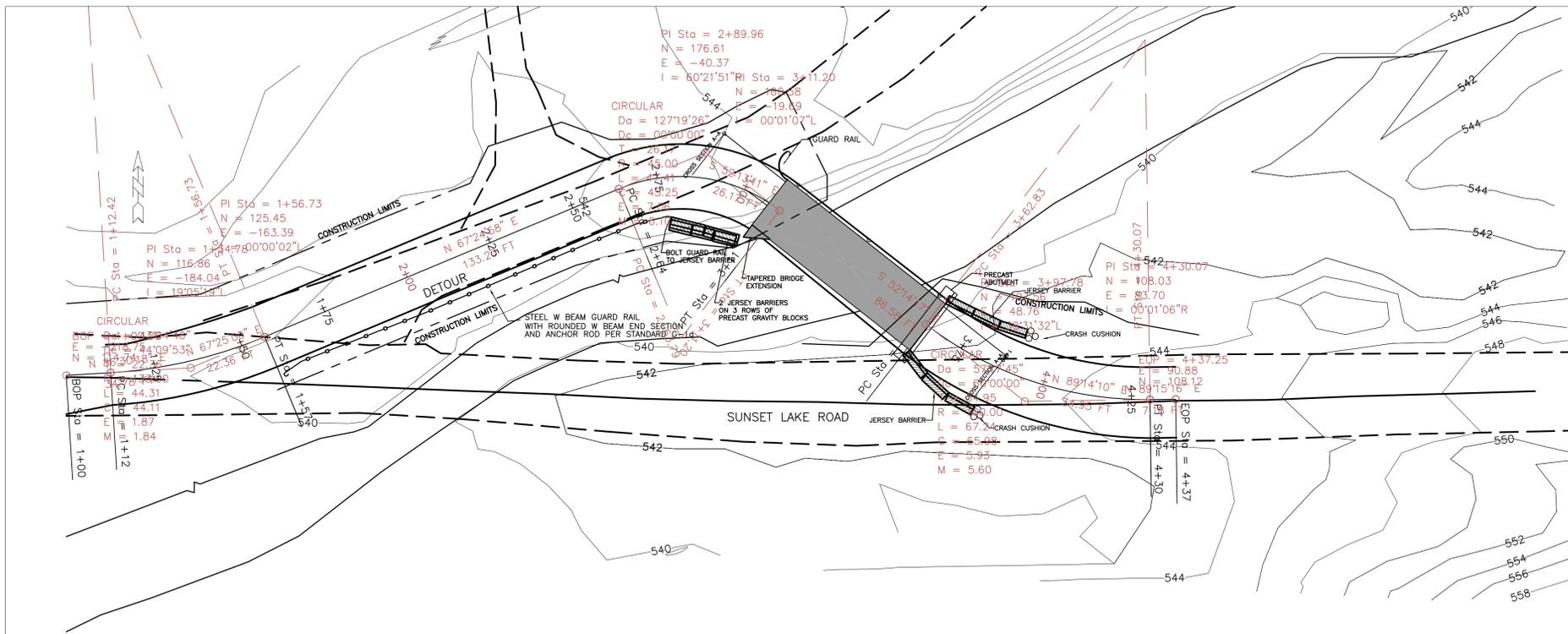
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Brattleboro BRO 1442(35) Temporary Bypass Review (Approved).pdf

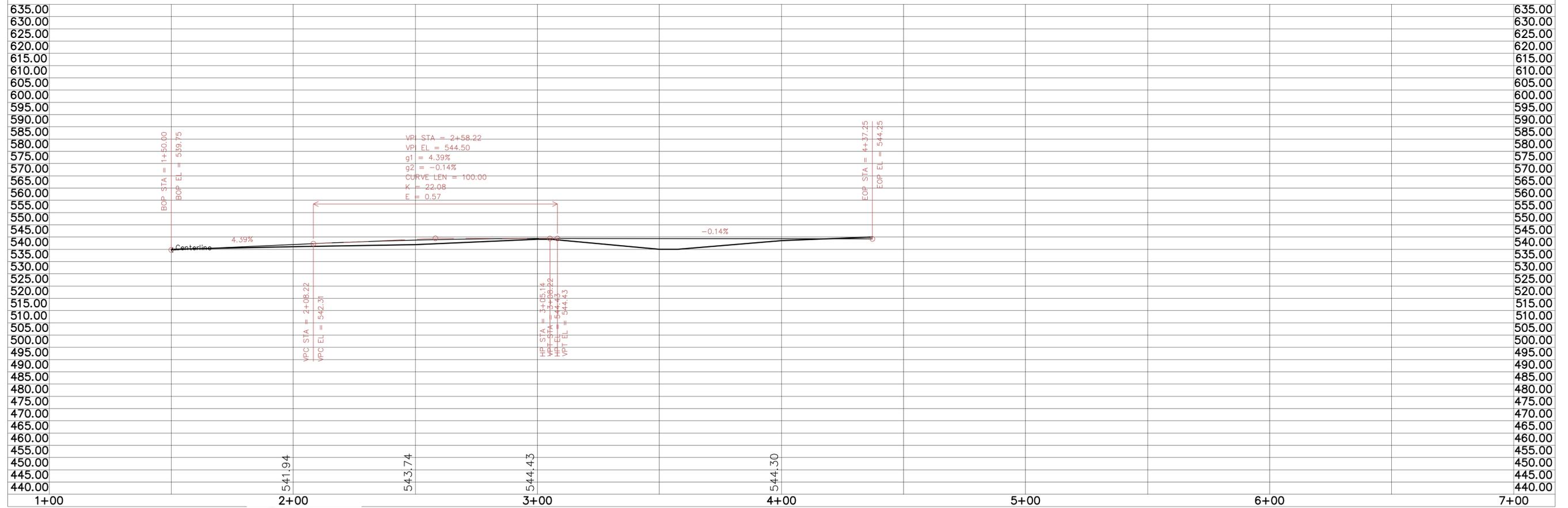
CK'D BY MJC OK'D BY TAS

May 22, 2014

RESUBMIT No Approved  
 BY M. J. Chenette DATE 05/22/2014



SCALES:  
 1" = 20' HOR  
 1" = 20' VER



PLAN AND PROFILE

RENAUD BROS. INC.  
 BRO 1442 (35)  
 SUNSET LAKE ROAD  
 BRATTLEBORO, VT

DATE: 3-3-2014  
 AMENDED: 5-15-2014



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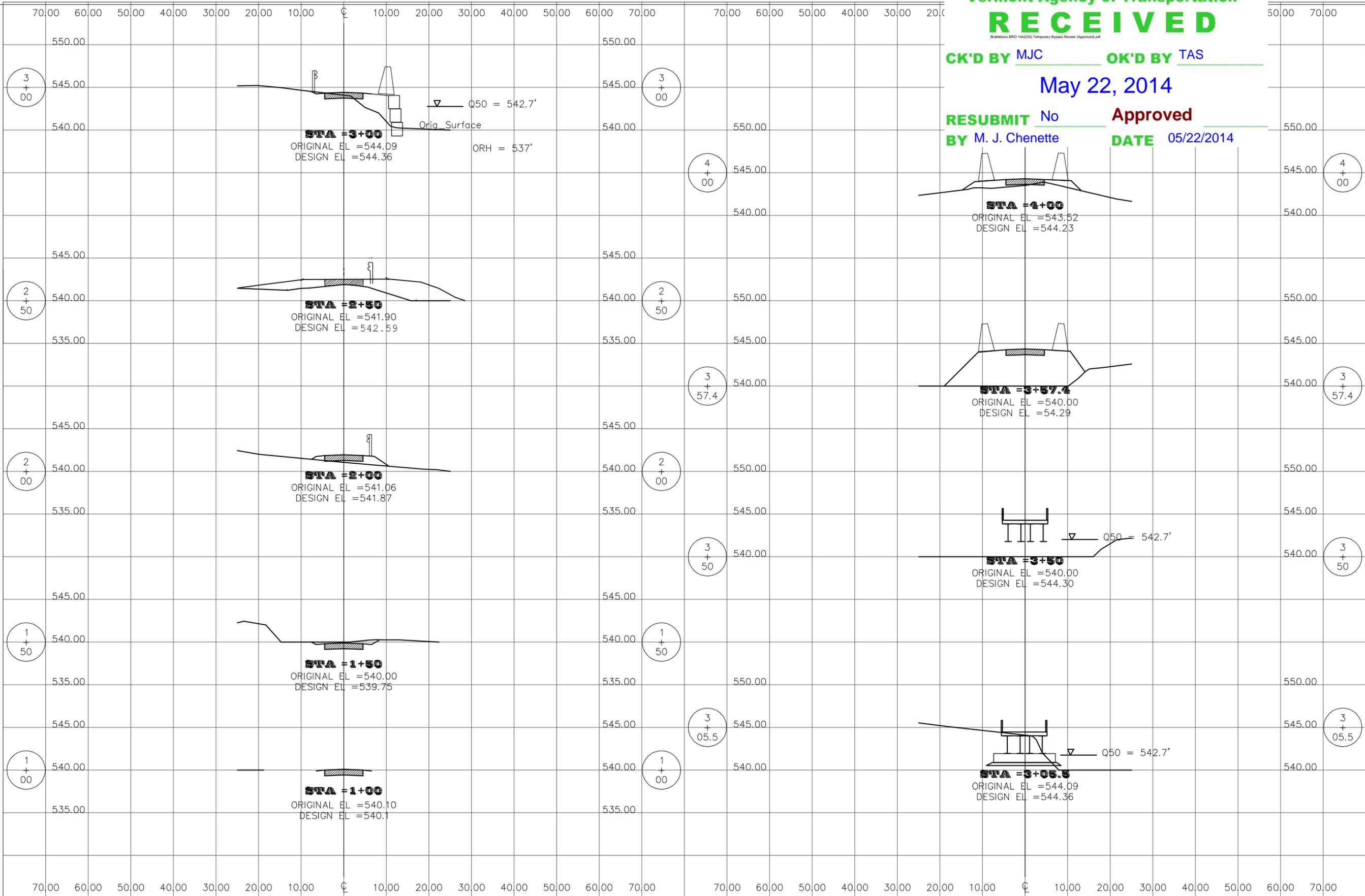
Brattleboro BRO 1442(35) Temporary Bypass Review (Approved).pdf

