JOSEPH P. CARRARA & SONS, INC.

LETTER OF TRANSMITTAL

2464 CASE STREET
MIDDLEBURY, VERMONT 05753

TEL (802) 388-6363
FAX (802) 388-9010

DATE : **April 21, 2014**	JOB NO. : **23419-013**
ATTENTION : **Mr. Kevin Ture** *KTure@wmschultz.com*	
RE : **Vermont Route 73**	
Rochester, Vermont	
Rochester BRF 0162 (16) Bridge No. 15	
Rochester BRF 0162 (17) Bridge No. 16	
Transmittal #2	**Precast Concrete**

TO: **W.M. Schultz Construction, Inc.**
831 Route 67 PO Box 2620
Ballston Spa, New York 12020

518-885-0060

WE ARE SENDING YOU [x] Attached [ ] Under separate cover via **Email** the following items:

[x] Shop Drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of Letter [ ] Change Order [ ] Other:

COPIES	DATE	NO.	DESCRIPTION
1	4/21/14	as noted	**J. P. Carrara & Sons' Precast Framing and Individual Piece Detail Drawings, Bridge No. 15:**
			"For Approval" Drawings: C1, F1 - F5, NB1 - NB11, AB1 - AB5, AS1 - AS3,
			WW1, WW2, & M1 - M3
1	4/21/14	as noted	**J. P. Carrara & Sons' Precast Framing and Individual Piece Detail Drawings, Bridge No. 16:**
			"For Approval" Drawings: C1, F1 - F5, NB1 - NB6, AB1 - AB5, AS1 - AS3,
			WW1, WW2, M1, & M2
1	4/21/14	-	**Design Calculations for Component Lifting and Handling**

THESE ARE TRANSMITTED as checked below :

[x] For approval [ ] Approved as submitted [ ] Resubmit ____ copies for approval

[ ] For your use [ ] Approved as noted [ ] Submit ____ copies for distribution

[ ] As requested [ ] Returned for corrections [ ] Return ____ corrected prints

[ ] For review and comment [ ] ____

[ ] FOR BIDS DUE ____ 20 ____ [ ] PRINTS RETURNED AFTER LOAN TO US

REMARKS **Kevin,**

Attached please find our precast framing drawings and individual piece details for the precast/prestressed concrete NEXT Beams, abutment walls, pier caps, wingwalls, and approach slabs, which are resubmitted for approval on the project. Also attached are design calculations for component lifting and handling.

Please contact us at 802-388-6363 with any questions.

COPY TO :

SIGNED : Michael Weigand

If enclosures are not as noted, please notify us at once.

Engineering Report

JOB: Town of Rochester County of Windsor VT RTE 73 (Rural Major Collector) BR 15 &16
LOC: Rochester, VT
TASK: Component Lifting and Handling

JOB NO. JPC-14002
CLIENT: J.P. Carrara & Sons

DATE: 2014-03-20

DESIGN: R. Slade, E.I.
F. Holz, E.I.
CHECK: R. Eriksson, P.E.

STATE OF VERMONT
ROY L. ERIKSSON
No. 75908
Structural
LICENSED
PROFESSIONAL ENGINEER

03.20.14

Bridge 16

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

Eriksson technologies

Project Overview

A lifting and handling analysis was performed for the precast components on bridges 15 &16 of route 73 (Rural Major Collector) in Rochester, VT. The contract drawings called for the use of precast prestressed NEXT beams, precast abutments (divided into two pieces for fabrication), precast wing walls, and precast approach slabs. This design is in accordance with the current versions of the *AASHTO LRFD Bridge Design Specifications, 6th Ed. (2012)* and the *VTrans Structures Design Manual (2010)*.

The components have already been designed for the in-place condition by the EOR, and were therefore only evaluated for lifting and handling. Lifting of the beams is accomplished by means of four 4-strand lifting loops consisting of three 0.6” dia. 270ksi strands each, placed as detailed in the approved shop drawings. Precast curtain walls will be cast on each of the beams as a secondary castings, as well as precast parapets/curbs will be cast onto each of the exterior beams as tertiary castings. Additionally, one of the exterior beams on bridge 15 will have a top-flange extension cast along one end. Due to the weight and of these beams along with geometric constraints the lifting loops shall be cast within the stems of the NEXT beams as detailed in the shop drawings. Finally, a spreader frame should be used so as to provide a vertical pick. Similar to the NEXT beams, each portion of the precast abutments shall be lifted by means of two 4-strand lifting loops consisting of four 0.6” dia. 270ksi strands each.

The precast wing walls and approach slabs should be lifted by the Dayton Superior inserts provided. The four Swift Lift anchors embedded within the front-face of the wing walls should be used to support the members during stripping. The two anchors embedded within the top-face (vertical) of the wing walls should be used to support the members during erection. The Swift Lift anchors embedded within the top-face of the approach slabs should be used to support the members during both stripping and erection.

The angle of the lifting cables to the horizontal shall be a minimum of 60 degrees unless otherwise noted on the shop drawings, and spreader beams should be used to insure that all lifting devices are equally engaged. If not otherwise stated on the shop drawings, these members should be stored and shipping on hardwood dunnage placed directly beneath the lifting inserts/loops. Impact factors of ±25% and ±50% were assumed for handling and hauling, respectively.

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Lifting & Handling Calculations

Project: Town of Rochester County of Windsor VT RTE 73 (Rural Major Collector) BR 15 &16

Description: Bridge 16: Wing Walls, Abutments, Approach Slabs **Location:** Rochester, VT

Client: J.P.Carrara & Sons

By: R. Slade, E.I. **Chk:** R. Eriksson, P.E. **Date:** 2014-03-19

Specifications: *AASHTO LRFD Bridge Design Specifications, 6th Ed (2012)*
VTrans Structures Design Manual, 5th ed. (2010)
PCI Design Handbook 7th Ed - Precast And Prestressed Concrete (2010)

1. Design Parameters

1.1 Materials:

Concrete $f_c := 5.0 \cdot ksi$ $f_{ci} := 3.5ksi$ $\gamma_c := 0.150 \cdot kcf$

Strand $f_{pu} := 270ksi$ $d_{0.6} := 0.6in$ $A_{0.6} := 0.217in^2$

1.2 Loads:

Lifting $IM_{pick} := 25\%$

Shipping $IM_{ship} := 50\%$

Safety Fact. $FS := 4$

1.3 Geometry:

Abutment $th_{abt} := 4ft$ $d_{void} := (3ft + 4in)$ $b_{void} := (2ft + 6in)$ $No_{voids} := 5$ (total)

Abutment 1

Side 1 $h_{abt.max.1.1} := (10ft + 2.5in)$ $h_{abt.min.1.1} := (6ft + 4.5in)$

$L_{top.1.1} := (2ft + 9in)$ $L_{abt.1.1} := (25ft + 3in)$ $No_{voids.1} := 3$

Side 2 $h_{abt.max.1.2} := (9ft + 5.875in)$ $h_{abt.min.1.2} := (5ft + 11.75in)$

$L_{top.1.2} := (2ft + 9in)$ $L_{abt.1.2} := (14ft + 9in)$ $No_{voids.2} := 2$

Abutment 2

Side 1 $h_{abt.max.2.1} := (9ft + 4.68in)$ $h_{abt.min.2.1} := (6ft + 0.19in)$

$L_{top.2.1} := (2ft + 9in)$ $L_{abt.2.1} := (25ft + 3in)$ $No_{voids.1} := 3$

Side 2 $h_{abt.max.2.2} := (10ft + 2.63in)$ $h_{abt.min.2.2} := (6ft + 5.69in)$

$L_{top.2.2} := (3ft + 9in)$ $L_{abt.2.2} := (15ft + 9in)$ $No_{voids.2} := 2$

Wingwalls $th_{ww} := (1ft + 6in)$

WW 1 $h_{ww.1} := h_{abt.max.1.2} = 9.49\,ft$ $L_{ww.1} := [(8ft + 5.875in) + (7ft + 9.5in)] \cdot 0.5 = 8.14\,ft$

WW 2 $h_{ww.2} := h_{abt.max.1.1} = 10.21\,ft$ $L_{ww.2} := 8ft = 8\,ft$

$h_{ww.2.min} := 9.6ft$ $L_{ww.2.min} := 2ft$

WW 3 $h_{ww.3} := h_{abt.max.2.1} = 9.39\,ft$ $L_{ww.3} := 8ft = 8\,ft$

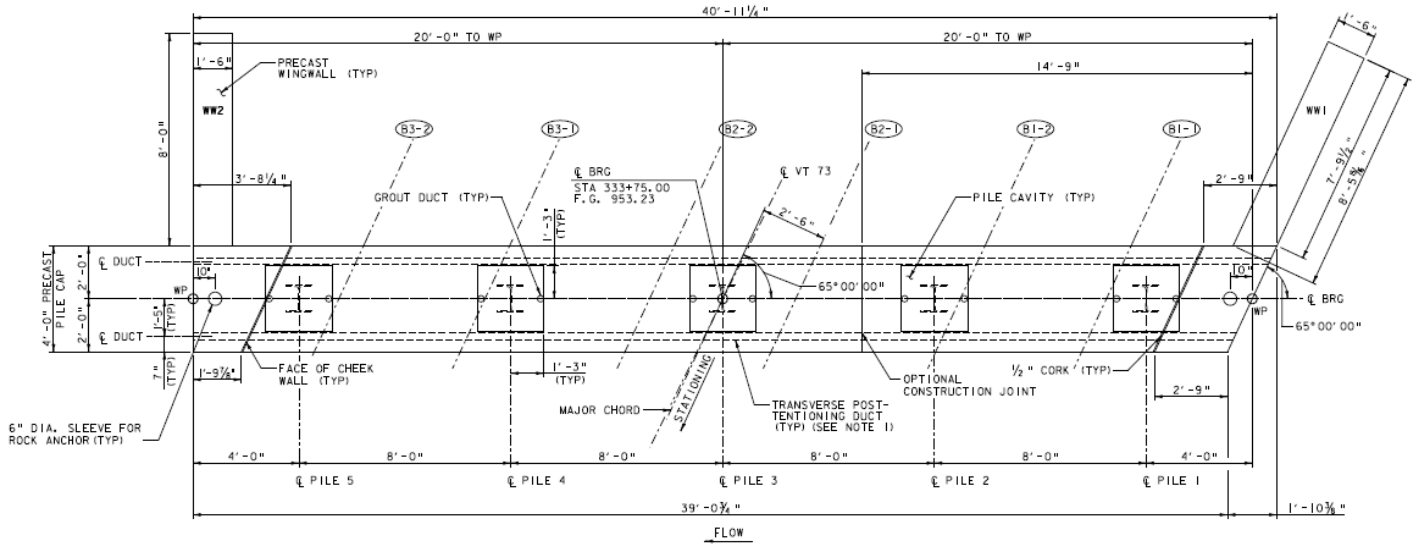
$h_{ww.3.min} := 6.92ft$ $L_{ww.3.min} := 2ft$

WW 4 $h_{ww.4} := h_{abt.max.2.2} = 10.22\,ft$ $L_{ww.4} := [(8ft + 5.875in) + (7ft + 9.5in)] \cdot 0.5 = 8.14\,ft$

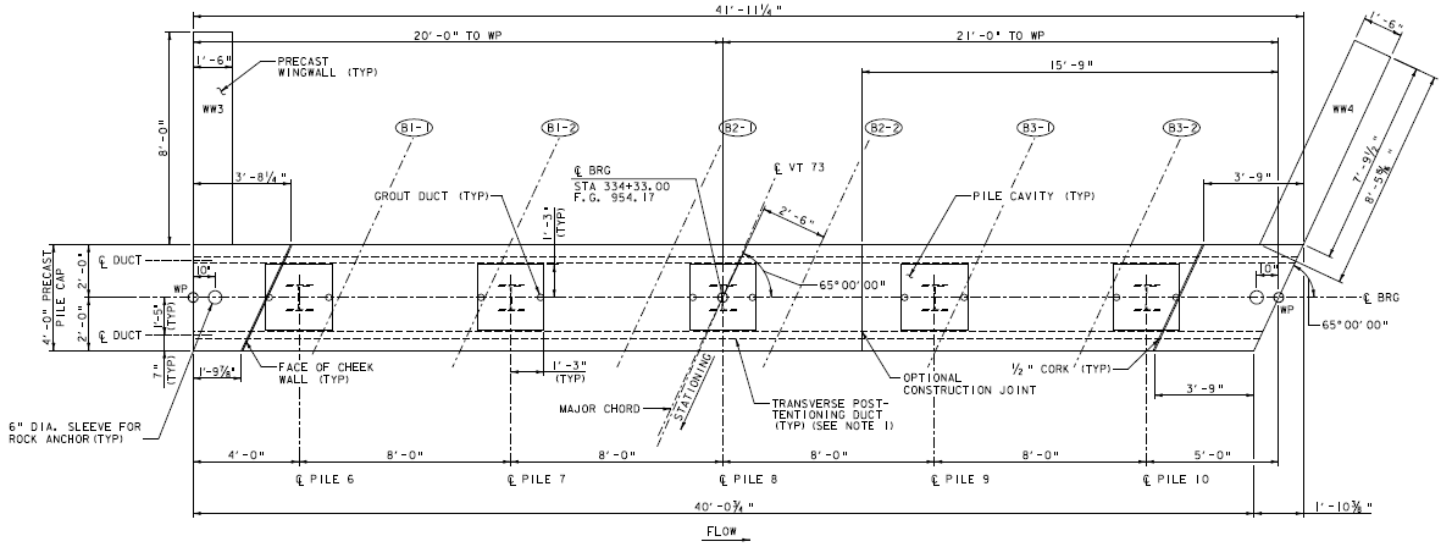
Approach Slabs $\theta_{skew} := 25deg$ $th_{slab} := 1ft + 3in$ $L_{slab} := 20ft + 0.9375in$

Exterior Slabs $b_{slab.ext} := 8ft + 0in$

Interior Slabs $b_{slab.int} := 9ft + 8in$

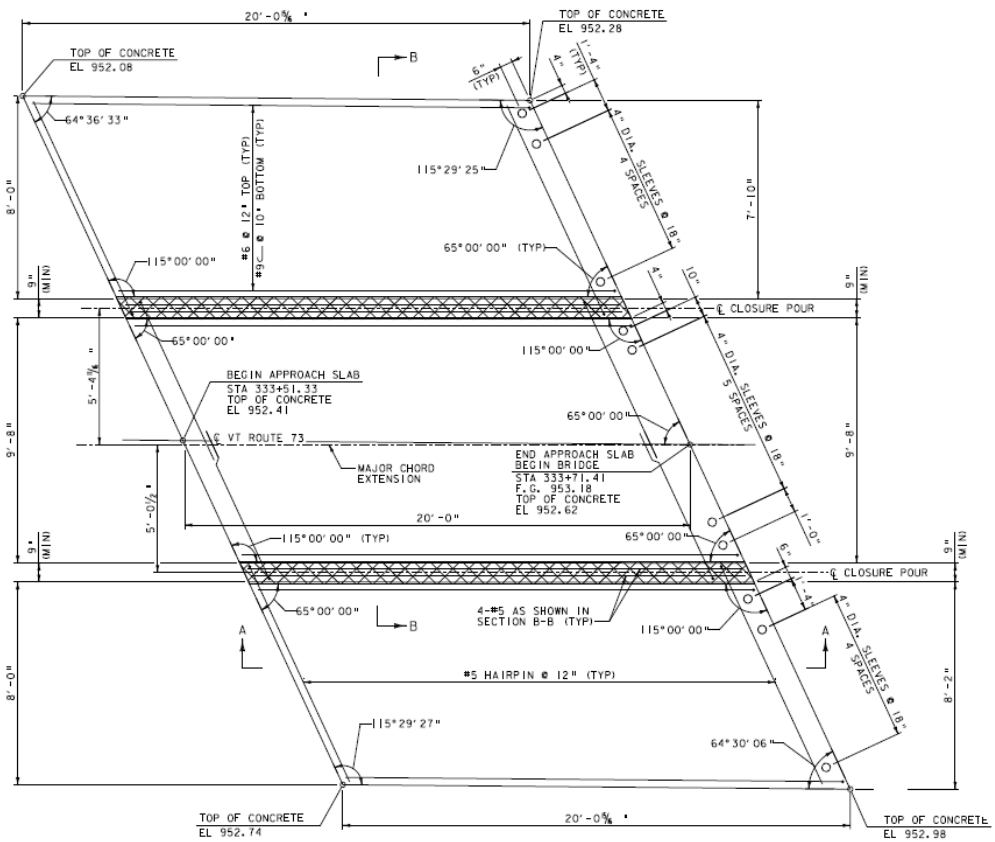


ABUTMENT NO 1 PLAN
SCALE ½" = 1'-0"

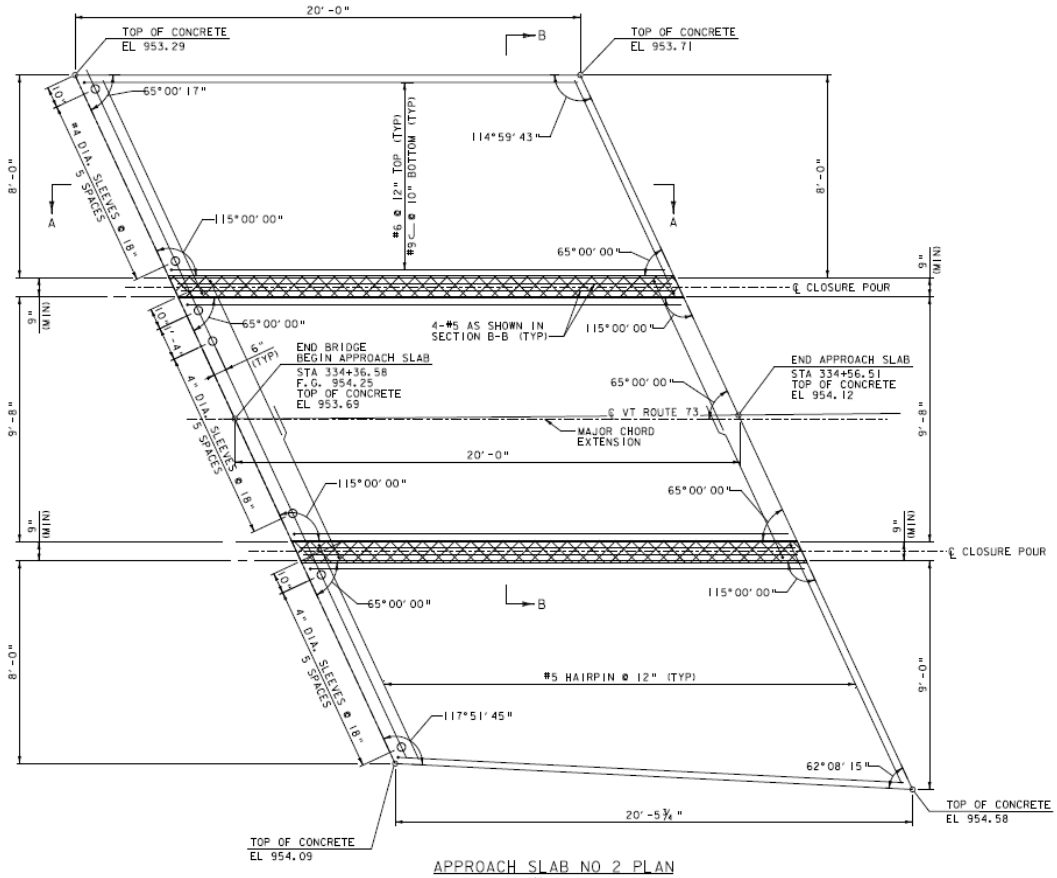


ABUTMENT NO 2 PLAN
SCALE ½" = 1'-0"

Figure 3. Abutment Plans



APPROACH SLAB NO 1 PLAN
SCALE ½" = 1'-0"



APPROACH SLAB NO 2 PLAN
SCALE ½" = 1'-0"

Figure 4. Approach Slab Plans

2. Weights

2.1 Abutments

Voids

$V_{voids.1} := b_{void}^2 \cdot d_{void} \cdot (No_{voids.1}) = 62.5\,ft^3$

$V_{voids.2} := b_{void}^2 \cdot d_{void} \cdot (No_{voids.2}) = 41.67\,ft^3$

Abutment 1

Side 1

$V_{abt.1.1} := th_{abt} \cdot \left[(h_{abt.max.1.1} \cdot L_{top.1.1}) + \left[h_{abt.min.1.1} \cdot (L_{abt.1.1} - L_{top.1.1}) \right] \right] = 686.04\,ft^3$

$P_{abt.1.1} := (V_{abt.1.1} - V_{voids.1}) \cdot \gamma_c = 93.53 \cdot kip$

Side 2

$V_{abt.1.2} := th_{abt} \cdot \left[(h_{abt.max.1.2} \cdot L_{top.1.2}) + \left[h_{abt.min.1.2} \cdot (L_{abt.1.2} - L_{top.1.2}) \right] \right] = 391.39\,ft^3$

$P_{abt.1.2} := (V_{abt.1.2} - V_{voids.2}) \cdot \gamma_c = 52.46 \cdot kip$

Abutment 2

Side 1

$V_{abt.2.1} := th_{abt} \cdot \left[(h_{abt.max.2.1} \cdot L_{top.2.1}) + \left[h_{abt.min.2.1} \cdot (L_{abt.2.1} - L_{top.2.1}) \right] \right] = 644.72\,ft^3$

$P_{abt.2.1} := (V_{abt.2.1} - V_{voids.1}) \cdot \gamma_c = 87.33 \cdot kip$

Side 2

$V_{abt.2.2} := th_{abt} \cdot \left[(h_{abt.max.2.2} \cdot L_{top.2.2}) + \left[h_{abt.min.2.2} \cdot (L_{abt.2.2} - L_{top.2.2}) \right] \right] = 464.05\,ft^3$

$P_{abt.2.2} := (V_{abt.2.2} - V_{voids.2}) \cdot \gamma_c = 63.36 \cdot kip$

Design Load

$P_{abt.max} := \max(P_{abt.1.1}, P_{abt.1.2}, P_{abt.2.1}, P_{abt.2.2}) = 93.53 \cdot kip$

2.2 Wingwalls

WW 1

$V_{WW.1} := (h_{ww.1} \cdot L_{ww.1}) \cdot th_{ww} = 115.9\,ft^3$

$P_{WW.1} := V_{WW.1} \cdot \gamma_c = 17.4 \cdot kip$

WW 2

$V_{WW.2} := \left[(h_{ww.2} \cdot L_{ww.2}) - \frac{(L_{ww.2} - L_{ww.2.min}) \cdot (h_{ww.2} - h_{ww.2.min})}{2} \right] \cdot th_{ww} = 119.8\,ft^3$

$P_{WW.2} := V_{WW.2} \cdot \gamma_c = 18 \cdot kip$

WW 3

$V_{WW.3} := (h_{ww.3} \cdot L_{ww.3}) \cdot th_{ww} = 112.68\,ft^3$

$V_{WW.3} := \left[(h_{ww.3} \cdot L_{ww.3}) - \frac{(L_{ww.3} - L_{ww.3.min}) \cdot (h_{ww.3} - h_{ww.3.min})}{2} \right] \cdot th_{ww} = 101.6\,ft^3$

$P_{WW.3} := V_{WW.3} \cdot \gamma_c = 15.2 \cdot kip$

WW 4

$V_{WW.4} := (h_{ww.4} \cdot L_{ww.4}) \cdot th_{ww} = 124.8\,ft^3$

$P_{WW.4} := V_{WW.4} \cdot \gamma_c = 18.7 \cdot kip$

Design Load

$P_{WW.max} := \max(P_{WW.1}, P_{WW.2}, P_{WW.3}, P_{WW.4}) = 18.72 \cdot kip$

2.3 Approach Slabs

Exterior Slabs

$V_{slab.ext} := (b_{slab.ext} \cdot L_{slab}) \cdot th_{slab} = 200.78\,ft^3$

$P_{slab.ext} := V_{slab.ext} \cdot \gamma_c = 30.1 \cdot kip$

Interior Slabs

$V_{slab.int} := (b_{slab.int} \cdot L_{slab}) \cdot th_{slab} = 242.61\,ft^3$

$P_{slab.int} := V_{slab.int} \cdot \gamma_c = 36.4 \cdot kip$

Design

$P_{slab.design} := \max(P_{slab.ext}, P_{slab.int}) = 36.39 \cdot kip$

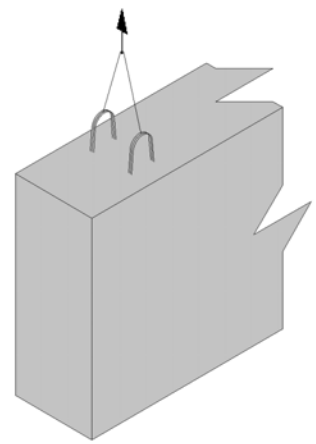
3. Lifting

3.1 Abutment Design

3.1.1 Lifter Design

$No_{loops} := 4$ (use two pairs of lifting loops at each lifting location)

$\phi_{pick} := 60deg$ (minimum pick angel between loops in a pair)



Lifting Load $P_{lift} := \frac{P_{abt.max} \cdot (1 + IM_{pick})}{No_{loops} \cdot \sin(\phi_{pick})} = 33.8 \cdot kip$

$d_{embed} := 48in$

$\psi_{embed} := \min\left(\frac{d_{embed}}{36in}, 1\right) = 1.00$

Loop Capacity $P_{Leg} := \psi_{embed} \cdot \frac{0.8 \cdot f_{pu} \cdot A_{0.6}}{FS} = 11.7 \cdot kip$ (capacity of each leg)

$P_{Loop} := 2 \cdot P_{Leg} \cdot (0.6) = 14.1\,kip$ (0.6 to account for shear)

try $No_{strands} := 3$ strands per loop:

$P_{Loop} := P_{Loop} \cdot No_{strands} = 42.2 \cdot kip$ > $P_{lift} = 33.8 \cdot kip$ **OK**

3.1.2 Lifter Placement

Abutment 1

Side 1

$x_a := \frac{L_{abt.1.1}}{2} = 12.625\,ft$ $V_a := th_{abt} \cdot (L_{abt.1.1} \cdot h_{abt.min.1.1}) = 643.9\,ft^3$

$x_b := \frac{L_{top.1.1}}{2} = 1.375\,ft$ $V_b := th_{abt} \cdot [L_{top.1.1} \cdot (h_{abt.max.1.1} - h_{abt.min.1.1})] = 42.2\,ft^3$

$x_{voids} := (4ft) + 8ft = 12\,ft$ $V_{voids} := V_{voids.1} = 62.5\,ft^3$

$CG := \frac{(V_a \cdot x_a) + (V_b \cdot x_b) - (V_{voids} \cdot x_{voids})}{V_a + V_b - V_{voids}} = 11.93\,ft$ (from outside edge)

$x_{edge1} := CG - \left(\frac{15ft}{2}\right) = 53.1 \cdot in$ $x_{edge2} := L_{abt.1.1} - \left(CG + \frac{15ft}{2}\right) = 69.9 \cdot in$

Side 2

$x_a := \frac{L_{abt.1.2}}{2} = 7.375\,ft$ $V_a := th_{abt} \cdot (L_{abt.1.2} \cdot h_{abt.min.1.2}) = 352.8\,ft^3$

$x_b := \frac{L_{top.1.2}}{2} = 1.375\,ft$ $V_b := th_{abt} \cdot [L_{top.1.2} \cdot (h_{abt.max.1.2} - h_{abt.min.1.2})] = 38.6\,ft^3$

$x_{voids} := (4ft) + 4ft = 8\,ft$ $V_{voids} := V_{voids.2} = 41.667\,ft^3$

$CG := \frac{(V_a \cdot x_a) + (V_b \cdot x_b) - (V_{voids} \cdot x_{voids})}{V_a + V_b - V_{voids}} = 6.64\,ft$ (from outside edge)

$x_{edge1} := CG - \left(\frac{10ft}{2}\right) = 19.7 \cdot in$ $x_{edge2} := L_{abt.1.2} - \left(CG + \frac{10ft}{2}\right) = 37.3 \cdot in$

Abutment 2

Side 1

$x_a := \frac{L_{abt.2.1}}{2} = 12.625\,ft$ $\qquad V_a := th_{abt} \cdot (L_{abt.2.1} \cdot h_{abt.min.2.1}) = 607.6\,ft^3$

$x_b := \frac{L_{top.2.1}}{2} = 1.375\,ft$ $\qquad V_b := th_{abt} \cdot [L_{top.2.1} \cdot (h_{abt.max.2.1} - h_{abt.min.2.1})] = 37.1\,ft^3$

$x_{voids} := (4ft) + 8ft = 12\,ft$ $\qquad V_{voids} := V_{voids.1} = 62.5\,ft^3$

$$CG := \frac{(V_a \cdot x_a) + (V_b \cdot x_b) - (V_{voids} \cdot x_{voids})}{V_a + V_b - V_{voids}} = 11.97\,ft$$ (from outside edge)

$x_{edge1} := CG - \left(\frac{15ft}{2}\right) = 53.7 \cdot in$ $\qquad x_{edge2} := L_{abt.2.1} - \left(CG + \frac{15ft}{2}\right) = 69.3 \cdot in$

Side 2

$x_a := \frac{L_{abt.2.2}}{2} = 7.875\,ft$ $\qquad V_a := th_{abt} \cdot (L_{abt.2.2} \cdot h_{abt.min.2.2}) = 407.9\,ft^3$

$x_b := \frac{L_{top.2.2}}{2} = 1.875\,ft$ $\qquad V_b := th_{abt} \cdot [L_{top.2.2} \cdot (h_{abt.max.2.2} - h_{abt.min.2.2})] = 56.2\,ft^3$

$x_{voids} := (2.5ft) + 4ft = 6.5\,ft$ $\qquad V_{voids} := V_{voids.2} = 41.667\,ft^3$

$$CG := \frac{(V_a \cdot x_a) + (V_b \cdot x_b) - (V_{voids} \cdot x_{voids})}{V_a + V_b - V_{voids}} = 7.21\,ft$$ (from outside edge)

$x_{edge1} := CG - \left(\frac{10ft}{2}\right) = 26.6 \cdot in$ $\qquad x_{edge2} := L_{abt.1.2} - \left(CG + \frac{10ft}{2}\right) = 30.4 \cdot in$

3.2 Wingwall Design

3.2.1 Lifter Placement

WW 1

$$x_{edge.1} := 0.207 \cdot L_{ww.1} = 20.2 \cdot in$$

$$y_{edge.1} := 0.207 \cdot h_{ww.1} = 23.6 \cdot in$$

WW 2

$$V_a := h_{ww.2} \cdot L_{ww.2}$$

$$V_b := \frac{(L_{ww.2} - L_{ww.2.min}) \cdot (h_{ww.2} - h_{ww.2.min})}{2}$$

$$CG_{WW.2x} := \frac{\left(V_a \cdot \frac{L_{ww.2}}{2}\right) - \left[V_b \cdot \frac{(L_{ww.2} - L_{ww.2.min})}{3}\right]}{V_a - V_b} = 4.046\,ft$$

$$CG_{WW.2y} := \frac{\left(V_a \cdot \frac{h_{ww.2}}{2}\right) - \left[V_b \cdot \frac{(h_{ww.2} - h_{ww.2.min})}{3}\right]}{V_a - V_b} = 5.216\,ft$$

$$x_{edge.2.2} := 18in \qquad x_{edge.2.1} := CG_{WW.2x} - (L_{ww.2} - CG_{WW.2x} - x_{edge.2.2}) = 19.1 \cdot in$$

$$y_{edge.2.2} := 28in \qquad y_{edge.2.1} := CG_{WW.2y} - (h_{ww.2} - CG_{WW.2y} - y_{edge.2.2}) = 30.7 \cdot in$$

