KUBRICKY CONSTRUCTION CORP.
269 BALLARD ROAD

WILTON, NY 12831
518 792-5864

KUBRICKY CONSTRUCTION CORP.
A PROUD MEMBER OF THE D.A. COLLINS™ COMPANIES

Rutland City BRF 3000 (2014036)
SUBMITTAL 89.0

Issued 06/10/16
Respond by 06/16/16

To

Timothy Pockette, PE

Topic	900.645 Truss Erection Plan
Status	For Approval
Spec section	900.645
Responsibility	(19) Ripley Road
Received from submitter	6/10/16
Sent to approver	6/10/16
Required from approver	6/16/16

From

Volker H.D. Burkowski

Signed by _____ Date 6/10/16

Proceed as Indicated _____ Date _____
Owner Authorized Representative

GENERAL NOTES

SECTION 1: CRANES

1. CRANE SET-UP POSITION IS APPROXIMATE AND MAY BE ADJUSTED TO SUIT ON-SITE CONDITIONS AT THE TIME OF ERECTION. THE NEW POSITION SHALL BE WITHIN THE CRANE ENVELOPE AS SHOWN ON THE ERECTION DRAWING OR AS NOTED IN THE ERECTION PROCEDURE.

2. THE CRANE WILL BE LOCATED TO CLEAR ALL OVERHEAD AND UNDERGROUND OBSTRUCTIONS.

3. NO CRANE SHALL BE OPERATED IN A MANNER THAT WILL EXCEED ITS RATED CAPACITY AT ANY RADIUS AS SPECIFIED BY THE CRANE MANUFACTURER.

4. CRANE CAPACITY CHARTS SHALL BE POSTED IN THE CRANE CAB AND IN CLEAR VIEW OF THE OPERATOR AT ALL TIMES.

5. THE CRANES TO BE USED ARE:

CRANE A - LINKBELT HYDRAULIC CRANE
MODEL ATC 3275
156,500 LBS COUNTERWEIGHT
FULL OUTRIGGERS (26'6")
BOOM MODE EM6 (87.8')

CRANE B - LINKBELT HYDRAULIC CRANE
MODEL ATC 3275
156,500 LBS COUNTERWEIGHT
FULL OUTRIGGERS (26'6")
BOOM MODE EM5 (133.4')

CRANE C - LIEBHERR HYDRAULIC CRANE
MODEL LTM 1220-5.2
172,000 LBS COUNTERWEIGHT
FULL OUTRIGGERS (27.2')
BOOM LENGTH 128'

CRANE D - LINKBELT HYDRAULIC CRANE
MODEL ATC 3275
156,500 LBS COUNTERWEIGHT
FULL OUTRIGGERS (26'6")
BOOM MODE EM5 (117.1')

6. BASED ON AVAILABILITY, DIFFERENT CRANES MAY BE SUBSTITUTED AT THE TIME OF ERECTION. THE SUBSTITUTED CRANE CAPACITY WILL MEET OR EXCEED LOAD CAPACITIES AT THE SPECIFIED RADIUS.

7. ERECTION WIND SPEED IS NOT TO EXCEED 20 MPH.

SECTION 2: ERECTION

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE WEIGHT OF EACH LIFT AND INSURING THE STABILITY OF EACH MEMBER PRIOR TO CRANE RELEASE AND DURING ALL PHASES OF ERECTION.

2. PICK POINT TO BE THE CENTER OF THE LOAD UNLESS OTHERWISE NOTED.

3. LIFT WEIGHTS SHALL INCLUDE THE WEIGHT OF THE LIFTING APPARATUS PLUS THE WEIGHT OF THE GIRDER.

SECTION 3: BOLTED CONNECTIONS

1. CONNECTIONS:

A. SPLICE ELEMENT - SPLICE AND FIELD CONNECTIONS OF MAIN STRESS CARRYING MEMBERS SHALL BE MADE WITH ALL OF THE HOLES FILLED WITH APPROVED HIGH STRENGTH BOLTS AND FULL SIZE ERECTION PINS, WITH BOLTS FULLY TENSIONED BEFORE THE EXTERNAL SUPPORT SYSTEMS ARE RELEASED. AT LEAST ONE-HALF OF THIS PERCENTAGE SHALL BE BOLTS. THE ERECTION PINS SHALL BE USED IN THE CORNERS OF ALL MAIN CONNECTIONS.

B. FLOORBEAMS - FLOORBEAMS AND LATERALS SHALL BE INSTALLED AS THE WORK PROGRESSES. THE NUMBER AND LOCATION OF FLOORBEAMS AND LATERALS NEEDED TO INSURE LATERAL STABILITY OF THE MEMBERS DURING ALL PHASES THE ERECTION PROCESS ARE SHOWN ON THESE ERECTION DRAWINGS. FLOORBEAMS AND LATERALS REQUIRED FOR STABILITY SHALL HAVE CONNECTIONS MADE WITH 100 PERCENT OF THE HOLES FILLED WITH APPROVED HIGH STRENGTH BOLTS. THE BOLTS SHALL BE TIGHTENED UNTIL THERE IS NO GAP BETWEEN THE CONNECTED PARTS. AFTER THE FLOORBEAMS AND/OR LATERAL BRACING REQUIRED FOR STABILITY HAVE BEEN INSTALLED, SUBSEQUENT FLOORBEAMS AND/OR LATERAL BRACING MAY HAVE EACH OF THEIR CONNECTIONS MADE WITH A MINIMUM OF TWO APPROVED HIGH STRENGTH BOLTS INSTALLED IN EACH CONNECTION UNLESS A GREATER NUMBER OF BOLTS IS REQUIRED FOR STABILITY. THE BOLTS SHALL BE TIGHTENED UNTIL THERE IS NO GAP BETWEEN THE CONNECTED PARTS.

2. FIRST STAGE TIGHTENING OF FLOORBEAM BOLTS SHALL BE SUCH THAT NO GAP EXISTS BETWEEN CONNECTED PARTS, AFTER WRENCH TIGHTENING.

3. MEMBERS SHALL BE SUBJECT TO ONLY LIGHT DRIFTING TO ALIGN HOLES. ANY PINNING SHALL NOT CAUSE ELONGATION OF THE HOLES NOR DISTORTION TO THE MEMBERS.

4. FIELD REAMING OF THE HOLES SHALL NOT BE PERFORMED UNLESS APPROVED BY THE CONTRACT DOCUMENTS OR THE ENGINEER OF RECORD.

NO.	DATE		BY	CHK'D	APPR.
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PREPARED BY:

D.A. COLLINS CONSTRUCTION CO., INC

RYAN BIGGS CLARK DAVIS
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Project 11085-1

STATE OF VERMONT
DAVID MacGREGOR
NO. 018.0009298
STRUCTURAL
LICENSED
PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER

APPROVAL

TH 10 (RIPLEY ROAD) OVER OTTER CREEK
BRIDGE NO: 17 (TH 10)
RUTLAND COUNTY

LOCATION:	RUTLAND CITY, VT	PROJECT NUMBER:	BRF 3000 (19)
STATE OF VERMONT AGENCY OF TRANSPORTATION			
CONTRACTOR:	KUBRICKY CONSTRUCTION CORP.		
FABRICATOR:	CASCO BAY STEEL STRUCTURES, INC. JOB NUMBER 598		
ERECTOR:	D.A. COLLINS CONSTRUCTION CO., INC. 269 BALLARD ROAD WILTON, NY 12831		
TITLE	ERECTION NOTES		
DRAWN BY KJG	CHECKED BY	DATE 5/26/16	
SCALE AS SHOWN	DRG. NO. EP-1	SHEET 1 OF 4	

ERECTION PROCEDURE

1. SET UP CRANE A AT C.P. #1.

2. USE CRANE A TO PICK THE SPAN 2 SOUTH TRUSS FROM THE DELIVERY TRUCK AT P.P. #1 USING RIGGING DETAIL R-1 AND SET ON CRIBBING AT S.P. #1.

3. USE CRANE A TO TRIP AND PICK THE SPAN 2 SOUTH TRUSS FROM S.P. #1 USING RIGGING DETAIL R-2 AND SET BACK ON THE DELIVERY TRUCK AT P.P. #1 UPRIGHT. SECURE THE TRUSS USING TD-1.

4. BACK THE DELIVERY TRUCK ACROSS THE EXISTING TEMPORARY BRIDGE TO THE EAST SIDE OF OTTER CREEK.

5. USE CRANE A TO PICK THE SPAN 2 NORTH TRUSS FROM THE DELIVERY TRUCK AT P.P. #1 USING RIGGING DETAIL R-1 AND SET ON CRIBBING AT S.P. #1.

6. USE CRANE A TO TRIP AND PICK THE SPAN 2 NORTH TRUSS FROM S.P. #1 USING RIGGING DETAIL R-2 AND SET BACK ON THE DELIVERY TRUCK AT P.P. #1 UPRIGHT. SECURE THE TRUSS USING TD-1

7. SET UP CRANE B AT C.P. #2 AND CRANE C AT C.P. #3.

8. PULL THE SPAN 2 SOUTH TRUSS ONTO THE EXISTING TEMPORARY BRIDGE AND PICK FROM P.P. #2 AND P.P. #3 WITH CRANE B AND CRANE C RESPECTIVELY USING RIGGING DETAIL R-3.

9. USE CRANE B AND CRANE C TO SET THE SPAN 2 SOUTH TRUSS AT S.P. #2 AND S.P. #3 RESPECTIVELY. BEFORE DISCONNECTING THE CRANES, COMPLETE THE FOLLOWING:

   A. AFTER THE SPAN 2 SOUTH TRUSS IS POSITIONED, SECURE THE TRUSS USING TD-2.

10. BACK THE SPAN 2 NORTH TRUSS ONTO THE EXISTING TEMPORARY BRIDGE AND PICK FROM P.P. #2 AND P.P. #3 WITH CRANE B AND CRANE C RESPECTIVELY USING RIGGING DETAIL R-3.