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May 22, 2014

RESUBMIT No Approved

BY M. J. Chenette DATE 05/22/2014



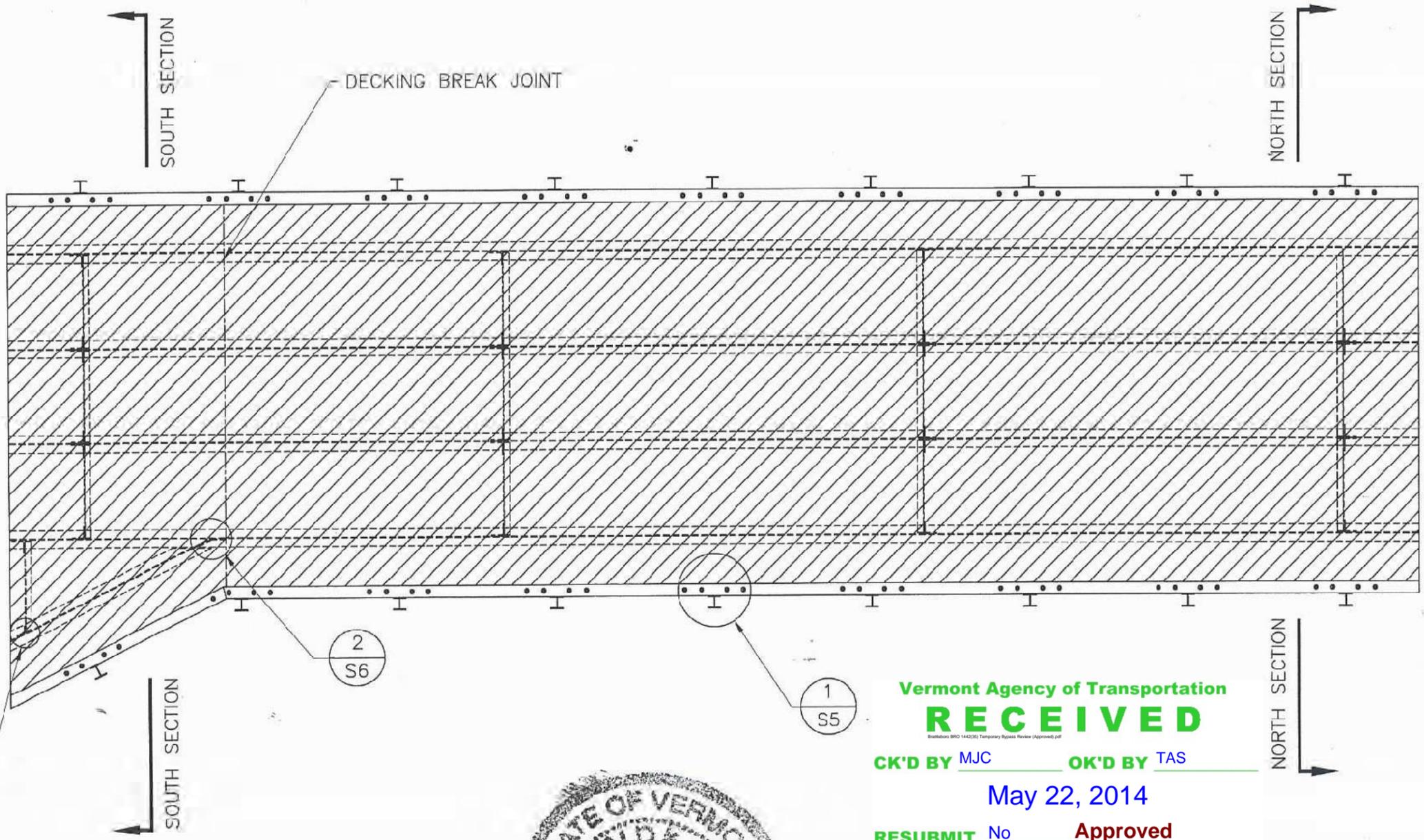
CROSS SECTIONS

RENAUD BROS. INC.  
 BRO 1442 (35)  
 SUNSET LAKE ROAD  
 BRATTLEBORO, VT

DATE: 3-3-2014	
AMENDED: 3-15-2014	



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May 22, 2014

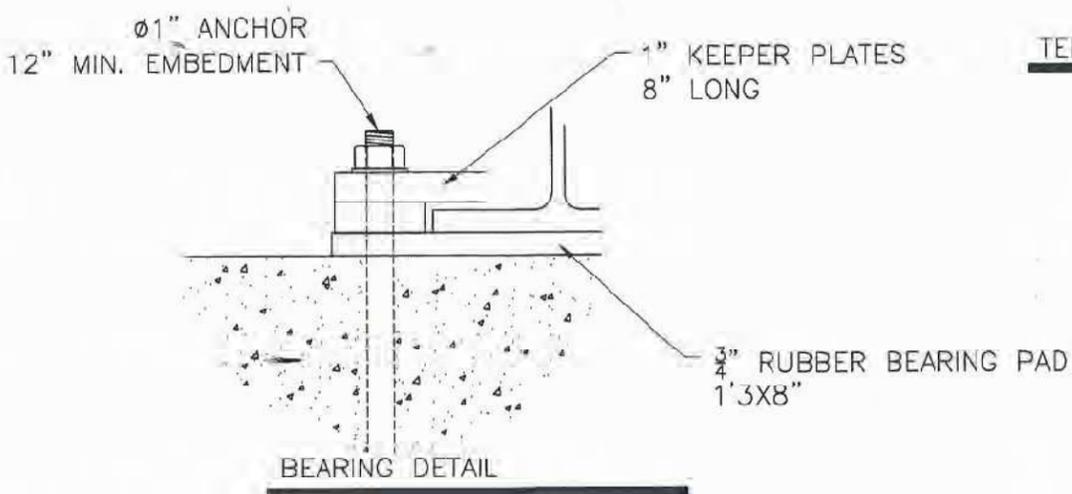
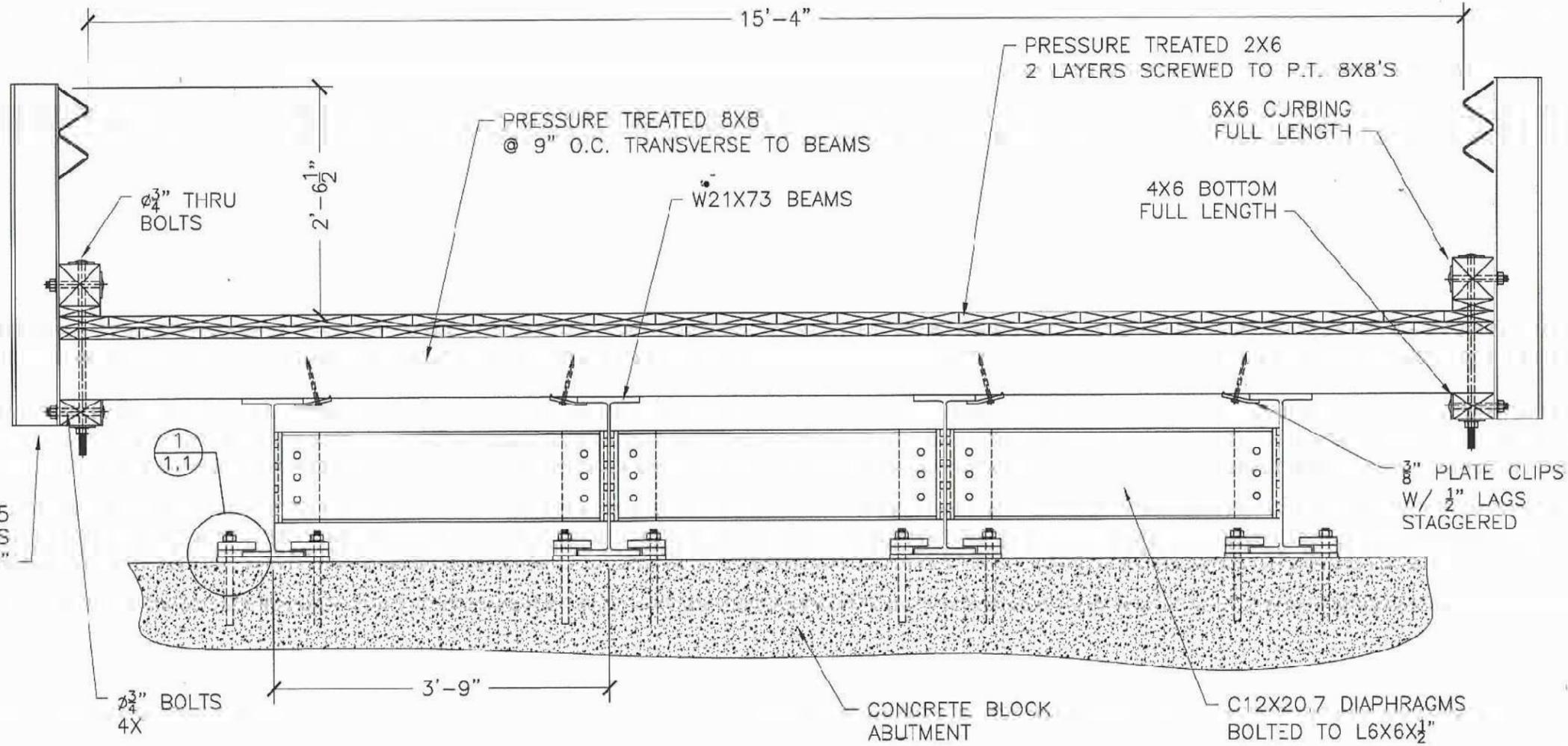
RESUBMIT No Approved  
BY M. J. Chenette DATE 05/22/2014