WW 3

$$V_a := h_{ww.3} \cdot L_{ww.3}$$

$$V_b := \frac{(L_{ww.3} - L_{ww.3.min}) \cdot (h_{ww.3} - h_{ww.3.min})}{2}$$

$$CG_{WW.3x} := \frac{\left(V_a \cdot \frac{L_{ww.3}}{2}\right) - \left[V_b \cdot \frac{(L_{ww.3} - L_{ww.3.min})}{3}\right]}{V_a - V_b} = 4.219\,ft$$

$$CG_{WW.3y} := \frac{\left(V_a \cdot \frac{h_{ww.3}}{2}\right) - \left[V_b \cdot \frac{(h_{ww.3} - h_{ww.3.min})}{3}\right]}{V_a - V_b} = 5.119\,ft$$

$$x_{edge.3.2} := 18in \qquad x_{edge.3.1} := CG_{WW.3x} - (L_{ww.3} - CG_{WW.3x} - x_{edge.3.2}) = 23.3 \cdot in$$

$$y_{edge.3.2} := 28in \qquad y_{edge.3.1} := CG_{WW.3y} - (h_{ww.3} - CG_{WW.3y} - y_{edge.3.2}) = 38.2 \cdot in$$

WW 4

$$x_{edge.4} := 0.207 \cdot L_{ww.4} = 20.2 \cdot in$$

$$y_{edge.4} := 0.207 \cdot h_{ww.4} = 25.4 \cdot in$$

minimum

$$edge_{design.min} := \min\left(\begin{pmatrix} x_{edge.1} & x_{edge.2.1} & x_{edge.2.2} & x_{edge.3.1} & x_{edge.3.2} & x_{edge.4} \\ y_{edge.1} & y_{edge.2.1} & y_{edge.2.2} & y_{edge.3.1} & y_{edge.3.2} & y_{edge.4} \end{pmatrix}\right) = 18 \cdot in$$

maximum

$$edge_{design.max} := \max\left(\begin{pmatrix} x_{edge.1} & x_{edge.2.1} & x_{edge.2.2} & x_{edge.3.1} & x_{edge.3.2} & x_{edge.4} \\ y_{edge.1} & y_{edge.2.1} & y_{edge.2.2} & y_{edge.3.1} & y_{edge.3.2} & y_{edge.4} \end{pmatrix}\right) = 38.2 \cdot in$$

3.2.2 Lifter Design

Stripping

Lifting Load

$No_{inserts} := 4 \qquad \phi_{pick} := 60deg$

$$T_{lift} := \frac{P_{WW.max} \cdot (1 + IM_{pick})}{\sin(\phi_{pick}) \cdot No_{inserts}} = 6.8 \cdot kip$$

Use minimum of (4) P-52 Swift Lift Anchor - 4 ton x 9-1/2"

Capacity

$T_{SWL} := 8.0kip$

$$adj := \sqrt{\frac{f_{ci}}{1600psi}} = 1.48$$

$T_{SWL.eff} := adj \cdot T_{SWL} = 11.8 \cdot kip \quad > \quad T_{lift} = 6.8 \cdot kip$ **OK**

$edge_{min} := 17in \quad < \quad edge_{design.min} = 18 \cdot in$ **OK**

Stress

$$S_{min} := \frac{ft \cdot th_{ww}^2}{6} = 0.38\,ft^3$$ (per ft-width)

$$M_{max} := ft \cdot \frac{edge_{design.max}^2}{2} \cdot (th_{ww} \cdot \gamma_c) = 1.1 \cdot kip \cdot ft$$

$$f_{max} := \frac{M_{max}}{S_{min}} \cdot (1 + IM_{ship}) = 32 \cdot psi$$ (Maximum Bending Stress per ft-width)

$$f_{cr} := \frac{7.5psi}{FS} \cdot \sqrt{\frac{f_{ci}}{psi}} = 111 \cdot psi \quad > \quad f_{max} = 32 \cdot psi$$ **OK**

Erection

Lifting Load

$No_{inserts} := 2 \qquad \phi_{pick} := 60deg$

$$T_{lift} := \frac{P_{WW.max} \cdot (1 + IM_{pick})}{\sin(\phi_{pick}) \cdot No_{inserts}} = 13.5 \cdot kip$$

Use minimum of (2) P-52 Swift Lift Anchor - 20 Tons x 19-3/4"

Capacity

$T_{SWL} := 16.3kip$

$$adj := \sqrt{\frac{f_{ci}}{4500psi}} = 0.88$$

$T_{SWL.eff} := adj \cdot T_{SWL} = 14.4 \cdot kip \quad > \quad T_{lift} = 13.5 \cdot kip$ **OK**

$th_{min} := 14in \quad < \quad th_{ww} = 18 \cdot in$ **OK**

$edge_{min} := 16in \quad < \quad edge_{design.min} = 18 \cdot in$ **OK**

3.3 Approach Slab Design

3.3.1 Lifter Placement

Exterior Slabs

$x_{edge.ext} := 0.207 \cdot b_{slab.ext} = 19.9 \cdot in$

$x_{edge.ext.max} := 0.207 \cdot b_{slab.ext} + (12in) = 31.9 \cdot in$ (one exterior slab has an additional +12" of overhang due to tapering skew)

$y_{edge.ext} := 0.207 \cdot L_{slab} = 49.9 \cdot in$ (align lifters to slab skew)

Interior Slabs

$x_{edge.int} := 0.207 \cdot b_{slab.int} = 24 \cdot in$

$y_{edge.int} := 0.207 \cdot L_{slab} = 49.9 \cdot in$ (align lifters to slab skew)

Design

$edge_{design.min} := \min(x_{edge.ext}, y_{edge.ext}, x_{edge.int}, y_{edge.int}, x_{edge.ext.max}) = 19.9 \cdot in$

$edge_{design.max} := \max(x_{edge.ext}, y_{edge.ext}, x_{edge.int}, y_{edge.int}, x_{edge.ext.max}) = 49.9 \cdot in$

3.3.1 Lifter Design

Lifting Load

$No_{inserts} := 4 \qquad \phi_{pick} := 60deg$

$$T_{lift} := \frac{P_{slab.design} \cdot (1 + IM_{pick})}{\sin(\phi_{pick}) \cdot No_{inserts}} = 13.1 \cdot kip$$

Use minimum of (4) P-52 Swift Lift Anchor - 8 ton x 10"

Capacity

$T_{SWL} := 16kip$

$$adj := \sqrt{\frac{f_{ci}}{3500psi}} = 1.00$$

$T_{SWL.eff} := adj \cdot T_{SWL} = 16 \cdot kip \quad > \quad T_{lift} = 13.1 \cdot kip$ **OK**

$edge_{min} := 19in \quad < \quad edge_{design.min} = 19.9 \cdot in$ **OK**

Stress

$$S_{min} := ft \cdot \frac{th_{slab}^2}{6} = 0.26 ft^3$$ (per ft-width)

$$M_{max} := ft \cdot \frac{edge_{design.max}^2}{2} \cdot (th_{slab} \cdot \gamma_c) = 1.6 \cdot kip \cdot ft$$

$$f_{max} := \frac{M_{max}}{S_{min}} \cdot (1 + IM_{ship}) = 65 \cdot psi$$ (Maximum Bending Stress per ft-width)

$$f_{cr} := \frac{7.5psi}{FS} \cdot \sqrt{\frac{f_{ci}}{psi}} = 111 \cdot psi \quad > \quad f_{max} = 65 \cdot psi$$ **OK**

Lifting and Handling Calculations - Bridge 16

Description: Lifting and Handling of NEXT Beams

Project: VT Rt 73 **Location:** Rochester, VT

Client: J.P. Carrara & Sons, Inc.

By: F. Holz, E.I. **Chk:** R. Eriksson, P.E. **Date:** March 19, 2014

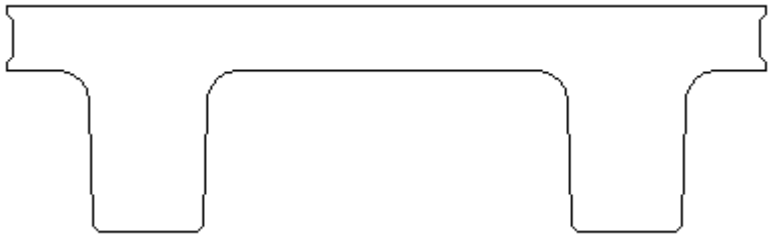
Specifications and References: *AASHTO LRFD Bridge Design Specifications*, 6th ed
VTrans Structures Design Manual, 5th ed, 2010

Materials: Beam $\gamma_c := 0.150 \cdot kcf$

Loads: Impact during handling $IF_{handling} := 25\%$

NEXT 1

Beam



Flange length $L_{flg} := 9ft + 10.75in$

Area $A_{bm} := 1528.75in^2$

Length $L_{bm} := 61ft + 10.375in$

Weight $W_{bm} := A_{bm} \cdot L_{bm} \cdot \gamma_c = 98.516 \cdot kip$

Center of gravity $cg_{bm} := 0.5 \cdot L_{flg} = 59.375 \cdot in$ $cg_{bm.z} := 0.5 \cdot L_{bm} = 371.188 \cdot in$

Curb

Width $b_{curb} := 2ft$

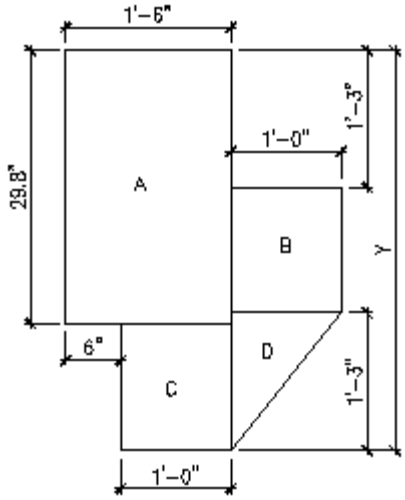
Thickness $h_{curb} := (13.75 \quad 12.25 \quad 11.5 \quad 10.75 \quad 10.5 \quad 10.25)^T in$ $h_{curb.avg} := \dfrac{2 \cdot \sum_{i=1}^{5} h_{curb_i} + h_{curb_6}}{11} = 11.614 \cdot in$

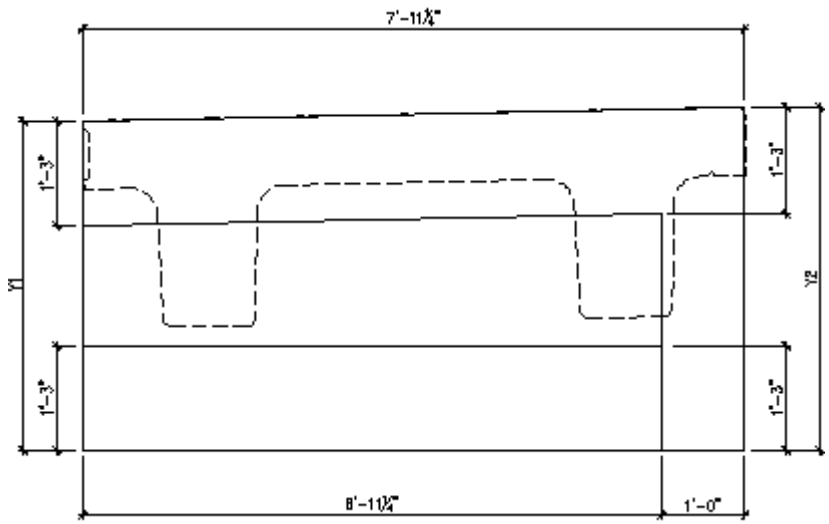
Weight $W_{curb} := h_{curb.avg} \cdot b_{curb} \cdot L_{bm} \cdot \gamma_c = 17.962 \cdot kip$

Center of gravity $cg_{curb} := 1ft$ $cg_{curb.z} := cg_{bm.z} = 30.932\,ft$

Curtain wall

$$\text{WeightAndCG}(Y_1, Y_2, L, c) :=$$





$$\text{Area}_A \leftarrow (1\text{ft} + 6\text{in}) \cdot 29.8\text{in}$$

$$\text{Area}_D \leftarrow (1\text{ft} + 3\text{in}) \cdot 1\text{ft} \cdot 0.5$$

$$\text{Area}_{B1} \leftarrow \left[Y_1 - (1\text{ft} + 3\text{in}) - (1\text{ft} + 3\text{in})\right] \cdot 1\text{ft}$$

$$\text{Area}_{B2} \leftarrow \left[Y_2 - (1\text{ft} + 3\text{in}) - (1\text{ft} + 3\text{in})\right] \cdot 1\text{ft}$$

$$\text{Area}_{C1} \leftarrow \left(Y_1 - 29.8\text{in}\right) \cdot 1\text{ft}$$

$$\text{Area}_{C2} \leftarrow \left(Y_2 - 29.8\text{in}\right) \cdot 1\text{ft}$$

$$V_A \leftarrow \text{Area}_A \cdot L$$

$$V_B \leftarrow 0.5 \cdot \left(\text{Area}_{B1} + \text{Area}_{B2}\right) \cdot (L - c)$$

$$V_C \leftarrow 0.5 \cdot \left(\text{Area}_{C1} + \text{Area}_{C2}\right) \cdot L$$

$$V_D \leftarrow \text{Area}_D \cdot (L - c)$$

$$cg_A \leftarrow 0.5 \cdot L$$

$$b \leftarrow Y_1 - (1\text{ft} + 3\text{in}) - (1\text{ft} + 3\text{in})$$

$$a \leftarrow Y_2 - (1\text{ft} + 3\text{in}) - (1\text{ft} + 3\text{in})$$

$$cg_B \leftarrow \frac{(L - c) \cdot (2a + b)}{3 \cdot (a + b)}$$

$$b \leftarrow Y_1 - 29.8\text{in}$$

$$a \leftarrow Y_2 - 29.8\text{in}$$

$$cg_C \leftarrow \frac{L \cdot (2a + b)}{3 \cdot (a + b)}$$

$$cg_D \leftarrow 0.5 \cdot (L - c)$$

$$W_{cw} \leftarrow \left(V_A + V_B + V_C + V_D\right) \cdot \gamma_c$$

$$cg_{cw} \leftarrow \frac{V_A \cdot cg_A + V_B \cdot cg_B + V_C \cdot cg_C + V_D \cdot cg_D}{V_A + V_B + V_C + V_D}$$

$$cg_{A.z} \leftarrow 0.5(1\text{ft} + 6\text{in})$$

$$cg_{B.z} \leftarrow (1\text{ft} + 6\text{in}) + 0.5 \cdot 1\text{ft}$$

$$cg_{C.z} \leftarrow 6\text{in} + 0.5 \cdot 1\text{ft}$$

$$cg_{D.z} \leftarrow (1\text{ft} + 6\text{in}) + \frac{1\text{ft}}{3}$$

$$cg_{cw.z} \leftarrow \frac{V_A \cdot cg_{A.z} + V_B \cdot cg_{B.z} + V_C \cdot cg_{C.z} + V_D \cdot cg_{D.z}}{V_A + V_B + V_C + V_D}$$

$$\text{output} \leftarrow \begin{pmatrix} \frac{W_{cw}}{\text{kip}} & \frac{cg_{cw}}{\text{in}} & \frac{cg_{cw.z}}{\text{in}} \end{pmatrix}^T$$

return output

Abutment 1

$Y_1 := 3ft + 8.375in$ $\quad Y_2 := 3ft + 5.375in$ $\quad L_{flg} = 118.75 \cdot in$ $\quad c := 1ft$

$Output := WeightAndCG(Y_1, Y_2, L_{flg}, c)$

Weight $\quad W_{cw1} := Output_1 \cdot kip = 9.412 \cdot kip$

Center of gravity $\quad cg_{cw1} := L_{flg} - Output_2 \cdot in = 61.525 \cdot in$ (transverse, measured from the exterior face)

Center of gravity $\quad cg_{cw1.z} := Output_3 \cdot in = 12.949 \cdot in$ (longitudinal, measured from end of flange)

Abutment 2

$Y_1 := 3ft + 8.75in$ $\quad Y_2 := 3ft + 5.25in$ $\quad L_{flg} = 118.75 \cdot in$ $\quad c := 2ft$

$Output := WeightAndCG(Y_1, Y_2, L_{flg}, c)$

Weight $\quad W_{cw2} := Output_1 \cdot kip = 9.185 \cdot kip$

Center of gravity $\quad cg_{cw2} := L_{flg} - Output_2 \cdot in = 62.782 \cdot in$ (transverse, measured from the exterior face)

Center of gravity $\quad cg_{cw2.z} := Output_3 \cdot in = 12.676 \cdot in$ (longitudinal, measured from end of flange)

Unit summary

Weight of unit $\quad W_{unit} := W_{bm} + W_{curb} + W_{cw1} + W_{cw2} = 135.076 \cdot kip$

C.G. of unit (transverse)

$$cg_{unit} := \frac{W_{bm} \cdot cg_{bm} + W_{curb} \cdot cg_{curb} + W_{cw1} \cdot cg_{cw1} + W_{cw2} \cdot cg_{cw2}}{W_{unit}} = 53.457 \cdot in$$

Distance from centerline of beam $\quad cg_{diff} := \frac{L_{flg}}{2} - cg_{unit} = 5.918 \cdot in$ (towards curb)

C.G. of unit (longitudinal)

$$cg_{unit.z} := \frac{W_{bm} \cdot cg_{bm.z} + W_{curb} \cdot cg_{curb.z} - W_{cw1} \cdot cg_{cw1.z} + W_{cw2} \cdot (L_{bm} + cg_{cw2.z})}{W_{unit}} = 30.877 \cdot ft$$

Distance from midspan of beam $\quad cg_{diff.z} := cg_{unit.z} - \frac{L_{bm}}{2} = -0.664 \cdot in$ (towards abutment 2)

Lifter load

Lifter cg distance from CL of beam $\quad cg_{lift} := 3in$ $\quad$ Separation b/w points $\quad s_{lift} := 5ft$

Lifter cg distance from midspan of beam $\quad cg_{lift.z} := 0in$ $\quad$ Separation b/w points $\quad s_{lift.z} := 63ft + 6in$

Distance between lifting cg and unit cg $\quad dist := |cg_{diff} - cg_{lift}| = 2.918 \cdot in$ (transverse)

Distance between lifting cg and unit cg $\quad dist_z := |cg_{diff.z} - cg_{lift.z}| = 0.664 \cdot in$ (longitudinal)

Load distribution due to imbalance $\quad distr := \frac{0.5 \cdot s_{lift} + dist}{s_{lift}} = 54.9 \cdot \%$

Load distribution due to imbalance $\quad distr_z := \frac{0.5 \cdot s_{lift.z} + dist_z}{s_{lift.z}} = 50.1 \cdot \%$

Heaviest load carried by lifter $\quad Load_{max.1} := W_{unit} \cdot distr \cdot distr_z = 37.118 \cdot kip$

NEXT 2

Abutment 1

$Y_1 := 3ft + 8.625in$ $\quad Y_2 := 3ft + 11.625in$ $\quad L_{flg} = 118.75 \cdot in$ $\quad c := 0ft$

$Output := WeightAndCG(Y_1, Y_2, L_{flg}, c)$

Weight $\quad W_{cw1} := Output_1 \cdot kip = 10.471 \cdot kip$

Center of gravity $\quad cg_{cw1} := L_{flg} - Output_2 \cdot in = 58.674 \cdot in$ (transverse, measured from the exterior face)

Center of gravity $\quad cg_{cw1.z} := Output_3 \cdot in = 13.588 \cdot in$ (longitudinal, measured from end of flange)

Abutment 2

$Y_1 := 3ft + 9in$ $\quad Y_2 := 4ft + 0.625in$ $\quad L_{flg} = 118.75 \cdot in$ $\quad c := 0ft$

$Output := WeightAndCG(Y_1, Y_2, L_{flg}, c)$

Weight $\quad W_{cw2} := Output_1 \cdot kip = 10.641 \cdot kip$

Center of gravity $\quad cg_{cw2} := L_{flg} - Output_2 \cdot in = 58.541 \cdot in$ (transverse, measured from the exterior face)

Center of gravity $\quad cg_{cw2.z} := Output_3 \cdot in = 13.658 \cdot in$ (longitudinal, measured from end of flange)

Unit summary

Weight of unit $\quad W_{unit} := W_{bm} + W_{cw1} + W_{cw2} = 119.628 \cdot kip$

C.G. of unit (transverse) $\quad cg_{unit} := \dfrac{W_{bm} \cdot cg_{bm} + W_{cw1} \cdot cg_{cw1} + W_{cw2} \cdot cg_{cw2}}{W_{unit}} = 59.239 \cdot in$

Distance from centerline of beam $\quad cg_{diff} := \dfrac{L_{flg}}{2} - cg_{unit} = 0.136 \cdot in$

C.G. of unit (longitudinal) $\quad cg_{unit.z} := \dfrac{W_{bm} \cdot cg_{bm.z} - W_{cw1} \cdot cg_{cw1.z} + W_{cw2} \cdot (L_{bm} + cg_{cw2.z})}{W_{unit}} = 30.978 \cdot ft$

Distance from midspan of beam $\quad cg_{diff.z} := cg_{unit.z} - \dfrac{L_{bm}}{2} = 0.553 \cdot in$ (towards abutment 2)

Lifter load

Lifter cg distance from CL of beam $\quad cg_{lift} := 3in$ $\quad$ Separation b/w points $\quad s_{lift} := 5ft$

Lifter cg distance from midspan of beam $\quad cg_{lift.z} := 0in$ $\quad$ Separations b/w points $\quad s_{lift.z} := 63ft + 6in$

Distance between lifting cg and unit cg $\quad dist := |cg_{diff} - cg_{lift}| = 2.864 \cdot in$ (transverse)

Distance between lifting cg and unit cg $\quad dist_z := |cg_{diff.z} - cg_{lift.z}| = 0.553 \cdot in$ (longitudinal)

Load distribution due to imbalance $\quad distr := \dfrac{0.5 \cdot s_{lift} + dist}{s_{lift}} = 54.8 \cdot \%$

Load distribution due to imbalance $\quad distr_z := \dfrac{0.5 \cdot s_{lift.z} + dist_z}{s_{lift.z}} = 50.1 \cdot \%$

Heaviest load carried by lifter $\quad Load_{max.2} := W_{unit} \cdot distr \cdot distr_z = 32.81 \cdot kip$

NEXT 3

Abutment 1

$Y_1 := 4ft + 0in$ $\quad Y_2 := 4ft + 3in$ $\quad L_{flg} = 118.75 \cdot in$ $\quad c := 1ft$

$Output := WeightAndCG(Y_1, Y_2, L_{flg}, c)$

Weight $\quad W_{cw1} := Output_1 \cdot kip = 10.968 \cdot kip$

Center of gravity $\quad cg_{cw1} := L_{flg} - Output_2 \cdot in = 60.412 \cdot in$ (transverse, measured from the exterior face)

Center of gravity $\quad cg_{cw1.z} := Output_3 \cdot in = 13.62 \cdot in$ (longitudinal, measured from end of flange)

Abutment 2

$Y_1 := 4ft + 0.875in$ $\quad Y_2 := 4ft + 4.375in$ $\quad L_{flg} = 118.75 \cdot in$ $\quad c := 2ft$

$Output := WeightAndCG(Y_1, Y_2, L_{flg}, c)$

Weight $\quad W_{cw2} := Output_1 \cdot kip = 10.881 \cdot kip$

Center of gravity $\quad cg_{cw2} := L_{flg} - Output_2 \cdot in = 61.792 \cdot in$ (transverse, measured from the exterior face)

Center of gravity $\quad cg_{cw2.z} := Output_3 \cdot in = 13.401 \cdot in$ (longitudinal, measured from end of flange)

Unit summary

Weight of unit $\quad W_{unit} := W_{bm} + W_{curb} + W_{cw1} + W_{cw2} = 138.328 \cdot kip$

C.G. of unit (transverse)

$$cg_{unit} := \frac{W_{bm} \cdot cg_{bm} + W_{curb} \cdot cg_{curb} + W_{cw1} \cdot cg_{cw1} + W_{cw2} \cdot cg_{cw2}}{W_{unit}} = 53.496 \cdot in$$

Distance from centerline of beam $\quad cg_{diff} := \frac{L_{flg}}{2} - cg_{unit} = 5.879 \cdot in$ (towards curb)

C.G. of unit (longitudinal)

$$cg_{unit.z} := \frac{W_{bm} \cdot cg_{bm.z} + W_{curb} \cdot cg_{curb.z} - W_{cw1} \cdot cg_{cw1.z} + W_{cw2} \cdot (L_{bm} + cg_{cw2.z})}{W_{unit}} = 30.911 \cdot ft$$

Distance from midspan of beam $\quad cg_{diff.z} := cg_{unit.z} - \frac{L_{bm}}{2} = -0.26 \cdot in$ (towards abutment 2)

Lifter load

Lifter cg distance from CL of beam $\quad cg_{lift} := 3in$ $\quad$ Separation b/w points $\quad s_{lift} := 5ft$

Lifter cg distance from midspan of beam $\quad cg_{lift.z} := 0in$ $\quad$ Separation b/w points $\quad s_{lift.z} := 63ft + 6in$

Distance between lifting cg and unit cg $\quad dist := |cg_{diff} - cg_{lift}| = 2.879 \cdot in$ (transverse)

Distance between lifting cg and unit cg $\quad dist_z := |cg_{diff.z} - cg_{lift.z}| = 0.26 \cdot in$ (longitudinal)

Load distribution due to imbalance $\quad distr := \frac{0.5 \cdot s_{lift} + dist}{s_{lift}} = 54.8 \cdot \%$

Load distribution due to imbalance $\quad distr_z := \frac{0.5 \cdot s_{lift.z} + dist_z}{s_{lift.z}} = 50 \cdot \%$

Heaviest load carried by lifter $\quad Load_{max.3} := W_{unit} \cdot distr \cdot distr_z = 37.927 \cdot kip$

Lifting and Handling

Factor of safety $FS_{handling} := 4$

Impact factor $IF_{handling} := 25\%$

Interior Beams

Maximum lifter load $Load_{max.INT} := (Load_{max.2}) = 32.81 \cdot kip$

Design Load per Loop: $P_{lift.INT} := (1 + IF_{handling}) \cdot Load_{max.INT} = 41.0 \cdot kip$

Based on conclusions of the research by Noppakunwijai in the PCI Journal article, "Pullout Capacity of Non-Prestressed Bent Strands for Prestressed Concrete Girders" from July-August 2002, the strength of a single 0.6" diameter strand with at least 36in embedment length is 80% of f_{pu}.

Strand Strength: $f_{pu} := 270ksi$

Area of 0.6" Strand: $A_{ps} := 0.217in^2$

Allowable Capacity: $P_{1strand} := (80\%) f_{pu} \cdot A_{ps} = 46.9 \cdot kip$

These capacities are based on a 4:1 factor of safety with a minimum embedment of 36".
Strands should be spread apart approximately 6" at ends of strands.

Design Capacity: $d_{embed} := 26in$

$$\psi_{embed} := \min\left(\frac{d_{embed}}{36in}, 1\right) = 0.72$$

$$P_{leg} := \psi_{embed} \cdot \frac{P_{1strand}}{FS_{handling}} = 8.5 \cdot kip$$ (capacity of each leg)

$$P_{design} := 2 \cdot P_{leg} \cdot (0.6) = 10.2\,kip$$ (0.6 to account for shear)

No. Strands/Loop: $No_{strands} := \frac{P_{lift.INT}}{P_{design}} = 4.0$ **USE** (4) 0.6" dia. strands per lifter

Exterior Beams

Maximum lifter load $Load_{max.EXT} := \max(Load_{max.1}, Load_{max.3}) = 37.927 \cdot kip$

Design Load per Loop: $P_{lift.EXT} := (1 + IF_{handling}) \cdot Load_{max.EXT} = 47.4 \cdot kip$

Based on conclusions of the research by Noppakunwijai in the PCI Journal article, "Pullout Capacity of Non-Prestressed Bent Strands for Prestressed Concrete Girders" from July-August 2002, the strength of a single 0.6" diameter strand with at least 36in embedment length is 80% of f_{pu}.

Strand Strength: $f_{pu} := 270ksi$

Area of 0.6" Strand: $A_{ps} := 0.217in^2$

Allowable Capacity: $P_{1strand} := (80\%) f_{pu} \cdot A_{ps} = 46.9 \cdot kip$

These capacities are based on a 4:1 factor of safety with a minimum embedment of 36".
Strands should be spread apart approximately 6" at ends of strands.

Design Capacity: $d_{embed} := 36in$ **(bend a 12" return at the bottom of each leg to achieve full strand development)**

$$\psi_{embed} := \min\left(\frac{d_{embed}}{36in}, 1\right) = 1.00$$

$$P_{leg} := \psi_{embed} \cdot \frac{P_{1strand}}{FS_{handling}} = 11.7 \cdot kip$$ (capacity of each leg)

$$P_{design} := 2 \cdot P_{leg} \cdot (0.6) = 14.1\,kip$$ (0.6 to account for shear)

No. Strands/Loop: $No_{strands} := \frac{P_{lift.EXT}}{P_{design}} = 3.4$ **USE** (4) 0.6" dia. strands per lifter

NEXT BEAM GENERAL NOTES

1. MIN. CONCRETE STRENGTH AT 28 DAYS SHALL BE 7,000 PSI.
2. MIN. CONCRETE STRENGTH AT STRESS TRANSFER SHALL BE 5,500 PSI.
3. REINFORCING STEEL SHALL BE GR-60, ASTM A-615 (AASHTO M31) AND SHALL ADHERE TO THE REQUIREMENTS OF LEVEL II (DUAL COATED) REINFORCING STEEL IN ACCORDANCE WITH SECTION 507. 1
4. PRESTRESSING STRANDS SHALL CONFORM TO ASTM A-416 (AASHTO M203) AND SHALL CONSIST OF 0.60"ø x 270 KSI 7-WIRE LOW RELAXATION STRANDS.
5. PRESTRESSING STRANDS SHALL EACH BE PULLED TO HAVE A NET TENSION OF 44.0 K AFTER ACCOUNTING FOR CHUCK SLIPPAGE. TENSION SHALL BE VERIFIED BY MEASURING STRAND ELONGATION. (SEE EXAMPLE ELONGATION CALCULATION AND TENSIONING PROCEDURE, THIS SHEET.)
6. ENDS OF PRESTRESSING STRANDS SHALL BE CUT FLUSH WITH END OF NEXT BEAM STEMS (UNLESS NOTED OTHERWISE) AND EPOXY PAINTED.
7. ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
8. THE TOP OF BEAMS SHALL RECEIVE A SMOOTH FLOAT FINISH (UNLESS NOTED OTHERWISE).
9. SHEAR KEY SURFACES SHALL BE SAND BLASTED CLEAN. 1
10. BEAMS SHALL BE HANDLED AND ERECTED USING THE LIFTING LOOPS ONLY. THE MINIMUM SLING ANGLE FROM THE HORIZONTAL SHALL BE 90° (VERTICAL PICK). RIGGING SHALL BE CONFIGURED SUCH THAT THE BEAMS REMAIN PLUMB AND LEVEL AT ALL TIMES. A SPREADER BEAM OR FRAME MAY BE REQUIRED. THE PINS OF THE SHACKLES SHALL BE PLACED THOUGH THE LIFTING LOOPS – SEE DETAIL, THIS SHEET. BEAMS SHALL BE STORED AND TRANSPORTED WITH TIMBER SUPPORTS WITHIN 3'-0" OF THE BEAM ENDS, UNLESS APPROVED BY J.P. CARRARA & SONS, INC. 1
11. MATERIAL SPECIFICATION AND MIX DESIGN SHALL CONFORM TO VERMONT SPEC. P510.02 AND P510.05 RESPECTIVELY.