11. USE CRANE B AND CRANE C TO SET THE SPAN 2 NORTH TRUSS AT S.P. #4 AND S.P. #5 RESPECTIVELY. BEFORE DISCONNECTING THE CRANES, COMPLETE THE FOLLOWING:

   A. AFTER THE SPAN 2 NORTH TRUSS IS POSITIONED, SECURE THE TRUSS USING TD-2.

12. USE CRANE B AND CRANE C AS REQUIRED TO INSTALL SPAN 2 FLOORBEAMS.

13. CONNECT EACH FLOOR BEAM TO THE SPAN 2 NORTH AND SOUTH TRUSSES PER SECTION 3.1.B.

14. USE CRANE B AND CRANE C AS REQUIRED TO INSTALL SPAN 2 LATERAL BRACING.

15. CONNECT EACH LATERAL BRACE BETWEEN FLOOR BEAMS PER SECTION 3.1.B.

16. TENSION THE BOLTS IN ACCORDANCE WITH VAOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

17. SET CRANE D UP AT C.P. #4.

18. USE CRANE D TO LIFT THE SPAN 1 SOUTH TRUSS OFF OF THE DELIVERY TRUCK AT S.P. #1 USING RIGGING DETAIL R-1 AND PLACE ON CRIBBING.

19. USING CRANE D, TRIP AND PICK THE SPAN 1 SOUTH TRUSS FROM S.P. #1 USING RIGGING DETAIL R-2.

20. USE CRANE D TO SET THE SPAN 1 SOUTH TRUSS AT S.P. #6. BEFORE DISCONNECTING THE CRANE, COMPLETE THE FOLLOWING:

   A. AFTER THE SPAN 1 SOUTH TRUSS IS POSITIONED, SECURE THE TRUSS USING TD-2.

21. USE CRANE D TO LIFT THE SPAN 1 NORTH TRUSS OFF OF THE DELIVERY TRUCK AT S.P. #1 USING RIGGING DETAIL R-1 AND PLACE ON CRIBBING.

22. USE CRANE D TO TRIP AND PICK THE SPAN 1 NORTH TRUSS FROM S.P. #1 USING RIGGING DETAIL R-2.

23. USE CRANE D TO SET THE SPAN 1 NORTH TRUSS AT S.P. #7. BEFORE DISCONNECTING THE CRANE, COMPLETE THE FOLLOWING:

   A. AFTER THE SPAN 1 NORTH TRUSS IS POSITIONED, SECURE THE TRUSS USING TD-2.

24. USE CRANE D AS REQUIRED TO INSTALL SPAN 1 FLOORBEAMS.

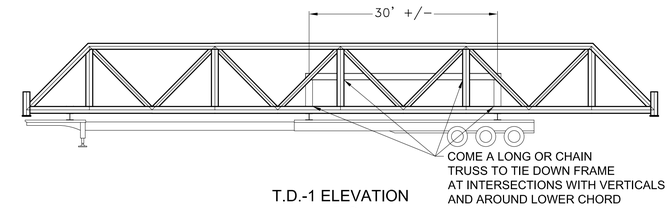
25. CONNECT EACH FLOOR BEAM TO THE SPAN 1 NORTH AND SOUTH TRUSSES PER SECTION 3.1.B.

26. USE CRANE D AS REQUIRED TO INSTALL SPAN 1 LATERAL BRACING.

27. CONNECT EACH LATERAL BRACE BETWEEN FLOOR BEAMS PER SECTION 3.1.B.

28. TENSION THE BOLTS IN ACCORDANCE WITH VAOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

NOTE: THE TRUSSES OF EITHER SPAN SHALL NOT BE ERECTED UNLESS BOTH TRUSSES OF THAT SPAN AND AT LEAST TWO (2) FLOORBEAMS CAN BE ERECTED IN THE SAME SHIFT.



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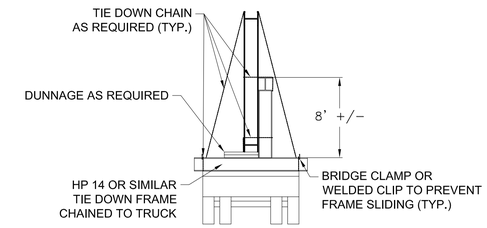
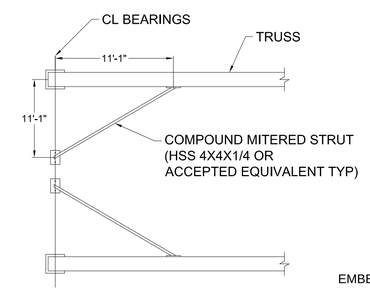


T.D.-1 END VIEW
N.T.S.



T.D.-2 PLAN
TYP EACH ABUTMENT AND PIER
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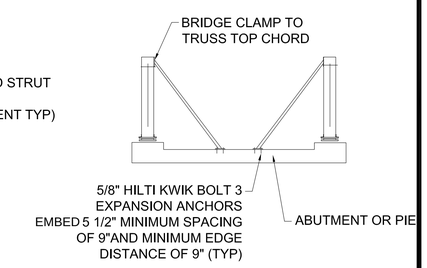

T.D.-2 ELEVATION
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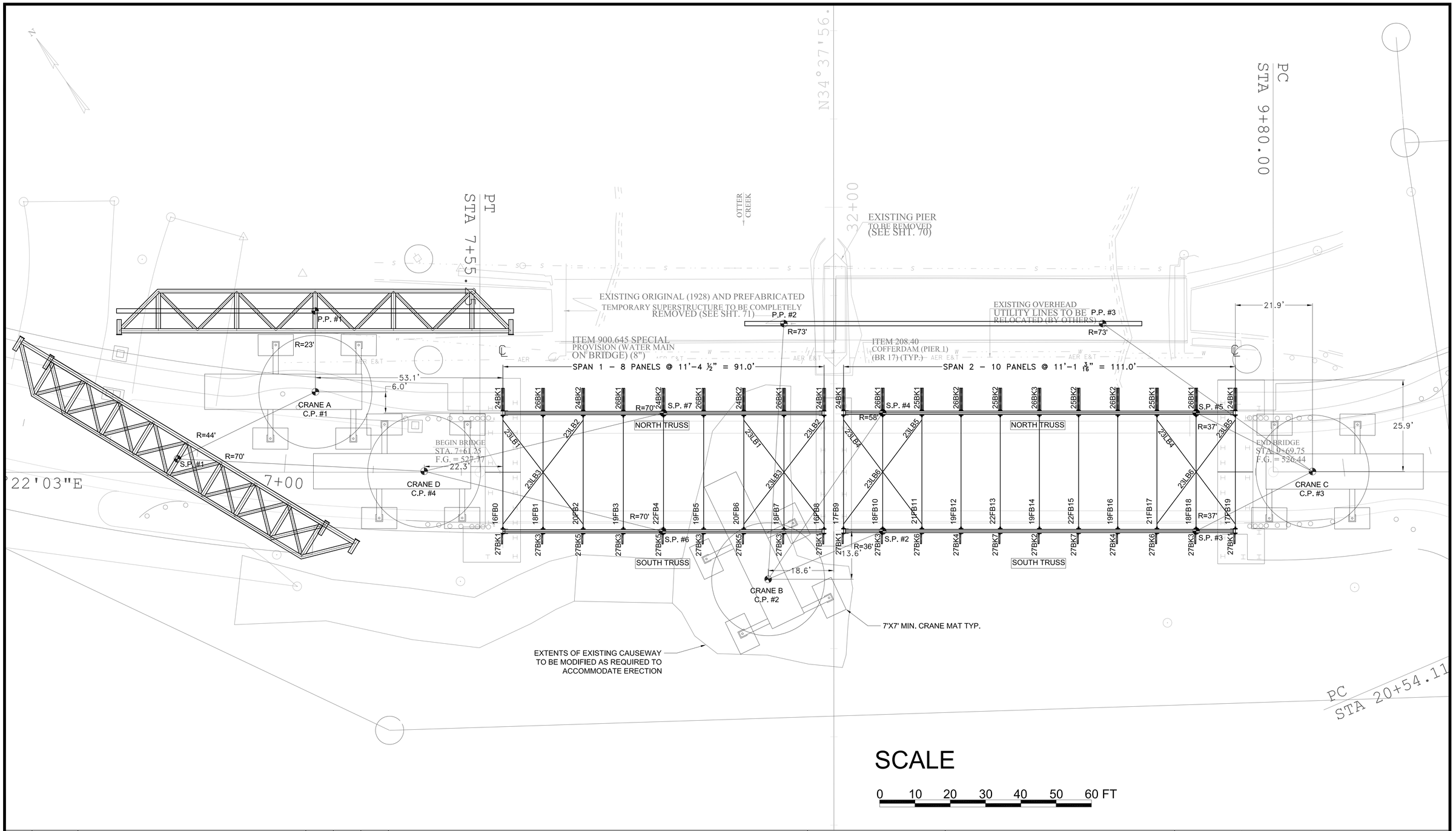
ERECTOR:	D.A. COLLINS CONSTRUCTION CO., INC. 269 BALLARD ROAD WILTON, NY 12831		
TITLE	ERECTION PROCEDURE		
DRAWN BY KJG	CHECKED BY	DATE 5/26/16	
SCALE AS SHOWN	DRG. NO. EP-2	SHEET 2 OF 4	



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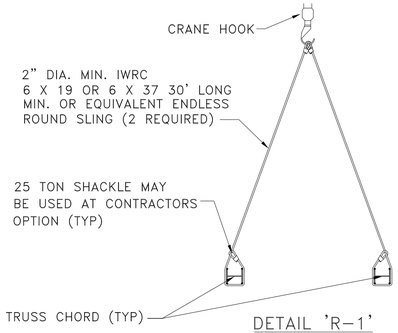
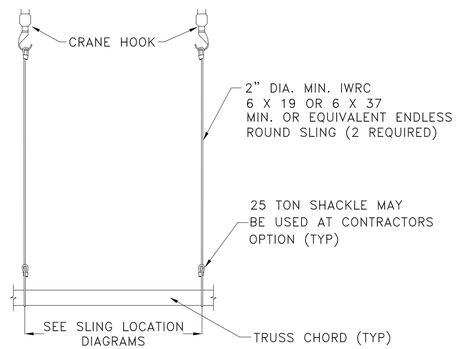
TITLE	ERECTION PLAN		
DRAWN BY KJG	CHECKED BY	DATE 5/26/16	
SCALE AS SHOWN	DRG. NO. EP–3	SHEET 3 OF 4	



DETAIL 'R-1'
NOT TO SCALE



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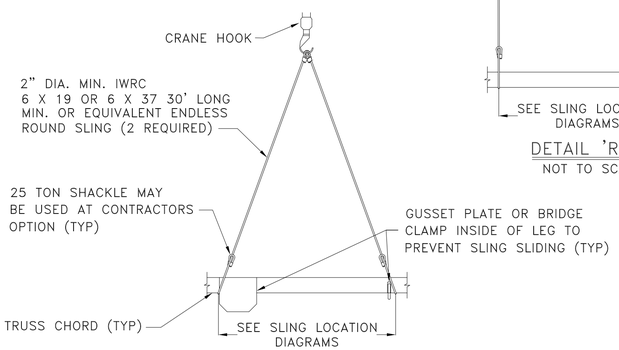
NOT TO SCALE



