



S.D. Ireland Companies

Precast Division

193 Industrial Ave. Williston, VT 05495
P.O. Box 2286 South Burlington, VT 05407
p: 802-863-6222 f: 802-860-1528



www.sdireland.com

Attention:	Ted Luck	Date:	6/12/2014
Company:	Luck Brothers	Job Name:	Warren BRF 013-4(32)
Address:		Job Number:	SDI #14046
City, St, Zip:		Regarding:	Abutments- Final fab dwgs w/ all approved revisions
Ph: / Fax:			

WE ARE SENDING:

<input type="checkbox"/> Quote	<input type="checkbox"/> Details	<input type="checkbox"/> Other: _____
<input checked="" type="checkbox"/> Prints	<input type="checkbox"/> Plans	<input type="checkbox"/> Specifications
<input type="checkbox"/> Copy Of Letter	<input type="checkbox"/> Change Order	<input type="checkbox"/> Revised Submittals

Copies	Date	Pages	Description
1	6/12/2014	1	Transmittal Cover
1	6/12/2014	9	Fabrication drawings, post tension wedge part
1	6/12/2014	2	Reinforcing drawings
1	6/12/2014	14	Abutment Lifting / Handling drawings/details/calculations
1	6/12/2014	1	Mix Design

These Are Submitted as Checked Below:

<input checked="" type="checkbox"/> For Approval	<input type="checkbox"/> Approved as Submitted	<input type="checkbox"/> Resubmit __ Copies for Approval
<input checked="" type="checkbox"/> For Your Use	<input type="checkbox"/> Approved as Noted	<input type="checkbox"/> Submit__ Copies for Distribution
<input checked="" type="checkbox"/> As Requested	<input type="checkbox"/> Returned for Corrections	<input type="checkbox"/> Return __ Corrected Prints
<input type="checkbox"/> For Review and Comment		<input type="checkbox"/> Prints Returned After Loan to Us
<input type="checkbox"/> For Bids Due: _____		<input checked="" type="checkbox"/> Other: _____

Notes/Remarks:

The attached submittal incorporates all approved revisions and changes made.

We will build as attached and have provided as per Rob Youngs request.

Please review and provide approved stamped shop drawings for our records.

Thank you.

Matt@sdireland.com

Tim Dudley for Matt Wheeler 802-863-6222 ext 253

tdudley@sdireland.com

Copy To: _____

Signed: _____

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

Abutment 2 :

Concrete:

Mix Designation: P60TER

1. Specified Mix Design	5000 PSI
2. Proposed Mix Design	6000 PSI
3. Striping Strength	3000 PSI
4. Handling Strength	3000 PSI
5. Shipping Strength	5000 PSI
6. Install Strength	5000 PSI
7. Traffic Loading	5000 PSI

Fabrication Tolerances:

1. Width ±1/4"
2. Height ±1/4"
3. Length ±1/2"
4. Rebar Cover 2" Min. (Unless Noted Otherwise)
5. Rebar Spacing ±1"
6. Rebar Clearance ±1/4"
7. Insert Placement ±1/4"

Reinforcing:

General Notes:

1. Reinforcing Steel - ASTM A615, Grade 60, Level II, Dual Coated
2. Materials and Manufacturing shall conform to ASTM C1433
3. Bar tied at every intersection.

Tolerances:

1. Spacing ±1"
2. Clearance ±1/4"

Lap Lengths:

1. Per AASHTO 5.11.2.1.1 & 5.11.5.3.1
Lap Length for Level II (Dual Coated):
#4 Bar=17"
#5 Bar=26"
#6 Bar=39"
#7 Bar=53"
#8 Bar=69"

Post Tension Materials for (20) 2-0.6 Tendons @ 43.6ft ea: (Abutment 1 & 2)

1. 1,920 ft .6 Monstr 50 mil USA Monofit .6E, 40 pcs @ 48 ft ea, 50 MILL
2. 40 pieces 4-0.6in. Cast Wedge Plate Uncoated
3. 80 pieces .6" 2-Part Wedge w/ Ring
4. 40 pieces 7"x7"x1" A36, Galv Ans Plate w/3.3" Ctr Hole
5. 960 feet ± 3" I.D. PVC Duct

Note: The proposed installation sequence listed below is preliminary and subject to change based on the review of the proposed erection plan

Installation Sequence:

1. Pieces will be shipped 1 per truckload.
2. Unload pieces utilizing all pick points.
3. Grade base gravel at least ½" below the underside of the precast to allow for grout infill.
4. Place shims under abutment as required. Set shims to desired grade.
5. Place precast abutment pieces onto shims. Modify shims as necessary to achieve desired final grade.

- 5A. Apply bonding compound to entire face of both match cast abutment face (by others in the field)
- 5B. Snug corresponding match cast abutment faces.
- 5C. Stress Tendons to 3 kips.

6. Backfill edges of abutment unit up at least 6" to act as a dam for grout installation.

7. Install HPC Rapid Set evenly into the corrugated tubes. Observe that the HPC Rapid Set fills in all areas under the abutment pieces.

8. After HPC Rapid Set has acquired proper strength, post tension abutment pieces together to 44 kips.

9. Refer to VTTrans plans and specs. for HPC strength and curing requirements and post tensioning details.

Vermont Agency of Transportation
RECEIVED
ON: June 12, 2014
and Checked for
CONFORMANCE
BY: Rob Young DATE: 6/17/2014

Approved	<input checked="" type="checkbox"/>	X	Approved As Noted
Rejected	<input type="checkbox"/>		

This review is only for general conformance with the design concepts and the information provided. It does not constitute a design review. The reviewer does not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include the responsibility of the Designer. The Contractor's responsibility for the design and construction of the project shall remain with the Contractor. The Designer's responsibility is limited to the fabrication process or to the means, methods, techniques, sequences and procedures of construction, coordination of the work with that of other trades and protection of work in site and existing structures.

McFarland Johnson
By: D. Kell Date: 6/13/2014

CONTRACTORS V/S/P/E:

PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SDI JOB #14046)
SUPERVISOR: M. WHEELER
DETAILER: I. ADAMS
CHECKER: E. Borendse
ENGINEER: N/A

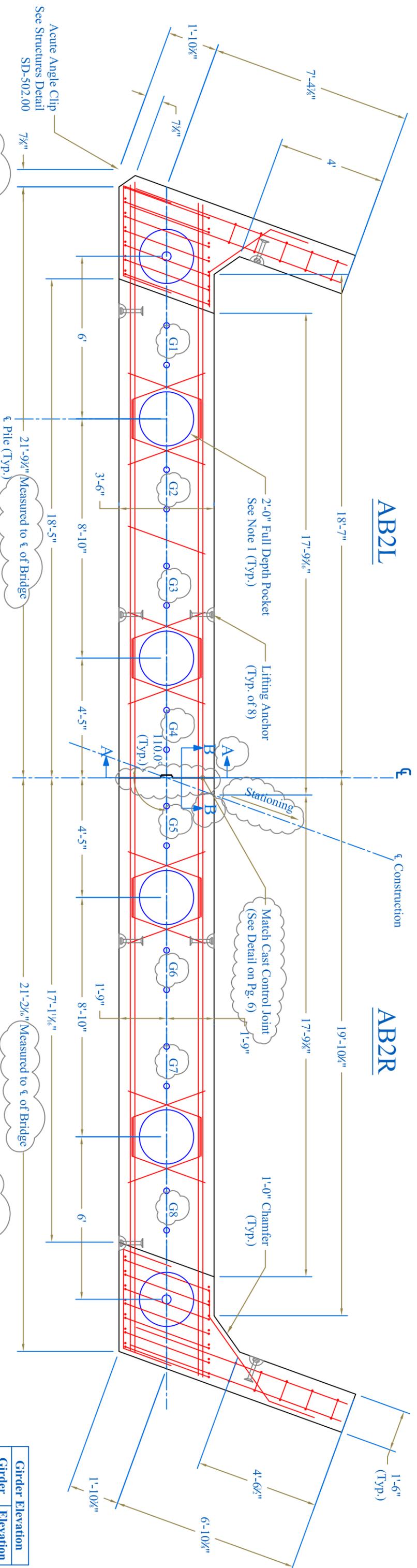
PROJECT NAME: Warren
PROJECT #: BRF 013-4(32)
LOCATION: Bridge #166
Route 100, Warren, VT

Luck Brothers, Inc
73 Trade Road
Plattsburg, NY, 12901
Ph: (518)-561-4321

FABRICATOR:
193 INDUSTRIAL AVE.
WILLISTON, VT 05495
Ph: (802) 658-0201

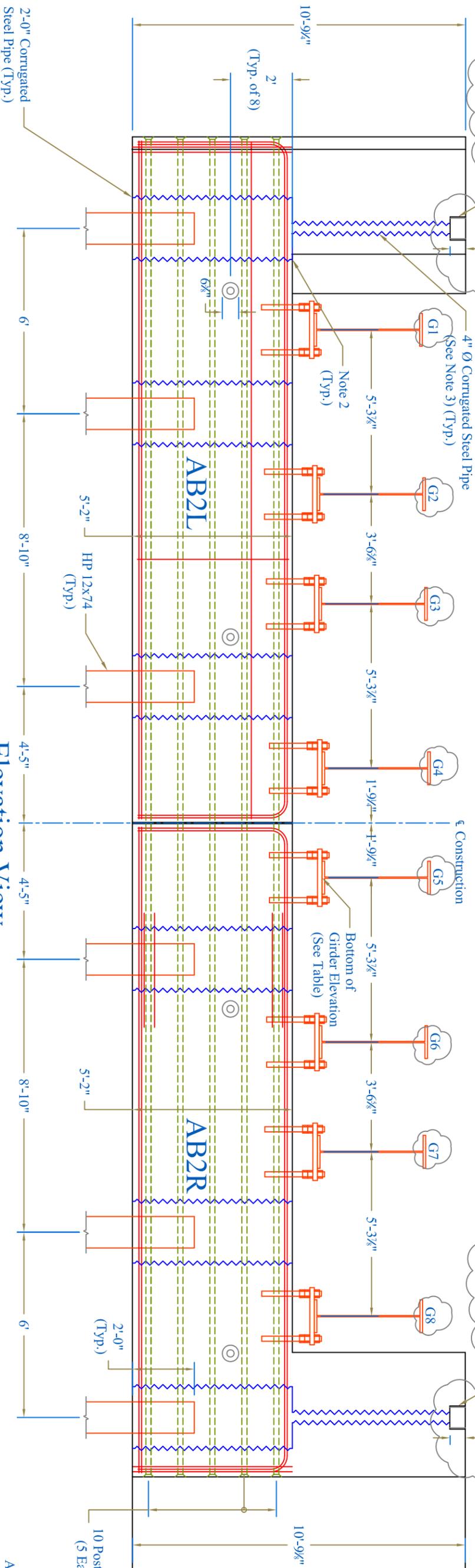


Abutment Text



Plan View

Girder Elevation	Girder	Elevation
G1	1137.85	
G2	1137.95	
G3	1138.01	
G4	1138.11	
G5	1138.11	
G6	1138.0	
G7	1137.94	
G8	1137.84	



Elevation View

AB1L Weight = 76,790 lbs
 AB1R Weight = 77,140 lbs

CONTRACTORS VISPEL:

- NOTES:**
1. Use 24" Galvanized Corrugated Steel Pipe for Pile Pockets Conforming to Subsection 7111.01.
 2. Form Top 6" with Removable Form to Eliminate Exposed Corrugated Steel on the Top of The Abutment
 3. 4" Galvanized Corrugated Steel Pipe to Conform to Subsection 711.01.
 4. Richmond ties; 2 part epoxy paint any portion of ties outside the clear area plus 1" deeper and any broken section. Patch hole per manufacturers directions to achieve the correct perimeter edge conditions.

PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SDI JOB #14046)
 SUPERVISOR: M. WHEELER
 DETAILER: I. ADAMS
 CHECKER: E. Barendse
 ENGINEER: N/A

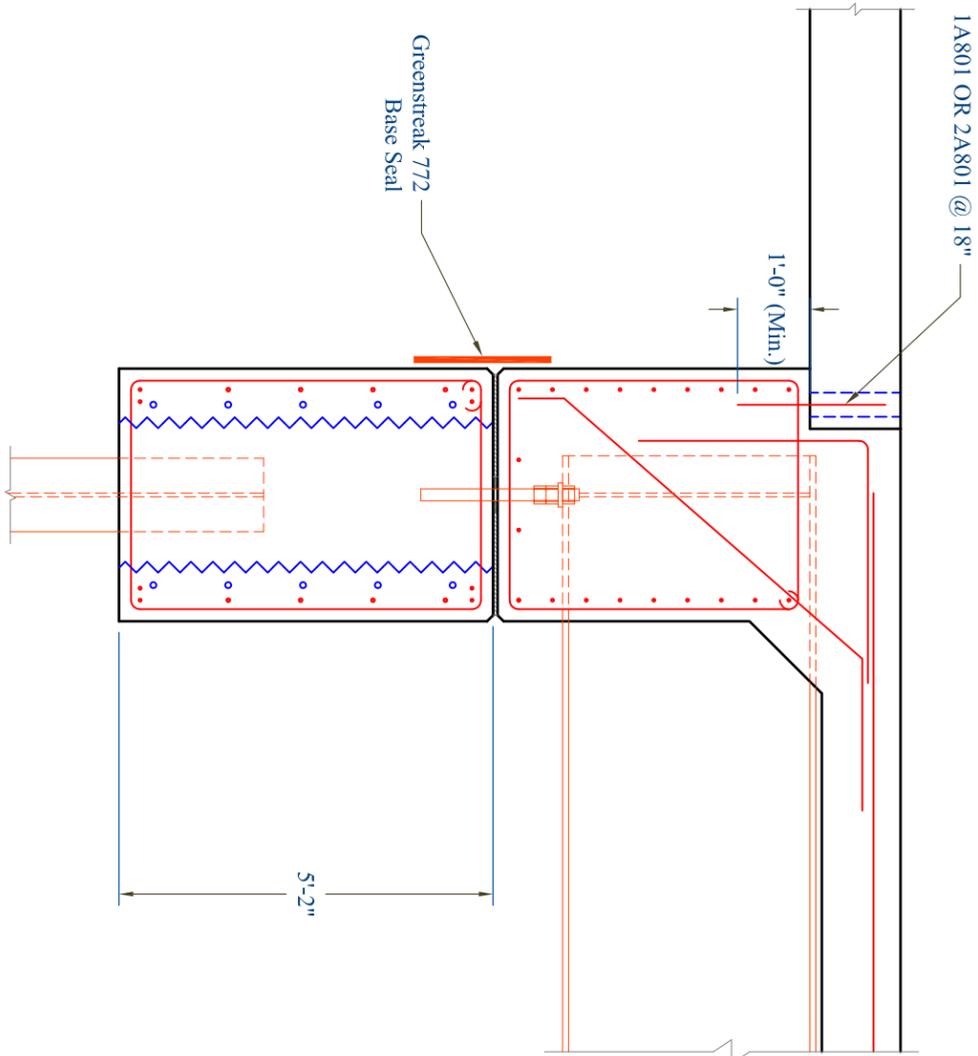
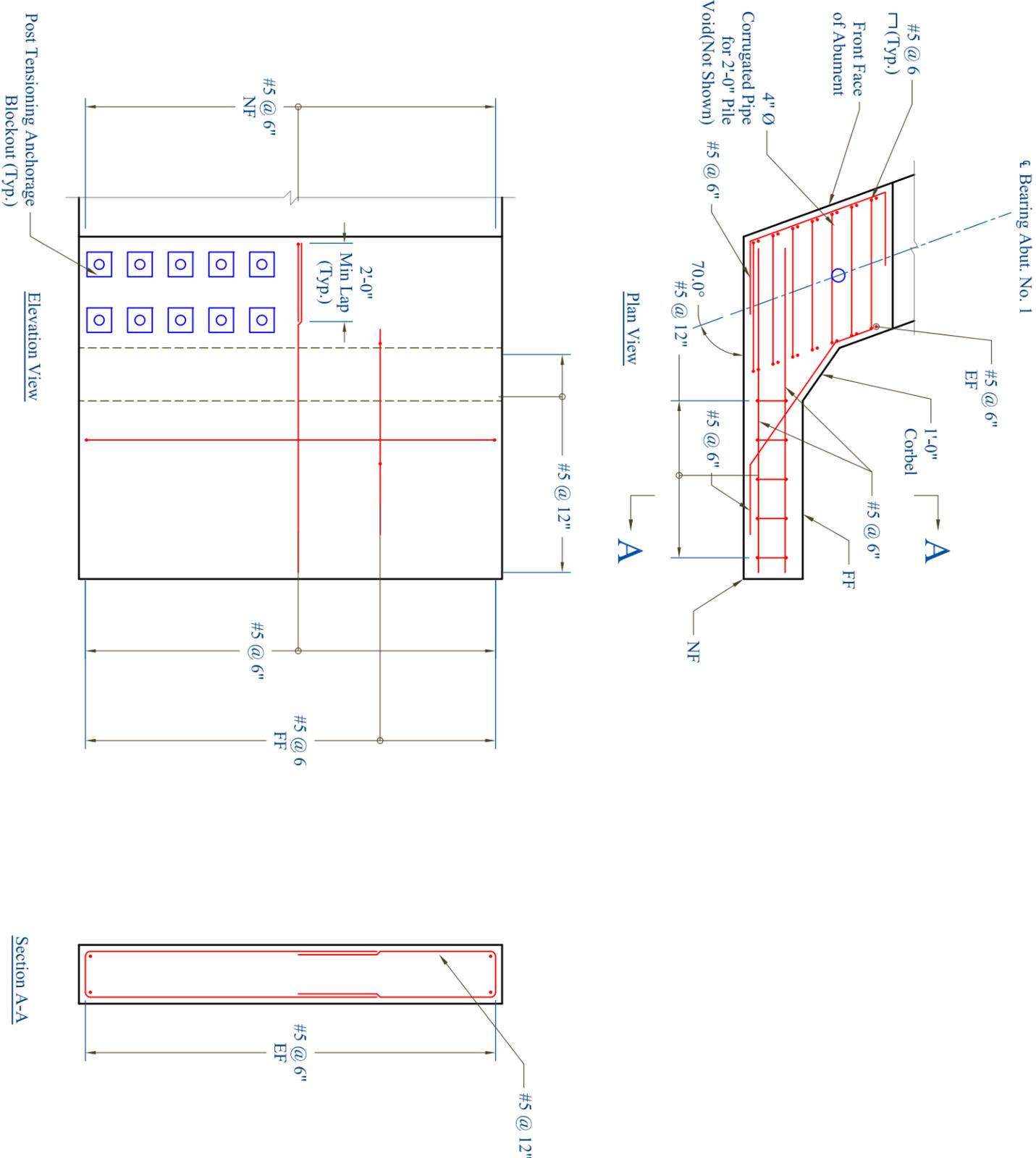
Luck Brothers, Inc
 73 Trade Road
 Plattsburg, NY, 12901
 Ph: (518)-561-4321