    DESIGN MIX: J.P.C. BRIDGE MIX #430M (5 GAL./CY DCI)
12. QUALITY CONTROL PROCEDURES ARE IN ACCORDANCE WITH PCI REQUIREMENTS. J.P. CARRARA & SONS, INC. IS A PCI CERTIFIED PLANT.
13. CURING METHOD: AS SOON AS THE TOP OF BEAM IS FINISHED, A COVER OF INSULATED POLY. THE DESIRED CURING TEMPERATURE RANGE SHALL NOT DROP BELOW 70°F. THE TEMPERATURE SHALL BE RECORDED BY AUTOMATIC SENSOR INSTRUMENTS ON GRAPH CHARTS, SPACED NOT MORE THAN 100' APART AND WILL CONTINUE UNTIL RELEASE STRENGTH IS ACHIEVED. EACH CHART SHALL BE MARKED WITH THE CASTING DATED AND LOCATION OF THE RECORDER. IF NECESSARY TO MAINTAIN CASTING BED TEMPERATURE PRIOR TO CONCRETE PLACEMENT OR TO ACCELERATE EARLY AGE STRENGTH GAIN, EXTERNAL RADIANT HEAT MAY BE EMPLOYED VIA HOT WATER DUCTS BENEATH AND WITHIN THE PERIPHERY OF THE CASTING BED. MAXIMUM CURING TEMPERATURE SHALL NOT EXCEED PCI SPECIFIED LIMITS.
14. OWNER SHALL PROVIDE APPROPRIATE WATERPROOFING TO GROUTED SHEAR KEYS. J.P. CARRARA & SONS, INC. SHALL NOT BE HELD LIABLE FOR PROBLEMS ASSOCIATED WITH MOISTURE INFILTRATING GROUTED SHEAR KEYS. 1
15. PRECAST CONCRETE PARAPET SHALL HAVE A RUBBED FINISH IN ACCORDANCE WITH SECTION 501.

ABUTMENT, WING WALL, & APPROACH SLAB GENERAL NOTES

1. MIN. CONCRETE STRENGTH AT 28 DAYS SHALL BE 5,000 PSI.
2. MIN. CONCRETE STRENGTH AT STRIPPING SHALL BE 3,500 PSI.
3. REINFORCING STEEL IN THE ABUTMENTS & APPROACH SLABS SHALL BE GR-60, ASTM A-615 (AASHTO M31) AND SHALL ADHERE TO THE REQUIREMENTS OF LEVEL I REINFORCING STEEL IN ACCORDANCE WITH SECTION 507.

   REINFORCING STEEL IN THE WING WALLS SHALL BE GR-60, ASTM A-615 (AASHTO M31) AND SHALL ADHERE TO THE REQUIREMENTS OF LEVEL II (DUAL COATED) REINFORCING STEEL IN ACCORDANCE WITH SECTION 507 (UNLESS NOTED OTHERWISE).
4. THE TOP OF ABUTMENTS, APPROACH SLABS, & WING WALLS SHALL RECEIVE A SMOOTH FLOAT FINISH (UNLESS NOTED OTHERWISE). 1
5. SHEAR KEY SURFACES SHALL BE SAND BLASTED CLEAN. 1
6. PRECAST CONCRETE UNITS SHALL BE HANDLED AND ERECTED USING THE LIFTING INSERTS ONLY. THE MINIMUM SLING ANGLE FROM THE HORIZONTAL SHALL BE 60°. NON-PRESTRESSED UNITS SHALL BE STORED & TRANSPORTED WITH TIMBER SUPPORTS AT 5th POINTS, UNLESS APPROVED BY J.P. CARRARA & SONS, INC.
7. MATERIAL SPECIFICATION AND MIX DESIGN SHALL CONFORM TO VERMONT SPEC. P510.02 AND P510.05 RESPECTIVELY.

   DESIGN MIX:
   - WING WALLS: J.P.C. BRIDGE MIX #425M NO DCI
   - APPROACH SLABS: J.P.C. BRIDGE MIX #425M NO DCI
   - ABUTMENTS: J.P.C. BRIDGE MIX #445M
8. QUALITY CONTROL PROCEDURES ARE IN ACCORDANCE WITH PCI REQUIREMENTS. J.P. CARRARA & SONS, INC. IS A PCI CERTIFIED PLANT.
9. CURING METHOD: AS SOON AS THE TOP OF PRECAST CONCRETE UNITS ARE FINISHED, A COVER OF RIGID INSULATION AND POLY WILL BE PLACED OVER THE UNIT. NATURAL CURE WITH NO EXTERNAL HEAT APPLIED.
10. ABUTMENT POST-TENSIONING SEQUENCE: 1
    - A. ERECT PRECAST CONCRETE ABUTMENTS. APPLY SIKADUR 32 HI-MOD EPOXY TO FIRST UNIT ERECTED AT MATCH CAST JOINT.
    - B. THREAD (2) 1/2"ø POLY STRAND TENDONS THROUGH DUCTS IN ABUTMENTS, AND POST-TENSION CENTER TENDONS TO APPROXIMATELY 5,000 LBS.
    - C. AFTER 12 HOURS, POST-TENSION ALL TENDONS TO 32,000 LBS.

STRAND TENSIONING PROCEDURE:

1. PULL EACH STRAND INITIALLY TO 3,000* LBS. AND MARK STRAND.
2. THEN PULL EACH STRAND TO A TOTAL TENSION OF 45,026* LBS. AND MEASURE ELONGATION AFTER SEATING. IT MUST BE BETWEEN 19"* AND 21"*.

   * NOTE: FORCES READ ON STRESSING JACK GAUGES MUST BE MADE TO CORRESPOND TO ABOVE VALUES BASED ON CALIBRATION DATA FOR SPECIFIC JACK USED.

EXAMPLE PRESTRESSING STRAND ELONGATION CALC. AND TENSIONING

(NOT TO BE USED FOR CONSTRUCTION)

SIZE & GRADE: 0.60"ø x 270 KSI
AREA: 0.217 IN^2
TENSION: 44,000 LB. EACH STRAND
GRIP-TO-GRIP: 252'-0" = 252.00'
Es = 28,600,000 PSI (ASSUMED FOR THESE CALCULATIONS; VALUE TO BE OBTAINED FOR STRAND SPOOL ACTUALLY USED)

EXAMPLE:

$$\Delta = \frac{PL}{AE} = \frac{(44{,}000 - 3{,}000) \times 252.00 \times 12}{0.217 \times 28{,}600{,}000} = 19.977''$$

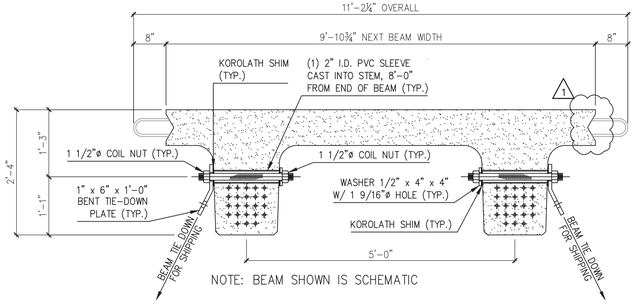
THEREFORE: (TOLERANCES € 5%)

Δ UPPER LIMIT = 1.05 x 19.977" = 20.98" = 21"
Δ LOWER LIMIT = 0.95 x 19.977" = 18.98" = 19"

EXTRA FORCE REQUIRED TO COMPENSATE FOR 1/2" CHUCK SLIPPAGE:

$$\Delta P = \frac{0.5 \times 41{,}000}{19.977} = 1{,}026 \text{ LBS.}$$

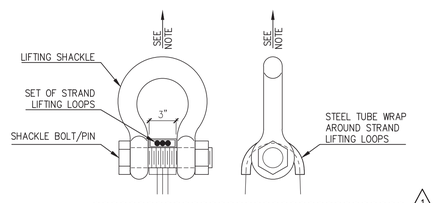
TOTAL TENSIONING FORCE = 44,000 + 1,026 = 45,026 LBS.



NOTE: BEAM SHOWN IS SCHEMATIC

NEXT BEAM 28D HOLD-DOWN DETAIL FOR SHIPPING

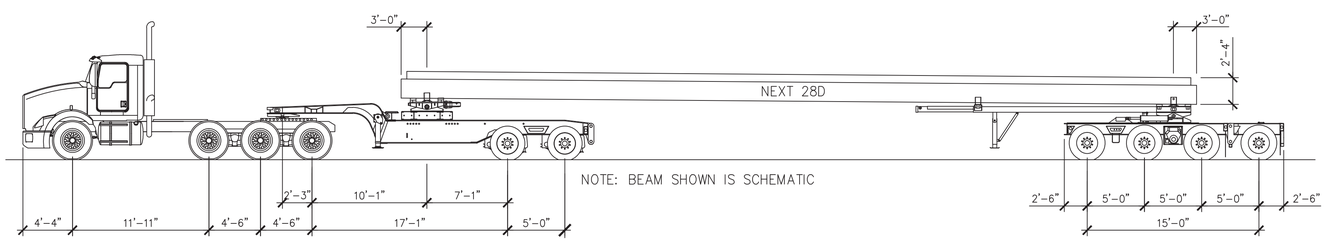
N.T.S.



NOTE: BEAMS AND ABUTMENTS SHALL BE HANDLED AND ERECTED USING THE LIFTING LOOPS ONLY. SHACKLE BOLT/PIN SHALL BE PLACED UNDER LIFT LOOPS AS SHOWN. DESIGN AND CONFIGURATION OF RIGGING BY PURCHASER. 1

LIFTING SHACKLE DETAILS

N.T.S.



NOTE: BEAM SHOWN IS SCHEMATIC

SHIPPING ELEVATION

N.T.S.

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MIDDLEBURY, VT 05753

1 4/11/14 REVISE & RESUBMIT

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Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 15 PROJECT NO.: BRF 0162 (16)

BRIDGE 16 COVER SHEET

DATE:	MAR. 14, 2014
SCALE:	NOTED
CHKD:	DFTM: AAT/RWS JLJ/KLT
JOB NO:	23419-013
DWG. NO:	C1

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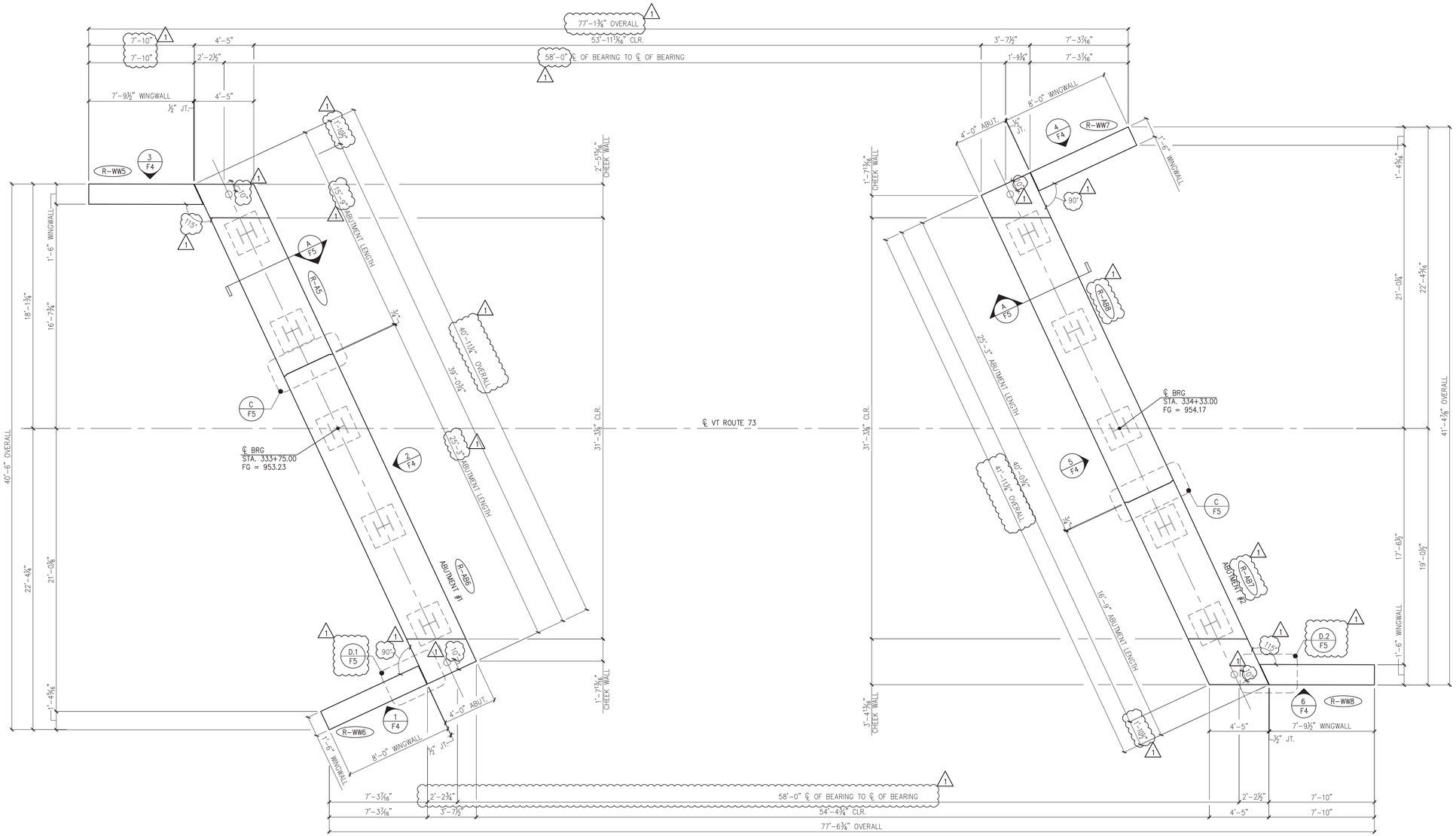

1/F1 PRECAST CONCRETE ABUTMENT AND WINGWALL LAYOUT
1/4" =1'-0"

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PO BOX 2620
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TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

1 ABUTMENT AND WINGWALL FRAMING PLAN

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JLJ/KLT
JOB NO: 23419-013
DWG. NO: F1

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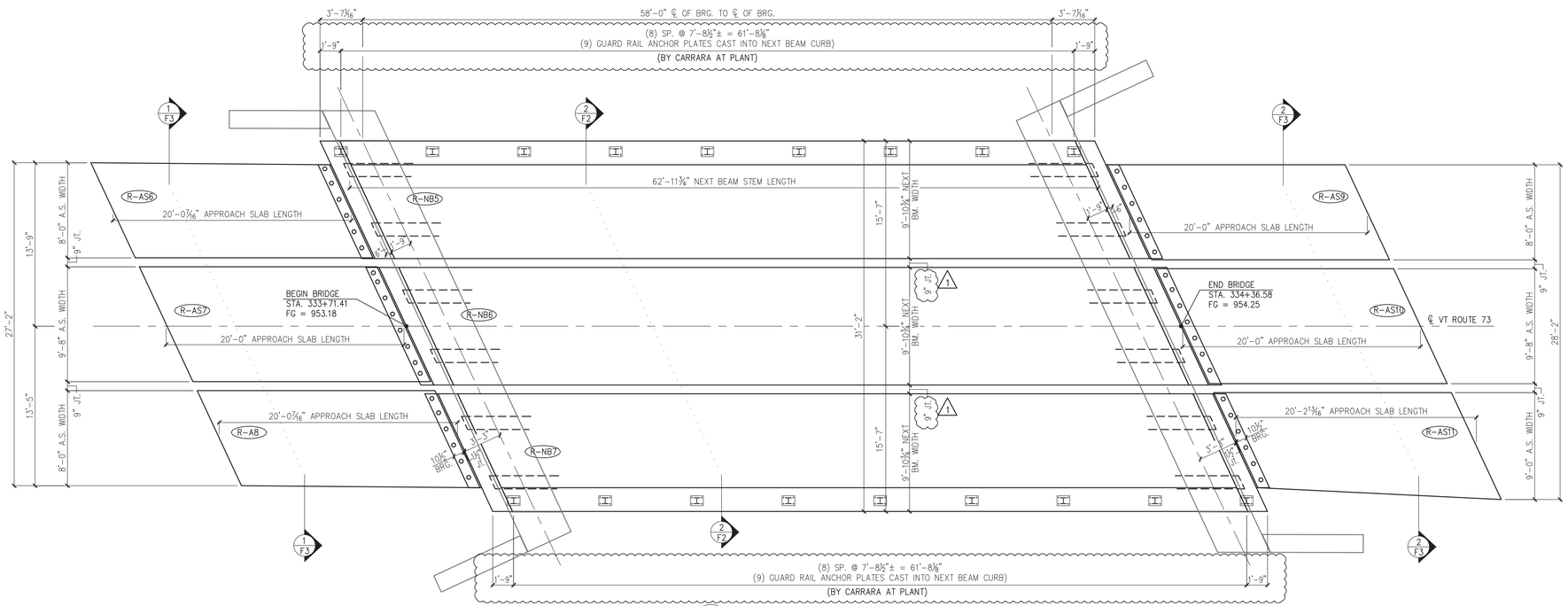
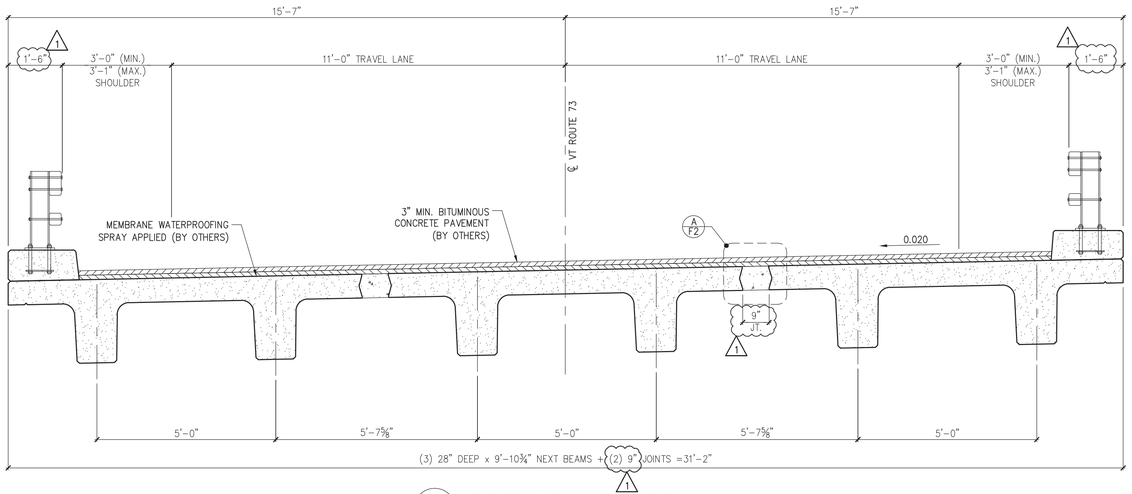
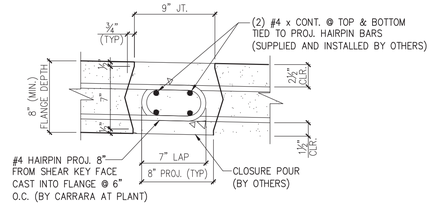


1 / F2 APPROACH SLAB & PRESTRESSED NEXT BEAM LAYOUT
3/16" =1'-0"



2 / F2 NEXT BEAM TRANSVERSE SECTION
1/2" =1'-0"



A / F2 NEXT BEAM CLOSURE POUR
1 1/2" =1'-0"

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PO BOX 2620
BALLSTON SPA, NY 12020

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BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

SUPERSTRUCTURE PLANS & SECTIONS

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JOB NO:	23419-013
DWG. NO:	F2

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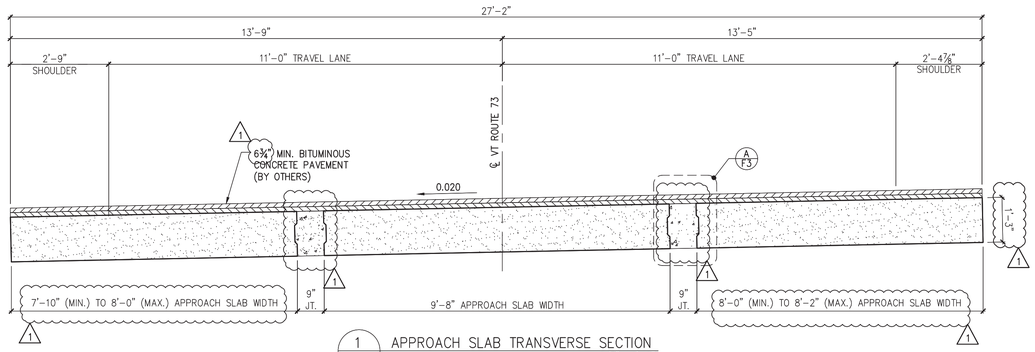
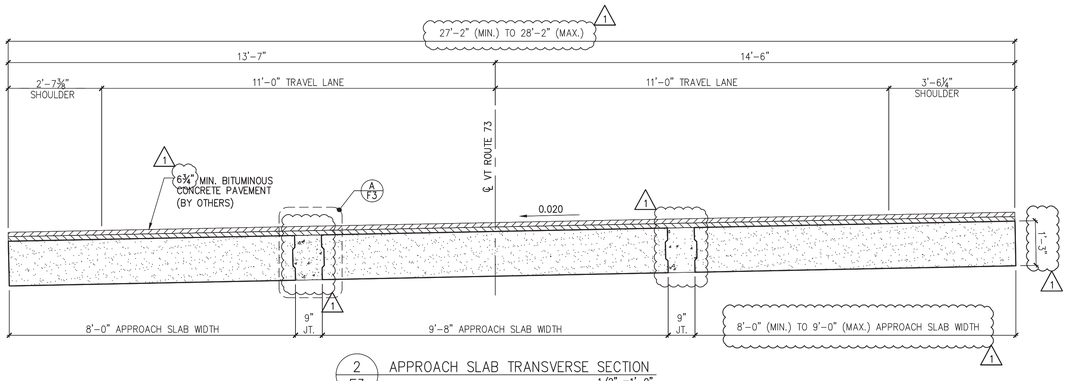
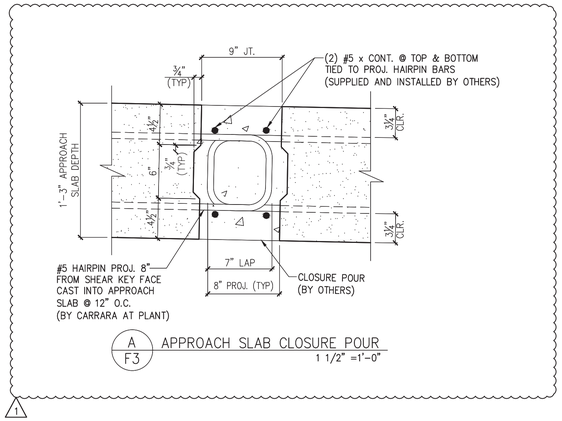


1 / F3 APPROACH SLAB TRANSVERSE SECTION
1/2" =1'-0"



2 / F3 APPROACH SLAB TRANSVERSE SECTION
1/2" =1'-0"



A / F3 APPROACH SLAB CLOSURE POUR
1 1/2" =1'-0"

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PO BOX 2620
BALLSTON SPA, NY 12020

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BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

TRANSVERSE SECTIONS & DETAILS

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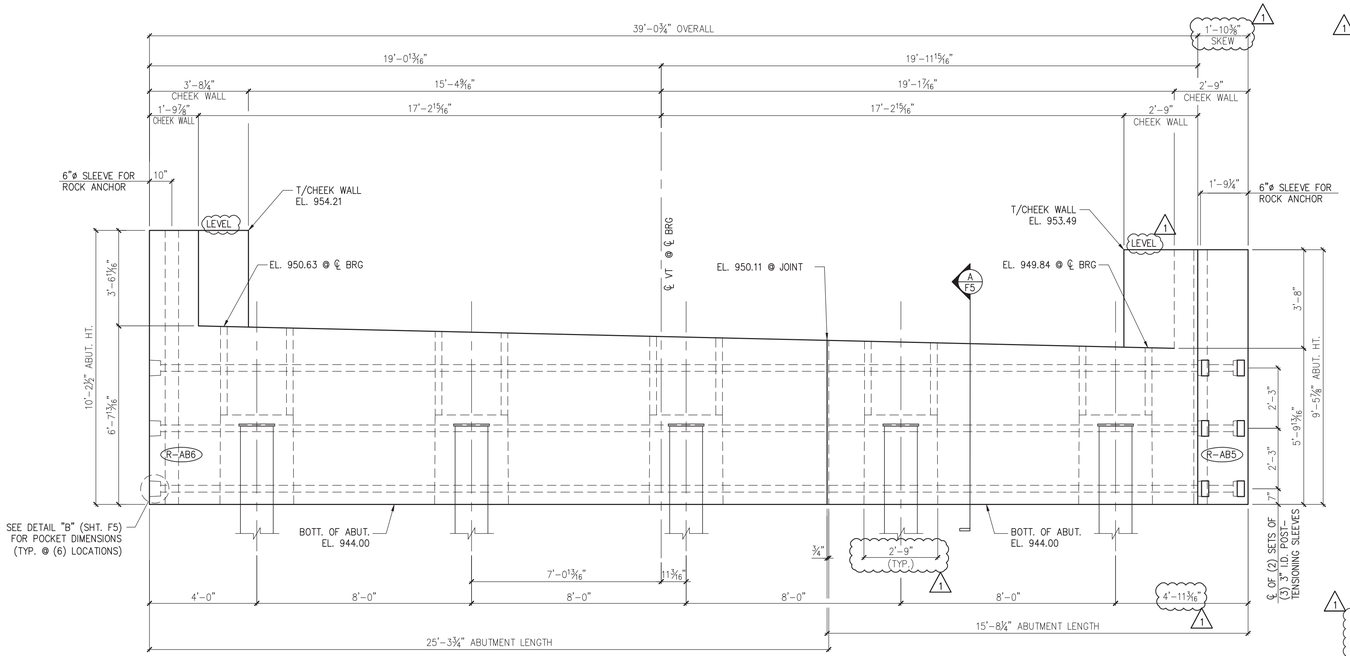
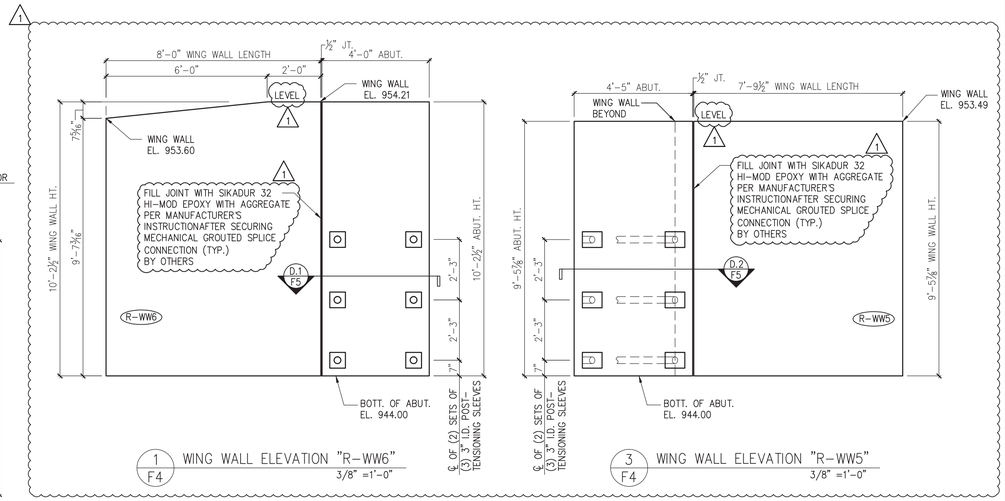
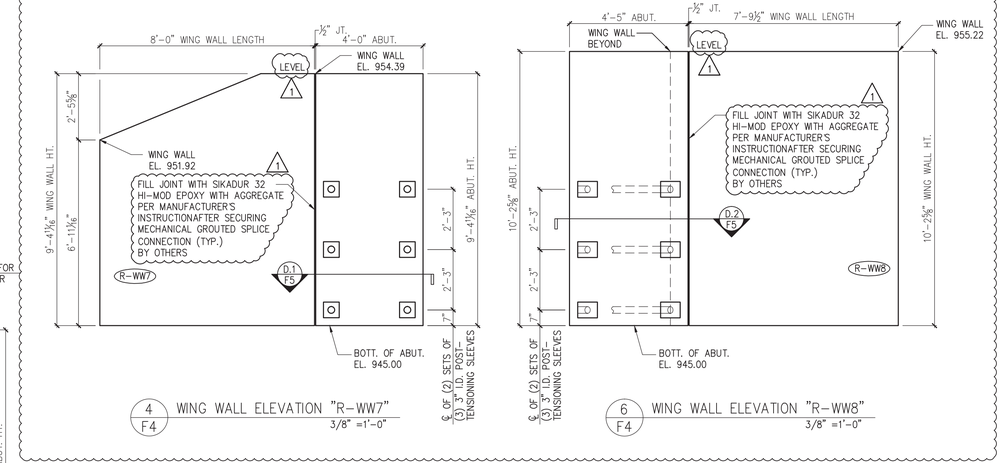


2 F4 ABUTMENT #1 ELEVATION
3/8" =1'-0"



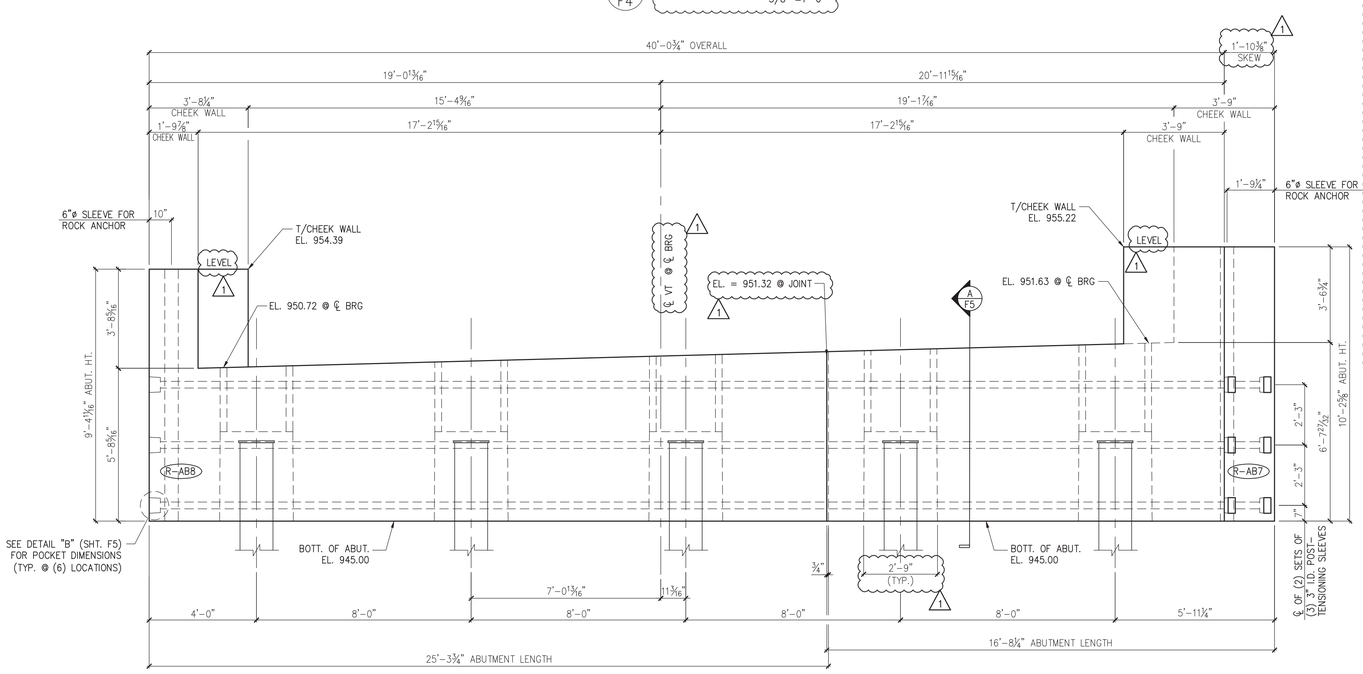
1 F4 WING WALL ELEVATION "R-WW6"
3/8" =1'-0"

3 F4 WING WALL ELEVATION "R-WW5"
3/8" =1'-0"



4 F4 WING WALL ELEVATION "R-WW7"
3/8" =1'-0"

6 F4 WING WALL ELEVATION "R-WW8"
3/8" =1'-0"



5 F4 ABUTMENT #2 ELEVATION
3/8" =1'-0"

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2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

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PO BOX 2620
BALLSTON SPA, NY 12020

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COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

ABUTMENT ELEVATIONS

DATE: MAR. 14, 2014
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DWG. NO: F4