DO NOT SCALE DRAWINGS

REV.			JOB NAME:	BRATTLEBORO
NO.	DATE	COMMENTS	JOB NO.:	BRO 1442(35)
1	5/5/14	WIDEN APPROACH	SHEET NAME:	RAIL ATTACHMENT DETAIL
DATE:	1/31/14		R RENAUD EGOS, INC. 100 STATE ST. #100 BRATTLEBORO, VT 05701 TEL: 802-251-2801 FAX: 802-251-2803	SHEET:
DRAWN BY:	A.D.			4
CHK'D BY:	C.E.			

C:\Users\j\Documents\Drawings\2014\BR2\11\BR20 BR0 447(35)\SAGE Hill TEMP.dwg, 5/5/2014 3:07 PM



TEMPORARY BRIDGE NORTH ELEVATION



Vermont Agency of Transportation  
**RECEIVED**

CK'D BY MJC OK'D BY TAS

May 22, 2014

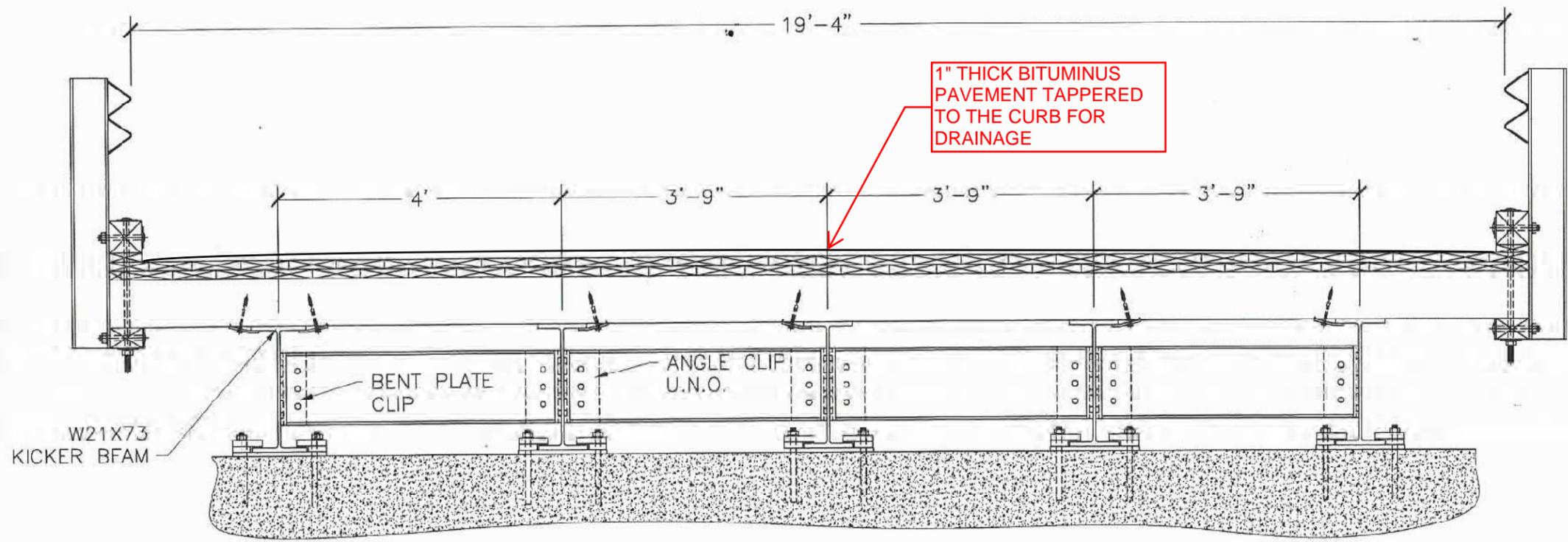
RESUBMIT No Approved

BY M. J. Chenette DATE 05/22/2014

DO NOT SCALE DRAWINGS

REV.			JOB NAME: BRATTLEBORO
			JCB NO: BRC 1442(35)
NO.	DATE	COMMENTS	SHEET NAME: TEMP BRIDGE ELEVATION
1	5/5/14	WIDEN APPROACH	SHEET: 5
DATE: 5/31/14 DRAWN BY: A.D. CHK'D BY: C.E.			R. CHENETTE, INC. REGISTERED PROFESSIONAL ENGINEER No. 10218 VERMONT, U.S.A. EX. 00218-1-1-102

C:\Users\mchenette\Documents\Works In Progress\2014\BRATTLEBORO BRO-1442(35)\SAGE HILL TEMP RAIL BRATTLEBORO 5/5/2014 10:08 PM  
 Brattleboro BRO 1442(35) Temporary Bypass Review (Approved).pdf



TEMPORARY BRIDGE SOUTH ELEVATION

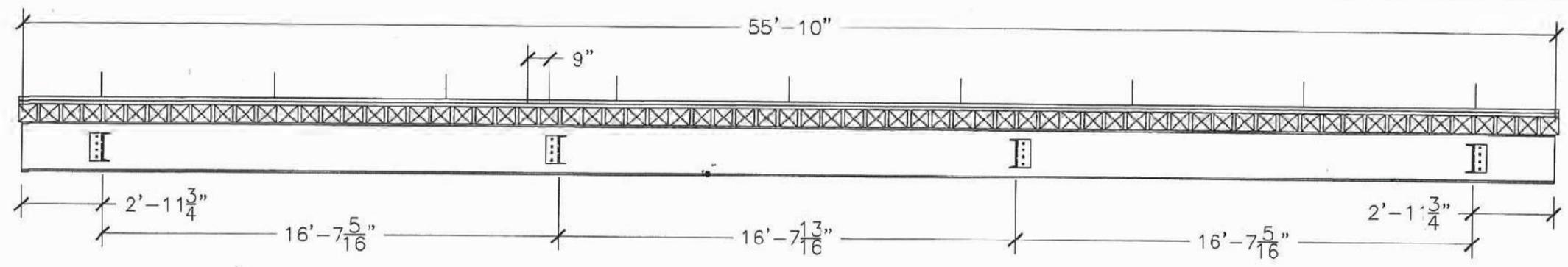
Vermont Agency of Transportation  
**RECEIVED**

CK'D BY MJC OK'D BY TAS  
 May 22, 2014  
 RESUBMIT No Approved  
 BY M. J. Chenette DATE 05/22/2014

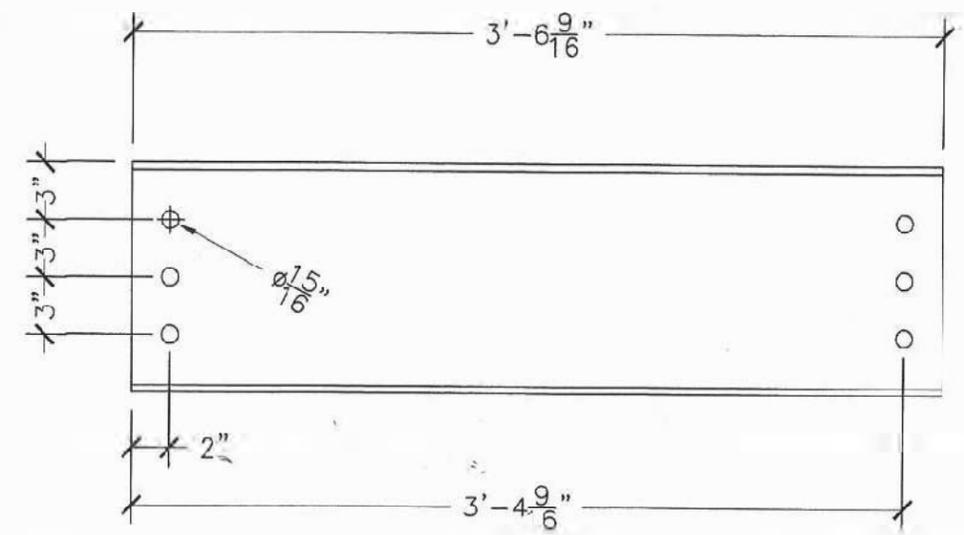
DO NOT SCALE DRAWINGS

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NO.	DATE	COMMENTS	SHEET NAME: RAIL ATTACHMENT DETAIL
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DATE:	1/31/14		
DRAWN BY:	A.D.		
CHK'D BY:	C.E.		
			SHEET: <b>6</b>