DETAIL 'R-2'
NOT TO SCALE

NOTE 6

Truss	Truss Length (ft)	Truss Weight (lbs)	Rigging Allowance (lbs)	Total Pick Weight (lbs)	Crane	Crane Position	Pick Point	Crane Pick Radius (ft)	Capacity at Pick Radius (lbs)	Supply vs Demand (Pick)	Set Point	Crane Set Radius (ft)	Capacity at Set Radius (lbs)	Supply vs Demand (Set)
Span 1 North Truss	91	56000	5000	61000	Crane D	C.P. #4	S.P. #1	70	65800	1.08	S.P. #7	70	65800	1.08
Span 1 South Truss	91	56000	5000	61000	Crane D	C.P. #4	S.P. #1	70	65800	1.08	S.P. #6	70	65800	1.08
Span 2 North Truss (Horizontal)	111	80000	5000	85000	Crane A	C.P. #1	P.P. #1	23	156100	1.84	S.P. #1	44	101700	1.2
Span 2 South Truss (Horizontal)	111	80000	5000	85000	Crane A	C.P. #1	P.P. #1	23	156100	1.84	S.P. #1	44	101700	1.2
Span 2 North Truss (Trip and Pick)	111	80000	5000	85000	Crane A	C.P. #1	S.P. #1	44	101700	1.2	P.P. #1	23	156100	1.84
Span 2 South Truss (Trip and Pick)	111	80000	5000	85000	Crane A	C.P. #1	S.P. #1	44	101700	1.2	P.P. #1	23	156100	1.84
Span 2 North Truss	111	80000	5000	55000	Crane B	C.P. #2	P.P. #2	73	57800	1.05	S.P. #4	58	79400	1.44
Span 2 South Truss	111	80000	5000	55000	Crane B	C.P. #2	P.P. #2	73	57800	1.05	S.P. #2	36	102900	1.87
Span 2 North Truss	111	80000	5000	55000	Crane C	C.P. #3	P.P. #3	73	61000	1.11	S.P. #5	37	103000	1.87
Span 2 South Truss	111	80000	5000	55000	Crane C	C.P. #3	P.P. #3	73	61000	1.11	S.P. #3	37	103000	1.87

NOTES:

1. WEIGHTS IN TABLE ABOVE INCLUDE THE HEAVIEST RIGGING OPTION AS WELL AS THE ADDITIONAL WEIGHT FROM GALVANIZING.

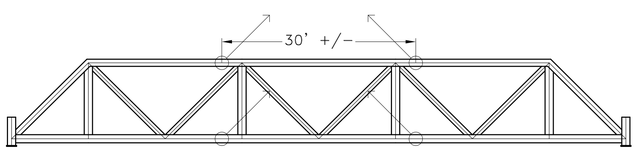
2. CAPACITIES IN THE TABLE ABOVE WERE CONSERVATIVELY FOUND BY ROUNDING UP TO THE NEAREST RADIUS LISTED IN EACH CRANE CHART (NOT INTERPOLATED).

3. EACH OF THE CRANE'S INTERNAL SAFETY FEATURES (INCLUDING BUT NOT LIMITED TO THE ELECTRONIC SAFE LOAD AND STABILITY INDICATOR) SHALL BE FULLY FUNCTIONING AS INTENDED BY THE CRANE MANUFACTURER. MANUAL OVERRIDE OF SAID FEATURES DURING GIRDER ERECTION IS NOT PERMITTED.

4. RIGGING SHALL NOT BE ADDED OR MODIFIED SUCH THAT THE RIGGING ALLOWANCE IS EXCEEDED.

5. SLINGS MAY BE SHACKLED TOGETHER TO ACHIEVE THE MINIMUM LENGTHS SHOWN IN THE RIGGING DETAILS AS LONG AS THE WORKING LOAD LIMIT OF THE SHACKLE MEETS OR EXCEEDS THE SLING TENSION FOR THE PICK.

6. TOTAL PICK WEIGHTS IN THE TABLE FOR THE TWO CRANE PICKS OF THE SPAN 2 NORTH AND SOUTH TRUSSES (PICKS MADE FROM C.P. #2 AND C.P. #3) HAVE BEEN CALCULATED BY DIVIDING THE TRUSS WEIGHT BY TWO AND THEN SUBSEQUENTLY ADDING AN ADDITION 25% OF THIS VALUE PRIOR TO THE ADDITION OF THE RIGGING ALLOWANCE (E.G. SPAN 2 NORTH TRUSS PICK WITH CRANE B AT C.P. #2: PICK WEIGHT = ((80,000 LBS)*(.5))*1.25 + 5000 LBS = 550000 LBS.



SLING LOCATION FOR RIGGING DETAIL R-1
PICKING SPAN 1 TRUSSES HORIZONTAL
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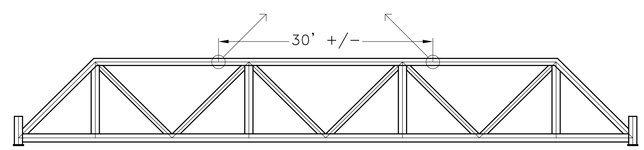

SLING LOCATION FOR RIGGING DETAIL R-2
TRIPPING AND PICKING SPAN 1 TRUSSES
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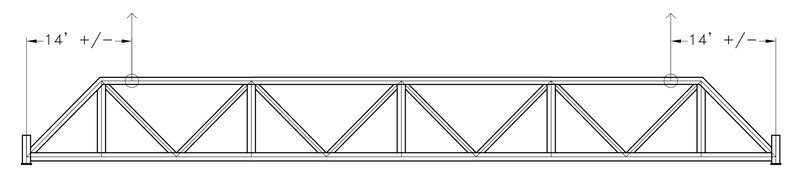

SLING LOCATION FOR RIGGING DETAIL R-3
PICKING SPAN 2 TRUSSES UPRIGHT
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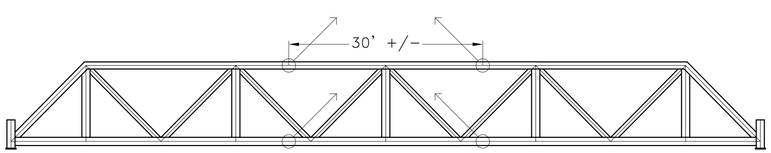
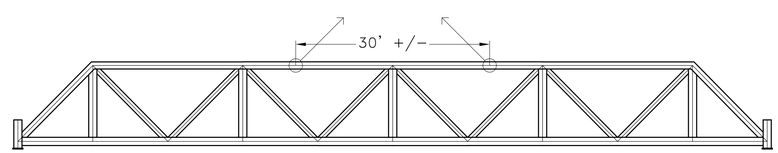


SLING LOCATION FOR RIGGING DETAIL R-1
PICKING SPAN 2 TRUSSES HORIZONTAL
N.T.S.



SLING LOCATION FOR RIGGING DETAIL R-2
TRIPPING AND PICKING SPAN 2 TRUSSES
N.T.S.

NO.	DATE		BY	CHK'D	APPR.
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CONTRACTOR: KUBRICKY CONSTRUCTION CORP.
FABRICATOR: CASCO BAY STEEL STRUCTURES, INC.
JOB NUMBER 598
ERECTOR: D.A. COLLINS CONSTRUCTION CO., INC.
269 BALLARD ROAD
WILTON, NY 12831

TITLE: PICKING DETAILS

DRAWN BY KJG | CHECKED BY | DATE 5/26/16
SCALE AS SHOWN | DRG. NO. EP-4 | SHEET 4 OF 4

Design Calculations
TRUSS ERECTION CALCULATIONS

TH 10 (RIPLEY ROAD) OVER OTTER CREEK
Project BRF 3000 (19)

Rutland County
Rutland City, Vermont

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Span 2 Erection ..... 2.1 – 2.19

Submitted to:

D.A. Collins Construction Co., Inc.
269 Ballard Road
Wilton, New York 12118
518-664-9855

Submitted by:

Ryan Biggs | Clark Davis
Engineering & Surveying
257 Ushers Road
Clifton Park, New York 12065
518-406-5506

RBCD Project 11085-1

June 10, 2016

RYAN BIGGS CLARK DAVIS

PROJECT NAME: RIPLEY RD OVER OTTER CREEK
DESCRIPTION: RUTLAND, VT

INTRO

PROJECT NO.: 11085-1
PAGE: 1.1
DATE: JUNE 2016
BY: MGY
✓DCM

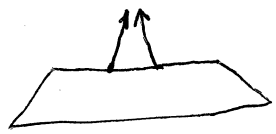
CONTRACTOR WILL BE ERECTING TWO BRIDGE SPANS ON RIPLEY RD OVER OTTER CREEK.

EACH SPAN HAS TWO TRUSSES CONNECTED VIA FLOORBEAMS.

SPAN 1 = 91' ; SPAN 2 = 111'

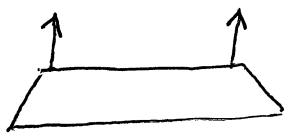
FOR EACH SPAN:

CALCULATE WEIGHTS

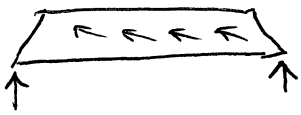


CHECK TRUSS DURING REMOVAL FROM HAUL UNIT

CHECK TRUSS DURING SETTING



CHECK TRUSS AFTER SETTING



CHECK RIGGING

CALCULATE TRUSS WEIGHTS

REF CASCO BAY SHOP DWGS
(JOB 598)

CONSIDER SPAN 1 NORTH TRUSS

BC	17,946 lbs	×	1	=	17,946 lbs
TC	5648 lbs + 6694 lbs + 5648 lbs			=	17,990 lbs
ED	2521 lbs	×	2	=	5,042 lbs
V	727 lbs	×	4	=	2,908 lbs
D	806 lbs	×	6	=	4,836 lbs

Σ 48,722 lbs

× 1.05 (MISC) × 1.08 (GALV.)