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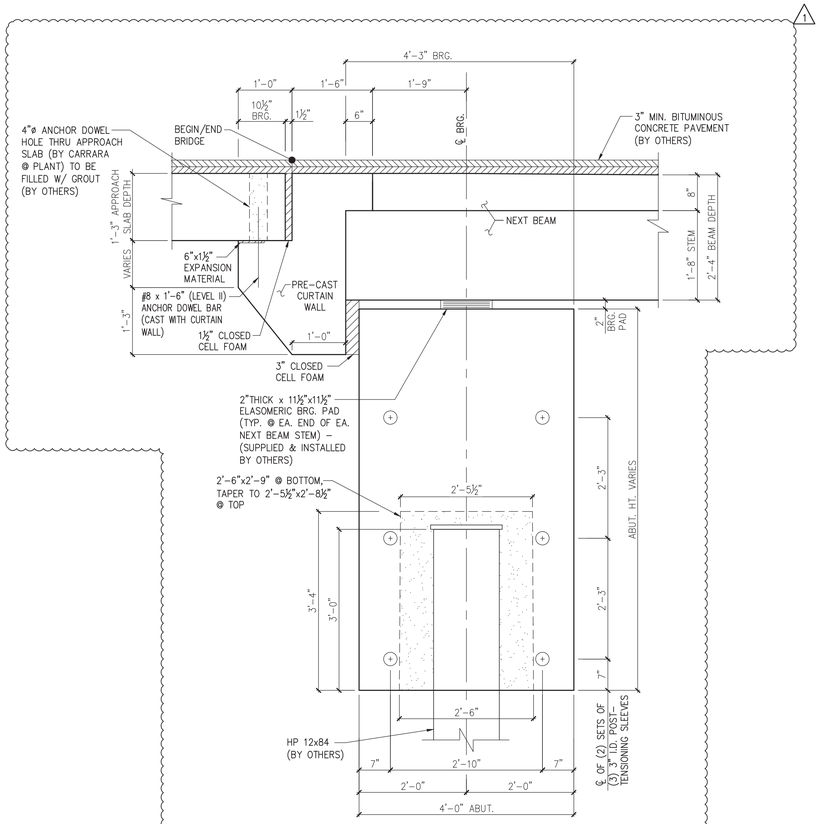
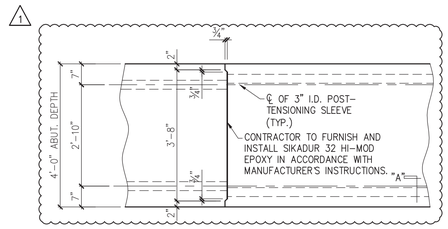
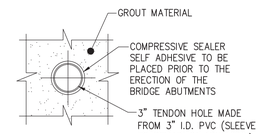


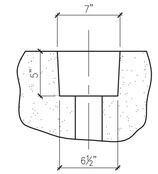
A / F5 BEARING SECTION
NEXT BEAM STEM BEARING 3/4" =1'-0"



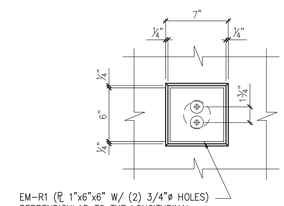
C / F5 MATCH CAST SECTION @ P.T. SLEEVE
1/2" =1'-0"



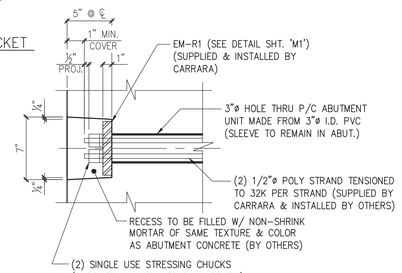
SECTION – "A"
1 1/2" =1'-0"



PLAN OF POCKET



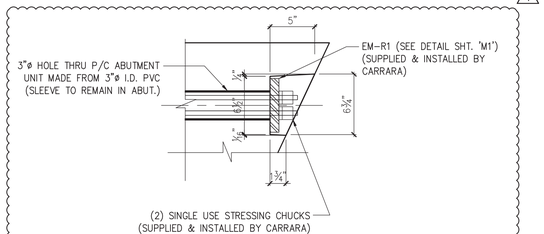
ABUTMENT ELEVATION



SECTION AT CENTERLINE

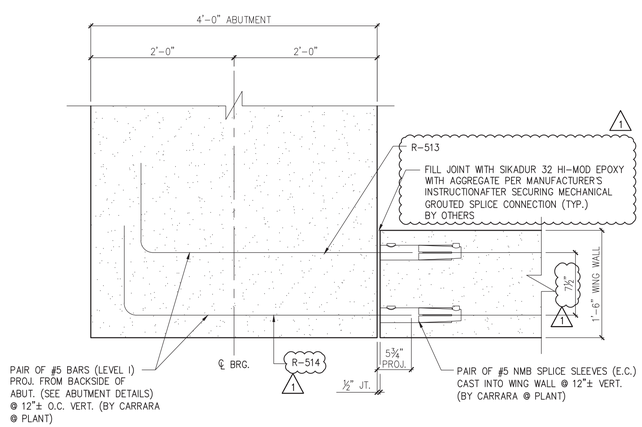
NOTE: ANCHORAGE ASSEMBLIES SHALL BE EPOXY PAINTED AFTER INSTALLATION, BY OTHERS.

DETAIL – "B"
1 1/2" =1'-0"

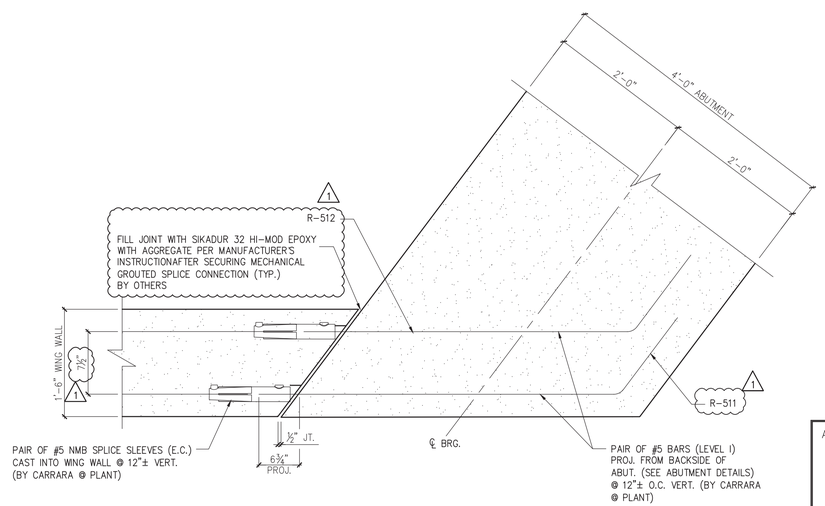


NOTE: ANCHORAGE ASSEMBLIES SHALL BE EPOXY PAINTED AFTER INSTALLATION, BY OTHERS.

DETAIL – "C"
1 1/2" =1'-0"



D.1 / F5 WING WALL CONNECTION DETAIL
1" =1'-0"



D.2 / F5 WING WALL CONNECTION DETAIL
1" =1'-0"

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2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

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PO BOX 2620
BALLSTON SPA, NY 12020

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VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

ABUTMENT DETAILS

DATE:	MAR. 14, 2014
SCALE:	NOTED
CHKD:	DFTM: AAT/RWS JJ/KLT
JOB NO:	23419-013
DWG. NO:	F5

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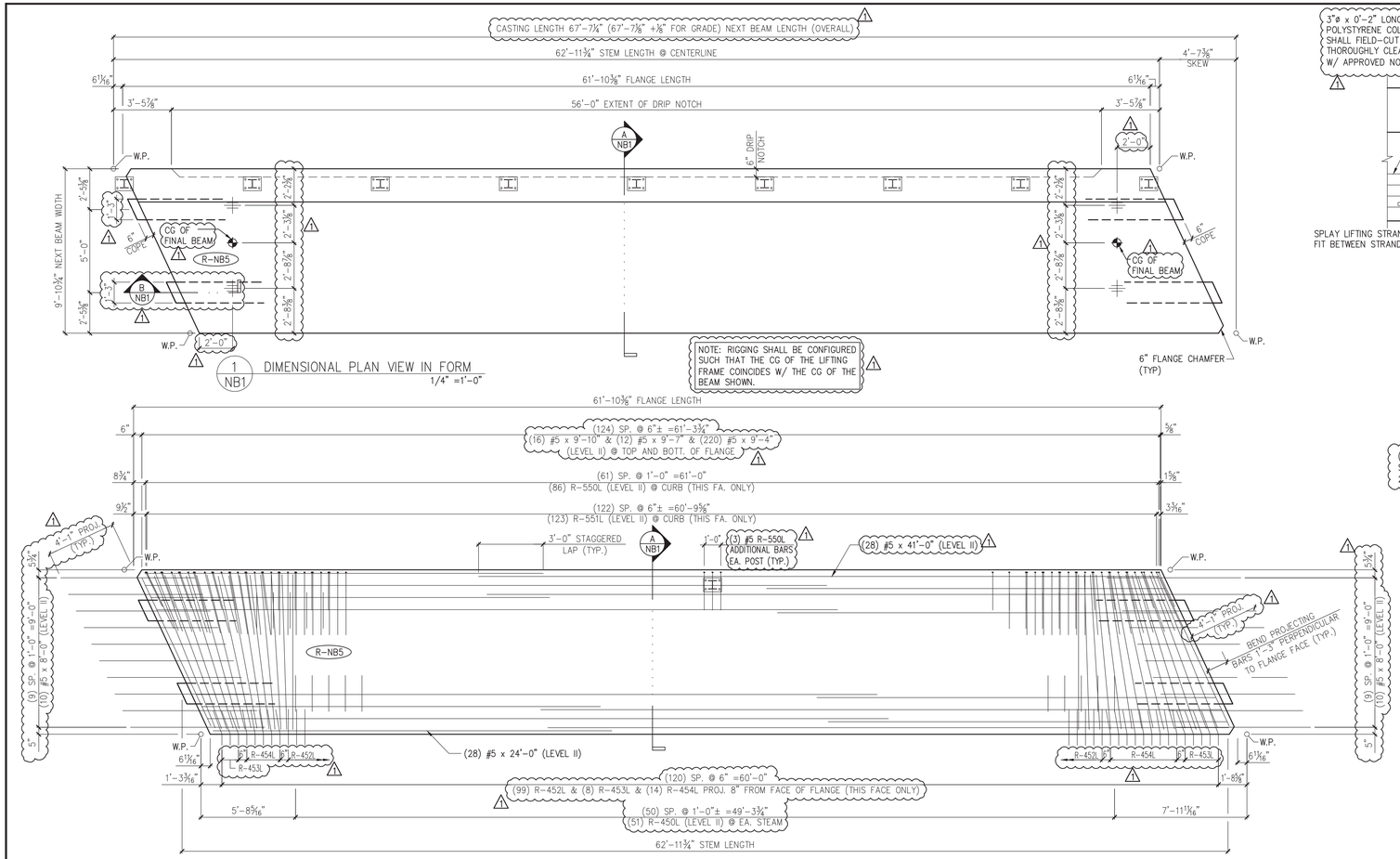
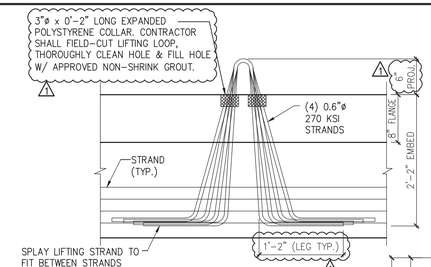
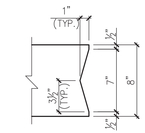


1 NB1 DIMENSIONAL PLAN VIEW IN FORM
1/4" =1'-0"

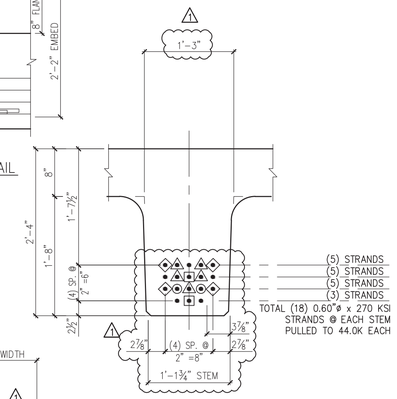
2 NB1 REINFORCING PLAN VIEW IN FORM
ALL DIMENSIONS INDICATED ARE PARALLEL OR PERPENDICULAR TO ℄ OF STEMS U.N.O.
1/4" =1'-0"



TYPICAL LIFTING AND HANDING DETAIL
SCALE: 1" =1'-0"
NOTE: OTHER REINF. NOT SHOWN FOR CLARITY.



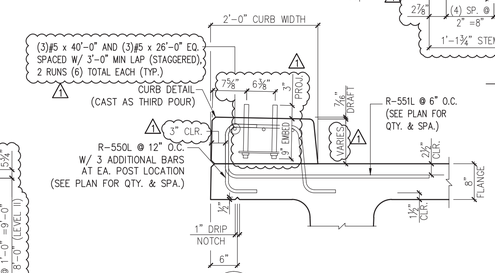
DETAIL – "A"
1 1/2" =1'-0"



DETAIL – "C" (STEM STRAND PATTERN)
1" =1'-0"

PRESTRESSING NOTATIONS

- ● DENOTES STRAIGHT STRANDS TO BE CUT FLUSH WITH EA. END OF EA. STEM
- ◇ DENOTES STRAIGHT STRANDS TO PROJECT 1'-6" FROM EA. END OF EA. STEM
- △ DENOTES STRAIGHT STRANDS TO BE DEBONDED 6" FROM EA. END OF EA. STEM
- ▣ DENOTES STRAIGHT STRANDS TO BE DEBONDED 8'-0" FROM EA. END OF EA. STEM
- ⊙ DENOTES STRAIGHT STRANDS TO BE DEBONDED 12'-0" FROM EA. END OF EA. STEM



D NB1 REINFORCING @ CURB
3/4" =1'-0"

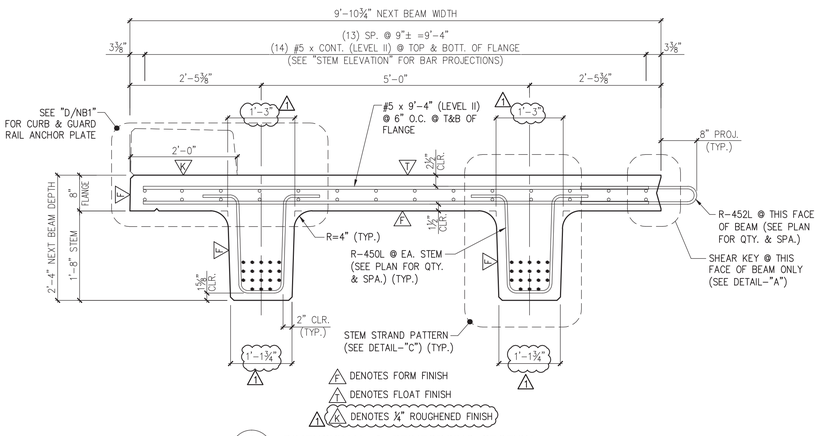
DETENSIONING SCHEDULE
N.T.S.

SUBMITTED
APR 21 2014
J.P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

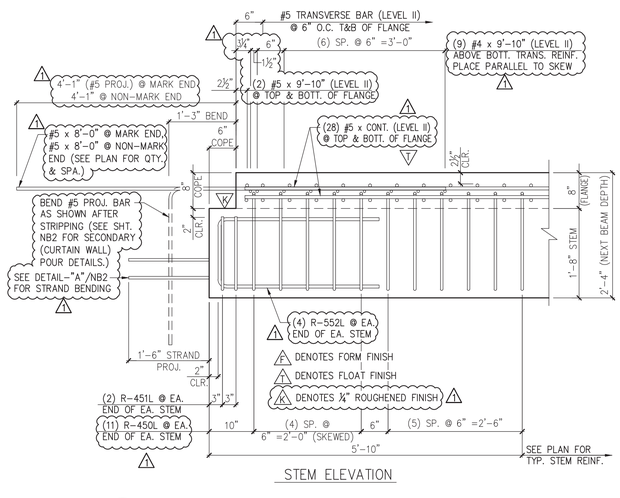
MARK: R-NB5	QTY.: 1	WT.:	49.3 T	VOL.:	24.33 cy
TOTAL WITH CURTAIN WALLS & CURB –		WT.:	67.5 T	VOL.:	33.4 cy

MATERIAL LIST / NEXT BEAM

ITEM	MARK	DESCRIPTION	QTY.
1	R-450L	#4 BENT BAR (LEVEL II, DUAL COATED)	146
2	R-451L	#4 BENT BAR (LEVEL II, DUAL COATED)	8
3	R-452L	#4 BENT BAR (LEVEL II, DUAL COATED)	99
4	R-453L	#4 BENT BAR (LEVEL II, DUAL COATED)	8
5	R-454L	#4 BENT BAR (LEVEL II, DUAL COATED)	14
6			
7	R-550L	#5 BENT BAR (LEVEL II, DUAL COATED)	93
8	R-551L	#5 BENT BAR (LEVEL II, DUAL COATED)	123
9	R-552L	#5 BENT BAR (LEVEL II, DUAL COATED)	16
10			
11		#4 x 9'-10" (LEVEL II, DUAL COATED)	18
12			
13		#5 x 8'-0" (LEVEL II, DUAL COATED)	20
14		#5 x 9'-4" (LEVEL II, DUAL COATED)	220
15		#5 x 9'-7" (LEVEL II, DUAL COATED)	12
16		#5 x 9'-10" (LEVEL II, DUAL COATED)	20
17		#5 x 24'-0" (LEVEL II, DUAL COATED)	28
18		#5 x 26'-0" (LEVEL II, DUAL COATED)	6
19		#5 x 40'-0" (LEVEL II, DUAL COATED)	6
20		#5 x 41'-0" (LEVEL II, DUAL COATED)	28
21			
22		SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS	4

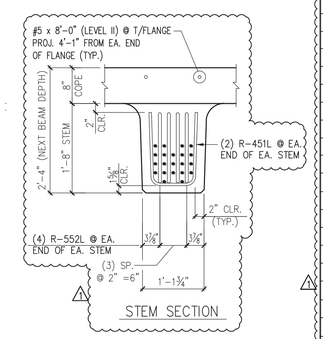


A NB1 DIMENSIONAL & REINFORCING SECTION
3/4" =1'-0"



STEM ELEVATION

B NB1 END BLOCK STEM REINFORCING DETAILS
3/4" =1'-0"



STEM SECTION

△1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JLJ/KLT
JOB NO: 23419-013
DWG. NO: NB1

Eriksson technologies
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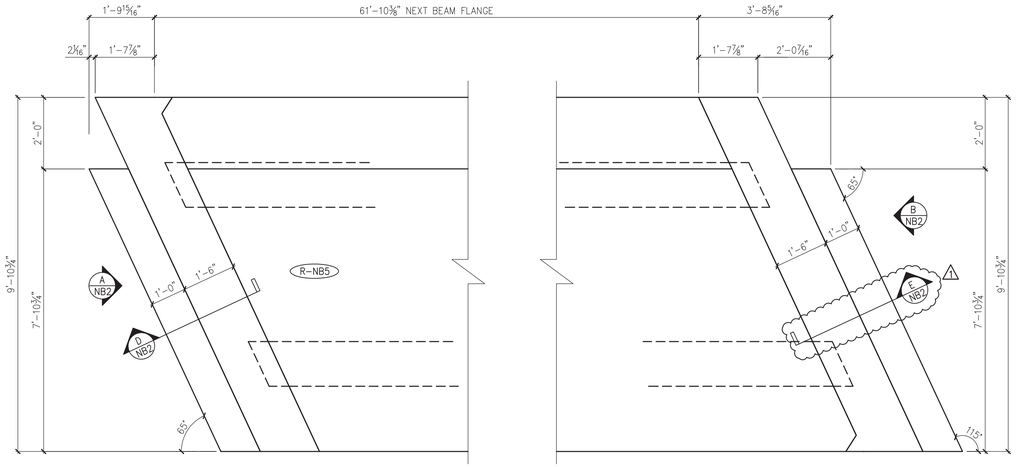
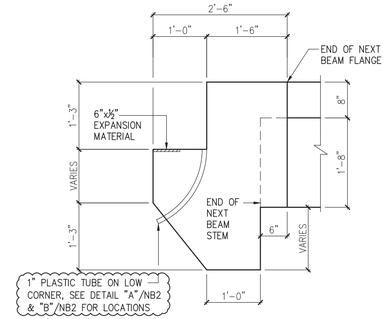
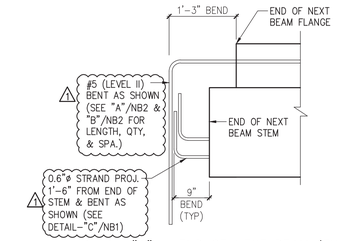


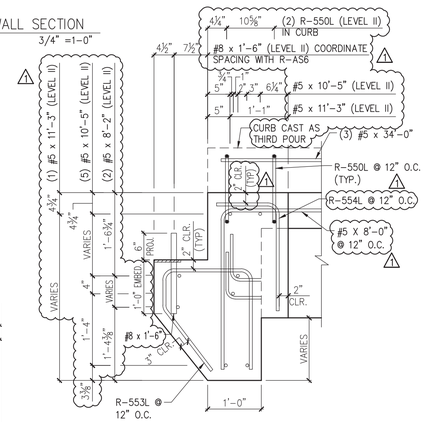
1 NB2 CURTAIN WALL PLAN VIEW IN FORM
(CAST AS SECONDARY POUR, AFTER DETENSIONING) 1/2" =1'-0"



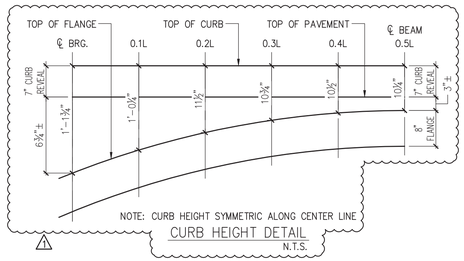
C NB2 DIMENSIONAL CURTAIN WALL SECTION
3/4" =1-0"



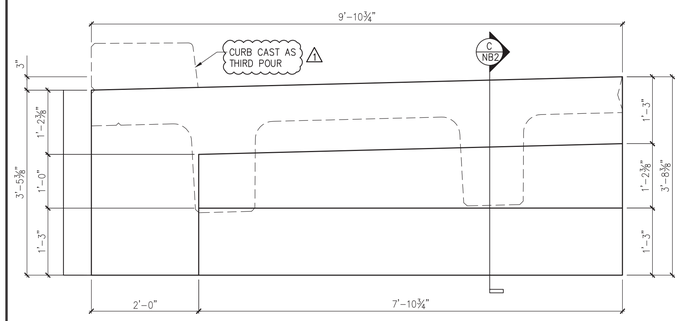
DETAIL "A" – END OF NEXT BEAM (TYP.)
(PRIOR TO CASTING CURTAIN WALL) 3/4" =1'-0"



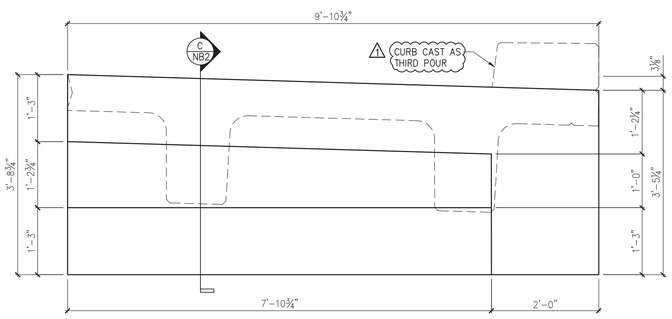
D NB2 REINFORCING CURTAIN WALL SECTION
3/4" =1-0"



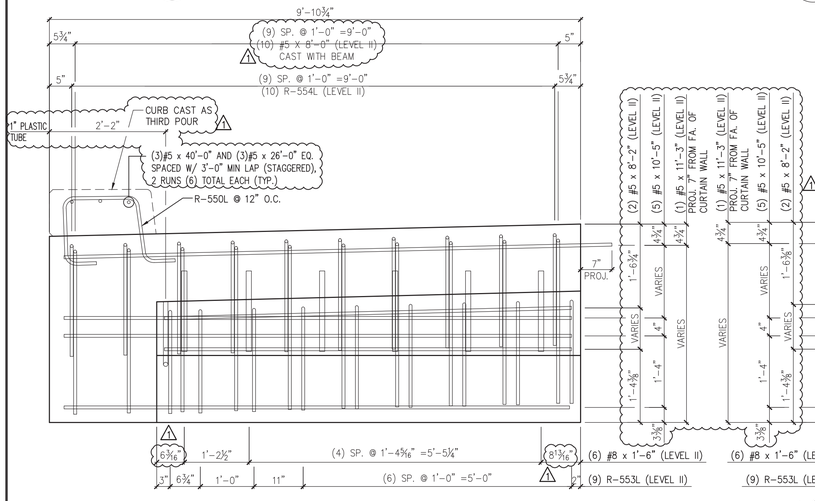
CURB HEIGHT DETAIL
N.T.S.



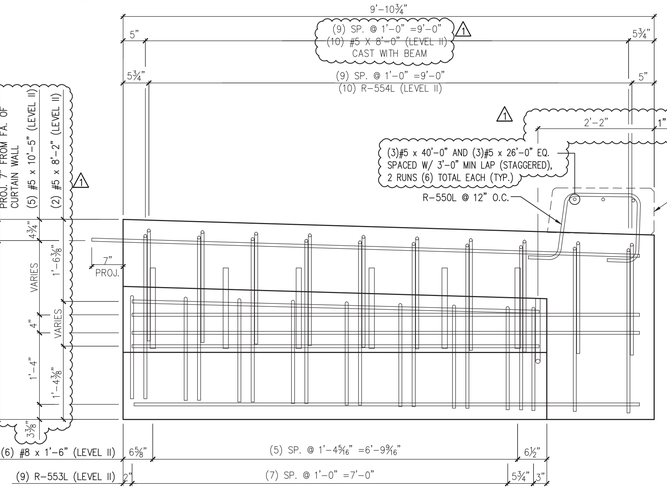
A NB2 DIMENSIONAL CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1-0"



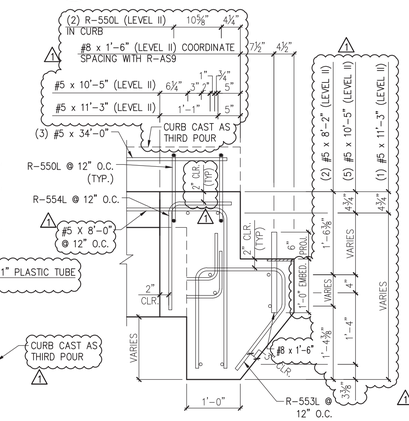
B NB2 DIMENSIONAL CURTAIN WALL ELEVATION @ ABUT. #2
3/4" =1-0"



A NB2 REINFORCING CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1-0"



B NB2 REINFORCING CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1-0"



E NB2 REINFORCING CURTAIN WALL SECTION
3/4" =1-0"

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

MARK:	R-NB5	QTY.:	1	WT.:	9.3 T	VOL.:	4.60 cy

MATERIAL LIST / CURTAIN WALLS

ITEM	MARK	DESCRIPTION	QTY.
1	R-553L	#5 BENT BAR (LEVEL II, DUAL COATED)	18
2	R-554L	#5 BENT BAR (LEVEL II, DUAL COATED)	20
3			
4			
5		#5 x 8'-2" (LEVEL II, DUAL COATED)	4
6		#5 x 10'-5" (LEVEL II, DUAL COATED)	10
7		#5 x 11'-3" (LEVEL II, DUAL COATED)	2
8			
9		#8 x 1'-6" (LEVEL II, DUAL COATED)	12
10			
11			
12			
13			
14			

1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: NB2

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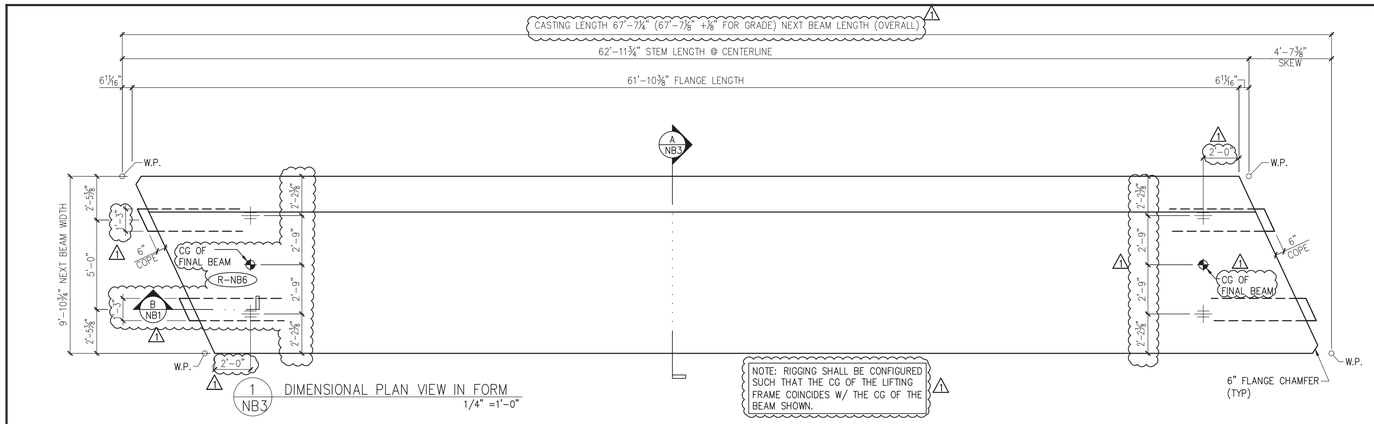
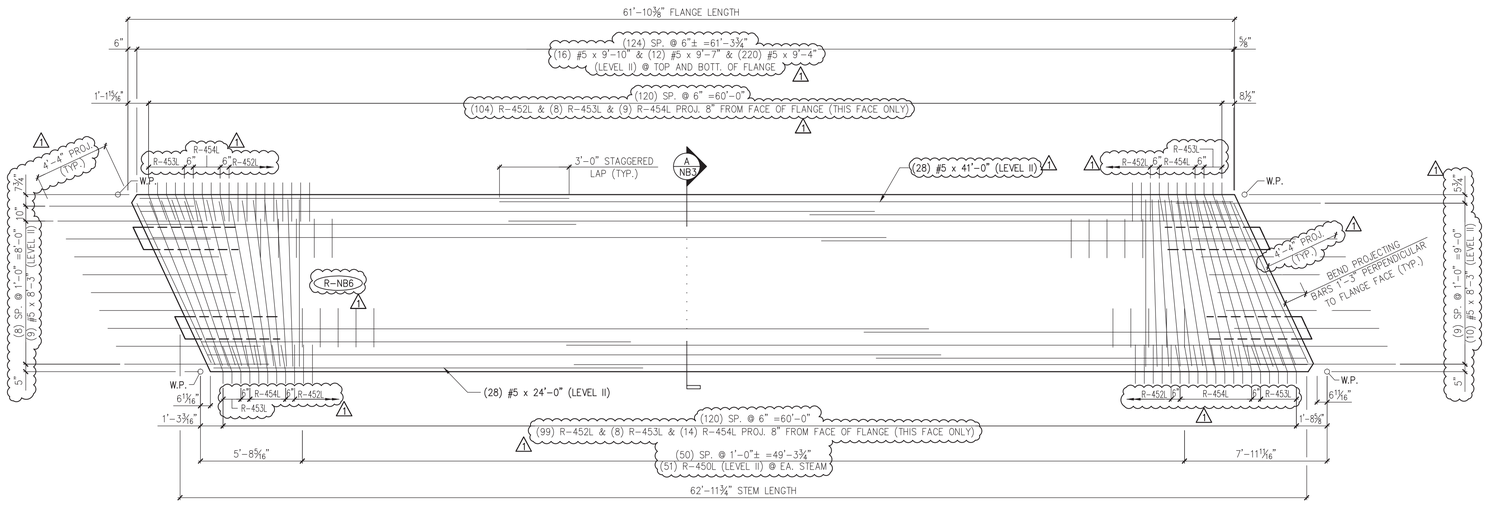
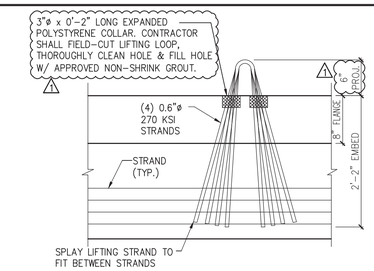


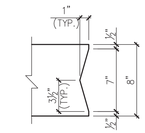
1 NB3 DIMENSIONAL PLAN VIEW IN FORM
1/4" =1'-0"



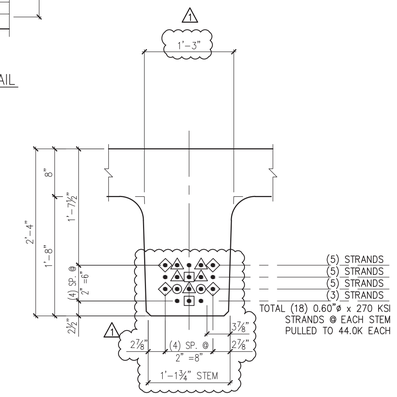
2 NB3 REINFORCING PLAN VIEW IN FORM
ALL DIMENSIONS INDICATED ARE PARALLEL OR PERPENDICULAR TO ℄ OF STEMS U.N.O.
1/4" =1'-0"



TYPICAL LIFTING AND HANDING DETAIL
SCALE 1" =1'-0"
NOTE: OTHER REINF. NOT SHOWN FOR CLARITY.