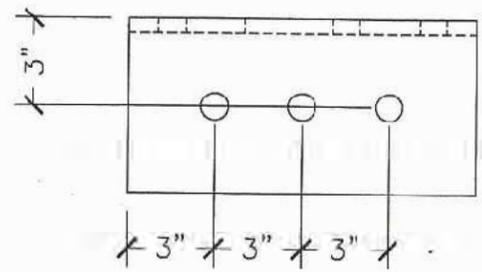
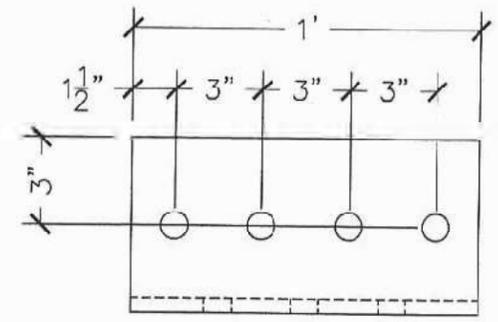
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**BRIDGE UPSTREAM ELEVATION**



**DIAPHRAGMS- 12 REQ.**  
**MAT'L: C12X20.7**



**ANGLE CLIPS- 24 REQ.**  
**MAT'L: L6X6X1/2"**

**Vermont Agency of Transportation**  
**RECEIVED**

CK'D BY MJC OK'D BY TAS

May 22, 2014

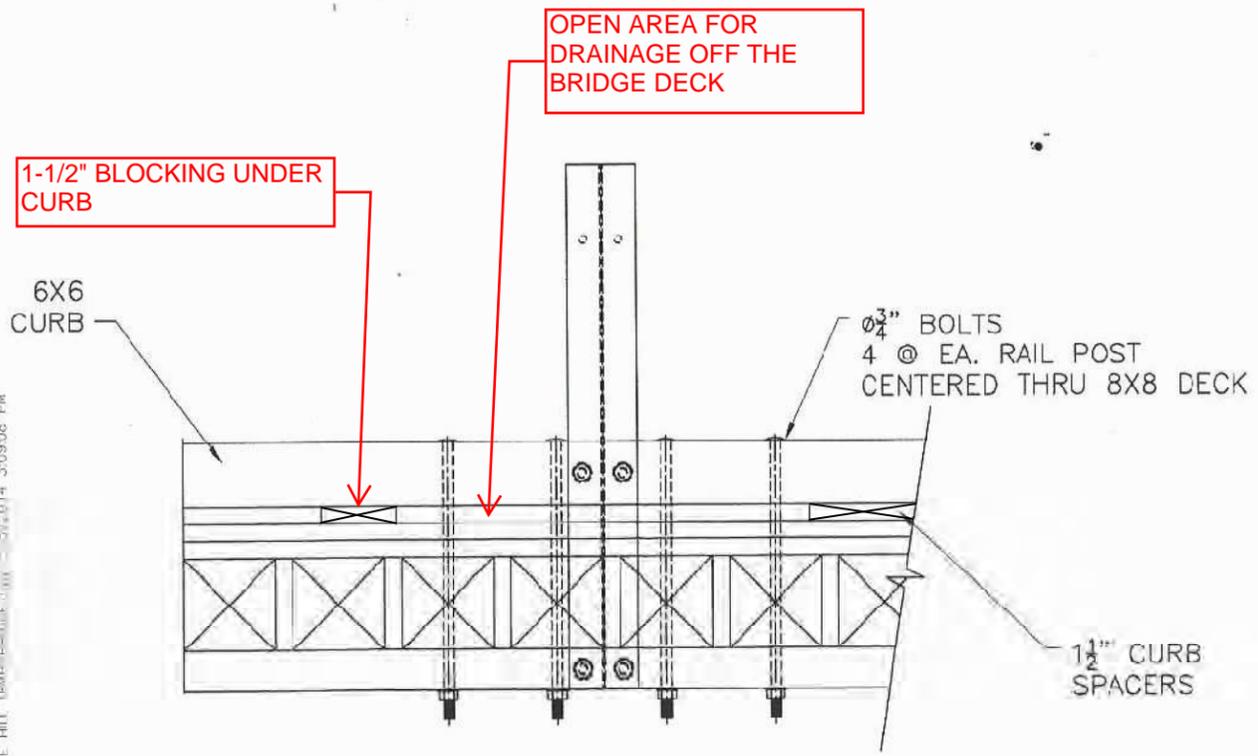
RESUBMIT No Approved  
 BY M. J. Chenette DATE 05/22/2014



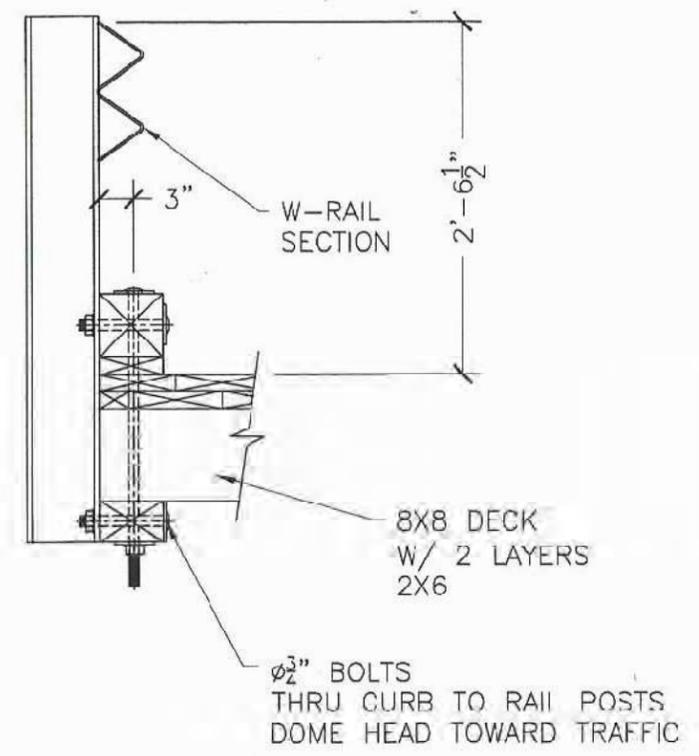
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NO.	DATE	COMMENTS	JOB NO.:	BRO 1442(35)
1	5/5/14	WIDEN APPROACH	SHEET NAME:	SIDE ELEVATION
DATE:	1/31/14			SHEET:
DRAWN BY:	A.D.			7
CHK'D BY:	C.E.			

DO NOT SCALE DRAWINGS

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1 RAILING POST ATTACHMENT DETAIL  
S5 N.T.S.



RAILING POST ATTACHMENT DETAIL  
N.T.S.

Vermont Agency of Transportation  
**RECEIVED**

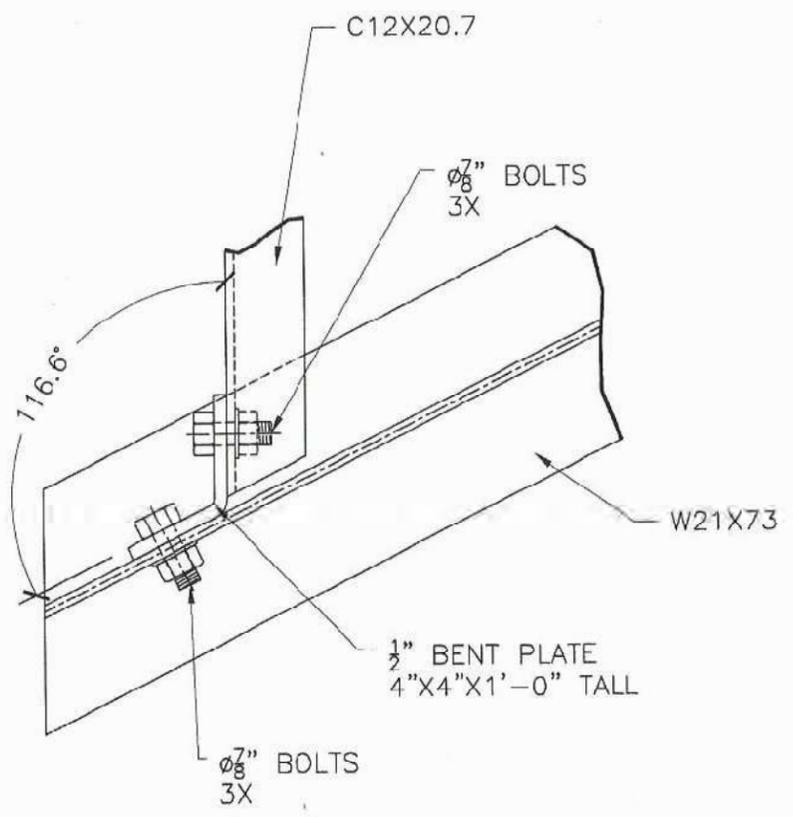
CK'D BY MJC OK'D BY TAS  
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BY M. J. Chenette DATE 05/22/2014



