Sewalls Falls Bridge 2012 Load Rating

Prepared for the

CITY of CONCORD, NEW HAMPSHIRE
ENGINEERING SERVICES DIVISION

June 2012

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SUMMARY:

The purpose of this report is to prepare a load rating analysis of the trusses of the Sewalls Falls Bridge, which carries Sewalls Falls Road over the Merrimack River in the City of Concord, NH. This analysis in conjunction with the in-depth inspection of the structure establishes a baseline for the City to judge the feasibility of repair, re-use, modification or replacement options for the bridge.

Figure 1: Bridge from north shore, left (upstream) side

CHA conducted the in-depth structural inspection of the truss spans only during the week of March 5th through 9th of 2012, see inspection report dated March 2012. The inspection was limited to the two truss spans superstructure elements only. The substructure and existing bridge flooring members are contemplated for complete replacement in the various bridge rehab/replacement schemes under consideration. The existing multi-girder approach spans forming the elevated southern approach to the two main truss spans are expected to be replaced by a filled-earth causeway

In this report, a load rating analysis of the truss both in its existing condition, based on in-depth inspection, and in its as-built condition based on plans from Berlin Construction Company, dated 1915 was prepared to determine its load capacity and if it can be rehabilitated to support legal highway loads (HL93). The main members and gusset plates were analyzed. The floor beams and stringers were assumed to be replaced in kind and were not analyzed. A new partially filled concrete deck was assumed to be installed as suggested in a previously prepared engineering report.

Three truss ratings were completed. The first rating was for the truss in its current condition. The second was for the bridge in its original condition with no deterioration. The third was for the truss

in its original condition with a sidewalk cantilevered outside the truss. The gussets plates were also analyzed.

The results of the analysis indicate the bridge is understrength for current legal highway loads with all diagonals and most gussets having insufficient capacity. The lowest rating is 0.59 (21.2Tons) inventory and 0.77 (27.7Tons) operating. The posted 10Ton weight restriction is less than this rating. However, the posted capacity is controlled by the approach spans and should not be increased.

CHA believes the bridge can be rehabilitated and strengthened to support legal highway loads (HL93). The gusset plates control the capacity at about 50% of the legal load. CHA believes these members can be strengthened to achieve the full legal highway capacity by replacing rivets with high strength bolts and lengthening the connection. The previous engineering report included the addition of a sidewalk cantilevered outside of the truss. This can be done but will require additional strengthening of the top and bottom chords. Rehabilitating the truss to support a sidewalk requires the strengthening of **every** member of the truss. CHA believes this exceeds the practical limits of rehabilitation.

CHA estimates the work to rehabilitate the trusses to full legal capacity without a sidewalk will consist of the following repairs:

Description	Number Repaired	Total Number In Bridge	Percent Replaced
1. Replace diagonals bent from vehicular impact	7	40	17.5%
2. Strengthen tension diagonals	25	40	62.3%
3. Strengthen lower chord members	17	36	47.2%
4. Strengthen verticals	7	32	21.9%
5. Strengthen gussets	40	72	55.6%
6. Replace Floorbeams	20	20	100%
7. Replace Stringers	144	144	100%
8. Replace bottom lateral Bracing	36	36	100%

CHA has reviewed the rehabilitation costs in the engineering report from NHDOT dated January 2011. The report includes a truss rehabilitation cost of approximately $2.9 million. CHA believes this cost is reasonable to rehabilitate the truss based on the results of the analysis but does not include a more extensive rehabilitation to support a cantilevered sidewalk.

A summary of the member ratings is shown in the following Tables.

TRUSS AS-INSPECTED					
COMPONENT	MEMBER No.	RFinventory	TONS	RFoperating	TONS
Bottom Chord	L0-L1	0.59	21.2	0.77	27.7
Top Chord	U4-U5	1.04	37.4	1.34	48.2.
Verticals	L2-U2	1.31	47.2	1.69	60.8
Diagonals	L4-U3	0.69	24.8	0.90	32.4

TRUSS AS-BUILT (No Sidewalk)					
COMPONENT	MEMBER No.	RFinventory	TONS	RFoperating	TONS
Bottom Chord	L0-L1	1.05	37.8	1.37	49.3
Top Chord	U4-U5	1.04	37.4	1.34	48.2.
Verticals	L2-U2	1.41	50.8	1.83	65.9
Diagonals	L3-U2	0.82	29.5	1.06	38.2

TRUSS AS-BUILT (With Sidewalk)					
COMPONENT	MEMBER No.	RFinventory	TONS	RFoperating	TONS
Bottom Chord	L0-L1	0.95	34.2	1.24	44.6
Top Chord	U4-U5	0.94	33.8	1.22	43.9.
Verticals	L2-U2	1.33	47.9	1.73	62.3
Diagonals	L3-U2	0.71	25.6	0.92	33.1

GUSSETS AS-INSPECTED (No Sidewalk)					
COMPONENT	MEMBER No.	RFinventory	TONS	RFoperating	TONS
Bottom Chord	L4	0.64	23.0	0.83	29.9
Top Chord	U4	0.66	23.8	0.86	31.0.

GUSSETS AS-BUILT (No Sidewalk)					
COMPONENT	MEMBER No.	RFinventory	TONS	RFoperating	TONS
Bottom Chord	L4	0.79	28.4	1.02	36.7
Top Chord	U4	0.66	23.8	0.86	31.0.

The rating methodology and calculations are described in the following report.

BRIDGE DESCRIPTION:

Sewall's Falls Bridge carries Sewalls Falls Road over the Merrimack River in the City of Concord, NH. The bridge consists of two simply supported Pratt truss spans, built in 1915, approximately 165 and 167 feet long. The spans are supported on cast in place concrete abutments and a masonry pier. The trusses are 19.5 feet apart and have a width between guard rails of approximately 17.5 feet. The bridge currently has open grid steel flooring on stringers and floor beams.

The truss spans are identical except for the end bays. The end bays on the shorter truss are each one foot shorter creating the shorter span. CHA analyzed the longer span because it carries more load yielding the controlling rating.

Design plans dated 1936 show the addition of an elevated structure at the south approach, comprised of 10 steel multi-girder spans (not rated), which replaced an earth-filled causeway. The two truss spans have nine panels in a parallel-chord, Pratt-truss configuration, with diagonal counters forming an "X" in the 3 center panels (Fig. 2). As is common in the Pratt design, the first and last interior panel points (U1LI & U8L8) have a vertical member serving primarily as a floorbeam hanger. Trusses are comprised of riveted, built-up members connected by riveted gusset plates at all panel points. Top chords are channel-box sections comprised of 2 rolled channel sections with outward-facing flanges with a single top plate; these sections are open on the bottom to receive the panel-point gusset plates. Truss verticals and diagonals are single-angle pairs or double-angle pairs. Truss bottom chords are double-angle pairs, supplemented with a single pair of outer side plates in the central 5 panels of the truss.

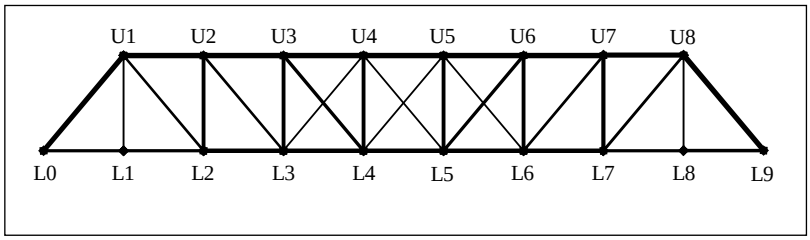


Figure 2: Sewalls Falls Bridge truss schematic

The two circa-1915 truss spans differ in length by 2 feet, presumably to fit the pre-existing pier and abutment layout. This difference is made up solely in the lengths of the first and last panels of the spans, which results in different slopes in the truss end-posts. Intermediate panel lengths and *all* corresponding member cross-sections (including those in the differing end panels) are the same in both spans. The standard intermediate panel length is 18'-6½". Record drawings indicate center-to-center bearing dimensions of 166'-10½" for Span 1 (south span); and 164'-10½" for Span 2 (north span). Field measurements are consistent with these dimensions.

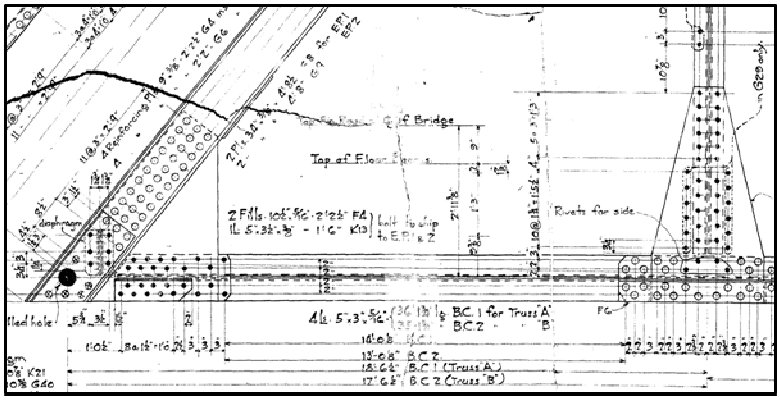


Figure 3: Excerpt from 1915 shop drawings

Figure 4: Typical floor framing - Span 2 Panel 9

The Stringers are rolled beams; their date of origin was not determined, but they have the same staggered holes in the top flanges (for fastening timber nailers), as shown in the 1915 shop drawings. Floorbeams are built-up riveted sections with separate web plates and flange angles. Both the stringers and the floorbeams have been extensively modified; they have welded flange cover plates and web repair plates, possibly from multiple generations of rehabs and retrofit construction. Truss members are all original sections, with a very few localized welded and bolted repairs.

Without exception, truss dimensions and member sizes appear to be consistent with the 1915 record drawings

METHODOLOGY:

Truss Analysis:

The truss was load rated using the LRFR methodology in accordance with the AASHTO Manual for Bridge Evaluation.

Member properties were acquired and calculated from record drawings dated 1915 and shop drawings from Berlin Bridge Co. also dated 1915. All primary member sizes were verified by field inspection. Net section properties were calculated by hand. Section losses measured by field inspection on March 5, 2012 are included in the as-inspected rating.

Member capacities were calculated in spreadsheets using the section properties. There were no material designations on the plans or shop drawings. Therefore the material is assumed to have a yield strength of 30ksi and a tensile strength of 60ksi in accordance with the Manual for Bridge Evaluations for unknown steel built between 1905 and 1936.

The bridge consists of two simple spans. The STAAD.Pro V8i version 20.07.07.32, three dimensional structural modeling and analysis software by Bentley Systems Inc. was used to analyze the truss. A 2-dimensional STAAD model of the longer span truss was used for the analysis. Actual member properties for primary members are used for input in the STAAD model. All secondary members and floor loads are calculated by hand and entered as point loads in the model. All members were analyzed as truss members carrying tension or compression only. The counter diagonals (L3U4, L4U5 and L5U4) are constructed of light duty framing members and were modeled as tension only members since they are considered to buckle under compressive loads.

Dead Load was increased by 5% to account for bolts, connection angles, lacing bars, batten plates, rivets and miscellaneous steel. A weight of 65lb/sf was assumed for the proposed future deck based on information from the Bridge Grid Flooring Manufacturers Association.

The Live Load influence line ordinates for each member were generated in STAAD by placing a unit load at each bottom chord node. Influence lines were created in spreadsheets using the STAAD output. The influence lines were used to determine where to place the live load to create the maximum tension and the maximum compression in each truss member.

The member capacities from spreadsheets, dead load force values from STAAD and the max live load force values from spreadsheets were all entered into another spreadsheet that applies all load and resistance factors and calculates and member load ratings.

The rating process was repeated for the as-inspected condition. Adjusted member properties were calculated using the deterioration measured during the field inspection. The adjusted member properties were used to calculate new capacities and new rating factors.

A fatigue life was also calculated to confirm the truss could be rehabilitated. A fatigue vehicle was placed on the bridge in various locations to calculate the maximum tension and compression stress range for each member. The stress ranges were compared to stress range for infinite life. A finite life was calculated for members exceeding the infinite life stress range. The total number of trucks crossing the bridge over its life was calculated using the 1994 AADT of 2730 vehicles per day with 3% trucks which was provided by NHDOT. The number of lifetime stress cycles and corresponding life in years was calculated in accordance with the Manual for Bridge Evaluation.

Gusset Plate Analysis:

The gusset plates were rated using LRFR method based on FHWA-IF03-014, February 2009, Load Rating Guidance and Example for Bolted and Riveted Gusset Plates in Truss Bridges.

The dead loads and live loads generated for the member load ratings were entered into another spreadsheet and reordered for the gusset plate analysis.

All required geometry for gusset plate analysis was carefully and conservatively scaled from the 1929 shop drawings and then input into the spreadsheet. Section losses were input into the spreadsheet from the provided inspection report.

RESULTS OF ANALYSIS:

As-Inspected Rating:

The following table shows the controlling rating factors for all truss members. The bridge is composed of eight trusses. The worst deterioration from all the trusses was entered for each member. These deteriorated members do not all occur on the same truss. See the field inspection for locations of deterioration.

TRUSS RATING (AS-INSPECTED)								
	MEMBER	DC	DW	LL+IM	ϕR	$\phi_c\phi_s\phi R$	RF_{OPE}	RF_{INV}
BOTTOM CHORD	L0-L1 T	-68.7	-4.4	-83.3	-198.4	-178.6	0.77	0.59
	L1-L2 T	-68.7	-4.4	-83.3	-198.4	-178.6	0.77	0.59
	L2-L3 T	-120.9	-7.7	-145.1	-358.2	-322.4	0.82	0.63
	L3-L4 T	-163.3	-10.4	-177.4	-521.1	-469.0	1.04	0.80
	L4-L5 T	-172.9	-10.9	-179.2	-652.2	-587.0	1.47	1.13
TOP CHORD	L0-U1 C	110.6	7.1	133.8	527.6	474.8	1.80	1.39
	U1-U2 C	120.9	7.7	145.1	495.4	445.8	1.45	1.12
	U2-U3 C	155.7	9.9	185.1	632.3	569.1	1.44	1.11
	U3-U4 C	165.5	10.6	208.9	710.8	639.7	1.48	1.14
	U4-U5 C	174.2	11.1	224.2	712.1	640.9	1.34	1.04
VERTICAL	L1-U1 T	-16.9	-1.4	-58.4	-202.9	-182.6	2.02	1.56
	L2-U2 C	46.8	2.8	70.8	249.5	224.6	1.69	1.31
	L2-U2 T	46.8	2.8	-15.1	-310.1	-279.1	15.96	12.31
	L3-U3 C	15.4	0.8	55.4	176.2	158.6	1.85	1.43
	L3-U3 T	15.4	0.8	-14.4	-232.5	-209.3	11.54	8.90
	L4-U4 C	-5.1	-0.5	43.8	178.8	161.0	2.81	2.17
DIAGONAL	L2-U1 C	-83.6	-5.3	7.7	184.0	165.6	23.93	18.46
	L2-U1 T	-83.6	-5.3	-111.4	-307.1	-276.4	1.09	0.84
	L3-U2 C	-55.8	-3.5	19.2	123.2	110.9	6.42	4.95
	L3-U2 T	-55.8	-3.5	-90.2	-226.4	-203.8	1.06	0.82
	L4-U3 C	-15.7	-1.0	18.3	28.0	25.2	1.65	1.28
	L4-U3 T	-15.7	-1.0	-70.9	-119.0	-107.1	0.90	0.69
	L3-U4 T	12.3	0.7	-16.9	-94.4	-85.0	4.26	3.28
	L5-U4 T	-1.7	-0.1	-53	-94.4	-85.0	1.16	0.89
	L4-U5 T	-1.7	-0.1	-53	-94.4	-85.0	1.16	0.89

As-Built Rating:

The following table shows the rating factors for the truss members as originally designed. The bridge is composed of two spans. One span was made 2ft shorter than the other by reducing the end bays by 1 ft. This table represents the longer truss since it yields the controlling rating. The diagonals have a capacity of about 80% of legal loads.

TRUSS RATING (AS-BUILT) (No Sidewalk)								
	MEMBER	DC	DW	LL+IM	ϕR	$\phi_c\phi_s\phi R$	RF_{OPE}	RF_{INV}
BOTTOM CHORD	L0-L1 T	-68.7	-4.4	-83.3	-273.6	-246.2	1.37	1.05
	L1-L2 T	-68.7	-4.4	-83.3	-273.6	-246.2	1.37	1.05
	L2-L3 T	-120.9	-7.7	-145.1	-487.8	-439.0	1.41	1.09
	L3-L4 T	-163.3	-10.4	-177.4	-637.5	-573.8	1.48	1.14
	L4-L5 T	-172.9	-10.9	-179.2	-691.1	-622.0	1.61	1.24
TOP CHORD	L0-U1 C	110.6	7.1	133.8	527.6	474.8	1.80	1.39
	U1-U2 C	120.9	7.7	145.1	495.4	445.8	1.45	1.12
	U2-U3 C	155.7	9.9	185.1	632.3	569.1	1.44	1.11
	U3-U4 C	165.5	10.6	208.9	710.8	639.7	1.48	1.14
	U4-U5 C	174.2	11.1	224.2	712.1	640.9	1.34	1.04
VERTICAL	L1-U1 T	-16.9	-1.4	-58.4	-202.9	-182.6	2.02	1.56
	L2-U2 C	46.8	2.8	70.8	263.6	237.2	1.83	1.41
	L2-U2 T	46.8	2.8	-15.1	-326.0	-293.4	16.66	12.85
	L3-U3 C	15.4	0.8	55.4	205.6	185.0	2.20	1.70
	L3-U3 T	15.4	0.8	-14.4	-273.6	-246.2	13.44	10.37
	L4-U4 T	-5.1	-0.5	43.8	204.2	183.8	3.20	2.47
DIAGONAL	L2-U1 C	-83.6	-5.3	7.7	199.8	179.9	25.30	19.52
	L2-U1 T	-83.6	-5.3	-111.4	-327.2	-294.5	1.21	0.93
	L3-U2 C	-55.8	-3.5	19.2	132.3	119.1	6.73	5.20
	L3-U2 T	-55.8	-3.5	-90.2	-238.3	-214.5	1.15	0.88
	L4-U3 C	-15.7	-1.0	18.3	39.4	35.4	2.07	1.60
	L4-U3 T	-15.7	-1.0	-70.9	-136.8	-123.1	1.06	0.82
	L3-U4 C	12.3	0.7	-16.9	-101.5	-91.4	4.54	3.50
	L5-U4 T	-1.7	-0.1	-53	-101.5	-91.4	1.24	0.96
	L4-U5 T	-1.7	-0.1	-53	-101.5	-91.4	1.24	0.96

TRUSS RATING (AS-BUILT) (With Sidewalk)								
	MEMBER	DC	DW	LL+IM	ϕR	$\phi_c\phi_s\phi R$	RF_{OPE}	RF_{INV}
BOTTOM CHORD	L0-L1 T	-80.5	-4.4	-83.3	-273.6	-246.2	1.24	0.95
	L1-L2 T	-80.5	-4.4	-83.3	-273.6	-246.2	1.24	0.95
	L2-L3 T	-141.5	-7.7	-145.1	-487.8	-439.0	1.28	0.99
	L3-L4 T	-191.2	-10.4	-177.4	-637.5	-573.8	1.33	1.03
	L4-L5 T	-201.4	-10.9	-179.2	-691.1	-622.0	1.46	1.13
TOP CHORD	L0-U1 C	129.0	7.1	133.8	527.6	474.8	1.68	1.29
	U1-U2 C	141.5	7.7	145.1	495.4	445.8	1.31	1.01
	U2-U3 C	182.3	9.9	185.1	632.3	569.1	1.31	1.01
	U3-U4 C	193.8	10.6	208.9	710.8	639.7	1.35	1.04
	U4-U5 C	204.0	11.1	224.2	712.1	640.9	1.22	0.94
VERTICAL	L1-U1 T	-20.6	-1.4	-58.4	-202.9	-182.6	1.96	1.51
	L2-U2 C	54.2	2.8	70.8	263.6	237.2	1.73	1.33
	L2-U2 T	54.2	2.8	-15.1	-326.0	-293.4	16.99	13.11
	L3-U3 C	17.5	0.8	55.4	205.6	185.0	2.16	1.67
	L3-U3 T	17.5	0.8	-14.4	-273.6	-246.2	13.54	10.45
	L4-U4 C	-6.3	-0.5	43.8	204.2	183.8	3.22	2.48
DIAGONAL	L2-U1 C	-97.8	-5.3	7.7	199.8	179.9	26.53	20.47
	L2-U1 T	-97.8	-5.3	-111.4	-327.2	-294.5	1.09	0.84
	L3-U2 C	-65.3	-3.5	19.2	132.3	119.1	7.06	5.45
	L3-U2 T	-65.3	-3.5	-90.2	-220.8	-198.7	0.92	0.71
	L4-U3 C	-18.5	-1.0	18.3	36.9	33.2	2.08	1.61
	L4-U3 T	-18.5	-1.0	-70.9	-136.8	-123.1	1.03	0.79
	L3-U4 T	14.2	0.7	-16.9	-83.6	-75.2	3.91	3.01
	L5-U4 T	-2.0	-0.1	-53	-83.6	-75.2	1.01	0.78
	L4-U5 T	-2.0	-0.1	-53	-83.6	-75.2	1.01	0.78

Fatigue Life:

The following table shows the fatigue life of the trusses. Only the diagonals have less than infinite fatigue life. The minimum finite life calculated for the diagonals is about 145 years. The bridge has a minimum remaining fatigue life of 45 years being that it is approximately 100 years old. CHA believes this can be increased with the strengthening of the members and gussets required to bring the bridge up to legal load capacity.

TRUSS FATIGUE RATING											
	MEMBER	+(Comp) (Kip)	- (Ten) (Kip)	Δf_{max} (Kip)	Δf_{max} Gross (Ksi)	$\Delta F_{TH\ Gross}$ (Ksi)		$\Delta f_{max\ net}$ (Ksi)	$\Delta F_{TH\ Net}$ (Ksi)		Life (Years)
BOTTOM CHORD	L0-L1	0	-48.8	73.2	7.63	24	O.K.	8.53	10	O.K.	
	L1-L2	0	-48.8	73.2	7.63	24	O.K.	8.53	10	O.K.	
	L2-L3	0	-83.9	125.85	7.35	24	O.K.	8.94	10	O.K.	
	L3-L4	0	-102.1	153.15	6.85	24	O.K.	8.36	10	O.K.	
	L4-L5	0	-101.6	152.4	6.28	24	O.K.	7.70	10	O.K.	
TOP CHORD	L0-U1	78.4	0	117.6							
	U1-U2	83.9	0	125.85							
	U2-U3	107.1	0	160.65							
	U3-U4	117.5	0	176.25							
	U4-U5	127.1	0	190.65							
VERTICAL	L1-U1	0	-37	55.5	7.79	24	O.K.	9.10	10	O.K.	
	L2-U2	43.8	-9.1	79.35	6.96	24	O.K.	7.76	10	O.K.	
	L3-U3	35	-9.5	66.75	6.95	24	O.K.	7.78	10	O.K.	
	L4-U4	26.1	0	39.15							
DIAGONAL	L2-U1	4.9	-67.3	108.3	9.43	24	O.K.	13.16	10	N.G.	
	L3-U2	11.6	-55.9	101.25	12.11	24	O.K.	19.81	10	N.G.	362.8
	L4-U3	12.2	-44.9	85.65	17.84	24	O.K.	26.93	10	N.G.	144.5
	L3-U4	0	-10.6	15.9	4.47	24	O.K.	8.20	10	O.K.	
	L5-U4	0	-33.7	50.55	14.20	24	O.K.	26.06	10	N.G.	159.5
	L4-U5	0	-33.7	50.55	14.20	24	O.K.	26.06	10	N.G.	159.5

Gusset Plate Rating:

The following table shows the rating factors for the truss gusset plates. The gussets are understrenght and are the weakest part of the truss. CHA believes these gussets can be brought up to legal load capacity by replacing rivets with high strength bolts and, lengthening connections and adding cover plates.

GUSSET PLATE RATING (AS-BUILT)			
NODE	**Inventory RF**	**Operating RF**	**Criteria**
L0	2.15	2.79	Rivet shear at L0L1
L1	4.15	5.38	Rivet shear at L1U1
L2	1.16	1.50	Plate tension at L2L3
L3	0.9	1.17	Plate tension at L3L4
L4	0.79	1.02	Plate tension at L3L4
U1	1.08	1.40	Plate shear at Section A
U2	1.45	1.88	Rivet shear at U2U3
U3	0.72	0.93	Rivet shear at U2U3
U4	0.66	0.86	Rivet shear at U4U3

GUSSET PLATE RATING (AS-BUILT)			
NODE	**Inventory RF**	**Operating RF**	**Criteria**
L0	1.94	2.51	Plate tension at L0L1
L1	4.15	5.38	Rivet shear at L1U1
L2	0.98	1.27	Plate tension at L2L3
L3	0.74	0.96	Plate tension at L3L4
L4	0.64	0.83	Plate tension at L3L4
U1	0.91	1.18	Plate shear at Section A
U2	1.45	1.88	Rivet shear at U2U3
U3	0.72	0.93	Rivet shear at U2U3
U4	0.66	0.86	Rivet shear at U4U3

APPENDIX

Calculations

LOADS

DEAD LOAD

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

NODE LOAD SUMMARY

L0

MEMBER	*lb*	*QUANTITY*	*TOTAL*	
L0L1	*605.69*	*0.5*	303	
L0U1	*2166.38*	*0.5*	1083	
GUSSET	459	1	459	
BOT. LAT.	320	0.25	80	
END FLOORBEAM	506	0.5	253	
END SWAY	1545	0.25	386	
DECK	28279	0.25	7070	
		TOTAL	9.63	kip
		Add 5%	**10.12**	kip
Water (DW)	1378	0.5	**0.69**	kip

L1

MEMBER	*lb*	*QUANTITY*	*TOTAL*	
L0L1	*605.69*	*0.5*	303	
L1U1	*562.29*	*0.5*	281	
L1L2	*605.69*	*0.5*	303	
GUSSET	343	1	343	
BOT. LAT.	320	0.5	160	
TYP FLOORBEAM	1174	0.5	587	
DECK	28279	0.5	14139	
		TOTAL	16.12	kip
		Add 5%	**16.92**	kip
Water (DW)	1378	1	**1.38**	kip

L2

MEMBER	*lb*	*QUANTITY*	*TOTAL*	
L1L2	*605.69*	*0.5*	303	
L2U1	*1160.52*	*0.5*	580	
L2U2	*903.45*	*0.5*	452	
L2L3	*1080.16*	*0.5*	540	
GUSSET	639	1	639	
BOT. LAT.	320	0.5	160	
TOP STRUT	767	0.25	192	
TYP FLOORBEAM	1174	0.5	587	
DECK	28279	0.5	14139	
		TOTAL	17.59	kip
		Add 5%	**18.47**	kip
Water (DW)	1378	1	**1.38**	kip

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

L3

MEMBER	*lb*	*QUANTITY*	*TOTAL*	
L2L3	*1080.16*	*0.5*	540	
L3U2	*845.12*	*0.5*	423	
L3U3	*758.14*	*0.5*	379	
L3U4	*359.88*	*0.5*	180	
L3L4	*1411.39*	*0.5*	706	
GUSSET	471	1	471	
BOT. LAT.	320	0.5	160	
TOP STRUT	767	0.25	192	
TYP FLOORBEAM	1174	0.5	587	
DECK	28279	0.5	14139	
		TOTAL	17.78	kip
		Add 5%	**18.67**	kip
Water (DW)	1378	1	**1.38**	kip

L4

MEMBER	*lb*	*QUANTITY*	*TOTAL*	
L3L4	*1411.39*	*0.5*	706	
L4U3	*485.24*	*0.5*	243	
L4U4	*758.14*	*0.5*	379	
L4U5	*359.88*	*0.5*	180	
L4L5	*1530.01*	*0.5*	765	
GUSSET	408	1	408	
BOT. LAT.	320	0.5	160	
TOP STRUT	767	0.25	192	
TYP FLOORBEAM	1174	0.5	587	
DECK	28279	0.5	14139	
		TOTAL	17.76	
		Add 5%	**18.65**	
				kip
Water (DW)	1378	1	**1.38**	kip

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

U1 kip

MEMBER	*lb*	*QUANTITY*	*TOTAL*
L0U1	*2166.38*	*0.5*	1083
L1U1	*562.29*	*0.5*	281
L2U1	*1160.52*	*0.5*	580
U1U2	*1193.09*	*0.5*	597
GUSSET	598	1	598
TOP. LAT.	320	0.25	80
END SWAY	1545	0.25	386
		TOTAL	3.61
		Add 5%	**3.79**

U2 kip

MEMBER	*lb*	*QUANTITY*	*TOTAL*	kip
U1U2	*1193.09*	*0.5*	597	
L2U2	*903.45*	*0.5*	452	
L3U2	*845.12*	*0.5*	423	
U2U3	*1537.58*	*0.5*	769	
GUSSET	469	1	469	
TOP. LAT.	320	0.5	160	
TOP STRUT	767	0.25	192	
		TOTAL	3.06	
		Add 5%	**3.22**	

U3 kip

MEMBER	*lb*	*QUANTITY*	*TOTAL*	kip
U2U3	*1537.58*	*0.5*	769	
L3U3	*758.14*	*0.5*	379	
L4U3	*485.24*	*0.5*	243	
U3U4	*1725.60*	*0.5*	863	
GUSSET	317	1	317	
TOP. LAT.	320	0.5	160	
TOP STRUT	767	0.25	192	
		TOTAL	2.92	
		Add 5%	**3.07**	

U4 kip

MEMBER	*lb*	*QUANTITY*	*TOTAL*	kip
U3U4	*1725.60*	*0.5*	863	
L3U4	*359.88*	*0.5*	180	
L4U4	*758.14*	*0.5*	379	
L5U4	*359.88*	*0.5*	180	
U4U5	*1725.60*	*0.5*	863	
GUSSET	232	1	232	
TOP. LAT.	320	0.5	160	
TOP STRUT	767	0.25	192	
		TOTAL	3.05	
		Add 5%	**3.20**	

COMPLETED BY	XL		DATE	5/25/2012
CHECKED BY			PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls		SUBJECT	Node Dead Loads

NODE L0

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL34x3/8x4'-8 1/2	720.4	490	(lb/ft3)	2	408.5	
	PL18x3/8x2'-2 1/2	178.9	490	(lb/ft3)	1	50.7	
					TOTAL	**459.3**	

NODE L1

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL26x3/8x4'-2	487.5	490	(lb/ft3)	2	276.5	
	PL16x3/8x3'-3	234.0	490	(lb/ft3)	1	66.4	
					TOTAL	**342.8**	

NODE L2

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL45x3/8x5'-1	1029.4	490	(lb/ft3)	2	583.8	
	PL14x3/8x3'-1	194.3	490	(lb/ft3)	1	55.1	
					TOTAL	**638.9**	

NODE L3

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL38x3/8x4'-3 1/2	733.9	490	(lb/ft3)	2	416.2	
	PL14x3/8x3'-1	194.3	490	(lb/ft3)	1	55.1	
					TOTAL	**471.3**	

NODE L4

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL32x3/8x5'	720.0	490	(lb/ft3)	2	408.3	
					TOTAL	**408.3**	

NODE U1

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL42x3/8x5'	945.0	490	(lb/ft3)	2	535.9	
	PL20x3/8x2'-5	217.5	490	(lb/ft3)	1	61.7	
					TOTAL	**597.6**	

NODE U2

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL34x3/8x4'-1/2	618.4	490	(lb/ft3)	2	350.7	
	PL30x3/8x3'-1	416.3	490	(lb/ft3)	1	118.0	
					TOTAL	**468.7**	

NODE U3

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL26x3/8x3'	351.0	490	(lb/ft3)	2	199.1	
	PL30x3/8x3'-1	416.3	490	(lb/ft3)	1	118.0	
					TOTAL	**317.1**	

NODE U4

	SIZE	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
GUSSET PLATE	PL28x3/8x3'-3	409.5	490	(lb/ft3)	2	232.2	
					TOTAL	**232.2**	

Note: The weight of the fill plates, reinforcing plates and angles is ignored here. Since the gusset plates are calculated as square plates, which is conservative, we assume the fill plate and reinforcing plate weight are counted.