DETAIL – "A"
1 1/2" =1'-0"



DETAIL – "C" (STEM STRAND PATTERN)
1" =1'-0"

PRESTRESSING NOTATIONS

- ● DENOTES STRAIGHT STRANDS TO BE CUT FLUSH WITH EA. END OF EA. STEM
- ◇ DENOTES STRAIGHT STRANDS TO PROJECT 1'-6" FROM EA. END OF EA. STEM
- △ DENOTES STRAIGHT STRANDS TO BE DEBONDED 6" FROM EA. END OF EA. STEM
- ▣ DENOTES STRAIGHT STRANDS TO BE DEBONDED 8'-0" FROM EA. END OF EA. STEM
- ⊙ DENOTES STRAIGHT STRANDS TO BE DEBONDED 12'-0" FROM EA. END OF EA. STEM

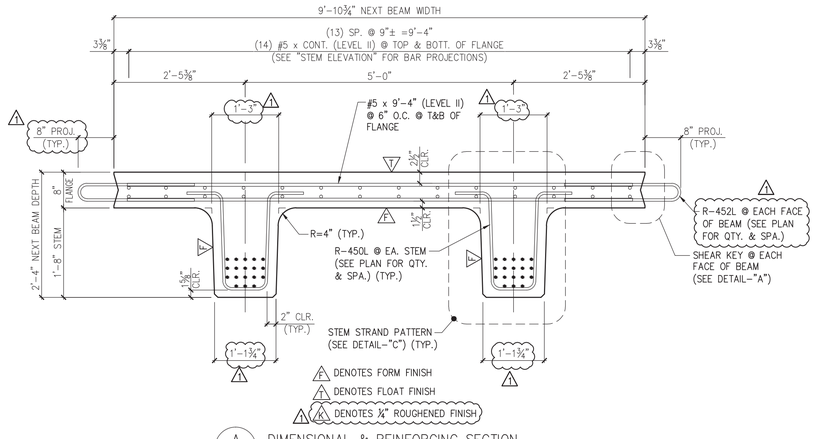
DETENSIONING SCHEDULE
N.T.S.

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

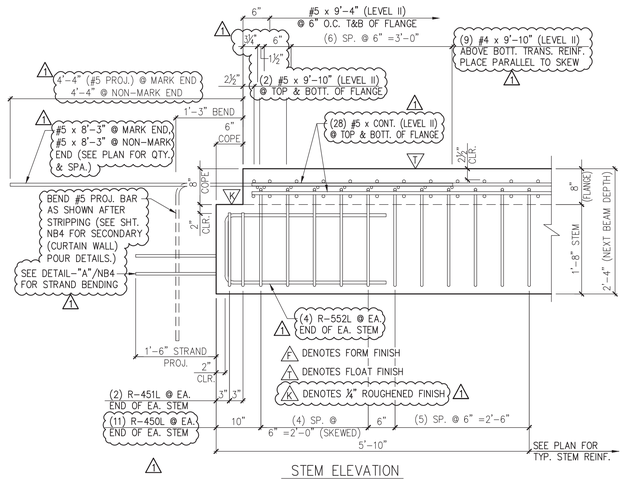
MARK:	R-NB6	QTY.:	1	WT.:	△1 49.3 T	VOL.:	24.33 cy
TOTAL WITH CURTAIN WALLS –				WT.:	29.91 T	VOL.:	29.54 cy

MATERIAL LIST / NEXT BEAM

ITEM	MARK	DESCRIPTION	QTY.
1	R-450L	#4 BENT BAR (LEVEL II, DUAL COATED)	146
2	R-451L	#4 BENT BAR (LEVEL II, DUAL COATED)	8
3	R-452L	#4 BENT BAR (LEVEL II, DUAL COATED)	203
4	R-453L	#4 BENT BAR (LEVEL II, DUAL COATED)	16
5	R-454L	#4 BENT BAR (LEVEL II, DUAL COATED)	23
6			
7	R-552L	#5 BENT BAR (LEVEL II, DUAL COATED)	16
8			
9		#4 x 9'-10" (LEVEL II, DUAL COATED)	18
10		#5 x 8'-0" (LEVEL II, DUAL COATED)	20
11		#5 x 9'-4" (LEVEL II, DUAL COATED)	220
12		#5 x 9'-7" (LEVEL II, DUAL COATED)	12
13		#5 x 9'-10" (LEVEL II, DUAL COATED)	20
14		#5 x 24-0" (LEVEL II, DUAL COATED)	28
15		#5 x 41'-0" (LEVEL II, DUAL COATED)	28
16			
17			
18		SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS	4

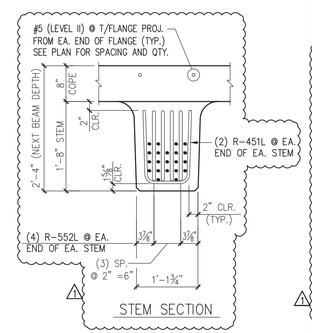


A NB3 DIMENSIONAL & REINFORCING SECTION
3/4" =1'-0"



STEM ELEVATION

B NB3 END BLOCK STEM REINFORCING DETAILS
3/4" =1'-0"



STEM SECTION

△1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

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STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

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VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: NB3

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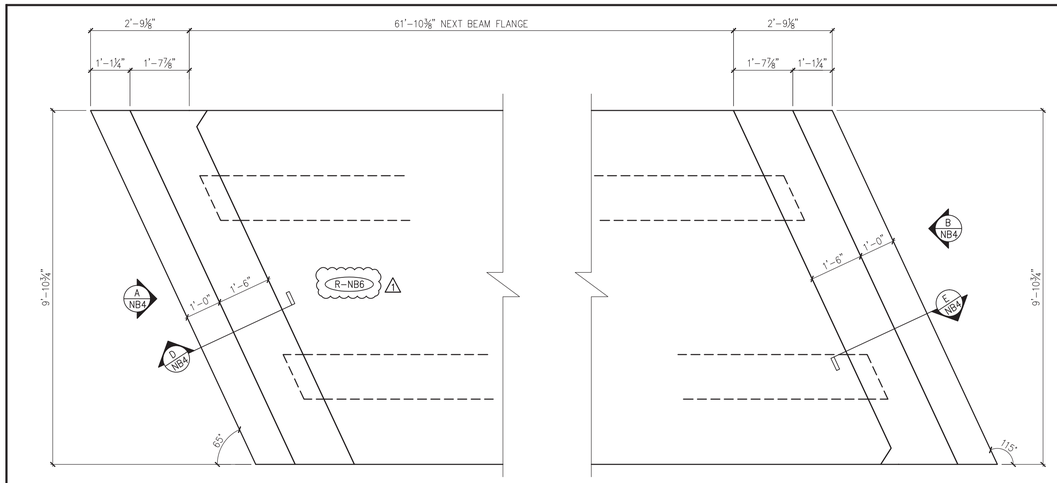
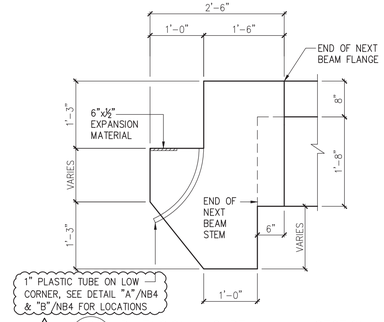
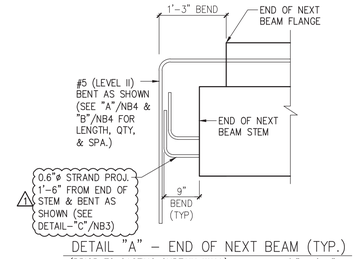


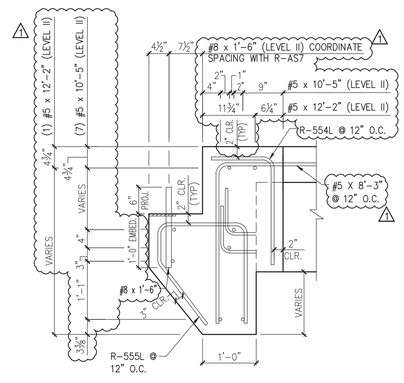
1 NB4 CURTAIN WALL PLAN VIEW IN FORM
(CAST AS SECONDARY POUR, AFTER DETENSIONING) 1/2" =1'-0"



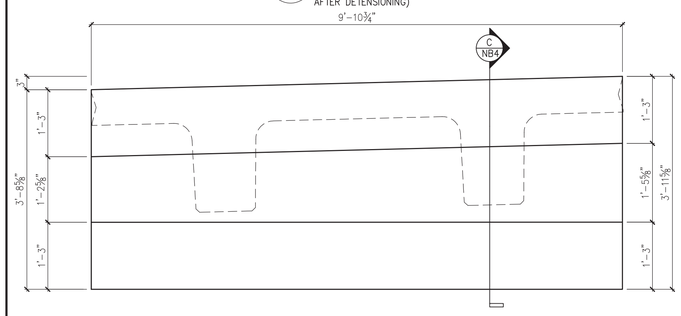
C NB4 DIMENSIONAL CURTAIN WALL SECTION
3/4" =1'-0"



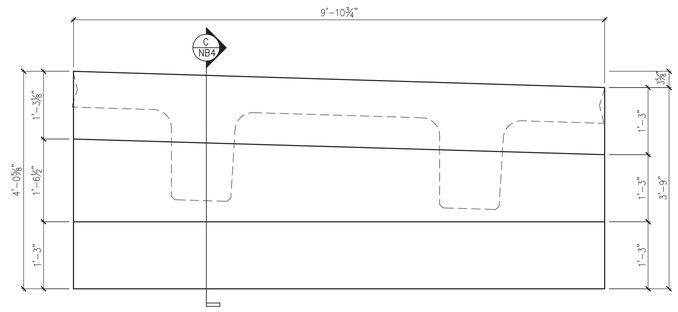
DETAIL "A" – END OF NEXT BEAM (TYP.)
(PRIOR TO CASTING CURTAIN WALL) 3/4" =1'-0"



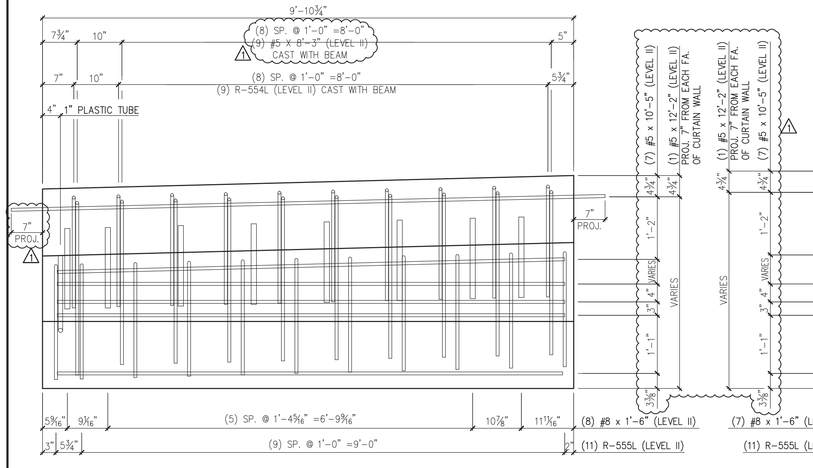
D NB4 REINFORCING CURTAIN WALL SECTION
3/4" =1'-0"



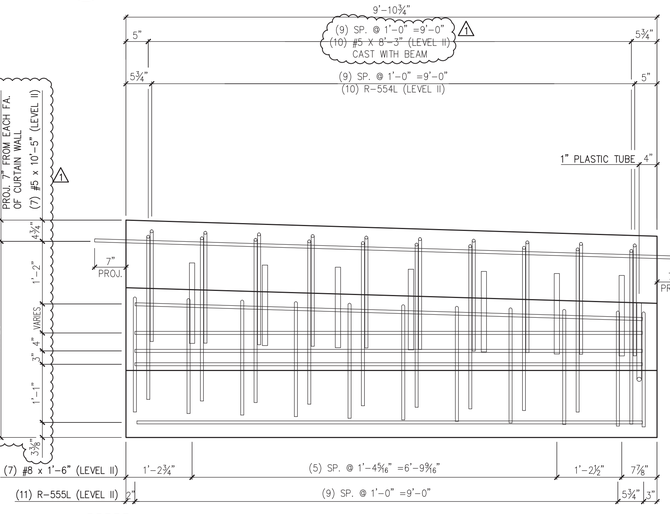
A NB4 DIMENSIONAL CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1'-0"



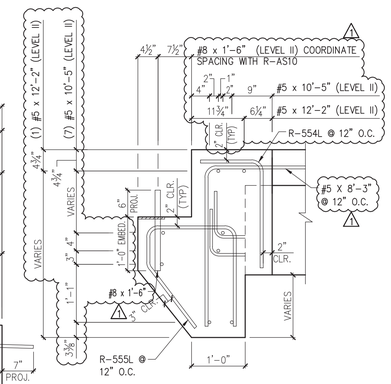
B NB4 DIMENSIONAL CURTAIN WALL ELEVATION @ ABUT. #2
3/4" =1'-0"



A NB4 REINFORCING CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1'-0"



B NB4 REINFORCING CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1'-0"



E NB4 REINFORCING CURTAIN WALL SECTION
3/4" =1'-0"

1 4/11/14 REVISE & RESUBMIT

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

MARK:	R-NB6	QTY.:	1	WT.:	1 10.6 T	VOL.:	5.22 cy

MATERIAL LIST / CURTAIN WALLS

ITEM	MARK	DESCRIPTION	QTY.
1	R-554L	#5 BENT BAR (LEVEL II, DUAL COATED)	20
2	R-555L	#5 BENT BAR (LEVEL II, DUAL COATED)	22
3			
4			
5		#5 x 10'-5" (LEVEL II, DUAL COATED)	14
6		#5 x 12'-2" (LEVEL II, DUAL COATED)	2
7			
8		#8 x 1'-6" (LEVEL II, DUAL COATED)	15
9			
10			
11			
12			
13			
14			

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Precast & Prestress Manufacturer
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PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JU/KLT
JOB NO: 23419-013
DWG. NO: NB4

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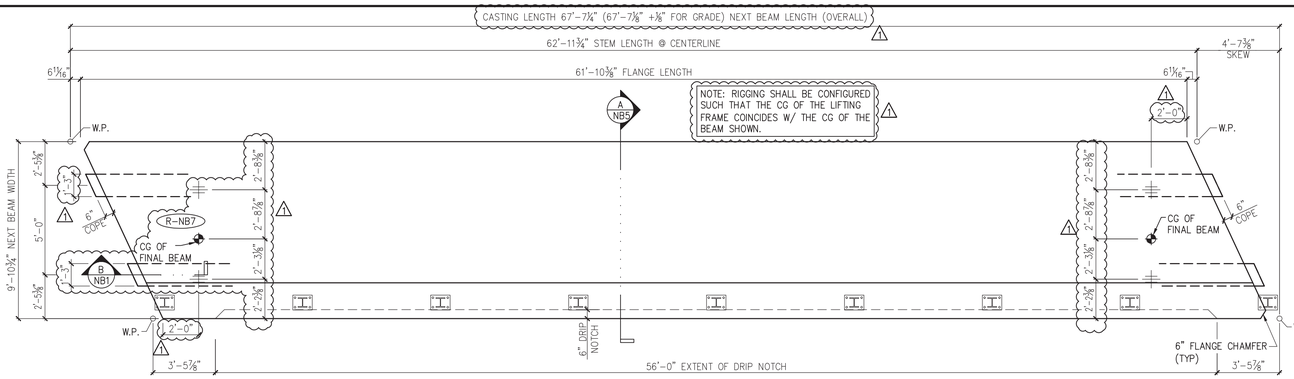
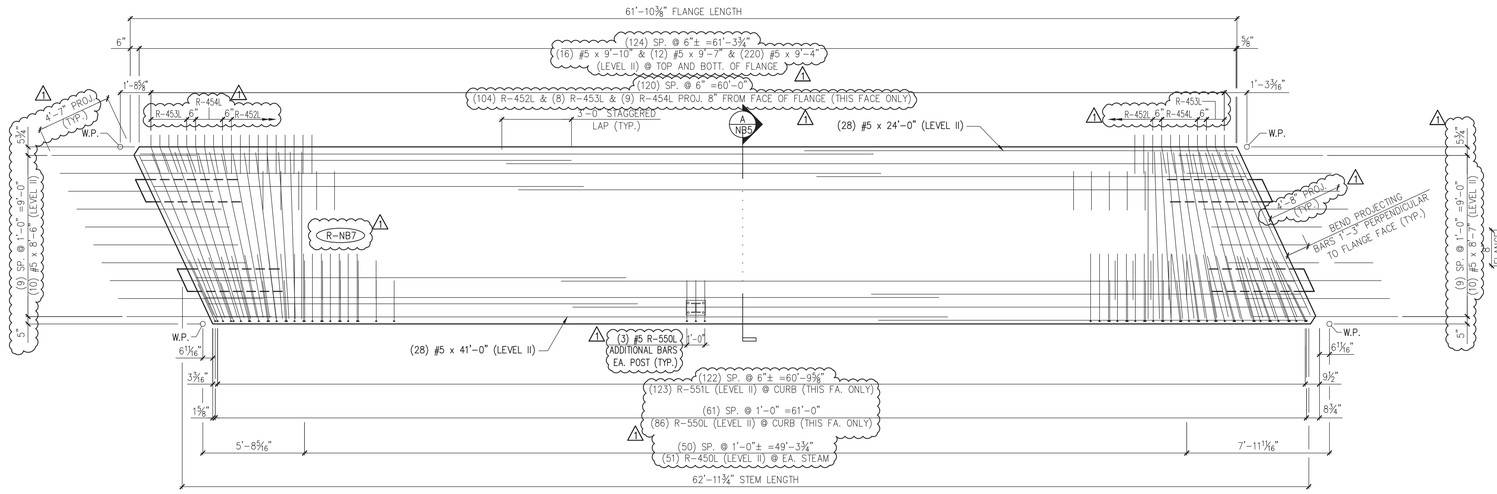
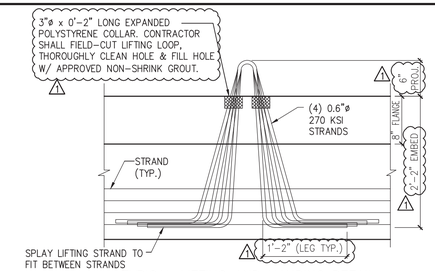


1 NB5 DIMENSIONAL PLAN VIEW IN FORM
1/4" =1'-0"

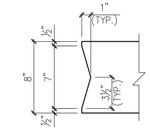


2 NB5 REINFORCING PLAN VIEW IN FORM
1/4" =1'-0"

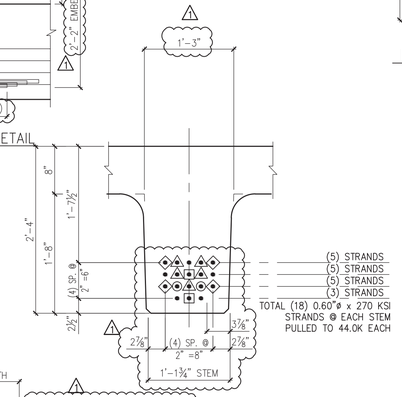
ALL DIMENSIONS INDICATED ARE PARALLEL OR PERPENDICULAR TO ℄ OF STEMS U.N.O.



TYPICAL LIFTING AND HANDING DETAIL
SCALE: 1" =1'-0"
NOTE: OTHER REINF. NOT SHOWN FOR CLARITY.



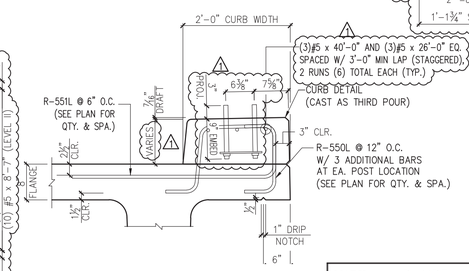
DETAIL – "A"
1 1/2" =1'-0"



DETAIL – "C" (STEM STRAND PATTERN)
1" =1'-0"

PRESTRESSING NOTATIONS

- DENOTES STRAIGHT STRANDS TO BE CUT FLUSH WITH EA. END OF EA. STEM
- DENOTES STRAIGHT STRANDS TO PROJECT 1'-6" FROM EA. END OF EA. STEM
- DENOTES STRAIGHT STRANDS TO BE DEBONDED 6" FROM EA. END OF EA. STEM
- DENOTES STRAIGHT STRANDS TO BE DEBONDED 8'-0" FROM EA. END OF EA. STEM
- DENOTES STRAIGHT STRANDS TO BE DEBONDED 12'-0" FROM EA. END OF EA. STEM



DETENSIONING SCHEDULE
N.T.S.

MARK: R-NB7	QTY.: 1	WT.: 49.3 T	VOL.: 24.33 cy
TOTAL WITH CURTAIN WALLS & CURB –		WT.: 69.2 T	VOL.: 34.16 cy

MATERIAL LIST / NEXT BEAM

ITEM	MARK	DESCRIPTION	QTY.
1	R-450L	#4 BENT BAR (LEVEL II, DUAL COATED)	146
2	R-451L	#4 BENT BAR (LEVEL II, DUAL COATED)	8
3	R-452L	#4 BENT BAR (LEVEL II, DUAL COATED)	104
4	R-453L	#4 BENT BAR (LEVEL II, DUAL COATED)	8
5	R-454L	#4 BENT BAR (LEVEL II, DUAL COATED)	9
6			
7	R-550L	#5 BENT BAR (LEVEL II, DUAL COATED)	93
8	R-551L	#5 BENT BAR (LEVEL II, DUAL COATED)	123
9	R-552L	#5 BENT BAR (LEVEL II, DUAL COATED)	16
10			
11		#4 x 9'-10" (LEVEL II, DUAL COATED)	18
12			
13			
14		#5 x 8'-6" (LEVEL II, DUAL COATED)	10
15		#5 x 8'-7" (LEVEL II, DUAL COATED)	10
16		#5 x 9'-4" (LEVEL II, DUAL COATED)	220
17		#5 x 9'-7" (LEVEL II, DUAL COATED)	12
18		#5 x 9'-10" (LEVEL II, DUAL COATED)	20
19		#5 x 24-0" (LEVEL II, DUAL COATED)	28
20		#5 x 26'-0" (LEVEL II, DUAL COATED)	6
21		#5 x 40'-0" (LEVEL II, DUAL COATED)	6
22		#5 x 41'-0" (LEVEL II, DUAL COATED)	28
23			
24		SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS	4

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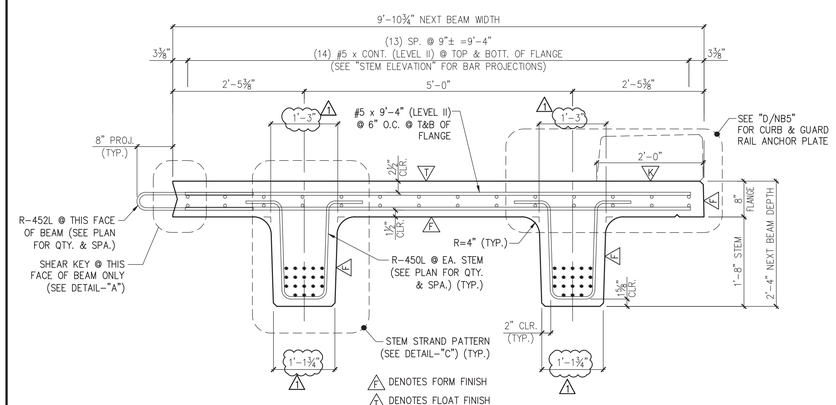
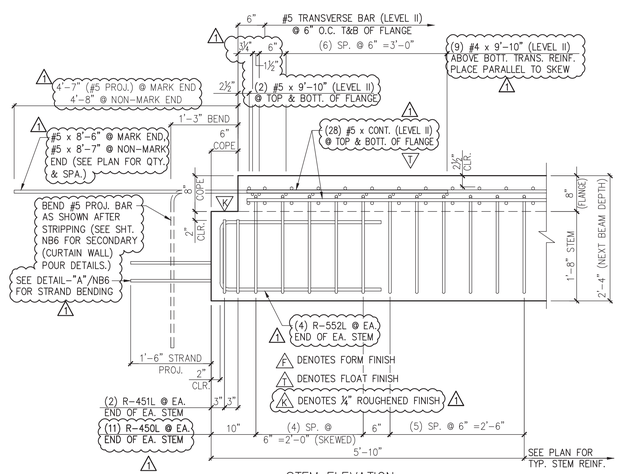
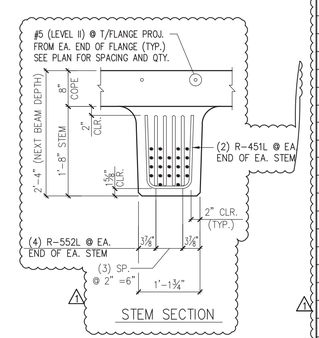


A NB5 DIMENSIONAL & REINFORCING SECTION
3/4" =1'-0"



STEM ELEVATION

B NB5 END BLOCK STEM REINFORCING DETAILS
3/4" =1'-0"



STEM SECTION

4/11/14 REVISE & RESUBMIT

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STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: NB5

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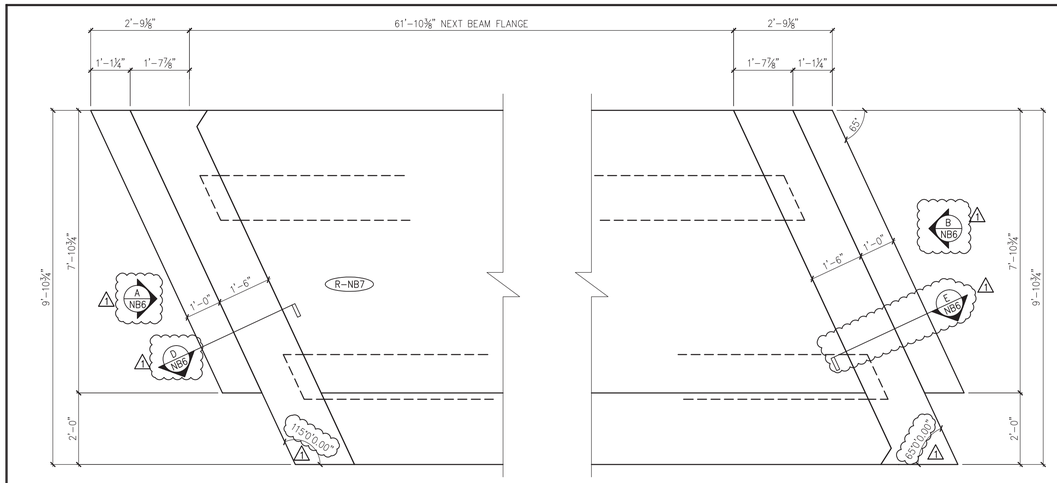
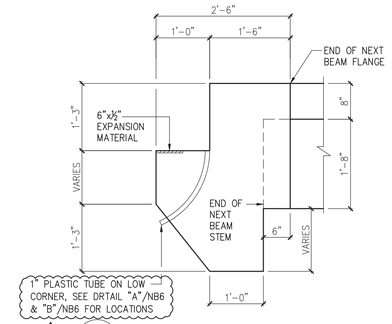
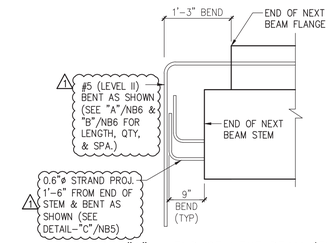


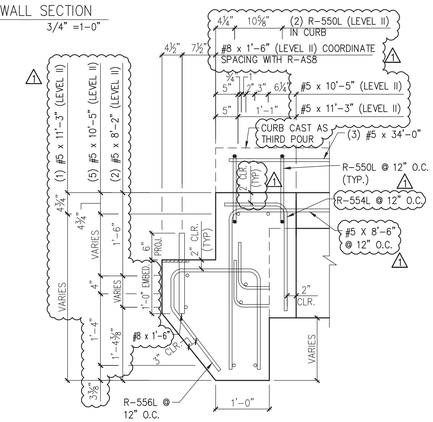
1 NB6 CURTAIN WALL PLAN VIEW IN FORM
(CAST AS SECONDARY POUR, AFTER DETENSIONING) 1/2" =1'-0"



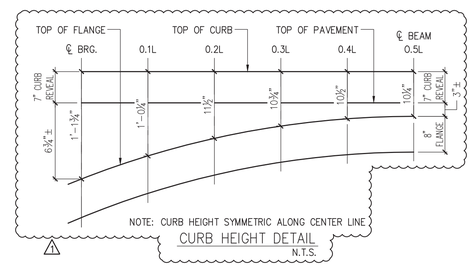
C NB6 DIMENSIONAL CURTAIN WALL SECTION
3/4" =1-0"



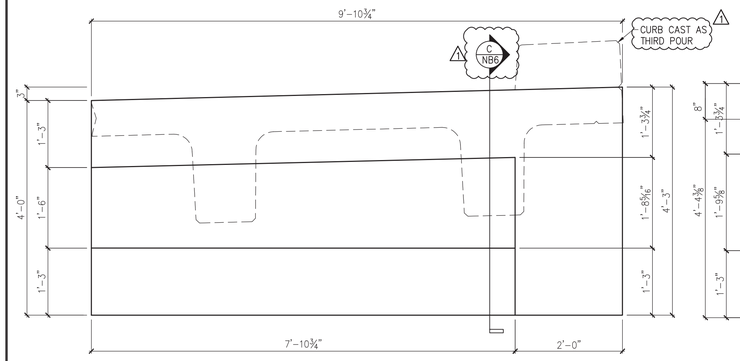
DETAIL "A" – END OF NEXT BEAM (TYP.)
(PRIOR TO CASTING CURTAIN WALL) 3/4" =1'-0"



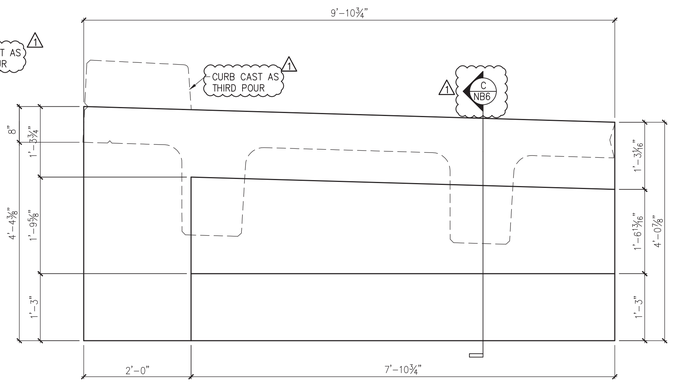
E NB6 REINFORCING CURTAIN WALL SECTION
3/4" =1-0"



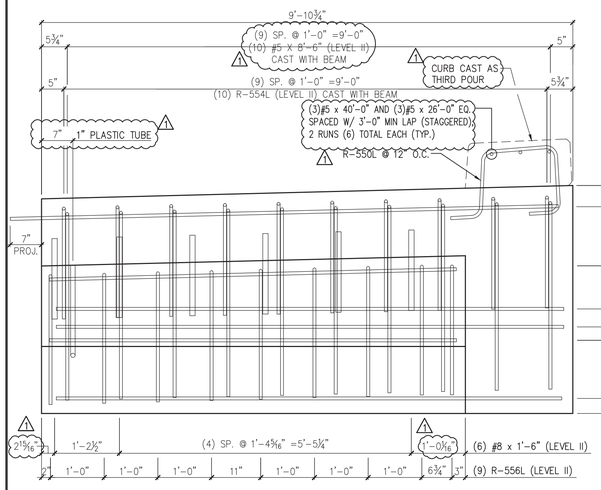
CURB HEIGHT DETAIL
N.T.S.