FABRICATOR:
 193 INDUSTRIAL AVE.
 WILLISTON, VT 05495
 Ph: (802) 658-0201



RECEIVED
 ON: June 12, 2014
 and Checked for
 CONFORMANCE
 BY: [Signature] DATE: 6/12/2014

Approved
 X Approved As Noted
 McFarland Johnson
 6/12/2014



Vermont Agency of Transportation
RECEIVED
 ON: **June 12, 2014**
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

McFarland Johnson
 By: **D. Kull**
 Date: **6/13/2014**

Approved
 Approved As Noted
 Rejected

CONTRACTORS VISPE:

PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SD) JOB #14046
 SUPERVISOR: M. WHEELER
 DETAILER: I. ADAMS
 CHECKER: E. Barendse
 ENGINEER: N/A

PROJECT NAME: Warren
 PROJECT #: BRP 013-4(32)
 LOCATION: Bridge #166
 Route 100, Warren, VT

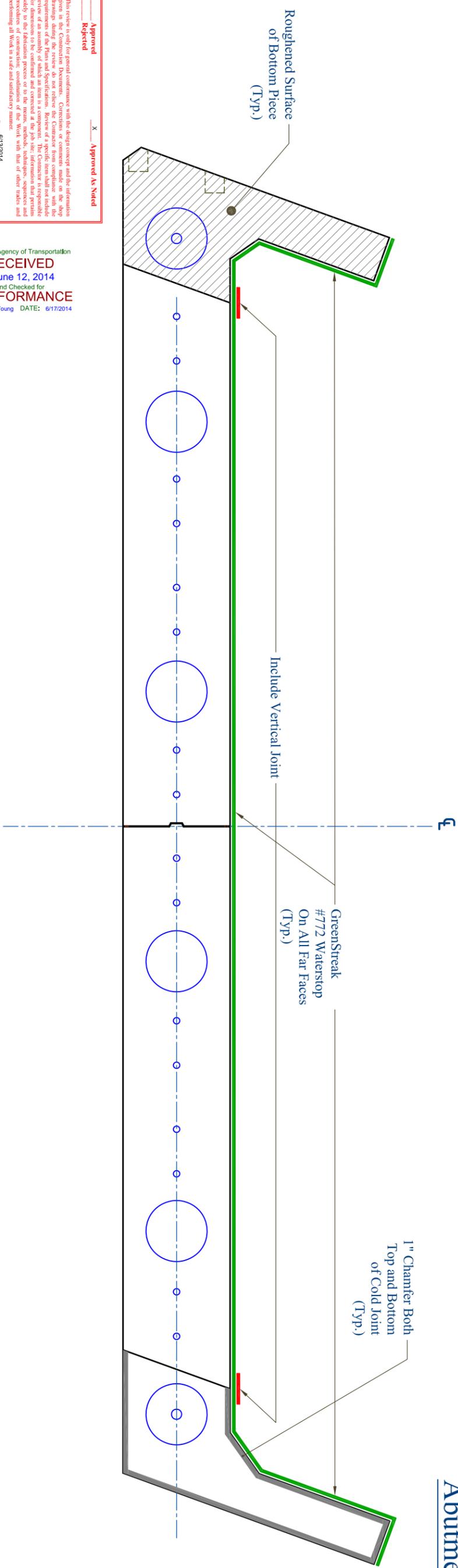
Luck Brothers, Inc
 73 Trade Road
 Plattsburg, NY, 12901
 Ph: (518)-561-4321

FABRICATOR:
 193 INDUSTRIAL AVE.
 WILLISTON, VT 05495
 Ph: (802) 658-0201



Abutment 2

Abutment Plan View

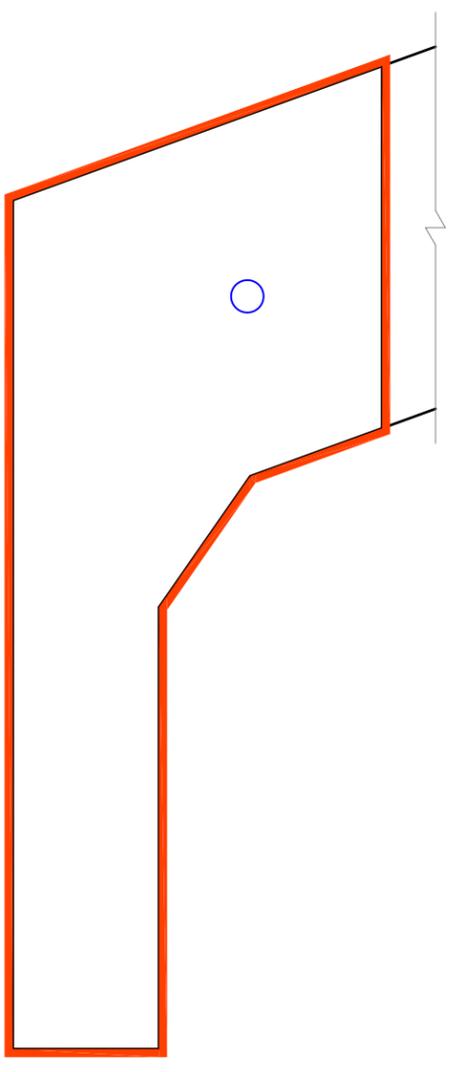


Approved _____ X _____ Approved As Noted
 Rejected _____

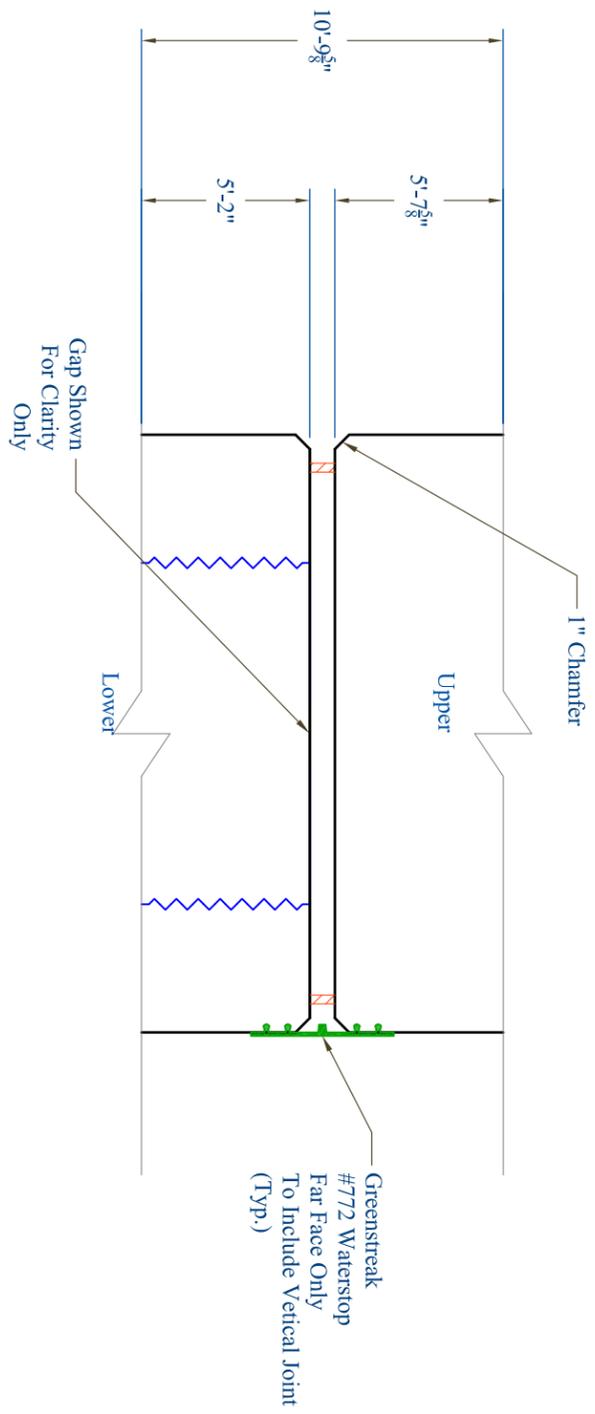
This review is only for general conformance with the design concept and the information provided. It does not constitute an approval of the design or the construction of the drawings. The reviewer does not release the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly or which an item is a component. The Contractor is responsible for ensuring that all components are checked at the job site, after which the permit application shall be submitted to the appropriate authority. The Contractor shall maintain procedures of construction, coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner. Date: 6/13/2014
 By: D. Keil

Vermont Agency of Transportation
RECEIVED
 ON: **June 12, 2014**
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

Upper Piece Plan View



Water Stop Joint Detail



CONTRACTORS VIS-PE:

PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SDI JOB #14046)

SUPERVISOR: M. WHEELER
 DETAILER: I. ADAMS
 CHECKER: E. Barendse
 ENGINEER: N/A

PROJECT NAME: Warren
 PROJECT #: BRF 013-4(32)
 LOCATION: Bridge #166
 Route 100, Warren, VT

Luck Brothers, Inc
 73 Trade Road
 Plattsburg, NY, 12901
 Ph: (518)-561-4321

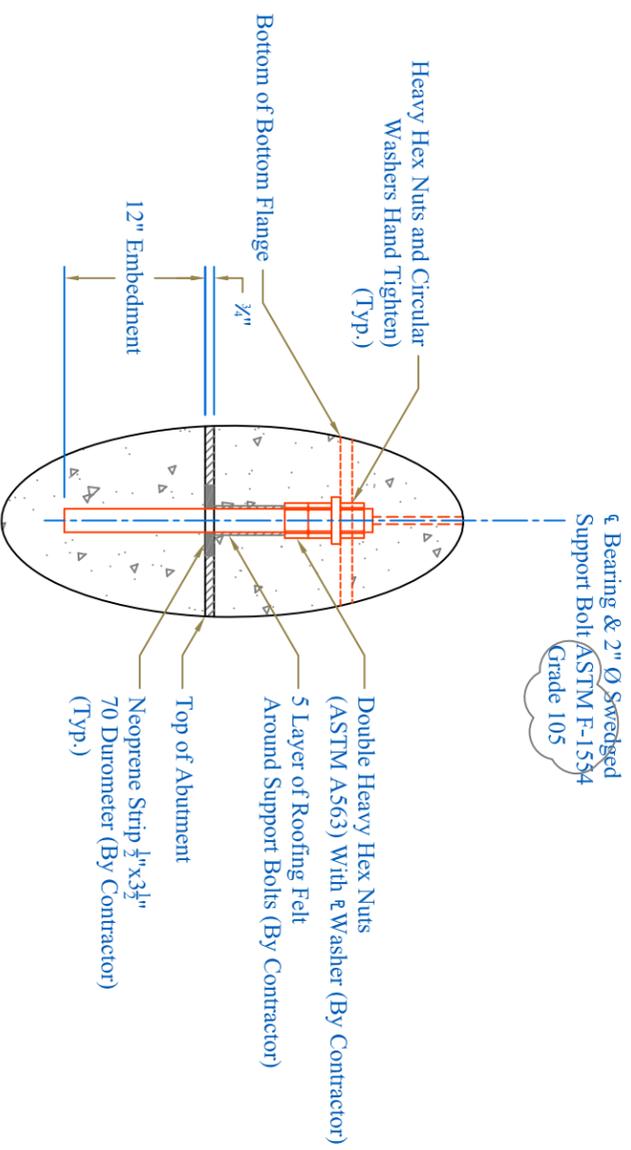
FABRICATOR:
 193 INDUSTRIAL AVE.
 WILLISTON, VT 05495
 Ph: (802) 658-0201