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

TYPICAL TOP LATERAL SYSTEM

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	3X3X5/16	315	6.1	(lb/ft)	2	319.95	
					TOTAL	**319.95**	

TYPICAL TOP STRUT

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	4X3X3/8	216	8.5	(lb/ft)	4	612.00	
ANGLE	3X3X5/16	76	6.1	(lb/ft)	4	155.35	
					TOTAL	**767.35**	

TYPICAL BOT LATERAL SYSTEM

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	3X3X5/16	315	6.1	(lb/ft)	2	319.95	
					TOTAL	**319.95**	

TYPICAL FLOOR BEAM

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	4X3X3/8	229	8.5	(lb/ft)	4	647.42	
	SIZE	**VOLUME (in3)**	**UNIT WEIGHT**		**NUMBER**	**WEIGHT (lb)**	
PLATE	PL26X5/16	1857	490	(lb/ft3)	1	526.46	
					TOTAL	**1173.87**	

END FLOOR BEAM

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	4X3X3/8	229	8.5	(lb/ft)	2	323.71	
	SIZE	**VOLUME (in3)**	**UNIT WEIGHT**		**NUMBER**	**WEIGHT (lb)**	
PLATE	PL9X5/16	643	490	(lb/ft3)	1	182.23	
					TOTAL	**505.94**	

TYPICAL END SWAY

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	5X3X3/8	216	9.8	(lb/ft)	4	705.60	
ANGLE	3X3X5/16	76	6.1	(lb/ft)	6	231.80	
ANGLE	5X3X3/8	108	9.8	(lb/ft)	4	352.80	length is assumed
	SIZE	**VOLUME (in3)**	**UNIT WEIGHT**		**NUMBER**	**WEIGHT (lb)**	
PLATE	5/16" WEB	450	490	(lb/ft3)	2	255.21	area is assumed
					TOTAL	**1545.41**	

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

DECK AT EACH PANEL

WEIGHT	65	lb/sf	
AREA	333.72	sf	ONE PANEL
TOTAL WEIGHT	**21691.8**	lb	ONE PANEL

TYPICAL STRINGER

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
	W15X36	223	36	(lb/ft)	8	5352.00	at each panel
					TOTAL	**5352.00**	

UNIT FENCE AT EACH PANEL

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
PIPE	2" DIA	223	3.66	(lb/ft)	6	407.18	Pipe 2 STD
ANGLE	3X3X5/16	60	6.1	(lb/ft)	4	122.00	length is assumed
					TOTAL	**529.18**	

UNIT WHEELGUARD AT EACH PANEL

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
ANGLE	6X6X3/8	223	14.9	(lb/ft)	2	552.54	estimated from photos
	SIZE	**VOLUME (in3)**	**UNIT WEIGHT**		**NUMBER**	**WEIGHT (lb)**	
PLATE	24X6X3/8	54	490	(lb/ft3)	10	153.13	estimated from photos
					TOTAL	**705.67**	

WATER PIPE AT EACH PANEL (DW)

	SIZE	LENGTH (in)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
PIPE	10" DIA	223	40.5	(lb/ft)	1	750.94	aasume Pipe 10 STD
WATER	10	223	62	(lb/ft3)	1	627.00	assume water pipe
					TOTAL	**1377.94**	

DECK AT EACH PANEL TOTAL **28278.64** lb

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

L0L1

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
9.6	223	2136	490	(lb/ft3)	1	605.69	

L1L2

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
9.6	223	2136	490	(lb/ft3)	1	605.69	

L2L3

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
17.12	223	3809	490	(lb/ft3)	1	1080.16	

L3L4

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
22.37	223	4977	490	(lb/ft3)	1	1411.39	

L4L5

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
24.25	223	5396	490	(lb/ft3)	1	1530.01	

L0U1

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
21.43	357	7640	490	(lb/ft3)	1	2166.38	

U1U2

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
18.91	223	4207	490	(lb/ft3)	1	1193.09	

U2U3

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
24.37	223	5422	490	(lb/ft3)	1	1537.58	

U3U4

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
27.35	223	6085	490	(lb/ft3)	1	1725.60	

U4U5

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
27.35	223	6085	490	(lb/ft3)	1	1725.60	

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	Node Dead Loads

L1U1

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
7.12	279	1983	490	(lb/ft3)	1	562.29	

L2U2

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
11.44	279	3186	490	(lb/ft3)	1	903.45	

L3U3

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
9.6	279	2674	490	(lb/ft3)	1	758.14	

L4U4

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
9.6	279	2674	490	(lb/ft3)	1	758.14	

L2U1

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
11.48	357	4093	490	(lb/ft3)	1	1160.52	

L3U2

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
8.36	357	2980	490	(lb/ft3)	1	845.12	

L4U3

AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
4.8	357	1711	490	(lb/ft3)	1	485.24	

L3U4, L5U4, L4U5

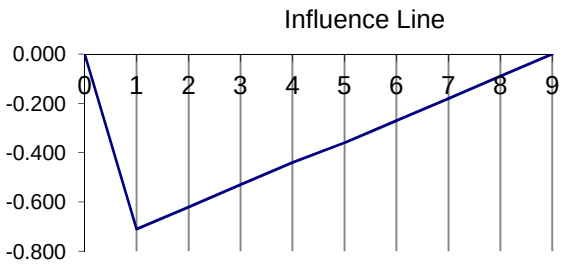
AREA (in2)	LENGTH (in)	VOLUME (in3)	UNIT WEIGHT		NUMBER	WEIGHT (lb)	COMMENTS
3.56	357	1269	490	(lb/ft3)	1	359.88	

LIVE LOAD

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* **L0-L1**, *STAAD Beam* **1**

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.710	-0.620	-0.530	-0.440	-0.360	-0.270	-0.180	-0.090	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-3.454	-6.470	-5.595	-4.719	-3.892	-3.065	-2.189	-1.314	-0.438	***-31.1***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	18.540 ft	32.540 ft	46.540 ft	Axle Loc.	18.540 ft	22.540 ft
Infl. Force	-0.710	-0.642	-0.574	Infl. Force	-0.710	-0.691
Load	-22.7 k	-20.5 k	-4.6 k	Load	-17.8 k	-17.3 k
Total Load =	***-52.2 k***	*(w/ dist. & impact)*		*Total Load =*	***-38.2 k***	*(w/ dist. & impact)*

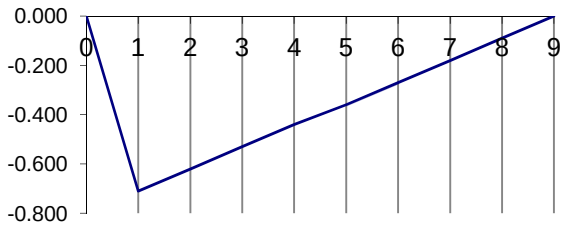
Maximum Load = ***-83.3 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* **L1-L2**, *STAAD Beam* **2**

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.710	-0.620	-0.530	-0.440	-0.360	-0.270	-0.180	-0.090	0.000

Influence Line



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-3.454	-6.470	-5.595	-4.719	-3.892	-3.065	-2.189	-1.314	-0.438	***-31.1***

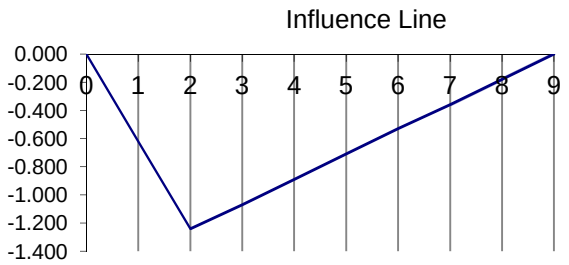
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	18.540 ft	32.540 ft	46.540 ft	Axle Loc.	18.540 ft	22.540 ft
Infl. Force	-0.710	-0.642	-0.574	Infl. Force	-0.710	-0.691
Load	-22.7 k	-20.5 k	-4.6 k	Load	-17.8 k	-17.3 k
Total Load =	***-52.2 k***	*(w/ dist. & impact)*		*Total Load =*	***-38.2 k***	*(w/ dist. & impact)*

Maximum Load = ***-83.3 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* **L2-L3**, *STAAD Beam* **3**

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.620	-1.240	-1.070	-0.890	-0.710	-0.530	-0.360	-0.180	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-3.016	-9.049	-11.238	-9.535	-7.784	-6.032	-4.330	-2.627	-0.876	***-54.5***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	37.080 ft	51.080 ft	65.080 ft	Axle Loc.	37.080 ft	41.080 ft
Infl. Force	-1.240	-1.112	-0.978	Infl. Force	-1.240	-1.203
Load	-39.7 k	-35.6 k	-7.8 k	Load	-31.0 k	-30.1 k
Total Load =	***-90.6 k***	*(w/ dist. & impact)*		*Total Load =*	***-66.6 k***	*(w/ dist. & impact)*

Maximum Load = ***-145.1 k*** *(TENSION)*

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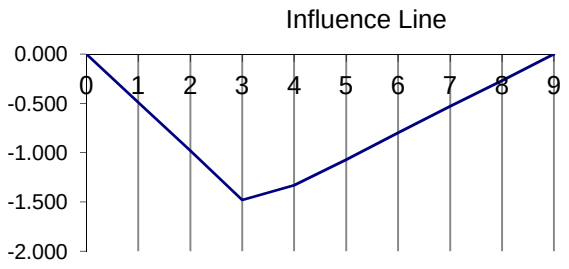
Influence Diagram, *Location* **L3-L4**, *STAAD Beam* 4

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.490	-0.980	-1.480	-1.330	-1.070	-0.800	-0.530	-0.270	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-2.384	-7.151	-11.968	-13.670	-11.676	-9.097	-6.470	-3.892	-1.314	***-67.6***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	69.620 ft	83.620 ft	Axle Loc.	55.620 ft	59.620 ft
Infl. Force	-1.480	-1.367	-1.197	Infl. Force	-1.480	-1.448
Load	-47.4 k	-43.7 k	-9.6 k	Load	-37.0 k	-36.2 k
Total Load =	***-109.8 k***	*(w/ dist. & impact)*		*Total Load =*	***-79.8 k***	*(w/ dist. & impact)*

Maximum Load = ***-177.4 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
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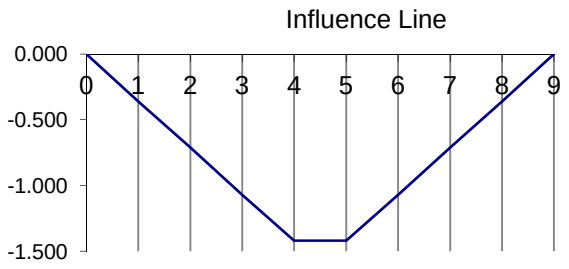
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* **L4-L5**, *STAAD Beam* 5

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.360	-0.710	-1.070	-1.420	-1.420	-1.070	-0.710	-0.360	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-1.751	-5.205	-8.660	-12.114	-13.816	-12.114	-8.660	-5.205	-1.751	***-69.3***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	74.160 ft	88.160 ft	102.160 ft	Axle Loc.	74.160 ft	78.160 ft
Infl. Force	-1.420	-1.420	-1.241	Infl. Force	-1.420	-1.420
Load	-45.4 k	-45.4 k	-9.9 k	Load	-35.5 k	-35.5 k
Total Load =	***-109.9 k***	*(w/ dist. & impact)*		*Total Load =*	***-77.4 k***	*(w/ dist. & impact)*

Maximum Load = ***-179.2 k*** *(TENSION)*

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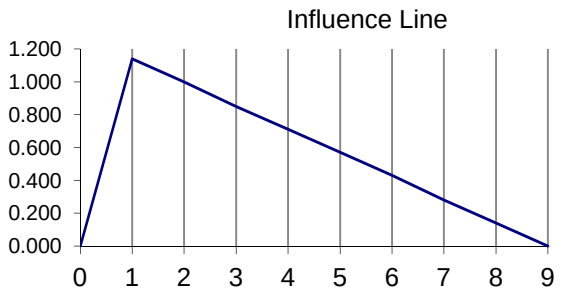
Influence Diagram, *Location* **L0-U1**, *STAAD Beam* 10

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	1.140	1.000	0.850	0.710	0.570	0.430	0.280	0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	5.546	10.411	9.000	7.589	6.227	4.865	3.454	2.043	0.681	***49.8***
Ten.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	18.540 ft	32.540 ft	46.540 ft	Axle Loc.	18.540 ft	22.540 ft
Infl. Force	1.140	1.034	0.923	Infl. Force	1.140	1.110
Load	36.5 k	33.1 k	7.4 k	Load	28.5 k	27.7 k
Total Load =	***83.9 k***	*(w/ dist. & impact)*		*Total Load =*	***61.3 k***	*(w/ dist. & impact)*

Maximum Load = ***133.8 k*** *(COMPRESSION)*

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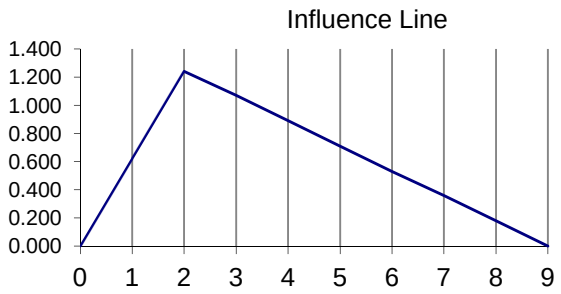
Influence Diagram, *Location* U1-U2, *STAAD Beam* 11

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.620	1.240	1.070	0.890	0.710	0.530	0.360	0.180	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	3.016	9.049	11.238	9.535	7.784	6.032	4.330	2.627	0.876	***54.5***
Ten.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	37.080 ft	51.080 ft	65.080 ft	Axle Loc.	37.080 ft	41.080 ft
Infl. Force	1.240	1.112	0.978	Infl. Force	1.240	1.203
Load	39.7 k	35.6 k	7.8 k	Load	31.0 k	30.1 k
Total Load =	***90.6 k***	*(w/ dist. & impact)*		*Total Load =*	***66.6 k***	*(w/ dist. & impact)*

Maximum Load = ***145.1 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
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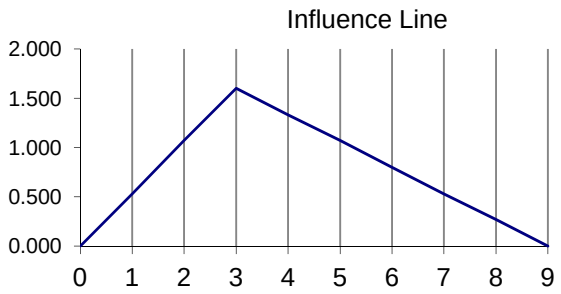
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* U2-U3, *STAAD Beam* 12

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.530	1.070	1.600	1.330	1.070	0.800	0.530	0.270	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	2.578	7.784	12.989	14.254	11.676	9.097	6.470	3.892	1.314	***70.1***
Ten.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***

DESIGN TRUCK

Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft
Axle Loc.	55.620 ft	69.620 ft	83.620 ft
Infl. Force	1.600	1.396	1.197
Load	51.2 k	44.7 k	9.6 k

Total Load = ***115.0 k*** *(w/ dist. & impact)*

DESIGN TANDEM

Axle	1	2
Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	59.620 ft
Infl. Force	1.600	1.542
Load	40.0 k	38.5 k

Total Load = ***85.7 k*** *(w/ dist. & impact)*

Maximum Load = ***185.1 k*** *(COMPRESSION)*

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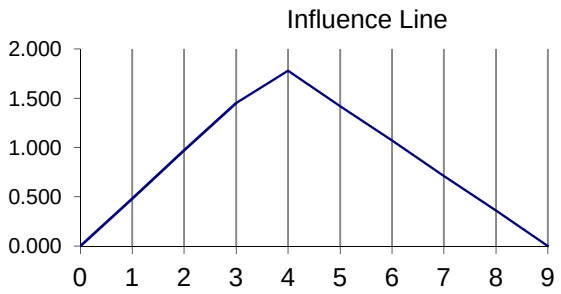
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* U3-U4, *STAAD Beam* 13

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.480	0.970	1.450	1.780	1.420	1.070	0.710	0.360	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*										
Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	2.335	7.054	11.773	15.714	15.568	12.114	8.660	5.205	1.751	***80.2***
Ten.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	60.160 ft	74.160 ft	88.160 ft	Axle Loc.	74.160 ft	70.160 ft
Infl. Force	1.531	1.780	1.508	Infl. Force	1.780	1.709
Load	49.0 k	57.0 k	12.1 k	Load	44.5 k	42.7 k
Total Load =	***128.7 k***	*(w/ dist. & impact)*		*Total Load =*	***95.1 k***	*(w/ dist. & impact)*

Maximum Load = ***208.9 k*** *(COMPRESSION)*

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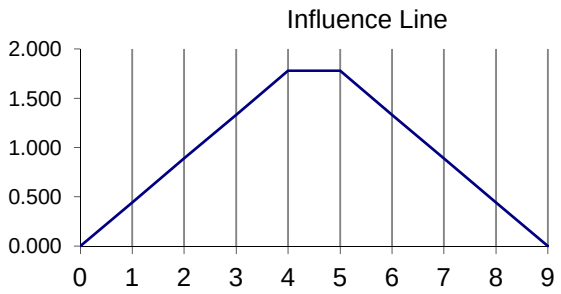
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* U4-U5, *STAAD Beam* 14

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.440	0.890	1.330	1.780	1.780	1.330	0.890	0.440	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*										
Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	2.141	6.470	10.800	15.130	17.319	15.130	10.800	6.470	2.141	***86.4***
Ten.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	74.160 ft	88.160 ft	102.160 ft	Axle Loc.	74.160 ft	78.160 ft
Infl. Force	1.780	1.780	1.550	Infl. Force	1.780	1.780
Load	57.0 k	57.0 k	12.4 k	Load	44.5 k	44.5 k
Total Load =	***137.8 k***	*(w/ dist. & impact)*		*Total Load =*	***97.1 k***	*(w/ dist. & impact)*

Maximum Load = ***224.2 k*** *(COMPRESSION)*

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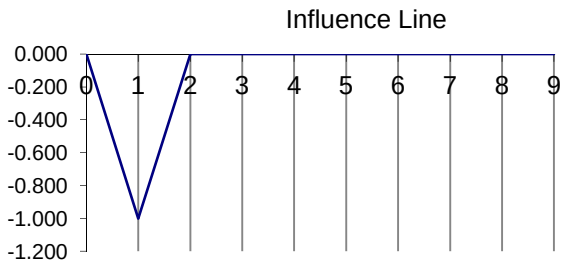
Influence Diagram, *Location* L1-U1, *STAAD Beam* 19

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-4.865	-4.865	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***-9.7***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	18.540 ft	32.540 ft	46.540 ft	Axle Loc.	18.540 ft	22.540 ft
Infl. Force	-1.000	-0.245	0.000	Infl. Force	-1.000	-0.784
Load	-32.0 k	-7.8 k	0.0 k	Load	-25.0 k	-19.6 k
Total Load =	***-43.4 k***	*(w/ dist. & impact)*		*Total Load =*	***-48.6 k***	*(w/ dist. & impact)*

Maximum Load = ***-58.4 k*** *(TENSION)*

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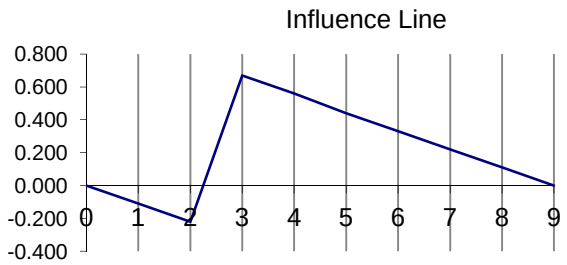
Influence Diagram, *Location* L2-U2, *STAAD Beam* 20

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.110	-0.220	0.670	0.560	0.440	0.330	0.220	0.110	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	3.259	5.984	4.865	3.746	2.676	1.605	0.535	***22.7***
Ten.	-0.535	-1.605	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***-2.1***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	37.080 ft	23.080 ft	9.080 ft	Axle Loc.	37.080 ft	33.080 ft
Infl. Force	-0.220	-0.137	-0.054	Infl. Force	-0.220	-0.196
Load	-7.0 k	-4.4 k	-0.4 k	Load	-5.5 k	-4.9 k
Total Load =	***-12.9 k***	*(w/ dist. & impact)*		*Total Load =*	***-11.3 k***	*(w/ dist. & impact)*

Maximum Load = ***-15.1 k*** *(TENSION)*

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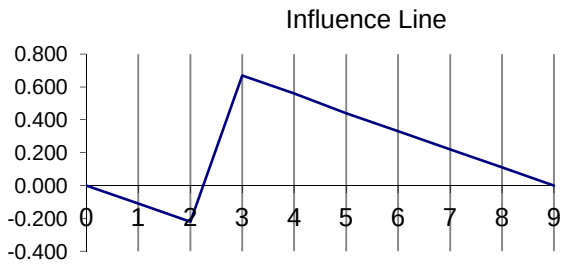
Influence Diagram, *Location* L2-U2, *STAAD Beam* 20

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.110	-0.220	0.670	0.560	0.440	0.330	0.220	0.110	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	3.259	5.984	4.865	3.746	2.676	1.605	0.535	***22.7***
Ten.	-0.535	-1.605	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***-2.1***

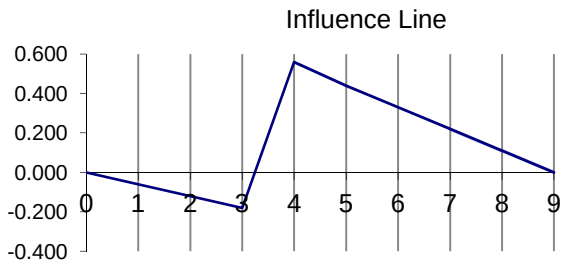
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	69.920 ft	83.620 ft	Axle Loc.	55.620 ft	59.620 ft
Infl. Force	0.670	0.585	0.499	Infl. Force	0.670	0.646
Load	21.4 k	18.7 k	4.0 k	Load	16.8 k	16.2 k
Total Load =	***48.2 k***	*(w/ dist. & impact)*		*Total Load =*	***35.9 k***	*(w/ dist. & impact)*

Maximum Load = ***70.8 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L3-U3, *STAAD Beam* 21

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.542	37.084	55.626	74.168	92.710	111.252	129.794	148.336	166.878
Force	0.000	-0.060	-0.120	-0.180	0.560	0.440	0.330	0.220	0.110	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	2.725	4.865	3.746	2.676	1.606	0.535	***16.2***
Ten.	-0.292	-0.876	-1.460	0.000	0.000	0.000	0.000	0.000	0.000	***-2.6***

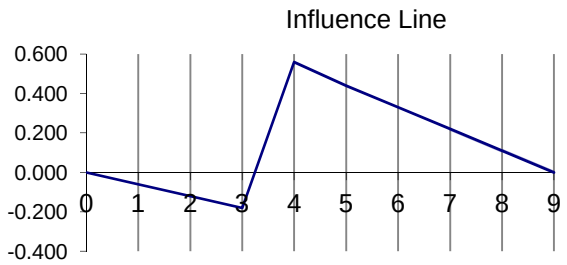
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	41.620 ft	27.620 ft	Axle Loc.	55.620 ft	51.620 ft
Infl. Force	-0.180	-0.135	-0.089	Infl. Force	-0.180	-0.167
Load	-5.8 k	-4.3 k	-0.7 k	Load	-4.5 k	-4.2 k
Total Load =	***-11.8 k***	*(w/ dist. & impact)*		*Total Load =*	***-9.5 k***	*(w/ dist. & impact)*

Maximum Load = ***-14.4 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L3-U3, *STAAD Beam* 21

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.060	-0.120	-0.180	0.560	0.440	0.330	0.220	0.110	0.000



Panel Width =	*18.54 ft*		Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*		Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	2.724	4.865	3.746	2.676	1.605	0.535	***16.2***
Ten.	-0.292	-0.876	-1.459	0.000	0.000	0.000	0.000	0.000	0.000	***-2.6***

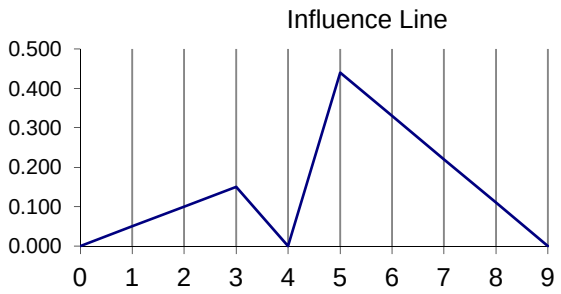
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	74.160 ft	88.160 ft	102.160 ft	Axle Loc.	74.160 ft	78.160 ft
Infl. Force	0.560	0.469	0.384	Infl. Force	0.560	0.534
Load	17.9 k	15.0 k	3.1 k	Load	14.0 k	13.4 k
Total Load =	***39.3 k***	*(w/ dist. & impact)*		*Total Load =*	***29.8 k***	*(w/ dist. & impact)*

Maximum Load = ***55.4 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L4-U4, *STAAD Beam* 22

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.050	0.100	0.150	0.000	0.440	0.330	0.220	0.110	0.000



Panel Width =	*18.54 ft*		Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*		Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*										
Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.243	0.730	1.216	0.730	2.141	3.746	2.676	1.605	0.535	***13.6***
Ten.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***

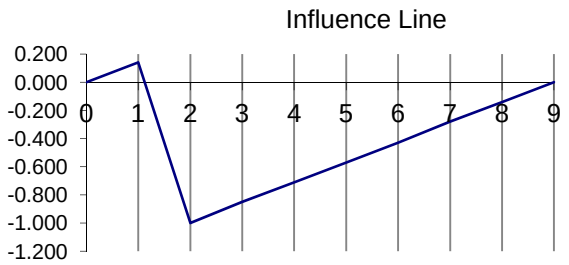
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	92.700 ft	106.700 ft	120.700 ft	Axle Loc.	92.700 ft	96.700 ft
Infl. Force	0.440	0.357	0.274	Infl. Force	0.440	0.416
Load	14.1 k	11.4 k	2.2 k	Load	11.0 k	10.4 k
Total Load =	***30.2 k***	*(w/ dist. & impact)*		*Total Load =*	***23.3 k***	*(w/ dist. & impact)*

Maximum Load = ***43.8 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L2-U1, *STAAD Beam* 27

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.140	-1.000	-0.850	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.681	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.7***
Ten.	0.000	-4.865	-9.000	-7.589	-6.227	-4.865	-3.454	-2.043	-0.681	***-38.7***

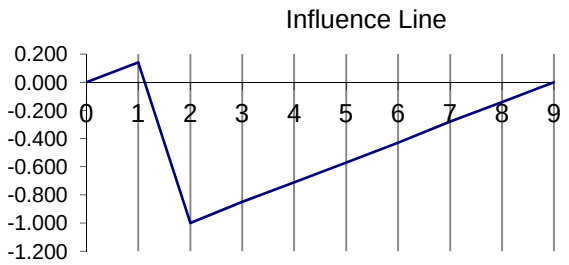
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	37.080 ft	51.080 ft	65.080 ft	Axle Loc.	37.080 ft	41.080 ft
Infl. Force	-1.000	-0.887	-0.779	Infl. Force	-1.000	-0.968
Load	-32.0 k	-28.4 k	-6.2 k	Load	-25.0 k	-24.2 k
Total Load =	***-72.6 k***	*(w/ dist. & impact)*		*Total Load =*	***-53.6 k***	*(w/ dist. & impact)*

Maximum Load = ***-111.4 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L2-U1, *STAAD Beam* 27

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.140	-1.000	-0.850	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.681	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.7***
Ten.	0.000	-4.865	-9.000	-7.589	-6.227	-4.865	-3.454	-2.043	-0.681	***-38.7***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	18.540 ft	4.540 ft	0.000 ft	Axle Loc.	18.540 ft	15.540 ft
Infl. Force	0.140	0.034	0.000	Infl. Force	0.140	0.117
Load	4.5 k	1.1 k	0.0 k	Load	3.5 k	2.9 k
Total Load =	***6.1 k***	*(w/ dist. & impact)*		*Total Load =*	***7.0 k***	*(w/ dist. & impact)*

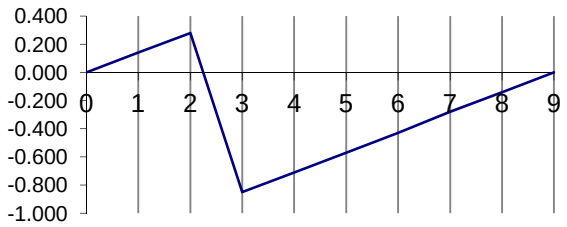
Maximum Load = ***7.7 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L3-U2, *STAAD Beam* 28

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.140	0.280	-0.850	-0.710	-0.570	-0.430	-0.280	-0.140	0.000

Influence Line



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.681	2.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***2.7***
Ten.	0.000	0.000	-4.135	-7.589	-6.227	-4.865	-3.454	-2.043	-0.681	***-29.0***

DESIGN TRUCK

Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft
Axle Loc.	55.620 ft	69.620 ft	83.620 ft
Infl. Force	-0.850	-0.744	-0.639
Load	-27.2 k	-23.8 k	-5.1 k
Total Load =	***-61.2 k***	*(w/ dist. & impact)*	

DESIGN TANDEM

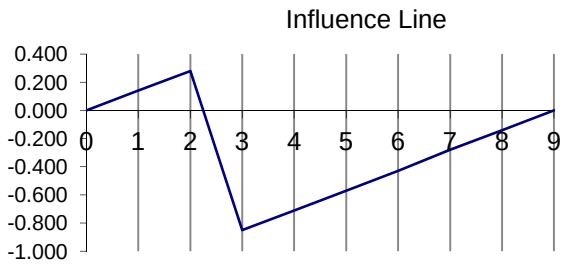
Axle	1	2
Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	59.620 ft
Infl. Force	-0.850	-0.820
Load	-21.3 k	-20.5 k
Total Load =	***-45.5 k***	*(w/ dist. & impact)*

Maximum Load = ***-90.2 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L3-U2, *STAAD Beam* 28

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.140	0.280	-0.850	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.681	2.043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***2.7***
Ten.	0.000	0.000	-4.135	-7.589	-6.227	-4.865	-3.454	-2.043	-0.681	***-29.0***

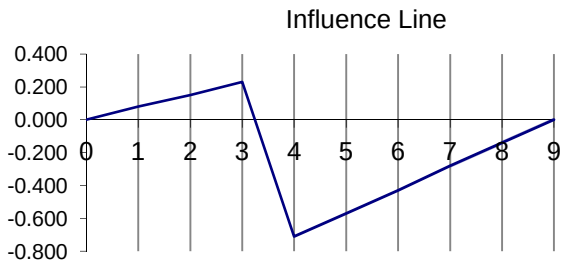
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	37.080 ft	23.080 ft	9.080 ft	Axle Loc.	37.080 ft	33.080 ft
Infl. Force	0.280	0.174	0.069	Infl. Force	0.280	0.250
Load	9.0 k	5.6 k	0.5 k	Load	7.0 k	6.2 k
Total Load =	***16.5 k***	*(w/ dist. & impact)*		*Total Load =*	***14.4 k***	*(w/ dist. & impact)*

Maximum Load = ***19.2 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L4-U3, *STAAD Beam* 29

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.080	0.150	0.230	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.389	1.119	1.849	0.000	0.000	0.000	0.000	0.000	0.000	***3.4***
Ten.	0.000	0.000	0.000	-3.454	-6.227	-4.865	-3.454	-2.043	-0.681	***-20.7***

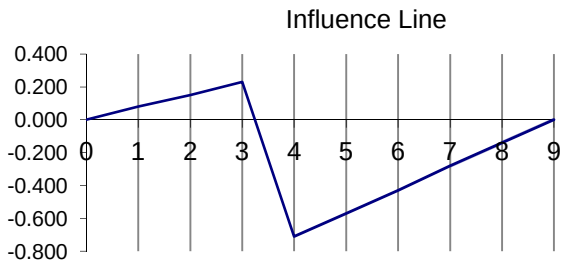
DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	74.160 ft	88.160 ft	102.160 ft	Axle Loc.	74.160 ft	78.160 ft
Infl. Force	-0.710	-0.604	-0.499	Infl. Force	-0.710	-0.680
Load	-22.7 k	-19.3 k	-4.0 k	Load	-17.8 k	-17.0 k
Total Load =	***-50.2 k***	*(w/ dist. & impact)*		*Total Load =*	***-37.9 k***	*(w/ dist. & impact)*

Maximum Load = ***-70.9 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L4-U3, *STAAD Beam* 29

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.080	0.150	0.230	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.389	1.119	1.849	0.000	0.000	0.000	0.000	0.000	0.000	***3.4***
Ten.	0.000	0.000	0.000	-3.454	-6.227	-4.865	-3.454	-2.043	-0.681	***-20.7***

DESIGN TRUCK

Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft
Axle Loc.	55.620 ft	41.620 ft	27.620 ft
Infl. Force	0.230	0.170	0.114
Load	7.4 k	5.4 k	0.9 k

Total Load = ***14.9 k*** *(w/ dist. & impact)*

DESIGN TANDEM

Axle	1	2
Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	51.620 ft
Infl. Force	0.230	0.213
Load	5.8 k	5.3 k

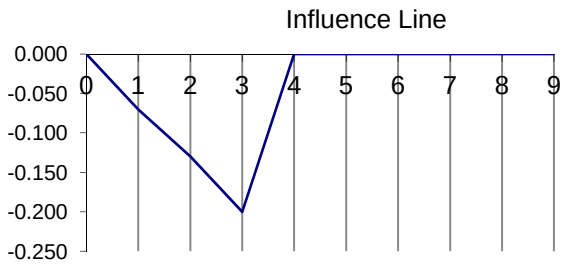
Total Load = ***12.1 k*** *(w/ dist. & impact)*