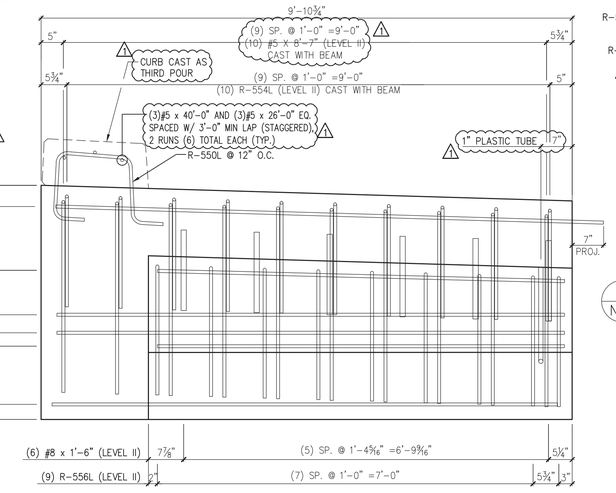
A NB6 DIMENSIONAL CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1-0"



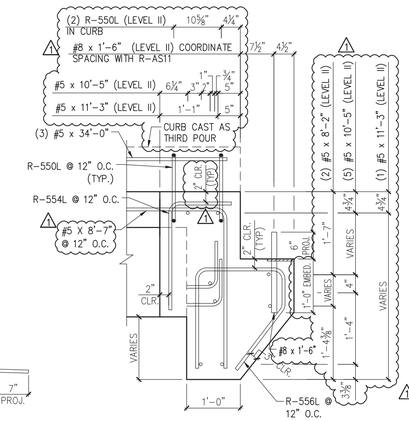
B NB6 DIMENSIONAL CURTAIN WALL ELEVATION @ ABUT. #2
3/4" =1-0"



A NB6 REINFORCING CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1-0"



B NB6 REINFORCING CURTAIN WALL ELEVATION @ ABUT. #1
3/4" =1-0"



D NB6 REINFORCING CURTAIN WALL SECTION
3/4" =1-0"

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MARK:	R-NB7	QTY.: 1	WT.: 1 10.9 T	VOL.: 5.39 cy

MATERIAL LIST / CURTAIN WALLS

ITEM	MARK	DESCRIPTION	QTY.
1	R-554L	#5 BENT BAR (LEVEL II, DUAL COATED)	20
2	R-556L	#5 BENT BAR (LEVEL II, DUAL COATED)	18
3			
4			
5			
6		#5 x 8'-2" (LEVEL II, DUAL COATED)	4
7		#5 x 10'-5" (LEVEL II, DUAL COATED)	10
8		#5 x 11'-3" (LEVEL II, DUAL COATED)	2
9			
10		#8 x 1'-6" (LEVEL II, DUAL COATED)	12
11			
12			
13			
14			

1 4/11/14 REVISE & RESUBMIT

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BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JLJ/KLT
JOB NO: 23419-013
DWG. NO: NB6

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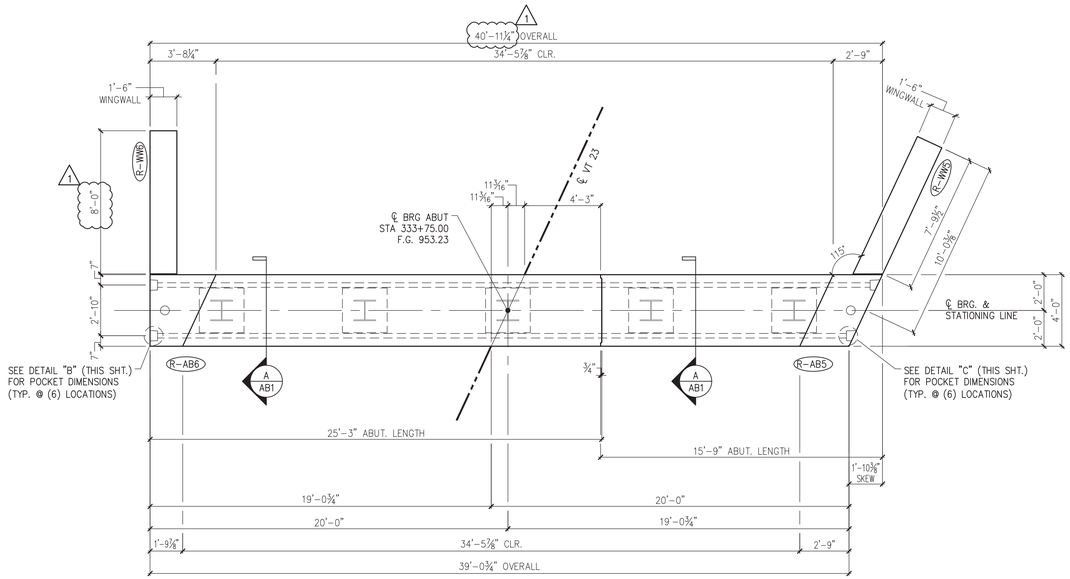
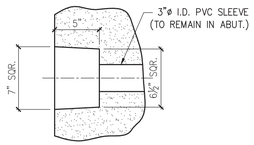
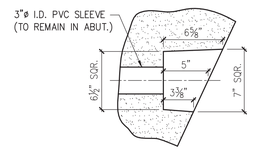


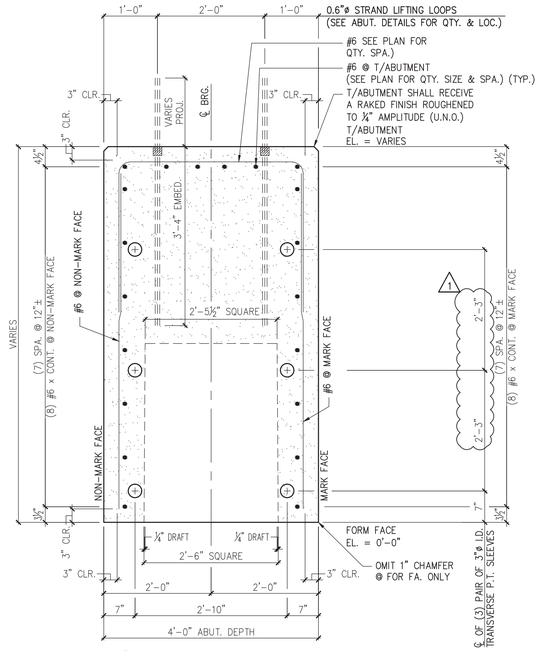
1 / AB1 ABUTMENT 1 ASSEMBLY PLAN
1/4" =1'-0"



DETAIL – "B"
1 1/2" =1'-0"

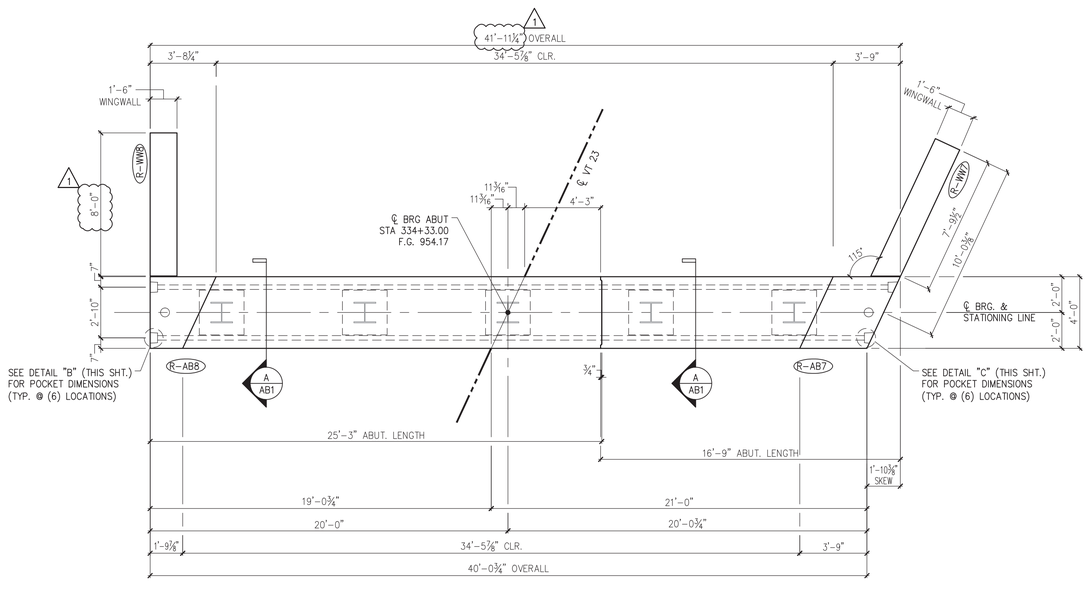


DETAIL – "C"
1 1/2" =1'-0"



A / AB1 ABUTMENT SECTION
3/4" =1'-0"

SHOP NOTE:
ALL EDGES OF ABUTMENT SHALL
RECEIVE A 1" CHAMFER (U.N.O.)



2 / AB1 ABUTMENT 2 ASSEMBLY PLAN
1/4" =1'-0"

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APR 21 2014
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△1 4/11/14 REVISE & RESUBMIT

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COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST ABUTMENT
PLAN, SECTION & DETAILS

DATE:	MAR. 14, 2014
SCALE:	NOTED
CHKD:	DFTM: AAT/RWS JLJ/KLT
JOB NO:	23419-013
DWG. NO:	AB1

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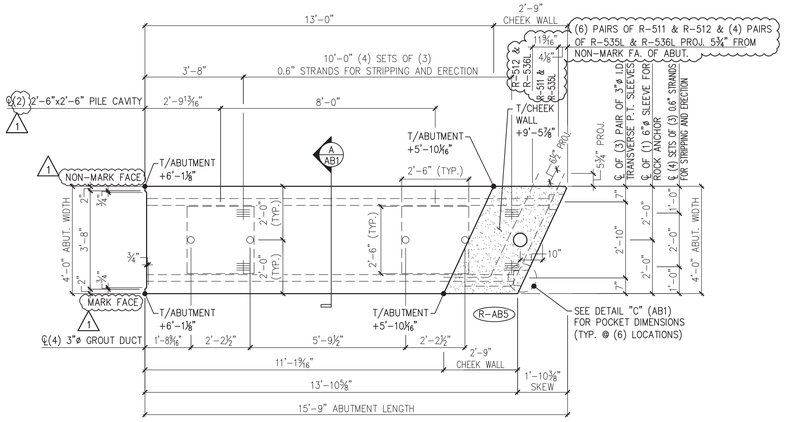
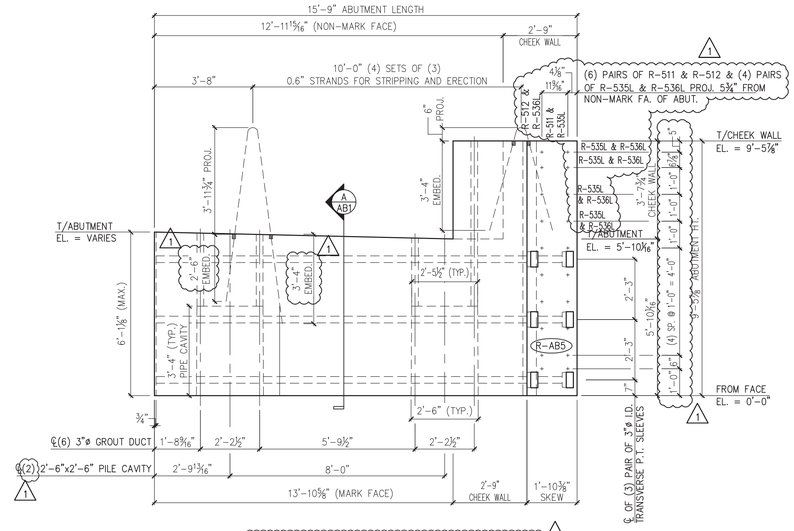
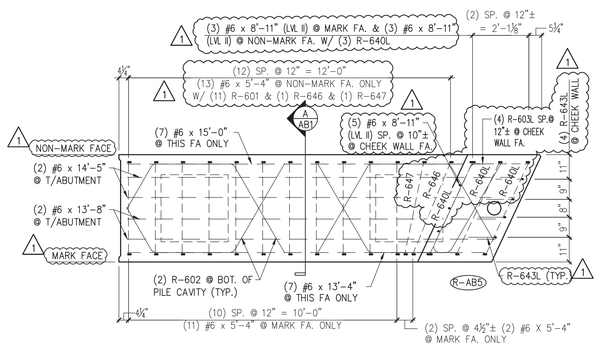


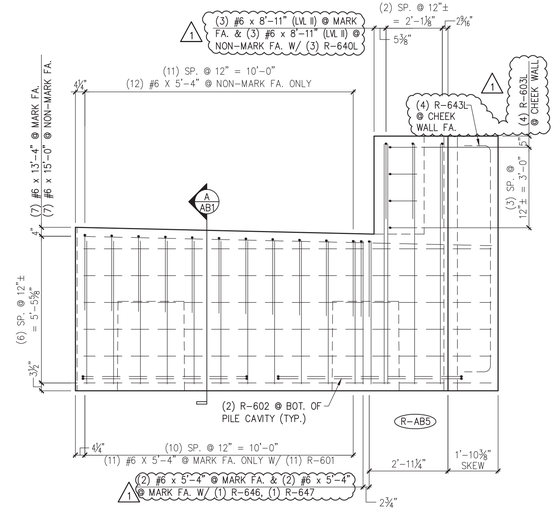
1 AB2 ABUTMENT DIMENSIONAL PLAN VIEW IN FORM
3/8" =1'-0"



2 AB2 ABUTMENT DIMENSIONAL MARK FACE ELEV.
3/8" =1'-0"



3 AB2 ABUTMENT REINFORCING PLAN VIEW IN FORM
3/8" =1'-0"



4 AB2 ABUTMENT REINFORCING MARK FACE ELEV.
3/8" =1'-0"

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APR 21 2014
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MIDDLEBURY, VT 05753

MARK:	R-AB5	QTY.: 1	WT.: 26.3 T	VOL.: 12.99 cy

ITEM	MARK	MATERIAL LIST / ABUTMENT	QTY.
1	R-511	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	6
2	R-512	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	6
3	R-535L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
4	R-536L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
5			
6	R-601	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	11
7	R-602	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	4
8	R-603L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
9	R-640L	#6 BENT BAR (LEVEL II – DUAL COATED)	3
10	R-643L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
11	R-645	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	3
12	R-646	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
13	R-647	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
14			
15			
16		#6 x 5'-4" (LEVEL I – BLACK REINFORCEMENT)	26
17		#6 x 8'-11" (LEVEL I – BLACK REINFORCEMENT)	11
18		#6 x 13'-4" (LEVEL I – BLACK REINFORCEMENT)	7
19		#6 x 13'-8" (LEVEL I – BLACK REINFORCEMENT)	2
20		#6 x 14'-5" (LEVEL I – BLACK REINFORCEMENT)	2
21		#6 x 15'-0" (LEVEL I – BLACK REINFORCEMENT)	7
22			
23		SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS	4

1 4/11/14 REVISE & RESUBMIT

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COUNTY OF WINDSOR

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VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST ABUTMENT DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: AB2

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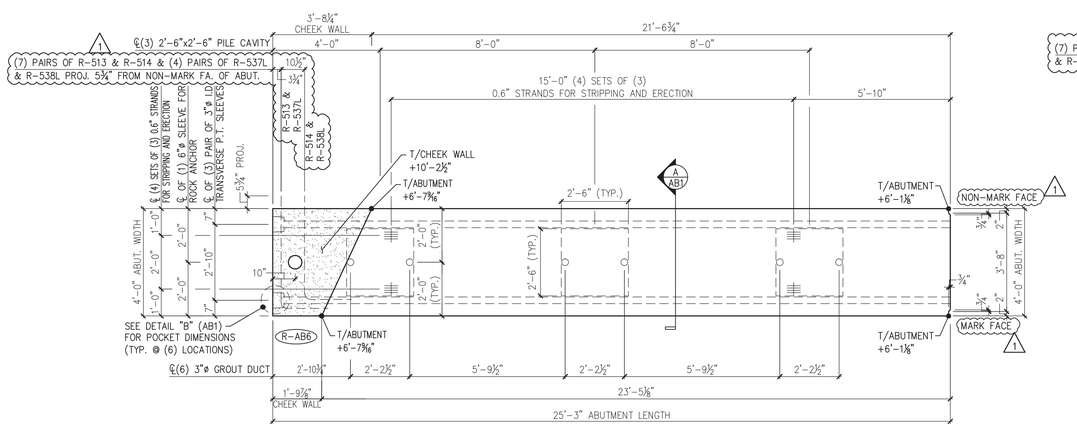
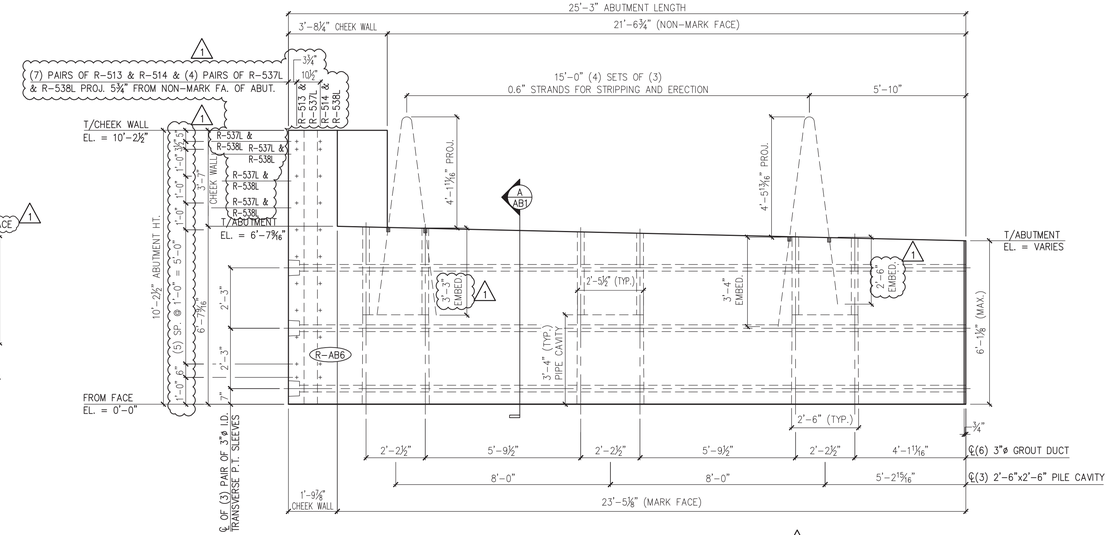
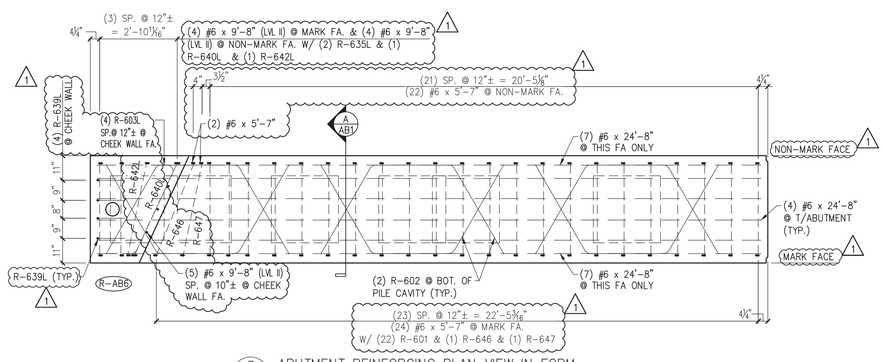


1 AB3 ABUTMENT DIMENSIONAL PLAN VIEW IN FORM
3/8" =1'-0"

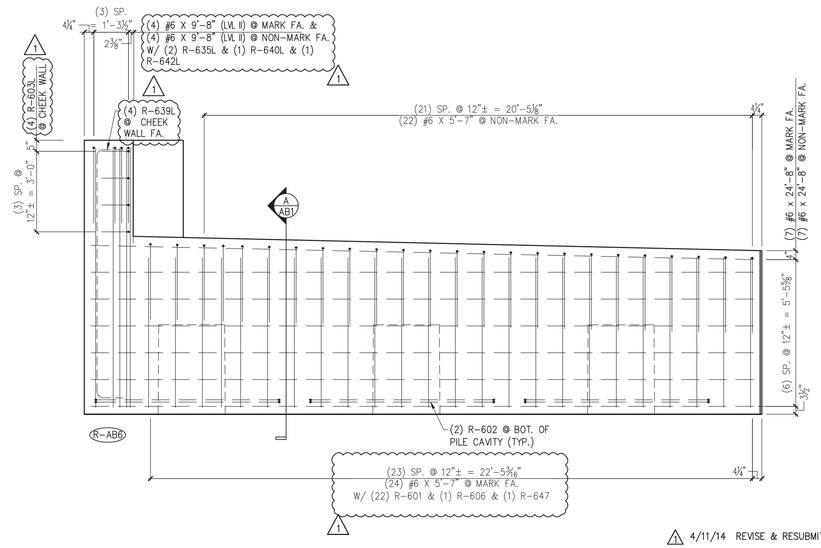


2 AB3 ABUTMENT DIMENSIONAL MARK FACE ELEV.
3/8" =1'-0"

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753



3 AB3 ABUTMENT REINFORCING PLAN VIEW IN FORM
3/8" =1'-0"



4 AB3 ABUTMENT REINFORCING MARK FACE ELEV.
3/8" =1'-0"

MARK: R-AB6	QTY.: 1	WT.: 46.8 T	VOL.: 21.10 cy

MATERIAL LIST / ABUTMENT

ITEM	MARK	DESCRIPTION	QTY.
1	R-513	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	7
2	R-514	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	7
3	R-537L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
4	R-538L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
5			
6	R-601	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	24
7	R-602	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	6
8	R-646	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
9	R-603L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
10	R-635L	#6 BENT BAR (LEVEL II – DUAL COATED)	2
11	R-639L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
12	R-640L	#6 BENT BAR (LEVEL II – DUAL COATED)	1
13	R-642L	#6 BENT BAR (LEVEL II – DUAL COATED)	1
14	R-645	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
15	R-646	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
16	R-647	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
17			
18			
19		#6 x 5'-7" (LEVEL I – BLACK REINFORCEMENT)	48
20		#6 x 9'-8" (LEVEL I – BLACK REINFORCEMENT)	13
21		#6 x 24'-8" (LEVEL I – BLACK REINFORCEMENT)	18
22			
23		SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS	4

1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST ABUTMENT DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJJ/KLT
JOB NO: 23419-013
DWG. NO: AB3

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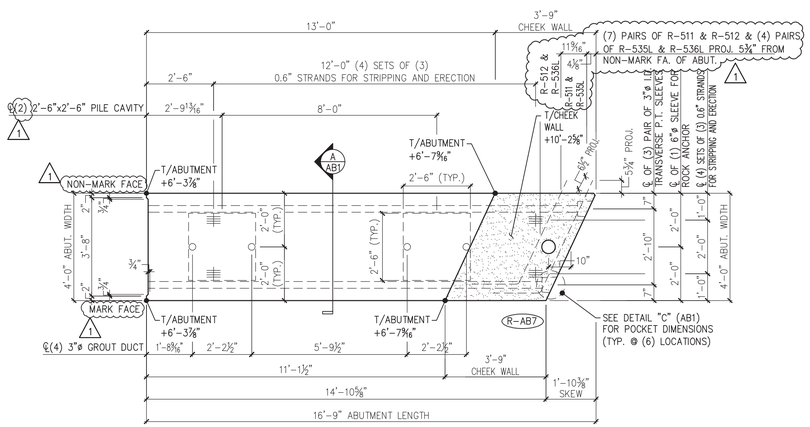
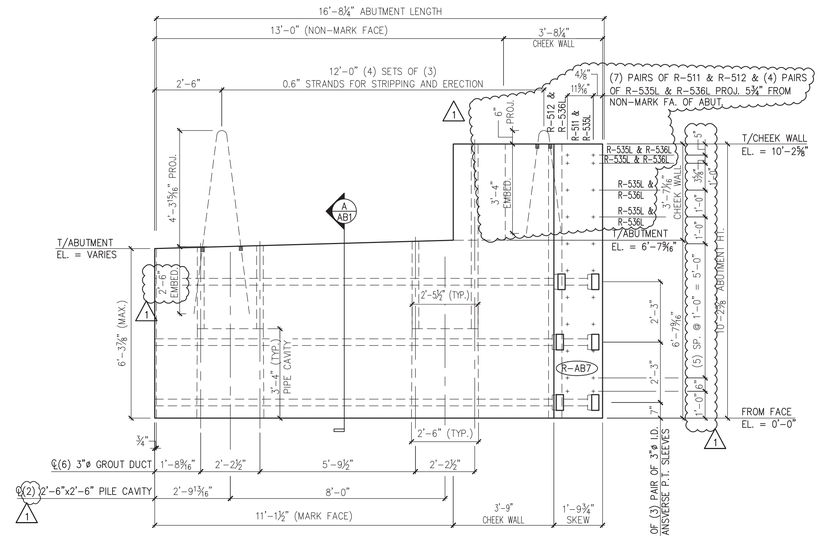
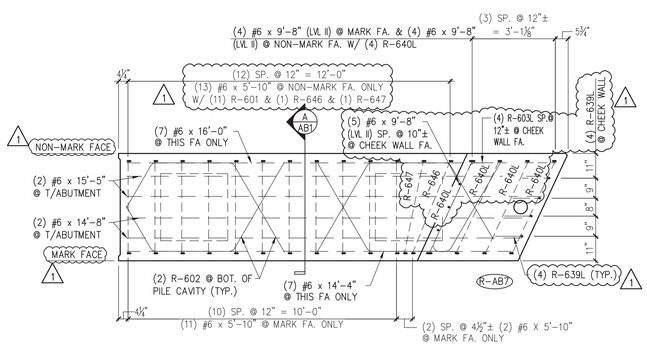


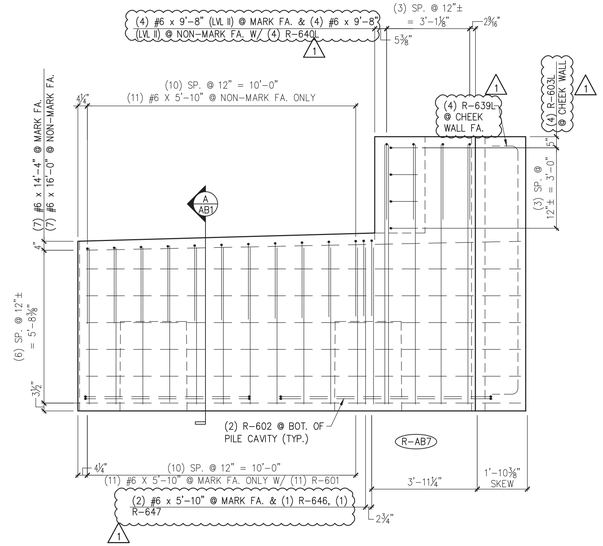
1 AB4 ABUTMENT DIMENSIONAL PLAN VIEW IN FORM
3/8" =1'-0"



2 AB4 ABUTMENT DIMENSIONAL MARK FACE ELEV.
3/8" =1'-0"



3 AB4 ABUTMENT REINFORCING PLAN VIEW IN FORM
3/8" =1'-0"



4 AB4 ABUTMENT REINFORCING MARK FACE ELEV.
3/8" =1'-0"

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

MARK: R-AB7	QTY.: 1	WT.: 31.7 T	VOL.: 15.65 cy

MATERIAL LIST / ABUTMENT

ITEM	MARK	DESCRIPTION	QTY.
1	R-511	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	7
2	R-512	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	7
3	R-535L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
4	R-536L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
5			
6	R-601	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	11
7	R-602	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	4
8	R-603L	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	4
9	R-639L	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	4
10	R-640L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
11	R-645	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	4
12	R-646	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
13	R-647	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
14			
15		#6 x 5'-10" (LEVEL I – BLACK REINFORCEMENT)	26
16		#6 x 9'-8" (LEVEL I – BLACK REINFORCEMENT)	13
17		#6 x 14'-4" (LEVEL I – BLACK REINFORCEMENT)	7
18		#6 x 14'-8" (LEVEL I – BLACK REINFORCEMENT)	2
19		#6 x 15'-5" (LEVEL I – BLACK REINFORCEMENT)	2
20		#6 x 16'-0" (LEVEL I – BLACK REINFORCEMENT)	7

1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
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W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST ABUTMENT DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: AB4

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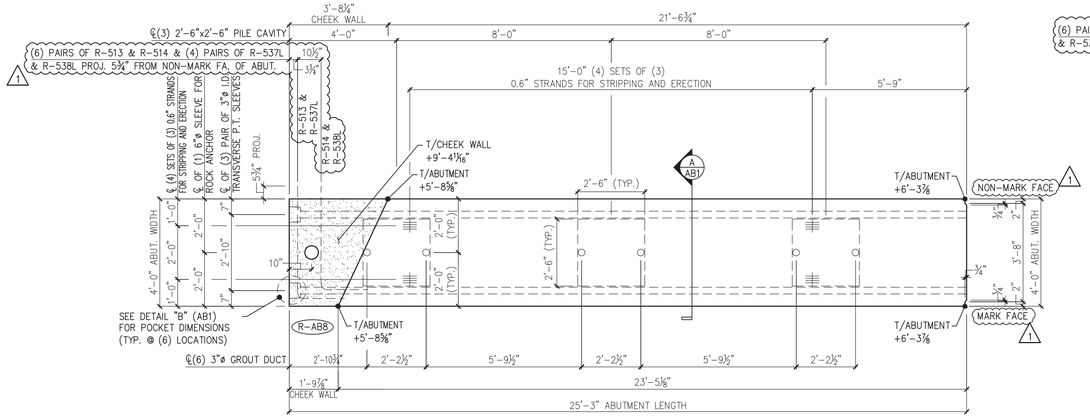
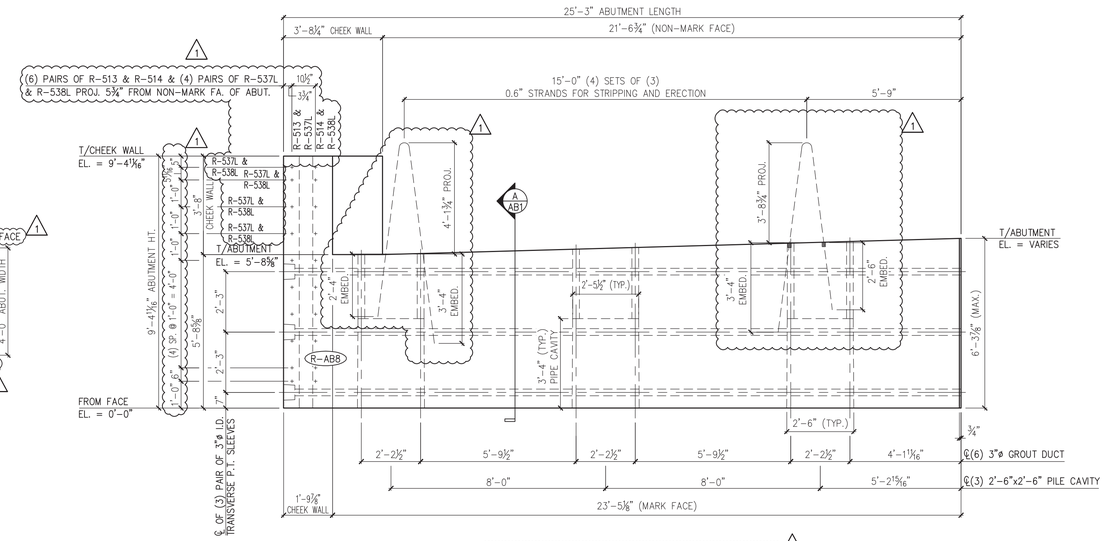
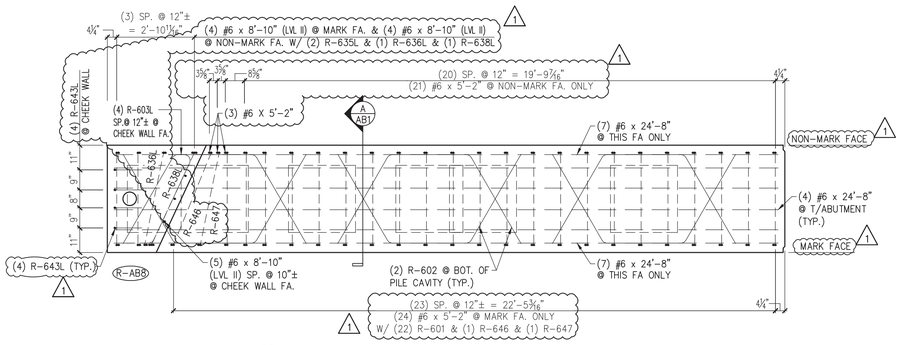