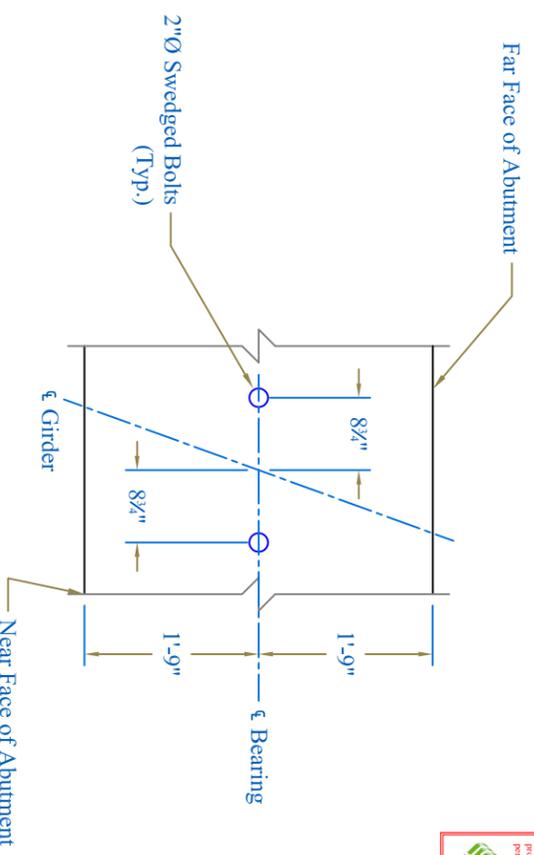
06/12/14

Cold Joint Detail

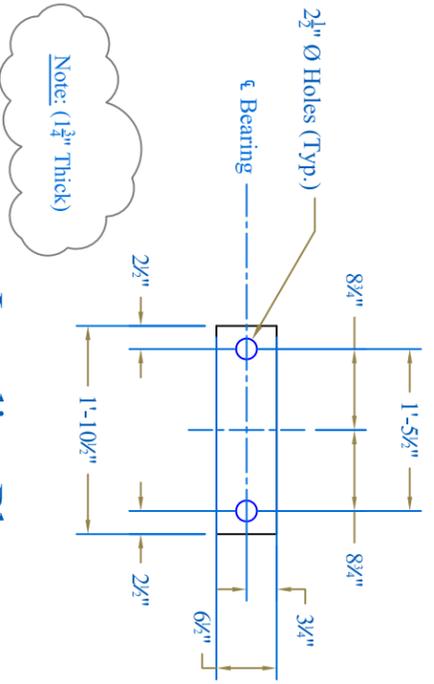
1 of 1



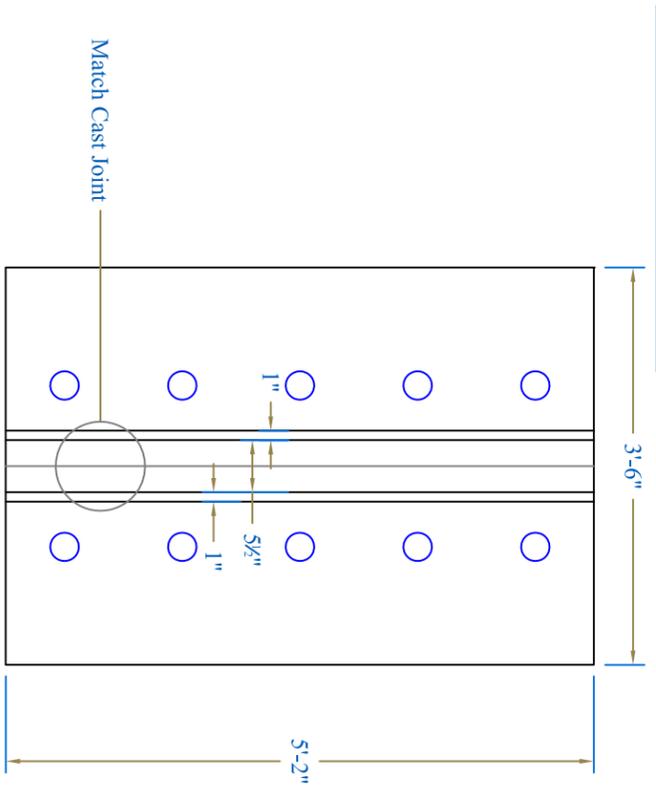
Support Bolt Detail



Support Bolt Layout

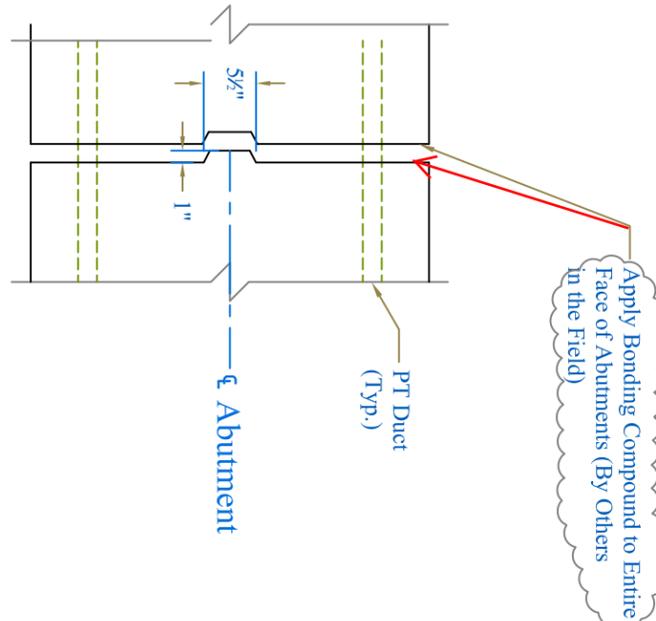


Leveling Plate

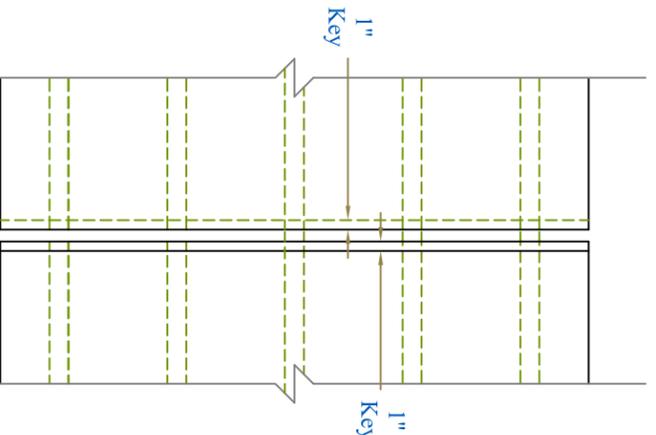


Match Cast Detail

Abutment Face: A-A



Plan View: B-B



Section View

Approved	X	Approved As Noted
Rejected		

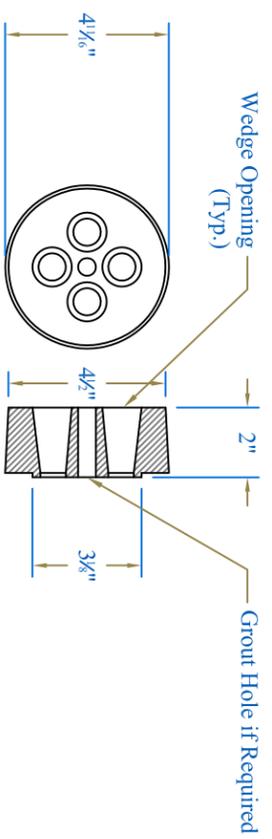
This review is only for general concurrence with the design concept and the information given in the Construction Documents. Concurrence or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the review of an assembly or subassembly from a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the manufacturer's methods, techniques, sequences and procedures shall not be used as a basis for design. All work shall be done in accordance with the performance of all work in a safe and satisfactory manner.

Date: 6/13/2014
By: D. Kull

McFarland Johnson

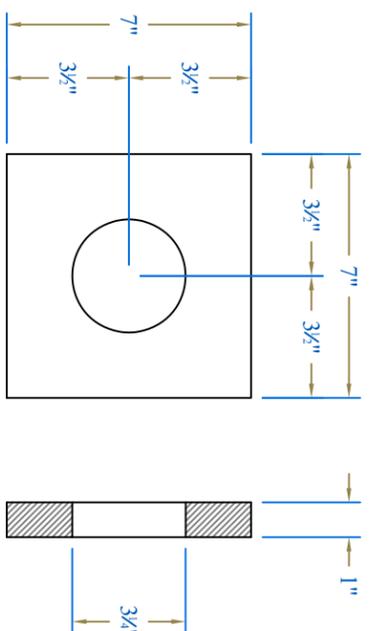
Vermont Agency of Transportation
RECEIVED
 ON: **June 12, 2014**
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

CONTRACTORS VISPE:		PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SD) JOB #14046)	
		SUPERVISOR: M. WHEELER	
		DETAILER: I. ADAMS	
		CHECKER: E. Barendse	
		ENGINEER: N/A	
		PROJECT NAME: Warren	
		PROJECT #: BRP 013-4(32)	
		LOCATION: Bridge #166	
		Route 100, Warren, VT	
Luck Brothers, Inc		FABRICATOR:	
73 Trade Road		193 INDUSTRIAL AVE.	
Plattsburg, NY, 12901		WILLISTON, VT 05495	
Ph: (518)-561-4321		Ph: (802) 658-0201	
04/08/2014		Connection Details	
		SD Ireland	
		PRECAST	
		6 of 7	

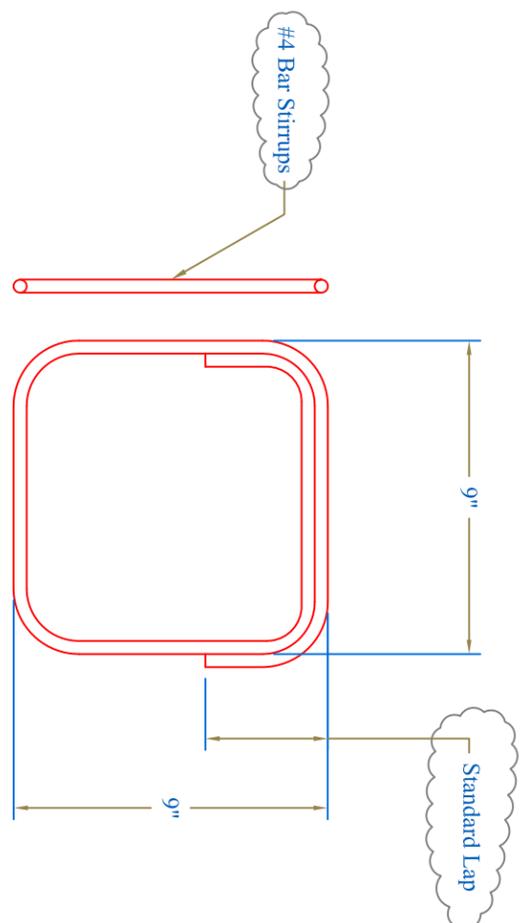


Typical 4-0.6" Cast Wedge Plate

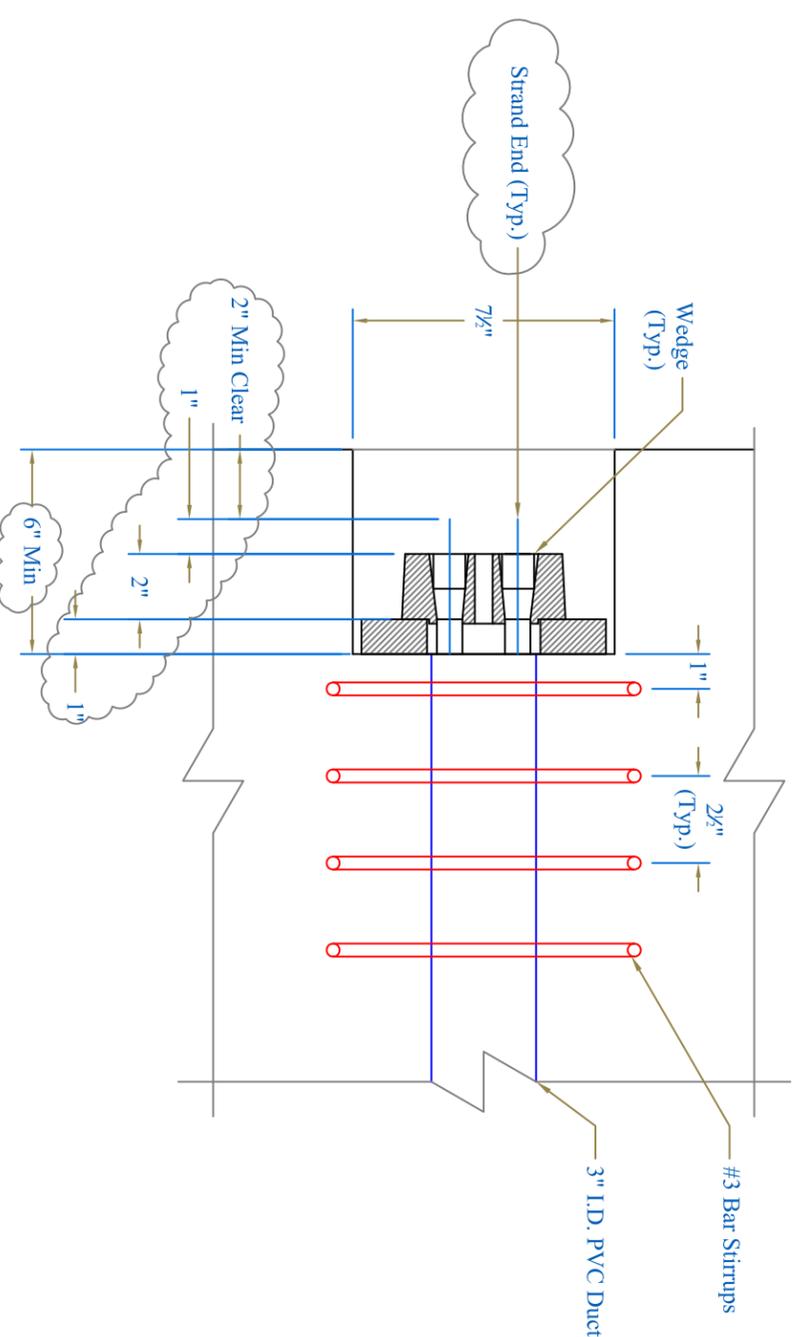
Part # 68-04 1532 13



Bearing Plate

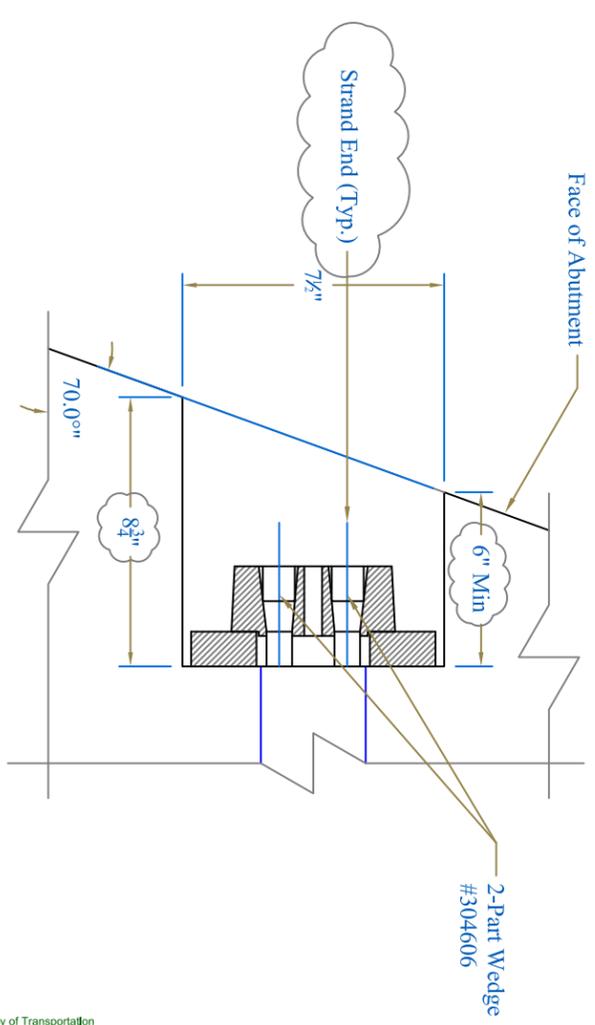


Reinforcement Detail



Bearing Plate Section

ANS(A Non Stock) Plate (Manufactured per Request so Not Part #)



Bearing Plate Plan

Vermont Agency of Transportation
RECEIVED
 ON: June 12, 2014
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

Approved	<input checked="" type="checkbox"/> Approved As Noted
Rejected	<input type="checkbox"/>
This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include any other items. The Contractor shall be responsible for ensuring that all items are properly dimensioned to be confirmed and corrected at the job site. Information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction, coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.	
McFarland Johnson By: <u> </u> D. Kild	Date: 6/19/2014

PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SOI JOB #14046)
 SUPERVISOR: M. WHEELER
 DETAILER: I. ADAMS
 CHECKER: E. Barendse
 ENGINEER: N/A