Maximum Load = ***18.3 k*** *(COMPRESSION)*

COMP. BY	XL	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION		

Influence Diagram, *Location* L3-U4, *STAAD Beam* 30

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.070	-0.130	-0.200	0.000	0.000	0.000	0.000	0.000	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-0.341	-0.973	-1.605	-0.973	0.000	0.000	0.000	0.000	0.000	***-3.9***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	55.620 ft	41.620 ft	27.620 ft	Axle Loc.	55.620 ft	51.620 ft
Infl. Force	-0.200	-0.147	-0.099	Infl. Force	-0.200	-0.185
Load	-6.4 k	-4.7 k	-0.8 k	Load	-5.0 k	-4.6 k
Total Load =	***-13.0 k***	*(w/ dist. & impact)*		*Total Load =*	***-10.5 k***	*(w/ dist. & impact)*

Maximum Load = ***-16.9 k*** *(TENSION)*

COMP. BY	XL	SHEET	OF
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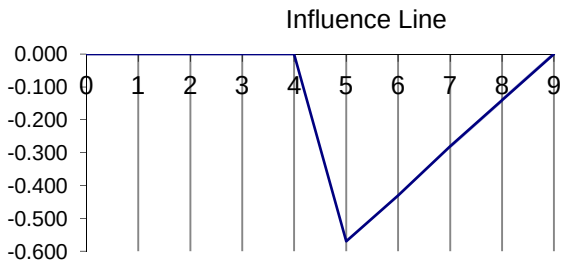
Influence Diagram, *Location* L5-U4, *STAAD Beam* 31

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.000	0.000	0.000	0.000	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	0.000	0.000	0.000	0.000	-2.773	-4.865	-3.454	-2.043	-0.681	***-13.8***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	92.700 ft	106.700 ft	120.700 ft	Axle Loc.	92.700 ft	96.700 ft
Infl. Force	-0.570	-0.464	-0.353	Infl. Force	-0.570	-0.540
Load	-18.2 k	-14.9 k	-2.8 k	Load	-14.3 k	-13.5 k
Total Load =	***-39.2 k***	*(w/ dist. & impact)*		*Total Load =*	***-30.3 k***	*(w/ dist. & impact)*

Maximum Load = ***-53.0 k*** *(TENSION)*

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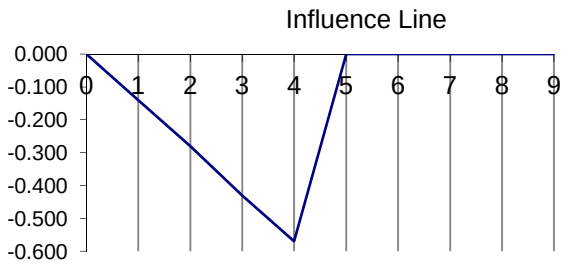
Influence Diagram, *Location* L4-U5, *STAAD Beam* 32

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.140	-0.280	-0.430	-0.570	0.000	0.000	0.000	0.000	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*

LANE LOADING *(w/ dist. but no impact)*

Bay	1	2	3	4	5	6	7	8	9	Total
Comp.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	***0.0***
Ten.	-0.681	-2.043	-3.454	-4.865	-2.773	0.000	0.000	0.000	0.000	***-13.8***

DESIGN TRUCK				***DESIGN TANDEM***		
Axle	1	2	3	Axle	1	2
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	25.0 k	25.0 k
Spacing	0.00 ft	14.00 ft	14.00 ft	Spacing	0.00 ft	4.00 ft
Axle Loc.	74.160 ft	60.160 ft	46.160 ft	Axle Loc.	74.160 ft	70.160 ft
Infl. Force	-0.570	-0.464	-0.353	Infl. Force	-0.570	-0.540
Load	-18.2 k	-14.9 k	-2.8 k	Load	-14.3 k	-13.5 k
Total Load =	***-39.2 k***	*(w/ dist. & impact)*		*Total Load =*	***-30.3 k***	*(w/ dist. & impact)*

Maximum Load = ***-53.0 k*** *(TENSION)*

FATIGUE LIVE LOAD

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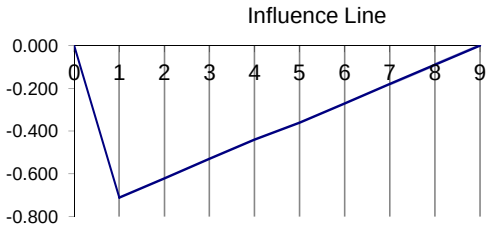
Influence Diagram, *Location* **L0-L1**, *STAAD Beam* **1**

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.710	-0.620	-0.530	-0.440	-0.360	-0.270	-0.180	-0.090	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	18.540 ft	48.540 ft	62.540 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-0.710	-0.564	-0.496	Infl. Force	0.000	0.000	0.000
Load	-22.7 k	-18.1 k	-4.0 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-48.8 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-48.8 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

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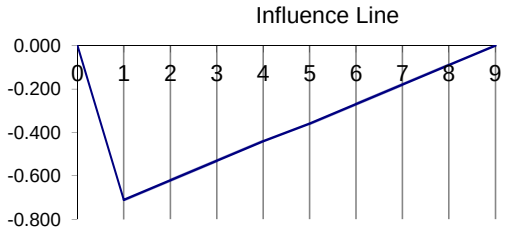
Influence Diagram, *Location* **L1-L2**, *STAAD Beam* **2**

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.710	-0.620	-0.530	-0.440	-0.360	-0.270	-0.180	-0.090	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*
Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	18.540 ft	48.540 ft	62.540 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-0.710	-0.564	-0.496	Infl. Force	0.000	0.000	0.000
Load	-22.7 k	-18.1 k	-4.0 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-48.8 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-48.8 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

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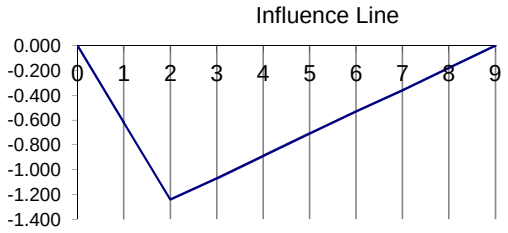
Influence Diagram, *Location* **L2-L3**, *STAAD Beam* **3**

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.620	-1.240	-1.070	-0.890	-0.710	-0.530	-0.360	-0.180	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	37.080 ft	67.080 ft	81.080 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-1.240	-0.959	-0.823	Infl. Force	0.000	0.000	0.000
Load	-39.7 k	-30.7 k	-6.6 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-83.9 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-83.9 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

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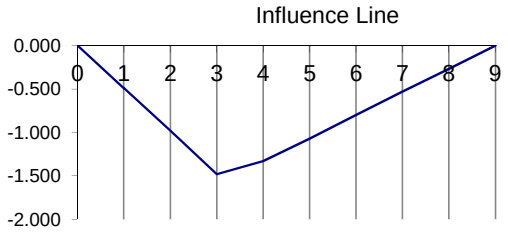
Influence Diagram, *Location* **L3-L4**, *STAAD Beam* 4

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.490	-0.980	-1.480	-1.330	-1.070	-0.800	-0.530	-0.270	0.000



Panel Width = *18.54 ft* Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* Impact Factor = *1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	55.620 ft	85.620 ft	41.620 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-1.480	-1.169	-1.102	Infl. Force	0.000	0.000	0.000
Load	-47.4 k	-37.4 k	-8.8 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-102.1 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-102.1 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

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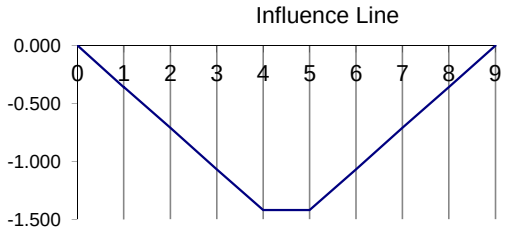
Influence Diagram, *Location* **L4-L5**, *STAAD Beam* 5

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.360	-0.710	-1.070	-1.420	-1.420	-1.070	-0.710	-0.360	0.000



Panel Width = *18.54 ft* Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* Impact Factor = *1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	74.160 ft	104.160 ft	60.160 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-1.420	-1.204	-1.156	Infl. Force	0.000	0.000	0.000
Load	-45.4 k	-38.5 k	-9.2 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-101.6 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-101.6 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

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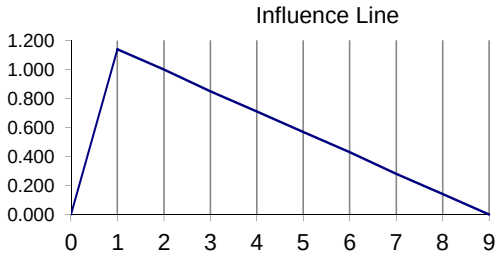
Influence Diagram, *Location* **L0-U1**, *STAAD Beam* 10

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	1.140	1.000	0.850	0.710	0.570	0.430	0.280	0.140	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	200.000 ft	230.000 ft	244.000 ft	Axle Loc.	18.540 ft	48.540 ft	62.540 ft
Infl. Force	0.000	0.000	0.000	Infl. Force	1.140	0.907	0.798
Load	0.0 k	0.0 k	0.0 k	Load	36.5 k	29.0 k	6.4 k
Total Load =	***0.0 k***	*(w/ dist. & impact)*		*Total Load =*	***78.4 k***	*(w/ dist. & impact)*	

Maximum Tension= ***0.0 k*** *(COMPRESSION)* ***Maximum Compression=*** ***78.4 k*** *(COMPRESSION)*

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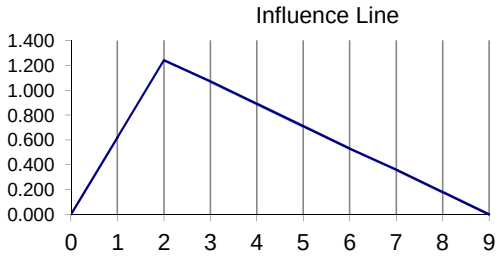
Influence Diagram, *Location* U1-U2, *STAAD Beam* 11

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.620	1.240	1.070	0.890	0.710	0.530	0.360	0.180	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*
Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	200.000 ft	230.000 ft	244.000 ft	Axle Loc.	37.080 ft	67.080 ft	81.080 ft
Infl. Force	0.000	0.000	0.000	Infl. Force	1.240	0.959	0.823
Load	0.0 k	0.0 k	0.0 k	Load	39.7 k	30.7 k	6.6 k
Total Load =	***0.0 k***	*(w/ dist. & impact)*		*Total Load =*	***83.9 k***	*(w/ dist. & impact)*	

Maximum Tension= ***0.0 k*** *(COMPRESSION)* ***Maximum Compression=*** ***83.9 k*** *(COMPRESSION)*

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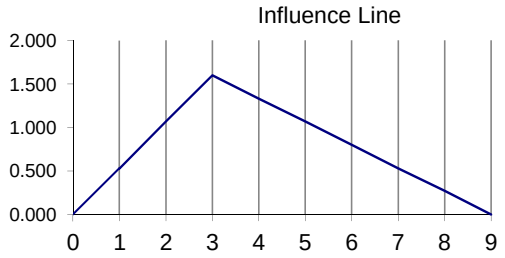
Influence Diagram, *Location* U2-U3, *STAAD Beam* 12

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.530	1.070	1.600	1.330	1.070	0.800	0.530	0.270	0.000



Panel Width = *18.54 ft* Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* Impact Factor = *1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	200.000 ft	230.000 ft	244.000 ft	Axle Loc.	55.620 ft	85.620 ft	41.620 ft
Infl. Force	0.000	0.000	0.000	Infl. Force	1.600	1.169	1.200
Load	0.0 k	0.0 k	0.0 k	Load	51.2 k	37.4 k	9.6 k
Total Load =	***0.0 k***	*(w/ dist. & impact)*		*Total Load =*	***107.1 k***	*(w/ dist. & impact)*	

Maximum Tension= ***0.0 k*** *(COMPRESSION)* ***Maximum Compression=*** ***107.1 k*** *(COMPRESSION)*

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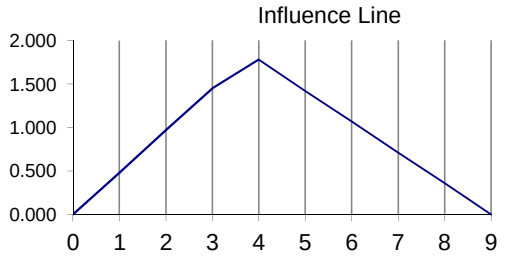
Influence Diagram, *Location* U3-U4, *STAAD Beam* 13

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.480	0.970	1.450	1.780	1.420	1.070	0.710	0.360	0.000



Panel Width =	*18.54*	*ft*	Distribution Factor =	*0.82*	
Lane Load =	*0.640*	*k/ft*	Impact Factor =	*1.33*	

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	200.000 ft	230.000 ft	244.000 ft	Axle Loc.	74.160 ft	104.160 ft	60.160 ft
Infl. Force	0.000	0.000	0.000	Infl. Force	1.780	1.204	1.531
Load	0.0 k	0.0 k	0.0 k	Load	57.0 k	38.5 k	12.2 k
Total Load =	***0.0 k***	*(w/ dist. & impact)*		*Total Load =*	***117.5 k***	*(w/ dist. & impact)*	

Maximum Tension= ***0.0 k*** *(COMPRESSION)* ***Maximum Compression=*** ***117.5 k*** *(COMPRESSION)*

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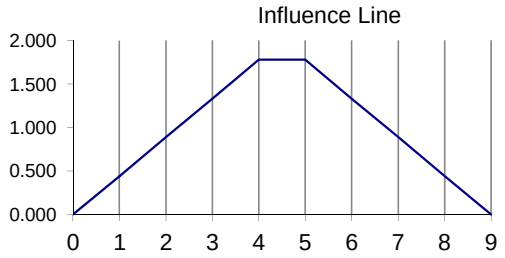
Influence Diagram, *Location* U4-U5, *STAAD Beam* 14

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.440	0.890	1.330	1.780	1.780	1.330	0.890	0.440	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*
Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	200.000 ft	230.000 ft	244.000 ft	Axle Loc.	74.160 ft	104.160 ft	60.160 ft
Infl. Force	0.000	0.000	0.000	Infl. Force	1.780	1.502	1.440
Load	0.0 k	0.0 k	0.0 k	Load	57.0 k	48.1 k	11.5 k
Total Load =	***0.0 k***	*(w/ dist. & impact)*		*Total Load =*	***127.1 k***	*(w/ dist. & impact)*	

Maximum Tension= ***0.0 k*** *(COMPRESSION)* ***Maximum Compression=*** ***127.1 k*** *(COMPRESSION)*

COMP. BY PMP | SHEET ____ OF ____

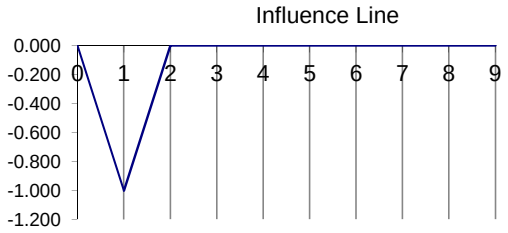
CHECK BY ____ | DATE 5/25/2012

PROJ. NAME & LOC. SEWALL'S FALLS | PROJ. NO 23968

SUBJECT: EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE

Influence Diagram, *Location* L1-U1, *STAAD Beam* 19

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

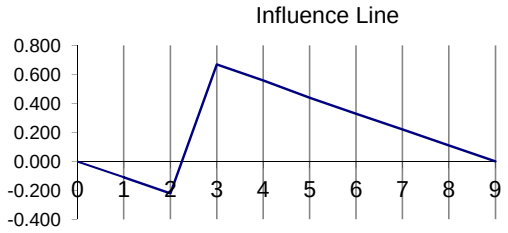
TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	18.540 ft	48.540 ft	4.540 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-1.000	0.000	-0.245	Infl. Force	0.000	0.000	0.000
Load	-32.0 k	0.0 k	-2.0 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-37.0 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-37.0 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

COMP. BY	PMP	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE		

Influence Diagram, *Location* L2-U2, *STAAD Beam* 20

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.110	-0.220	0.670	0.560	0.440	0.330	0.220	0.110	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	37.080 ft	7.080 ft	-6.920 ft	Axle Loc.	55.620 ft	85.620 ft	99.620 ft
Infl. Force	-0.220	-0.042	0.000	Infl. Force	0.670	0.486	0.399
Load	-7.0 k	-1.3 k	0.0 k	Load	21.4 k	15.5 k	3.2 k
Total Load =	***-9.1 k***	*(w/ dist. & impact)*		*Total Load =*	***43.8 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-9.1 k*** *(TENSION)* ***Maximum Compression=*** ***43.8 k*** *(COMPRESSION)*

COMP. BY	PMP	SHEET	OF
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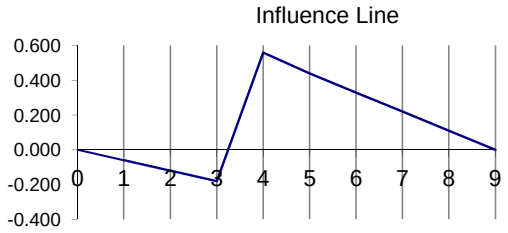
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE		

Influence Diagram, *Location* L3-U3, *STAAD Beam* 21

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.542	37.084	55.626	74.168	92.710	111.252	129.794	148.336	166.878
Force	0.000	-0.060	-0.120	-0.180	0.560	0.440	0.330	0.220	0.110	0.000



Panel Width = *18.54 ft* Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* Impact Factor = *1.33*

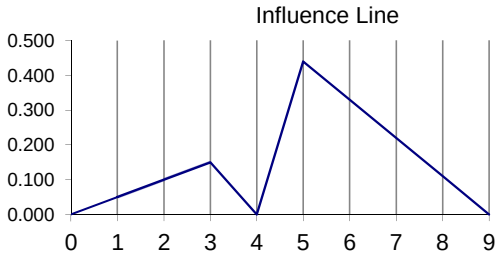
TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	55.626 ft	25.626 ft	11.626 ft	Axle Loc.	74.168 ft	104.168 ft	118.168 ft
Infl. Force	-0.180	-0.083	-0.038	Infl. Force	0.560	0.372	0.289
Load	-5.8 k	-2.7 k	-0.3 k	Load	17.9 k	11.9 k	2.3 k
Total Load =	***-9.5 k***	*(w/ dist. & impact)*		*Total Load =*	***35.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-9.5 k*** *(TENSION)* ***Maximum Compression=*** ***35.0 k*** *(COMPRESSION)*

COMP. BY	PMP	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE		

Influence Diagram, *Location* L4-U4, *STAAD Beam* 22

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.050	0.100	0.150	0.000	0.440	0.330	0.220	0.110	0.000



Panel Width = *18.54 ft* Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* Impact Factor = *1.33*

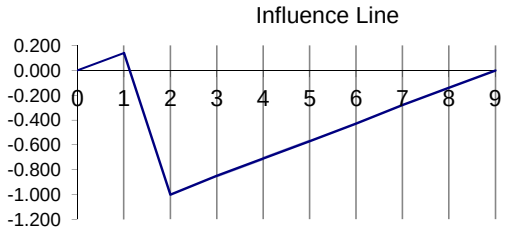
TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	200.000 ft	230.000 ft	244.000 ft	Axle Loc.	92.700 ft	122.700 ft	136.700 ft
Infl. Force	0.000	0.000	0.000	Infl. Force	0.440	0.262	0.179
Load	0.0 k	0.0 k	0.0 k	Load	14.1 k	8.4 k	1.4 k
Total Load =	***0.0 k***	*(w/ dist. & impact)*		*Total Load =*	***26.1 k***	*(w/ dist. & impact)*	

Maximum Tension= ***0.0 k*** *(COMPRESSION)* ***Maximum Compression=*** ***26.1 k*** *(COMPRESSION)*

COMP. BY	PMP	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE		

Influence Diagram, *Location* L2-U1, *STAAD Beam* 27

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.140	-1.000	-0.850	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	37.080 ft	67.080 ft	81.080 ft	Axle Loc.	18.540 ft	-11.460 ft	-2.540 ft
Infl. Force	-1.000	-0.763	-0.658	Infl. Force	0.140	0.000	0.000
Load	-32.0 k	-24.4 k	-5.3 k	Load	4.5 k	0.0 k	0.0 k
Total Load =	***-67.3 k***	*(w/ dist. & impact)*		*Total Load =*	***4.9 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-67.3 k*** *(TENSION)* ***Maximum Compression=*** ***4.9 k*** *(COMPRESSION)*

COMP. BY PMP | SHEET ____ OF ____
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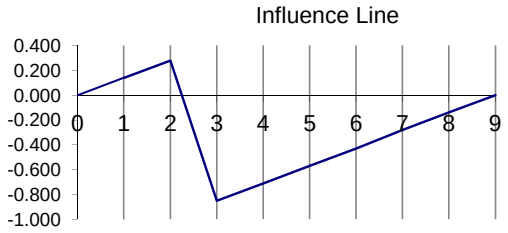
PROJ. NAME & LOC. SEWALL'S FALLS | PROJ. NO 23968
SUBJECT: EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE

Influence Diagram, *Location* L3-U2, *STAAD Beam* 28

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.140	0.280	-0.850	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*
Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

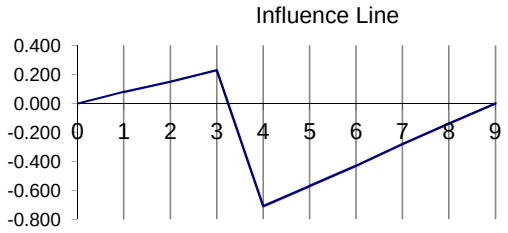
TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	55.620 ft	85.620 ft	99.620 ft	Axle Loc.	37.080 ft	7.080 ft	-6.920 ft
Infl. Force	-0.850	-0.623	-0.518	Infl. Force	0.280	0.053	0.000
Load	-27.2 k	-20.0 k	-4.1 k	Load	9.0 k	1.7 k	0.0 k
Total Load =	***-55.9 k***	*(w/ dist. & impact)*		*Total Load =*	***11.6 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-55.9 k*** *(TENSION)* ***Maximum Compression=*** ***11.6 k*** *(COMPRESSION)*

COMP. BY PMP | SHEET ____ OF ____
CHECK BY ____ | DATE 5/25/2012
PROJ. NAME & LOC. SEWALL'S FALLS | PROJ. NO 23968
SUBJECT: EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE

Influence Diagram, *Location* L4-U3, *STAAD Beam* 29

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.080	0.150	0.230	-0.710	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*
Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

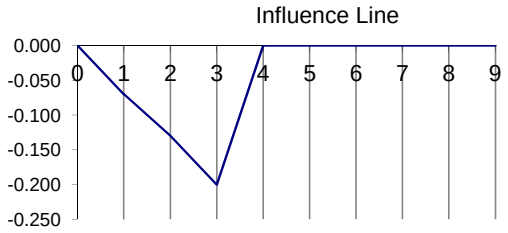
TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	74.160 ft	104.160 ft	118.160 ft	Axle Loc.	55.620 ft	25.620 ft	11.620 ft
Infl. Force	-0.710	-0.483	-0.374	Infl. Force	0.230	0.107	0.050
Load	-22.7 k	-15.5 k	-3.0 k	Load	7.4 k	3.4 k	0.4 k
Total Load =	***-44.9 k***	*(w/ dist. & impact)*		*Total Load =*	***12.2 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-44.9 k*** *(TENSION)* ***Maximum Compression=*** ***12.2 k*** *(COMPRESSION)*

COMP. BY	PMP	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE		

Influence Diagram, *Location* L3-U4, *STAAD Beam* 30

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.070	-0.130	-0.200	0.000	0.000	0.000	0.000	0.000	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	55.620 ft	25.620 ft	69.620 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-0.200	-0.093	-0.049	Infl. Force	0.000	0.000	0.000
Load	-6.4 k	-3.0 k	-0.4 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-10.6 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-10.6 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

COMP. BY PMP | SHEET ____ OF ____

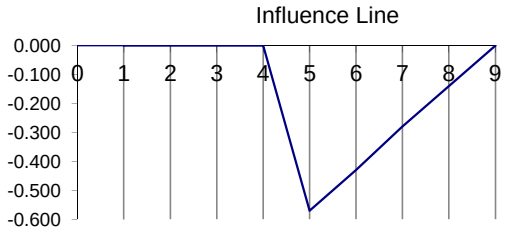
CHECK BY ____ | DATE 5/25/2012

PROJ. NAME & LOC. SEWALL'S FALLS | PROJ. NO 23968

SUBJECT: EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE

Influence Diagram, *Location* L5-U4, *STAAD Beam* 31

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	0.000	0.000	0.000	0.000	-0.570	-0.430	-0.280	-0.140	0.000



Panel Width = *18.54 ft* | Distribution Factor = *0.82*

Lane Load = *0.640 k/ft* | Impact Factor = *1.33*

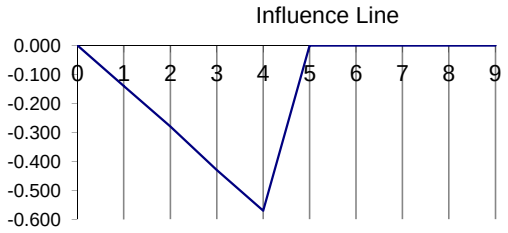
TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	92.700 ft	122.700 ft	136.700 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-0.570	-0.337	-0.228	Infl. Force	0.000	0.000	0.000
Load	-18.2 k	-10.8 k	-1.8 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-33.7 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-33.7 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

COMP. BY	PMP	SHEET	OF
CHECK BY		DATE	5/25/2012
PROJ. NAME & LOC.	SEWALL'S FALLS	PROJ. NO	23968
SUBJECT:	EXISTING TRUSS MEMBER AXIAL LIVE LOAD CALCULATION FATIGUE		

Influence Diagram, *Location* L4-U5, *STAAD Beam* 32

Joint	0	1	2	3	4	5	6	7	8	9
Dist.	0.0	18.540	37.080	55.620	74.160	92.700	111.240	129.780	148.320	166.860
Force	0.000	-0.140	-0.280	-0.430	-0.570	0.000	0.000	0.000	0.000	0.000



Panel Width =	*18.54 ft*	Distribution Factor =	*0.82*
Lane Load =	*0.640 k/ft*	Impact Factor =	*1.33*

TRUCK TENSION				***TRUCK COMPRESSION***			
Axle	1	2	3	Axle	1	2	3
Axle Load	32.0 k	32.0 k	8.0 k	Axle Load	32.0 k	32.0 k	8.0 k
Spacing	0.00 ft	30.00 ft	14.00 ft	Spacing	0.00 ft	30.00 ft	14.00 ft
Axle Loc.	74.160 ft	44.160 ft	30.160 ft	Axle Loc.	200.000 ft	230.000 ft	244.000 ft
Infl. Force	-0.570	-0.337	-0.228	Infl. Force	0.000	0.000	0.000
Load	-18.2 k	-10.8 k	-1.8 k	Load	0.0 k	0.0 k	0.0 k
Total Load =	***-33.7 k***	*(w/ dist. & impact)*		*Total Load =*	***0.0 k***	*(w/ dist. & impact)*	

Maximum Tension= ***-33.7 k*** *(TENSION)* ***Maximum Compression=*** ***0.0 k*** *(COMPRESSION)*

STAAD OUTPUT

DEAD LOADS
(No Sidewalk)

```
**************************************************
*                                                *
*           STAAD.Pro V8i SELECTseries2          *
*           Version  20.07.07.32                 *
*           Proprietary Program of               *
*           Bentley Systems, Inc.                *
*           Date=    MAY 18, 2012                *
*           Time=    11:18:45                    *
*                                                *
*      USER ID: Clough Harbour _Associates LLP    *
**************************************************
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```
     1. STAAD PLANE
INPUT FILE: Sewalls Falls DC.STD
     2. START JOB INFORMATION
     3. ENGINEER DATE 02-MAY-12
     4. JOB NAME SEWALL'S FALLS
     5. JOB NO 23968
     6. ENGINEER NAME XL
     7. END JOB INFORMATION
     8. INPUT WIDTH 79
     9. UNIT FEET KIP
    10. JOINT COORDINATES
    11. 1 0 0 0; 2 18.542 0 0; 3 37.084 0 0; 4 55.626 0 0; 5 74.168 0 0; 6 92.71 0 0
    12. 7 111.252 0 0; 8 129.794 0 0; 9 148.336 0 0; 10 166.878 0 0; 11 18.542 23.21 0
    13. 12 37.084 23.21 0; 13 55.626 23.21 0; 14 74.168 23.21 0; 15 92.71 23.21 0
    14. 16 111.252 23.21 0; 17 129.794 23.21 0; 18 148.336 23.21 0
    15. MEMBER INCIDENCES
    16. 1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 5 6; 6 6 7; 7 7 8; 8 8 9; 9 9 10; 10 1 11
    17. 11 11 12; 12 12 13; 13 13 14; 14 14 15; 15 15 16; 16 16 17; 17 17 18; 18 18 10
    18. 19 11 2; 20 12 3; 21 13 4; 22 14 5; 23 15 6; 24 16 7; 25 17 8; 26 18 9
    19. 27 11 3; 28 12 4; 29 13 5; 30 14 4; 31 14 6; 32 15 5; 33 15 7; 34 16 6
    20. 35 17 7; 36 18 8
    21. UNIT INCHES KIP
    22. DEFINE MATERIAL START
    23. ISOTROPIC STEEL
    24. E 29000
    25. POISSON 0.3
    26. DENSITY 0.000283
    27. ALPHA 6E-006
    28. DAMP 0.03
    29. TYPE STEEL
    30. STRENGTH FY 36 FU 58 RY 1.5 RT 1.2
    31. END DEFINE MATERIAL
    32. MEMBER PROPERTY AMERICAN
    33. 1 2 8 9 PRIS AX 9.6
    34. 3 7 PRIS AX 17.12
    35. 4 6 PRIS AX 22.37
    36. 5 PRIS AX 24.25
    37. 10 18 PRIS AX 21.43
    38. 11 17 PRIS AX 18.91
    39. 12 16 PRIS AX 24.37
    40. 13 TO 15 PRIS AX 27.35
```

```
41. 19 26 PRIS AX 7.12
42. 20 25 PRIS AX 11.44
43. 21 TO 24 PRIS AX 9.6
44. 27 36 PRIS AX 11.48
45. 28 35 PRIS AX 8.36
46. 29 34 PRIS AX 4.8
47. 30 TO 33 PRIS AX 3.56
48. CONSTANTS
49. MATERIAL STEEL ALL
50. UNIT FEET KIP
51. SUPPORTS
52. 10 PINNED
53. 1 FIXED BUT FX MZ
54. MEMBER TRUSS
55. 1 TO 36
56. LOAD 1 LOADTYPE DEAD  TITLE LOAD CASE 1
57. JOINT LOAD
58. 1 10 FY -10.12
59. 2 9 FY -16.92
60. 3 8 FY -18.47
61. 4 7 FY -18.67
62. 5 6 FY -18.65
63. 11 18 FY -3.79
64. 12 17 FY -3.22
65. 13 16 FY -3.07
66. 14 15 FY -3.2
67. PERFORM ANALYSIS PRINT STATICS CHECK
```

P R O B L E M S T A T I S T I C S

```
NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS =    18/    36/     2

      SOLVER USED IS THE OUT-OF-CORE BASIC SOLVER

ORIGINAL/FINAL BAND-WIDTH=    10/     3/     12 DOF
TOTAL PRIMARY LOAD CASES =    1, TOTAL DEGREES OF FREEDOM =     51
SIZE OF STIFFNESS MATRIX =        1 DOUBLE  KILO-WORDS
REQRD/AVAIL. DISK SPACE  =     12.1/  29025.8 MB
```

```
 STAAD PLANE                                              -- PAGE NO.    3

 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      1 EQN.NO.       2
       LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
       THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
       EFFECTIVELY RELEASED IN THIS DIRECTION.
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       5
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       8
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      11
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      14
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      17
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      20
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      23
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      26
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      29
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      32
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      35

**WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     18



       STATIC LOAD/REACTION/EQUILIBRIUM SUMMARY FOR CASE NO.     1
       LOADTYPE DEAD  TITLE LOAD CASE 1


        CENTER OF FORCE BASED ON Y FORCES ONLY (FEET).
      (FORCES IN NON-GLOBAL DIRECTIONS WILL INVALIDATE RESULTS)

                     X =  0.834390027E+02
                     Y =  0.320704193E+01
                     Z =  0.000000000E+00

***TOTAL APPLIED LOAD ( KIP  FEET ) SUMMARY (LOADING     1 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =        -192.22
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=      -16038.64


***TOTAL REACTION LOAD( KIP  FEET ) SUMMARY (LOADING     1 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =         192.22
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=       16038.64
```

```
MAXIMUM DISPLACEMENTS ( INCH /RADIANS) (LOADING      1)
          MAXIMUMS    AT NODE
   X = -4.94409E-01       1
   Y = -1.22420E+00       6
   Z =  0.00000E+00       0
   RX=  0.00000E+00       0
   RY=  0.00000E+00       0
   RZ=  0.00000E+00       0


************ END OF DATA FROM INTERNAL STORAGE ************


 68. PRINT MEMBER FORCES
```