55,251 lbs

→ SAY 56,000 lbs FOR ERECTION DWGS

LET $w = \downarrow \div 91'$

$= 0.62$ KIP/FT

CHECK TRUSS LIFTING DURING REMOVAL FROM HAUL UNIT

SPAN 1 NORTH TRUSS

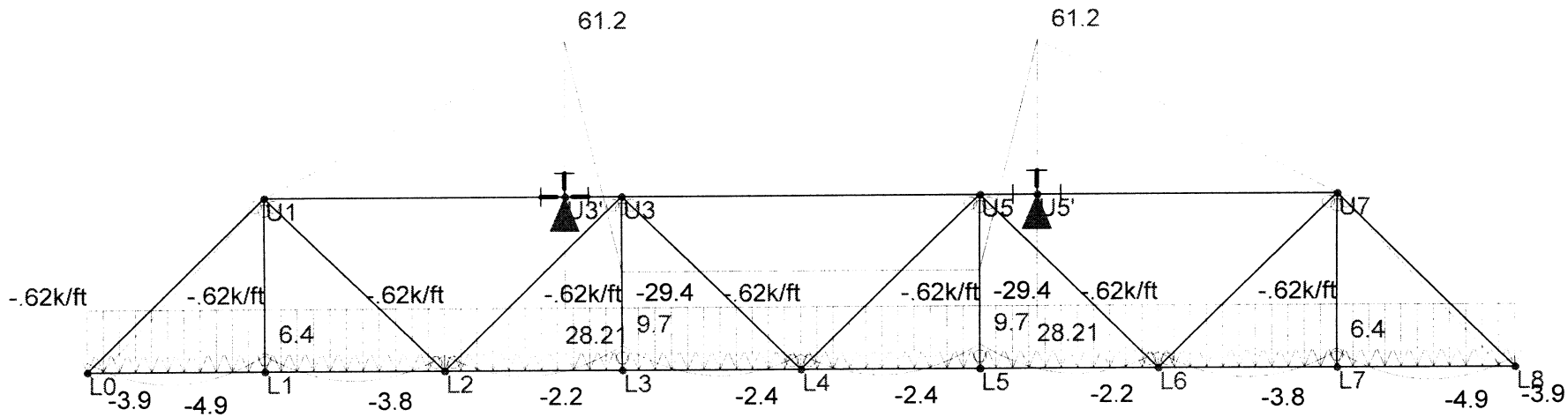
BASED ON SLINGS OWNED BY CONTRACTOR, LIFTING WILL OCCUR NEAR PANEL POINT BUT NOT @ P.P.

SEE NEXT FEW PGS FOR RISA PRINTOUTS OF M, V, & A DIAGRAMS.

FOR SIMPLICITY LOAD WAS APPLIED UNIFORMLY ACROSS BOTTOM CHORD

T & B CHORDS WERE TREATED AS CONTINUOUS

WEBs WERE TREATED AS PIN-PIN



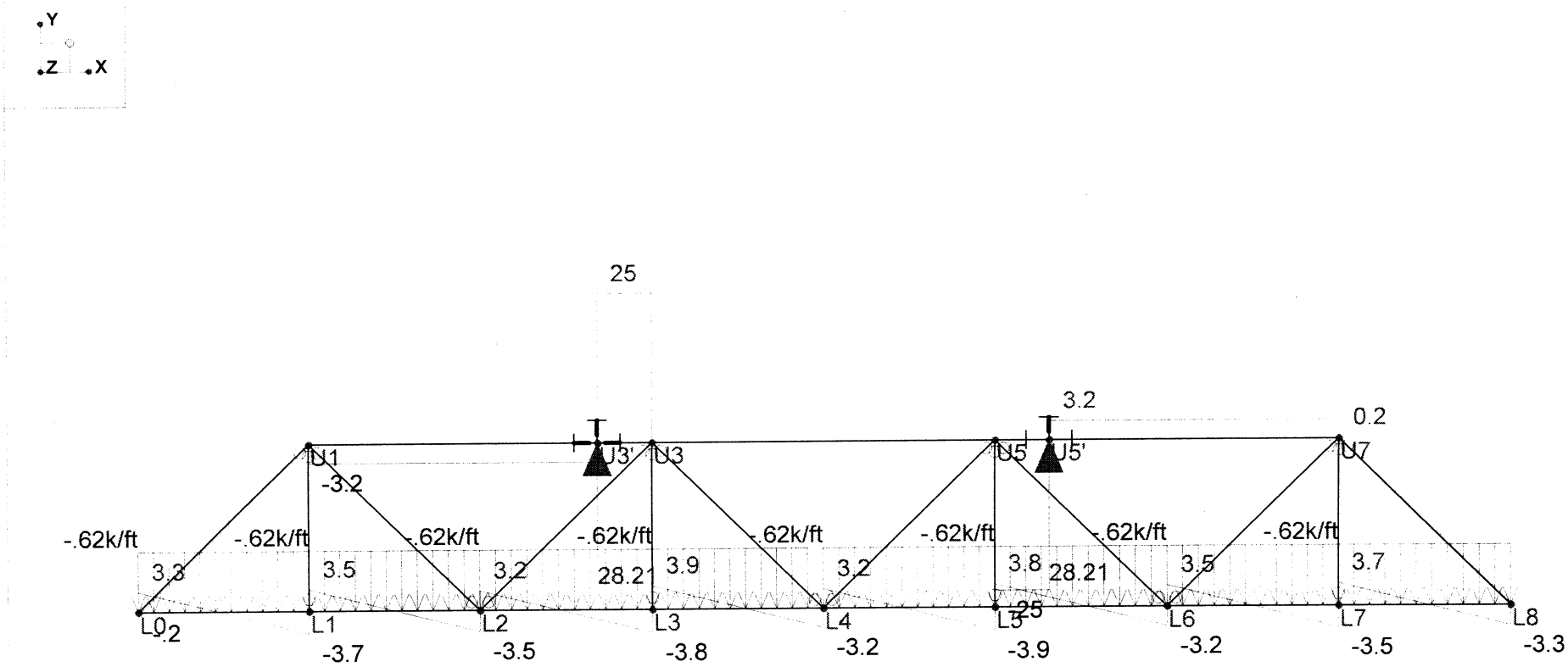
Loads: LC 1,
Results for LC 1,
Member z Bending Moments (k-ft)
Y-direction Reaction Units are k and k-ft

RB|CD
mgy ✓DCM
11085-1

Ripley Road over Otter Creek Truss Erection
Span 1

SK - 3
June 7, 2016 at 5:06 AM
Span 1.r3d

17



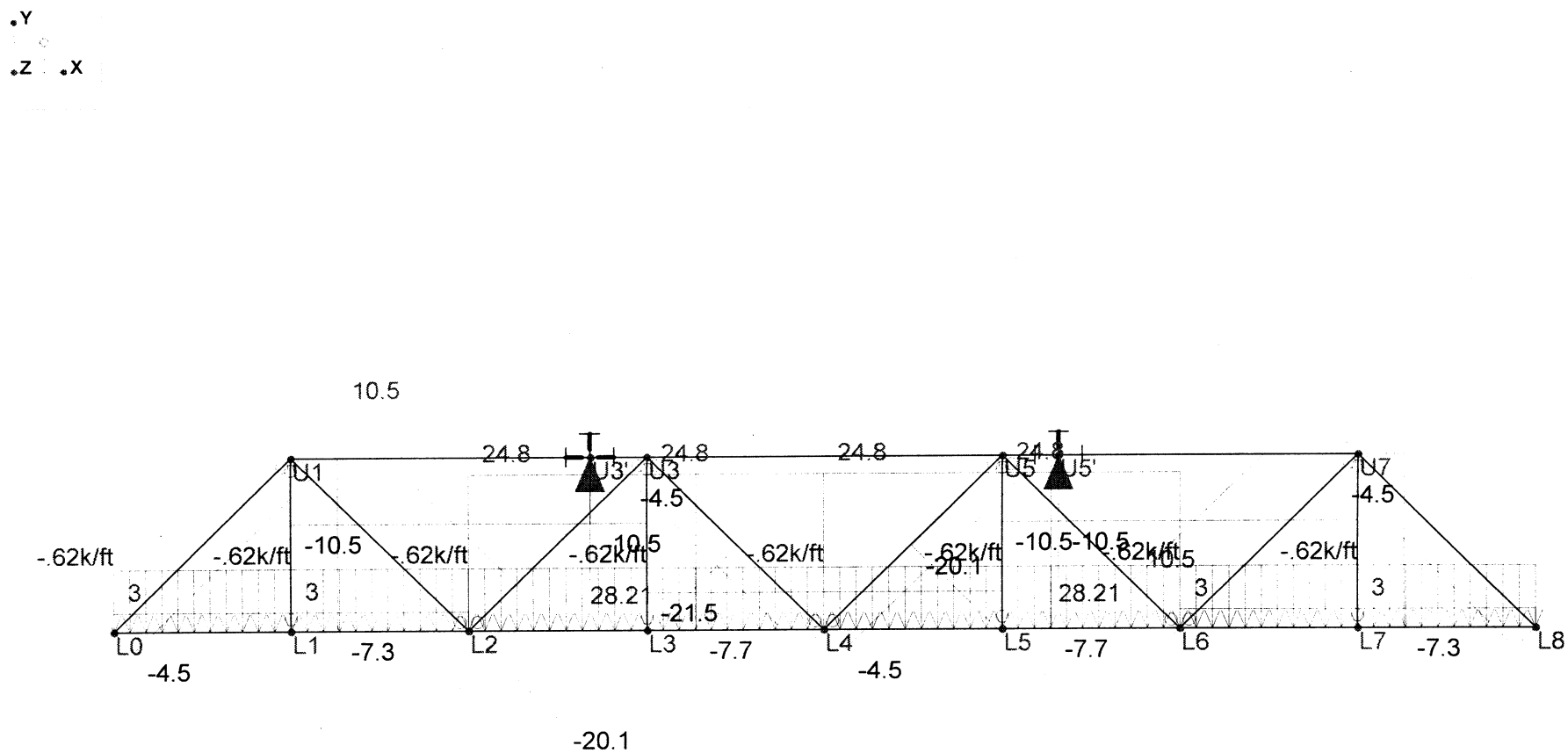
Loads: LC 1,
Results for LC 1,
Member y Shear Forces (k)
Y-direction Reaction Units are k and k-ft

RB|CD
mgy √DCM
11085-1

Ripley Road over Otter Creek Truss Erection
Span 1

SK - 4
June 7, 2016 at 5:06 AM
Span 1.r3d

1.5



Loads: LC 1,
Results for LC 1,
Member Axial Forces (k)
Y-direction Reaction Units are k and k-ft

RB|CD

mgy ✓DCM

11085-1

Ripley Road over Otter Creek Truss Erection

Span 1

SK - 2

June 7, 2016 at 5:05 AM

Span 1.r3d

CHECK TOP CHORD SHEAR

W12x170 FLANGE

$f_v = V/A_f = 25K \div (2)(12.6'')(1.56'') = 0.6 KSI << F_v$

O.K. BY INSP.