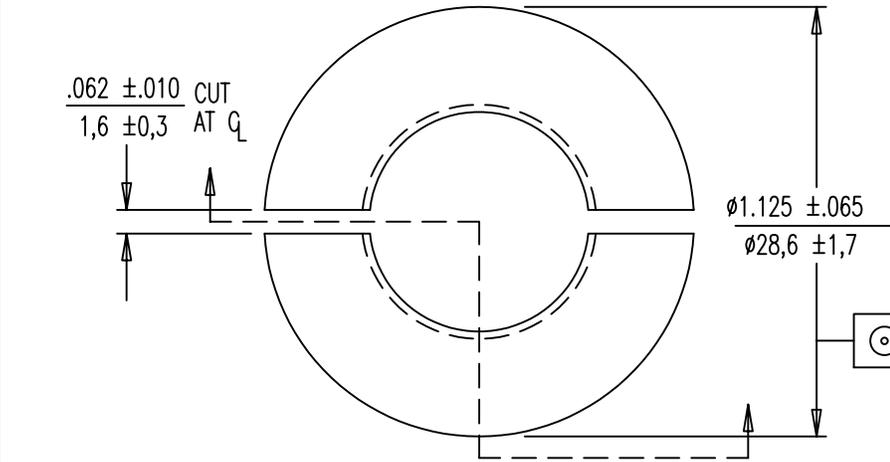
PROJECT NAME: Warren
 PROJECT #: BRP 013-4(32)
 LOCATION: Bridge #166
 Route 100, Warren, VT

Luck Brothers, Inc
 73 Trade Road
 Plattsburg, NY, 12901
 Ph: (518)-561-4321

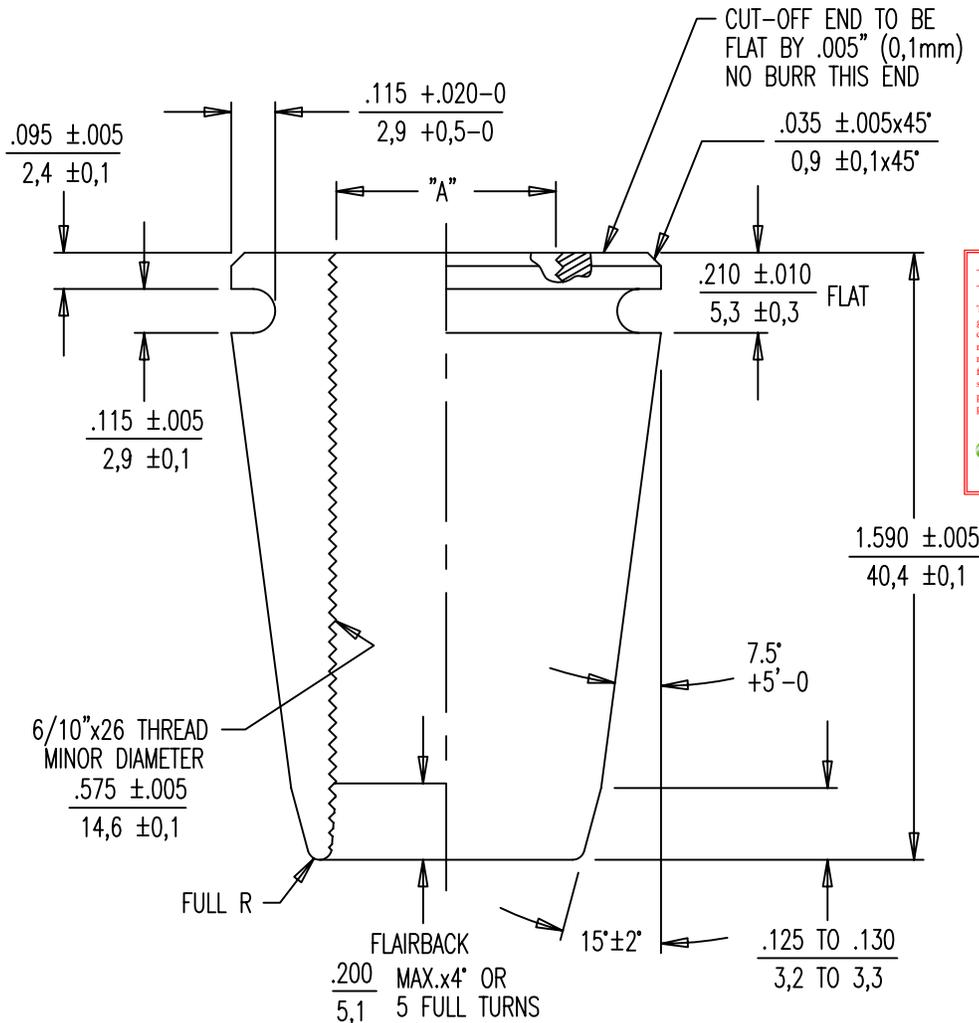
FABRICATOR:
 193 INDUSTRIAL AVE.
 WILLISTON, VT 05495
 Ph: (802) 658-0201

Post Tensioning Details

CONTRACTORS VISPE:



- NOTES:
- PART TO BE PROTECTED FROM CORROSION BY USING APPROPRIATE TYPE OF OIL.
 - SURFACE FINISH $R_a = 125 \mu\text{IN.}$



Vermont Agency of Transportation
RECEIVED
 ON: June 12, 2014
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

Approved
 Rejected
 Approved As Noted

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Date: 6/13/2014
 By: D. Kull

McFarland Johnson

PART NO.	DESCRIPTION
304606	UNCOATED
304609	ZINC PLATED

DYWIDAG POST-TENSIONING SYSTEMS		DIMENSIONS: INCH/mm mm FOR REFERENCE ONLY		Q.A.		QUALITY PLAN NUMBER: QS00072010S		PART NUMBER 304606 304609													
0.6" 2-PART WEDGE, 1.6" LONG WITH O-RING GROOVE FOR MONOSTRAND				WEIGHT .18 LBS.		<table border="1"> <thead> <tr> <th>REV.</th> <th>DATE</th> <th>NAME</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>09-29-97</td> <td>A.W.</td> <td>PB-105</td> </tr> <tr> <td>2</td> <td>03-11-05</td> <td>C.S.</td> <td></td> </tr> </tbody> </table>		REV.	DATE	NAME		1	09-29-97	A.W.	PB-105	2	03-11-05	C.S.			
REV.	DATE	NAME																			
1	09-29-97	A.W.	PB-105																		
2	03-11-05	C.S.																			
DATE: 03-05-97 DWG: G. MALECKI CHK: H.K. APP: K.S.		MATERIAL: C12L14 1-1/8" ROUND		SCALE 2:1				DRAWING NUMBER 304606													
This drawing, the pertinent enclosures, descriptions, calculations etc. and their contents are the property of DYWIDAG SYSTEMS INTERNATIONAL, USA, INC. They are not allowed to be duplicated with-out our permission. They are also not to be shown or explained for any reason to a third party other than for reasons expressly intended by the original receiver. They have to be returned on request.																					
DYWIDAG-SYSTEMS INTERNATIONAL, USA, INC. DSI																					

RECEIVED
 JUN 12 2014
 CONFORMANCE
 DATE: 01/20/14

Approved As Noted
 Rejected

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Date: 6/13/2014
 By: D. Kull

LEGEND:
 CONT.-CONTINUOUS
 TRANS.-TRANSVERSE
 DWLS.-DOWELS
 VERTS.-VERTICAL
 HORIZ.-HORIZONTAL
 T&B -TOP & BOTTOM
 I.F.-INNER FACE
 O.F.-OUTER FACE
 E.E.-EACH END
 E.F.-EACH FACE
 F.F.-FRONT FACE
 R.F.-REAR FACE
 E.W.-EACH WAY
 O.C.-ON CENTER
 L.W.-LONG WAY
 S.W.-SHORT WAY

FOR FIELD USE

ALL DUAL COATED REINF. DENOTED (Z)

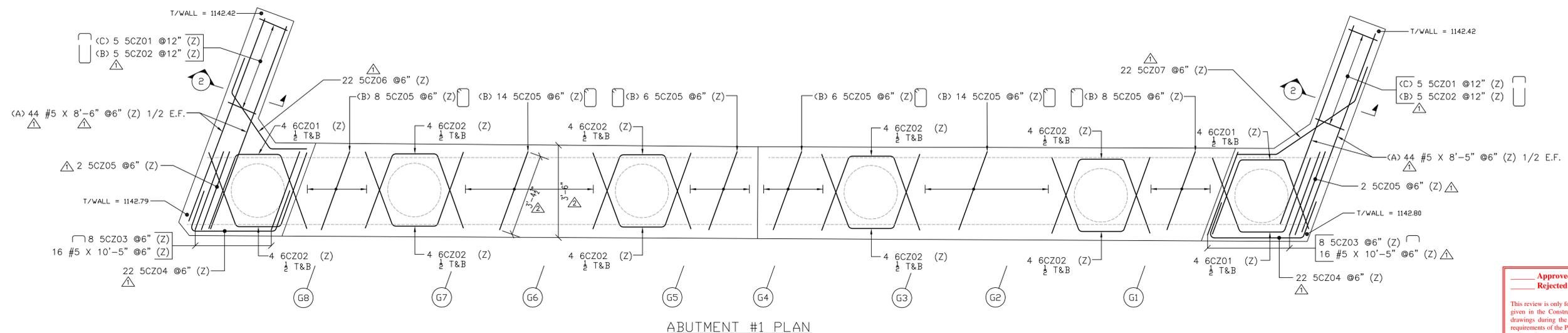
ELEVATIONS & DIMENSIONS SHOWN ON THIS DWG. ARE FOR REINF. DETAILING PURPOSES ONLY AND ARE NOT INTENDED FOR CONSTRUCTION.

REINF. BARS ASTM A615 GRADE 60 DUAL COATED

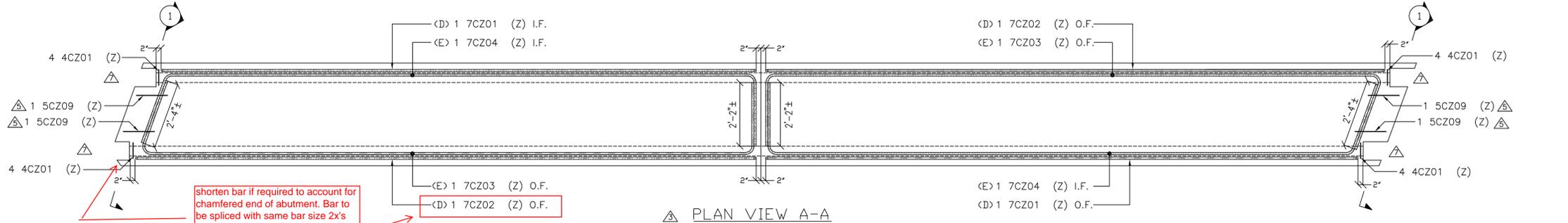
VERIFICATION OF UNCLEAR INFORMATION MAY BE REQUESTED ON THIS DRAWING. SHOULD VERIFICATION BE LEFT UN-ADDRESSED IT WILL REMAIN AS SHOWN AND ASSUME TO BE CORRECT.

6-12-14	REMOVED SC208/SDI/FOR RECORD
4-30-14	REVISED/SDI/FOR JOB USE
4-18-14	APPROVED AS NOTED
4-17-14	REVIEWED/SDI COM./FOR APPROVAL
4-17-14	REVIEWED/SDI COM./FOR APPROVAL
4-08-14	REVIEWED/ENG COM./FOR APPROVAL
2-24-14	DFI INTERNAL REVIEW/FOR APPROVAL
2-18-14	FOR APPROVAL

DIMENSION		2000 7TH STREET SOUTH, N.Y. 13322 PH: (518) 574-1936 FAX: (518) 574-1830 www.dimensionfab.com
STRUCTURE	VTAOT WARREN BR# 013-4(32) PRECAST	
LOCATION	BRIDGE 166 ROUTE 100 (MINOR ARTERIAL) WARREN, VT	
ARCHITECT		
ENGINEER		
CUSTOMER	S.D. IRELAND CONCRETE CONST. CORP.	
DRAWN BY	DATE	DT#
ED	2/18/14	8756
DRAWING COVERS		DRAWING #
ABUTMENT #1		C
DUAL COATED REINFORCING		

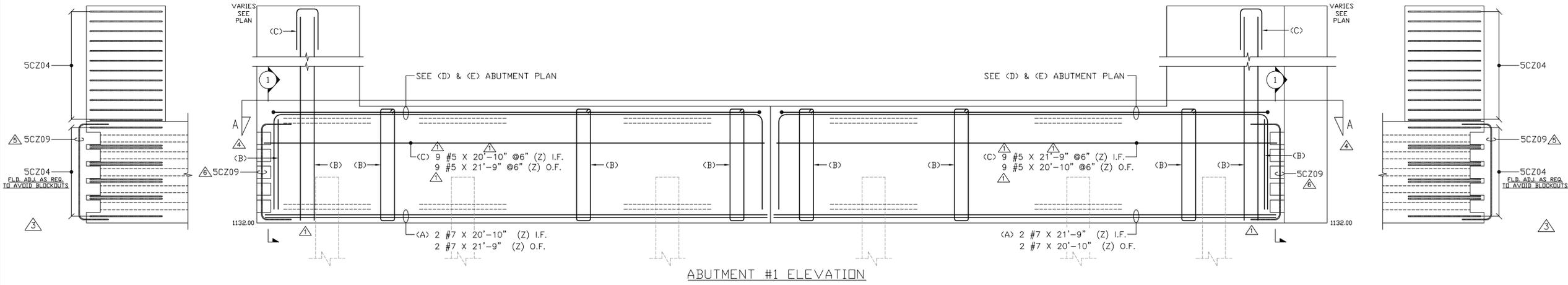


ABUTMENT #1 PLAN

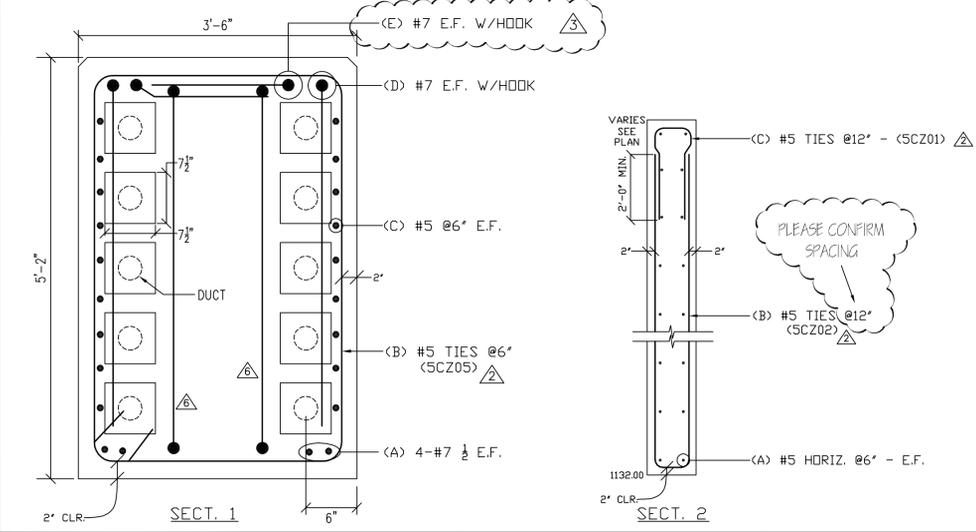


PLAN VIEW A-A

Shorten bar if required to account for chamfered end of abutment. Bar to be spliced with same bar size 2x's the 53" lap distance.