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	1	1	-68.70	0.00	0.00	0.00	0.00	0.00
		2	68.70	0.00	0.00	0.00	0.00	0.00
2	1	2	-68.70	0.00	0.00	0.00	0.00	0.00
		3	68.70	0.00	0.00	0.00	0.00	0.00
3	1	3	-120.85	0.00	0.00	0.00	0.00	0.00
		4	120.85	0.00	0.00	0.00	0.00	0.00
4	1	4	-163.31	0.00	0.00	0.00	0.00	0.00
		5	163.31	0.00	0.00	0.00	0.00	0.00
5	1	5	-172.09	0.00	0.00	0.00	0.00	0.00
		6	172.09	0.00	0.00	0.00	0.00	0.00
6	1	6	-163.31	0.00	0.00	0.00	0.00	0.00
		7	163.31	0.00	0.00	0.00	0.00	0.00
7	1	7	-120.85	0.00	0.00	0.00	0.00	0.00
		8	120.85	0.00	0.00	0.00	0.00	0.00
8	1	8	-68.70	0.00	0.00	0.00	0.00	0.00
		9	68.70	0.00	0.00	0.00	0.00	0.00
9	1	9	-68.70	0.00	0.00	0.00	0.00	0.00
		10	68.70	0.00	0.00	0.00	0.00	0.00
10	1	1	110.06	0.00	0.00	0.00	0.00	0.00
		11	-110.06	0.00	0.00	0.00	0.00	0.00
11	1	11	120.85	0.00	0.00	0.00	0.00	0.00
		12	-120.85	0.00	0.00	0.00	0.00	0.00
12	1	12	155.67	0.00	0.00	0.00	0.00	0.00
		13	-155.67	0.00	0.00	0.00	0.00	0.00
13	1	13	165.48	0.00	0.00	0.00	0.00	0.00
		14	-165.48	0.00	0.00	0.00	0.00	0.00
14	1	14	174.16	0.00	0.00	0.00	0.00	0.00
		15	-174.16	0.00	0.00	0.00	0.00	0.00
15	1	15	165.48	0.00	0.00	0.00	0.00	0.00
		16	-165.48	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
16	1	16	155.67	0.00	0.00	0.00	0.00	0.00
		17	-155.67	0.00	0.00	0.00	0.00	0.00
17	1	17	120.85	0.00	0.00	0.00	0.00	0.00
		18	-120.85	0.00	0.00	0.00	0.00	0.00
18	1	18	110.06	0.00	0.00	0.00	0.00	0.00
		10	-110.06	0.00	0.00	0.00	0.00	0.00
19	1	11	-16.92	0.00	0.00	0.00	0.00	0.00
		2	16.92	0.00	0.00	0.00	0.00	0.00
20	1	12	46.81	0.00	0.00	0.00	0.00	0.00
		3	-46.81	0.00	0.00	0.00	0.00	0.00
21	1	13	15.35	0.00	0.00	0.00	0.00	0.00
		4	-15.35	0.00	0.00	0.00	0.00	0.00
22	1	14	-5.08	0.00	0.00	0.00	0.00	0.00
		5	5.08	0.00	0.00	0.00	0.00	0.00
23	1	15	-5.08	0.00	0.00	0.00	0.00	0.00
		6	5.08	0.00	0.00	0.00	0.00	0.00
24	1	16	15.35	0.00	0.00	0.00	0.00	0.00
		7	-15.35	0.00	0.00	0.00	0.00	0.00
25	1	17	46.81	0.00	0.00	0.00	0.00	0.00
		8	-46.81	0.00	0.00	0.00	0.00	0.00
26	1	18	-16.92	0.00	0.00	0.00	0.00	0.00
		9	16.92	0.00	0.00	0.00	0.00	0.00
27	1	11	-83.55	0.00	0.00	0.00	0.00	0.00
		3	83.55	0.00	0.00	0.00	0.00	0.00
28	1	12	-55.79	0.00	0.00	0.00	0.00	0.00
		4	55.79	0.00	0.00	0.00	0.00	0.00
29	1	13	-15.72	0.00	0.00	0.00	0.00	0.00
		5	15.72	0.00	0.00	0.00	0.00	0.00
30	1	14	12.25	0.00	0.00	0.00	0.00	0.00
		4	-12.25	0.00	0.00	0.00	0.00	0.00
31	1	14	-1.65	0.00	0.00	0.00	0.00	0.00
		6	1.65	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
32	1	15	-1.65	0.00	0.00	0.00	0.00	0.00
		5	1.65	0.00	0.00	0.00	0.00	0.00
33	1	15	12.25	0.00	0.00	0.00	0.00	0.00
		7	-12.25	0.00	0.00	0.00	0.00	0.00
34	1	16	-15.72	0.00	0.00	0.00	0.00	0.00
		6	15.72	0.00	0.00	0.00	0.00	0.00
35	1	17	-55.79	0.00	0.00	0.00	0.00	0.00
		7	55.79	0.00	0.00	0.00	0.00	0.00
36	1	18	-83.55	0.00	0.00	0.00	0.00	0.00
		8	83.55	0.00	0.00	0.00	0.00	0.00

********** END OF LATEST ANALYSIS RESULT **********

69. FINISH

********** END OF THE STAAD.Pro RUN **********

**** DATE= MAY 18,2012 TIME= 11:18:47 ****

```
**************************************************************
*        For questions on STAAD.Pro, please contact          *
*        Bentley Systems or Partner offices                  *
*                                                            *
*            Telephone             Web / Email               *
*  USA       +1  (714) 974-2500                              *
*  UK        +44 (0) 808 101 9246                            *
*  SINGAPORE +65 6225-6158                                   *
*  FRANCE    +33 (0) 1 55238400                              *
*  GERMANY   +49 0931 40468                                  *
*  INDIA     +91 (033) 4006-2021                             *
*  JAPAN     +81 (03)5952-6500    http://www.ctc-g.co.jp     *
*  CHINA     +86 21 6288 4040                                *
*  THAILAND  +66 (0)2645-1018/19 partha.p@reisoftwareth.com*
*                                                            *
*  Worldwide  http://selectservices.bentley.com/en-US/       *
*                                                            *
**************************************************************
```

DEAD LOADS
(With Sidewalk)

```
**************************************************
*                                                *
*           STAAD.Pro V8i SELECTseries2          *
*           Version  20.07.07.32                 *
*           Proprietary Program of               *
*           Bentley Systems, Inc.                *
*           Date=    MAY 24, 2012                *
*           Time=    16:12: 2                    *
*                                                *
*      USER ID: Clough Harbour _Associates LLP    *
**************************************************
```

```
     1. STAAD PLANE
INPUT FILE: Sewalls Falls DC+sidewalk.STD
     2. START JOB INFORMATION
     3. ENGINEER DATE 02-MAY-12
     4. JOB NAME SEWALL'S FALLS
     5. JOB NO 23968
     6. ENGINEER NAME XL
     7. END JOB INFORMATION
     8. INPUT WIDTH 79
     9. UNIT FEET KIP
    10. JOINT COORDINATES
    11. 1 0 0 0; 2 18.542 0 0; 3 37.084 0 0; 4 55.626 0 0; 5 74.168 0 0; 6 92.71 0 0
    12. 7 111.252 0 0; 8 129.794 0 0; 9 148.336 0 0; 10 166.878 0 0; 11 18.542 23.21 0
    13. 12 37.084 23.21 0; 13 55.626 23.21 0; 14 74.168 23.21 0; 15 92.71 23.21 0
    14. 16 111.252 23.21 0; 17 129.794 23.21 0; 18 148.336 23.21 0
    15. MEMBER INCIDENCES
    16. 1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 5 6; 6 6 7; 7 7 8; 8 8 9; 9 9 10; 10 1 11
    17. 11 11 12; 12 12 13; 13 13 14; 14 14 15; 15 15 16; 16 16 17; 17 17 18; 18 18 10
    18. 19 11 2; 20 12 3; 21 13 4; 22 14 5; 23 15 6; 24 16 7; 25 17 8; 26 18 9
    19. 27 11 3; 28 12 4; 29 13 5; 30 14 4; 31 14 6; 32 15 5; 33 15 7; 34 16 6
    20. 35 17 7; 36 18 8
    21. UNIT INCHES KIP
    22. DEFINE MATERIAL START
    23. ISOTROPIC STEEL
    24. E 29000
    25. POISSON 0.3
    26. DENSITY 0.000283
    27. ALPHA 6E-006
    28. DAMP 0.03
    29. TYPE STEEL
    30. STRENGTH FY 36 FU 58 RY 1.5 RT 1.2
    31. END DEFINE MATERIAL
    32. MEMBER PROPERTY AMERICAN
    33. 1 2 8 9 PRIS AX 9.6
    34. 3 7 PRIS AX 17.12
    35. 4 6 PRIS AX 22.37
    36. 5 PRIS AX 24.25
    37. 10 18 PRIS AX 21.43
    38. 11 17 PRIS AX 18.91
    39. 12 16 PRIS AX 24.37
    40. 13 TO 15 PRIS AX 27.35
```

```
41. 19 26 PRIS AX 7.12
42. 20 25 PRIS AX 11.44
43. 21 TO 24 PRIS AX 9.6
44. 27 36 PRIS AX 11.48
45. 28 35 PRIS AX 8.36
46. 29 34 PRIS AX 4.8
47. 30 TO 33 PRIS AX 3.56
48. CONSTANTS
49. MATERIAL STEEL ALL
50. UNIT FEET KIP
51. SUPPORTS
52. 10 PINNED
53. 1 FIXED BUT FX MZ
54. MEMBER TRUSS
55. 1 TO 36
56. LOAD 1 LOADTYPE DEAD  TITLE LOAD CASE 1
57. JOINT LOAD
58. 1 10 FY -10.12
59. 2 9 FY -16.92
60. 3 8 FY -18.47
61. 4 7 FY -18.67
62. 5 6 FY -18.65
63. 11 18 FY -3.79
64. 12 17 FY -3.22
65. 13 16 FY -3.07
66. 14 15 FY -3.2
67. LOAD 2 LOADTYPE DEAD  TITLE LOAD CASE 2
68. JOINT LOAD
69. 1 10 FY -2.04
70. 2 TO 9 FY -3.7
71. LOAD COMB 3 COMBINATION LOAD CASE 3
72. 1 1.0 2 1.0
73. PERFORM ANALYSIS PRINT STATICS CHECK
```

P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 18/ 36/ 2

SOLVER USED IS THE OUT-OF-CORE BASIC SOLVER

```
ORIGINAL/FINAL BAND-WIDTH=    10/     3/     12 DOF
TOTAL PRIMARY LOAD CASES =    2, TOTAL DEGREES OF FREEDOM =     51
SIZE OF STIFFNESS MATRIX =        1 DOUBLE  KILO-WORDS
REQRD/AVAIL. DISK SPACE  =     12.1/  22009.9 MB
```

```
 STAAD PLANE                                              -- PAGE NO.    3

 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      1 EQN.NO.       2
       LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
       THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
       EFFECTIVELY RELEASED IN THIS DIRECTION.
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       5
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       8
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      11
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      14
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      17
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      20
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      23
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      26
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      29
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      32
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      35

**WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     18



       STATIC LOAD/REACTION/EQUILIBRIUM SUMMARY FOR CASE NO.     1
       LOADTYPE DEAD  TITLE LOAD CASE 1


        CENTER OF FORCE BASED ON Y FORCES ONLY (FEET).
      (FORCES IN NON-GLOBAL DIRECTIONS WILL INVALIDATE RESULTS)

                     X =  0.834390027E+02
                     Y =  0.320704193E+01
                     Z =  0.000000000E+00

***TOTAL APPLIED LOAD ( KIP  FEET ) SUMMARY (LOADING     1 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =        -192.22
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=      -16038.64


***TOTAL REACTION LOAD( KIP  FEET ) SUMMARY (LOADING     1 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =         192.22
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=       16038.64
```

```
MAXIMUM DISPLACEMENTS ( INCH /RADIANS) (LOADING      1)
          MAXIMUMS    AT NODE
   X = -4.94409E-01       1
   Y = -1.22420E+00       6
   Z =  0.00000E+00       0
   RX=  0.00000E+00       0
   RY=  0.00000E+00       0
   RZ=  0.00000E+00       0


       STATIC LOAD/REACTION/EQUILIBRIUM SUMMARY FOR CASE NO.     2
       LOADTYPE DEAD  TITLE LOAD CASE 2


        CENTER OF FORCE BASED ON Y FORCES ONLY (FEET).
      (FORCES IN NON-GLOBAL DIRECTIONS WILL INVALIDATE RESULTS)

                     X =  0.834390027E+02
                     Y =  0.000000000E+00
                     Z =  0.000000000E+00

***TOTAL APPLIED LOAD ( KIP  FEET ) SUMMARY (LOADING     2 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =         -33.68
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=       -2810.23


***TOTAL REACTION LOAD( KIP  FEET ) SUMMARY (LOADING     2 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =          33.68
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=        2810.23


MAXIMUM DISPLACEMENTS ( INCH /RADIANS) (LOADING      2)
          MAXIMUMS    AT NODE
   X = -8.47155E-02       1
   Y = -2.08501E-01       6
   Z =  0.00000E+00       0
   RX=  0.00000E+00       0
   RY=  0.00000E+00       0
   RZ=  0.00000E+00       0



************ END OF DATA FROM INTERNAL STORAGE ************


 74. LOAD LIST 3
 75. PRINT MEMBER FORCES
```

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	3	1	-80.52	0.00	0.00	0.00	0.00	0.00
		2	80.52	0.00	0.00	0.00	0.00	0.00
2	3	2	-80.52	0.00	0.00	0.00	0.00	0.00
		3	80.52	0.00	0.00	0.00	0.00	0.00
3	3	3	-141.54	0.00	0.00	0.00	0.00	0.00
		4	141.54	0.00	0.00	0.00	0.00	0.00
4	3	4	-191.15	0.00	0.00	0.00	0.00	0.00
		5	191.15	0.00	0.00	0.00	0.00	0.00
5	3	5	-201.42	0.00	0.00	0.00	0.00	0.00
		6	201.42	0.00	0.00	0.00	0.00	0.00
6	3	6	-191.15	0.00	0.00	0.00	0.00	0.00
		7	191.15	0.00	0.00	0.00	0.00	0.00
7	3	7	-141.54	0.00	0.00	0.00	0.00	0.00
		8	141.54	0.00	0.00	0.00	0.00	0.00
8	3	8	-80.52	0.00	0.00	0.00	0.00	0.00
		9	80.52	0.00	0.00	0.00	0.00	0.00
9	3	9	-80.52	0.00	0.00	0.00	0.00	0.00
		10	80.52	0.00	0.00	0.00	0.00	0.00
10	3	1	129.00	0.00	0.00	0.00	0.00	0.00
		11	-129.00	0.00	0.00	0.00	0.00	0.00
11	3	11	141.54	0.00	0.00	0.00	0.00	0.00
		12	-141.54	0.00	0.00	0.00	0.00	0.00
12	3	12	182.27	0.00	0.00	0.00	0.00	0.00
		13	-182.27	0.00	0.00	0.00	0.00	0.00
13	3	13	193.81	0.00	0.00	0.00	0.00	0.00
		14	-193.81	0.00	0.00	0.00	0.00	0.00
14	3	14	203.95	0.00	0.00	0.00	0.00	0.00
		15	-203.95	0.00	0.00	0.00	0.00	0.00
15	3	15	193.81	0.00	0.00	0.00	0.00	0.00
		16	-193.81	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
16	3	16	182.27	0.00	0.00	0.00	0.00	0.00
		17	-182.27	0.00	0.00	0.00	0.00	0.00
17	3	17	141.54	0.00	0.00	0.00	0.00	0.00
		18	-141.54	0.00	0.00	0.00	0.00	0.00
18	3	18	129.00	0.00	0.00	0.00	0.00	0.00
		10	-129.00	0.00	0.00	0.00	0.00	0.00
19	3	11	-20.62	0.00	0.00	0.00	0.00	0.00
		2	20.62	0.00	0.00	0.00	0.00	0.00
20	3	12	54.21	0.00	0.00	0.00	0.00	0.00
		3	-54.21	0.00	0.00	0.00	0.00	0.00
21	3	13	17.51	0.00	0.00	0.00	0.00	0.00
		4	-17.51	0.00	0.00	0.00	0.00	0.00
22	3	14	-6.33	0.00	0.00	0.00	0.00	0.00
		5	6.33	0.00	0.00	0.00	0.00	0.00
23	3	15	-6.33	0.00	0.00	0.00	0.00	0.00
		6	6.33	0.00	0.00	0.00	0.00	0.00
24	3	16	17.51	0.00	0.00	0.00	0.00	0.00
		7	-17.51	0.00	0.00	0.00	0.00	0.00
25	3	17	54.21	0.00	0.00	0.00	0.00	0.00
		8	-54.21	0.00	0.00	0.00	0.00	0.00
26	3	18	-20.62	0.00	0.00	0.00	0.00	0.00
		9	20.62	0.00	0.00	0.00	0.00	0.00
27	3	11	-97.76	0.00	0.00	0.00	0.00	0.00
		3	97.76	0.00	0.00	0.00	0.00	0.00
28	3	12	-65.26	0.00	0.00	0.00	0.00	0.00
		4	65.26	0.00	0.00	0.00	0.00	0.00
29	3	13	-18.48	0.00	0.00	0.00	0.00	0.00
		5	18.48	0.00	0.00	0.00	0.00	0.00
30	3	14	14.22	0.00	0.00	0.00	0.00	0.00
		4	-14.22	0.00	0.00	0.00	0.00	0.00
31	3	14	-2.02	0.00	0.00	0.00	0.00	0.00
		6	2.02	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
32	3	15	-2.02	0.00	0.00	0.00	0.00	0.00
		5	2.02	0.00	0.00	0.00	0.00	0.00
33	3	15	14.22	0.00	0.00	0.00	0.00	0.00
		7	-14.22	0.00	0.00	0.00	0.00	0.00
34	3	16	-18.48	0.00	0.00	0.00	0.00	0.00
		6	18.48	0.00	0.00	0.00	0.00	0.00
35	3	17	-65.26	0.00	0.00	0.00	0.00	0.00
		7	65.26	0.00	0.00	0.00	0.00	0.00
36	3	18	-97.76	0.00	0.00	0.00	0.00	0.00
		8	97.76	0.00	0.00	0.00	0.00	0.00

********** END OF LATEST ANALYSIS RESULT **********

76. FINISH

********** END OF THE STAAD.Pro RUN **********

**** DATE= MAY 24,2012 TIME= 16:12: 5 ****

```
************************************************************
*        For questions on STAAD.Pro, please contact        *
*        Bentley Systems or Partner offices                *
*                                                          *
*            Telephone             Web / Email             *
*  USA       +1  (714) 974-2500                            *
*  UK        +44 (0) 808 101 9246                          *
*  SINGAPORE +65 6225-6158                                 *
*  FRANCE    +33 (0) 1 55238400                            *
*  GERMANY   +49 0931 40468                                *
*  INDIA     +91 (033) 4006-2021                           *
*  JAPAN     +81 (03)5952-6500    http://www.ctc-g.co.jp   *
*  CHINA     +86 21 6288 4040                              *
*  THAILAND  +66 (0)2645-1018/19 partha.p@reisoftwareth.com*
*                                                          *
*  Worldwide  http://selectservices.bentley.com/en-US/     *
*                                                          *
************************************************************
```

UTILITY LOADS

```
**************************************************
*                                                *
*           STAAD.Pro V8i SELECTseries2          *
*           Version  20.07.07.32                 *
*           Proprietary Program of               *
*           Bentley Systems, Inc.                *
*           Date=    MAY 18, 2012                *
*           Time=    11:32:28                    *
*                                                *
*      USER ID: Clough Harbour _Associates LLP    *
**************************************************
```

```
     1. STAAD PLANE
INPUT FILE: Sewalls Falls DW.STD
     2. START JOB INFORMATION
     3. ENGINEER DATE 02-MAY-12
     4. JOB NAME SEWALL'S FALLS
     5. JOB NO 23968
     6. ENGINEER NAME XL
     7. END JOB INFORMATION
     8. INPUT WIDTH 79
     9. UNIT FEET KIP
    10. JOINT COORDINATES
    11. 1 0 0 0; 2 18.542 0 0; 3 37.084 0 0; 4 55.626 0 0; 5 74.168 0 0; 6 92.71 0 0
    12. 7 111.252 0 0; 8 129.794 0 0; 9 148.336 0 0; 10 166.878 0 0; 11 18.542 23.21 0
    13. 12 37.084 23.21 0; 13 55.626 23.21 0; 14 74.168 23.21 0; 15 92.71 23.21 0
    14. 16 111.252 23.21 0; 17 129.794 23.21 0; 18 148.336 23.21 0
    15. MEMBER INCIDENCES
    16. 1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 5 6; 6 6 7; 7 7 8; 8 8 9; 9 9 10; 10 1 11
    17. 11 11 12; 12 12 13; 13 13 14; 14 14 15; 15 15 16; 16 16 17; 17 17 18; 18 18 10
    18. 19 11 2; 20 12 3; 21 13 4; 22 14 5; 23 15 6; 24 16 7; 25 17 8; 26 18 9
    19. 27 11 3; 28 12 4; 29 13 5; 30 14 4; 31 14 6; 32 15 5; 33 15 7; 34 16 6
    20. 35 17 7; 36 18 8
    21. UNIT INCHES KIP
    22. DEFINE MATERIAL START
    23. ISOTROPIC STEEL
    24. E 29000
    25. POISSON 0.3
    26. DENSITY 0.000283
    27. ALPHA 6E-006
    28. DAMP 0.03
    29. TYPE STEEL
    30. STRENGTH FY 36 FU 58 RY 1.5 RT 1.2
    31. END DEFINE MATERIAL
    32. MEMBER PROPERTY AMERICAN
    33. 1 2 8 9 PRIS AX 9.6
    34. 3 7 PRIS AX 17.12
    35. 4 6 PRIS AX 22.37
    36. 5 PRIS AX 24.25
    37. 10 18 PRIS AX 21.43
    38. 11 17 PRIS AX 18.91
    39. 12 16 PRIS AX 24.37
    40. 13 TO 15 PRIS AX 27.35
```

```
41. 19 26 PRIS AX 7.12
42. 20 25 PRIS AX 11.44
43. 21 TO 24 PRIS AX 9.6
44. 27 36 PRIS AX 11.48
45. 28 35 PRIS AX 8.36
46. 29 34 PRIS AX 4.8
47. 30 TO 33 PRIS AX 3.56
48. CONSTANTS
49. MATERIAL STEEL ALL
50. UNIT FEET KIP
51. SUPPORTS
52. 10 PINNED
53. 1 FIXED BUT FX
54. MEMBER TRUSS
55. 1 TO 36
56. LOAD 1 LOADTYPE DEAD  TITLE LOAD CASE 1
57. JOINT LOAD
58. 1 10 FY -0.69
59. 2 TO 9 FY -1.38
60. PERFORM ANALYSIS PRINT STATICS CHECK
```

P R O B L E M S T A T I S T I C S

```
NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS =    18/    36/     2

      SOLVER USED IS THE OUT-OF-CORE BASIC SOLVER

ORIGINAL/FINAL BAND-WIDTH=    10/     3/     12 DOF
TOTAL PRIMARY LOAD CASES =    1, TOTAL DEGREES OF FREEDOM =     50
SIZE OF STIFFNESS MATRIX =        1 DOUBLE  KILO-WORDS
REQRD/AVAIL. DISK SPACE  =     12.1/  29025.8 MB
```

```
 STAAD PLANE                                              -- PAGE NO.    3

 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
       LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
       THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
       EFFECTIVELY RELEASED IN THIS DIRECTION.
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
 ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

**WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17



       STATIC LOAD/REACTION/EQUILIBRIUM SUMMARY FOR CASE NO.     1
       LOADTYPE DEAD  TITLE LOAD CASE 1


        CENTER OF FORCE BASED ON Y FORCES ONLY (FEET).
      (FORCES IN NON-GLOBAL DIRECTIONS WILL INVALIDATE RESULTS)

                     X =  0.834390027E+02
                     Y =  0.000000000E+00
                     Z =  0.000000000E+00

***TOTAL APPLIED LOAD ( KIP  FEET ) SUMMARY (LOADING     1 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =         -12.42
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=       -1036.31


***TOTAL REACTION LOAD( KIP  FEET ) SUMMARY (LOADING     1 )
    SUMMATION FORCE-X =           0.00
    SUMMATION FORCE-Y =          12.42
    SUMMATION FORCE-Z =           0.00

   SUMMATION OF MOMENTS AROUND THE ORIGIN-
   MX=           0.00  MY=           0.00  MZ=        1036.31
```

```
MAXIMUM DISPLACEMENTS ( INCH /RADIANS) (LOADING      1)
          MAXIMUMS    AT NODE
   X = -3.15966E-02       1
   Y = -7.77651E-02       5
   Z =  0.00000E+00       0
   RX=  0.00000E+00       0
   RY=  0.00000E+00       0
   RZ=  0.00000E+00       0


************ END OF DATA FROM INTERNAL STORAGE ************


 61. PRINT MEMBER FORCES
```

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	1	1	-4.41	0.00	0.00	0.00	0.00	0.00
		2	4.41	0.00	0.00	0.00	0.00	0.00
2	1	2	-4.41	0.00	0.00	0.00	0.00	0.00
		3	4.41	0.00	0.00	0.00	0.00	0.00
3	1	3	-7.72	0.00	0.00	0.00	0.00	0.00
		4	7.72	0.00	0.00	0.00	0.00	0.00
4	1	4	-10.38	0.00	0.00	0.00	0.00	0.00
		5	10.38	0.00	0.00	0.00	0.00	0.00
5	1	5	-10.94	0.00	0.00	0.00	0.00	0.00
		6	10.94	0.00	0.00	0.00	0.00	0.00
6	1	6	-10.38	0.00	0.00	0.00	0.00	0.00
		7	10.38	0.00	0.00	0.00	0.00	0.00
7	1	7	-7.72	0.00	0.00	0.00	0.00	0.00
		8	7.72	0.00	0.00	0.00	0.00	0.00
8	1	8	-4.41	0.00	0.00	0.00	0.00	0.00
		9	4.41	0.00	0.00	0.00	0.00	0.00
9	1	9	-4.41	0.00	0.00	0.00	0.00	0.00
		10	4.41	0.00	0.00	0.00	0.00	0.00
10	1	1	7.07	0.00	0.00	0.00	0.00	0.00
		11	-7.07	0.00	0.00	0.00	0.00	0.00
11	1	11	7.72	0.00	0.00	0.00	0.00	0.00
		12	-7.72	0.00	0.00	0.00	0.00	0.00
12	1	12	9.92	0.00	0.00	0.00	0.00	0.00
		13	-9.92	0.00	0.00	0.00	0.00	0.00
13	1	13	10.57	0.00	0.00	0.00	0.00	0.00
		14	-10.57	0.00	0.00	0.00	0.00	0.00
14	1	14	11.11	0.00	0.00	0.00	0.00	0.00
		15	-11.11	0.00	0.00	0.00	0.00	0.00
15	1	15	10.57	0.00	0.00	0.00	0.00	0.00
		16	-10.57	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
16	1	16	9.92	0.00	0.00	0.00	0.00	0.00
		17	-9.92	0.00	0.00	0.00	0.00	0.00
17	1	17	7.72	0.00	0.00	0.00	0.00	0.00
		18	-7.72	0.00	0.00	0.00	0.00	0.00
18	1	18	7.07	0.00	0.00	0.00	0.00	0.00
		10	-7.07	0.00	0.00	0.00	0.00	0.00
19	1	11	-1.38	0.00	0.00	0.00	0.00	0.00
		2	1.38	0.00	0.00	0.00	0.00	0.00
20	1	12	2.76	0.00	0.00	0.00	0.00	0.00
		3	-2.76	0.00	0.00	0.00	0.00	0.00
21	1	13	0.81	0.00	0.00	0.00	0.00	0.00
		4	-0.81	0.00	0.00	0.00	0.00	0.00
22	1	14	-0.47	0.00	0.00	0.00	0.00	0.00
		5	0.47	0.00	0.00	0.00	0.00	0.00
23	1	15	-0.47	0.00	0.00	0.00	0.00	0.00
		6	0.47	0.00	0.00	0.00	0.00	0.00
24	1	16	0.81	0.00	0.00	0.00	0.00	0.00
		7	-0.81	0.00	0.00	0.00	0.00	0.00
25	1	17	2.76	0.00	0.00	0.00	0.00	0.00
		8	-2.76	0.00	0.00	0.00	0.00	0.00
26	1	18	-1.38	0.00	0.00	0.00	0.00	0.00
		9	1.38	0.00	0.00	0.00	0.00	0.00
27	1	11	-5.30	0.00	0.00	0.00	0.00	0.00
		3	5.30	0.00	0.00	0.00	0.00	0.00
28	1	12	-3.53	0.00	0.00	0.00	0.00	0.00
		4	3.53	0.00	0.00	0.00	0.00	0.00
29	1	13	-1.03	0.00	0.00	0.00	0.00	0.00
		5	1.03	0.00	0.00	0.00	0.00	0.00
30	1	14	0.73	0.00	0.00	0.00	0.00	0.00
		4	-0.73	0.00	0.00	0.00	0.00	0.00
31	1	14	-0.14	0.00	0.00	0.00	0.00	0.00
		6	0.14	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
32	1	15	-0.14	0.00	0.00	0.00	0.00	0.00
		5	0.14	0.00	0.00	0.00	0.00	0.00
33	1	15	0.73	0.00	0.00	0.00	0.00	0.00
		7	-0.73	0.00	0.00	0.00	0.00	0.00
34	1	16	-1.03	0.00	0.00	0.00	0.00	0.00
		6	1.03	0.00	0.00	0.00	0.00	0.00
35	1	17	-3.53	0.00	0.00	0.00	0.00	0.00
		7	3.53	0.00	0.00	0.00	0.00	0.00
36	1	18	-5.30	0.00	0.00	0.00	0.00	0.00
		8	5.30	0.00	0.00	0.00	0.00	0.00

********** END OF LATEST ANALYSIS RESULT **********

62. FINISH

********** END OF THE STAAD.Pro RUN **********

**** DATE= MAY 18,2012 TIME= 11:32:30 ****

```
************************************************************
*        For questions on STAAD.Pro, please contact        *
*        Bentley Systems or Partner offices                *
*                                                          *
*            Telephone             Web / Email             *
*  USA       +1  (714) 974-2500                            *
*  UK        +44 (0) 808 101 9246                          *
*  SINGAPORE +65 6225-6158                                 *
*  FRANCE    +33 (0) 1 55238400                            *
*  GERMANY   +49 0931 40468                                *
*  INDIA     +91 (033) 4006-2021                           *
*  JAPAN     +81 (03)5952-6500    http://www.ctc-g.co.jp   *
*  CHINA     +86 21 6288 4040                              *
*  THAILAND  +66 (0)2645-1018/19 partha.p@reisoftwareth.com*
*                                                          *
*  Worldwide  http://selectservices.bentley.com/en-US/     *
*                                                          *
************************************************************
```

LIVE LOAD

```
**************************************************
*                                                *
*           STAAD.Pro V8i SELECTseries2          *
*           Version  20.07.07.32                 *
*           Proprietary Program of               *
*           Bentley Systems, Inc.                *
*           Date=    MAY 18, 2012                *
*           Time=    11:38:17                    *
*                                                *
*      USER ID: Clough Harbour _Associates LLP    *
**************************************************
```

```
     1. STAAD PLANE
INPUT FILE: Sewalls Falls influence line tension only member.STD
     2. START JOB INFORMATION
     3. ENGINEER DATE 02-MAY-12
     4. JOB NAME SEWALL'S FALLS
     5. JOB NO 23968
     6. ENGINEER NAME XL
     7. END JOB INFORMATION
     8. INPUT WIDTH 79
     9. SET NL 10
    10. UNIT FEET KIP
    11. JOINT COORDINATES
    12. 1 0 0 0; 2 18.542 0 0; 3 37.084 0 0; 4 55.626 0 0; 5 74.168 0 0; 6 92.71 0 0
    13. 7 111.252 0 0; 8 129.794 0 0; 9 148.336 0 0; 10 166.878 0 0; 11 18.542 23.21 0
    14. 12 37.084 23.21 0; 13 55.626 23.21 0; 14 74.168 23.21 0; 15 92.71 23.21 0
    15. 16 111.252 23.21 0; 17 129.794 23.21 0; 18 148.336 23.21 0
    16. MEMBER INCIDENCES
    17. 1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 5 6; 6 6 7; 7 7 8; 8 8 9; 9 9 10; 10 1 11
    18. 11 11 12; 12 12 13; 13 13 14; 14 14 15; 15 15 16; 16 16 17; 17 17 18; 18 18 10
    19. 19 11 2; 20 12 3; 21 13 4; 22 14 5; 23 15 6; 24 16 7; 25 17 8; 26 18 9
    20. 27 11 3; 28 12 4; 29 13 5; 30 14 4; 31 14 6; 32 15 5; 33 15 7; 34 16 6
    21. 35 17 7; 36 18 8
    22. UNIT INCHES KIP
    23. DEFINE MATERIAL START
    24. ISOTROPIC STEEL
    25. E 29000
    26. POISSON 0.3
    27. DENSITY 0.000283
    28. ALPHA 6E-006
    29. DAMP 0.03
    30. TYPE STEEL
    31. STRENGTH FY 36 FU 58 RY 1.5 RT 1.2
    32. END DEFINE MATERIAL
    33. MEMBER PROPERTY AMERICAN
    34. 1 2 8 9 PRIS AX 9.6
    35. 3 7 PRIS AX 17.12
    36. 4 6 PRIS AX 22.37
    37. 5 PRIS AX 24.25
    38. 10 18 PRIS AX 21.43
    39. 11 17 PRIS AX 18.91
    40. 12 16 PRIS AX 24.37
```

```
41. 13 TO 15 PRIS AX 27.35
42. 19 26 PRIS AX 7.12
43. 20 25 PRIS AX 11.44
44. 21 TO 24 PRIS AX 9.6
45. 27 36 PRIS AX 11.48
46. 28 35 PRIS AX 8.36
47. 29 34 PRIS AX 4.8
48. 30 TO 33 PRIS AX 3.56
49. CONSTANTS
50. MATERIAL STEEL ALL
51. UNIT FEET KIP
52. SUPPORTS
53. 10 PINNED
54. 1 FIXED BUT FX
55. MEMBER TRUSS
56. 1 TO 36
57. MEMBER TENSION
58. 30 TO 33
59. LOAD 1 LOADTYPE LIVE  TITLE LOAD CASE 2
60. JOINT LOAD
61. 1 FY -1.
62. PERFORM ANALYSIS
```