CHECK BENDING-AXIAL INTERACTION OF W12x170 TOP CHORD

$f_b = M/S_y = (12''/FT)(61\ FT\text{-}K) \div 82.3\ IN^3 = 8.9\ KSI$

$f_t = T/A = 11K \div 50\ IN^2 = 0.22\ KSI$

$$\frac{f_t}{F_T} + \frac{f_b}{F_B} = \frac{0.22 KSI}{27.5 KSI\ (0.55 f_y)} + \frac{8.9 KSI}{37.5 KSI\ (0.75 f_y\ \text{WEAK AXIS})} = 0.25 << 1.0$$

∴ O.K.

W14x90 BOTTOM CHORD IN COMPRESSION → C = 25 KIPS

USE AISC 14TH FOR SIMPLICITY

PG 4-15 w/ $K\ell = 11$ FT $P_n/\Omega_c = 723K >> \downarrow$ ∴ O.K.

OK BY INSP. IF AASHTO EQ. USED.

CALCULATE SPAN 1 WIND AREA

BC $\left(\frac{14.5''}{12''/FT}\right)(91') = 110\ FT^2$

TC $\left(\frac{12.6''}{12''/FT}\right)(16' + 68.5' + 16') = 106\ FT^2$

V $(4)(11.25')\left(\frac{14.6''}{12''/FT}\right) = 55\ FT^2$

D $(6)(16')\left(\frac{10''}{12''/FT}\right) = 80\ FT^2$

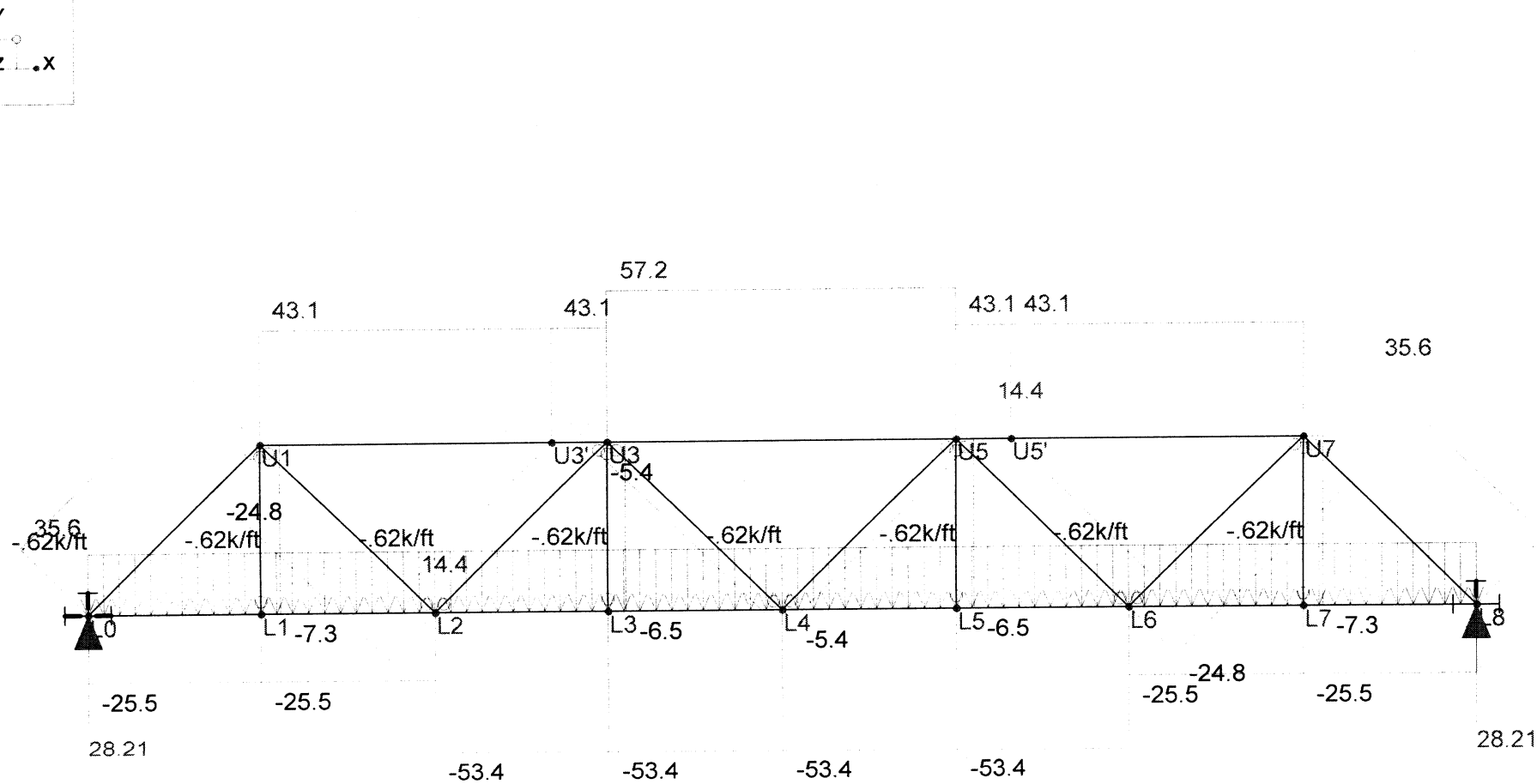
$\Sigma\ 351\ FT^2 \div 91' =$

$3.86\ FT^2/FT \rightarrow$

SAY $4\ FT^2/FT$ OF TRUSS TO ACCOUNT FOR THE GUSSET ℄ AREAS NOT ALREADY ACCOUNTED FOR VIA THE NODE TO NODE OVERLAPS

$75\ PSF \times 4\ FT^2 = 300\ lb/FT$ (MIN @ 100MPH) ✓

$(\checkmark)\left(\frac{30MPH^2}{100MPH^2}\right) = 27\ lb/FT$ ✓ $\longrightarrow$ SAY 15 lb/FT ALONG TC & 15 lb/FT ALONG BC



Loads: LC 1,
Results for LC 1,
Member Axial Forces (k)
Y-direction Reaction Units are k and k-ft

DL AXIAL FORCES SITTING ON BRGS

RB|CD
mgy ✓DCM
11085-1

Ripley Road over Otter Creek Truss Erection
Span 1

SK - 1
June 7, 2016 at 4:58 AM
Span 1.r3d

19

INVESTIGATE SPAN 1 TOP CHORD

SUPPORTS SELF WT DL BETWEEN PANEL POINTS

170lb/FT SELF x 1.08 FOR GALV

$M_{DL} = \frac{1}{8} w l^2 = \frac{1}{8}(0.184\ K/FT)(23')^2 = 12.2$ FT-K

$f_{b_y} = M/S_y = (12''/FT)(\ ) \div 82.3\ IN^3 = 1.77$ KSI

SUPPORTS TRUSS ACTION AXIAL FORCE

PG 1.9

$f_a = P/A = 57\ K \div 50\ IN^2 = 1.14$ KSI

SUPPORTS LATERAL WIND BETWEEN TEMP. BRACES

PG 1.8

$M_{LAT} = \frac{1}{8} w l^2 = \frac{1}{8}(0.015\ K/FT)(68.5')^2 = 8.8$ FT-K

$f_{b_x} = M/S_x = (12''/FT)(\ ) \div 235\ IN^3 = 0.45$ KSI

$\frac{kl}{r}$ $(1.0)(68.5')(12''/FT) \div 5.74'' = 143$

$\frac{kl}{r}$ $(0.75)(23')(12''/FT) \div 3.22'' = 64$

CALCULATE ALLOWABLE BENDING STRESS OF GIRDER

GIVEN: W12 x 170; f_y = 50 KSI ; l_{ub} = SAY 23 FT → 276 IN

FROM AASHTO TABLE 10.32.1A:

$$F_B = \frac{50\times10^6 C_b}{S_{xc}}\left(\frac{I_{yc}}{l_{ub}}\right)\sqrt{\frac{0.772J}{I_{yc}} + 9.87\left(\frac{d}{l_{ub}}\right)^2} \leq 0.55 f_y$$

LET C_b = 1.0 d = 14 IN S_{xc} = 235 IN^3

$$I_{yc} = \tfrac{1}{12}(t_f)(b_f)^3 = \tfrac{1}{12}(1.56'')(12.6'')^3 = 260 \text{ IN}^4$$

$$J = \tfrac{1}{3}\left[2 b_f t_f^3 + D t_w^3\right] = \tfrac{1}{3}\left(2(\quad)^3 + (\quad)^3\right)$$

$d - 2(t_f)$

$$= 35.6 \text{ INCHES}^4 \quad (1\text{-}25 \text{ AISC } 14)$$

$$F_B = \frac{50\times10^6\cdot(1.0)}{235 \text{ IN}^3}\left(\frac{260 \text{ IN}^4}{276 \text{ IN}}\right)\sqrt{\frac{0.772(35.6 \text{ IN}^4)}{260 \text{ IN}^4} + 9.87\left(\frac{14 \text{ IN}}{276 \text{ IN}}\right)^2}$$

$$= 72.6 \text{ KSI} \leq 0.55 f_y \longrightarrow \text{USE } F_B = 27.5 \text{ KSI}$$

$$F'_{ex} = \frac{\pi^2 E}{FS(Kl/r)^2} = \frac{\pi^2 \cdot 29000\,KSI}{2.12(143)^2} = 6.6 \text{ KSI}$$

$$F'_{ey} = \quad = \frac{\pi^2 \cdot 29000\,KSI}{2.12(64)^2} = 33 \text{ KSI}$$

INTERACTION

1) $$\frac{f_a}{F_A} + \frac{C_{mx} f_{bx}}{(1 - f_a/F'_{ex})F_{Bx}} + \frac{C_{my} f_{by}}{(1 - f_a/F'_{ey})(F_{By})} \overset{?}{\leq} 1.0$$

$$\frac{1.14\,KSI}{6.6\,KSI} + \frac{(1.0)(0.45\,KSI)}{(1 - 1.14\,KSI/6.6\,KSI)27.5\,KSI} + \frac{(1.0)(1.77\,KSI)}{(1 - 1.14\,KSI/33\,KSI)(37.5\,KSI)}$$

$= 0.24 < 1.0 \therefore$ O.K.