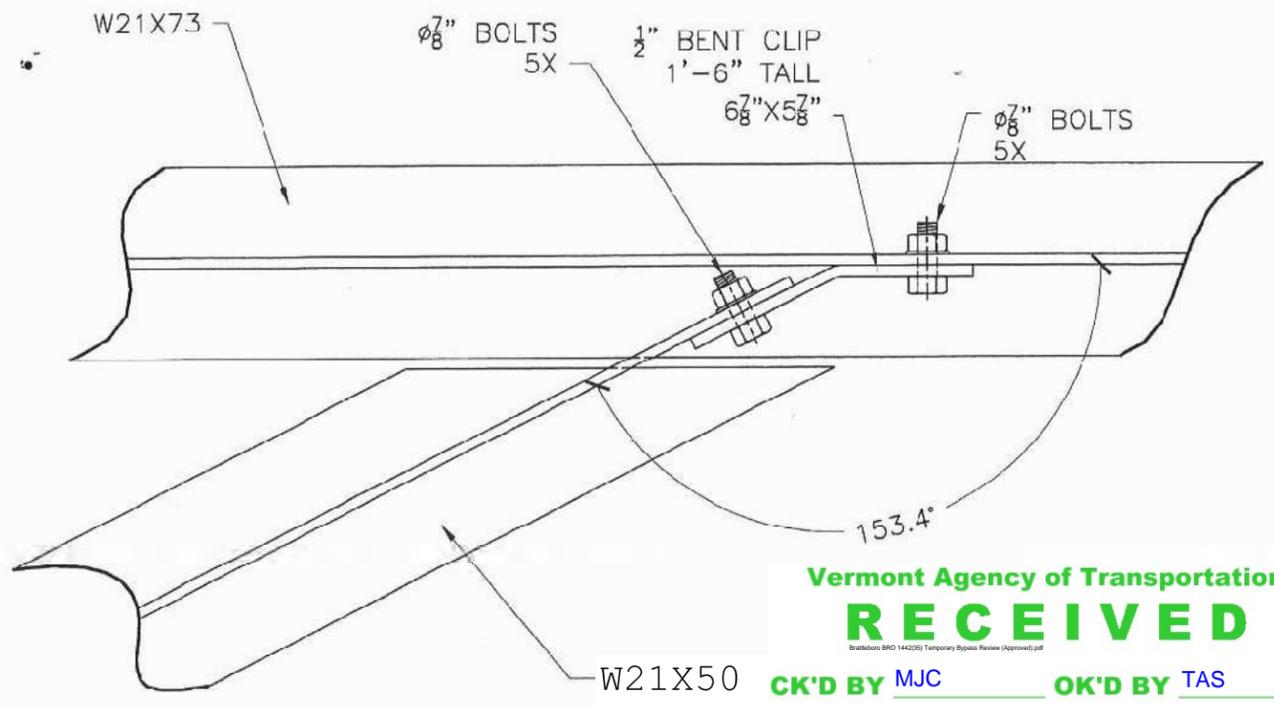
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REV.		JOB NAME:	BRATTLEBORO
NO.	DATE	COMMENTS	JOB NO:
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DATE: 1/31/14		SHEET NAME: RAIL ATTACHMENT DETAIL	
DRAWN BY: A.D.		SHEET: 8	
CHK'D BY: C.E.		B. R. CHENETTE, INC.	

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1 KICKER BEAM TO DIAPHRAGM DETAIL  
 S6 TOP FLANGE REMOVED FOR CLARITY



2 BEAM TO KICKER BEAM DETAIL  
 S6 TOP FLANGE REMOVED FOR CLARITY



Vermont Agency of Transportation  
**RECEIVED**

CK'D BY MJC OK'D BY TAS

May 22, 2014

RESUBMIT No Approved  
 BY M. J. Chenette DATE 05/22/2014

DO NOT SCALE DRAWINGS

REV.			JOB NAME:
NO.	DATE	COMMENTS	BATTLEBORO
1	5/5/14	WIDEN APPROACH	JOB NO: BRO 1442(35)
			SHEET NAME: RAIL ATTACHMENT DETAIL
			SHEET: 9
DATE:	1/31/14		
DRAWN BY:	A.D.		
CHK'D BY:	C.E.		

## Temporary Bridge Calculations

Design = HL 93

Design Load: Large of:

TO CHECK GOVERNING VEHICLE:  
 (USED ONLY FULL POINT LOAD OF VEHICLE)

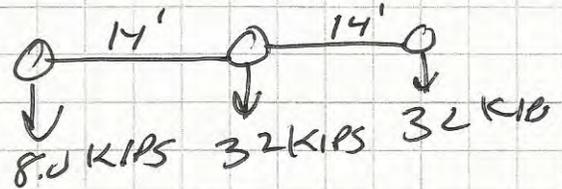
TRUCK LOAD = 657.7 K-ft  
 WITH WHEELS @ 7.7, 21.3 + 35.3'

FOR TANK TRUCK

M = 600 K-ft  
 WITH WHEELS @ 24' + 28'

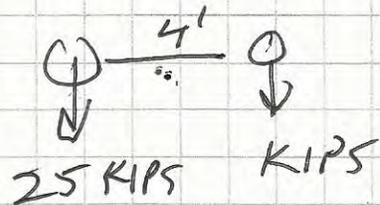
∴ DESIGN TRUCK GOVERNS

Design Truck



OR

DESIGN Tandem



+

DESIGN LANE LOAD  
 OF 0.640 KLF  
 DISTRIBUTED OVER 10'

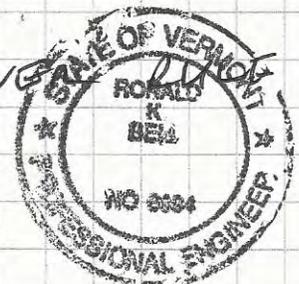
### LOAD DISTRIBUTION

UNIFORM LANE LOAD =  $\frac{9}{10} = \frac{3.75}{10} = 0.375 \times 0.9 \times 0.64 = 0.216$  KLF

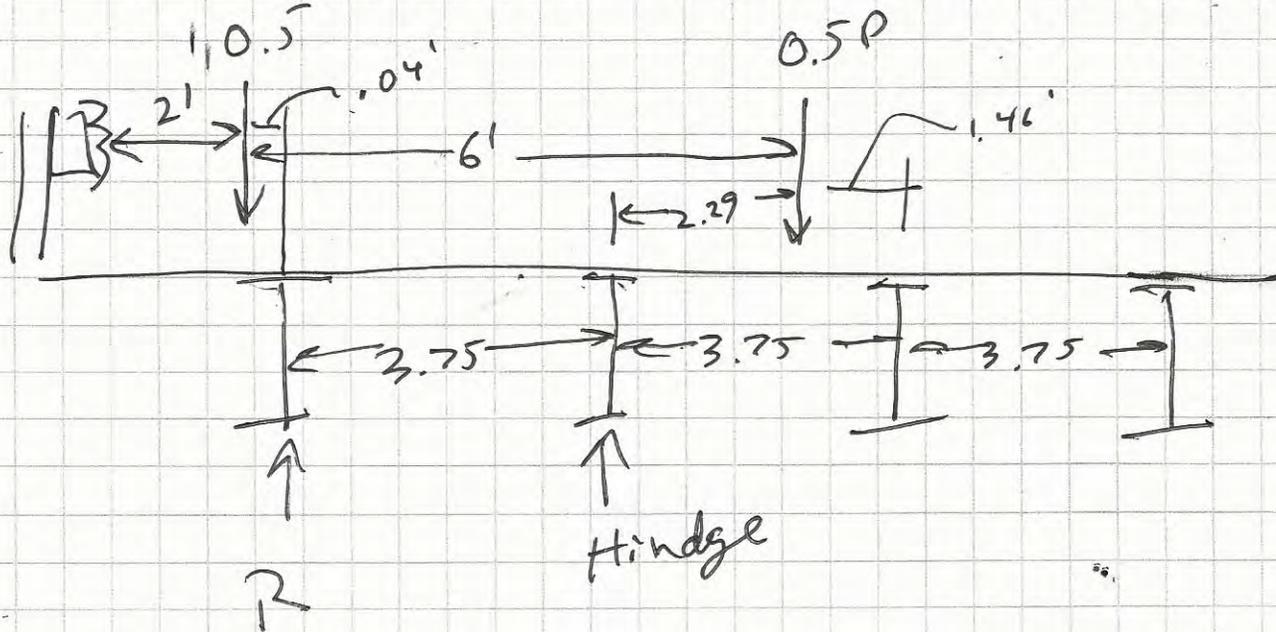
∴ transverse modification

WHEEL LOAD MOMENTS:

From Table 4.6.2.2.2d-1 USE LEVER RULE  
 FOR EXTERIOR BEAMS



DISTRIBUTION ON ~~EXTERIOR~~ EXTERIOR BEAMS



$$M_{\text{Hinge}} = -(-2.29)(0.5P) + (3.75)(0.5P) - (3.75)(R) = 0$$

$$R = 0.2P$$

DISTRIBUTION ON INTERIOR BEAMS:

FROM TABLE 4.6.2.2. & -1 DISTRIBUTION FOR

$$\text{PLANK DECK} = 9/6.7 = \frac{3.75}{6.7} = 0.56$$

ON WHEEL LOAD

$$\frac{0.56}{2 \text{ wheels}} = 0.28 P$$



LOAD CALC. CONT.