P R O B L E M S T A T I S T I C S

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 18/ 36/ 2

SOLVER USED IS THE OUT-OF-CORE BASIC SOLVER

ORIGINAL/FINAL BAND-WIDTH= 10/ 3/ 12 DOF
TOTAL PRIMARY LOAD CASES = 1, TOTAL DEGREES OF FREEDOM = 50
SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
REQRD/AVAIL. DISK SPACE = 12.1/ 29025.8 MB

```
ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
      LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
      THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
      EFFECTIVELY RELEASED IN THIS DIRECTION.
ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
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 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  1 iterations, Case=    1



  63. CHANGE
  64. MEMBER TENSION
  65. 30 TO 33
  66. LOAD 2 LOADTYPE LIVE  TITLE LOAD CASE 2
  67. JOINT LOAD
  68. 2 FY -1.
  69. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
```

```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    2



  70. CHANGE
  71. MEMBER TENSION
  72. 30 TO 33
  73. LOAD 3 LOADTYPE LIVE  TITLE LOAD CASE 2
  74. JOINT LOAD
  75. 3 FY -1.
  76. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
```

```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    3



  77. CHANGE
  78. MEMBER TENSION
  79. 30 TO 33
  80. LOAD 4 LOADTYPE LIVE  TITLE LOAD CASE 2
  81. JOINT LOAD
  82. 4 FY -1.
  83. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
```

```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    4



  84. CHANGE
  85. MEMBER TENSION
  86. 30 TO 33
  87. LOAD 5 LOADTYPE LIVE  TITLE LOAD CASE 2
  88. JOINT LOAD
  89. 5 FY -1.
  90. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
```

```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    5



  91. CHANGE
  92. MEMBER TENSION
  93. 30 TO 33
  94. LOAD 6 LOADTYPE LIVE  TITLE LOAD CASE 2
  95. JOINT LOAD
  96. 6 FY -1.
  97. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
            THE FIRST 12 ARE LISTED ABOVE.
            TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
```

```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    6



  98. CHANGE
  99. MEMBER TENSION
 100. 30 TO 33
 101. LOAD 7 LOADTYPE LIVE  TITLE LOAD CASE 2
 102. JOINT LOAD
 103. 7 FY -1.
 104. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
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```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    7



 105. CHANGE
 106. MEMBER TENSION
 107. 30 TO 33
 108. LOAD 8 LOADTYPE LIVE  TITLE LOAD CASE 2
 109. JOINT LOAD
 110. 8 FY -1.
 111. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
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```
 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    8



 112. CHANGE
 113. MEMBER TENSION
 114. 30 TO 33
 115. LOAD 9 LOADTYPE LIVE  TITLE LOAD CASE 2
 116. JOINT LOAD
 117. 9 FY -1.
 118. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17

**START ITERATION NO.           2
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37
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 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  2 iterations, Case=    9



 119. CHANGE
 120. MEMBER TENSION
 121. 30 TO 33
 122. LOAD 10 LOADTYPE LIVE  TITLE LOAD CASE 2
 123. JOINT LOAD
 124. 10 FY -1.
 125. PERFORM ANALYSIS
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      2 EQN.NO.       4
        LOADS APPLIED OR DISTRIBUTED HERE FROM ELEMENTS WILL BE IGNORED.
        THIS MAY BE DUE TO ALL MEMBERS AT THIS JOINT BEING RELEASED OR
        EFFECTIVELY RELEASED IN THIS DIRECTION.
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     11 EQN.NO.       7
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      3 EQN.NO.      10
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     12 EQN.NO.      13
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      4 EQN.NO.      16
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     13 EQN.NO.      19
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      5 EQN.NO.      22
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     14 EQN.NO.      25
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      6 EQN.NO.      28
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     15 EQN.NO.      31
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT      7 EQN.NO.      34
  ZERO STIFFNESS IN DIRECTION 6 AT JOINT     16 EQN.NO.      37

 **WARNING - THERE WERE MORE THAN 12 DOF WITH ZERO STIFFNESS.
             THE FIRST 12 ARE LISTED ABOVE.
             TOTAL # TRANSLATIONAL=      0 TOTAL # ROTATIONAL=     17


**NOTE-Tension/Compression converged after  1 iterations, Case=   10



 126. CHANGE
 127. LOAD LIST ALL
 128. PRINT MEMBER FORCES
```

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
1	1	1	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	2	1	-0.71	0.00	0.00	0.00	0.00	0.00
		2	0.71	0.00	0.00	0.00	0.00	0.00
	3	1	-0.62	0.00	0.00	0.00	0.00	0.00
		2	0.62	0.00	0.00	0.00	0.00	0.00
	4	1	-0.53	0.00	0.00	0.00	0.00	0.00
		2	0.53	0.00	0.00	0.00	0.00	0.00
	5	1	-0.44	0.00	0.00	0.00	0.00	0.00
		2	0.44	0.00	0.00	0.00	0.00	0.00
	6	1	-0.36	0.00	0.00	0.00	0.00	0.00
		2	0.36	0.00	0.00	0.00	0.00	0.00
	7	1	-0.27	0.00	0.00	0.00	0.00	0.00
		2	0.27	0.00	0.00	0.00	0.00	0.00
	8	1	-0.18	0.00	0.00	0.00	0.00	0.00
		2	0.18	0.00	0.00	0.00	0.00	0.00
	9	1	-0.09	0.00	0.00	0.00	0.00	0.00
		2	0.09	0.00	0.00	0.00	0.00	0.00
	10	1	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
2	1	2	0.00	0.00	0.00	0.00	0.00	0.00
		3	0.00	0.00	0.00	0.00	0.00	0.00
	2	2	-0.71	0.00	0.00	0.00	0.00	0.00
		3	0.71	0.00	0.00	0.00	0.00	0.00
	3	2	-0.62	0.00	0.00	0.00	0.00	0.00
		3	0.62	0.00	0.00	0.00	0.00	0.00
	4	2	-0.53	0.00	0.00	0.00	0.00	0.00
		3	0.53	0.00	0.00	0.00	0.00	0.00
	5	2	-0.44	0.00	0.00	0.00	0.00	0.00
		3	0.44	0.00	0.00	0.00	0.00	0.00
	6	2	-0.36	0.00	0.00	0.00	0.00	0.00
		3	0.36	0.00	0.00	0.00	0.00	0.00
	7	2	-0.27	0.00	0.00	0.00	0.00	0.00
		3	0.27	0.00	0.00	0.00	0.00	0.00
	8	2	-0.18	0.00	0.00	0.00	0.00	0.00
		3	0.18	0.00	0.00	0.00	0.00	0.00
	9	2	-0.09	0.00	0.00	0.00	0.00	0.00
		3	0.09	0.00	0.00	0.00	0.00	0.00
	10	2	0.00	0.00	0.00	0.00	0.00	0.00
		3	0.00	0.00	0.00	0.00	0.00	0.00
3	1	3	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	2	3	-0.62	0.00	0.00	0.00	0.00	0.00
		4	0.62	0.00	0.00	0.00	0.00	0.00
	3	3	-1.24	0.00	0.00	0.00	0.00	0.00
		4	1.24	0.00	0.00	0.00	0.00	0.00
	4	3	-1.07	0.00	0.00	0.00	0.00	0.00
		4	1.07	0.00	0.00	0.00	0.00	0.00
	5	3	-0.89	0.00	0.00	0.00	0.00	0.00
		4	0.89	0.00	0.00	0.00	0.00	0.00
	6	3	-0.71	0.00	0.00	0.00	0.00	0.00
		4	0.71	0.00	0.00	0.00	0.00	0.00
	7	3	-0.53	0.00	0.00	0.00	0.00	0.00
		4	0.53	0.00	0.00	0.00	0.00	0.00
	8	3	-0.36	0.00	0.00	0.00	0.00	0.00
		4	0.36	0.00	0.00	0.00	0.00	0.00
	9	3	-0.18	0.00	0.00	0.00	0.00	0.00
		4	0.18	0.00	0.00	0.00	0.00	0.00
	10	3	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
4	1	4	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	2	4	-0.49	0.00	0.00	0.00	0.00	0.00
		5	0.49	0.00	0.00	0.00	0.00	0.00
	3	4	-0.98	0.00	0.00	0.00	0.00	0.00
		5	0.98	0.00	0.00	0.00	0.00	0.00
	4	4	-1.48	0.00	0.00	0.00	0.00	0.00
		5	1.48	0.00	0.00	0.00	0.00	0.00
	5	4	-1.33	0.00	0.00	0.00	0.00	0.00
		5	1.33	0.00	0.00	0.00	0.00	0.00
	6	4	-1.07	0.00	0.00	0.00	0.00	0.00
		5	1.07	0.00	0.00	0.00	0.00	0.00
	7	4	-0.80	0.00	0.00	0.00	0.00	0.00
		5	0.80	0.00	0.00	0.00	0.00	0.00
	8	4	-0.53	0.00	0.00	0.00	0.00	0.00
		5	0.53	0.00	0.00	0.00	0.00	0.00
	9	4	-0.27	0.00	0.00	0.00	0.00	0.00
		5	0.27	0.00	0.00	0.00	0.00	0.00
	10	4	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
5	1	5	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	2	5	-0.36	0.00	0.00	0.00	0.00	0.00
		6	0.36	0.00	0.00	0.00	0.00	0.00
	3	5	-0.71	0.00	0.00	0.00	0.00	0.00
		6	0.71	0.00	0.00	0.00	0.00	0.00
	4	5	-1.07	0.00	0.00	0.00	0.00	0.00
		6	1.07	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	5	5	-1.42	0.00	0.00	0.00	0.00	0.00
		6	1.42	0.00	0.00	0.00	0.00	0.00
	6	5	-1.42	0.00	0.00	0.00	0.00	0.00
		6	1.42	0.00	0.00	0.00	0.00	0.00
	7	5	-1.07	0.00	0.00	0.00	0.00	0.00
		6	1.07	0.00	0.00	0.00	0.00	0.00
	8	5	-0.71	0.00	0.00	0.00	0.00	0.00
		6	0.71	0.00	0.00	0.00	0.00	0.00
	9	5	-0.36	0.00	0.00	0.00	0.00	0.00
		6	0.36	0.00	0.00	0.00	0.00	0.00
	10	5	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
6	1	6	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	2	6	-0.27	0.00	0.00	0.00	0.00	0.00
		7	0.27	0.00	0.00	0.00	0.00	0.00
	3	6	-0.53	0.00	0.00	0.00	0.00	0.00
		7	0.53	0.00	0.00	0.00	0.00	0.00
	4	6	-0.80	0.00	0.00	0.00	0.00	0.00
		7	0.80	0.00	0.00	0.00	0.00	0.00
	5	6	-1.07	0.00	0.00	0.00	0.00	0.00
		7	1.07	0.00	0.00	0.00	0.00	0.00
	6	6	-1.33	0.00	0.00	0.00	0.00	0.00
		7	1.33	0.00	0.00	0.00	0.00	0.00
	7	6	-1.48	0.00	0.00	0.00	0.00	0.00
		7	1.48	0.00	0.00	0.00	0.00	0.00
	8	6	-0.98	0.00	0.00	0.00	0.00	0.00
		7	0.98	0.00	0.00	0.00	0.00	0.00
	9	6	-0.49	0.00	0.00	0.00	0.00	0.00
		7	0.49	0.00	0.00	0.00	0.00	0.00
	10	6	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
7	1	7	0.00	0.00	0.00	0.00	0.00	0.00
		8	0.00	0.00	0.00	0.00	0.00	0.00
	2	7	-0.18	0.00	0.00	0.00	0.00	0.00
		8	0.18	0.00	0.00	0.00	0.00	0.00
	3	7	-0.36	0.00	0.00	0.00	0.00	0.00
		8	0.36	0.00	0.00	0.00	0.00	0.00
	4	7	-0.53	0.00	0.00	0.00	0.00	0.00
		8	0.53	0.00	0.00	0.00	0.00	0.00
	5	7	-0.71	0.00	0.00	0.00	0.00	0.00
		8	0.71	0.00	0.00	0.00	0.00	0.00
	6	7	-0.89	0.00	0.00	0.00	0.00	0.00
		8	0.89	0.00	0.00	0.00	0.00	0.00
	7	7	-1.07	0.00	0.00	0.00	0.00	0.00
		8	1.07	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	8	7	-1.24	0.00	0.00	0.00	0.00	0.00
		8	1.24	0.00	0.00	0.00	0.00	0.00
	9	7	-0.62	0.00	0.00	0.00	0.00	0.00
		8	0.62	0.00	0.00	0.00	0.00	0.00
	10	7	0.00	0.00	0.00	0.00	0.00	0.00
		8	0.00	0.00	0.00	0.00	0.00	0.00
8	1	8	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	2	8	-0.09	0.00	0.00	0.00	0.00	0.00
		9	0.09	0.00	0.00	0.00	0.00	0.00
	3	8	-0.18	0.00	0.00	0.00	0.00	0.00
		9	0.18	0.00	0.00	0.00	0.00	0.00
	4	8	-0.27	0.00	0.00	0.00	0.00	0.00
		9	0.27	0.00	0.00	0.00	0.00	0.00
	5	8	-0.36	0.00	0.00	0.00	0.00	0.00
		9	0.36	0.00	0.00	0.00	0.00	0.00
	6	8	-0.44	0.00	0.00	0.00	0.00	0.00
		9	0.44	0.00	0.00	0.00	0.00	0.00
	7	8	-0.53	0.00	0.00	0.00	0.00	0.00
		9	0.53	0.00	0.00	0.00	0.00	0.00
	8	8	-0.62	0.00	0.00	0.00	0.00	0.00
		9	0.62	0.00	0.00	0.00	0.00	0.00
	9	8	-0.71	0.00	0.00	0.00	0.00	0.00
		9	0.71	0.00	0.00	0.00	0.00	0.00
	10	8	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
9	1	9	0.00	0.00	0.00	0.00	0.00	0.00
		10	0.00	0.00	0.00	0.00	0.00	0.00
	2	9	-0.09	0.00	0.00	0.00	0.00	0.00
		10	0.09	0.00	0.00	0.00	0.00	0.00
	3	9	-0.18	0.00	0.00	0.00	0.00	0.00
		10	0.18	0.00	0.00	0.00	0.00	0.00
	4	9	-0.27	0.00	0.00	0.00	0.00	0.00
		10	0.27	0.00	0.00	0.00	0.00	0.00
	5	9	-0.36	0.00	0.00	0.00	0.00	0.00
		10	0.36	0.00	0.00	0.00	0.00	0.00
	6	9	-0.44	0.00	0.00	0.00	0.00	0.00
		10	0.44	0.00	0.00	0.00	0.00	0.00
	7	9	-0.53	0.00	0.00	0.00	0.00	0.00
		10	0.53	0.00	0.00	0.00	0.00	0.00
	8	9	-0.62	0.00	0.00	0.00	0.00	0.00
		10	0.62	0.00	0.00	0.00	0.00	0.00
	9	9	-0.71	0.00	0.00	0.00	0.00	0.00
		10	0.71	0.00	0.00	0.00	0.00	0.00
	10	9	0.00	0.00	0.00	0.00	0.00	0.00
		10	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
10	1	1	0.00	0.00	0.00	0.00	0.00	0.00
		11	0.00	0.00	0.00	0.00	0.00	0.00
	2	1	1.14	0.00	0.00	0.00	0.00	0.00
		11	-1.14	0.00	0.00	0.00	0.00	0.00
	3	1	1.00	0.00	0.00	0.00	0.00	0.00
		11	-1.00	0.00	0.00	0.00	0.00	0.00
	4	1	0.85	0.00	0.00	0.00	0.00	0.00
		11	-0.85	0.00	0.00	0.00	0.00	0.00
	5	1	0.71	0.00	0.00	0.00	0.00	0.00
		11	-0.71	0.00	0.00	0.00	0.00	0.00
	6	1	0.57	0.00	0.00	0.00	0.00	0.00
		11	-0.57	0.00	0.00	0.00	0.00	0.00
	7	1	0.43	0.00	0.00	0.00	0.00	0.00
		11	-0.43	0.00	0.00	0.00	0.00	0.00
	8	1	0.28	0.00	0.00	0.00	0.00	0.00
		11	-0.28	0.00	0.00	0.00	0.00	0.00
	9	1	0.14	0.00	0.00	0.00	0.00	0.00
		11	-0.14	0.00	0.00	0.00	0.00	0.00
	10	1	0.00	0.00	0.00	0.00	0.00	0.00
		11	0.00	0.00	0.00	0.00	0.00	0.00
11	1	11	0.00	0.00	0.00	0.00	0.00	0.00
		12	0.00	0.00	0.00	0.00	0.00	0.00
	2	11	0.62	0.00	0.00	0.00	0.00	0.00
		12	-0.62	0.00	0.00	0.00	0.00	0.00
	3	11	1.24	0.00	0.00	0.00	0.00	0.00
		12	-1.24	0.00	0.00	0.00	0.00	0.00
	4	11	1.07	0.00	0.00	0.00	0.00	0.00
		12	-1.07	0.00	0.00	0.00	0.00	0.00
	5	11	0.89	0.00	0.00	0.00	0.00	0.00
		12	-0.89	0.00	0.00	0.00	0.00	0.00
	6	11	0.71	0.00	0.00	0.00	0.00	0.00
		12	-0.71	0.00	0.00	0.00	0.00	0.00
	7	11	0.53	0.00	0.00	0.00	0.00	0.00
		12	-0.53	0.00	0.00	0.00	0.00	0.00
	8	11	0.36	0.00	0.00	0.00	0.00	0.00
		12	-0.36	0.00	0.00	0.00	0.00	0.00
	9	11	0.18	0.00	0.00	0.00	0.00	0.00
		12	-0.18	0.00	0.00	0.00	0.00	0.00
	10	11	0.00	0.00	0.00	0.00	0.00	0.00
		12	0.00	0.00	0.00	0.00	0.00	0.00
12	1	12	0.00	0.00	0.00	0.00	0.00	0.00
		13	0.00	0.00	0.00	0.00	0.00	0.00
	2	12	0.53	0.00	0.00	0.00	0.00	0.00
		13	-0.53	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	3	12	1.07	0.00	0.00	0.00	0.00	0.00
		13	-1.07	0.00	0.00	0.00	0.00	0.00
	4	12	1.60	0.00	0.00	0.00	0.00	0.00
		13	-1.60	0.00	0.00	0.00	0.00	0.00
	5	12	1.33	0.00	0.00	0.00	0.00	0.00
		13	-1.33	0.00	0.00	0.00	0.00	0.00
	6	12	1.07	0.00	0.00	0.00	0.00	0.00
		13	-1.07	0.00	0.00	0.00	0.00	0.00
	7	12	0.80	0.00	0.00	0.00	0.00	0.00
		13	-0.80	0.00	0.00	0.00	0.00	0.00
	8	12	0.53	0.00	0.00	0.00	0.00	0.00
		13	-0.53	0.00	0.00	0.00	0.00	0.00
	9	12	0.27	0.00	0.00	0.00	0.00	0.00
		13	-0.27	0.00	0.00	0.00	0.00	0.00
	10	12	0.00	0.00	0.00	0.00	0.00	0.00
		13	0.00	0.00	0.00	0.00	0.00	0.00
13	1	13	0.00	0.00	0.00	0.00	0.00	0.00
		14	0.00	0.00	0.00	0.00	0.00	0.00
	2	13	0.48	0.00	0.00	0.00	0.00	0.00
		14	-0.48	0.00	0.00	0.00	0.00	0.00
	3	13	0.97	0.00	0.00	0.00	0.00	0.00
		14	-0.97	0.00	0.00	0.00	0.00	0.00
	4	13	1.45	0.00	0.00	0.00	0.00	0.00
		14	-1.45	0.00	0.00	0.00	0.00	0.00
	5	13	1.78	0.00	0.00	0.00	0.00	0.00
		14	-1.78	0.00	0.00	0.00	0.00	0.00
	6	13	1.42	0.00	0.00	0.00	0.00	0.00
		14	-1.42	0.00	0.00	0.00	0.00	0.00
	7	13	1.07	0.00	0.00	0.00	0.00	0.00
		14	-1.07	0.00	0.00	0.00	0.00	0.00
	8	13	0.71	0.00	0.00	0.00	0.00	0.00
		14	-0.71	0.00	0.00	0.00	0.00	0.00
	9	13	0.36	0.00	0.00	0.00	0.00	0.00
		14	-0.36	0.00	0.00	0.00	0.00	0.00
	10	13	0.00	0.00	0.00	0.00	0.00	0.00
		14	0.00	0.00	0.00	0.00	0.00	0.00
14	1	14	0.00	0.00	0.00	0.00	0.00	0.00
		15	0.00	0.00	0.00	0.00	0.00	0.00
	2	14	0.44	0.00	0.00	0.00	0.00	0.00
		15	-0.44	0.00	0.00	0.00	0.00	0.00
	3	14	0.89	0.00	0.00	0.00	0.00	0.00
		15	-0.89	0.00	0.00	0.00	0.00	0.00
	4	14	1.33	0.00	0.00	0.00	0.00	0.00
		15	-1.33	0.00	0.00	0.00	0.00	0.00
	5	14	1.78	0.00	0.00	0.00	0.00	0.00
		15	-1.78	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	6	14	1.78	0.00	0.00	0.00	0.00	0.00
		15	-1.78	0.00	0.00	0.00	0.00	0.00
	7	14	1.33	0.00	0.00	0.00	0.00	0.00
		15	-1.33	0.00	0.00	0.00	0.00	0.00
	8	14	0.89	0.00	0.00	0.00	0.00	0.00
		15	-0.89	0.00	0.00	0.00	0.00	0.00
	9	14	0.44	0.00	0.00	0.00	0.00	0.00
		15	-0.44	0.00	0.00	0.00	0.00	0.00
	10	14	0.00	0.00	0.00	0.00	0.00	0.00
		15	0.00	0.00	0.00	0.00	0.00	0.00
15	1	15	0.00	0.00	0.00	0.00	0.00	0.00
		16	0.00	0.00	0.00	0.00	0.00	0.00
	2	15	0.36	0.00	0.00	0.00	0.00	0.00
		16	-0.36	0.00	0.00	0.00	0.00	0.00
	3	15	0.71	0.00	0.00	0.00	0.00	0.00
		16	-0.71	0.00	0.00	0.00	0.00	0.00
	4	15	1.07	0.00	0.00	0.00	0.00	0.00
		16	-1.07	0.00	0.00	0.00	0.00	0.00
	5	15	1.42	0.00	0.00	0.00	0.00	0.00
		16	-1.42	0.00	0.00	0.00	0.00	0.00
	6	15	1.78	0.00	0.00	0.00	0.00	0.00
		16	-1.78	0.00	0.00	0.00	0.00	0.00
	7	15	1.45	0.00	0.00	0.00	0.00	0.00
		16	-1.45	0.00	0.00	0.00	0.00	0.00
	8	15	0.97	0.00	0.00	0.00	0.00	0.00
		16	-0.97	0.00	0.00	0.00	0.00	0.00
	9	15	0.48	0.00	0.00	0.00	0.00	0.00
		16	-0.48	0.00	0.00	0.00	0.00	0.00
	10	15	0.00	0.00	0.00	0.00	0.00	0.00
		16	0.00	0.00	0.00	0.00	0.00	0.00
16	1	16	0.00	0.00	0.00	0.00	0.00	0.00
		17	0.00	0.00	0.00	0.00	0.00	0.00
	2	16	0.27	0.00	0.00	0.00	0.00	0.00
		17	-0.27	0.00	0.00	0.00	0.00	0.00
	3	16	0.53	0.00	0.00	0.00	0.00	0.00
		17	-0.53	0.00	0.00	0.00	0.00	0.00
	4	16	0.80	0.00	0.00	0.00	0.00	0.00
		17	-0.80	0.00	0.00	0.00	0.00	0.00
	5	16	1.07	0.00	0.00	0.00	0.00	0.00
		17	-1.07	0.00	0.00	0.00	0.00	0.00
	6	16	1.33	0.00	0.00	0.00	0.00	0.00
		17	-1.33	0.00	0.00	0.00	0.00	0.00
	7	16	1.60	0.00	0.00	0.00	0.00	0.00
		17	-1.60	0.00	0.00	0.00	0.00	0.00
	8	16	1.07	0.00	0.00	0.00	0.00	0.00
		17	-1.07	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	9	16	0.53	0.00	0.00	0.00	0.00	0.00
		17	-0.53	0.00	0.00	0.00	0.00	0.00
	10	16	0.00	0.00	0.00	0.00	0.00	0.00
		17	0.00	0.00	0.00	0.00	0.00	0.00
17	1	17	0.00	0.00	0.00	0.00	0.00	0.00
		18	0.00	0.00	0.00	0.00	0.00	0.00
	2	17	0.18	0.00	0.00	0.00	0.00	0.00
		18	-0.18	0.00	0.00	0.00	0.00	0.00
	3	17	0.36	0.00	0.00	0.00	0.00	0.00
		18	-0.36	0.00	0.00	0.00	0.00	0.00
	4	17	0.53	0.00	0.00	0.00	0.00	0.00
		18	-0.53	0.00	0.00	0.00	0.00	0.00
	5	17	0.71	0.00	0.00	0.00	0.00	0.00
		18	-0.71	0.00	0.00	0.00	0.00	0.00
	6	17	0.89	0.00	0.00	0.00	0.00	0.00
		18	-0.89	0.00	0.00	0.00	0.00	0.00
	7	17	1.07	0.00	0.00	0.00	0.00	0.00
		18	-1.07	0.00	0.00	0.00	0.00	0.00
	8	17	1.24	0.00	0.00	0.00	0.00	0.00
		18	-1.24	0.00	0.00	0.00	0.00	0.00
	9	17	0.62	0.00	0.00	0.00	0.00	0.00
		18	-0.62	0.00	0.00	0.00	0.00	0.00
	10	17	0.00	0.00	0.00	0.00	0.00	0.00
		18	0.00	0.00	0.00	0.00	0.00	0.00
18	1	18	0.00	0.00	0.00	0.00	0.00	0.00
		10	0.00	0.00	0.00	0.00	0.00	0.00
	2	18	0.14	0.00	0.00	0.00	0.00	0.00
		10	-0.14	0.00	0.00	0.00	0.00	0.00
	3	18	0.28	0.00	0.00	0.00	0.00	0.00
		10	-0.28	0.00	0.00	0.00	0.00	0.00
	4	18	0.43	0.00	0.00	0.00	0.00	0.00
		10	-0.43	0.00	0.00	0.00	0.00	0.00
	5	18	0.57	0.00	0.00	0.00	0.00	0.00
		10	-0.57	0.00	0.00	0.00	0.00	0.00
	6	18	0.71	0.00	0.00	0.00	0.00	0.00
		10	-0.71	0.00	0.00	0.00	0.00	0.00
	7	18	0.85	0.00	0.00	0.00	0.00	0.00
		10	-0.85	0.00	0.00	0.00	0.00	0.00
	8	18	1.00	0.00	0.00	0.00	0.00	0.00
		10	-1.00	0.00	0.00	0.00	0.00	0.00
	9	18	1.14	0.00	0.00	0.00	0.00	0.00
		10	-1.14	0.00	0.00	0.00	0.00	0.00
	10	18	0.00	0.00	0.00	0.00	0.00	0.00
		10	0.00	0.00	0.00	0.00	0.00	0.00
19	1	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	2	11	-1.00	0.00	0.00	0.00	0.00	0.00
		2	1.00	0.00	0.00	0.00	0.00	0.00
	3	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	4	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	5	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	6	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	7	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	8	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	9	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
	10	11	0.00	0.00	0.00	0.00	0.00	0.00
		2	0.00	0.00	0.00	0.00	0.00	0.00
20	1	12	0.00	0.00	0.00	0.00	0.00	0.00
		3	0.00	0.00	0.00	0.00	0.00	0.00
	2	12	-0.11	0.00	0.00	0.00	0.00	0.00
		3	0.11	0.00	0.00	0.00	0.00	0.00
	3	12	-0.22	0.00	0.00	0.00	0.00	0.00
		3	0.22	0.00	0.00	0.00	0.00	0.00
	4	12	0.67	0.00	0.00	0.00	0.00	0.00
		3	-0.67	0.00	0.00	0.00	0.00	0.00
	5	12	0.56	0.00	0.00	0.00	0.00	0.00
		3	-0.56	0.00	0.00	0.00	0.00	0.00
	6	12	0.44	0.00	0.00	0.00	0.00	0.00
		3	-0.44	0.00	0.00	0.00	0.00	0.00
	7	12	0.33	0.00	0.00	0.00	0.00	0.00
		3	-0.33	0.00	0.00	0.00	0.00	0.00
	8	12	0.22	0.00	0.00	0.00	0.00	0.00
		3	-0.22	0.00	0.00	0.00	0.00	0.00
	9	12	0.11	0.00	0.00	0.00	0.00	0.00
		3	-0.11	0.00	0.00	0.00	0.00	0.00
	10	12	0.00	0.00	0.00	0.00	0.00	0.00
		3	0.00	0.00	0.00	0.00	0.00	0.00
21	1	13	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	2	13	-0.06	0.00	0.00	0.00	0.00	0.00
		4	0.06	0.00	0.00	0.00	0.00	0.00
	3	13	-0.12	0.00	0.00	0.00	0.00	0.00
		4	0.12	0.00	0.00	0.00	0.00	0.00
	4	13	-0.18	0.00	0.00	0.00	0.00	0.00
		4	0.18	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	5	13	0.56	0.00	0.00	0.00	0.00	0.00
		4	-0.56	0.00	0.00	0.00	0.00	0.00
	6	13	0.44	0.00	0.00	0.00	0.00	0.00
		4	-0.44	0.00	0.00	0.00	0.00	0.00
	7	13	0.33	0.00	0.00	0.00	0.00	0.00
		4	-0.33	0.00	0.00	0.00	0.00	0.00
	8	13	0.22	0.00	0.00	0.00	0.00	0.00
		4	-0.22	0.00	0.00	0.00	0.00	0.00
	9	13	0.11	0.00	0.00	0.00	0.00	0.00
		4	-0.11	0.00	0.00	0.00	0.00	0.00
	10	13	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
22	1	14	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	2	14	0.05	0.00	0.00	0.00	0.00	0.00
		5	-0.05	0.00	0.00	0.00	0.00	0.00
	3	14	0.10	0.00	0.00	0.00	0.00	0.00
		5	-0.10	0.00	0.00	0.00	0.00	0.00
	4	14	0.15	0.00	0.00	0.00	0.00	0.00
		5	-0.15	0.00	0.00	0.00	0.00	0.00
	5	14	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	6	14	0.44	0.00	0.00	0.00	0.00	0.00
		5	-0.44	0.00	0.00	0.00	0.00	0.00
	7	14	0.33	0.00	0.00	0.00	0.00	0.00
		5	-0.33	0.00	0.00	0.00	0.00	0.00
	8	14	0.22	0.00	0.00	0.00	0.00	0.00
		5	-0.22	0.00	0.00	0.00	0.00	0.00
	9	14	0.11	0.00	0.00	0.00	0.00	0.00
		5	-0.11	0.00	0.00	0.00	0.00	0.00
	10	14	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
23	1	15	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	2	15	0.11	0.00	0.00	0.00	0.00	0.00
		6	-0.11	0.00	0.00	0.00	0.00	0.00
	3	15	0.22	0.00	0.00	0.00	0.00	0.00
		6	-0.22	0.00	0.00	0.00	0.00	0.00
	4	15	0.33	0.00	0.00	0.00	0.00	0.00
		6	-0.33	0.00	0.00	0.00	0.00	0.00
	5	15	0.44	0.00	0.00	0.00	0.00	0.00
		6	-0.44	0.00	0.00	0.00	0.00	0.00
	6	15	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	7	15	0.15	0.00	0.00	0.00	0.00	0.00
		6	-0.15	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	8	15	0.10	0.00	0.00	0.00	0.00	0.00
		6	-0.10	0.00	0.00	0.00	0.00	0.00
	9	15	0.05	0.00	0.00	0.00	0.00	0.00
		6	-0.05	0.00	0.00	0.00	0.00	0.00
	10	15	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
24	1	16	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	2	16	0.11	0.00	0.00	0.00	0.00	0.00
		7	-0.11	0.00	0.00	0.00	0.00	0.00
	3	16	0.22	0.00	0.00	0.00	0.00	0.00
		7	-0.22	0.00	0.00	0.00	0.00	0.00
	4	16	0.33	0.00	0.00	0.00	0.00	0.00
		7	-0.33	0.00	0.00	0.00	0.00	0.00
	5	16	0.44	0.00	0.00	0.00	0.00	0.00
		7	-0.44	0.00	0.00	0.00	0.00	0.00
	6	16	0.56	0.00	0.00	0.00	0.00	0.00
		7	-0.56	0.00	0.00	0.00	0.00	0.00
	7	16	-0.18	0.00	0.00	0.00	0.00	0.00
		7	0.18	0.00	0.00	0.00	0.00	0.00
	8	16	-0.12	0.00	0.00	0.00	0.00	0.00
		7	0.12	0.00	0.00	0.00	0.00	0.00
	9	16	-0.06	0.00	0.00	0.00	0.00	0.00
		7	0.06	0.00	0.00	0.00	0.00	0.00
	10	16	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
25	1	17	0.00	0.00	0.00	0.00	0.00	0.00
		8	0.00	0.00	0.00	0.00	0.00	0.00
	2	17	0.11	0.00	0.00	0.00	0.00	0.00
		8	-0.11	0.00	0.00	0.00	0.00	0.00
	3	17	0.22	0.00	0.00	0.00	0.00	0.00
		8	-0.22	0.00	0.00	0.00	0.00	0.00
	4	17	0.33	0.00	0.00	0.00	0.00	0.00
		8	-0.33	0.00	0.00	0.00	0.00	0.00
	5	17	0.44	0.00	0.00	0.00	0.00	0.00
		8	-0.44	0.00	0.00	0.00	0.00	0.00
	6	17	0.56	0.00	0.00	0.00	0.00	0.00
		8	-0.56	0.00	0.00	0.00	0.00	0.00
	7	17	0.67	0.00	0.00	0.00	0.00	0.00
		8	-0.67	0.00	0.00	0.00	0.00	0.00
	8	17	-0.22	0.00	0.00	0.00	0.00	0.00
		8	0.22	0.00	0.00	0.00	0.00	0.00
	9	17	-0.11	0.00	0.00	0.00	0.00	0.00
		8	0.11	0.00	0.00	0.00	0.00	0.00
	10	17	0.00	0.00	0.00	0.00	0.00	0.00
		8	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
26	1	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	2	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	3	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	4	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	5	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	6	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	7	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	8	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
	9	18	-1.00	0.00	0.00	0.00	0.00	0.00
		9	1.00	0.00	0.00	0.00	0.00	0.00
	10	18	0.00	0.00	0.00	0.00	0.00	0.00
		9	0.00	0.00	0.00	0.00	0.00	0.00
27	1	11	0.00	0.00	0.00	0.00	0.00	0.00
		3	0.00	0.00	0.00	0.00	0.00	0.00
	2	11	0.14	0.00	0.00	0.00	0.00	0.00
		3	-0.14	0.00	0.00	0.00	0.00	0.00
	3	11	-1.00	0.00	0.00	0.00	0.00	0.00
		3	1.00	0.00	0.00	0.00	0.00	0.00
	4	11	-0.85	0.00	0.00	0.00	0.00	0.00
		3	0.85	0.00	0.00	0.00	0.00	0.00
	5	11	-0.71	0.00	0.00	0.00	0.00	0.00
		3	0.71	0.00	0.00	0.00	0.00	0.00
	6	11	-0.57	0.00	0.00	0.00	0.00	0.00
		3	0.57	0.00	0.00	0.00	0.00	0.00
	7	11	-0.43	0.00	0.00	0.00	0.00	0.00
		3	0.43	0.00	0.00	0.00	0.00	0.00
	8	11	-0.28	0.00	0.00	0.00	0.00	0.00
		3	0.28	0.00	0.00	0.00	0.00	0.00
	9	11	-0.14	0.00	0.00	0.00	0.00	0.00
		3	0.14	0.00	0.00	0.00	0.00	0.00
	10	11	0.00	0.00	0.00	0.00	0.00	0.00
		3	0.00	0.00	0.00	0.00	0.00	0.00
28	1	12	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	2	12	0.14	0.00	0.00	0.00	0.00	0.00
		4	-0.14	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	3	12	0.28	0.00	0.00	0.00	0.00	0.00
		4	-0.28	0.00	0.00	0.00	0.00	0.00
	4	12	-0.85	0.00	0.00	0.00	0.00	0.00
		4	0.85	0.00	0.00	0.00	0.00	0.00
	5	12	-0.71	0.00	0.00	0.00	0.00	0.00
		4	0.71	0.00	0.00	0.00	0.00	0.00
	6	12	-0.57	0.00	0.00	0.00	0.00	0.00
		4	0.57	0.00	0.00	0.00	0.00	0.00
	7	12	-0.43	0.00	0.00	0.00	0.00	0.00
		4	0.43	0.00	0.00	0.00	0.00	0.00
	8	12	-0.28	0.00	0.00	0.00	0.00	0.00
		4	0.28	0.00	0.00	0.00	0.00	0.00
	9	12	-0.14	0.00	0.00	0.00	0.00	0.00
		4	0.14	0.00	0.00	0.00	0.00	0.00
	10	12	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
29	1	13	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	2	13	0.08	0.00	0.00	0.00	0.00	0.00
		5	-0.08	0.00	0.00	0.00	0.00	0.00
	3	13	0.15	0.00	0.00	0.00	0.00	0.00
		5	-0.15	0.00	0.00	0.00	0.00	0.00
	4	13	0.23	0.00	0.00	0.00	0.00	0.00
		5	-0.23	0.00	0.00	0.00	0.00	0.00
	5	13	-0.71	0.00	0.00	0.00	0.00	0.00
		5	0.71	0.00	0.00	0.00	0.00	0.00
	6	13	-0.57	0.00	0.00	0.00	0.00	0.00
		5	0.57	0.00	0.00	0.00	0.00	0.00
	7	13	-0.43	0.00	0.00	0.00	0.00	0.00
		5	0.43	0.00	0.00	0.00	0.00	0.00
	8	13	-0.28	0.00	0.00	0.00	0.00	0.00
		5	0.28	0.00	0.00	0.00	0.00	0.00
	9	13	-0.14	0.00	0.00	0.00	0.00	0.00
		5	0.14	0.00	0.00	0.00	0.00	0.00
	10	13	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
30	1	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	2	14	-0.07	0.00	0.00	0.00	0.00	0.00
		4	0.07	0.00	0.00	0.00	0.00	0.00
	3	14	-0.13	0.00	0.00	0.00	0.00	0.00
		4	0.13	0.00	0.00	0.00	0.00	0.00
	4	14	-0.20	0.00	0.00	0.00	0.00	0.00
		4	0.20	0.00	0.00	0.00	0.00	0.00
	5	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	6	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	7	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	8	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	9	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
	10	14	0.00	0.00	0.00	0.00	0.00	0.00
		4	0.00	0.00	0.00	0.00	0.00	0.00
31	1	14	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	2	14	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	3	14	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	4	14	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	5	14	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	6	14	-0.57	0.00	0.00	0.00	0.00	0.00
		6	0.57	0.00	0.00	0.00	0.00	0.00
	7	14	-0.43	0.00	0.00	0.00	0.00	0.00
		6	0.43	0.00	0.00	0.00	0.00	0.00
	8	14	-0.28	0.00	0.00	0.00	0.00	0.00
		6	0.28	0.00	0.00	0.00	0.00	0.00
	9	14	-0.14	0.00	0.00	0.00	0.00	0.00
		6	0.14	0.00	0.00	0.00	0.00	0.00
	10	14	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
32	1	15	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	2	15	-0.14	0.00	0.00	0.00	0.00	0.00
		5	0.14	0.00	0.00	0.00	0.00	0.00
	3	15	-0.28	0.00	0.00	0.00	0.00	0.00
		5	0.28	0.00	0.00	0.00	0.00	0.00
	4	15	-0.43	0.00	0.00	0.00	0.00	0.00
		5	0.43	0.00	0.00	0.00	0.00	0.00
	5	15	-0.57	0.00	0.00	0.00	0.00	0.00
		5	0.57	0.00	0.00	0.00	0.00	0.00
	6	15	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	7	15	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	8	15	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	9	15	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
	10	15	0.00	0.00	0.00	0.00	0.00	0.00
		5	0.00	0.00	0.00	0.00	0.00	0.00
33	1	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	2	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	3	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	4	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	5	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	6	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
	7	15	-0.20	0.00	0.00	0.00	0.00	0.00
		7	0.20	0.00	0.00	0.00	0.00	0.00
	8	15	-0.13	0.00	0.00	0.00	0.00	0.00
		7	0.13	0.00	0.00	0.00	0.00	0.00
	9	15	-0.07	0.00	0.00	0.00	0.00	0.00
		7	0.07	0.00	0.00	0.00	0.00	0.00
	10	15	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
34	1	16	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
	2	16	-0.14	0.00	0.00	0.00	0.00	0.00
		6	0.14	0.00	0.00	0.00	0.00	0.00
	3	16	-0.28	0.00	0.00	0.00	0.00	0.00
		6	0.28	0.00	0.00	0.00	0.00	0.00
	4	16	-0.43	0.00	0.00	0.00	0.00	0.00
		6	0.43	0.00	0.00	0.00	0.00	0.00
	5	16	-0.57	0.00	0.00	0.00	0.00	0.00
		6	0.57	0.00	0.00	0.00	0.00	0.00
	6	16	-0.71	0.00	0.00	0.00	0.00	0.00
		6	0.71	0.00	0.00	0.00	0.00	0.00
	7	16	0.23	0.00	0.00	0.00	0.00	0.00
		6	-0.23	0.00	0.00	0.00	0.00	0.00
	8	16	0.15	0.00	0.00	0.00	0.00	0.00
		6	-0.15	0.00	0.00	0.00	0.00	0.00
	9	16	0.08	0.00	0.00	0.00	0.00	0.00
		6	-0.08	0.00	0.00	0.00	0.00	0.00
	10	16	0.00	0.00	0.00	0.00	0.00	0.00
		6	0.00	0.00	0.00	0.00	0.00	0.00
35	1	17	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00