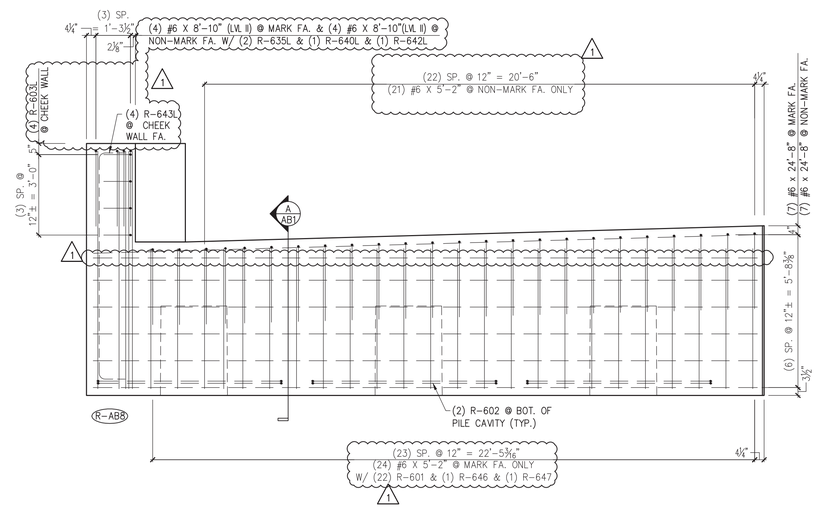
1 AB5 ABUTMENT DIMENSIONAL PLAN VIEW IN FORM
3/8" =1'-0"



2 AB5 ABUTMENT DIMENSIONAL MARK FACE ELEV.
3/8" =1'-0"



3 AB5 ABUTMENT REINFORCING PLAN VIEW IN FORM
3/8" =1'-0"



4 AB5 ABUTMENT REINFORCING MARK FACE ELEV.
3/8" =1'-0"

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

MARK: R-AB8 | QTY.: 1 | WT.: 43.7 T | VOL.: 21.57 cy

MATERIAL LIST / ABUTMENT

ITEM	MARK	DESCRIPTION	QTY.
1	R-513	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	6
2	R-514	#5 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	6
3	R-537L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
4	R-538L	#5 BENT BAR (LEVEL II – DUAL COATED)	4
5			
6	R-601	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	22
7	R-602	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	6
8	R-603L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
8	R-635L	#6 BENT BAR (LEVEL II – DUAL COATED)	2
8	R-636L	#6 BENT BAR (LEVEL II – DUAL COATED)	1
8	R-638L	#6 BENT BAR (LEVEL II – DUAL COATED)	1
9	R-640L	#6 BENT BAR (LEVEL II – DUAL COATED)	4
10	R-642L	#6 BENT BAR (LEVEL II – DUAL COATED)	1
11	R-643L	#6 BENT BAR (LEVEL II – DUAL COATED)	1
12	R-645	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
13	R-646	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
14	R-647	#6 BENT BAR (LEVEL I – BLACK REINFORCEMENT)	1
15			
16		#6 x 5'-2" (LEVEL I – BLACK REINFORCEMENT)	48
17		#6 x 8'-10" (LEVEL I – BLACK REINFORCEMENT)	13
18		#6 x 24'-8" (LEVEL I – BLACK REINFORCEMENT)	18
19			
20		SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS	4

1 4/11/14 REVISE & RESUBMIT

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PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST ABUTMENT DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: AB5

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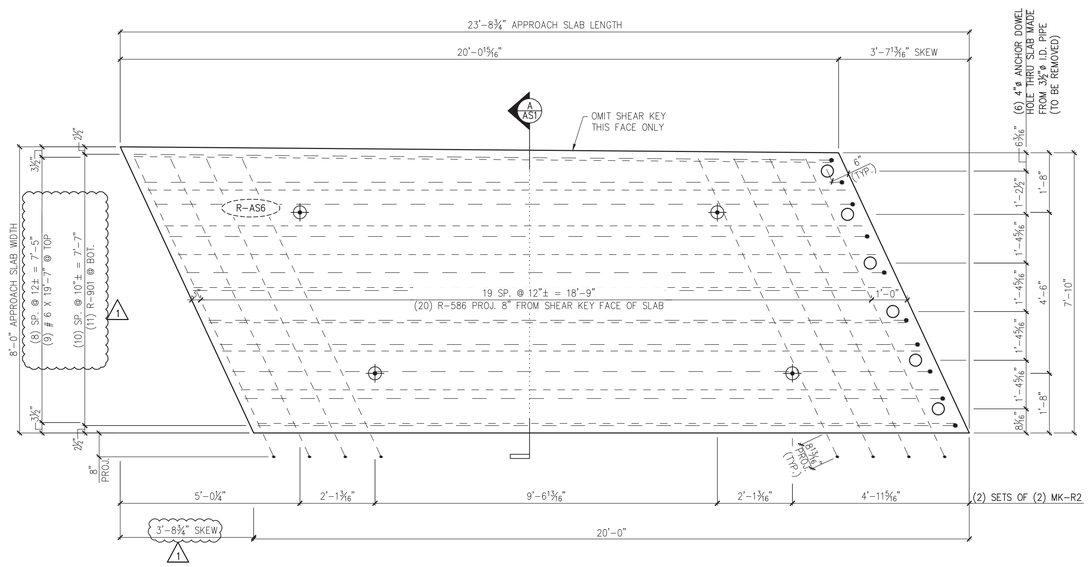
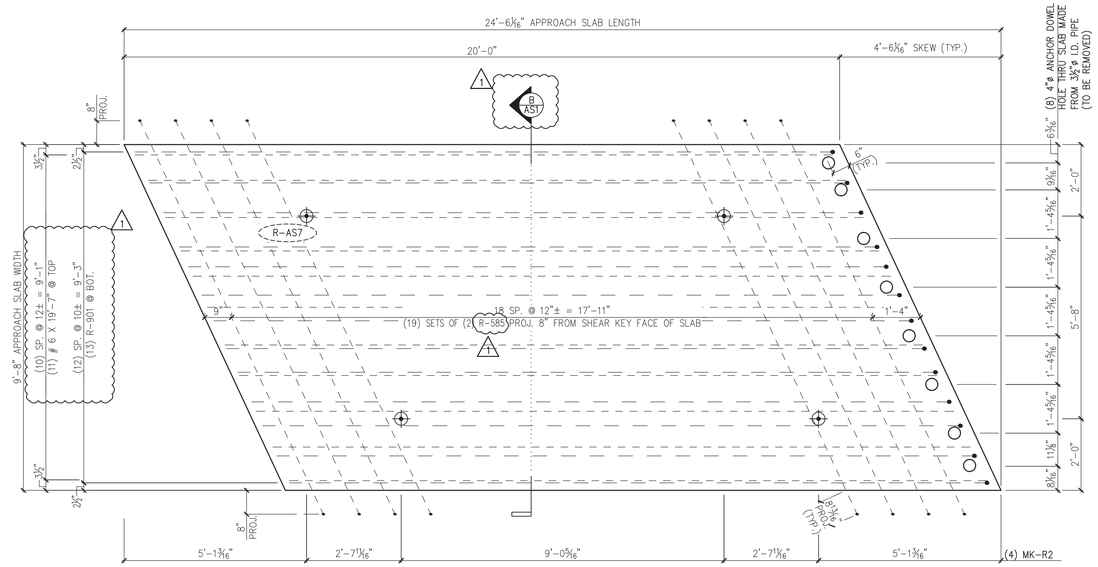
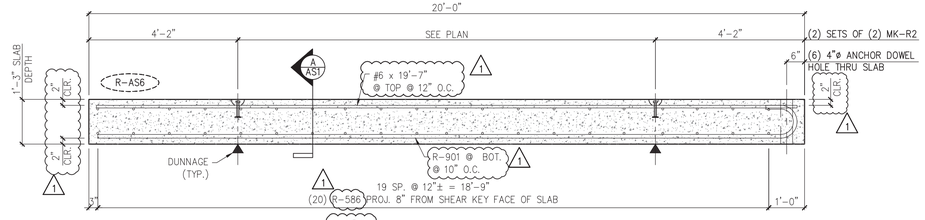


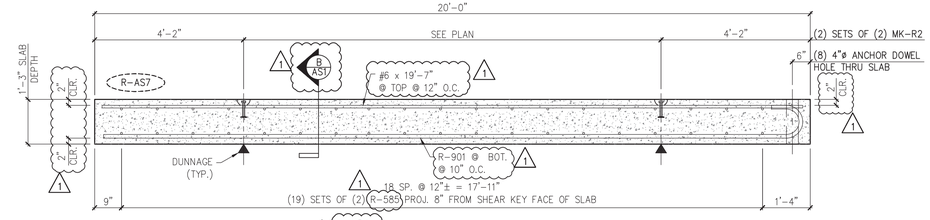
1 AS1 PLAN IN VIEW FORM 1/2" =1'-0"



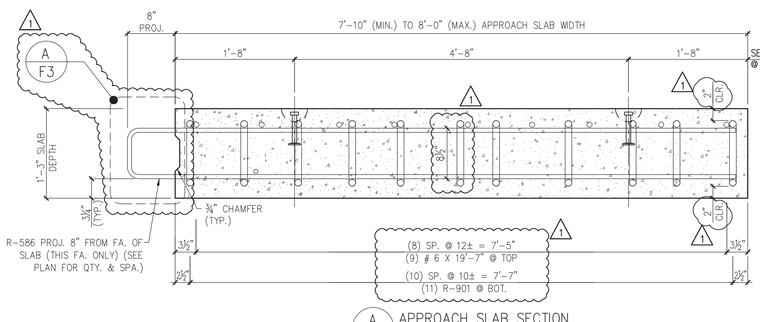
3 AS1 PLAN IN VIEW FORM 1/2" =1'-0"



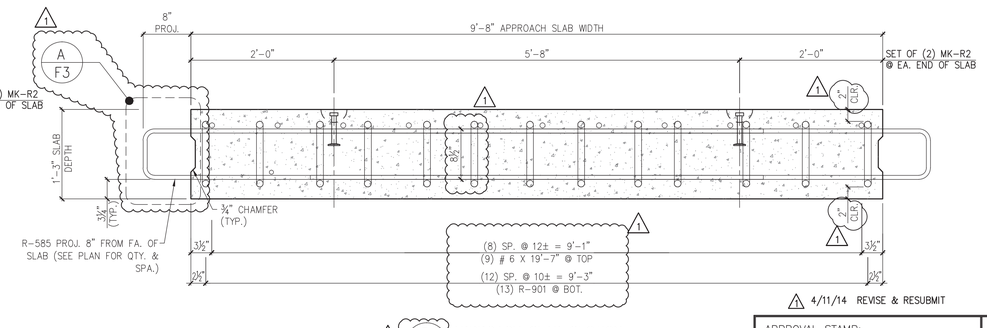
2 AS1 LONGITUDIAL SECTION 1/2" = 1'-0"



4 AS1 LONGITUDIAL SECTION 1/2" = 1'-0"



A AS1 APPROACH SLAB SECTION 1" = 1'-0"



B AS1 APPROACH SLAB SECTION 1" = 1'-0"

1 4/11/14 REVISE & RESUBMIT

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

MARK:	R-AS6	QTY.:	1	WT.:	14.9 T	VOL.:	7.33 cy
MARK:	R-AS7	QTY.:	1	WT.:	18.2 T	VOL.:	8.95 cy

MATERIAL LIST / APPROACH SLAB

ITEM	MARK	DESCRIPTION	QTY. WING WALL R-AS6	QTY. WING WALL R-AS7
1	R-585	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	0	38
2	R-586	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	20	0
3				
4		#6 x 19'-7" (LEVEL I, BLACK REINFORCEMENT)	9	9
5				
6	R-901	#9 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	11	13
7				
8	MK-R2	8T x 10" SWIFT LIFT LIFTER	4	4

APPROVAL STAMP:

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Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SCHULTZ CONSTRUCTION, INC.
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STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST APPROACH SLAB DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JLJ/KLT
JOB NO: 23419-013
DWG. NO: AS1

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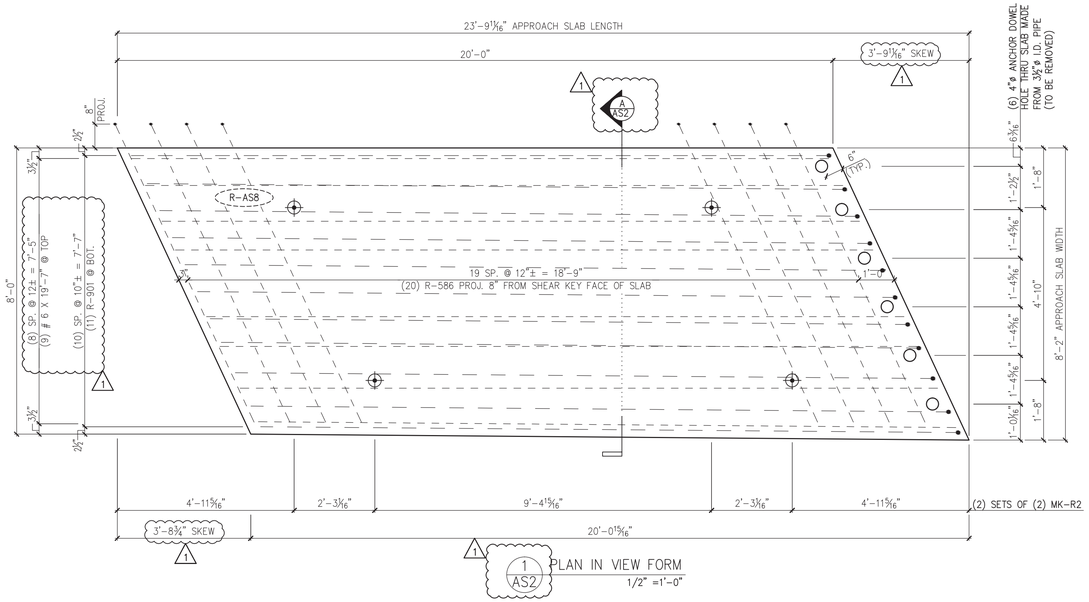

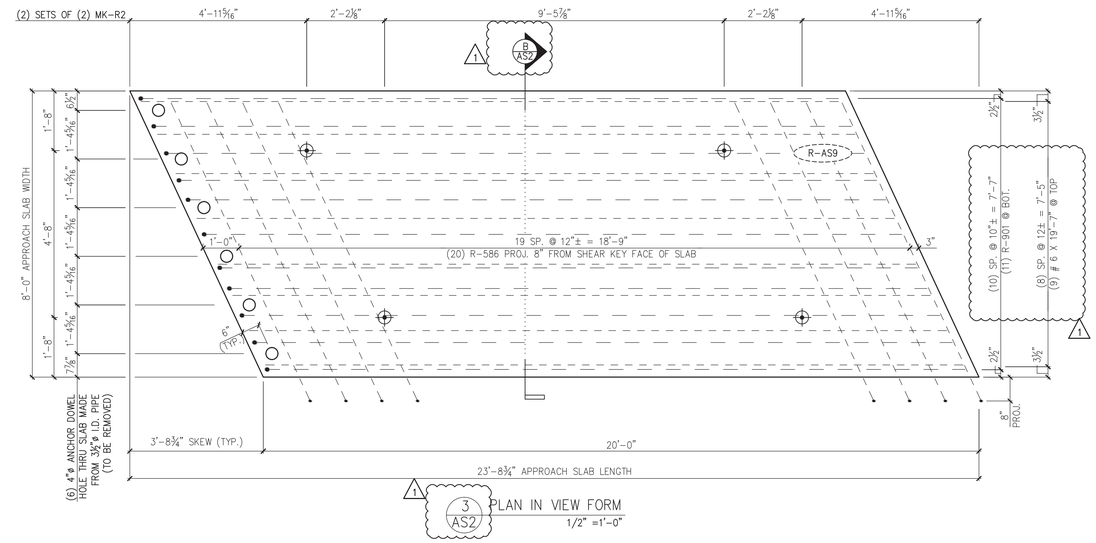

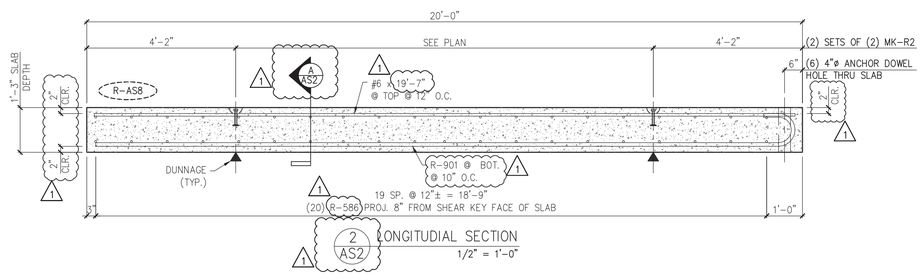

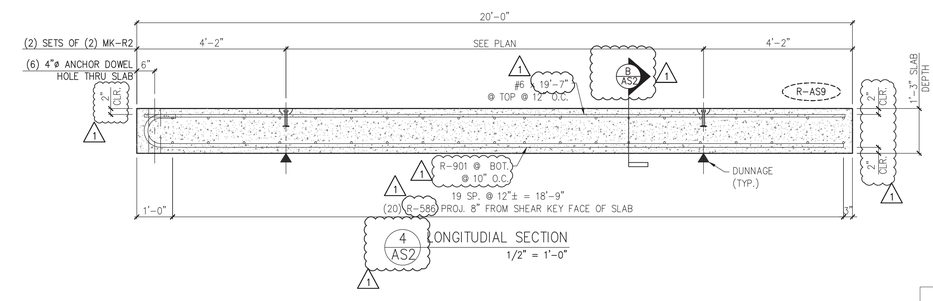

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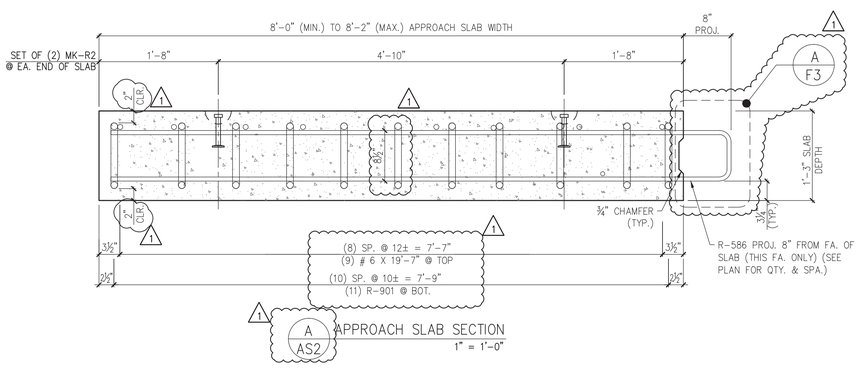
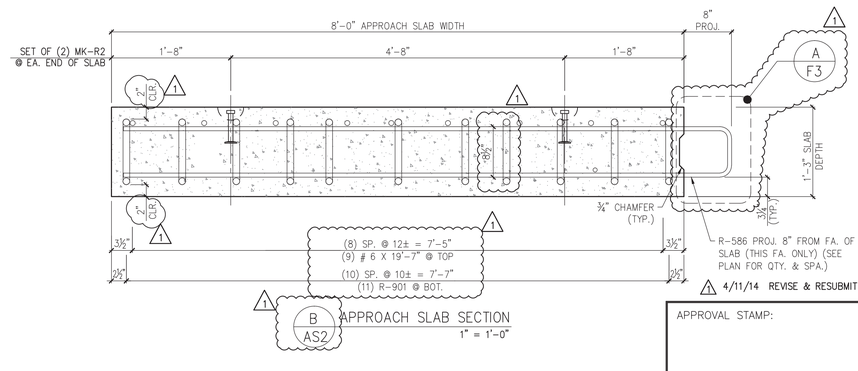
MIDDLEBURY, VT 05753





MARK:	R-AS8	QTY.:	1	WT.:	15.3 T	VOL.:	7.48 cy
MARK:	R-AS9	QTY.:	1	WT.:	15.0 T	VOL.:	7.41 cy

MATERIAL LIST / APPROACH SLAB

ITEM	MARK	DESCRIPTION	QTY./WING WALL R-AS8	QTY./WING WALL R-AS9
1				
2	R-586	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	20	20
3				
4	1	#6 x 19'-7" (LEVEL I, BLACK REINFORCEMENT)	9	9
5				
6	R-901	#9 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	11	11
7				
8	MK-R2	8T x 10" SWIFT LIFT LIFTER	4	4

1 4/11/14 REVISE & RESUBMIT

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Precast & Prestress Manufacturer
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PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST APPROACH SLAB DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JLJ/KLT
JOB NO: 23419-013
DWG. NO: AS2

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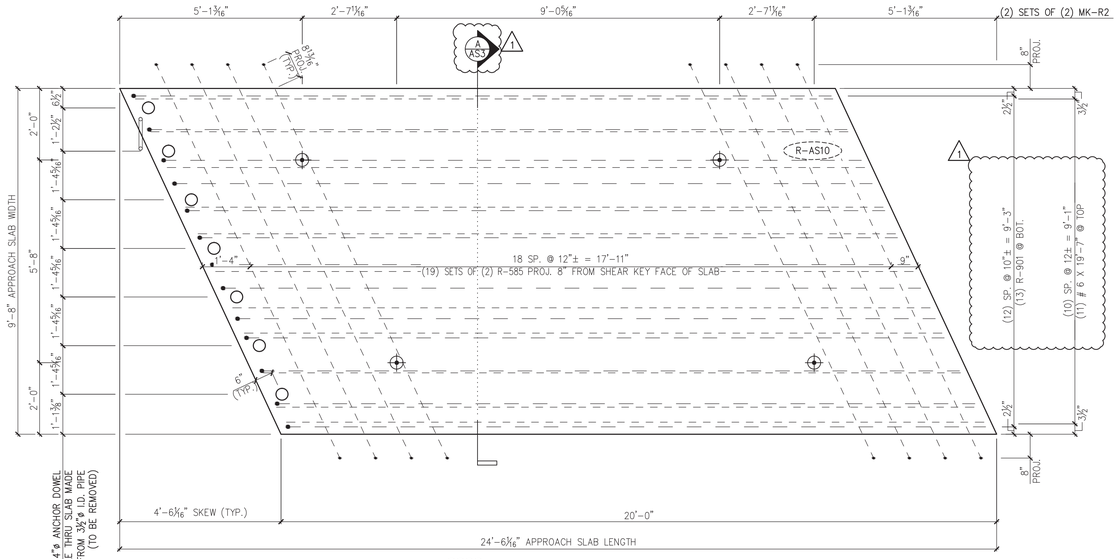
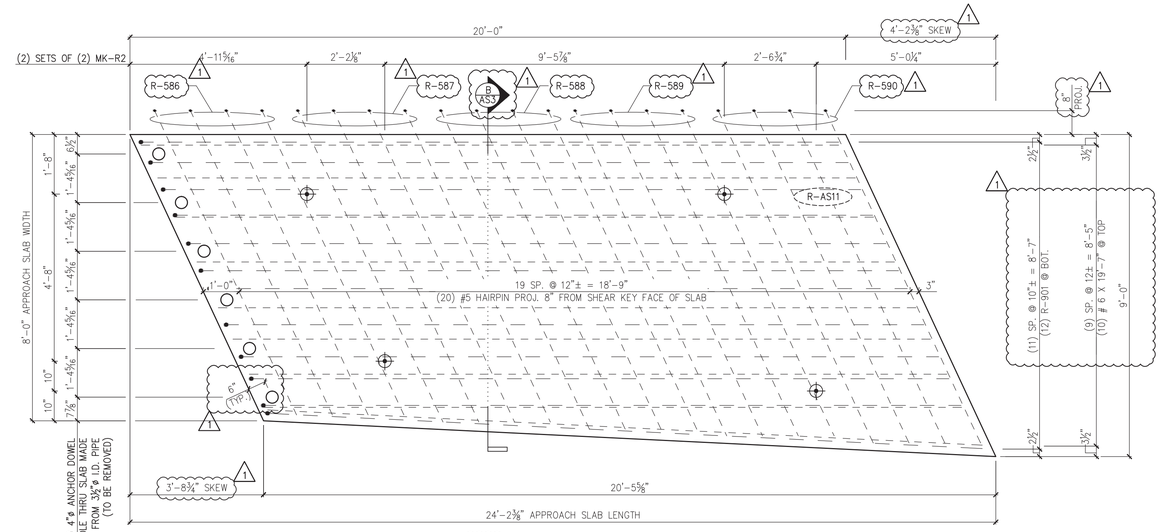
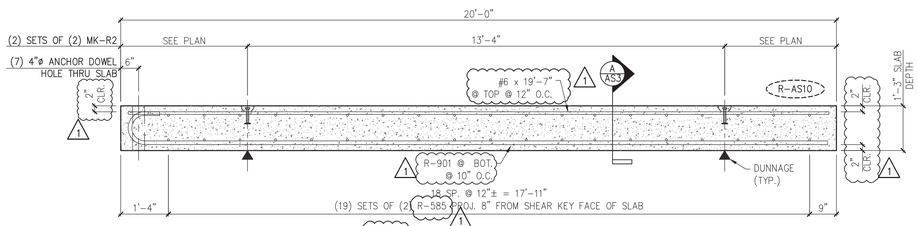


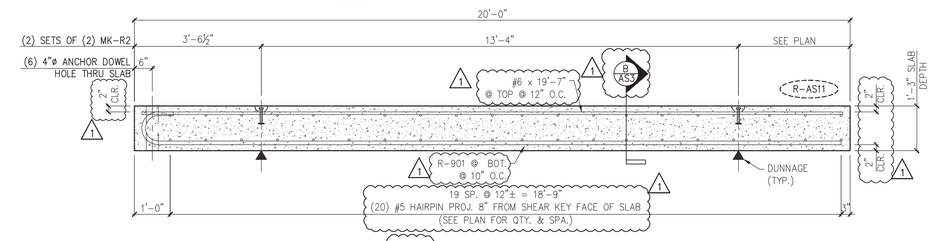
1 AS3 PLAN IN VIEW FORM
1/2" =1'-0"



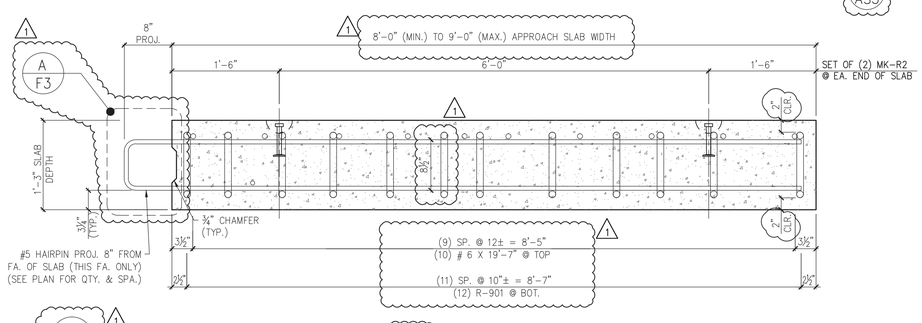
1 AS3 PLAN IN VIEW FORM
1/2" =1'-0"



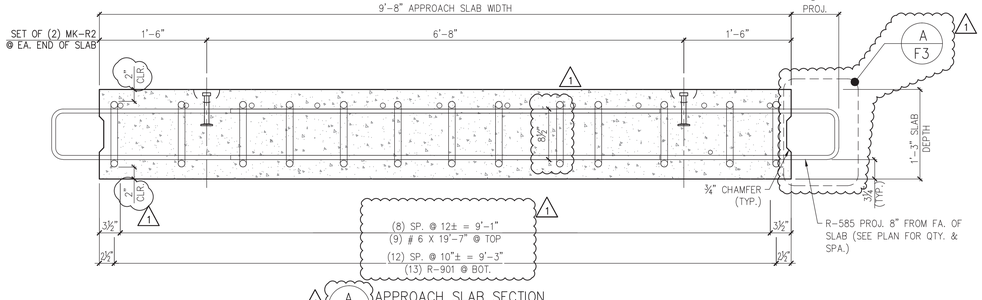
2 AS3 LONGITUDIAL SECTION
1/2" = 1'-0"



4 AS3 LONGITUDIAL SECTION
1/2" = 1'-0"



B AS3 APPROACH SLAB SECTION
1" = 1'-0"



A AS3 APPROACH SLAB SECTION
1" = 1'-0"

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

MARK:	R-AS10	QTY.: 1	WT.: 18.2 T	VOL.: 8.95 cy
MARK:	R-AS11	QTY.: 1	WT.: 16.0 T	VOL.: 7.87 cy

MATERIAL LIST / APPROACH SLAB

ITEM	MARK	DESCRIPTION	QTY./WING WALL R-AS10	QTY./WING WALL R-AS11
1	R-585	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	8	0
2	R-586	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	0	4
3	R-587	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	0	4
4	R-588	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	0	4
5	R-589	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	0	4
6	R-590	#5 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	0	4
7				
8				
8		#6 x 19'-7" (LEVEL I, BLACK REINFORCEMENT)	9	10
8				
8	R-901	#9 BENT BAR (LEVEL I, BLACK REINFORCEMENT)	13	12
8				
8	MK-R2	8T x 10" SWIFT LIFT LIFTER	4	4

1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

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Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST APPROACH SLAB DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JLJ/KLT
JOB NO: 23419-013
DWG. NO: AS3