ABUTMENT #1 ELEVATION



Drawing Sheet : C

Bar Mark	Qty	Size	Total Length	Type	'a'	'b'	'c'	'd'	'e'	'f'	'g'	'h'	'j'	'k'	'o'	'r'
4CZ01	16	#4	3'-9"	T2	0'-4 1/2"	0'-9"	0'-9"	0'-9"	0'-9"		0'-4 1/2"					
4CZ01	8	#4	3'-9"	T2	0'-4 1/2"	0'-9"	0'-9"	0'-9"	0'-9"		0'-4 1/2"					
4CZ01	40	#4	3'-9"	T2	0'-4 1/2"	0'-9"	0'-9"	0'-9"	0'-9"		0'-4 1/2"					
5CZ01	10	#5	6'-4"	T1		2'-7"	1'-2"	2'-7"								
5CZ02	10	#5	2'-2"	T1		10'-0"	1'-2"	10'-0"								
5CZ03	16	#5	5'-0 1/2"	T1		0'-10"	3'-4 1/2"	0'-10"								
5CZ04	44	#5	7'-6"	S13		2'-0"	3'-6"	2'-0"				3'-3 1/2"		1'-2 1/4"	1'-2 3/8"	
5CZ05	60	#5	17'-4"	T1		0'-5 1/2"	3'-4 1/2"	4'-10"	3'-4 1/2"	4'-10"		0'-5 1/2"				
5CZ06	22	#5	6'-0"	T2D		2'-0"	2'-9"	1'-3"				1'-8"	1'-1 1/4"	1'-0 1/4"		0'-8 1/4"
5CZ07	22	#5	7'-0"	T2D		2'-0"	3'-7"	1'-5"				1'-2"	1'-7 1/2"	0'-9 1/2"		1'-2"
5CZ09	4	#5	10'-0"	T1		2'-7"	4'-10"	2'-7"								
5CZ10	2	#5	9'-6"	T1		2'-7"	4'-4"	2'-7"								
6CZ01	12	#6	7'-8"	T3		3'-0"	1'-8"	3'-0"				2'-9 1/4"		1'-0 1/4"	3'-10"	
6CZ02	36	#6	7'-8"	T3		3'-0"	1'-8"	3'-0"				2'-9 1/4"		1'-0 1/4"	3'-9 1/4"	
7CZ01	2	#7	30'-1"	T1		4'-10"	20'-5"	4'-10"								
7CZ02	2	#7	31'-0"	T1		4'-10"	21'-4"	4'-10"								
7CZ03	2	#7	26'-1 1/2"	T1		2'-6"	20'-11"	2'-8 1/2"				2'-7"		0'-9 1/4"		
7CZ04	2	#7	25'-2 1/2"	T1		2'-6"	20'-2"	2'-6 1/2"				2'-4 1/2"		0'-10 1/4"	21'-0 7/8"	

Vermont Agency of Transportation
RECEIVED
 On: June 12, 2014
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

Approved
 Approved As Noted
 Rejected

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Date: 6/13/2014
 By: **McFarland Johnson**
 D. Kull

LEGEND:

- CONT.-CONTINUOUS
- TRANS.-TRANSVERSE
- DWLS.-DOWELS
- VERTS.-VERTICAL
- HORIZ.-HORIZONTAL
- T&B -TOP & BOTTOM
- I.F.-INNER FACE
- D.F.-DUTER FACE
- E.E.-EACH END
- E.F.-EACH FACE
- F.F.-FRONT FACE
- R.F.-REAR FACE
- E.W.-EACH WAY
- O.C.-ON CENTER
- L.W.-LONG WAY
- S.W.-SHORT WAY

FOR FIELD USE

ALL DUAL COATED REINF. DENOTED (Z)

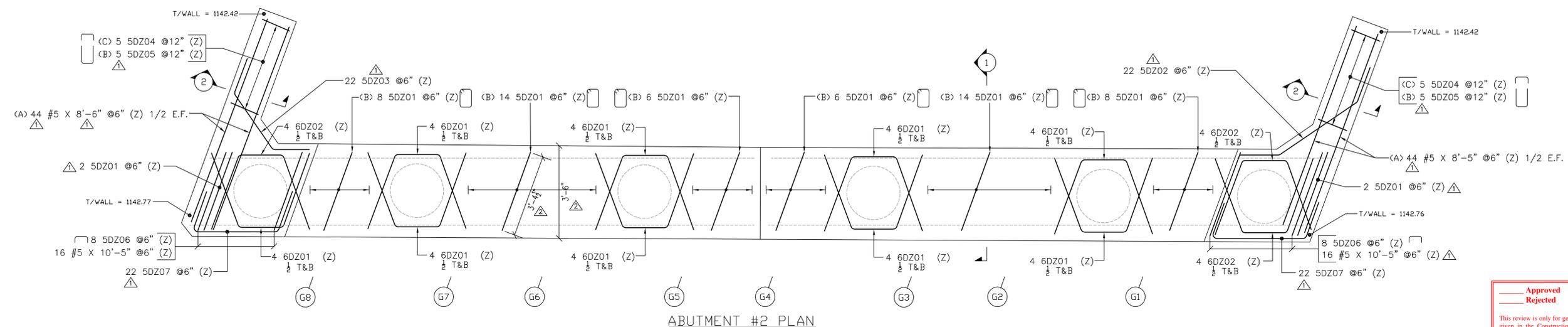
ELEVATIONS & DIMENSIONS SHOWN ON THIS DWG. ARE FOR REINF. DETAILING PURPOSES ONLY AND ARE NOT INTENDED FOR CONSTRUCTION.

REINF. BARS ASTM A615 GRADE 60 DUAL COATED

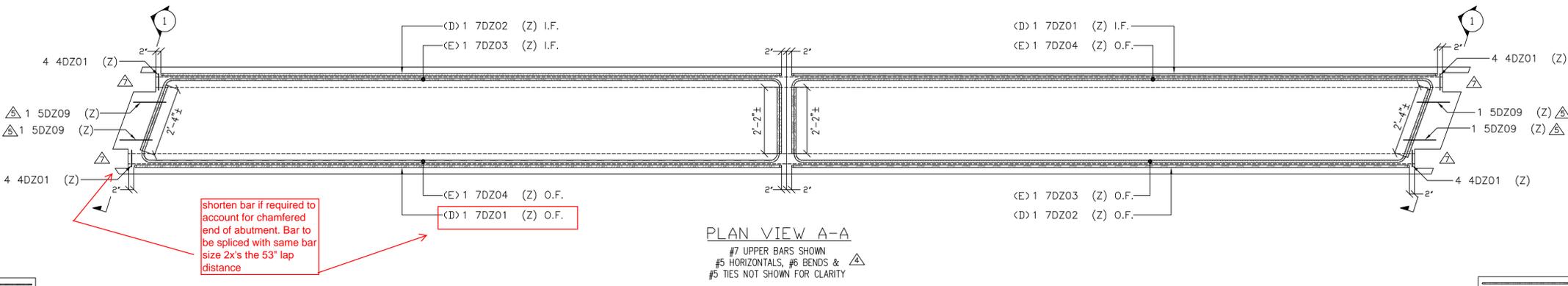
VERIFICATION OF UNCLEAR INFORMATION MAY BE REQUESTED ON THIS DRAWING. SHOULD VERIFICATION BE LEFT UN-ADDRESSED IT WILL REMAIN AS SHOWN AND ASSUME TO BE CORRECT.

NO.	DATE	REV.#	DESCRIPTION
8	6-12-14		REMOVED SDZ08/SDI/FOR RECORD
7	4-30-14		REVISED/SDI/FOR JOB USE
6	4-18-14		APPROVED AS NOTED
5	4-17-14		REVISED/SDI.COM./FOR APPROVAL
4	4-17-14		REVISED/SDI.COM./FOR APPROVAL
3	4-08-14		REVISED/ENG.COM./FOR APPROVAL
2	2-24-14		DFI INTERNAL REVIEW/FOR APPROVAL
1	2-18-14		FOR APPROVAL

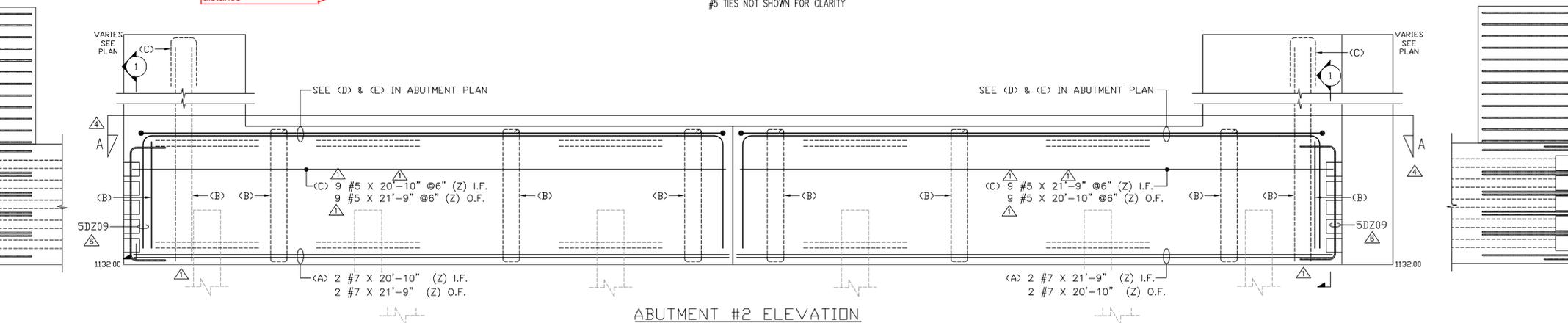
STRUCTURE	VTAOT WARREN BRF 013-4(32) PRECAST
LOCATION	BRIDGE 166 ROUTE 100 (MINOR ARTERIAL) WARREN, VT
ARCHITECT	
ENGINEER	
CUSTOMER	S.D. IRELAND CONCRETE CONST. CORP.
DRAWN BY	ED
DATE	2/18/14
DFI #	8756
DRAWING COVERS	ABUTMENT #2 DUAL COATED REINFORCING
DRAWING #	D



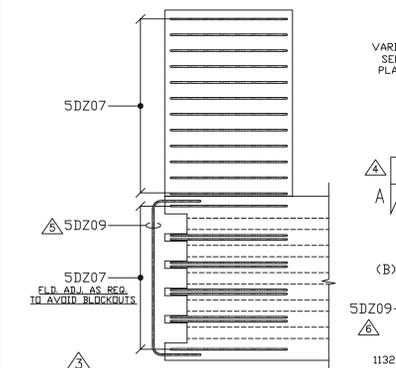
ABUTMENT #2 PLAN



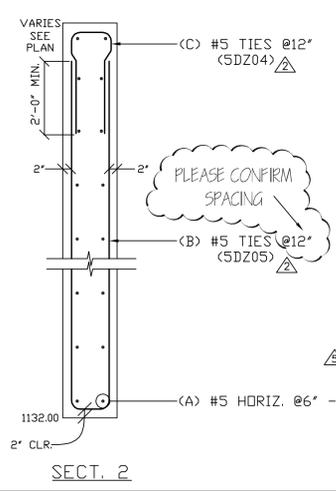
PLAN VIEW A-A



ABUTMENT #2 ELEVATION



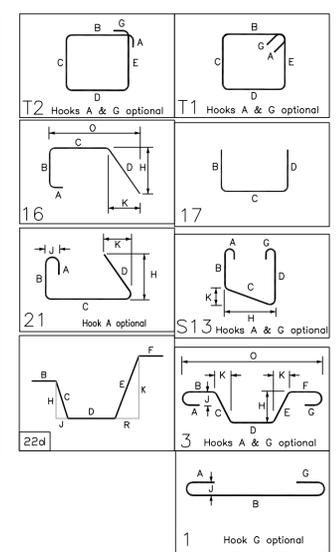
SECT. 1



SECT. 2

Drawing Sheet : D

Bar Mark	Qty	Size	Total Length	Type	BAR LIST															
					'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'J'	'K'	'O'	'R'				
4DZ01	16	#4	3'-9"	T2	0'-4 1/2"	0'-9"	0'-9"	0'-9"	0'-9"		0'-4 1/2"									
5DZ01	60	#5	17'-4"	T1	0'-5 1/2"	3'-4 1/2"	4'-10"	3'-4 1/2"	4'-10"		0'-5 1/2"									
5DZ02	22	#5	7'-0"	22D			2'-0"	3'-7"	1'-5"			1'-2"	1'-7 1/2"	0'-9 1/2"		1'-2"				
5DZ03	22	#5	6'-0"	22D			2'-0"	2'-9"	1'-3"			1'-8"	1'-1 1/2"	1'-0 1/2"						
5DZ04	10	#5	6'-4"	17			2'-7"	1'-2"	2'-7"											
5DZ05	10	#5	21'-2"	17			10'-0"	1'-2"	10'-0"											
5DZ06	16	#5	5'-0 1/2"	17			0'-10"	3'-4 1/2"	0'-10"											
5DZ07	44	#5	7'-6"	S13			2'-0"	3'-6"	2'-0"			3'-3 1/2"		1'-2 1/2"	1'-2 3/8"					
6DZ01	36	#6	7'-8"	3			3'-0"	1'-8"	3'-0"			2'-9 1/2"		1'-0 1/2"	3'-9 1/2"					
6DZ02	12	#6	7'-8"	3			3'-0"	1'-8"	3'-0"			2'-9 1/2"		1'-0 1/2"	3'-10"					
7DZ01	2	#7	31'-0"	17			4'-10"	21'-4"	4'-10"											
7DZ02	2	#7	30'-1"	17			4'-10"	20'-5"	4'-10"											
7DZ03	2	#7	25'-2"	16			2'-6"	20'-2"	2'-6"			2'-4 1/2"		0'-10 1/2"	21'-0 1/2"					
7DZ04	2	#7	26'-1 1/2"	21			2'-6"	20'-11"	2'-8 1/2"			2'-7"		0'-9 1/2"						
		#5																		
5DZ09	4	#5	10'-0"	17			2'-7"	4'-10"	2'-7"											



EN600 = 53,000 Vertical
106,000 Basket

Lift Device = AL Patterson Part # LPA20T10G
Lift Pin Anchor
W/ LPLE20T Lift Eye

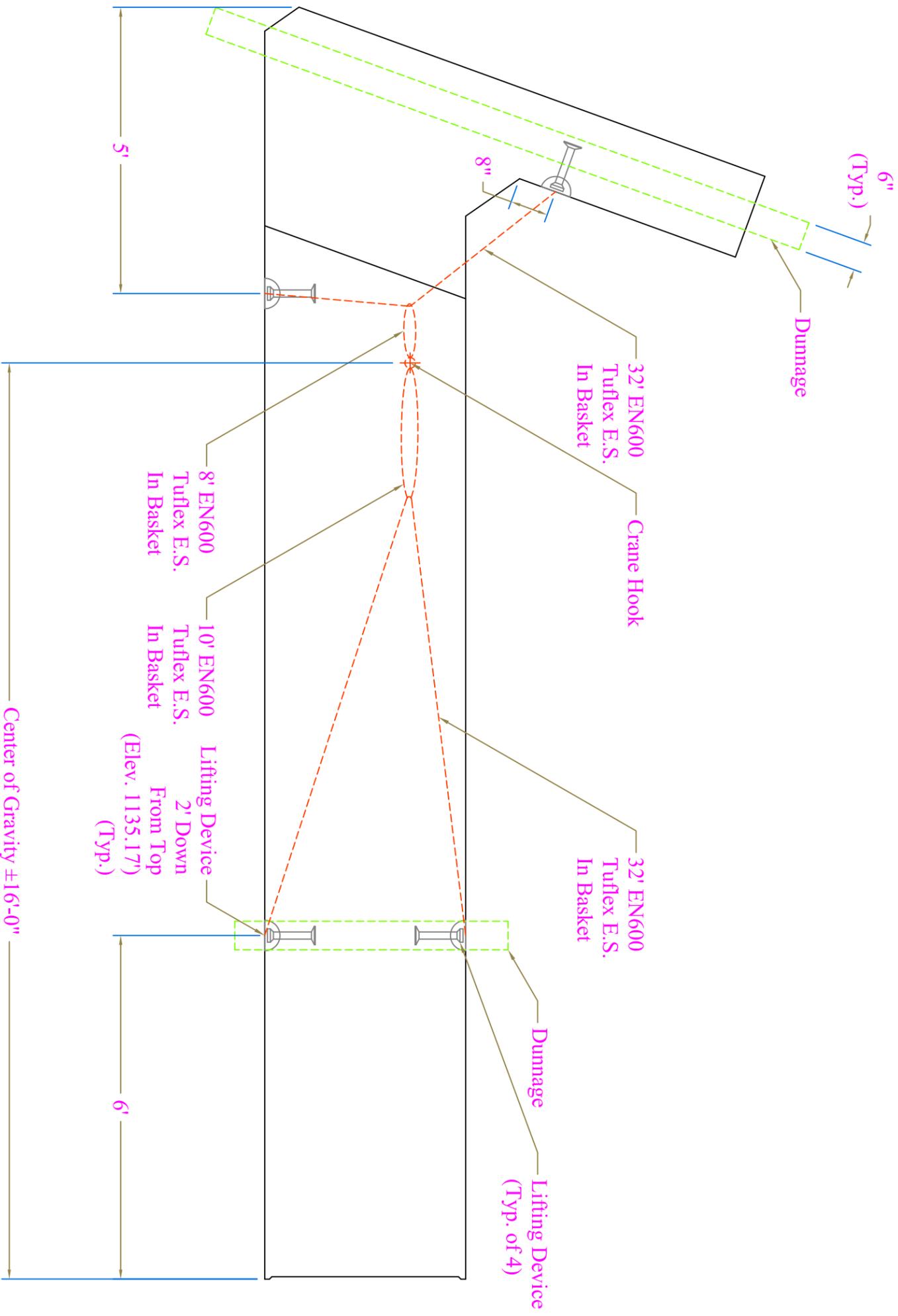
Vermont Agency of Transportation

RECEIVED

ON: **June 12, 2014**
and Checked for

CONFORMANCE

BY: **Rob Young** DATE: **6/17/2014**



This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Approved **Approved As Noted**
 Rejected