MEMBER END FORCES STRUCTURE TYPE = PLANE

ALL UNITS ARE -- KIP FEET (LOCAL)

MEMBER	LOAD	JT	AXIAL	SHEAR-Y	SHEAR-Z	TORSION	MOM-Y	MOM-Z
	2	17	-0.14	0.00	0.00	0.00	0.00	0.00
		7	0.14	0.00	0.00	0.00	0.00	0.00
	3	17	-0.28	0.00	0.00	0.00	0.00	0.00
		7	0.28	0.00	0.00	0.00	0.00	0.00
	4	17	-0.43	0.00	0.00	0.00	0.00	0.00
		7	0.43	0.00	0.00	0.00	0.00	0.00
	5	17	-0.57	0.00	0.00	0.00	0.00	0.00
		7	0.57	0.00	0.00	0.00	0.00	0.00
	6	17	-0.71	0.00	0.00	0.00	0.00	0.00
		7	0.71	0.00	0.00	0.00	0.00	0.00
	7	17	-0.85	0.00	0.00	0.00	0.00	0.00
		7	0.85	0.00	0.00	0.00	0.00	0.00
	8	17	0.28	0.00	0.00	0.00	0.00	0.00
		7	-0.28	0.00	0.00	0.00	0.00	0.00
	9	17	0.14	0.00	0.00	0.00	0.00	0.00
		7	-0.14	0.00	0.00	0.00	0.00	0.00
	10	17	0.00	0.00	0.00	0.00	0.00	0.00
		7	0.00	0.00	0.00	0.00	0.00	0.00
36	1	18	0.00	0.00	0.00	0.00	0.00	0.00
		8	0.00	0.00	0.00	0.00	0.00	0.00
	2	18	-0.14	0.00	0.00	0.00	0.00	0.00
		8	0.14	0.00	0.00	0.00	0.00	0.00
	3	18	-0.28	0.00	0.00	0.00	0.00	0.00
		8	0.28	0.00	0.00	0.00	0.00	0.00
	4	18	-0.43	0.00	0.00	0.00	0.00	0.00
		8	0.43	0.00	0.00	0.00	0.00	0.00
	5	18	-0.57	0.00	0.00	0.00	0.00	0.00
		8	0.57	0.00	0.00	0.00	0.00	0.00
	6	18	-0.71	0.00	0.00	0.00	0.00	0.00
		8	0.71	0.00	0.00	0.00	0.00	0.00
	7	18	-0.85	0.00	0.00	0.00	0.00	0.00
		8	0.85	0.00	0.00	0.00	0.00	0.00
	8	18	-1.00	0.00	0.00	0.00	0.00	0.00
		8	1.00	0.00	0.00	0.00	0.00	0.00
	9	18	0.14	0.00	0.00	0.00	0.00	0.00
		8	-0.14	0.00	0.00	0.00	0.00	0.00
	10	18	0.00	0.00	0.00	0.00	0.00	0.00
		8	0.00	0.00	0.00	0.00	0.00	0.00

********** END OF LATEST ANALYSIS RESULT **********

129. FINISH

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     *********** END OF THE STAAD.Pro RUN ***********

       **** DATE= MAY 18,2012   TIME= 11:38:23 ****

************************************************************
*        For questions on STAAD.Pro, please contact        *
*        Bentley Systems or Partner offices                *
*                                                          *
*            Telephone             Web / Email             *
*  USA       +1  (714) 974-2500                            *
*  UK        +44 (0) 808 101 9246                          *
*  SINGAPORE +65 6225-6158                                 *
*  FRANCE    +33 (0) 1 55238400                            *
*  GERMANY   +49 0931 40468                                *
*  INDIA     +91 (033) 4006-2021                           *
*  JAPAN     +81 (03)5952-6500    http://www.ctc-g.co.jp   *
*  CHINA     +86 21 6288 4040                              *
*  THAILAND  +66 (0)2645-1018/19 partha.p@reisoftwareth.com*
*                                                          *
*  Worldwide  http://selectservices.bentley.com/en-US/     *
*                                                          *
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SECTION PROPERTIES

AS-BUILT

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls Rating	SUBJECT	Section Property

BOTTOM CHORD

MEMBER L0-L2

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3x5/16	2	0.31	2.40	4.80
Holes Out	2		0.25	-0.51
Bot Angles, L5x3x5/16	2	0.31	2.40	4.80
Holes Out	2		0.25	-0.51
Totals			Gross =	**9.60**
			Net =	**8.58**

Member Capacity

ϕ_y = 0.95 ϕ_u = 0.8 *AASHTO 6.5.4.2*

F_y = 30 F_u = 60 *MBE Tab 6A.6.2.1*

R_p = 0.9 U = 1 *AASHTO 6.8.2.1*

$P_r = \phi_y F_y A_g$ 273.6 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 370.8 kip *AASHTO 6.8.2.1*

P_r = **273.6** kip

MEMBER L2-L3

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area	
Top Angles, L5x3 1/2 x5/16	2	0.31	2.56	5.12	
Holes Out	4		0.25	-1.02	
Bot Angles, L5x3 1/2 x5/16	2	0.31	2.56	5.12	
Holes Out	4		0.25	-1.02	
PL 11 x 5/16	2	0.31	3.44	6.88	
Holes Out	4		0.25	-1.02	
Totals			Gross =	**17.12**	control
			Net =	**14.07**	control

Member Capacity

$P_r = \phi_y F_y A_g$ 487.8 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 607.7 kip *AASHTO 6.8.2.1*

P_r = **487.8** kip

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls Rating	SUBJECT	Section Property

MEMBER L3-L4

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3 1/2 x7/16	2	0.44	3.53	7.06
Holes Out	4		0.36	-1.42
Bot Angles, L5x3 1/2 x7/16	2	0.44	3.53	7.06
Holes Out	4		0.36	-1.42
PL 11 x 3/8	2	0.38	4.13	8.25
Holes Out	4		0.30	-1.22
Totals			Gross =	**22.37**
			Net =	**18.31**

Member Capacity

$P_r = \phi_y F_y A_g$ 637.5 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 790.9 kip *AASHTO 6.8.2.1*

P_r = **637.5** kip

MEMBER L4-L5

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3 1/2 x1/2	2	0.50	4.00	8.00
Holes Out	4		0.41	-1.63
Bot Angles, L5x3 1/2 x1/2	2	0.50	4.00	8.00
Holes Out	4		0.41	-1.63
PL 11 x 3/8	2	0.38	4.13	8.25
Holes Out	4		0.30	-1.22
Totals			Gross =	**24.25**
			Net =	**19.78**

Member Capacity

$P_r = \phi_y F_y A_g$ 691.1 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 854.6 kip *AASHTO 6.8.2.1*

P_r = **691.1** kip

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TOP CHORD

MEMBER L0-U1

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x25	14.68	6.00	88.08	528.48	288.00	816.48
Σ A =	**21.43**	Σ Ay =	170.35		$\Sigma Ay^2 + I_o$ =	1819.17
	Y_{bar} =	7.95			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	465.11
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.66**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x25	14.68	6.17		560	8.9	568.48
Σ A =	21.43				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	750.73
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**5.92**				

Member Capacity

Slenderness

channel leg	b =	3	in		E =	29000	ksi
	t =	0.5	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	6		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.75	in		E =	29000	ksi
	t =	0.387	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	25.19		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	642.9	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	45.89		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

K=	0.75			*AASHTO 4.6.2.5*
l=	285.06	in		
r_s =	4.66	in		

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	2912.42	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

The section is assumed to a close section because of the lacing bars. Flexural torsion capacity is neglected for a close section.

P_e =	2912.42	kip			
P_e/P_o =	4.53		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	586.16	kip	*AASHTO 6.9.4.1.1*
P_r =	**527.55**	kip	*AASHTO 6.9.2.1*

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MEMBER U1-U2

use C12x20.7 in the steel manual

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x20.5	12.16	6.00	72.96	437.76	258.00	695.76
Σ A =	**18.91**	Σ Ay =	155.23		$\Sigma Ay^2 + I_o$ =	1698.45
	Y_{bar} =	8.21			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	424.26
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.74**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x20.5	12.16	6.20		467	7.72	474.85
Σ A =	18.91				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	657.10
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**5.89**				

Member Capacity

Slenderness

channel leg	b =	3	in		E =	29000	ksi
	t =	0.5	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	6		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.75	in		E =	29000	ksi
	t =	0.282	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	34.57		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	567.3	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	26.25		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

K=	0.75			*AASHTO 4.6.2.5*
l=	165.81	in		
r_s =	4.74	in		

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	7852.07	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

The section is assumed to a close section because of the lacing bars. Flexural torsion capacity is neglected for a close section.

P_e =	7852.07	kip			
P_e/P_o =	13.84		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	550.40	kip	*AASHTO 6.9.4.1.1*
P_r =	**495.36**	kip	*AASHTO 6.9.2.1*

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MEMBER U2-U3

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x30	17.62	6.00	105.72	634.32	324.00	958.32
Σ A =	**24.37**	Σ Ay =	187.99		$\Sigma Ay^2 + I_o$ =	1961.01
	Y_{bar} =	7.71			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	510.93
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.58**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x30	17.62	6.17		672	10.24	681.88
Σ A =	24.37				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	864.13
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**5.95**				

Member Capacity

Slenderness

channel leg	b =	3.125	in		E =	29000	ksi
	t =	0.5	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	6.25		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.75	in		E =	29000	ksi
	t =	0.51	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	19.12		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	731.1	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	30.11		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

	K=	0.75		*AASHTO 4.6.2.5*
	l=	183.81	in	
	r_s =	4.58	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	7694.75	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

The section is assumed to a close section because of the lacing bars. Flexural torsion capacity is neglected for a close section.

P_e =	7694.75	kip			
P_e/P_o =	10.52		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	702.60	kip	*AASHTO 6.9.4.1.1*
P_r =	**632.34**	kip	*AASHTO 6.9.2.1*

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MEMBER U3-U4

use MC12x35 in the steel manual

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x35	20.60	6.00	123.60	741.60	432.00	1173.60
Σ A =	**27.35**	Σ Ay =	205.87		$\Sigma Ay^2 + I_o$ =	2176.29
	Y_{bar} =	7.53			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	626.72
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.79**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x35	20.60	6.55		884	25.2	908.99
Σ A =	27.35				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	1091.24
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**6.32**				

Member Capacity

Slenderness

	b =	3.75	in		E =	29000	ksi
	t =	0.7	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	5.36		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.375	in		E =	29000	ksi
	t =	0.465	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	20.16		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	820.5	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	29.50		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

	K=	0.75		*AASHTO 4.6.2.5*
	l=	188.31	in	
	r_s =	4.79	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	8993.01	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

The section is assumed to a close section because of the lacing bars. Flexural torsion capacity is neglected for a close section.

P_e =	8993.01	kip			
P_e/P_o =	10.96		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	789.76	kip	*AASHTO 6.9.4.1.1*
P_r =	**710.78**	kip	*AASHTO 6.9.2.1*

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MEMBER U4-U5

use MC12x35 in the steel manual

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x35	20.60	6.00	123.60	741.60	432.00	1173.60
Σ A =	**27.35**	Σ Ay =	205.87		$\Sigma Ay^2 + I_o$ =	2176.29
	Y_{bar} =	7.53			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	626.72
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.79**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x35	20.60	6.55		884	25.2	908.99
Σ A =	27.35				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	1091.24
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**6.32**				

Member Capacity

Slenderness

	b =	3.75	in		E =	29000	ksi
	t =	0.7	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	5.36		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.375	in		E =	29000	ksi
	t =	0.465	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	20.16		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	820.5	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	28.80		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

K=	0.75			*AASHTO 4.6.2.5*
l=	183.81	in		
r_s =	4.79	in		

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	9438.73	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

The section is assumed to a close section because of the lacing bars. Flexural torsion capacity is neglected for a close section.

P_e =	9438.73	kip			
P_e/P_o =	11.50		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	791.18	kip	*AASHTO 6.9.4.1.1*
P_r =	**712.07**	kip	*AASHTO 6.9.2.1*

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Vertical

MEMBER L1-U1

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L3 x 3x 5/16	2	0.31	1.78	3.56
Holes Out	2		0.25	-0.51
Bot Angles, L3 x 3x 5/16	2	0.31	1.78	3.56
Holes Out	2		0.25	-0.51
Totals			Gross =	**7.12**
			Net =	**6.10**

Member Capacity **(tension)**

ϕ_y = 0.95	ϕ_u = 0.8		*AASHTO 6.5.4.2*
F_y = 30	F_u = 60		*MBE Tab 6A.6.2.1*
R_p = 0.9	U = 1		*AASHTO 6.8.2.1*
$P_r = \phi_y F_y A_g$	202.9 kip		*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	263.7 kip		*AASHTO 6.8.2.1*
P_r =	**202.9** kip		

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MEMBER L2-U2

ϕ_{hole} = 0.813 in

STRONG AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3x 3/8	2	2.86	4.36	12.48	54.48	2.01	112.98
Bot Angles, L5 x 3x 3/8	2	2.86	-4.36	-12.48	54.48	2.01	112.98
Σ A =	Gross =	**11.44**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	225.96
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	225.96
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.44**					

WEAK AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3x 3/8	2	2.86	1.88	5.37	10.08	7.35	34.86
Bot Angles, L5 x 3x 3/8	2	2.86	-1.88	-5.37	10.08	7.35	34.86
Σ A =		**11.44**				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	69.73
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**2.47**					

Holes Out	4		
Holes Out Area	1.22	Net =	**10.22**

Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.375	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	13.33		<	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
non slender	Q =		1			*AASHTO 6.9.4.2.1*
$P_o = QF_yA_g$ =	343.2	kip				*AASHTO 6.9.4.1.1*

Flexural buckling

This is a doubly symmetrical section.

K=	0.75		*AASHTO 4.6.2.5*
l=	198	in	
r_s =	2.47	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	904.98	kip			*AASHTO 6.9.4.1.2*
P_e/P_o =	2.64		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	292.83	kip	*AASHTO 6.9.4.1.1*
P_r =	**263.55**	kip	*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	326.0	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	441.6	kip	*AASHTO 6.8.2.1*
P_r =	**326.0**	kip	

Note: Torsional buckling is not considered for doubly symmetrical section since KzLz is less than KL as per AASHTO C6.9.4.1.3.

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MEMBER L3-U3

ϕ_{hole} = 0.813 in

STRONG AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	4.39	10.53	46.24	1.72	95.93
Bot Angles, L5 x 3 x 5/16	2	2.40	-4.39	-10.53	46.24	1.72	95.93
Σ A =	Gross =	**9.60**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	191.85
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	191.85
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.47**					

WEAK AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	1.86	4.46	8.28	6.24	29.04
Bot Angles, L5 x 3 x 5/16	2	2.40	-1.86	-4.46	8.28	6.24	29.04
Σ A =		**9.60**				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	58.08
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**2.46**					

Holes Out	4		
Holes Out Area	1.02	Net =	**8.58**

Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	16.00		>	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
slender			<	$0.91(E/F_y)^{1/2}$ =	28.29	*AASHTO 6.9.4.2.2-5*
$Q = 1.34-0.76*(b/t)*(Fy/E)^{1/2}$	0.95					*AASHTO 6.9.4.2.2-5*
$P_o = QF_yA_g$ =	273.28	kip				*AASHTO 6.9.4.1.1*

Flexural buckling

This is a doubly symmetrical section.

K=	0.75				*AASHTO 4.6.2.5*
l=	215.25	in			
r_s =	2.46	in			

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	637.88	kip			*AASHTO 6.9.4.1.2*
P_e/P_o =	2.33		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	228.42	kip		*AASHTO 6.9.4.1.1*
P_r =	**205.58**	kip		*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	273.6	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	370.8	kip	*AASHTO 6.8.2.1*
P_r =	**273.6**	kip	

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MEMBER L4-U4

ϕ_{hole} = 0.813 in

STRONG AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	4.39	10.53	46.24	1.72	95.93
Bot Angles, L5 x 3 x 5/16	2	2.40	-4.39	-10.53	46.24	1.72	95.93
Σ A =	Gross =	**9.60**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	191.85
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	191.85
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.47**					

WEAK AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	1.86	4.46	8.28	6.24	29.04
Bot Angles, L5 x 3 x 5/16	2	2.40	-1.86	-4.46	8.28	6.24	29.04
Σ A =		**9.60**				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	58.08
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**2.46**					

Holes Out	4		
Holes Out Area	1.02	Net =	**8.58**

Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	16.00		>	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
slender			<	$0.91(E/F_y)^{1/2}$ =	28.29	*AASHTO 6.9.4.2.2-5*
$Q = 1.34-0.76*(b/t)*(Fy/E)^{1/2}$	0.95					*AASHTO 6.9.4.2.2-5*
$P_o = QF_yA_g$ =	273.28	kip				*AASHTO 6.9.4.1.1*

Flexural buckling

This is a doubly symmetrical section.

K=	0.75				*AASHTO 4.6.2.5*
l=	219.25	in			
r_s =	2.46	in			

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	614.82	kip			*AASHTO 6.9.4.1.2*
P_e/P_o =	2.25		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	226.89	kip		*AASHTO 6.9.4.1.1*
P_r =	**204.20**	kip		*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	273.6	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	370.8	kip	*AASHTO 6.8.2.1*
P_r =	**273.6**	kip	

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Diagonal

MEMBER L2U1

ϕ_{hole} = 0.813 in

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L4 x 3x 7/16	2	2.87	4.32	12.40	53.59	2.18	111.53
Bot Angles, L4 x 3x 7/16	2	2.87	-4.32	-12.40	53.59	2.18	111.53
Σ A =		**11.48**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	223.06
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	223.06
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.41**					

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L4 x 3x 7/16	2	2.87	1.49	4.27	6.35	4.52	21.74
Bot Angles, L4 x 3x 7/16	2	2.87	-1.49	-4.27	6.35	4.52	21.74
Σ A =		11.48				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	43.48
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**1.95**					

Holes Out	4		
Holes Out Area	3.25	Net =	**8.23**

Member Capacity **(compression)**

Slenderness

b =	4	in		E =	29000	ksi
t =	0.4375	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	9.14		<	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
non slender	Q =		1			*AASHTO 6.9.4.2.1*
$P_o = QF_yA_g$ =	344.4	kip				*AASHTO 6.9.4.1.1*

Flexural buckling

This is a doubly symmetrical section.

K=	0.75				*AASHTO 4.6.2.5*
l=	259.56	in			
r_s =	1.95	in			

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	328.40	kip			*AASHTO 6.9.4.1.2*
P_e/P_o =	0.95		>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	222.04	kip	*AASHTO 6.9.4.1.1*
P_r =	**199.84**	kip	*AASHTO 6.9.2.1*

Member Capacity **(tension)**

ϕ_y = 0.95	ϕ_u = 0.8	*AASHTO 6.5.4.2*	
F_y = 30	F_u = 60	*MBE Tab 6A.6.2.1*	
R_p = 0.9	U = 1	*AASHTO 6.8.2.1*	
$P_r = \phi_y F_y A_g$	327.2 kip		*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	355.5 kip		*AASHTO 6.8.2.1*
P_r =	**327.2** kip		

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MEMBER L3-U2

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L4 x 3x 5/16	2	2.09	4.38	9.14	40.00	1.62	83.25
Bot Angles, L4 x 3x 5/16	2	2.09	-4.38	-9.14	40.00	1.62	83.25
Σ A =		**8.36**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	166.50
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	166.50
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.46**					

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L4 x 3x 5/16	2	2.09	1.44	3.00	4.32	3.36	15.36
Bot Angles, L4 x 3x 5/16	2	2.09	-1.44	-3.00	4.32	3.36	15.36
Σ A =		8.36				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	30.72
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**1.92**					

Holes Out	4		
Holes Out Area	3.25	Net =	**5.11**

Member Capacity **(compression)**

Slenderness

b =	4	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	12.80		<	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
non slender	Q =		1			*AASHTO 6.9.4.2.1*
$P_o = QF_yA_g$ =	250.8	kip				*AASHTO 6.9.4.1.1*

Flexural buckling

This is a doubly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	282.06	in				
r_s =	1.92	in				

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	196.45	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	0.78		>	0.44		*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	146.98	kip		*AASHTO 6.9.4.1.1*
P_r =	**132.28**	kip		*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	238.3	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	220.8	kip	*AASHTO 6.8.2.1*
P_r =	**220.8**	kip	

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MEMBER L4-U3

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3x 5/16	1	2.40	4.45	10.68	47.57	1.72	49.29
Bot Angles, L5 x 3x 5/16	1	2.40	-4.45	-10.68	47.57	1.72	49.29
Σ A =		**4.80**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	98.58
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	98.58
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.53**					

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3x 5/16	1	2.40	0.00	0.00	0.00	6.24	6.24
Bot Angles, L5 x 3x 5/16	1	2.40	0.00	0.00	0.00	6.24	6.24
Σ A =		4.80				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	12.48
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**1.61**					

Holes Out	2		
Holes Out Area	1.63	Net =	**3.18**

Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	16.00		>	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
slender			<	$0.91(E/F_y)^{1/2}$ =	28.29	*AASHTO 6.9.4.2.2-5*
$Q = 1.34-0.76*(b/t)*(Fy/E)^{1/2}$	0.95					*AASHTO 6.9.4.2.2-5*
$P_o = QF_yA_g$ =	136.64	kip				*AASHTO 6.9.4.1.1*

Flexural buckling

This is a singly symmetrical section.