DYNAMIC LOAD ALLOWANCE = 1.33

Trans Temp Bridge Load Modifier = 0.9

FACTORS FOR STRENGTH I CASE:

LL = 1.75  
IM = 1.75  
DL = 1.25

DEAD LOAD = 185 #/ft

Applied wheel loads =  $DF (0.25) \times IM (1.33) \times 0.9 = 0.34P$

8 KIPS  $\times 0.34 = 2.72$  KIPS FRONT WHEELS

32 KIPS  $\times 0.34 = 10.88$  KIPS REAR WHEELS





PROJECT NAME/ LOCATION: **Battleboro 1442(35)**  
 SHEET #: **4** OF **9**  
 CALCULATED BY: **Ron Bell** DATE: **4-17-2014**  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 SCALE: \_\_\_\_\_

**CHECK MAX. BENDING & SHEAR STRESS RATIOS;  
 FROM ENERCALC**



Project Title: BRO 1442 135  
 Engineer: RON BELL  
 Project Descr: TEMPORARY BRIDGE

Project ID: 2014-32

Printed: 14 APR 2014, 8:57AM

File = C:\Users\Ron\DOCUME~1\ENERCA~1\SUC4E3~1.EC6  
 ENERCALC, INC. 1983-2013, Build:6.13.8.31, Ver:6.13.12.31

Licensee : Bell Engineering

**Steel Beam**

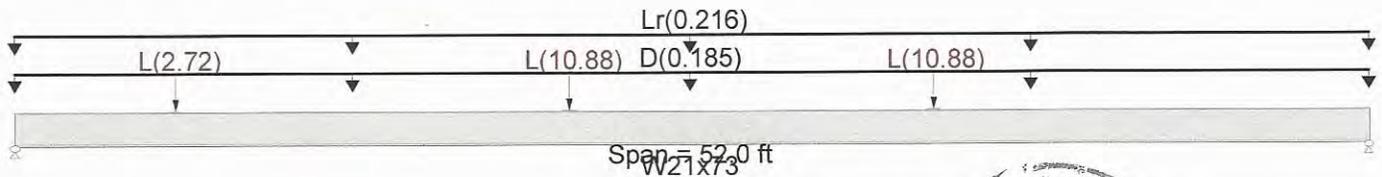
Lic. # : KW-06009396  
 Description : --None--

**CODE REFERENCES**

Calculations per AISC 360-05, IBC 2006, CBC 2007, ASCE 7-05  
 Load Combination Set : ASCE 7-05

**Material Properties**

Analysis Method : Load Resistance Factor Design  
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling  
 Bending Axis : Major Axis Bending  
 Load Combination ASCE 7-05  
 Fy : Steel Yield : 50.0 ksi  
 E : Modulus : 29,000.0 ksi



**Applied Loads**

Service loads entered. Load Factors will be applied for calculations.

- Load(s) for Span Number 1  
 Point Load : L = 2.720 k @ 6.20 ft  
 Point Load : L = 10.880 k @ 21.30 ft  
 Point Load : L = 10.880 k @ 35.30 ft  
 Uniform Load : D = 0.1850 k/ft, Tributary Width = 1.0 ft  
 Uniform Load : Lr = 0.2160 k/ft, Tributary Width = 1.0 ft



**DESIGN SUMMARY**

Maximum Bending Stress Ratio =	<b>0.898 : 1</b>	Maximum Shear Stress Ratio =	<b>0.127 : 1</b>
Section used for this span	<b>W21x73</b>	Section used for this span	<b>W21x73</b>
Mu : Applied	578.951 k-ft	Vu : Applied	36.787 k
Mn * Phi : Allowable	645.000 k-ft	Vn * Phi : Allowable	289.380 k
Load Combination	+1.125D+1.750Lr+1.750L	Load Combination	+1.125D+1.750Lr+1.750L
Location of maximum on span	22.100ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

**Design OK**

# DEFLECTION CALCS

5/9

Printed: 14 APR 2014, 8:55AM

File = c:\Users\Ron\DOCUME~1\ENERCA~1\SUB031~1\EC6  
 ENERCALC, INC. 1983-2013, Build:6.13.8.31, Ver:6.13.12.31

## Steel Beam

Lic. #: KW-06009396

Description: --None--

Licensee: Bell Engineering

### CODE REFERENCES

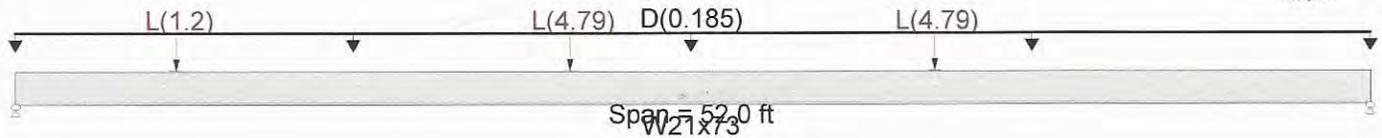
Calculations per AISC 360-05, IBC 2006, CBC 2007, ASCE 7-05

Load Combination Set: ASCE 7-05

### Material Properties

Analysis Method: Load Resistance Factor Design  
 Beam Bracing: Beam is Fully Braced against lateral-torsional buckling  
 Bending Axis: Major Axis Bending  
 Load Combination ASCE 7-05

Fy: Steel Yield: 50.0 ksi  
 E: Modulus: 29,000.0 ksi



### Applied Loads

Service loads entered. Load Factors will be applied for calculations.

- Load(s) for Span Number 1
  - Point Load: L = 1.20 k @ 6.20 ft
  - Point Load: L = 4.790 k @ 21.30 ft
  - Point Load: L = 4.790 k @ 35.30 ft
  - Uniform Load: D = 0.1850 k/ft, Tributary Width = 1.0 ft

### DESIGN SUMMARY

Maximum Bending Stress Ratio =	<b>0.370</b> : 1	Maximum Shear Stress Ratio =	<b>0.051</b> : 1
Section used for this span	<b>W21x73</b>	Section used for this span	<b>W21x73</b>
Mu : Applied	238.487 k-ft	Vu : Applied	14.902 k
Mn * Phi : Allowable	645.000 k-ft	Vn * Phi : Allowable	289.380 k
Load Combination	+1.125D+1.750Lr+1.750L	Load Combination	+1.125D+1.750Lr+1.750L
Location of maximum on span	21.320 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward L+Lr+S Deflection	0.986 in	Ratio =	<b>632</b>
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	<b>0</b> < 180
Max Downward Total Deflection	1.647 in	Ratio =	<b>379</b>
Max Upward Total Deflection	0.000 in	Ratio =	<b>0</b> < 160

### Overall Maximum Deflections - Unfactored Loads

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D+L	1	1.6474	26.260		0.0000	0.000

### Vertical Reactions - Unfactored

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	10.233	10.167
D Only	4.810	4.810
L Only	5.423	5.357
D+L	10.233	10.167

### Steel Section Properties : W21x73

Depth	=	21.200 in	Ixx	=	1,600.00 in <sup>4</sup>	J	=	3.020 in <sup>4</sup>
Web Thick	=	0.455 in	Sxx	=	151.00 in <sup>3</sup>	Cw	=	7,410.00 in <sup>6</sup>
Flange Width	=	8.300 in	Rxx	=	8.640 in			
Flange Thick	=	0.740 in	Zx	=	172.000 in <sup>3</sup>			
Area	=	21.500 in <sup>2</sup>	Iyy	=	70.600 in <sup>4</sup>	Wno	=	42.500 in <sup>2</sup>
Weight	=	73.186 plf	Syy	=	17.000 in <sup>3</sup>	Sw	=	65.200 in <sup>4</sup>
Kdesign	=	1.240 in	Ryy	=	1.810 in	Qf	=	29.700 in <sup>3</sup>
K1	=	0.875 in	Zy	=	26.600 in <sup>3</sup>	Qw	=	85.000 in <sup>3</sup>
rts	=	2.190 in	rT	=	2.130 in			
Ycg	=	10.600 in						

6/9

TIMBER DECK CALCS

**Wood Beam**

Lic. # : KW-06009396

Description : --None-- Per 4.6.2.1.3  $W_p = 7.5/10"$

**CODE REFERENCES**

Calculations per NDS 2005, IBC 2006, CBC 2007, ASCE 7-05

Load Combination Set : ASCE 7-05

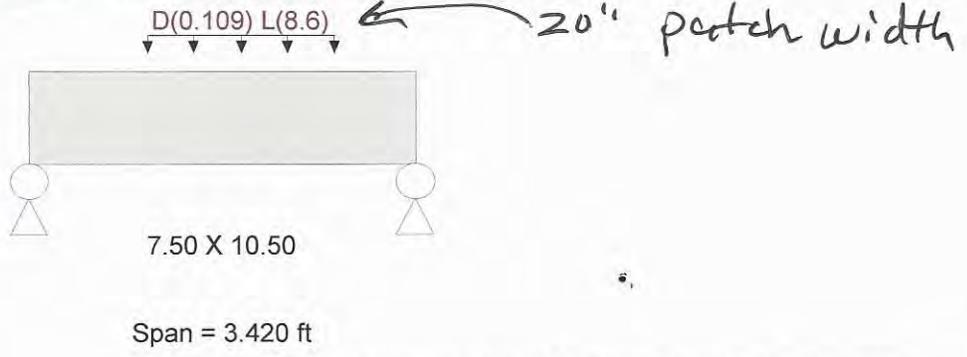
**Material Properties**

Analysis Method : Load Resistance Factor D  
 Load Combination ASCE 7-05

Wood Species : Spruce - Pine - Fir (South)  
 Wood Grade : NO.1

Beam Bracing : Beam is Fully Braced against lateral-torsion buckling

Fb - Tension	1,200.0 psi	E : Modulus of Elasticity	
Fb - Compr	600.0 psi	Ebend- xx	1,200.0 ksi
Fc - Prll	1,200.0 psi	Eminbend - xx	440.0 ksi
Fc - Perp	600.0 psi		
Fv	105.0 psi	Density	23.190 pcf
Ft	725.0 psi		



**Applied Loads**

Service loads entered. Load Factors will be applied for calculations.