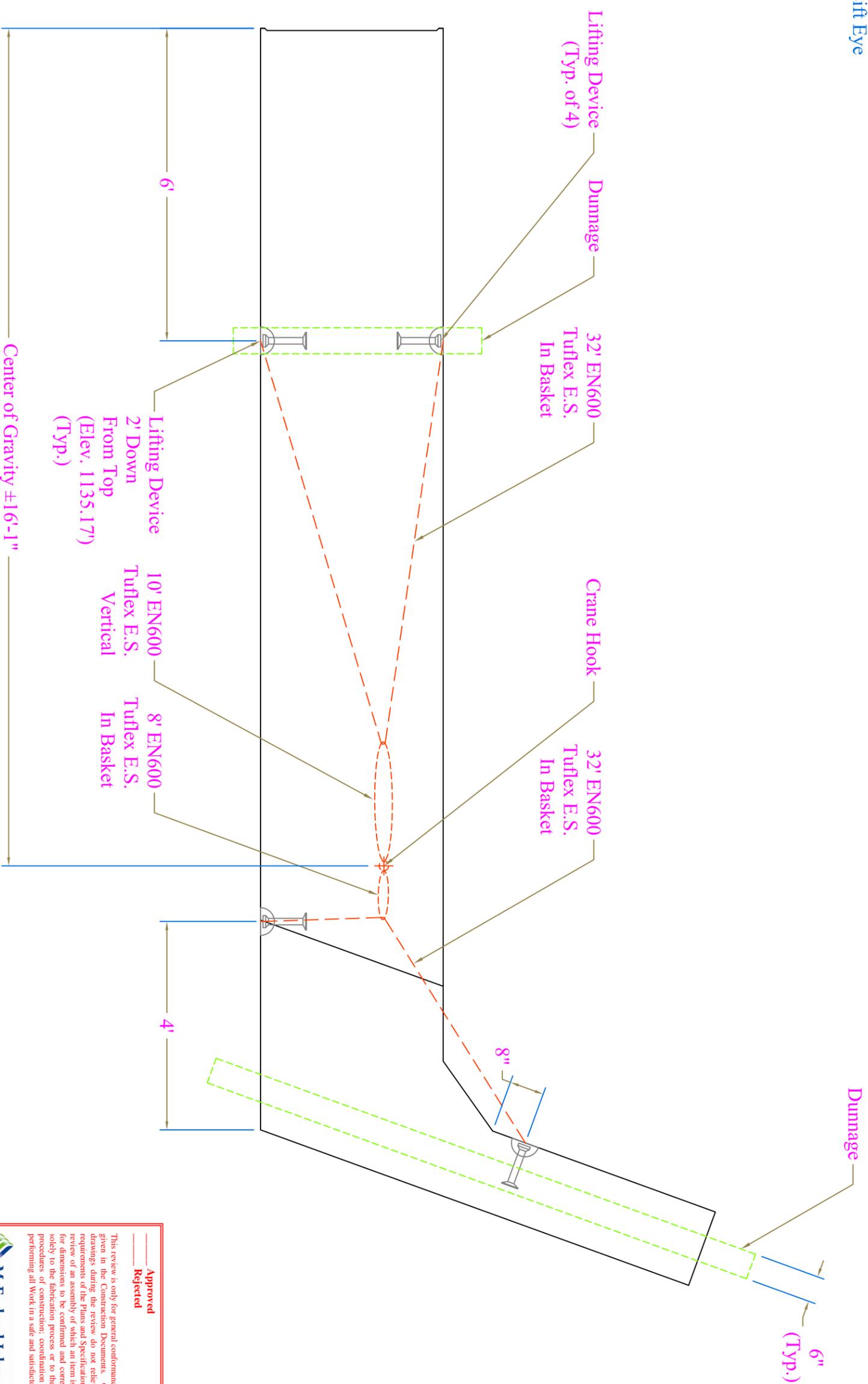
Date: **6/13/2014**
 By: **D. Kull**

CONTRACTORS VISPE:		PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SDI JOB #4046)	
SUPERVISOR: M. WHEELER		PROJECT NAME: Warren	
DETAILER: I. ADAMS		PROJECT #: BRF 013-4(32)	
CHECKER: E. Barendse		LOCATION: Bridge #166	
ENGINEER: N/A		Route 100, Warren, VT	
Luck Brothers, Inc 73 Trade Road Plattsburg, NY, 12901 Ph: (518)-561-4321		FABRICATOR: 193 INDUSTRIAL AVE. WILLISTON, VT 05495 Ph: (802) 658-0201	
03/03/2014		AB1L & AB2L Lifting	
		1 of 2	



EN600 = 53,000 Vertical
106,000 Basket

Lift Device = AL Patterson Part # LPA20T10G
Lift Pin Anchor
W/ LPLE20T Lift Eye



This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Approved
 Approved As Noted
 Rejected

Date: 6/13/2014
 By: D. Kill

McFarland Johnson

Vermont Agency of Transportation
RECEIVED
 ON: **June 12, 2014**
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

CONTRACTORS VISPE:		PRECAST CONCRETE ABUTMENT SHOP DRAWINGS (SDI JOB #14046)	
SUPERVISOR: M. WHEELER DETAILER: I. ADAMS CHECKER: E. Barendse ENGINEER: N/A		PROJECT NAME: Warren PROJECT #: BRF 013-4(32) LOCATION: Bridge #166 Route 100, Warren, VT	
Luck Brothers, Inc 73 Trade Road Plattsburg, NY, 12901 Ph: (518)-561-4321		FABRICATOR: 193 INDUSTRIAL AVE. WILLISTON, VT 05495 Ph: (802) 658-0201	
03/03/2014		AB1R & AB2R Lifting	
		2 of 2	



This review is only for conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in accordance with the Contract Documents.

ALP LIFTING PIN LIFTING SYSTEM

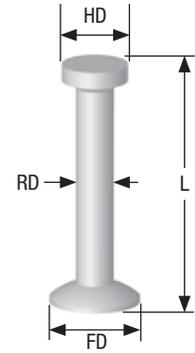


LIFTING & HANDLING

LIFTING PIN ANCHOR - DIMENSIONS AND MECHANICAL CAPACITIES



Part Number	L - Length	HD - Head Diameter	RD - Rod Diameter	FD - Foot Diameter	Min. Steel Strength, 4:1 SWL (lbs)
1T	Varies	3/4"	3/8"	1"	2,000
2T	Varies	1"	9/16"	1-3/8"	4,000
4T	Varies	1-3/8"	3/4"	1-7/8"	8,000
8T	Varies	1-13/16"	1-3/32"	2-3/4"	16,000
16T	Varies	2-3/4"	1-1/2"	3-7/8"	32,000
20T	Varies	2-3/4"	1-1/2"	3-7/8"	40,000



Vermont Agency of Transportation

RECEIVED

ON: June 12, 2014

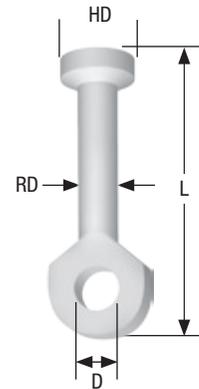
and Checked for CONFORMANCE

BY: Rob Young DATE: 6/17/2014

ALP LIFTING PIN EYE ANCHORS

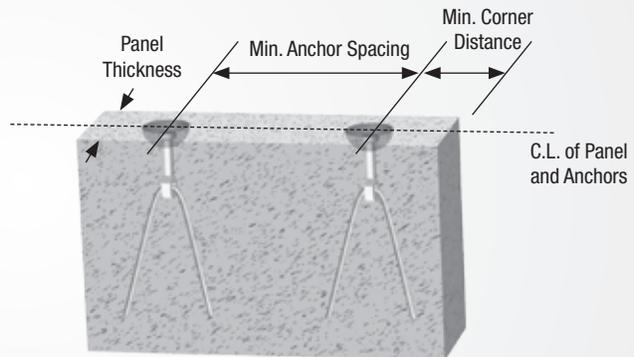
LIFTING PIN EYE ANCHOR - DIMENSIONS AND CAPACITIES WITH REBAR

Part Number	Ton	L Length	HD - Head Diameter	RD - Rod Diameter	D Diameter	Min. Panel Thickness	Min. Corner Distance	Tension w/rebar 4:1 SWL (lbs)	Min. Anchor Spacing
LPEA1TG	1T	2-5/8"	11/16"	3/8"	3/8"	3"	8"	2,000	16"
LPEA2TG	2T	3-1/2"	1-1/32"	9/16"	9/16"	3"	4"	4,000	8"
LPEA4TG	4T	4-3/4"	1-11/32"	3/4"	3/4"	4"	6"	8,000	12"
LPEA8TG	8T	7-1/16"	1-7/8"	1-3/32"	1"	6"	8"	16,000	16"
LPEA16TG	16T	9-7/8"	2-3/4"	1-1/2"	1-7/16"	6-1/2"	10"	32,000	18"
LPEA20TG	20T	9-7/8"	2-3/4"	1-1/2"	1-7/16"	6-1/2"	10"	40,000	18"



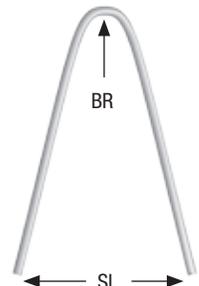
- Based on 4:1 Safety Factor
- Min. concrete compressive strength 2,000 psi. Safe work loads are based on Anchors with rebar installed.
- Anchors must be centered when installed. Deviations will result in reduction of safe working loads.

The Lifting Pin Eye Anchor utilizes rebar reinforcement which transfers tension loads deep into the concrete element and produces high safe working loads in thin wall sections.



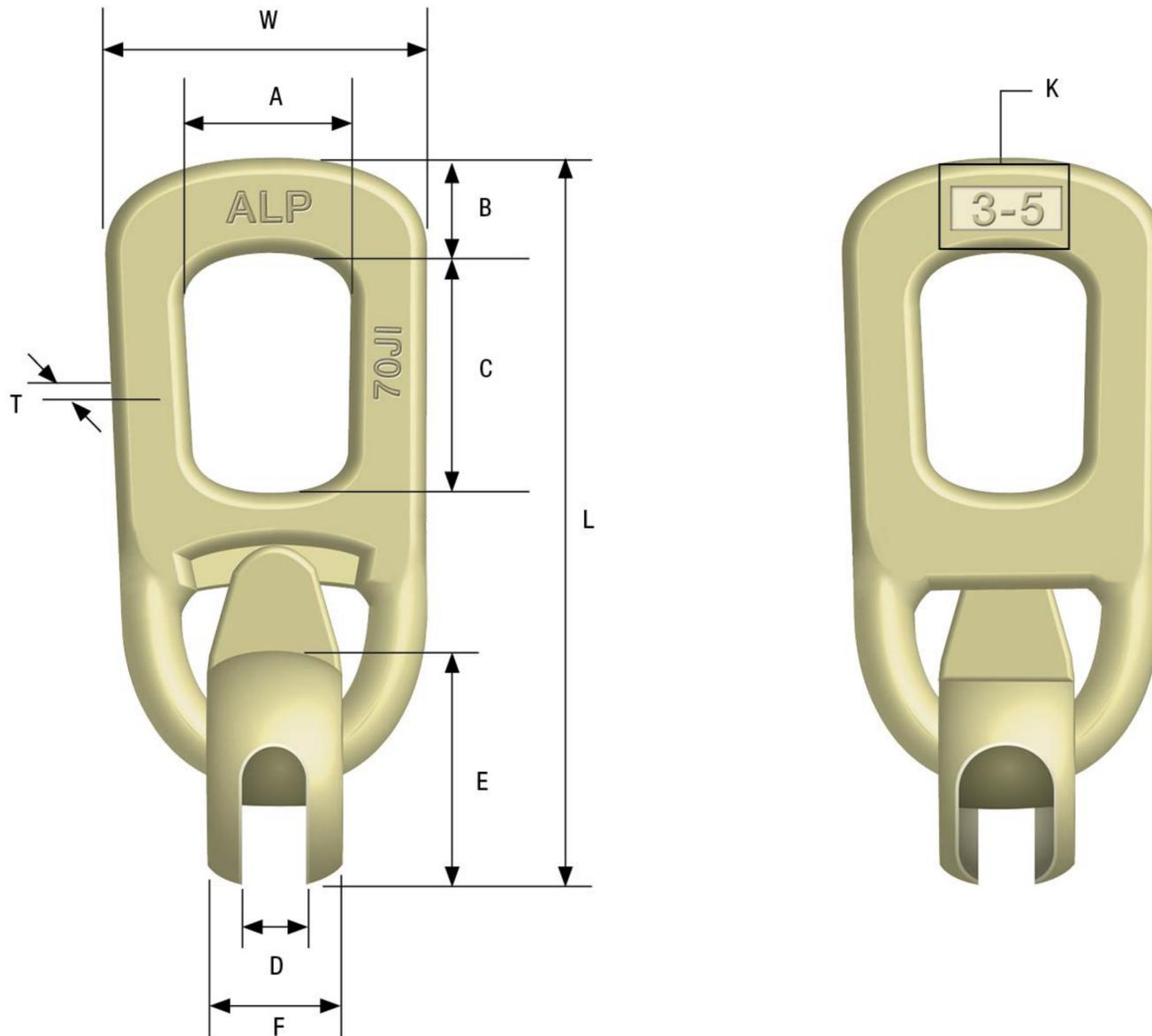
REBAR INFORMATION

Anchor Load Rating	Grade 60 Rebar Size	Rebar Total Length	SL - Spread Length		BR - Bending Radius
			Min.	Max.	
1T	0.306"	36"	12"	12"	3/4"
2T	#3	24"	6"	7-1/2"	1-1/4"
4T	#5	24"	7"	10"	2"
8T	#6	48"	10"	15"	2-1/2"
16T	#8	86"	12"	19-1/2"	3"
20T	#9	86"	12-1/2"	20"	3"



ALP LIFTING EYE - STANDARD

Designed as an attachment link for lifting and transport of precast concrete units in combination with the ALP Lifting Pin Anchor System. The Lifting Eye consists of a round body with a protruding lever arm and a high strength bail. The body has a "T" slot that engages the head of a Lifting Pin Anchor. The rotation capabilities allow the lifting eye to stay oriented in the direction of loading without binding up.