K=	0.75		*AASHTO 4.6.2.5*
l=	150.91	in	
r_s =	1.61	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	278.84	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

y_0 =	3.77	in	see supplemental calcs
r_0^2 =	37.35		*AASHTO 6.9.4.1.3-3*
H =	0.62		*AASHTO 6.9.4.1.3-7*
P_{ey} =	278.84	kip	
G =	11165	ksi	
Kzlz =	75.455	in	
J =	0.17		
Cw =	0.232		
P_{ez} =	49.74	kip	

$$H := 1 - \frac{y_0^2}{r_0^2} = 0.434$$

$$P_{ey} := \frac{\pi^2 \cdot E \cdot A_g}{\left(\frac{K_y \cdot l_y}{r_y}\right)^2}$$

$$P_{ez} := \left[\frac{\pi^2 \cdot E \cdot C_w}{(K_z \cdot l_z)^2} + G \cdot J\right] \cdot \frac{1}{r_0^2}$$

$$P_e = \frac{P_{ey} + P_{ez}}{2H} \cdot \left[1 - \sqrt{\frac{1 - 4 \cdot P_{ey} \cdot P_{ez} \cdot H}{(P_{ey} + P_{ez})^2}}\right]$$

P_e =	46.24	kip			
P_e =	46.24				
P_e/P_o =	0.34		<	0.44	*AASHTO 6.9.4.1.1-1*
P_n =	41.02	kip			*AASHTO 6.9.4.1.1*
P_r =	**36.92**	kip			*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	136.8	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	137.2	kip	*AASHTO 6.8.2.1*
P_r =	**136.8**	kip	

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MEMBER L3-U4, L5-U4, L4-U5

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L3 x 3x 5/16	1	1.78	4.27	7.59	32.38	1.50	33.88
Bot Angles, L3 x 3x 5/16	1	1.78	-4.27	-7.59	32.38	1.50	33.88
Σ A =		**3.56**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	67.76
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	67.76
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.36**					

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L3 x 3x 5/16	1	1.78	0.00	0.00	0.00	1.50	1.50
Bot Angles, L3 x 3x 5/16	1	1.78	0.00	0.00	0.00	1.50	1.50
Σ A =		3.56				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	3.00
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**0.92**					

Holes Out	2		
Holes Out Area	1.63	Net =	**1.94**

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	101.5	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	83.6	kip	*AASHTO 6.8.2.1*
P_r =	**83.6**	kip	

AS-INSPECTED

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BOTTOM CHORD

MEMBER L0-L2 OR L7-L9

Section Losses

Span 1 - Left Truss 1 **L1L2 @ L1**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.3100	0.003	0.013
B	3.00	0.3125	0.3125	0.000	0.000
C	3.00	0.3125	0.3125	0.000	0.000
D	5.00	0.3125	0.3125	0.000	0.000
E	5.00	0.3125	0.2850	0.028	0.138
F	3.00	0.3125	0.3050	0.008	0.023
G	3.00	0.3125	0.2810	0.032	0.094
H	5.00	0.3125	0.2880	0.025	0.123
				Total Area Loss	**0.390**

Span 1 - Right Truss 2 **L0L1 @ L1**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.288	0.025	0.123
B	3.00	0.3125	0.163	0.150	0.449
C	3.00	0.3125	0.179	0.134	0.401
D	5.00	0.3125	0.249	0.064	0.318
E	5.00	0.3125	0.254	0.059	0.293
F	3.00	0.3125	0.163	0.150	0.449
G	3.00	0.3125	0.179	0.134	0.401
H	5.00	0.3125	0.271	0.042	0.208
				Total Area Loss	**2.638**

Span 2 - Left Truss 1 **L8L9 @ L8**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.313	0.000	0.000
B	3.00	0.3125	0.306	0.007	0.020
C	3.00	0.3125	0.182	0.131	0.392
D	5.00	0.3125	0.305	0.008	0.038
E	5.00	0.3125	0.312	0.001	0.003
F	3.00	0.3125	0.210	0.103	0.308
G	3.00	0.3125	0.166	0.147	0.440
H	5.00	0.3125	0.306	0.007	0.033
				Total Area Loss	**1.231**

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Span 2 - Right Truss 2 **L8L9 @ L9**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.307	0.006	0.028
B	3.00	0.3125	0.267	0.046	0.137
C	3.00	0.3125	0.307	0.006	0.017
D	5.00	0.3125	0.299	0.014	0.068
E	5.00	0.3125	0.300	0.013	0.063
F	3.00	0.3125	0.195	0.118	0.353
G	3.00	0.3125	0.279	0.034	0.101
H	5.00	0.3125	0.293	0.020	0.098
				Total Area Loss	**0.861**

Section with PL G34 ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3x5/16	2	0.31	2.40	4.80
Holes Out	2		0.25	-0.51
Bot Angles, L5x3x5/16	2	0.31	2.40	4.80
Holes Out	2		0.25	-0.51
G34, PL 9x9x1/2	1	0.50	4.50	4.50
Holes Out	2		0.41	-0.81
Totals			Gross =	11.46
			Net =	9.63

Section without PL G34

Piece	Number	Thickness (in)	Area	Sum Area	
Top Angles, L5x3x5/16	2	0.31	2.40	4.80	
Holes Out	0		0.25	0.00	
Bot Angles, L5x3x5/16	2	0.31	2.40	4.80	
Holes Out	0		0.25	0.00	
Totals			Gross =	**6.96**	control
			Net =	**6.96**	control

Member Capacity

ϕ_y = 0.95	ϕ_u = 0.8	*AASHTO 6.5.4.2*
F_y = 30	F_u = 60	*MBE Tab 6A.6.2.1*
R_p = 0.9	U = 1	*AASHTO 6.8.2.1*

$P_r = \phi_y F_y A_g$	198.4	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	300.8	kip	*AASHTO 6.8.2.1*
P_r =	**198.4**	kip	

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MEMBER L2-L3 OR L6-L7

Section Losses

Span 1 - Left Truss 1 **L6L7 @ Tie Plate 3**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.274	0.039	0.193
B	3.50	0.3125	0.203	0.110	0.383
C	3.50	0.3125	0.173	0.140	0.488
D	5.00	0.3125	0.257	0.056	0.278
E	5.00	0.3125	0.281	0.032	0.158
F	3.50	0.3125	0.203	0.110	0.383
G	3.50	0.3125	0.173	0.140	0.488
H	5.00	0.3125	0.264	0.049	0.243
Left Plate	11.00	0.3125	0.231	0.082	0.897
Right Plate	11.00	0.3125	0.225	0.088	0.963
				Total Area Loss	**4.472**

Span 1 - Right Truss 2 **L6L7 @ Tie Plate 1**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.273	0.040	0.198
B	3.50	0.3125	0.279	0.034	0.117
C	3.50	0.3125	0.184	0.129	0.450
D	5.00	0.3125	0.275	0.038	0.188
E	5.00	0.3125	0.28	0.033	0.163
F	3.50	0.3125	0.299	0.014	0.047
G	3.50	0.3125	0.24	0.073	0.254
H	5.00	0.3125	0.281	0.032	0.158
Left Plate	11.00	0.3125	0.25	0.063	0.688
Right Plate	11.00	0.3125	0.253	0.060	0.655
				Total Area Loss	**2.915**

Span 2 - Left Truss 1 **L2L3 @ Tie Plate 5**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.2840	0.029	0.143
B	3.50	0.3125	0.3125	0.000	0.000
C	3.50	0.3125	0.2830	0.030	0.103
D	5.00	0.3125	0.2820	0.031	0.153
E	5.00	0.3125	0.1860	0.127	0.633
F	3.50	0.3125	0.2710	0.042	0.145
G	3.50	0.3125	0.2300	0.083	0.289
H	5.00	0.3125	0.2790	0.034	0.168
Left Plate	11.00	0.3125	0.1420	0.171	1.876
Right Plate	11.00	0.3125	0.2180	0.095	1.040
				Total Area Loss	**4.547**

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Span 2 - Right Truss 2 **L6L7 @ Tie Plate 1**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.3125	0.2750	0.038	0.188
B	3.50	0.3125	0.2260	0.087	0.303
C	3.50	0.3125	0.2080	0.105	0.366
D	5.00	0.3125	0.2820	0.031	0.153
E	5.00	0.3125	0.3010	0.012	0.058
F	3.50	0.3125	0.1690	0.144	0.502
G	3.50	0.3125	0.1910	0.122	0.425
H	5.00	0.3125	0.2980	0.015	0.073
Left Plate	11.00	0.3125	0.2710	0.042	0.457
Right Plate	11.00	0.3125	0.2700	0.043	0.468
				Total Area Loss	**2.990**

Section with PL G36 ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3 1/2 x5/16	2	0.31	2.56	5.12
Holes Out	4		0.25	-1.02
Bot Angles, L5x3 1/2 x5/16	2	0.31	2.56	5.12
Holes Out	4		0.25	-1.02
G36, PL 9x9x1/2	1	0.50	4.50	4.50
Holes Out	2		0.41	-0.81
PL 11 x 5/16	2	0.31	3.44	6.88
Holes Out	4		0.25	-1.02
Totals			Gross =	17.07
			Net =	13.21

Section without PL G36 ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area	
Top Angles, L5x3 1/2 x5/16	2	0.31	2.56	5.12	
Holes Out	2		0.25	-0.51	
Bot Angles, L5x3 1/2 x5/16	2	0.31	2.56	5.12	
Holes Out	2		0.25	-0.51	
PL 11 x 5/16	2	0.31	3.44	6.88	
Holes Out	4		0.25	-1.02	
Totals			Gross =	**12.57**	control
			Net =	**10.54**	control

By inspection, the section without lateral plate controls.

Member Capacity

$P_r = \phi_y F_y A_g$ 358.2 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 455.2 kip *AASHTO 6.8.2.1*

$P_r =$ **358.2** kip

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MEMBER L3-L4 OR L5-L6

Section Losses

Span 1 - Left Truss 1 **L5L6 @ Tie Plate 5 Controls**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.423	0.015	0.073
B	3.50	0.4375	0.361	0.077	0.268
C	3.50	0.4375	0.291	0.147	0.513
D	5.00	0.4375	0.42	0.018	0.088
E	5.00	0.4375	0.371	0.067	0.333
F	3.50	0.4375	0.361	0.077	0.268
G	3.50	0.4375	0.291	0.147	0.513
H	5.00	0.4375	0.337	0.101	0.503
Left Plate	11.00	0.375	0.289	0.086	0.946
Right Plate	11.00	0.375	0.322	0.053	0.583
				Total Area Loss	**4.085**

Span 1 - Right Truss 2 **L3L4 @ 8.2' From L3**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.3870	0.051	0.253
B	3.50	0.4375	0.4375	0.000	0.000
C	3.50	0.4375	0.4375	0.000	0.000
D	5.00	0.4375	0.4010	0.037	0.183
E	5.00	0.4375	0.4110	0.027	0.133
F	3.50	0.4375	0.3760	0.062	0.215
G	3.50	0.4375	0.3280	0.110	0.383
H	5.00	0.4375	0.4120	0.026	0.128
Left Plate	11.00	0.375	0.3140	0.061	0.671
Right Plate	11.00	0.375	0.3440	0.031	0.341
				Total Area Loss	**2.306**

Span 2 - Left Truss 1 **L3L4 @ Midpoint Tie Plates 1 and 2 Controls**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.426	0.012	0.058
B	3.50	0.4375	0.414	0.024	0.082
C	3.50	0.4375	0.406	0.032	0.110
D	5.00	0.4375	0.415	0.023	0.113
E	5.00	0.4375	0.393	0.045	0.223
F	3.50	0.4375	0.390	0.048	0.166
G	3.50	0.4375	0.379	0.059	0.205
H	5.00	0.4375	0.388	0.050	0.248
Left Plate	11.00	0.375	0.317	0.058	0.638
Right Plate	11.00	0.375	0.329	0.046	0.506
				Total Area Loss	**2.348**

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Span 2 - Right Truss 2 **L3L4 @ Between Tie Plates 2 and 3 Controls**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.416	0.022	0.108
B	3.50	0.4375	0.399	0.039	0.135
C	3.50	0.4375	0.359	0.079	0.275
D	5.00	0.4375	0.415	0.023	0.113
E	5.00	0.4375	0.400	0.038	0.188
F	3.50	0.4375	0.364	0.074	0.257
G	3.50	0.4375	0.349	0.089	0.310
H	5.00	0.4375	0.399	0.039	0.193
Left Plate	11.00	0.375	0.328	0.047	0.517
Right Plate	11.00	0.375	0.341	0.034	0.374
				Total Area Loss	**2.468**

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3 1/2 x7/16	2	0.44	3.53	7.06
Holes Out	2		0.36	-0.71
Bot Angles, L5x3 1/2 x7/16	2	0.44	3.53	7.06
Holes Out	2		0.36	-0.71
PL 11 x 3/8	2	0.38	4.13	8.25
Holes Out	4		0.30	-1.22
Totals			Gross =	**18.29**
			Net =	**15.64**

Member Capacity

$P_r = \phi_y F_y A_g$ 521.1 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 675.8 kip *AASHTO 6.8.2.1*

P_r = **521.1** kip

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MEMBER L4-L5

Section Losses

Span 1 - Left Truss 1 **NSSL**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.4375	0.000	0.000
B	3.50	0.4375	0.4375	0.000	0.000
C	3.50	0.4375	0.4375	0.000	0.000
D	5.00	0.4375	0.4375	0.000	0.000
E	5.00	0.4375	0.4375	0.000	0.000
F	3.50	0.4375	0.4375	0.000	0.000
G	3.50	0.4375	0.4375	0.000	0.000
H	5.00	0.4375	0.4375	0.000	0.000
Left Plate	11.00	0.375	0.375	0.000	0.000
Right Plate	11.00	0.375	0.375	0.000	0.000
				Total Area Loss	**0.000**

Span 1 - Right Truss 2 **NSSL**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.4375	0.000	0.000
B	3.50	0.4375	0.4375	0.000	0.000
C	3.50	0.4375	0.4375	0.000	0.000
D	5.00	0.4375	0.4375	0.000	0.000
E	5.00	0.4375	0.4375	0.000	0.000
F	3.50	0.4375	0.4375	0.000	0.000
G	3.50	0.4375	0.4375	0.000	0.000
H	5.00	0.4375	0.4375	0.000	0.000
Left Plate	11.00	0.375	0.375	0.000	0.000
Right Plate	11.00	0.375	0.375	0.000	0.000
				Total Area Loss	**0.000**

Span 2 - Left Truss 1 **NO DATA SHEET FOR L4L5 <=5%, COPIED TRUSS 2**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.438	0.000	0.000
B	3.50	0.4375	0.310	0.128	0.446
C	3.50	0.4375	0.331	0.107	0.373
D	5.00	0.4375	0.438	0.000	0.000
E	5.00	0.4375	0.438	0.000	0.000
F	3.50	0.4375	0.351	0.087	0.303
G	3.50	0.4375	0.368	0.070	0.243
H	5.00	0.4375	0.438	0.000	0.000
Left Plate	11.00	0.375	0.375	0.000	0.000
Right Plate	11.00	0.375	0.375	0.000	0.000
				Total Area Loss	**1.365**

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Span 2 - Right Truss 2 **L4L5 @ Tie Plate 1**

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)
A	5.00	0.4375	0.438	0.000	0.000
B	3.50	0.4375	0.310	0.128	0.446
C	3.50	0.4375	0.331	0.107	0.373
D	5.00	0.4375	0.438	0.000	0.000
E	5.00	0.4375	0.438	0.000	0.000
F	3.50	0.4375	0.351	0.087	0.303
G	3.50	0.4375	0.368	0.070	0.243
H	5.00	0.4375	0.438	0.000	0.000
Left Plate	11.00	0.375	0.375	0.000	0.000
Right Plate	11.00	0.375	0.375	0.000	0.000
				Total Area Loss	**1.365**

ϕ_{hole} = 0.813 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L5x3 1/2 x1/2	2	0.50	4.00	8.00
Holes Out	2		0.41	-0.81
Bot Angles, L5x3 1/2 x1/2	2	0.50	4.00	8.00
Holes Out	2		0.41	-0.81
PL 11 x 3/8	2	0.38	4.13	8.25
Holes Out	4		0.30	-1.22
Totals			Gross =	**22.89**
			Net =	**20.04**

Member Capacity

$P_r = \phi_y F_y A_g$ 652.2 kip *AASHTO 6.8.2.1*

$P_r = \phi_u F_u A_n R_p U$ 865.8 kip *AASHTO 6.8.2.1*

P_r = **652.2** kip

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TOP CHORD - NO SIGNIFICANT SECTION LOSS

MEMBER L0-U1

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x25	14.68	6.00	88.08	528.48	288.00	816.48
Σ A =	**21.43**	Σ Ay =	170.35		$\Sigma Ay^2 + I_o$ =	1819.17
	Y_{bar} =	7.95			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	465.11
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.66**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x25	14.68	6.17		560	8.9	568.48
Σ A =	21.43				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	750.73
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**5.92**				

Member Capacity

Slenderness

channel leg	b =	3	in		E =	29000	ksi
	t =	0.5	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	6		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.75	in		E =	29000	ksi
	t =	0.387	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	25.19		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	642.9	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	45.89		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

	K=	0.75		*AASHTO 4.6.2.5*
	l=	285.06	in	
	r_s =	4.66	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

	P_e =	2912.42	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

	P_e =	2231000	kip	

	P_e =	2912.42	kip		
	P_e/P_o =	4.53	>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

	P_n =	586.16	kip	*AASHTO 6.9.4.1.1*
	P_r =	**527.55**	kip	*AASHTO 6.9.2.1*

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MEMBER U1-U2

use C12x20.7 in the steel manual

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x20.5	12.16	6.00	72.96	437.76	258.00	695.76
Σ A =	**18.91**	Σ Ay =	155.23		$\Sigma Ay^2 + I_o$ =	1698.45
	Y_{bar} =	8.21			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	424.26
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.74**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x20.5	12.16	6.20		467	7.72	474.85
Σ A =	18.91				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	657.10
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**5.89**				

Member Capacity

Slenderness

channel leg	b =	3	in		E =	29000	ksi
	t =	0.5	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	6		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.75	in		E =	29000	ksi
	t =	0.282	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	34.57		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	567.3	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	26.25		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

K=	0.75			*AASHTO 4.6.2.5*
l=	165.81	in		
r_s =	4.74	in		

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	7852.07	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

P_e =	2231000	kip	see supplymental calculation	
P_e =	7852.07	kip		
P_e/P_o =	13.84	>	0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	550.40	kip	*AASHTO 6.9.4.1.1*
P_r =	**495.36**	kip	*AASHTO 6.9.2.1*

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MEMBER U2-U3

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x30	17.62	6.00	105.72	634.32	324.00	958.32
Σ A =	**24.37**	Σ Ay =	187.99		$\Sigma Ay^2 + I_o$ =	1961.01
	Y_{bar} =	7.71			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	510.93
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.58**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x30	17.62	6.17		672	10.24	681.88
Σ A =	24.37				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	864.13
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**5.95**				

Member Capacity

Slenderness

channel leg	b =	3.125	in		E =	29000	ksi
	t =	0.5	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	6.25		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.75	in		E =	29000	ksi
	t =	0.51	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	19.12		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	731.1	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	30.11		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

	K=	0.75		*AASHTO 4.6.2.5*
	l=	183.81	in	
	r_s =	4.58	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

	P_e =	7694.75	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

	P_e =	2231000	kip	
	P_e =	7694.75	kip	
	P_e/P_o =	10.52	> 0.44	*AASHTO 6.9.4.1.1-1*
$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$	P_n =	702.60	kip	*AASHTO 6.9.4.1.1*
	P_r =	**632.34**	kip	*AASHTO 6.9.2.1*

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MEMBER U3-U4

use MC12x35 in the steel manual

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x35	20.60	6.00	123.60	741.60	432.00	1173.60
Σ A =	**27.35**	Σ Ay =	205.87		$\Sigma Ay^2 + I_o$ =	2176.29
	Y_{bar} =	7.53			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	626.72
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.79**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x35	20.60	6.55		884	25.2	908.99
Σ A =	27.35				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	1091.24
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**6.32**				

Member Capacity

Slenderness

	b =	3.75	in		E =	29000	ksi
	t =	0.7	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	5.36		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.375	in		E =	29000	ksi
	t =	0.465	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	20.16		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	820.5	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	29.50		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

	K=	0.75		*AASHTO 4.6.2.5*
	l=	188.31	in	
	r_s =	4.79	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	8993.01	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

P_e =	2231000	kip				
P_e =	8993.01	kip				
P_e/P_o =	10.96		>	0.44		*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	789.76	kip	*AASHTO 6.9.4.1.1*
P_r =	**710.78**	kip	*AASHTO 6.9.2.1*

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MEMBER U4-U5

use MC12x35 in the steel manual

AXIS X-X	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Plate, PL 18x3/8	6.75	12.19	82.27	1002.61	0.08	1002.69
Channels, 2 C12x35	20.60	6.00	123.60	741.60	432.00	1173.60
Σ A =	**27.35**	Σ Ay =	205.87		$\Sigma Ay^2 + I_o$ =	2176.29
	Y_{bar} =	7.53			$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	626.72
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.79**				

AXIS Y-Y	A	x		Ax^2	I_o	$Ad^2 + I_o$
Top Plate, PL 18x3/8	6.75	0.00		0	182.3	182.25
Channels, 2 C12x35	20.60	6.55		884	25.2	908.99
Σ A =	27.35				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	1091.24
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**6.32**				

Member Capacity

Slenderness

	b =	3.75	in		E =	29000	ksi
	t =	0.7	in		F_y =	30	ksi
	k =	0.56			F_u =	60	ksi
	b/t =	5.36		<	$k(E/F_y)^{1/2}$ =	17.41	*AASHTO 6.9.4.2.1*
channel web	b =	9.375	in		E =	29000	ksi
	t =	0.465	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	20.16		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
top plate	b =	11	in		E =	29000	ksi
	t =	0.375	in		F_y =	30	ksi
	k =	1.49			F_u =	60	ksi
	b/t =	29.33		<	$k(E/F_y)^{1/2}$ =	46.33	*AASHTO 6.9.4.2.1*
	non slender	Q =		1			*AASHTO 6.9.4.2.1*
	$P_o = QF_yA_g$ =	820.5	kip				*AASHTO 6.9.4.1.1*
slenderness limit	KL/r =	28.80		<	120	OK!	

Flexural buckling

This is a singly symmetrical section.

	K=	0.75		*AASHTO 4.6.2.5*
	l=	183.81	in	
	r_s =	4.79	in	

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	9438.73	kip	*AASHTO 6.9.4.1.2*

Flexural torsion buckling

P_e =	2231000	kip	

P_e =	9438.73	kip				
P_e/P_o =	11.50		>	0.44		*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	791.18	kip	*AASHTO 6.9.4.1.1*
P_r =	**712.07**	kip	*AASHTO 6.9.2.1*

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Vertical

MEMBER L1-U1 - NSSL ϕ_{hole} = 0.563 in

Piece	Number	Thickness (in)	Area	Sum Area
Top Angles, L3 x 3x 5/16	2	0.31	1.78	3.56
Holes Out	1		0.18	-0.18
Bot Angles, L3 x 3x 5/16	2	0.31	1.78	3.56
Holes Out	0		0.18	0.00
Totals			Gross =	**7.12**
			Net =	**6.94**

Member Capacity **(tension)**

ϕ_y = 0.95	ϕ_u = 0.8		*AASHTO 6.5.4.2*
F_y = 30	F_u = 60		*MBE Tab 6A.6.2.1*
R_p = 0.9	U = 1		*AASHTO 6.8.2.1*
$P_r = \phi_y F_y A_g$	202.9	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	300.0	kip	*AASHTO 6.8.2.1*
P_r =	**202.9**	kip	

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MEMBER L2-U2 OR L7-U7

Section Losses Axis X-X

Span 1 - Right Truss 2 **U7L7 @ L7** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	5.00	0.375	0.297	0.078	0.390	5.02	1.96	9.84	0.0002	9.84
B	3.00	0.375	0.281	0.094	0.282	3.56	1.00	3.58	0.2115	3.79
C	3.00	0.375	0.297	0.078	0.234	-3.56	-0.83	2.97	0.1755	3.15
D	5.00	0.375	0.313	0.062	0.310	-5.03	-1.56	7.85	0.0001	7.85
E	5.00	0.375	0.297	0.078	0.390	5.02	1.96	9.84	0.0002	9.84
F	3.00	0.375	0.281	0.094	0.282	3.56	1.00	3.58	0.2115	3.79
G	3.00	0.375	0.297	0.078	0.234	-3.56	-0.83	2.97	0.1755	3.15
H	5.00	0.375	0.313	0.062	0.310	-5.03	-1.56	7.85	0.0001	7.85
				Total Area Loss	**2.432**	**Total Ad**	1.14		**Total I Loss**	**49.25**
						ΔY_{bar} =	0.13			

ϕ_{hole} = 0.813 in

STRONG AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3x 3/8	2	2.86	4.36	24.96	108.96	2.01	112.98
Bot Angles, L5 x 3x 3/8	2	2.86	-4.36	-24.96	108.96	2.01	112.98
Σ A =	Gross =	**9.01**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	225.96
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	176.71
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.43**				$I_{xx\ new} = I_{xx} - (A^* \text{ new } Y_{bar}^2)$=	176.56

Section Losses Axis Y-Y

Span 1 - Right Truss 2 **U7L7 @ L7** distance between angles, d_x = 0.375 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	5.00	0.375	0.297	0.078	0.390	-2.69	-1.05	2.82	0.81250	3.63
B	3.00	0.375	0.281	0.094	0.282	-0.52	-0.15	0.07	0.00021	0.08
C	3.00	0.375	0.297	0.078	0.234	-0.52	-0.12	0.06	0.00012	0.06
D	5.00	0.375	0.313	0.062	0.310	-2.69	-0.83	2.24	0.64583	2.88
E	5.00	0.375	0.297	0.078	0.390	2.69	1.05	2.82	0.81250	3.63
F	3.00	0.375	0.281	0.094	0.282	0.52	0.15	0.07	0.00021	0.08
G	3.00	0.375	0.297	0.078	0.234	0.52	0.12	0.06	0.00012	0.06
H	5.00	0.375	0.313	0.062	0.310	2.69	0.83	2.24	0.64583	2.88
				Total Area Loss	**2.432**	**Total Ad**	0.00		**Total I Loss**	**13.31**
						ΔX_{bar} =	0.00			

WEAK AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3x 3/8	2	2.86	1.88	10.74	20.16	7.35	34.86
Bot Angles, L5 x 3x 3/8	2	2.86	-1.88	-10.74	20.16	7.35	34.86
Σ A =	Gross =	**9.01**				$\Sigma Ay^2 + I_o$ =	69.73
						$I_{yy} = (\Sigma Ax^2 + I_o)$ =	56.42
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**2.50**				$I_{yy\ new} = I_{yy} - (A^* \text{ new } X_{bar}^2)$=	56.42

Holes Out	2		
Holes Out Area	0.61	Net =	**8.40**

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Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.375	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	13.33		<	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
non slender	Q =		1			*AASHTO 6.9.4.2.1*
$P_o = QF_yA_g$ =	270.24	kip				*AASHTO 6.9.4.1.1*

Flextural buckling

This is a doubly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	198	in				
r_s =	2.50	in				

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	732.27	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	2.71		>		0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	231.56	kip				*AASHTO 6.9.4.1.1*
P_r =	**208.41**	kip				*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	256.7	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	362.8	kip	*AASHTO 6.8.2.1*
P_r =	**256.7**	kip	

Note: Torsional buckling is not considered for doubly symmetrical section since KzLz is less than KL as per AASHTO C6.9.4.1.3.

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MEMBER L3-U3 OR L6-U6

Section Losses Axis X-X

Span 1 - Right Truss 2 **U3L3 @ L3** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	5.00	0.3125	0.279	0.034	0.168	5.05	0.85	4.26	0.0000	4.26
B	3.00	0.3125	0.211	0.102	0.305	3.56	1.08	3.86	0.2284	4.09
C	3.00	0.3125	0.303	0.010	0.029	-3.56	-0.10	0.36	0.0214	0.38
D	5.00	0.3125	0.277	0.036	0.178	-5.04	-0.90	4.52	0.0000	4.52
E	5.00	0.3125	0.285	0.028	0.138	5.05	0.69	3.50	0.0000	3.50
F	3.00	0.3125	0.168	0.145	0.434	3.56	1.54	5.50	0.3251	5.83
G	3.00	0.3125	0.306	0.007	0.020	-3.56	-0.07	0.25	0.0146	0.26
H	5.00	0.3125	0.278	0.035	0.173	-5.05	-0.87	4.39	0.0000	4.39
				Total Area Loss	**1.441**	**Total Ad**	2.23		**Total I Loss**	**27.24**
						ΔY_{bar} =	0.27			

ϕ_{hole} = 0.813 in

STRONG AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	4.39	10.53	46.24	1.72	95.93
Bot Angles, L5 x 3 x 5/16	2	2.40	-4.39	-10.53	46.24	1.72	95.93
Σ A =	Gross =	**8.16**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	191.85
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	164.61
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.48**				$I_{xx\ new} = I_{xx} - (A^*\ new\ Y_{bar}^2)$=	164.00

Section Losses Axis Y-Y

Span 1 - Right Truss 2 **U3L3 @ L3** distance between angles, d_x = 0.375 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	5.00	0.3125	0.279	0.034	0.168	-2.69	-0.45	1.21	0.34896	1.56
B	3.00	0.3125	0.211	0.102	0.305	-0.45	-0.14	0.06	0.00026	0.06
C	3.00	0.3125	0.303	0.010	0.029	-0.50	-0.01	0.01	0.00000	0.01
D	5.00	0.3125	0.277	0.036	0.178	-2.69	-0.48	1.28	0.36979	1.65
E	5.00	0.3125	0.285	0.028	0.138	2.69	0.37	0.99	0.28646	1.28
F	3.00	0.3125	0.168	0.145	0.434	0.43	0.19	0.08	0.00075	0.08
G	3.00	0.3125	0.306	0.007	0.020	0.50	0.01	0.00	0.00000	0.00
H	5.00	0.3125	0.278	0.035	0.173	2.69	0.46	1.25	0.35938	1.61
				Total Area Loss	**1.441**	**Total Ad**	-0.05		**Total I Loss**	**6.25**
						ΔX_{bar} =	-0.01			

WEAK AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	1.86	4.46	8.28	6.24	29.04
Bot Angles, L5 x 3 x 5/16	2	2.40	-1.86	-4.46	8.28	6.24	29.04
Σ A =		**8.16**				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	51.83
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**2.52**				$I_{yy\ new} = I_{yy} - (A^*\ new\ X_{bar}^2)$=	51.83

Holes Out	2		
Holes Out Area	0.51	Net =	**7.65**

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Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	16.00		>	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
slender			<	$0.91(E/F_y)^{1/2}$ =	28.29	*AASHTO 6.9.4.2.2-5*
$Q = 1.34-0.76*(b/t)*(Fy/E)^{1/2}$	0.95					*AASHTO 6.9.4.2.2-5*
$P_o = QF_yA_g$ =	232.26	kip				*AASHTO 6.9.4.1.1*

Flextural buckling

This is a doubly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	215.25	in				
r_s =	2.52	in				

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	569.25	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	2.45		>		0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	195.80	kip				*AASHTO 6.9.4.1.1*
P_r =	**176.22**	kip				*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	232.5	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	330.5	kip	*AASHTO 6.8.2.1*
P_r =	**232.5**	kip	

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MEMBER L4-U4 OR L5-U5

Section Losses Axis X-X

Span 2 - Right Truss 1 **U4L4 @ L4** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	5.00	0.3125	0.296	0.017	0.083	5.05	0.42	2.11	0.0000	2.11
B	3.00	0.3125	0.299	0.014	0.041	3.56	0.14	0.51	0.0304	0.54
C	3.00	0.3125	0.212	0.101	0.302	-3.56	-1.07	3.83	0.2261	4.05
D	5.00	0.3125	0.271	0.042	0.208	-5.04	-1.05	5.27	0.0000	5.27
E	5.00	0.3125	0.292	0.021	0.103	5.05	0.52	2.62	0.0000	2.62
F	3.00	0.3125	0.295	0.018	0.053	3.56	0.19	0.67	0.0394	0.71
G	3.00	0.3125	0.198	0.115	0.344	-3.56	-1.22	4.36	0.2576	4.62
H	5.00	0.3125	0.285	0.028	0.138	-5.05	-0.69	3.50	0.0000	3.50
				Total Area Loss	**1.268**	**Total Ad**	-2.77		**Total I Loss**	**23.42**
						ΔY_{bar} =	-0.33			

ϕ_{hole} = 0.813 in

STRONG AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	4.39	10.53	46.24	1.72	95.93
Bot Angles, L5 x 3 x 5/16	2	2.40	-4.39	-10.53	46.24	1.72	95.93
Σ A =	Gross =	**8.33**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	191.85
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	168.43
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.48**				$I_{xx\ new} = I_{xx} - (A^*\ new\ Y_{bar}^2)$=	167.50

Section Losses Axis Y-Y

Span 2 - Right Truss 1 **U4L4 @ L4** distance between angles, d_x = 0.375 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	5.00	0.3125	0.296	0.017	0.083	-2.69	-0.22	0.60	0.17188	0.77
B	3.00	0.3125	0.299	0.014	0.041	-0.49	-0.02	0.01	0.00000	0.01
C	3.00	0.3125	0.212	0.101	0.302	-0.45	-0.14	0.06	0.00025	0.06
D	5.00	0.3125	0.271	0.042	0.208	-2.69	-0.56	1.50	0.43229	1.93
E	5.00	0.3125	0.292	0.021	0.103	2.69	0.28	0.74	0.21354	0.95
F	3.00	0.3125	0.295	0.018	0.053	0.49	0.03	0.01	0.00000	0.01
G	3.00	0.3125	0.198	0.115	0.344	0.44	0.15	0.07	0.00038	0.07
H	5.00	0.3125	0.285	0.028	0.138	2.69	0.37	0.99	0.28646	1.28
				Total Area Loss	**1.268**	**Total Ad**	-0.11		**Total I Loss**	**5.08**
						ΔX_{bar} =	-0.01			