Load for Span Number 1

Uniform Load : D = 0.1090, L = 8.60 k/ft, Extent = 1.045 -->> 2.705 ft, Tributary Width = 1.0 ft

**DESIGN SUMMARY**

		<b>Design OK</b>	
Maximum Bending Stress Ratio =	<b>0.543</b> : 1	Maximum Shear Stress Ratio =	<b>0.958</b> : 1
Section used for this span	<b>7.50 X 10.50</b>	Section used for this span	<b>7.50 X 10.50</b>
fb : Actual =	1,408.08psi	fv : Actual =	217.34 psi
FB : Allowable =	2,592.00psi	Fv : Allowable =	226.80 psi
Load Combination	+1.250D+1.750L	Load Combination	+1.250D+1.750L
Location of maximum on span	= 1.797ft	Location of maximum on span	= 2.546ft
Span # where maximum occurs	= Span # 1	Span # where maximum occurs	= Span # 1
<b>Maximum Deflection</b>			
Max Downward L+Lr+S Deflection	0.021 in	Ratio =	<b>1944</b>
Max Upward L+Lr+S Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.021 in	Ratio =	<b>1920</b>
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

**Overall Maximum Deflections - Unfactored Loads**

Load Combination	Span	Max. "+" Defl	Location in Span	Load Combination	Max. "-" Defl	Location in Span
D+L	1,	0.0214	1.747		0.0000	0.000

**Vertical Reactions - Unfactored**

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	6.531	7.926
D Only	0.082	0.099
L Only	6.449	7.827
D+L	6.531	7.926



SUB STRUCTURE DESIGN

1 TRUCK =  $72 \text{ KIPS} \times 1.75 \times 1.33 = 168 \text{ KIPS}$

DECK =  $52' \times (19/2) (50 \text{ ft}^3) \times 15' = 35 \text{ KIPS}$  } 218 KIPS

Steel beams =  $4752' \times 73 \text{ lb/ft} = 15 \text{ KIPS}$

CONC. BLOCK FOUNDATION =  $38 \text{ BLOCKS} \times 3 \times 2 \times 6 \times 150 \text{ lb/ft}^3 = 205 \text{ KIPS}$

$P_u = \frac{218 \text{ KIPS}}{2 \text{ sides}} + 205 \text{ KIPS} = 314 \text{ KIPS/SIDE}$

$q_u = \text{Factored Load/ft}^2 = \frac{314 \text{ KIPS}}{252 \text{ ft}^2} = 1.25 \frac{\text{KIPS}}{\text{ft}^2}$

From C.10.6.2.6.1-1

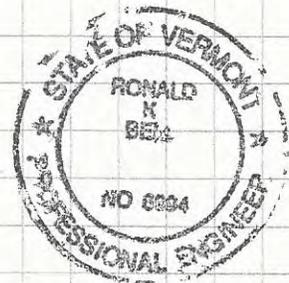
FOR SW, SP MEDIUM DENSE TO DENSE RECOMMEN

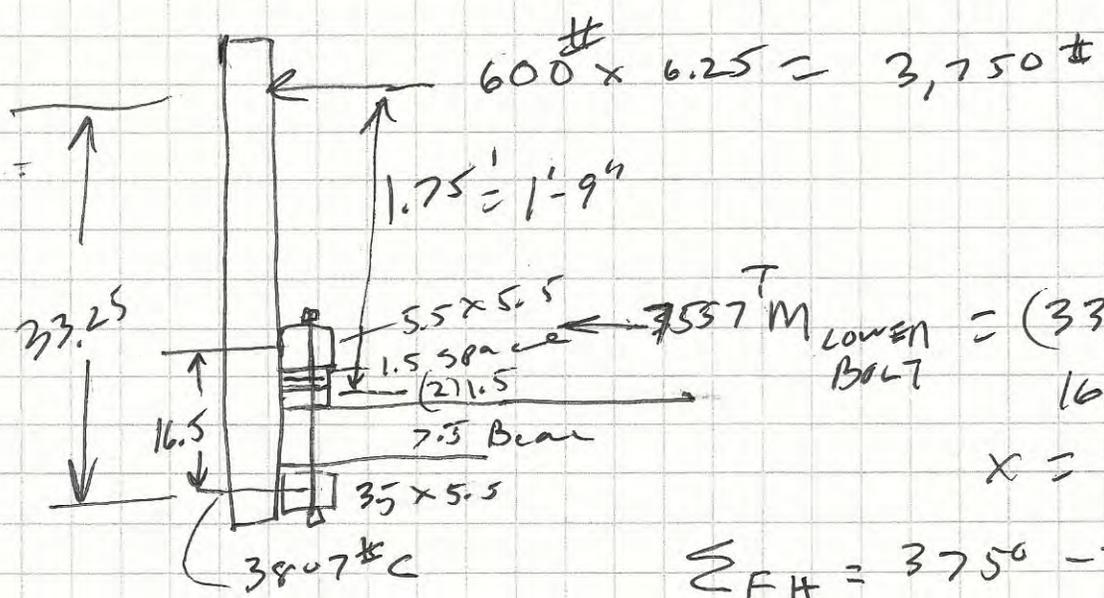
BEARING CAPACITY = 6.0 KSF

FOR FOUNDATION RESISTANCE FACTOR = 0.45

$6 \text{ KSF} \times 0.45 = 2.7 \text{ KSF}$

$2.7 \text{ KSF} > 1.25 \text{ KSF}$  OK





$$= (33.25)(3750) - 16.5(x) = 0$$

$$x = 7557 \#$$

↑ TENSION

$$\sum F_H = 3750 - 7557 = 3807 \#$$

↓ COMPRESSION

CHECK SIDE BEARING OF 6x6

$$3/4" \text{ Dia bolt} + 1/8" \text{ hole} = 7/8" \times 5.5" \times 4 \text{ Bolts} = 19.25 \text{ in}^2$$

$$\frac{7557 \#}{19.25 \text{ in}^2} = 392 \text{ psi}$$

SYP || To Grain  $F_c = 525 \text{ psi} > 392 \text{ psi}$  OK

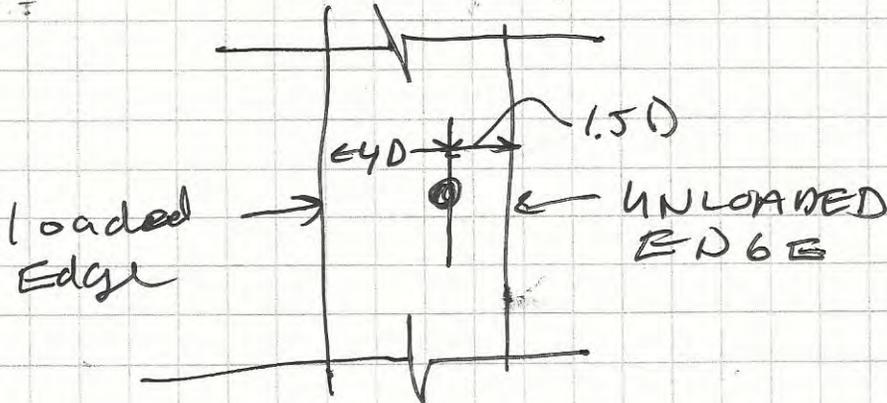
CHECK TOP TENSION BOLTS

$$\frac{7557 \#}{2 \text{ Bolts}} = 3,778 \# / \text{bolt}$$

$$\text{Bearing area required} = \frac{3778 \#}{525 \text{ psi}} = 7.2 \text{ in}^2$$

Provide washer  $4" \times 2" \times 1/4"$  ~~8~~  $8 \text{ in}^2 - 0.5 \text{ in}^2 = 7.5 \text{ in}^2$   
 ↑ Hide OK

TO PREVENT SIDE BLOWOUT COMPLY WITH MIN. EDGE DISTANCE SET FORTH IN NDS:



4 x .75" = 3" MIN. EDGE DISTANCE

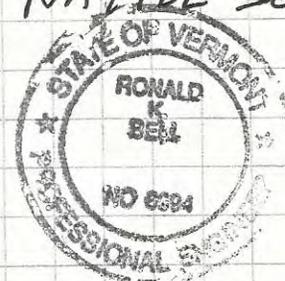
SUBSTRUCTURE:

BEAMS TO SIT ON (2) ROWS 6x3x2 HIGH CONCRETE BLOCKS - STAGGE JOINTS TO DISTRIBUTE LOADS TO SOIL.