2) $$\frac{f_a}{0.472 f_y} + \frac{f_{bx}}{F_{Bx}} + \frac{f_{by}}{F_{BY}} = \frac{1.14\,KSI}{(0.472)(50\,KSI)} + \frac{0.45\,KSI}{27.5\,KSI} + \frac{1.77\,KSI}{37.5\,KSI}$$

$= 0.11 < 1.0 \therefore$ O.K.

RYAN BIGGS CLARK DAVIS

PROJECT NAME: RIPLEY RD OVER OTTER CREEK
DESCRIPTION: RUTLAND, VT
SPAN 2 WEIGHTS

PROJECT NO.: 11085-1
PAGE: 2.1
DATE: JUNE 2016
BY: MGY
✓DCM

CALCULATE TRUSS WEIGHTS

REF CASCO BAY SHOP DWGS
(JOB 598)

CONSIDER SPAN 2 NORTH TRUSS

BC 27,184 lbs × 1 = 27,184 lbs

TC (2) 5632 lbs + 7,341 lbs + 9,632 lbs = 28,237 lbs

ED 2488 lbs × 2 = 4,976 lbs

V 727 lbs × 5 = 3,635 lbs

D 792.5 lbs × 8 = 6,340 lbs

Σ 70,372 lbs

× 1.05 (MISC) × 1.08 (GALV.)

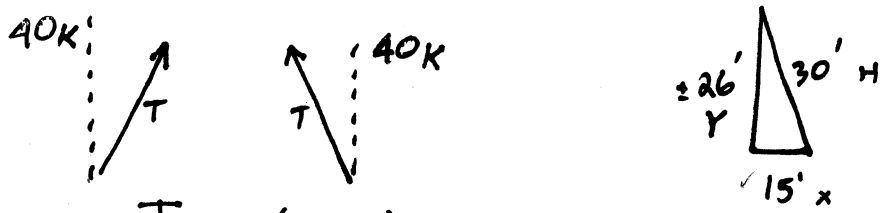
79,801 lbs

→ SAY 80,000 lbs FOR ERECTION DWGS

LET $w = (\downarrow) \div 111'$

$= 0.72$ KIP/FT

CHECK RIGGING



$T = P(H/Y)$

$= 40K(30'/26') = 46$ KIPS

25T SHACKLE WLL = 50K > ∴ O.K. (PG 9 OF ERECTION SUB.)

BLACK NYLON WLL @ CHOKER = 72K > ∴ O.K. (PG 8 OF ERECTION SUB)

2"ϕ IWRC WLL @ CHOKER = 27.8T = 55.6K > ∴ O.K. (PG 7 OF ERECTION SUB.)

SAME RIGGING USED FOR SPAN 1, SPAN 1 LIGHTER.

∴ RIGGING FOR SPAN 1 OK BY INSP.✓

CHECK TRUSS LIFTING DURING REMOVAL FROM HAUL UNIT

SPAN 2 NORTH TRUSS

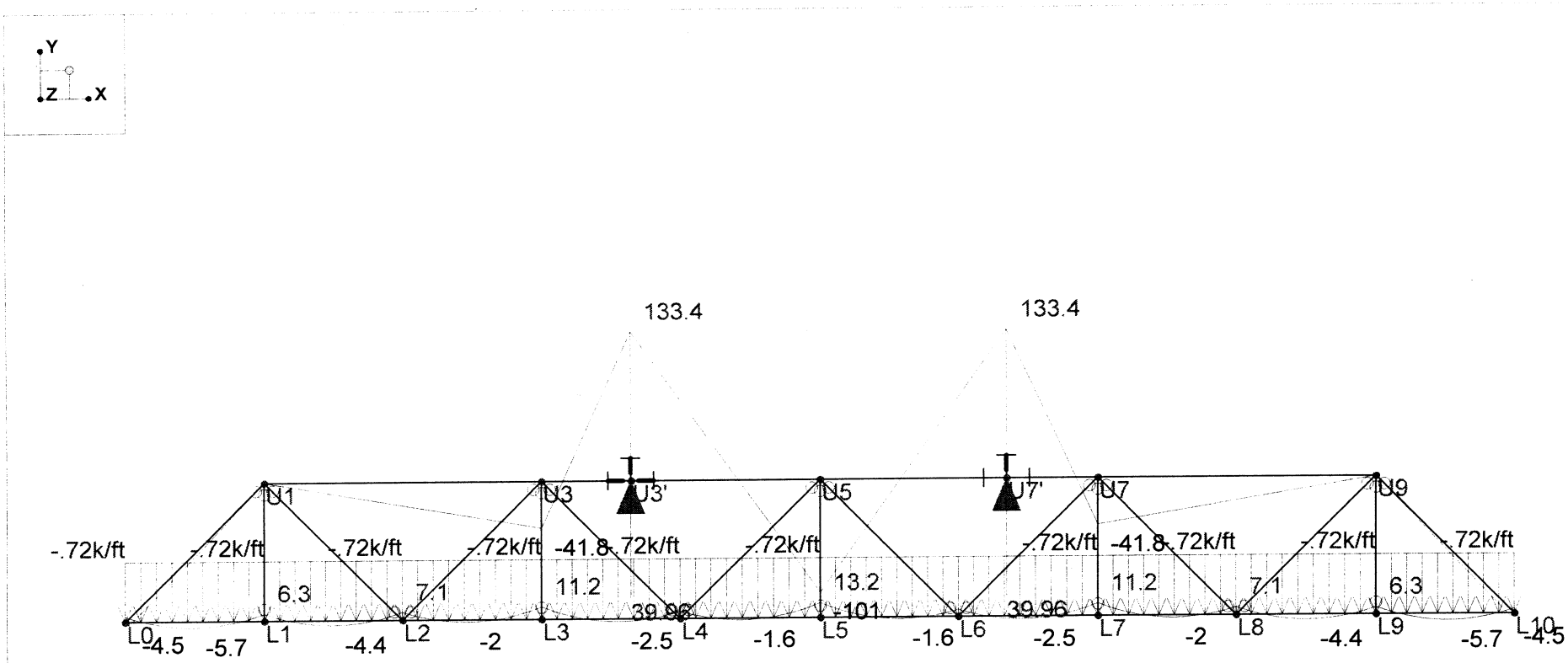
BASED ON SLINGS OWNED BY CONTRACTOR, LIFTING WILL OCCUR NEAR PANEL POINT BUT NOT @ P.P.

SEE NEXT FEW PGS FOR RISA PRINTOUTS OF M, V, & A DIAGRAMS.

FOR SIMPLICITY LOAD WAS APPLIED UNIFORMLY ACROSS BOTTOM CHORD

T & B CHORDS WERE TREATED AS CONTINUOUS

WEBs WERE TREATED AS PIN-PIN



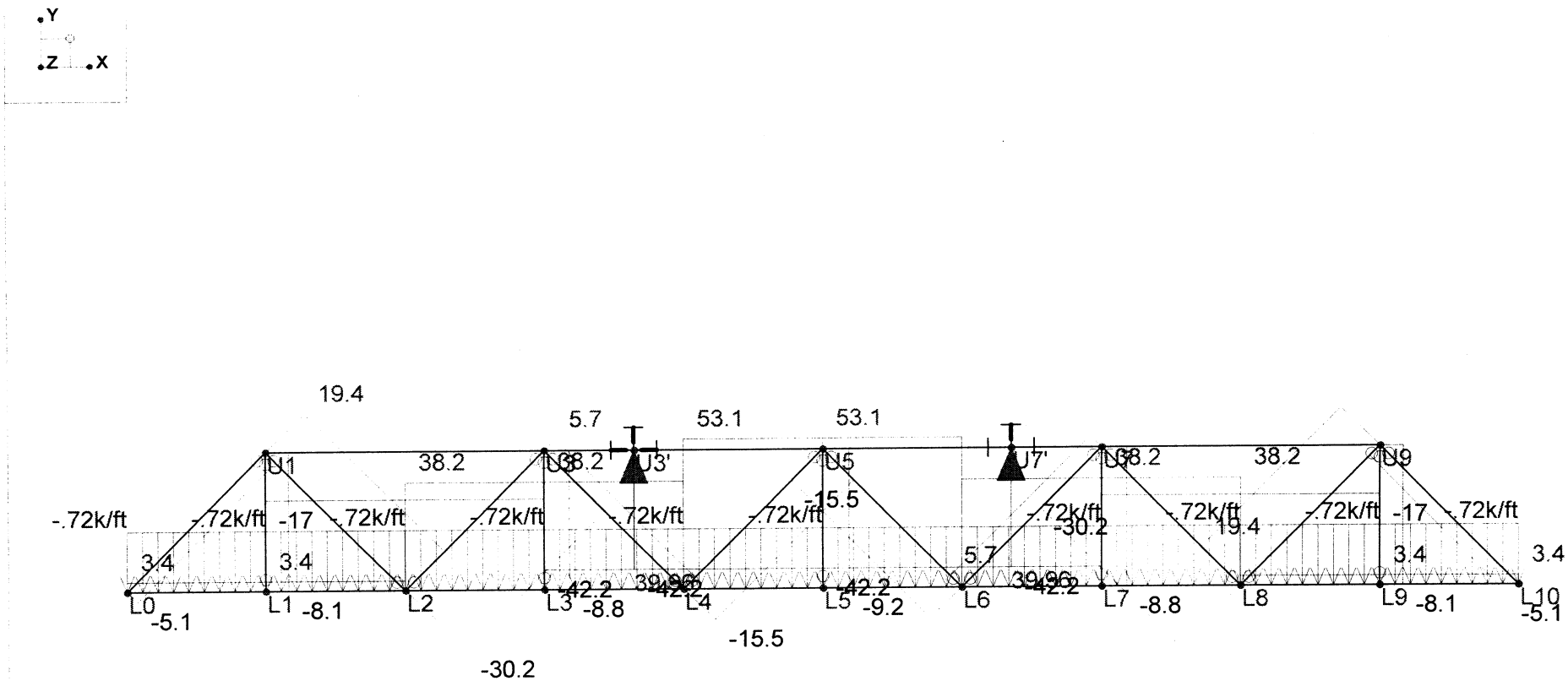
Loads: LC 1,
Results for LC 1,
Member z Bending Moments (k-ft)
Y-direction Reaction Units are k and k-ft

RB|CD
mgy ✓DCM
11085-1

Ripley Road over Otter Creek Truss Erection
Span 2

SK - 3
June 7, 2016 at 6:53 AM
Span 2.r3d

A-2



Loads: LC 1,
Results for LC 1,
Member Axial Forces (k)
Y-direction Reaction Units are k and k-ft

RB|CD

mgy √DCH

11085-1

Ripley Road over Otter Creek Truss Erection

Span 2

SK - 2

June 7, 2016 at 6:53 AM

Span 2.r3d

2.6

CHECK TOP CHORD SHEAR

W12x230 FLANGE

$f_v = V/A_f = 25K \div (2)(12.9'')(2.07'') = 0.5\ KSI << F_v$

O.K. BY INSP.