WEAK AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3 x 5/16	2	2.40	1.86	4.46	8.28	6.24	29.04
Bot Angles, L5 x 3 x 5/16	2	2.40	-1.86	-4.46	8.28	6.24	29.04
Σ A =		**8.33**				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	53.00
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**2.52**				$I_{yy\ new} = I_{yy} - (A^*\ new\ X_{bar}^2)$=	53.00

Holes Out	2		
Holes Out Area	0.51	Net =	**7.82**

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Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	16.00		>	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
slender			<	$0.91(E/F_y)^{1/2}$ =	28.29	*AASHTO 6.9.4.2.2-5*
$Q = 1.34-0.76*(b/t)*(Fy/E)^{1/2}$	0.95					*AASHTO 6.9.4.2.2-5*
$P_o = QF_yA_g$ =	237.19	kip				*AASHTO 6.9.4.1.1*

Flextural buckling

This is a doubly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	219.25	in				
r_s =	2.52	in				

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	560.99	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	2.37		>		0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	198.72	kip				*AASHTO 6.9.4.1.1*
P_r =	**178.84**	kip				*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	237.5	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	338.0	kip	*AASHTO 6.8.2.1*
P_r =	**237.5**	kip	

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Diagonal

MEMBER L2-U1 OR L7-U8

Section Losses Axis X-X

Span 2 - Right Truss 2 **U1L2 @ L2** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	4.00	0.4375	0.304	0.134	0.534	5.00	2.67	13.33	0.0008	13.33
B	3.00	0.4375	0.4375	0.000	0.000	3.56	0.00	0.00	0.0000	0.00
C	3.00	0.4375	0.4375	0.000	0.000	-3.56	0.00	0.00	0.0000	0.00
D	4.00	0.4375	0.4375	0.000	0.000	-5.06	0.00	0.00	0.0000	0.00
E	4.00	0.4375	0.416	0.022	0.086	5.05	0.43	2.19	0.0000	2.19
F	3.00	0.4375	0.4375	0.000	0.000	3.56	0.00	0.00	0.0000	0.00
G	3.00	0.4375	0.4375	0.000	0.000	-3.56	0.00	0.00	0.0000	0.00
H	4.00	0.4375	0.416	0.022	0.086	-5.05	-0.43	2.19	0.0000	2.19
				Total Area Loss	**0.706**	**Total Ad**	2.67		**Total I Loss**	**17.72**
						ΔY_{bar} =	0.25			

ϕ_{hole} = 0.813 in

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L4 x 3x 7/16	2	2.87	4.32	12.40	53.59	2.18	111.53
Bot Angles, L4 x 3x 7/16	2	2.87	-4.32	-12.40	53.59	2.18	111.53
Σ A =		**10.77**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	223.06
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	205.35
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.36**				$I_{xx\ new} = I_{xx} - (A^*\ new\ Y_{bar}^2)$=	204.69

Section Losses Axis Y-Y

Span 2 - Right Truss 2 **U1L2 @ L2** distance between angles, d_x = 0.375 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	4.00	0.4375	0.304	0.134	0.534	-2.19	-1.17	2.56	0.71200	3.27
B	3.00	0.4375	0.4375	0.000	0.000	-0.63	0.00	0.00	0.00000	0.00
C	3.00	0.4375	0.4375	0.000	0.000	-0.63	0.00	0.00	0.00000	0.00
D	4.00	0.4375	0.4375	0.000	0.000	-2.19	0.00	0.00	0.00000	0.00
E	4.00	0.4375	0.416	0.022	0.086	2.19	0.19	0.41	0.11467	0.53
F	3.00	0.4375	0.4375	0.000	0.000	0.63	0.00	0.00	0.00000	0.00
G	3.00	0.4375	0.4375	0.000	0.000	0.63	0.00	0.00	0.00000	0.00
H	4.00	0.4375	0.416	0.022	0.086	2.19	0.19	0.41	0.11467	0.53
				Total Area Loss	**0.706**	**Total Ad**	-0.79	**Total I Loss**	**Total I Loss**	**4.32**
						ΔX_{bar} =	-0.07			

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L4 x 3x 7/16	2	2.87	1.49	4.27	6.35	4.52	21.74
Bot Angles, L4 x 3x 7/16	2	2.87	-1.49	-4.27	6.35	4.52	21.74
Σ A =		10.77				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	39.16
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**1.91**				$I_{yy\ new} = I_{yy} - (A^*\ new\ X_{bar}^2)$=	39.10

Holes Out	0		
Holes Out Area	0.00	Net =	**10.77**

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Member Capacity **(compression)**

Slenderness

b =	4	in		E =	29000	ksi	
t =	0.4375	in		F_y =	30	ksi	
k =	0.45			F_u =	60	ksi	
b/t =	9.14		<	$k(E/F_y)^{1/2}$ =	13.99		*AASHTO 6.9.4.2.1*
non slender	Q =		1				*AASHTO 6.9.4.2.1*
$P_o = QF_yA_g$ =	323.22	kip					*AASHTO 6.9.4.1.1*

Flextural buckling

This is a doubly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	259.56	in				
r_s =	1.91	in				

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	295.33	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	0.91		>	0.44		*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	204.44	kip				*AASHTO 6.9.4.1.1*
P_r =	**183.99**	kip				*AASHTO 6.9.2.1*

Member Capacity **(tension)**

ϕ_y = 0.95	ϕ_u = 0.8		*AASHTO 6.5.4.2*
F_y = 30	F_u = 60		*MBE Tab 6A.6.2.1*
R_p = 0.9	U = 1		*AASHTO 6.8.2.1*
$P_r = \phi_y F_y A_g$	307.1 kip		*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	465.4 kip		*AASHTO 6.8.2.1*
P_r =	**307.1** kip		

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MEMBER L3-U2 OR L6-U7

Section Losses Axis X-X

Span 2 - Right Truss 2 **U2L3 @ L3** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	4.00	0.3125	0.31	0.003	0.010	5.06	0.05	0.26	0.0000	0.26
B	3.00	0.3125	0.3125	0.000	0.000	3.56	0.00	0.00	0.0000	0.00
C	3.00	0.3125	0.3125	0.000	0.000	-3.56	0.00	0.00	0.0000	0.00
D	4.00	0.3125	0.297	0.016	0.062	-5.05	-0.31	1.58	0.0000	1.58
E	4.00	0.3125	0.289	0.024	0.094	5.05	0.47	2.40	0.0000	2.40
F	3.00	0.3125	0.3125	0.000	0.000	3.56	0.00	0.00	0.0000	0.00
G	3.00	0.3125	0.3125	0.000	0.000	-3.56	0.00	0.00	0.0000	0.00
H	4.00	0.3125	0.25	0.063	0.250	-5.03	-1.26	6.33	0.0001	6.33
				Total Area Loss	**0.416**	**Total Ad**	-1.05		**Total I Loss**	**10.57**
						$\triangle Y_{bar}$ =	-0.13			

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L4 x 3x 5/16	2	2.09	4.38	9.14	40.00	1.62	83.25
Bot Angles, L4 x 3x 5/16	2	2.09	-4.38	-9.14	40.00	1.62	83.25
Σ A =		**7.94**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	166.50
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	155.93
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.43**				$I_{xx\ new} = I_{xx} - (A^*\ new\ Y_{bar}^2)$=	155.79

Section Losses Axis Y-Y

Span 2 - Right Truss 2 **U2L3 @ L3** distance between angles, d_x = 0.375 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
A	4.00	0.3125	0.31	0.003	0.010	-2.19	-0.02	0.05	0.01333	0.06
B	3.00	0.3125	0.3125	0.000	0.000	-0.50	0.00	0.00	0.00000	0.00
C	3.00	0.3125	0.3125	0.000	0.000	-0.50	0.00	0.00	0.00000	0.00
D	4.00	0.3125	0.297	0.016	0.062	-2.19	-0.14	0.30	0.08267	0.38
E	4.00	0.3125	0.289	0.024	0.094	2.19	0.21	0.45	0.12533	0.58
F	3.00	0.3125	0.3125	0.000	0.000	0.50	0.00	0.00	0.00000	0.00
G	3.00	0.3125	0.3125	0.000	0.000	0.50	0.00	0.00	0.00000	0.00
H	4.00	0.3125	0.25	0.063	0.250	2.19	0.55	1.20	0.33333	1.53
				Total Area Loss	**0.416**	**Total Ad**	0.60		**Total I Loss**	**2.55**
						$\triangle X_{bar}$ =	0.07			

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L4 x 3x 5/16	2	2.09	1.44	3.00	4.32	3.36	15.36
Bot Angles, L4 x 3x 5/16	2	2.09	-1.44	-3.00	4.32	3.36	15.36
Σ A =		7.94				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	28.17
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**1.88**				$I_{yy\ new} = I_{yy} - (A^*\ new\ X_{bar}^2)$=	28.13

Holes Out	0		
Holes Out Area	0.00	Net =	**7.94**

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Member Capacity **(compression)**

Slenderness

b =	4	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	12.80		<	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
non slender	Q =		1			*AASHTO 6.9.4.2.1*
$P_o = QF_yA_g$ =	238.32	kip				*AASHTO 6.9.4.1.1*

Flextural buckling

This is a doubly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	282.06	in				
r_s =	1.88	in				

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

P_e =	179.88	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	0.75		>		0.44	*AASHTO 6.9.4.1.1-1*

$$P_n = 0.658^{\left(\frac{P_o}{P_e}\right)} \cdot P_o$$

P_n =	136.88	kip				*AASHTO 6.9.4.1.1*
P_r =	**123.19**	kip				*AASHTO 6.9.2.1*

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	226.4	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	343.2	kip	*AASHTO 6.8.2.1*
P_r =	**226.4**	kip	

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MEMBER L4-U3 OR L5-U6

Section Losses Axis X-X

Span 2 - Right Truss 2 **L5U6 @ L5** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
E or A	5.00	0.3125	0.213	0.100	0.498	5.01	2.49	12.50	0.0004	12.50
F or B	3.00	0.3125	0.3125	0.000	0.000	3.56	0.00	0.00	0.0000	0.00
G or C	3.00	0.3125	0.3125	0.000	0.000	-3.56	0.00	0.00	0.0000	0.00
H or D	5.00	0.3125	0.287	0.026	0.128	-5.05	-0.64	3.25	0.0000	3.25
				Total Area Loss	**0.625**	**Total Ad**	1.85		**Total I Loss**	**15.75**
						ΔY_{bar} =	0.44			

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L5 x 3x 5/16	1	2.40	4.45	10.68	47.57	1.72	49.29
Bot Angles, L5 x 3x 5/16	1	2.40	-4.45	-10.68	47.57	1.72	49.29
Σ A =		**4.18**	Σ Ay =	0.00		Σ $Ay^2 + I_o$ =	98.58
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	82.82
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.43**				$I_{xx\ new} = I_{xx} - (A^*\ new\ Y_{bar}^2)$=	82.01

Section Losses Axis Y-Y

Span 2 - Right Truss 2 **L5U6 @ L5** distance to angle centroid, d_x = 1.68 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
E or A	5.00	0.3125	0.213	0.100	0.498	-1.66	-0.83	1.37	1.03646	2.41
F or B	3.00	0.3125	0.3125	0.000	0.000	1.68	0.00	0.00	0.00000	0.00
G or C	3.00	0.3125	0.3125	0.000	0.000	1.68	0.00	0.00	0.00000	0.00
H or D	5.00	0.3125	0.287	0.026	0.128	-1.66	-0.21	0.35	0.26563	0.62
				Total Area Loss	**0.625**	**Total Ad**	-1.04		**Total I Loss**	**3.02**
						ΔX_{bar} =	-0.25			

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L5 x 3x 5/16	1	2.40	0.00	0.00	0.00	6.24	6.24
Bot Angles, L5 x 3x 5/16	1	2.40	0.00	0.00	0.00	6.24	6.24
Σ A =		4.18				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	9.46
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**1.48**				$I_{yy\ new} = I_{yy} - (A^*\ new\ X_{bar}^2)$=	9.20

Holes Out	0		
Holes Out Area	0.00	Net =	**4.18**

Member Capacity **(compression)**

Slenderness

b =	5	in		E =	29000	ksi
t =	0.3125	in		F_y =	30	ksi
k =	0.45			F_u =	60	ksi
b/t =	16.00		>	$k(E/F_y)^{1/2}$ =	13.99	*AASHTO 6.9.4.2.1*
slender			<	$0.91(E/F_y)^{1/2}$ =	28.29	*AASHTO 6.9.4.2.2-5*
$Q = 1.34-0.76*(b/t)*(Fy/E)^{1/2}$	0.95					*AASHTO 6.9.4.2.2-5*
$P_o = QF_yA_g$ =	118.85	kip				*AASHTO 6.9.4.1.1*

Flextural buckling

This is a singly symmetrical section.

K=	0.75					*AASHTO 4.6.2.5*
l=	150.91	in				
r_s =	1.48	in				
P_e =	205.51	kip				*AASHTO 6.9.4.1.2*
P_e/P_o =	1.73		>	0.44		*AASHTO 6.9.4.1.1-1*
P_n =	93.30	kip				*AASHTO 6.9.4.1.1*
P_r =	**83.97**	kip				*AASHTO 6.9.2.1*

$$P_e = \frac{\pi^2 \cdot E}{\left(\frac{K \cdot l}{r_s}\right)^2} \cdot A_g$$

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	119.0	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	180.4	kip	*AASHTO 6.8.2.1*
P_r =	**119.0**	kip	

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MEMBER L3-U4, L5-U4, L4-U5, L6-U5

Section Losses Axis X-X

Span 1 - Left Truss 2 **L3U4 @ L3** overall member height, h_y = 10.125 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
E or A	3.00	0.3125	0.266	0.047	0.140	5.04	0.70	3.54	0.0000	3.54
F or B	3.00	0.3125	0.3125	0.000	0.000	3.56	0.00	0.00	0.0000	0.00
G or C	3.00	0.3125	0.3125	0.000	0.000	-3.56	0.00	0.00	0.0000	0.00
H or D	3.00	0.3125	0.276	0.037	0.110	-5.04	-0.55	2.79	0.0000	2.79
				Total Area Loss	**0.249**	**Total Ad**	0.15	**Total I Loss**		**6.33**
						ΔY_{bar} =	0.05			

AXIS X-X	Number	A	y	Ay	Ay^2	I_o	$Ay^2 + I_o$
Top Angles, L3 x 3x 5/16	1	1.78	4.27	7.59	32.38	1.50	33.88
Bot Angles, L3 x 3x 5/16	1	1.78	-4.27	-7.59	32.38	1.50	33.88
Σ A =		**3.31**	Σ Ay =	0.00		$\Sigma Ay^2 + I_o$ =	67.76
	Y_{bar} =	0.00				$I_{xx} = (\Sigma Ay^2 + I_o) - \Sigma A \times Y_{bar}^2$ =	61.43
	$r_x = (I_{xx} / \Sigma A)^{0.5}$ =	**4.31**				$I_{xx\ new} = I_{xx} - (A^*\ new\ Y_{bar}^2)$=	61.42

Section Losses Axis Y-Y

Span 1 - Left Truss 2 **L3U4 @ L3** distance to angle centroid, d_x = 0.865 in

Leg	Length (in)	Original Thickness (in)	Measured Thickness (in)	Thickness Loss (in)	Area Loss (in^2)	d	Ad	Ad^2	I_o	$I_{total\ loss}$
E or A	3.00	0.3125	0.266	0.047	0.140	-0.66	-0.09	0.06	0.10463	0.17
F or B	3.00	0.3125	0.3125	0.000	0.000	1.68	0.00	0.00	0.00000	0.00
G or C	3.00	0.3125	0.3125	0.000	0.000	1.68	0.00	0.00	0.00000	0.00
H or D	3.00	0.3125	0.276	0.037	0.110	-0.66	-0.07	0.05	0.08212	0.13
				Total Area Loss	**0.249**	**Total Ad**	-0.16		**Total I Loss**	**0.30**
						ΔX_{bar} =	-0.05			

AXIS Y-Y	Number	A	x	Ax	Ax^2	I_o	$Ad^2 + I_o$
Top Angles, L3 x 3x 5/16	1	1.78	0.00	0.00	0.00	1.50	1.50
Bot Angles, L3 x 3x 5/16	1	1.78	0.00	0.00	0.00	1.50	1.50
Σ A =		3.31				$I_{yy} = (\Sigma Ax^2 + I_o)$ =	2.70
	$r_y = (I_{yy} / \Sigma A)^{0.5}$ =	**0.90**				$I_{yy\ new} = I_{yy} - (A^*\ new\ X_{bar}^2)$=	2.70

Holes Out	0		
Holes Out Area	0.00	Net =	**3.31**

Member Capacity **(tension)**

$P_r = \phi_y F_y A_g$	94.4	kip	*AASHTO 6.8.2.1*
$P_r = \phi_u F_u A_n R_p U$	143.0	kip	*AASHTO 6.8.2.1*
P_r =	**94.4**	kip	

LOAD RATINGS

AS-INSPECTED

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	TRUSS RATING

As-Inspected Truss Rating

$$RF = \frac{\phi_c \cdot \phi_s \cdot \phi \cdot R_n - \gamma_{DC} \cdot DC - \gamma_{DW} \cdot DW - \gamma_P \cdot P}{\gamma_{LL} \cdot (LL + IM)}$$

(MBE 6A.4.2)

ϕ_c =	1	(MBE 6A.4.2.3)	
ϕ_s =	0.9	(MBE 6A.4.2.4)	
Υ_{DC} =	1.25	or	0.9
Υ_{DW} =	1.5		
Υ_{LL} =	1.35	operating	
	1.75	Inventory	
ϕR:	See section property		
DC:	See output of dead load STAAD model (DC)		
DW:	See output of dead load STAAD model (DW)		
LL+IM:	See live load calculations		
P:	N/A		

	MEMBER	STAAD MEMBER	DC	DW	LL+IM	ϕR	$\phi_c\phi_s\phi$R	RF_{OPE}	RF_{INV}
BOTTOM CHORD	L0-L1 T	1	-68.7	-4.4	-83.3	-198.4	-178.6	0.77	0.59
	L1-L2 T	2	-68.7	-4.4	-83.3	-198.4	-178.6	0.77	0.59
	L2-L3 T	3	-120.9	-7.7	-145.1	-413.3	-372.0	1.07	0.82
	L3-L4 T	4	-163.3	-10.4	-177.4	-564.7	-508.2	1.20	0.93
	L4-L5 T	5	-172.9	-10.9	-179.2	-652.2	-587.0	1.47	1.13
TOP CHORD	L0-U1 C	10	110.6	7.1	133.8	527.6	474.8	1.80	1.39
	U1-U2 C	11	120.9	7.7	145.1	495.4	445.8	1.45	1.12
	U2-U3 C	12	155.7	9.9	185.1	632.3	569.1	1.44	1.11
	U3-U4 C	13	165.5	10.6	208.9	710.8	639.7	1.48	1.14
	U4-U5 C	14	174.2	11.1	224.2	712.1	640.9	1.34	1.04
VERTICAL	L1-U1 T	19	-16.9	-1.4	-58.4	-202.9	-182.6	2.02	1.56
	L2-U2 C	20	46.8	2.8	70.8	208.4	187.6	1.31	1.01
	L2-U2 T	20	46.8	2.8	-15.1	-256.7	-231.0	13.60	10.49
	L3-U3 C	21	15.4	0.8	55.4	176.2	158.6	1.85	1.43
	L3-U3 T	21	15.4	0.8	-14.4	-232.5	-209.3	11.54	8.90
	L4-U4 C	22	-5.1	-0.5	43.8	178.9	161.0	2.81	2.17
DIAGONAL	L2-U1 C	27	-83.6	-5.3	7.7	184.1	165.7	23.94	18.47
	L2-U1 T	27	-83.6	-5.3	-111.4	-307.1	-276.4	1.09	0.84
	L3-U2 C	28	-55.8	-3.5	19.2	123.3	111.0	6.42	4.95
	L3-U2 T	28	-55.8	-3.5	-90.2	-226.4	-203.8	1.06	0.82
	L4-U3 C	29	-15.7	-1.0	18.3	84.5	76.1	3.71	2.87
	L4-U3 T	29	-15.7	-1.0	-70.9	-119.0	-107.1	0.90	0.69
	L3-U4 T	30	12.3	0.7	-16.9	-94.4	-85.0	4.26	3.28
	L5-U4 T	31	-1.7	-0.1	-53	-94.4	-85.0	1.16	0.89
	L4-U5 T	32	-1.7	-0.1	-53	-94.4	-85.0	1.16	0.89

NOTES:
Unit: kip
Tension: Negative; Compression: Positive

AS-BUILT (No Sidewalk)

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	TRUSS RATING

As-Built Truss Rating (No Sidewalk)

$$RF = \frac{\phi_c \cdot \phi_s \cdot \phi \cdot R_n - \gamma_{DC} \cdot DC - \gamma_{DW} \cdot DW - \gamma_P \cdot P}{\gamma_{LL} \cdot (LL + IM)}$$

(MBE 6A.4.2)

ϕ_c =	1	(MBE 6A.4.2.3)	
ϕ_s =	0.9	(MBE 6A.4.2.4)	
Υ_{DC} =	1.25	or	0.9
Υ_{DW} =	1.5		
Υ_{LL} =	1.35	operating	
	1.75	Inventory	
ϕR:	See section property		
DC:	See output of dead load STAAD model (DC)		
DW:	See output of dead load STAAD model (DW)		
LL+IM:	See live load calculations		
P:	N/A		

	MEMBER	STAAD MEMBER	DC	DW	LL+IM	ϕR	$\phi_c\phi_s\phi$R	RF_{OPE}	RF_{INV}
BOTTOM CHORD	L0-L1 T	1	-68.7	-4.4	-83.3	-273.6	-246.2	1.37	1.05
	L1-L2 T	2	-68.7	-4.4	-83.3	-273.6	-246.2	1.37	1.05
	L2-L3 T	3	-120.9	-7.7	-145.1	-487.8	-439.0	1.41	1.09
	L3-L4 T	4	-163.3	-10.4	-177.4	-637.5	-573.8	1.48	1.14
	L4-L5 T	5	-172.9	-10.9	-179.2	-691.1	-622.0	1.61	1.24
TOP CHORD	L0-U1 C	10	110.6	7.1	133.8	527.6	474.8	1.80	1.39
	U1-U2 C	11	120.9	7.7	145.1	495.4	445.8	1.45	1.12
	U2-U3 C	12	155.7	9.9	185.1	632.3	569.1	1.44	1.11
	U3-U4 C	13	165.5	10.6	208.9	710.8	639.7	1.48	1.14
	U4-U5 C	14	174.2	11.1	224.2	712.1	640.9	1.34	1.04
VERTICAL	L1-U1 T	19	-16.9	-1.4	-58.4	-202.9	-182.6	2.02	1.56
	L2-U2 C	20	46.8	2.8	70.8	263.6	237.2	1.83	1.41
	L2-U2 T	20	46.8	2.8	-15.1	-326.0	-293.4	16.66	12.85
	L3-U3 C	21	15.4	0.8	55.4	205.6	185.0	2.20	1.70
	L3-U3 T	21	15.4	0.8	-14.4	-273.6	-246.2	13.44	10.37
	L4-U4 C	22	-5.1	-0.5	43.8	204.2	183.8	3.20	2.47
DIAGONAL	L2-U1 C	27	-83.6	-5.3	7.7	199.8	179.9	25.30	19.52
	L2-U1 T	27	-83.6	-5.3	-111.4	-327.2	-294.5	1.21	0.93
	L3-U2 C	28	-55.8	-3.5	19.2	132.3	119.1	6.73	5.20
	L3-U2 T	28	-55.8	-3.5	-90.2	-220.8	-198.7	1.02	0.78
	L4-U3 C	29	-15.7	-1.0	18.3	36.9	33.2	1.98	1.53
	L4-U3 T	29	-15.7	-1.0	-70.9	-136.8	-123.1	1.06	0.82
	L3-U4 T	30	12.3	0.7	-16.9	-83.6	-75.2	3.83	2.95
	L5-U4 T	31	-1.7	-0.1	-53	-83.6	-75.2	1.02	0.79
	L4-U5 T	32	-1.7	-0.1	-53	-83.6	-75.2	1.02	0.79

NOTES:
Unit: kip
Tension: Negative; Compression: Positive

AS-BUILT (With Sidewalk)

COMPLETED BY	XL	DATE	5/25/2012
CHECKED BY		PROJ. NO.	23968
PROJ. NAME & LOCATION	Sewall's Falls	SUBJECT	TRUSS RATING

As-Built Truss Rating (With Sidewalk)

$$RF = \frac{\phi_c \cdot \phi_s \cdot \phi \cdot R_n - \gamma_{DC} \cdot DC - \gamma_{DW} \cdot DW - \gamma_P \cdot P}{\gamma_{LL} \cdot (LL + IM)}$$

(MBE 6A.4.2)

ϕ_c =	1	(MBE 6A.4.2.3)	
ϕ_s =	0.9	(MBE 6A.4.2.4)	
Υ_{DC} =	1.25	or	0.9
Υ_{DW} =	1.5		
Υ_{LL} =	1.35	operating	
	1.75	Inventory	
ϕR:	See section property		
DC:	See output of dead load STAAD model (DC)		
DW:	See output of dead load STAAD model (DW)		
LL+IM:	See live load calculations		
P:	N/A		

	MEMBER	STAAD MEMBER	DC	DW	LL+IM	ϕR	$\phi_c\phi_s\phi$R	RF_{OPE}	RF_{INV}
BOTTOM CHORD	L0-L1 T	1	-80.5	-4.4	-83.3	-273.6	-246.2	1.24	0.95
	L1-L2 T	2	-80.5	-4.4	-83.3	-273.6	-246.2	1.24	0.95
	L2-L3 T	3	-141.5	-7.7	-145.1	-487.8	-439.0	1.28	0.99
	L3-L4 T	4	-191.2	-10.4	-177.4	-637.5	-573.8	1.33	1.03
	L4-L5 T	5	-201.4	-10.9	-179.2	-691.1	-622.0	1.46	1.13
TOP CHORD	L0-U1 C	10	129.0	7.1	133.8	527.6	474.8	1.68	1.29
	U1-U2 C	11	141.5	7.7	145.1	495.4	445.8	1.31	1.01
	U2-U3 C	12	182.3	9.9	185.1	632.3	569.1	1.31	1.01
	U3-U4 C	13	193.8	10.6	208.9	710.8	639.7	1.35	1.04
	U4-U5 C	14	204.0	11.1	224.2	712.1	640.9	1.22	0.94
VERTICAL	L1-U1 T	19	-20.6	-1.4	-58.4	-202.9	-182.6	1.96	1.51
	L2-U2 C	20	54.2	2.8	70.8	263.6	237.2	1.73	1.33
	L2-U2 T	20	54.2	2.8	-15.1	-326.0	-293.4	16.99	13.11
	L3-U3 C	21	17.5	0.8	55.4	205.6	185.0	2.16	1.67
	L3-U3 T	21	17.5	0.8	-14.4	-273.6	-246.2	13.54	10.45
	L4-U4 C	22	-6.3	-0.5	43.8	204.2	183.8	3.22	2.48
DIAGONAL	L2-U1 C	27	-97.8	-5.3	7.7	199.8	179.9	26.53	20.47
	L2-U1 T	27	-97.8	-5.3	-111.4	-327.2	-294.5	1.09	0.84
	L3-U2 C	28	-65.3	-3.5	19.2	132.3	119.1	7.06	5.45
	L3-U2 T	28	-65.3	-3.5	-90.2	-220.8	-198.7	0.92	0.71
	L4-U3 C	29	-18.5	-1.0	18.3	36.9	33.2	2.08	1.61
	L4-U3 T	29	-18.5	-1.0	-70.9	-136.8	-123.1	1.03	0.79
	L3-U4 T	30	14.2	0.7	-16.9	-83.6	-75.2	3.91	3.01
	L5-U4 T	31	-2.0	-0.1	-53	-83.6	-75.2	1.01	0.78
	L4-U5 T	32	-2.0	-0.1	-53	-83.6	-75.2	1.01	0.78

NOTES:
Unit: kip
Tension: Negative; Compression: Positive

FATIGUE

COMPLETED BY	PMP
CHECKED BY	
PROJ. NAME & LOCATION	Sewall's Falls

Truss Fatigue Rating

					Cat A	Cat C	
γ_{LL} =	0.75	Fatigue 1	(MBE 7.2.2)	Rr=	1.7	1.2	(MBE Table 7.2.5.2-1)
Rsa=	1.0		(MBE Table 7.2.2.1-1)	A=	2.50E+10	4.40E+09	(AASHTO Table 6.6.1.2.5-1)
Rst=	1.0		(MBE Table 7.2.2.1-1)	n=	1	1	(Truck causes a single stress cycle on Details)
Rs=Rsa*Rst=	1.0		(MBE 7.2.2.1.1-1)	ADTTsl=	41	41	(NHDOT ADT=2730, 3% Trucks, 50% per direction)

DC: Unfactored DL: See output of dead load STAAD model (DC)
DW: Unfactored DW: See output of dead load STAAD model (DW)
LL+IM: Unfactored LL: See live load calculations. Includes distribution and Impact

					Max LL+IM		(MBE 7.2.2)	(MBE 7.2.2)	(MBE 7.2.4)								Eval Fatigue Life(MBE 7.2.5)
	MEMBER	STAAD MEMBER	DC (Kip)	DW (Kip)	+(Comp) (Kip)	-(Ten) (Kip)	Δf (Kip)	Δf_{eff} (Kip)	Δf_{max} (Kip)	A_{gross}	$\Delta f_{max\ Gross}$ (Ksi)	$\Delta F_{TH\ Gross}$ (Ksi)		A_{net}	$\Delta f_{max\ net}$ (Ksi)	$\Delta F_{TH\ Net}$ (Ksi)		Y (Years)
BOTTOM CHORD	L0-L1	1	-68.7	-4.4	0	-48.8	48.8	36.6	73.2	9.6	7.63	24	O.K.	8.58	8.53	10	O.K.	
	L1-L2	2	-68.7	-4.4	0	-48.8	48.8	36.6	73.2	9.6	7.63	24	O.K.	8.58	8.53	10	O.K.	
	L2-L3	3	-120.9	-7.7	0	-83.9	83.9	62.925	125.85	17.12	7.35	24	O.K.	14.07	8.94	10	O.K.	
	L3-L4	4	-163.3	-10.4	0	-102.1	102.1	76.575	153.15	22.37	6.85	24	O.K.	18.31	8.36	10	O.K.	
	L4-L5	5	-172.9	-10.9	0	-101.6	101.6	76.2	152.4	24.25	6.28	24	O.K.	19.78	7.70	10	O.K.	
TOP CHORD	L0-U1	10	110.6	7.1	78.4	0	78.4	58.8	117.6								
	U1-U2	11	120.9	7.7	83.9	0	83.9	62.925	125.85								
	U2-U3	12	155.7	9.9	107.1	0	107.1	80.325	160.65								
	U3-U4	13	165.5	10.6	117.5	0	117.5	88.125	176.25								
	U4-U5	14	174.2	11.1	127.1	0	127.1	95.325	190.65								
VERTICAL	L1-U1	19	-16.9	-1.4	0	-37	37	27.75	55.5	7.12	7.79	24	O.K.	6.1	9.10	10	O.K.	
	L2-U2	20	46.8	2.8	43.8	-9.1	52.9	39.675	79.35	11.4	6.96	24	O.K.	10.22	7.76	10	O.K.	
	L3-U3	21	15.4	0.8	35	-9.5	44.5	33.375	66.75	9.6	6.95	24	O.K.	8.58	7.78	10	O.K.	
	L4-U4	22	-5.1	-0.5	26.1	0	26.1	19.575	39.15								
DIAGONAL	L2-U1	27	-83.6	-5.3	4.9	-67.3	72.2	54.15	108.3	11.48	9.43	24	O.K.	8.23	13.16	10	N.G.	
	L3-U2	28	-55.8	-3.5	11.6	-55.9	67.5	50.625	101.25	8.36	12.11	24	O.K.	5.11	19.81	10	N.G.	362.8
	L4-U3	29	-15.7	-1.0	12.2	-44.9	57.1	42.825	85.65	4.8	17.84	24	O.K.	3.18	26.93	10	N.G.	144.5
	L3-U4	30	12.3	0.7	0	-10.6	10.6	7.95	15.9	3.56	4.47	24	O.K.	1.94	8.20	10	O.K.	
	L5-U4	31	-1.7	-0.1	0	-33.7	33.7	25.275	50.55	3.56	14.20	24	O.K.	1.94	26.06	10	N.G.	159.5
	L4-U5	32	-1.7	-0.1	0	-33.7	33.7	25.275	50.55	3.56	14.20	24	O.K.	1.94	26.06	10	N.G.	159.5

NOTES:
Unit: kip
Tension: Negative; Compression: Positive