Approved
 Rejected

 Approved As Noted

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Date: 6/13/2014
 By: D. Kull

McFarland Johnson

Vermont Agency of Transportation
RECEIVED
 ON: June 12, 2014
 and Checked for
CONFORMANCE
 BY: Rob Young DATE: 6/17/2014

Part Number	Description / Capacity	Weight Each (lbs)	L	W	T	A	B	C	D	E	F	K Load Range (Tons)	Ultimate Capacity in Tension (lbs)
LPLE1T	Lifting Eye for 1T, 1.3T Anchors	2.20	7-11/32"	3"	1/2"	1-3/4"	7/8"	2-3/4"	15/32"	2-1/8"	1-5/16"	1-1.3	13,000
LPLE2T	Lifting Eye for 1.5T, 2T, 2.5T Anchors	3.60	9"	3-1/2"	5/8"	2-1/8"	1"	3-3/8"	11/16"	2-9/16"	1-5/8"	1.5-2.5	25,000
LPLE4T	Lifting Eye for 3T, 4T, 5T Anchors	7.65	11"	4-11/16"	11/16"	2-5/8"	1-15/32"	3-7/16"	29/32"	3-3/8"	2-1/4"	3-5	50,000
LPLE8T	Lifting Eye for 6T, 8T, 10T Anchors	21.70	15-1/2"	6-1/4"	1-1/16"	3-1/8"	2"	4-3/8"	1-1/4"	4-1/2"	2-15/16"	6-10	100,000
LPLE20T	Lifting Eye for 12T, 16T, 20T Anchors	39.00	20"	7-11/16"	1-3/8"	4-3/8"	2-13/16"	5-15/16"	1-11/16"	5-5/8"	4-3/8"	12-20	200,000

Rated load has a 5:1 safety factor.

Crosby® Alloy Screw Pin Shackles

Load Rated®



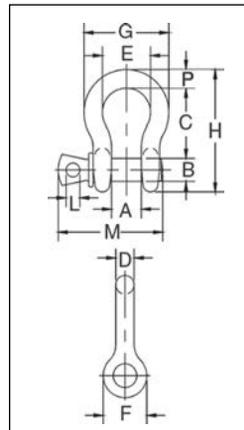
APPLICATION INSTRUCTIONS
SEE PAGE 89 OF THE GENERAL CATALOG

G-209A



G-209A Screw pin anchor shackles meet the performance requirements of Federal Specification RR-C-271F Type IVA, Grade B, Class 2, except for those provisions required of the contractor. For additional information, see page 444.

- Capacities 2 thru 21 metric tons. Meets performance requirements of Grade 8 shackles.
- Forged Alloy Steel – Quenched and Tempered, with alloy pins.
- Working Load Limit permanently shown on every shackle.
- Hot Dip Galvanized.
- Shackles can be furnished proof tested with certificates to designated standards, such as ABS, DNV, Lloyds, or other certification. Charges for proof testing and certification available when requested at the time of order.
- Approved for use at -40 degree C (-40 degree F) to 204 degree C (400 degree F).
- Meets or exceeds all requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements. Importantly, these shackles meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.



G-209A Crosby® Alloy Screw Pin Shackles

Nominal Size (in.)	Working Load Limit (t)*	G-209A Stock No.	Weight Each (lbs.)	Dimensions (in.)											Tolerance +/-	
				A	B	C	D	E	F	G	H	L	M	P	C	A
3/8	2	1017450	.31	.66	.44	1.44	.38	1.03	.91	1.78	2.49	.25	2.03	.38	.13	.06
7/16	2-2/3	1017472	.38	.75	.50	1.69	.44	1.16	1.06	2.03	2.91	.31	2.38	.44	.13	.06
1/2	3-1/3	1017494	.63	.81	.63	1.88	.50	1.31	1.19	2.31	3.28	.38	2.69	.50	.13	.06
5/8	5	1017516	1.38	1.06	.75	2.38	.63	1.69	1.50	2.94	4.19	.44	3.34	.69	.13	.06
3/4	7	1017538	2.35	1.25	.88	2.81	.75	2.00	1.81	3.50	4.97	.50	3.97	.81	.25	.06
7/8	9-1/2	1017560	3.61	1.44	1.00	3.31	.88	2.28	2.09	4.03	5.83	.50	4.50	.97	.25	.06
1	12-1/2	1017582	5.32	1.69	1.13	3.75	1.00	2.69	2.38	4.69	6.56	.56	5.07	1.06	.25	.06
1-1/8	15	1017604	7.25	1.81	1.25	4.25	1.16	2.91	2.69	5.16	7.47	.63	5.59	1.25	.25	.06
1-1/4	18	1017626	9.88	2.03	1.38	4.69	1.29	3.25	3.00	5.75	8.25	.69	6.16	1.38	.25	.06
1-3/8	21	1017648	13.25	2.25	1.50	5.25	1.42	3.63	3.31	6.38	9.16	.75	6.84	1.50	.25	.13

* Maximum Proof Load is 2 times the Working Load Limit (metric tons) and 2.2 times the Working Load Limit (short tons). Minimum Ultimate Strength is 4.5 times the Working Load Limit for metric tonnes, and 5 times the Working Load Limit for short tons. For Working Load Limit reduction due to side loading applications, see page 91.

Load Rated®



APPLICATION INSTRUCTIONS
SEE PAGE 89 OF THE GENERAL CATALOG

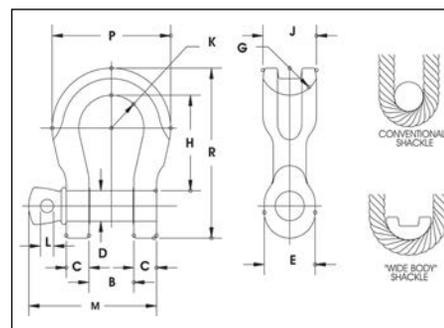
G-2169



S-2169



- Capacities of 7, 12.5 and 18 metric tons.
- Quenched and Tempered for maximum strength.
- Forged Alloy Steel.
- Available in galvanized and self colored finished.
- Individually proof tested and magnetic particle inspected. Crosby certification available at time of order.
- Meets or exceeds all requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements. Importantly, these shackles meet other critical performance requirements including fatigue life, impact properties and material traceability, not addressed by ASME B30.26.
- Look for the Red Pin® . . . the mark of genuine Crosby quality.



Vermont Agency of Transportation

RECEIVED
ON: **June 12, 2014**
and Checked for
CONFORMANCE
BY: Rob Young DATE: 6/17/2014

Approved	X	Approved As Noted
Rejected		

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

Date: 6/13/2014
By: D. Kull

McFarland Johnson

G-2169 / S-2169 Screw Pin "Wide Body" Shackles

Working Load Limit (t)*	G-2169 Stock No.	S-2169 Stock No.	Weight Each (lbs.)	Dimensions (in.)														
				B +/- .25	C	D +/- .02	E	G	H	J	K	L	M	P	R			
7	1021655	1021664	3.5	1.25	.69	.88	1.82	1.25	3.56	1.60	1.25	.50	3.97	4.10	5.87			
12.5	1021673	1021682	8.8	1.69	.92	1.13	2.38	1.37	4.63	2.13	1.63	.56	5.13	5.51	7.63			
18	1021691	1021699	13	2.03	1.16	1.38	2.69	1.50	5.81	2.50	2.00	.69	6.25	6.76	9.38			

* Ultimate Load is 5 times the Working Load Limit. Forged Alloy Steel. Proof Load is 2 times the Working Load Limit.

TUFLEX ENDLESS ROUNDSLINGS

Tuflex Endless (EN)
The Most Versatile Tuflex Roundsliding

Features, Advantages and Benefits

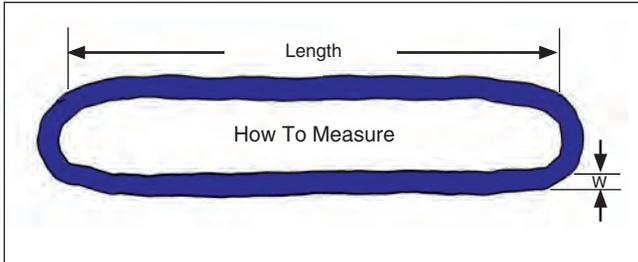
Maintains all the basic Tuflex features plus...

Promotes Safety

- Load stability and balance can be achieved by spreading sling legs.

Saves Money

- Wear points can be shifted to extend sling life
- The most flexible style of sling



Tuflex

Part No.	Color	Rated Capacity (lbs.)*				Minimum Length (ft.)	Approximate Measurements			
		Vertical	Choker	Basket @ 90°	Basket @ 45°		Weight (lbs. / ft.)	Body Dia. Relaxed (in.)	(W) Width at Load (in.)	Minimum Hardware Dia. ** (in.)
EN30	Purple	2,600	2,100	5,200	3,600	1 1/2	.2	5/8	1	7/16
EN60	Green	5,300	4,200	10,600	7,400	1 1/2	.3	7/8	1 3/8	5/8
EN90	Yellow	8,400	6,700	16,800	11,800	3	.5	1 1/8	1 3/4	3/4
EN120	Tan	10,600	8,500	21,200	14,000	3	.6	1 1/8	1 7/8	7/8
EN150	Red	13,200	10,600	26,400	18,000	3	.8	1 3/8	2	1
EN180	White	16,800	13,400	33,600	23,000	3	.9	1 3/8	2 1/8	1 1/8
EN240	Blue	21,200	17,000	42,400	29,000	3	1.3	1 3/4	2 5/8	1 3/16
EN360	Grey	31,000	24,800	62,000	43,000	3	1.7	2 1/4	3 1/4	1 1/2
EN600	Brown	53,000	42,400	106,000	74,000	8	2.8	2 3/4	4	2
EN800	Olive	66,000	52,800	132,000	93,000	8	3.4	3 1/8	4 5/8	2 1/8
EN1000	Black	90,000	72,000	180,000	127,000	8	4.3	3 5/8	5 1/4	2 1/2

* **WARNING** Do not exceed rated capacities. Sling capacity decreases as the angle from horizontal decreases. Slings should not be used at angles of less than 30°. Refer to Effect of Angle chart page 12.

** This is the smallest recommended connection hardware diameter to be used for a vertical hitch.

Vermont Agency of Transportation

RECEIVED

ON: June 12, 2014

and Checked for

62 CONFORMANCE

BY: Rob Young DATE: 6/17/2014

<input type="checkbox"/> Approved <input checked="" type="checkbox"/> Rejected	<input checked="" type="checkbox"/> Approved As Noted
<small>This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.</small>	
Date: 6/13/2014	
By: D. Kull	

Design Calculations

For:
**Warren Bridge Abutment
 Lifting/Handling Review
 Warren, VT**

For:
S.D. Ireland

Submitted On:
March 13, 2014

Vermont Agency of Transportation

RECEIVED

ON: **June 12, 2014**

and Checked for

CONFORMANCE

BY: Rob Young DATE: 6/17/2014

Approved Approved As Noted
 Rejected

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during the review do not relieve the Contractor from compliance with the requirements of the Plans and Specifications. Review of a specific item shall not include review of an assembly of which an item is a component. The Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of other trades and performing all Work in a safe and satisfactory manner.

 **McFarland Johnson**

Date: 6/13/2014

By: D. Kull

For Approval

Index	Page
Basis of Design.....	1
Calculations.....	2-6

Basis of Design

Reference:

- PCI Design Handbook: Precast and Prestressed Concrete; 6th Edition

General Design Parameters:

- Stripping Strength: 3000 psi
- Handling Strength: 3000 psi
- Shipping Strength: 5000 psi
- Abutment Width: 3'-6"
- Abutment Width at Wingwall: 1'-6"
- Abutment AB1L & AB2L Length: $b_1 = 22'-5 \frac{3}{8}"$
- Abutment AB1R & AB2R Length: $b_2 = 24'-2"$
- Wingwall Length: $b_3 = 8'-8 \frac{3}{4}"$
- Abutment Height: $a_1 = 5'-2"$
- Abutment Height at Wingwall: $a_2 = 10'-9 \frac{5}{8}"$
- Equivalent Static Load Multipliers (from PCI Table 5.3.3.1)
 - Stripping:
 - Flat, with removable side forms, no false joints or reveals; Smooth mold (form oil only): 1.3
 - Yard Handling and Erection:
 - All products: 1.2
 - Travel:
 - All products: 1.5

Calculations

AB1R & AB2R:

Note: AB1R and AB2R were analyzed as it was determined that this abutment configuration would control over the configuration of AB1L and AB2L.

$$\text{Area of abutment: } A_1 = (24'-2'')(5'-2'') = 17980 \text{ in}^2$$

$$\text{Area of wingwall: } A_2 = (8'-8 \frac{3}{4}'')(10'-9 \frac{5}{8}'') = 13578 \text{ in}^2$$

Resisting Section for M_y :

$$\text{Abutment: } S_{b,y1}^* = bh^2/6 = (3'-6'')(5'-2'')^2/6 = 26908 \text{ in}^3$$

$$\text{Wingwall: } S_{b,y2}^* = bh^2/6 = (1'-6'')(10'-9 \frac{5}{8}'')^2/6 = 50408 \text{ in}^3$$

$$\text{Unit weight at abutment: } (5'-2'')(150 \text{ pcf}) = 775 \text{ psf} = .775 \text{ ksf}$$

$$\text{Unit weight at wingwalls: } (10'-9 \frac{5}{8}'')(150 \text{ pcf}) = 1615 \text{ psf} = 1.615 \text{ ksf}$$

$$\text{Total weight: } (.775 \text{ ksf})(24'-2'')(3'-6'') + (1.615 \text{ ksf})(8'-8 \frac{3}{4}'')(1'-6'') = 86.7 \text{ k}$$

Allowable tensile stresses at stripping and lifting (PCI Eq. 5.3.3.1):

$$5\lambda\sqrt{f_c'} = 5(1.0)\sqrt{3000 \text{ psi}} = 0.274 \text{ ksi}$$

Allowable tensile stresses at traveling (PCI Eq. 5.3.3.1):

$$5\lambda\sqrt{f_c'} = 5(1.0)\sqrt{5000 \text{ psi}} = 0.354 \text{ ksi}$$

From PCI Figure 5.3.1.2:

$$\text{Abutment: } a = 3'-6'' ; b = 24'-2'' ; \text{Wingwall: } a = 1'-6'' ; b = 8'-8 \frac{3}{4}''$$

$$w_{y1} = (0.775 \text{ ksf})(3'-6'') = 2.71 \text{ ksf (for abutment)}$$

$$w_{y2} = (1.615 \text{ ksf})(1'-6'')(8'-8 \frac{3}{4}'')/(2.77') = 7.63 \text{ klf (for idealized wingwall at abutment)}$$

$$w_{y3} = (0.775 \text{ ksf})(24'-2''/2)(3'-6'')/(2.10') = 15.72 \text{ klf (for idealized abutment at wingwall)}$$

$$w_{y4} = (1.615 \text{ ksf})(1'-6'') = 2.42 \text{ klf (for idealized wingwall)}$$

Using mechanics of materials (see shear and moment diagrams on pages 4-6):

$$+ M_{y1}^* = (0.5)(2.77')(21.1 \text{ k}) + (0.5)(4.2')(32.1 \text{ k} - 21.1 \text{ k}) + (4.2')(21.1 \text{ k}) = 140.9 \text{ k-ft}$$

$$- M_{y1}^* = (0.5)(16.3 \text{ k})(6') - (0.5)(22.0 \text{ k})(8.1') = -40.2 \text{ k-ft}$$

$$+ M_{y2} = (0.5)(62.8 \text{ k})(4.54') = 142.6 \text{ k-ft}$$

* Note: In order to maximize effects, the location of the second lift support was varied between the second lift support location on the abutment the lift support located on the wingwall.