CHECK BENDING-AXIAL INTERACTION OF TOP CHORD

$f_b = M/S_y = (12''/FT)(134\ FT\text{-}K) \div 115\ IN^3 = 14\ KSI$

$f_t = T/A = 43K \div 67.7\ IN^2 = 0.6\ KSI$

$$\frac{f_t}{F_T} + \frac{f_b}{F_B} = \frac{0.6\ KSI}{27.5\ KSI\ (0.55 f_y)} + \frac{14\ KSI}{37.5\ KSI\ (0.75 f_y\ \text{WEAK AXIS})} = 0.40 << 1.0$$

∴ O.K.

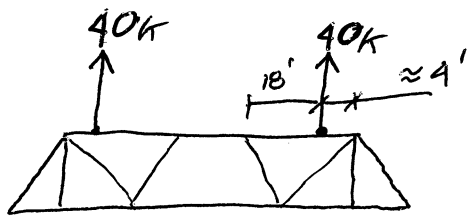
BOTTOM CHORD IN COMPRESSION → C = 53 KIPS (W14x120)

USE AISC 14TH FOR SIMPLICITY

PG 4-15 w/ $K\ell = 11$ FT $P_n/\Omega_c = 723K$ (W14x90) >> ↓ ∴ O.K.

"WEAKEST" CHORD ≫ "LARGEST" AXIAL REAL B.C. LOADS VS SECTION O.K. BY INSP.

INVESTIGATE TOP CHORD WHILE SETTING

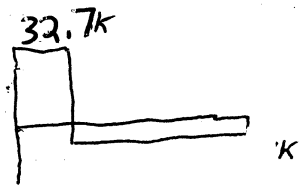


TOP CHORD SEES COMPRESSION, SIMILAR TO TRUSS ON BRGS

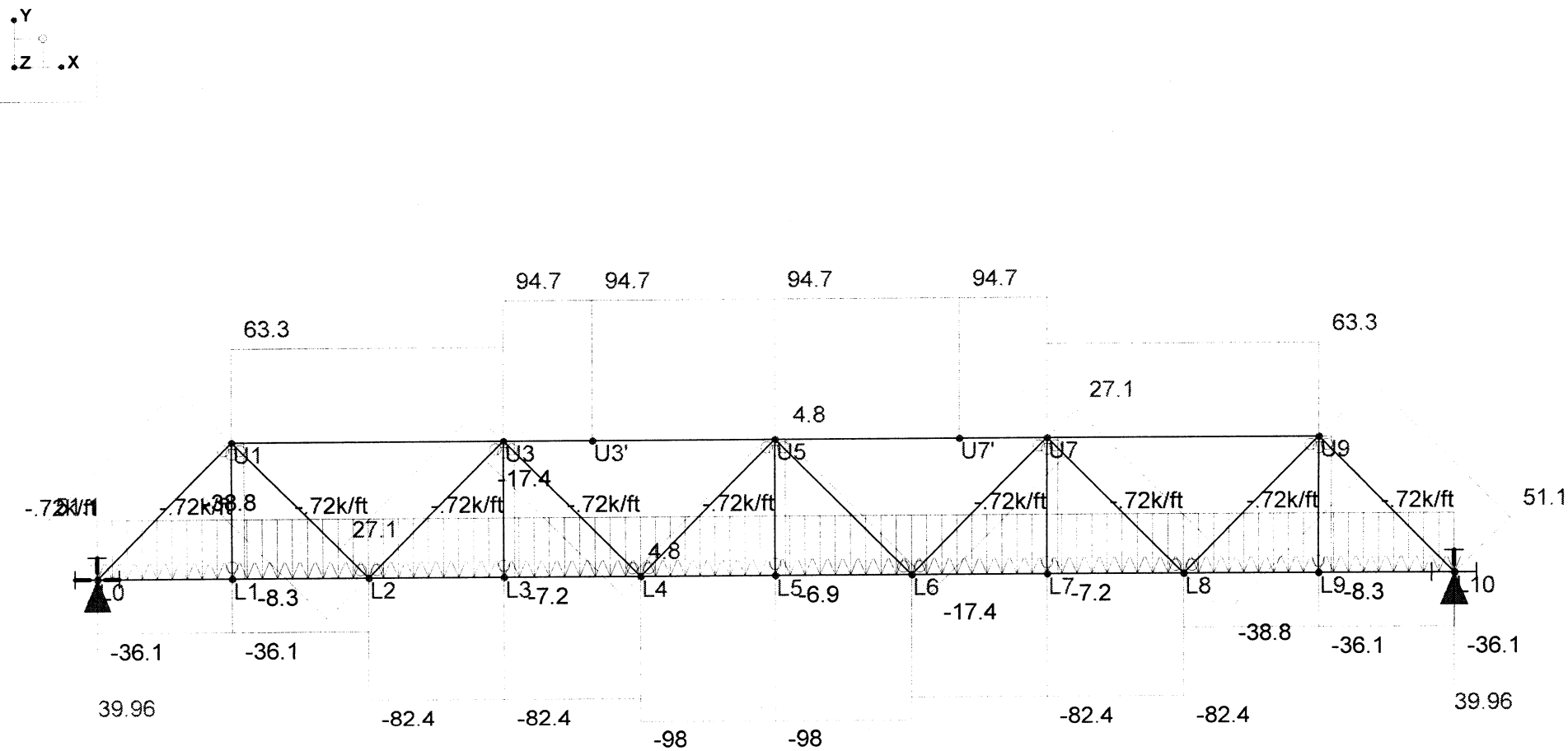
KIPS (NEXT PG)
See 2.10

& BENDING SINCE NOT LIFTING @ EXACT PANEL POINT

S.F.D.



$M = P \cdot e = (32.7\,k)(\approx 4')$ ✓
$= 131$ FT-KIPS



Loads: LC 1,
Results for LC 1,
Member Axial Forces (k)
Y-direction Reaction Units are k and k-ft

RB|CD
mgy ✓DCM
11085-1

Ripley Road over Otter Creek Truss Erection
Span 2

SK - 1
June 7, 2016 at 6:52 AM
Span 2.r3d

2
6

CHECK TOP CHORD SHEAR

PG 2.8 ✓ W12x170 FLANGE

$f_v = V/A_f = 33\,K \div (2)(12.6'')(1.56'') = 0.6\ KSI << F_v$

O.K. ✓ BY INSP.

CHECK BENDING-AXIAL INTERACTION OF TOP CHORD

PG 2.8

$f_b = M/S_y = (12''/FT)(131\ FT\text{-}K) \div 82.3\ IN^3 = 19.1\ KSI$

PG 2.9

$f_a = C/A = 63\,K \div 50\ IN^2 = 1.3\ KSI$

7%

$\frac{f_a}{F_A} + \frac{f_b}{F_B} = \frac{1.3\ KSI}{(\uparrow)} + \frac{19.1\ KSI}{37.5\ KSI\ (0.75 f_y\ \text{WEAK AXIS})} = 0.57 < 1.0$ ✓

∴ O.K.

GUSSETS

$\frac{Kl}{r} = (0.75)(23')(12''/FT) \div 3.22'' = 64$

$F_A = 23{,}580 - 1.03(\checkmark)^2 = 19.3\ KSI$

CALCULATE SPAN 2 WIND AREA

BC $\left(\frac{14.6''}{12''/FT}\right)(111') = 135\ FT^2$

TC $\left(\frac{12.6''}{12''/FT}\right)(16' + 44.5' + 16') = 81\ FT^2$

TC $\left(\frac{12.9''}{12''/FT}\right)(44.5') = 48\ FT^2$

V $(5)(11.25')\left(\frac{14.6''}{12''/FT}\right) = 69\ FT^2$

D $(8)(16')\left(\frac{10''}{12''/FT}\right) = 107\ FT^2$

$\Sigma\ 440\ FT^2 \div 111' =$

$3.95\ FT^2/FT \rightarrow$

SAY 4 FT^2/FT OF TRUSS TO ACCOUNT FOR THE GUSSET PL AREAS NOT ALREADY ACCOUNTED FOR VIA THE NODE TO NODE OVERLAPS

75 PSF × 4 FT^2 = 300 lb/FT (MIN @ 100MPH

$(\downarrow)\left(\frac{30MPH^2}{100MPH^2}\right) = 27\ lb/FT \rightarrow$ SAY 15 lb/FT ALONG TC & 15 lb/FT ALONG BC

INVESTIGATE SPAN 2 TOP CHORD

SUPPORTS SELF WT DL BETWEEN PANEL POINTS

230 lb/FT SELF + 8% GALV.