AREA PROVIDED FOR SOIL BEARING BASED ON 3.75' BEAM SPACING = 3.75' x 6' = 22.5 ft<sup>2</sup>

FACTORED BEAM REACTION = 34 KIPS

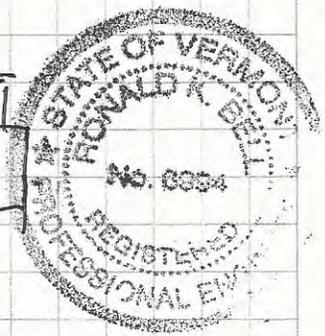
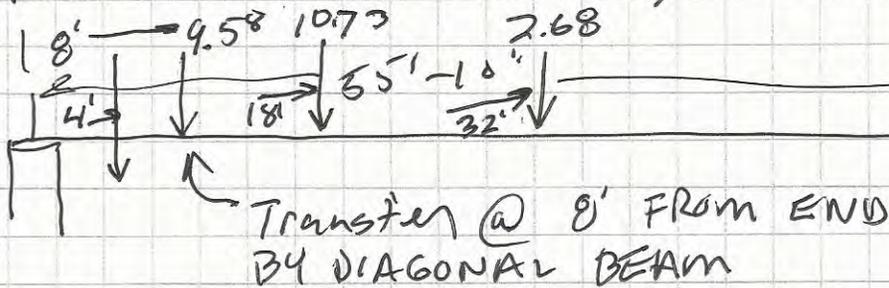
$$\frac{34}{22.5} = 1.5 \frac{\text{KIPS}}{\text{ft}^2} \gg \gg 2000 \text{ psc min OF NATIVE SOIL.}$$



CHECK OUTSIDE BEAM FOR ADDITIONAL LOAD DUE TO FLARED ENTRY  
 FOR WORST CASE DESIGN ASSUME THAT FLARED  
 END PUTS FULL WHEEL LOAD AT 8' FROM  
 END; THE SECOND AND FRONT AXEL LOAD  
 DISTRIBUTIONS ARE @ 0.28 P :

Rear wheel load =  $16 \text{ KIPS} \times 1.33 \times 0.9 = 19.15 \text{ KIPS}$   
 Center wheel load =  $(0.25)(32)(1.33)(0.9) = 10.73 \text{ KIPS}$   
 FRONT wheel load =  $(0.25)(8)(1.33)(0.9) = 2.68$

NOTE: FOR REAR WHEEL TO PUT FULL WGT. ON  
 EXTERIOR BEAM THE WHEEL LOCATION IS  
 APPROX. 4' FROM BRIDGE END (BUT LOAD IS  
 AT 8'). DIAGONAL BEAM ~~WILL~~ WILL  
 CARRY  $\frac{1}{2}$  LOAD TO ABUTMENT, THERE  
 FOR LOAD AT 8' =  $19.15 / 2 = 9.58 \text{ KIPS}$



CHECK SHEAR IN BOLTS :

(5)  $\frac{7}{8}$  A325 BOLTS : ALLOWABLE LOAD = 18.0 KIPS (BOLT)  
 (5)(18) = 90 KIPS  $\gg$  9.58 KIPS OK

BEARING CHECK ON  $\frac{1}{2}$  PLATE :

$(0.6)(50 \text{ KSI})(0.5 \text{ in})(0.875 \text{ in}) = 13.12 \text{ KIPS/BOLT}$   
OK

**Steel Beam**

Lic. #: KW-06009396

Licensee: Bell Engineering

Description: Splayed approach places 1/2 wheel load at 8' from end of bridge

**CODE REFERENCES**

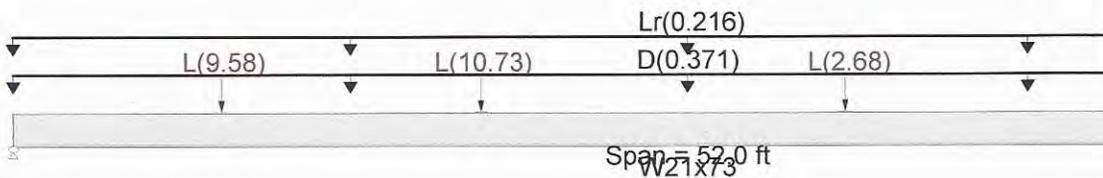
Calculations per AISC 360-05, IBC 2006, CBC 2007, ASCE 7-05

Load Combination Set: ASCE 7-05

**Material Properties**

Analysis Method: Load Resistance Factor Design  
 Beam Bracing: Beam is Fully Braced against lateral-torsional buckling  
 Bending Axis: Major Axis Bending  
 Load Combination: ASCE 7-05

Fy: Steel Yield: 50.0 ksi  
 E: Modulus: 29,000.0 ksi



**Applied Loads**

Service loads entered. Load Factors will be applied for calculations.

Load(s) for Span Number 1

- Point Load: L = 2.680 k @ 32.0 ft
- Point Load: L = 10.730 k @ 18.0 ft
- Point Load: L = 9.580 k @ 8.0 ft
- Uniform Load: D = 0.3710 k/ft, Tributary Width = 1.0 ft
- Uniform Load: Lr = 0.2160 k/ft, Tributary Width = 1.0 ft

**DESIGN SUMMARY**

**Design OK**

Maximum Bending Stress Ratio =	<b>0.906 : 1</b>	Maximum Shear Stress Ratio =	<b>0.169 : 1</b>
Section used for this span	<b>W21x73</b>	Section used for this span	<b>W21x73</b>
Mu : Applied	584.346 k-ft	Vu : Applied	48.947 k
Mn * Phi : Allowable	645.000 k-ft	Vn * Phi : Allowable	289.380 k
Load Combination	+1.125D+1.750Lr+1.750L	Load Combination	+1.125D+1.750Lr+1.750L
Location of maximum on span	18.200 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

# RENAUD BROS., INC.

283 Fort Bridgeman Road #2, Vernon, VT 05354

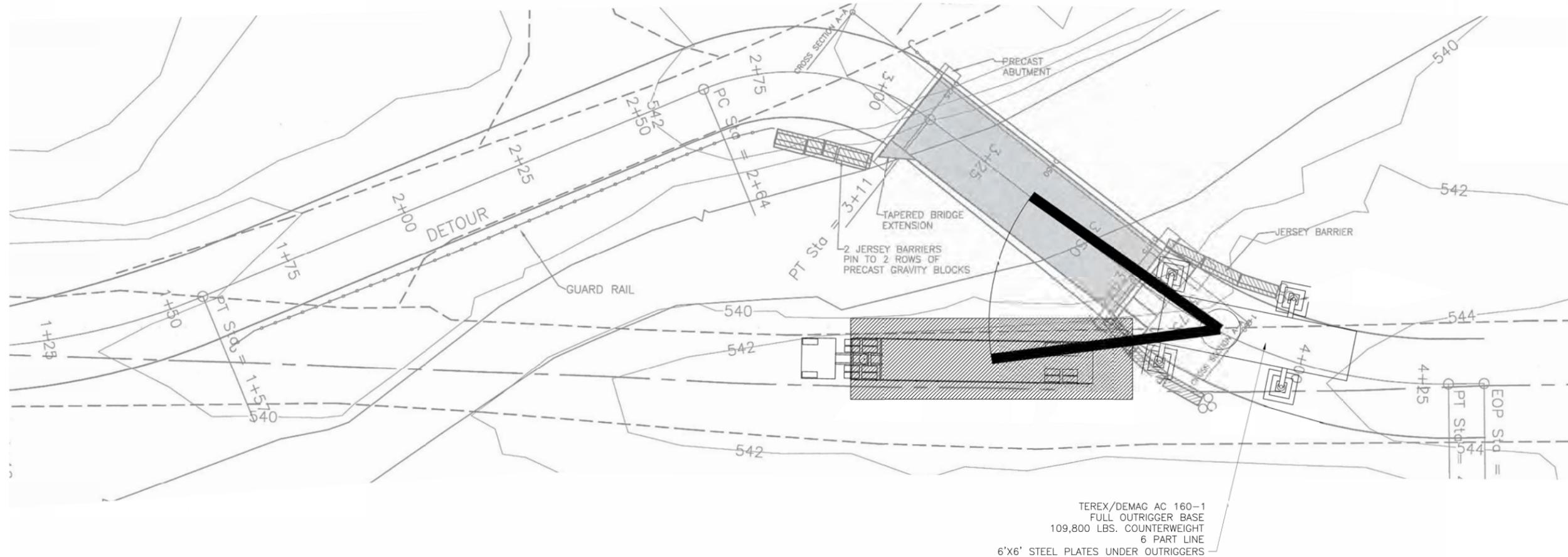
phone (802) 257-7383

fax (802) 257-7308

## Brattlboro BRO 1442 (35)

### Temporary Bridge Erection Sequence

- 1) Set abutments to specified grade
- 2) Set steel beam superstructure
- 3) Set 8x8 Pressure Treated deck members
- 4) Fasten the first layer of 1 ½" Pressure Treated decking at a 45 degree angle to the 8x8 decks
- 5) Fasten the second layer of 1 ½" Pressure Treated decking at 90 degrees to the first layer of 1 ½" Pressure Treated decking
- 6) Install bridge rail posts and rail
- 7) Prepare and set complete bridge on transport trailer.
- 8) Prepare and set complete bridge on abutments at the project site.



**CRANE LAYOUT PLAN**

DO NOT SCALE

TEMP. BRIDGE LIFTING SCHEDULE						
PIECEMARK	MAXIMUM SET RADIUS	PIECE WEIGHT	BLOCK WEIGHT	RIGGING WEIGHT	TOTAL LOAD WEIGHT	MAXIMUM CRANE CAPACITY
TEMP. BRIDGE	45'-0"	45,000 LBS.	2,000 LBS.	200 LBS.	47,200 LBS.	56,400 LBS.

RIGGING SCHEDULE			
LOCATION	RIGGING DESC.	QTY. REQ.	RATING
TEMP. BRIDGE	60" TPXC-2000 STRAPS	4	20,000 LBS./EA.
	12 TON SHACKLES	4	24,000 LBS./EA.

SHEET NAME: TEMP. BRG. RIGGING



REV. NO.	DATE:

**V.C.S.**  
**VALLEY CRANE SERVICES**  
 HOISTING & RIGGING SERVICES  
 VERMONT, USA  
 285 FT. BRIDGMAN RD., VERMONT, VT. 05554  
 PH. (802) 258-9055 FAX. (802) 297-7508

PROJECT NAME: BRATTLEBORO		
PROJECT NO: BRO 1442 (35)		
DRAWN BY: A.D.	CHK'D BY: M.S.	DATE: 5/20/14

SHEET NO.  
1  
OF  
1