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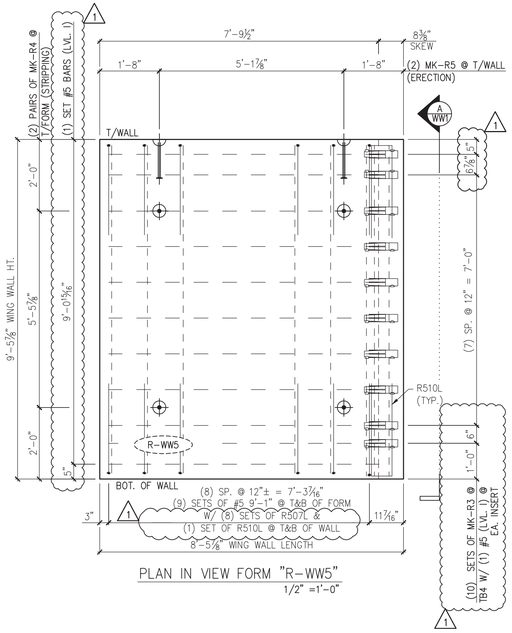
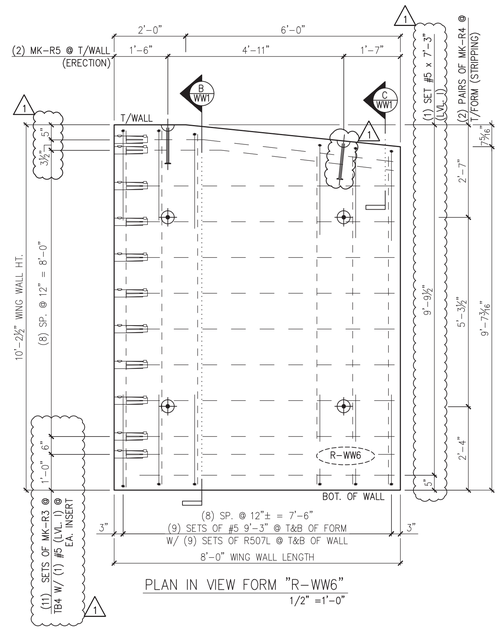
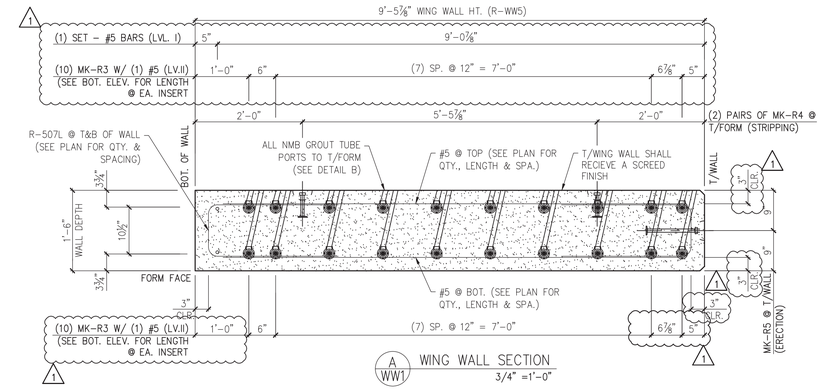


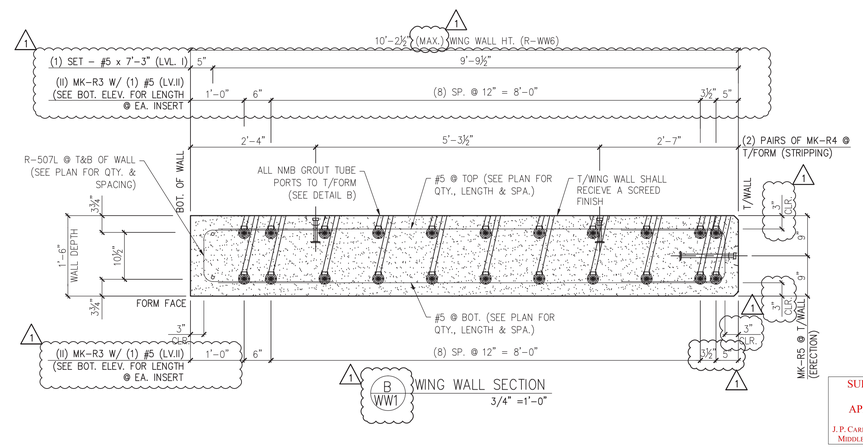
PLAN IN VIEW FORM "R-WW5"
1/2" =1'-0"



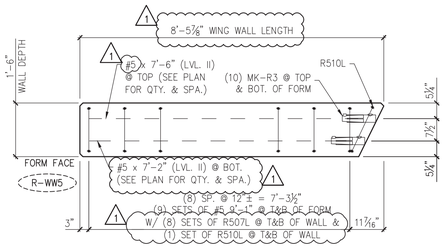
PLAN IN VIEW FORM "R-WW6"
1/2" =1'-0"



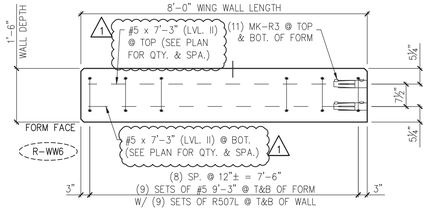
A WW1 WING WALL SECTION
3/4" =1'-0"



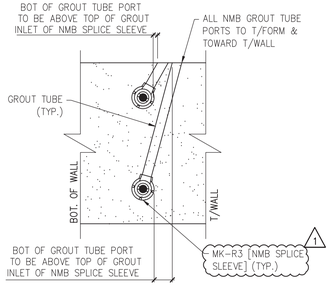
B WW1 WING WALL SECTION
3/4" =1'-0"



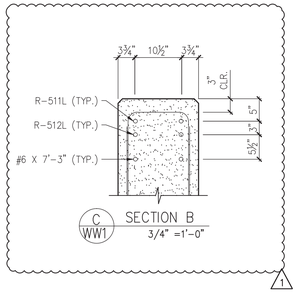
WING WALL BOTTOM ELEVATION
1/2" =1'-0"



WING WALL BOTTOM ELEVATION
1/2" =1'-0"



DETAIL - "B"
1-1/2" =1'-0"



SECTION B
3/4" =1'-0"

SUBMITTED
APR 21 2014
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MIDDLEBURY, VT 05753

MARK:	R-WW5	QTY.:	1	WT.:	8.8 T	VOL.:	4.30 cy
MARK:	R-WW6	QTY.:	1	WT.:	9.0 T	VOL.:	4.44 cy

MATERIAL LIST / WING WALL

ITEM	MARK	DESCRIPTION	QTY./WING WALL R-WW5	QTY./WING WALL R-WW6
1	R-507L	#5 BENT BAR (LEVEL II, DUAL COATED)	16	18
2	R-510L	#5 BENT BAR (LEVEL II, DUAL COATED)	2	0
3	R-511L	#5 BENT BAR (LEVEL II, DUAL COATED)	0	2
4	R-512L	#5 BENT BAR (LEVEL II, DUAL COATED)	0	2
5				
6				
7		#5 x 7'-2" (LEVEL II, DUAL COATED)	11	0
8		#5 x 7'-3" (LEVEL II, DUAL COATED)	0	20
9		#5 x 7'-6" (LEVEL II, DUAL COATED)	11	0
10		#5 x 9'-1" (LEVEL II, DUAL COATED)	18	0
11		#5 x 9'-3" (LEVEL II, DUAL COATED)	0	18
12				
13				
14	MK-R3	NMB SPLICE SLEEVE #5 U-X(PG) (EPOXY COATED) 1	20	22
15	MK-R4	4T x 9 1/2" SWIFT LIFT LIFTER	4	4
16	MK-R5	20T x 19 3/4" SWIFT LIFT LIFTER	2	2

1 4/11/14 REVISE & RESUBMIT

APPROVAL STAMP:

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Precast & Prestress Manufacturer
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W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST WING WALL DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: WW1

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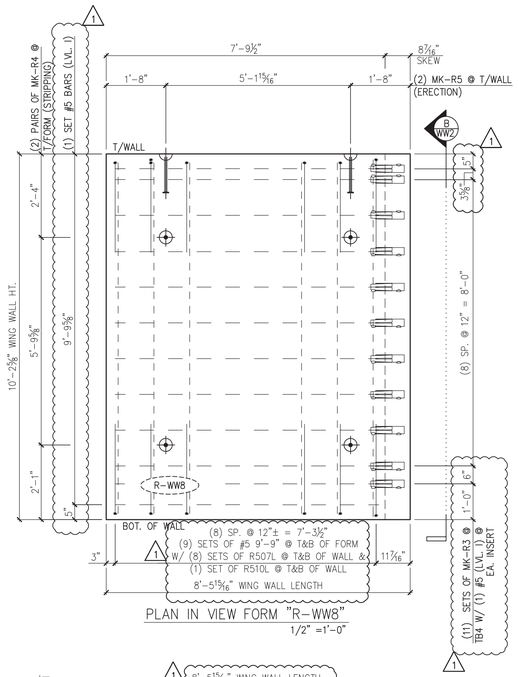
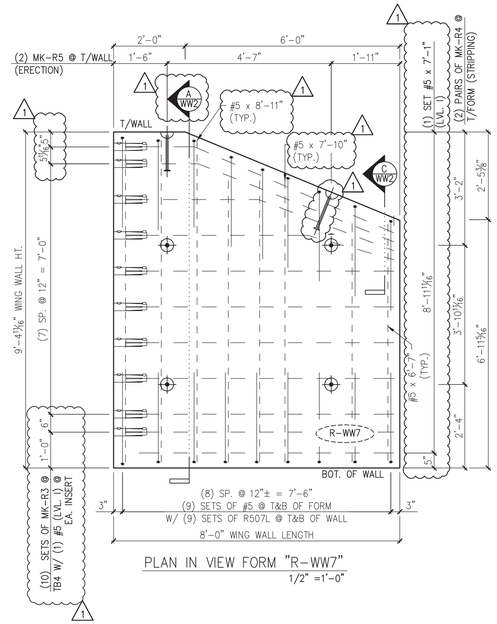
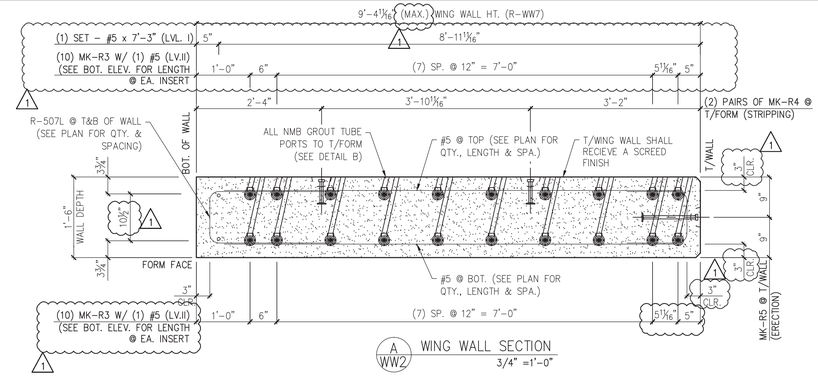


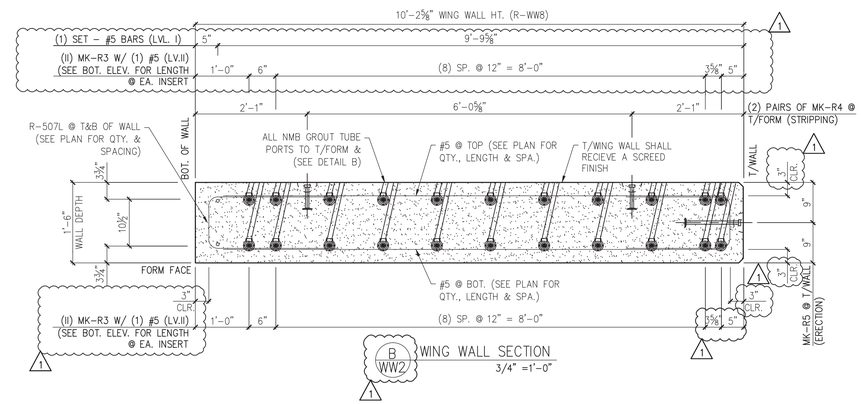
PLAN IN VIEW FORM "R-WW8"
1/2" =1'-0"



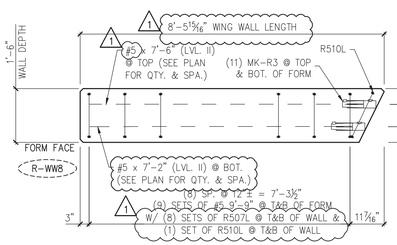
PLAN IN VIEW FORM "R-WW7"
1/2" =1'-0"



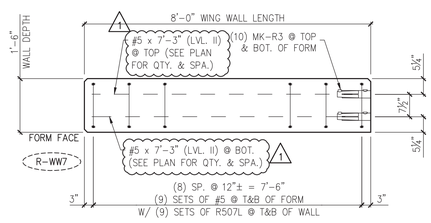
A WW2 WING WALL SECTION
3/4" =1'-0"



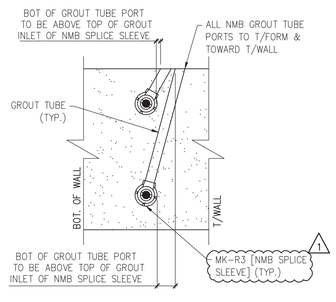
B WW2 WING WALL SECTION
3/4" =1'-0"



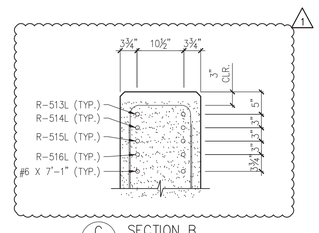
WING WALL BOTTOM ELEVATION
1/2" =1'-0"



WING WALL BOTTOM ELEVATION
1/2" =1'-0"



DETAIL - "B"
1-1/2" =1'-0"



C WW2 SECTION B
3/4" =1'-0"

SUBMITTED
APR 21 2014
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MIDDLEBURY, VT 05753

MARK:	R-WW8	QTY.:	1	WT.:	9.4 T	VOL.:	4.63 cy
MARK:	R-WW7	QTY.:	1	WT.:	7.7 T	VOL.:	3.76 cy

MATERIAL LIST / WING WALL

ITEM	MARK	DESCRIPTION	QTY./WING WALL R-WW8	QTY./WING WALL R-WW7
1	R-507L	#5 BENT BAR (LEVEL II, DUAL COATED)	16	18
2	R-510L	#5 BENT BAR (LEVEL II, DUAL COATED)	2	0
3	R-513L	#5 BENT BAR (LEVEL II, DUAL COATED)	0	2
4	R-514L	#5 BENT BAR (LEVEL II, DUAL COATED)	0	2
5	R-515L	#5 BENT BAR (LEVEL II, DUAL COATED)	0	2
6	R-516L	#5 BENT BAR (LEVEL II, DUAL COATED)	0	2
7				
8				
9		#5 x 6'-7" (LEVEL II, DUAL COATED)	0	6
10		#5 x 7'-2" (LEVEL II, DUAL COATED)	12	0
11		#5 x 7'-3" (LEVEL II, DUAL COATED)	0	14
12		#5 x 7'-6" (LEVEL II, DUAL COATED)	12	0
13		#5 x 7'-10" (LEVEL II, DUAL COATED)	0	6
14		#5 x 8'-11" (LEVEL II, DUAL COATED)	0	6
15		#5 x 9'-9" (LEVEL II, DUAL COATED)	18	0
16				
17				
18				
19	MK-R3	NMB SPLICE SLEEVE #5 U-X(PG) (EPOXY COATED) 1	22	20
	MK-R4	4T x 9 1/2" SWIFT LIFT LIFTER	4	4
	MK-R5	20T x 19 3/4" SWIFT LIFT LIFTER	2	2

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APPROVAL STAMP:

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COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

PRECAST WING WALL DETAILS

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: WW2

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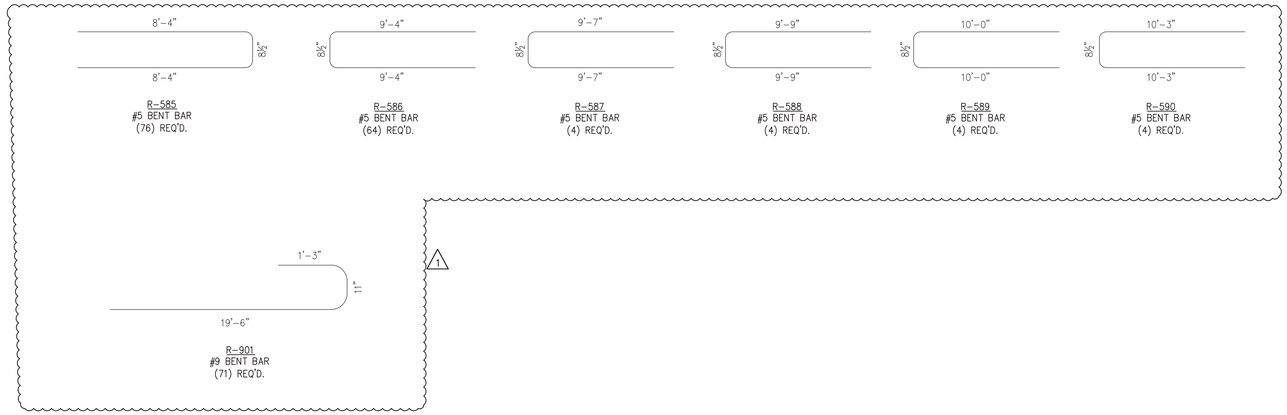
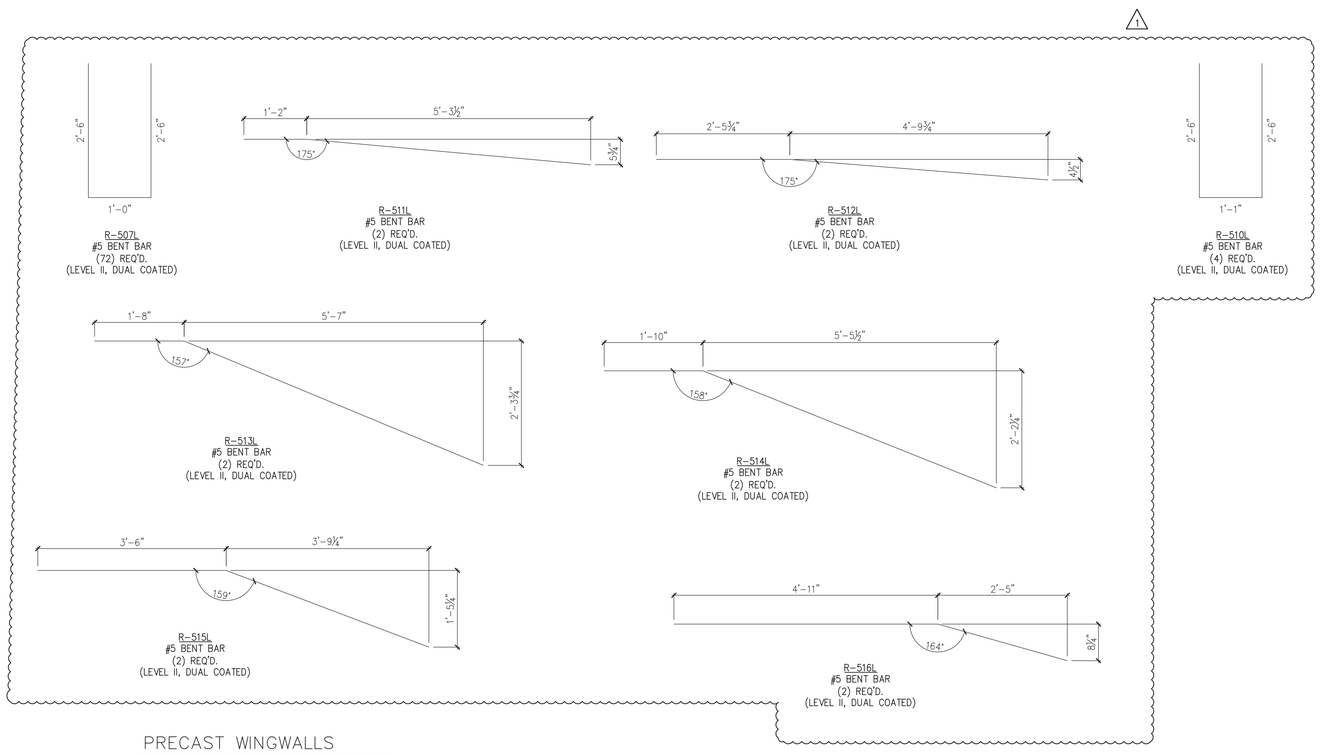


PRECAST APPROACH SLABS

MISCELLANEOUS MATERIALS					
ITEM	MARK	QTY.	DESCRIPTION	REMARKS	
1					PRECAST APPROACH SLABS
2		55	#6 x 19'-7" (LEVEL I, BLACK REINFORCEMENT)		PRECAST APPROACH SLABS
3					PRECAST APPROACH SLABS
4					PRECAST APPROACH SLABS
5					PRECAST APPROACH SLABS
6	MK-R2	24	8T x 10" SWIFT LIFT LIFTER		PRECAST APPROACH SLABS
7					PRECAST APPROACH SLABS
8					PRECAST APPROACH SLABS
9					PRECAST APPROACH SLABS
10		6	#5 x 6'-7" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
11		23	#5 x 7'-2" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
12		34	#5 x 7'-3" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
13		23	#5 x 7'-6" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
14		6	#5 x 7'-10" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
15		6	#5 x 8'-11" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
16		18	#5 x 9'-1" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
17		18	#5 x 9'-3" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
18		18	#5 x 9'-9" (LEVEL II, DUAL COATED)		PRECAST WING WALLS
19					PRECAST WING WALLS
20					PRECAST WING WALLS
21					PRECAST WING WALLS
22	MK-R3	84	NMB SPLICE SLEEVE #5 U-X(PG) (EPOXY COATED)		PRECAST WING WALLS
23	MK-R4	16	4T x 9 1/2" SWIFT LIFT LIFTER		PRECAST WING WALLS
24	MK-R5	8	20T x 19 3/4" SWIFT LIFT LIFTER		PRECAST WING WALLS
25					PRECAST WING WALLS

1



PRECAST WINGWALLS

1 4/11/14 REVISE & RESUBMIT

SUBMITTED
APR 21 2014
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MIDDLEBURY, VT 05753

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Precast & Prestress Manufacturer
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COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

MATERIALS LIST

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: M1

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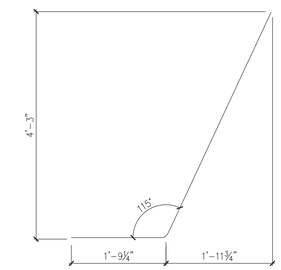
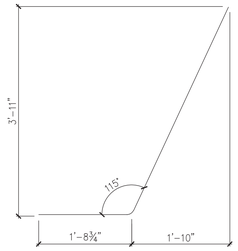


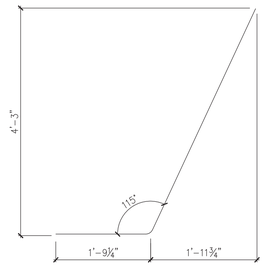
R-511
#5 BENT BAR
(13) REQ'D.



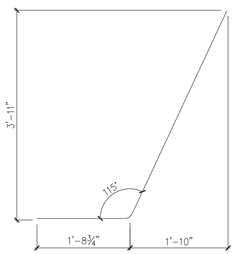
R-512
#5 BENT BAR
(13) REQ'D.

R-513
#5 BENT BAR
(13) REQ'D.

R-514
#5 BENT BAR
(13) REQ'D.



R-535L
#5 BENT BAR
(12) REQ'D.
(LEVEL II, DUAL COATED)

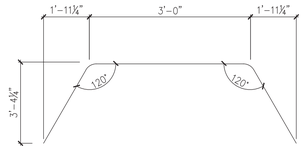


R-536L
#5 BENT BAR
(12) REQ'D.
(LEVEL II, DUAL COATED)

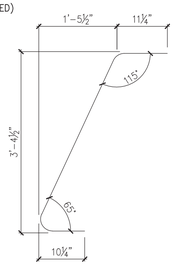
R-537L
#5 BENT BAR
(8) REQ'D.
(LEVEL II, DUAL COATED)

R-538L
#5 BENT BAR
(8) REQ'D.
(LEVEL II, DUAL COATED)

R-601
#6 BENT BAR
(68) REQ'D.

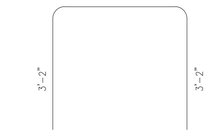


R-602
#6 BENT BAR
(20) REQ'D.



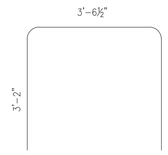
R-603L
#6 BENT BAR
(16) REQ'D.
(LEVEL II, DUAL COATED)

R-604
#6 BENT BAR
(8) REQ'D.

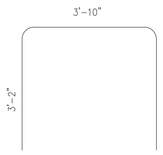


R-635L
#6 BENT BAR
(4) REQ'D.
(LEVEL II, DUAL COATED)

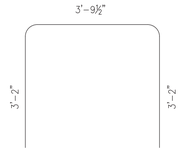
R-643L
#6 BENT BAR
(5) REQ'D.
(LEVEL II, DUAL COATED)



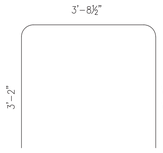
R-636L
#6 BENT BAR
(1) REQ'D.
(LEVEL II, DUAL COATED)



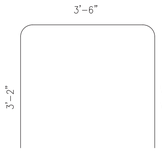
R-638L
#6 BENT BAR
(1) REQ'D.
(LEVEL II, DUAL COATED)



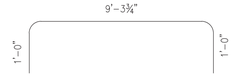
R-645
#6 BENT BAR
(9) REQ'D.



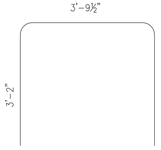
R-646
#6 BENT BAR
(4) REQ'D.



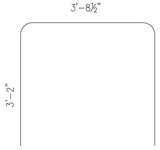
R-647
#6 BENT BAR
(4) REQ'D.



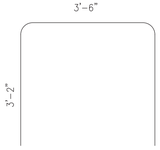
R-608
#6 BENT BAR
(8) REQ'D.



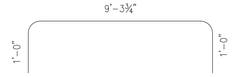
R-640L
#6 BENT BAR
(8) REQ'D.
(LEVEL II, DUAL COATED)



R-641L
#6 BENT BAR
(4) REQ'D.
(LEVEL II, DUAL COATED)



R-642L
#6 BENT BAR
(1) REQ'D.
(LEVEL II, DUAL COATED)



R-639L
#6 BENT BAR
(8) REQ'D.
(LEVEL II, DUAL COATED)

MISCELLANEOUS MATERIALS

ITEM	MARK	QTY.		REMARKS	
1		48	#6 x 5'-2" (LEVEL I – BLACK REINFORCEMENT)		PRECAST ABUTMENT
2		26	#6 x 5'-4" (LEVEL I – BLACK REINFORCEMENT)		
3		48	#6 x 5'-7" (LEVEL I – BLACK REINFORCEMENT)		
4		26	#6 x 5'-10" (LEVEL I – BLACK REINFORCEMENT)		
5		13	#6 x 8'-10" (LEVEL II – BLACK REINFORCEMENT)		
6		11	#6 x 8'-11" (LEVEL II – BLACK REINFORCEMENT)		
7		26	#6 x 9'-8" (LEVEL II – BLACK REINFORCEMENT)		
8		7	#6 x 13'-4" (LEVEL I – BLACK REINFORCEMENT)		
9		2	#6 x 13'-8" (LEVEL I – BLACK REINFORCEMENT)		
10		7	#6 x 14'-4" (LEVEL I – BLACK REINFORCEMENT)		
11		2	#6 x 14'-5" (LEVEL I – BLACK REINFORCEMENT)		
12		2	#6 x 14'-8" (LEVEL I – BLACK REINFORCEMENT)		
13		7	#6 x 15'-0" (LEVEL I – BLACK REINFORCEMENT)		
14		2	#6 x 15'-5" (LEVEL I – BLACK REINFORCEMENT)		
15		7	#6 x 16'-0" (LEVEL I – BLACK REINFORCEMENT)		
16		36	#6 x 24'-8" (LEVEL I – BLACK REINFORCEMENT)		
17					
18					
19		16	SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS		

SUBMITTED
APR 21 2014
J. P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

1 4/11/14 REVISE & RESUBMIT

PRECAST ABUTMENT

APPROVAL STAMP:

J.P. CARRARA & SONS INC.
Precast & Prestress Manufacturer
2464 CASE STR., MIDDLEBURY, VERMONT 05753 Phone:(802)388-6361 Fax:(802)388-9010

W.M. SCHULTZ CONSTRUCTION, INC.
PO BOX 2620
BALLSTON SPA, NY 12020

STATE OF VERMONT AGENCY OF TRANSPORTATION
COUNTY OF WINDSOR

TOWN OF ROCHESTER
VT ROUTE 73 (RURAL MAJOR COLLECTOR)
BRIDGE NO.: 16 PROJECT NO.: BRF 0162 (17)

MATERIALS LIST

DATE: MAR. 14, 2014
SCALE: NOTED
CHKD: DFTM: AAT/RWS JJ/KLT
JOB NO: 23419-013
DWG. NO: M2

Eriksson technologies
813.989.3317
TAMPA, FL LRFD.COM
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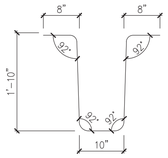
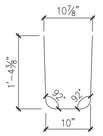
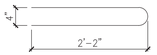


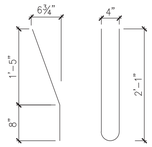
R-450L
#4 BENT BAR
(438) REQ'D.
(LEVEL II, DUAL COATED)



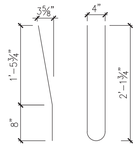
R-451L
#4 BENT BAR
(24) REQ'D.
(LEVEL II, DUAL COATED)



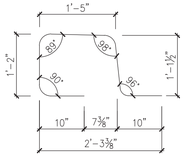
R-452L
#4 BENT BAR
(406) REQ'D.
(LEVEL II, DUAL COATED)



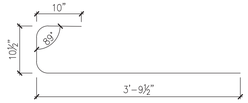
R-453L
#4 BENT BAR
(32) REQ'D.
(LEVEL II, DUAL COATED)



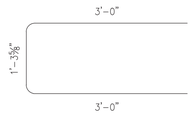
R-454L
#4 BENT BAR
(46) REQ'D.
(LEVEL II, DUAL COATED)



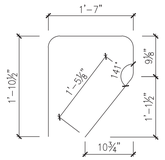
R-550L
#5 BENT BAR
(186) REQ'D.
(LEVEL II, DUAL COATED)



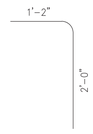
R-551L
#5 BENT BAR
(246) REQ'D.
(LEVEL II, DUAL COATED)



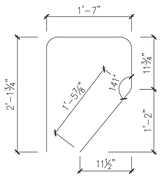
R-552L
#5 BENT BAR
(48) REQ'D.
(LEVEL II, DUAL COATED)



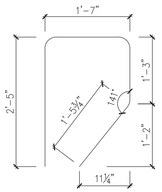
R-553L
#5 BENT BAR
(18) REQ'D.
(LEVEL II, DUAL COATED)



R-554L
#5 BENT BAR
(60) REQ'D.
(LEVEL II, DUAL COATED)



R-555L
#5 BENT BAR
(22) REQ'D.
(LEVEL II, DUAL COATED)



R-556L
#5 BENT BAR
(18) REQ'D.
(LEVEL II, DUAL COATED)

PRECAST BEAMS

MISCELLANEOUS MATERIALS

ITEM	MARK	QTY.		REMARKS	
1		54	#4 x 9'-10" (LEVEL II, DUAL COATED)		PRECAST BEAMS
2					
3		20	#5 x 8'-0" (LEVEL II, DUAL COATED)		
4		8	#5 x 8'-2" (LEVEL II, DUAL COATED)		
5		20	#5 x 8'-3" (LEVEL II, DUAL COATED)		
6		10	#5 x 8'-6" (LEVEL II, DUAL COATED)		
7		10	#5 x 8'-7" (LEVEL II, DUAL COATED)		
8		660	#5 x 9'-4" (LEVEL II, DUAL COATED)		
9		36	#5 x 9'-7" (LEVEL II, DUAL COATED)		
10		60	#5 x 9'-10" (LEVEL II, DUAL COATED)		
11		34	#5 x 10'-5" (LEVEL II, DUAL COATED)		
12		4	#5 x 11'-3" (LEVEL II, DUAL COATED)		
13		2	#5 x 12'-2" (LEVEL II, DUAL COATED)		
14		84	#5 x 24-0" (LEVEL II, DUAL COATED)		
15		12	#5 x 26'-0" (LEVEL II, DUAL COATED)		
16		12	#5 x 40'-0" (LEVEL II, DUAL COATED)		
17		84	#5 x 41'-0" (LEVEL II, DUAL COATED)		
18					
19		39	#8 x 1'-6" (LEVEL II, DUAL COATED)		
20					
21		12	SET OF (4) 0.60"ø x 270 KSI STRAND LIFTING LOOPS		

SUBMITTED
APR 21 2014
J.P. CARRARA & SONS, INC.
MIDDLEBURY, VT 05753

△1 4/11/14 REVISE & RESUBMIT

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