$M_{DL} = \frac{1}{8} w \ell^2 = \frac{1}{8}(0.25\ K/FT)(22.3')^2 = 15.5$ FT-K

$f_{b_y} = M/S_y = (12''/FT)(\ ) \div 115\ IN^3 = 1.62$ KSI

SUPPORTS TRUSS ACTION AXIAL FORCE

$f_a = P/A = 95\ K \div 67.7\ IN^2 = 1.4$ KSI

PG 2.9

SUPPORTS LATERAL WIND BETWEEN TEMP. BRACES

PG 2.11

$M_{LAT} = \frac{1}{8} w \ell^2 = \frac{1}{8}(0.015\ K/FT)(89\ FT)^2 = 14.9$ FT-K

$f_{b_x} = M/S_x = (12''/FT)(\ ) \div 321\ IN^3 = 0.6$ KSI

$\frac{K\ell}{r} = (1.0)(89')(12''/FT) \div 5.97'' = 179$

GUSSETS

$\frac{K\ell}{r} = (0.75)(22.3')(12''/FT) \div 3.31'' = 61$

CALCULATE ALLOWABLE BENDING STRESS OF TOP CHORD

GIVEN: W12 x 230 ; $f_y = 50$ KSI ; l_{ub} = SAY 22.3 FT → 267 IN

FROM AASHTO TABLE 10.32.1A:

$$F_B = \frac{50\times10^6 C_b}{S_{xc}}\left(\frac{I_{yc}}{l_{ub}}\right)\sqrt{\frac{0.772J}{I_{yc}} + 9.87\left(\frac{d}{l_{ub}}\right)^2} \leq 0.55 f_y$$

LET $C_b = 1.0$ $d = 15.1$ IN $S_{xc} = 321$ IN^3

$$I_{yc} = \tfrac{1}{12}(t_f)(b_f)^3 = \tfrac{1}{12}(2.07'')(12.9'')^3 = 370 \text{ IN}^4$$

$$J = \tfrac{1}{3}\left[2 b_f t_f^3 + D t_w^3\right] = \tfrac{1}{3}\left(2(\quad)(\quad)^3 + (\quad)(\quad)^3\right)$$

$d - 2(t_f)$

$= 83.8$ INCHES^4 (PG 1-25 AISC 14)

$$F_B = \frac{50\times10^6 \cdot (1.0)}{321 \text{ IN}^3}\left(\frac{370 \text{ IN}^4}{267 \text{ IN}}\right)\sqrt{\frac{0.772(83.8 \text{ IN}^4)}{370 \text{ IN}^4} + 9.87\left(\frac{15.1 \text{ IN}}{267 \text{ IN}}\right)^2}$$

$= 98$ KSI $\leq 0.55 f_y \longrightarrow$ USE $F_B = 27.5$ KSI

✓DCM

$$F'_{ex} = \frac{\pi^2 E}{FS(Kl/r)^2} = \frac{\pi^2 \cdot 29{,}000\,KSI}{2.12(179)^2} = 4.21\ KSI$$

← PG 2.12

$$F'_{ey} = \quad = \frac{\pi^2 \cdot 29{,}000\,KSI}{2.12(61)^2} = 36.28\ KSI$$

INTERACTION

1) $$\frac{f_a}{F_A} + \frac{C_{mx} f_{bx}}{(1 - f_a/F'_{ex})F_{Bx}} + \frac{C_{my} f_{by}}{(1 - f_a/F'_{ey})(F_{By})} \overset{?}{\leq} 1.0$$

$$\frac{\overset{PG\ 2.12}{1.4\ KSI}}{4.21\ KSI} + \frac{(1.0)(\overset{PG\ 2.12}{0.6\ KSI})}{(1 - 1.4\ KSI/4.21\ KSI)27.5\ KSI} + \frac{(1.0)(\overset{PG\ 2.12}{1.62\ KSI})}{(1 - 1.4\ KSI/36.28\ KSI)(37.5\ KSI)}$$

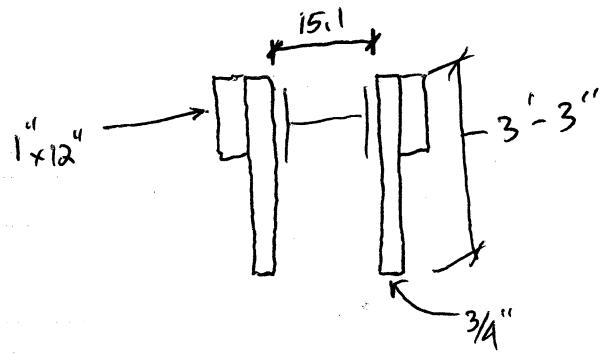
$= 0.41 < 1.0 \therefore$ O.K.

2) $$\frac{f_a}{0.472 f_y} + \frac{f_{bx}}{F_{Bx}} + \frac{f_{by}}{F_{BY}} = \frac{1.4\ KSI}{(0.472)(50\ KSI)} + \frac{0.6\ KSI}{27.5\ KSI} + \frac{1.62\ KSI}{37.5\ KSI}$$

$= 0.12 < 1.0 \therefore$ O.K.

CONSIDER GUSSET PLS @ SPAN 2, TOP CHORD, MID SPAN (i.e., U25 ON DESIGN DWGS)

W12x230 IS NOT CONTINUOUS SO PLS ARE WHAT PROVIDE LAT. STIFFNESS/CONTINUITY



$$I = 2\left(\tfrac{1}{12}(39")(3/4)^3 + (3/4")(39")(7.55" + 3/8)^2\right) = 3677 \text{ in}^4$$

$$+\ 2\left(\tfrac{1}{12}(12")(1")^3 + (1")(12")(7.55" + 3/4" + 1/2")^2\right) = 1860 \text{ in}^4$$

$$5537 \text{ in}^4$$

W12x230 $I = 2420 \text{ in}^4 <$ ∴ GUSSETS "STIFFER"

W12x230 $S_x = 321 \text{ in}^3 < \dfrac{\downarrow}{9.3"} = 595$ ∴ GUSSETS "STRONGER"

CONSIDER BRACING FORCE REQUIRED

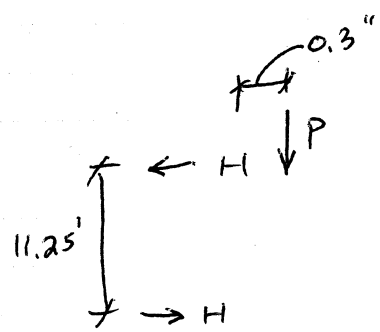
MITERED BRACE @ EACH END RESISTS WIND

$$\left(0.015\,K/FT\right)\left(\frac{\text{SAY } 111'}{2}\right) = 0.83\,K$$

CONSIDER TC DEFLECTION FROM WIND

$$\delta = \frac{5\left(\frac{0.015\,K/FT}{12''/FT}\right)\left(89' \times 12''/FT\right)^4}{384 \cdot 29{,}000\,KSI \cdot 2420\,IN^4} = 0.3''$$

W12x230
CONTROLS
OVER GUSSETS



$$\text{BRACE} = \frac{\left(\frac{80K}{2\text{ ENDS}}\right)(0.3'')}{11.25\,FT} = 0.09\,K$$

$$\Sigma_{\text{BRACE}} = 0.83K + 0.09K = 0.92\,K$$

CONSIDER 10% gravity $= (0.1)\left(\frac{80K}{2}\right) = 4$ KIPS >

USE TO DESIGN BRACE ✓

CONSIDER TEMP BRACE

$\Delta X \approx 11.5'$

$\Delta Y \approx 11.25' + 1' + 1\tfrac{1}{2}'' + 5\tfrac{1}{2}'' + \approx 1.2' \approx 14'$

℄ CHORD TO ℄ CHORD; ℄ CHORD TO BASE PL; BASE PL; BRG; T/PED TO T/SEAT

CON DOCS 68, 69, & 75 OF 245

$\Delta Z \approx$ SAY $11'$

$$\ell = \sqrt{11.5^2 + 14^2 + 11^2} = 21.2 \text{ FT}$$

$$\text{AXIAL BRACE} = \left(\frac{\downarrow}{11'}\right)(4.0K) = 7.7 \text{ KIPS}$$

FROM AISC 14TH w/ $K\ell = 21$ FT

HSS $6 \times 6 \times 3/16$ $\quad \frac{P_n}{\Omega_c} = 51.2\,K$ (PG 4-59)

$\boxed{\text{HSS } 4 \times 4 \times 1/4 \quad \frac{P_n}{\Omega_c} = 18.4\,K \quad (\text{PG } 4\text{-}63)}$

$4''\phi$ STD $\quad \frac{P_n}{\Omega_c} = 16\,K$ (PG 4-87)

USE HILTI KWIK BOLT 3 $5/8''\phi$, $5\tfrac{1}{2}''$ EMBED $9''$ SPACING $9''$ EDGE DIST

PG 336 HILTI 2008 $\quad$ SPACING & EDGE DIST ADJUSTMENTS

$V_{ALLOW} = (2 \text{ ANCHORS})(4.885K)(1.0)(1.0) = 9.7K > 4.0K \therefore$ OK

CONSIDER CRANE OUTRIGGERS

PROVIDE 7'x7' CRANE MAT UNDER EA CRANE OUTRIGGER

PGS (10-12 OF ERECTION SUBMITTAL) FOR CRANE A, B, & D

$f_p = P/A = 177K \div (7')(7')$

$= 3.6$ KSF O.K. GIVEN TEMP COND.

SOFTWARE NOT AVAIL FOR CRANE C OUTRIGGER LOADS

PICK WT SAME AS A, B, OR D

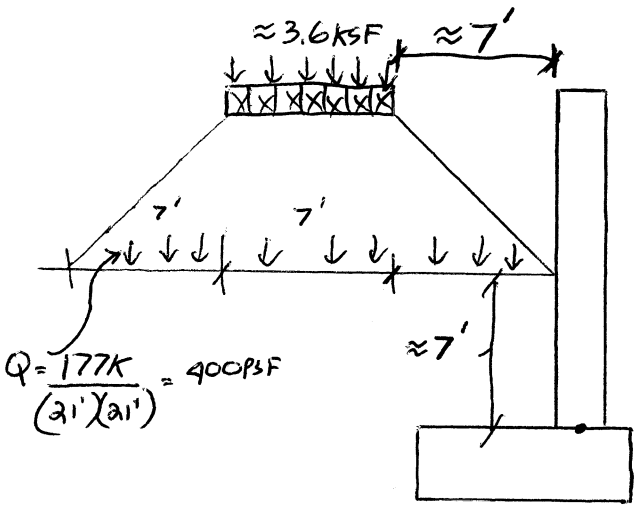
CWT ≈ 15K MORE

SELF ≈ 2K LESS

CONCLUSION
OUTRIGGER FORCES SIMILAR & IN TURN SOIL BRG PRESSURE SIMILAR & STILL O.K.

OUTRIGGERS WILL BE BEHIND SUBSTRUCTURES

CRANE MATS WILL CREATE SURCHARGE



ASSUMED AS DESIGNED MOMENT FULL BACKFILL w/ 250PSF Q

$$(250PSF)(0.3)(14')(14'/2) + (1/2)(0.3)(120PCF)(14')^2(14'/3) = 23.81 \text{ FT-K}$$

MOMENT w/ CRANE

$$(400PSF)(0.3)(7')(7'/2) + 1/2(0.3)(120PCF)(13')^2(13'/3) = 16.12 \text{ FT-K}$$

CRANE SURCHARGE LESS CRITICAL THAN FINAL DESIGN ∴ SAY O.K.