For Stripping:

$$f_t = + M_{y1} / S_{b,y1} = (140.9 \text{ k-ft})(12''/\text{ft})(1.3)/(26908 \text{ in}^3) = .082 \text{ ksi} < 0.274 \text{ ksi} \rightarrow \text{O.K.}$$

$$f_t = - M_{y1} / S_{b,y1} = (40.2 \text{ k-ft})(12''/\text{ft})(1.3)/(26908 \text{ in}^3) = .023 \text{ ksi} < 0.274 \text{ ksi} \rightarrow \text{O.K.}$$

$$f_t = M_{y2} / S_{b,y2} = (24.8 \text{ k/ft})(12''/\text{ft})(1.3)/(50408 \text{ in}^3) = \mathbf{0.01 \text{ ksi} < 0.274 \text{ ksi} \rightarrow \text{O.K.}}$$

For Yard Handling and Erection:

$$f_t = + M_{y1} / S_{b,y1} = (140.9 \text{ k/ft})(12''/\text{ft})(1.2)/(26908 \text{ in}^3) = \mathbf{.075 \text{ ksi} < 0.274 \text{ ksi} \rightarrow \text{O.K.}}$$

$$f_t = - M_{y1} / S_{b,y1} = (40.2 \text{ k/ft})(12''/\text{ft})(1.2)/(26908 \text{ in}^3) = \mathbf{.022 \text{ ksi} < 0.274 \text{ ksi} \rightarrow \text{O.K.}}$$

$$f_t = M_{y2} / S_{b,y2} = (24.8 \text{ k/ft})(12''/\text{ft})(1.2)/(50408 \text{ in}^3) = \mathbf{0.01 \text{ ksi} < 0.274 \text{ ksi} \rightarrow \text{O.K.}}$$

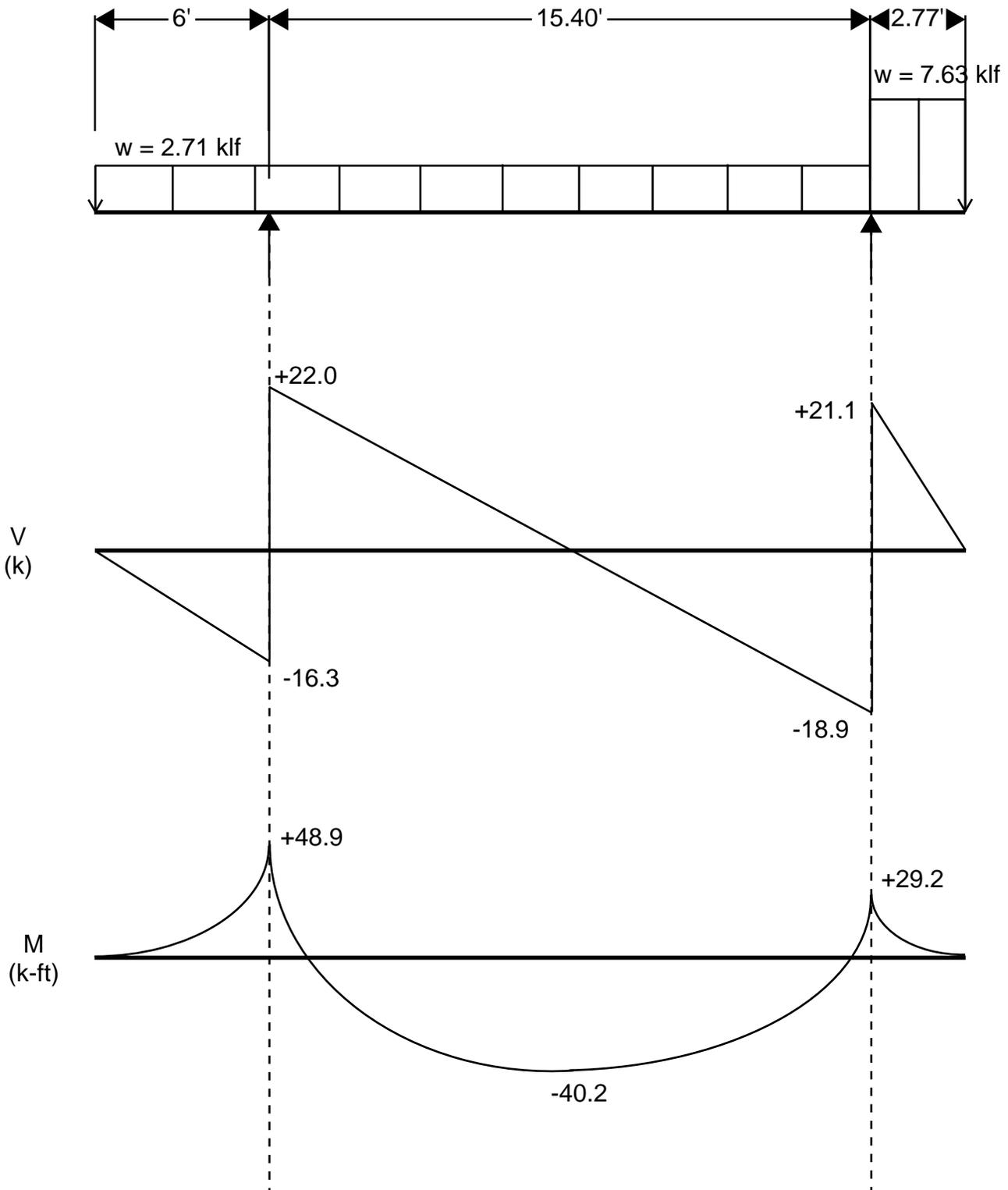
For Travel: (Strip lumber to dunnage to be aligned with lifting points)

$$f_t = M_{y1} / S_{b,y1} = (140.9 \text{ k/ft})(12''/\text{ft})(1.5)/(26908 \text{ in}^3) = \mathbf{.094 \text{ ksi} < 0.354 \text{ ksi} \rightarrow \text{O.K.}}$$

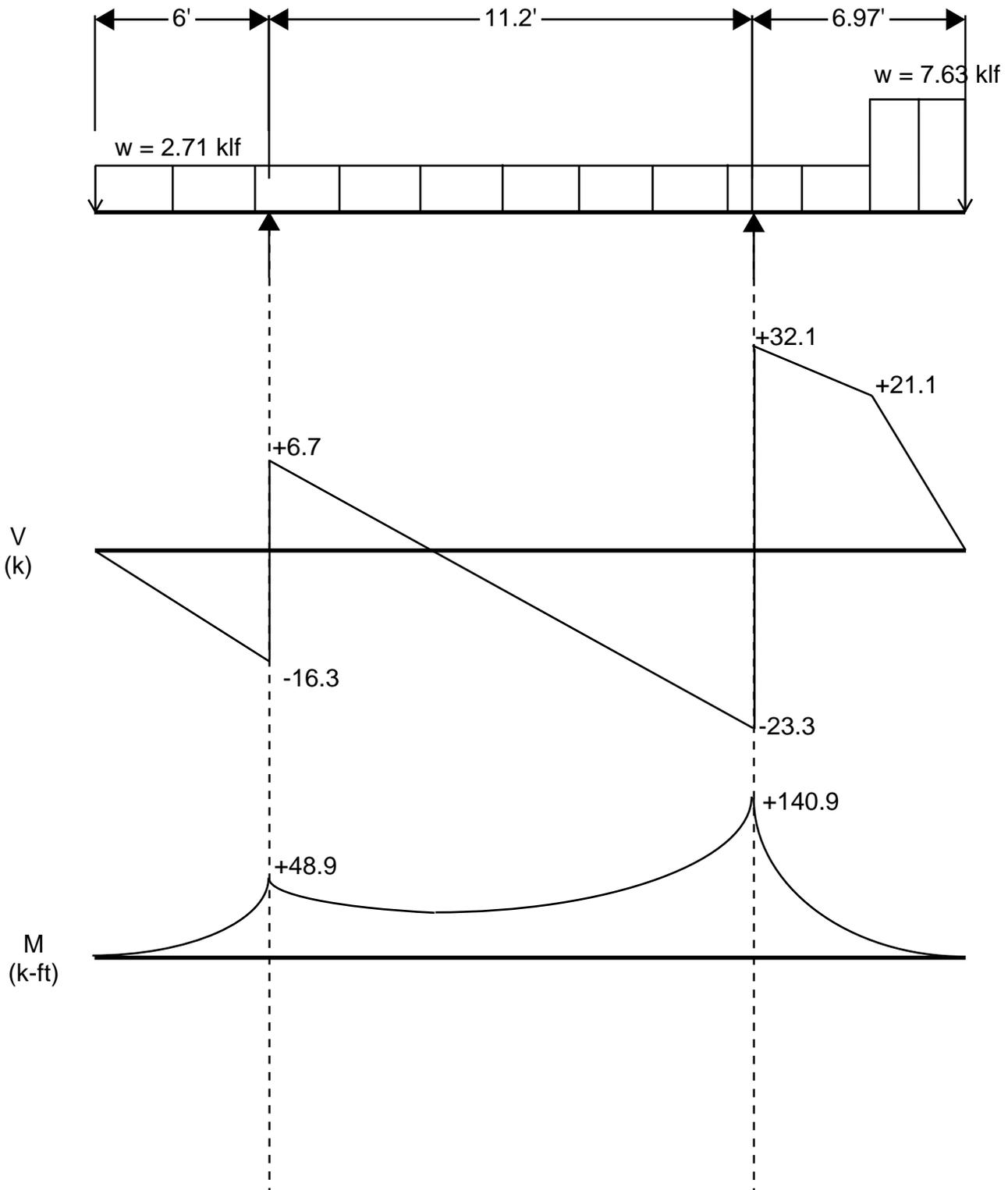
$$f_t = + M_{y1} / S_{b,y1} = (40.2 \text{ k/ft})(12''/\text{ft})(1.5)/(26908 \text{ in}^3) = \mathbf{.027 \text{ ksi} < 0.354 \text{ ksi} \rightarrow \text{O.K.}}$$

$$f_t = - M_{y2} / S_{b,y2} = (24.8 \text{ k/ft})(12''/\text{ft})(1.5)/(50408 \text{ in}^3) = \mathbf{0.01 \text{ ksi} < 0.354 \text{ ksi} \rightarrow \text{O.K.}}$$

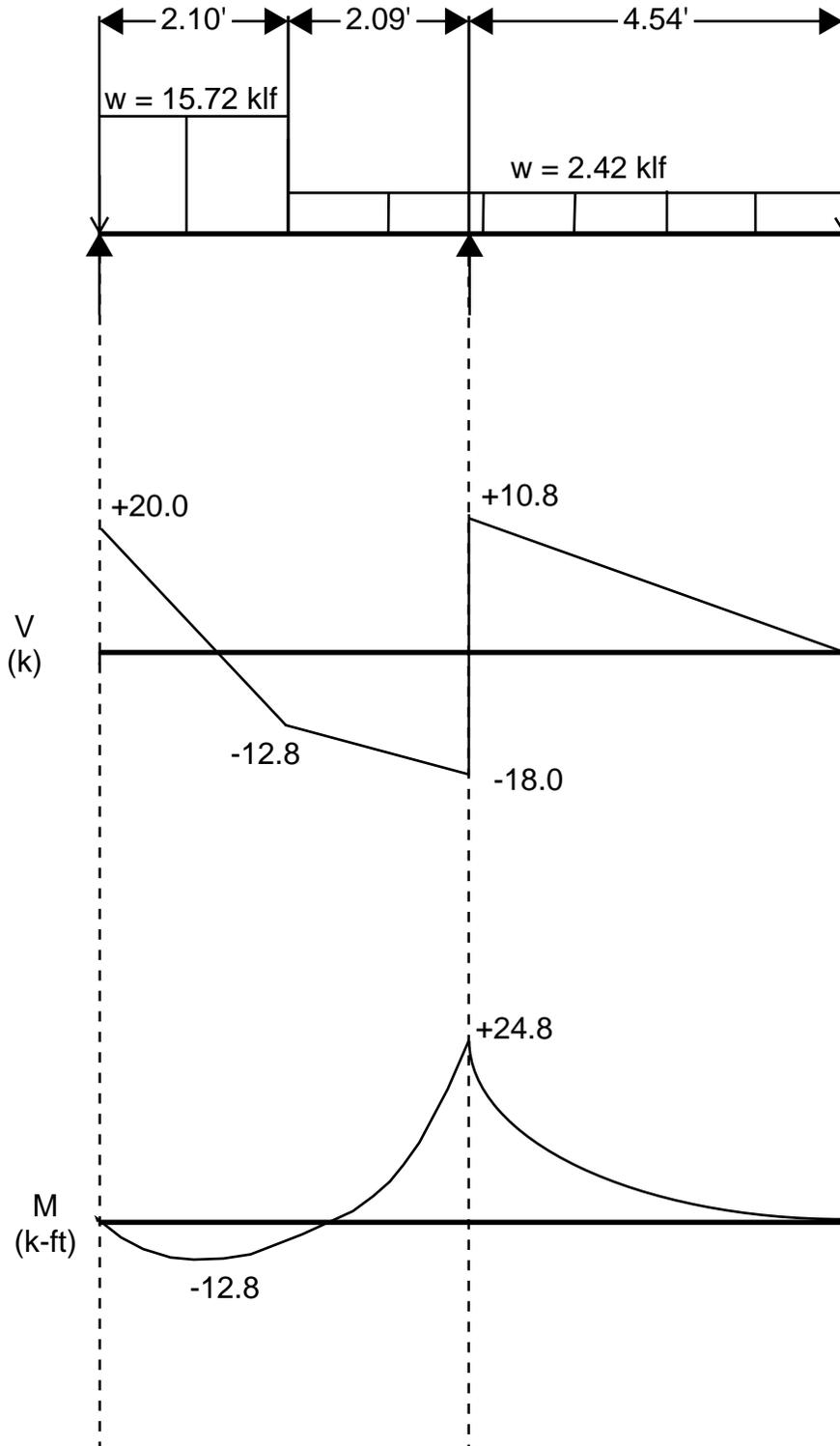
Max Negative M_y :



Max Positive M_y :



Max M_y in Wingwall:



CONCRETE MIX DESIGN

6000 psi

SCC

SDI MIX CODE: P60TER

DATE: July 18, 2013 **PLANT:** Burlington, VT

PROJECT: General DOT Precast - 2014

FINE AGGREGATE#1: ASTM C 33	Source: Hinesburg Sand & Gravel Specific Gravity: 2.65 (Abs.: 1.34%) Fineness Modulus: 2.92
FINE AGGREGATE#2: Fine Grade	Source: Hinesburg Sand & Gravel Specific Gravity: 2.65 (Abs.: 1.34%) Fineness Modulus: 1.49 (17.8% replacement)
COARSE AGGREGATE: ASTM C 33	Source: S.D. Ireland, Brownell Quarry Specific Gravity: 2.80 (Abs.: 0.30%) Description: 3/4" 100% Crushed Stone (Size #67)

CEMENT: Ternary Blend Cement; Lefarge North America Lakes and Seaway Re St. Constant, Quebec (Sp. Gvty. 3.02)

ADMIXTURES: Water Reducer (HRWR): Glenium 7500; BASF
Air Entraining Agent: Darex II AEA; Grace Concrete Chemicals

CONSTITUENTS (LBS. /YD³)

		<u>Abs.Vol.</u>
Coarse Aggregate (SSD)	1750	10.02
Fine Aggregate #1(SSD)	829	5.01
Fine Aggregate #2 (SSD)	180	1.09
Cement	800	4.25
Water	304.6	4.88
Air Content (Entrained)	6.5%	1.75
Total	3864	27.00ft³

MIX PROPERTIES

Water Cement Ratio: 0.38
Entrained Air Content: 5.0 % – 9.0%
Spread: 20" to 27"
Dry Unit Weight: 144.2 ± pcf

ADMIXTURE(S) DOSEAGE (OZ. /YD³)

Glenium 7500 (HRWR)	44 - 64
Darex II AEA	2.5

*Admixture dosage rates are subject to change.