



Telefax No.:

Please forward to: Annette

Company/Department:

From: Sean

Phone No. (Fax No.): 301-682-8000 (301-682-8005)

Date: 6/2/04

Pages transmitted: 26 INCLUDING COVER SHEET

---

30m Maxiflex evaluation

FTL DESIGN ENGINEERING STUDIO



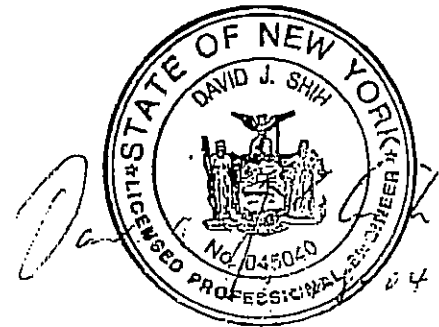
157 Chambers Street • New York, NY 10007

212 732 4691 FAX: 212 385 1025 www.ftlstudio.com

**30 M LOSBERGER FRAME TENT**

**STRUCTURAL EVALUATION**

**(3.8 M EAVE HEIGHT – MAXIFLEX PROFILE)**



Prepared for:

Doug Remsberg  
Losberger U.S. LLC  
95 Monocacy Boulevard, B20  
Frederick, MD 21705  
March 18, 2004

30 M LOSBERGER FRAME TENT  
STRUCTURAL EVALUATION

Prepared for  
Losberger U.S. LLC  
March 18, 2001

EVALUATION SUMMARY

This report documents the structural evaluation of the 30 m Losberger Frame Tent (30 m H 3.80) in accordance with applicable U.S. building codes. This study is based on the technical background information provided by Losberger U.S. LLC. The structure is intended for temporary use only and any of the following load assumptions should not be exceeded at any time for the conclusions of this report to remain valid.

F.T.L Design Engineering Studio compiled this report based on the existing tent system with reference to the applicable building codes in the U.S. This report includes the loads used in the analysis and gives an indication as to what wind exposure the structure is suitable for. Certification of this document only shows that the Professional Engineer of that particular State is in agreement with the report's contents. It does not, however, imply that the structure is generally suitable for use within that State, or that every installation is covered by the report.

Note: Temporary lightweight structures are not designed for seismic or snow loads.

WIND ZONE RATING

Wind Zone : 90 mph (3-second gust Speed)  
Exposure Class : Class C (Open Country or Terrain)  
Return Period : 2 Years (Accounts for the Temporary Nature of the Structure)  
Wind Pressure : 8.3 psf (Design Pressure)

It has been found that for the abovementioned wind zone, exposure class and return period, the structure satisfies the requirements of the American Society of Civil Engineers: Minimum Design Loads for Buildings and Other Structures (ASCE 7-98). In addition, for the above wind zone, exposure class and return period, the structure is also in accordance with the following building codes in the U.S.:

International Building Code (IBC)  
Uniform Building Code (UBC)  
Building Officials and Code Administrators (BOCA)  
Southern Building Code Congress Int'l: Standard Building Code (SBCCI-SBC)  
South Florida Building Code (SFBC)

As for the other wind zones and exposure classes, refer to Table 0-1 for rating and allowable installation parameters.

BASE REACTIONS

The maximum forces at the foundations / supports due to the rated load and exposure class are as follows:

Maximum Vertical Down Load : 1.50 K (Class C, 90 mph, 1000 lbs fixture loads)  
Maximum Vertical Uplift : 3.70 K (Class C, 90 mph)  
Maximum Shear : 3.16 K (Class C, 90 mph)

The values given are per base plate.

### ALLOWABLE HANGING LOADS ON FRAMES

The maximum allowable live load hung from the rafters is 1000 lbs distributed as follows:

Left Rafter Centerspan	:	250 lbs
Ridge	:	500 lbs
Right Rafter Centerspan	:	250 lbs

### ALLOWABLE DOWNLOADS ON FRAMES

The tent is not engineered for snow loads. The maximum allowable plan projected download on the structure, in addition to its dead weight, is only 1.5 psf.

### ADDITIONAL EXPOSURE AND (3-SECOND GUST) WIND SPEED COMBINATIONS

The 30 m version is suitable for up to a Class C, 90 mph 3-second gust wind exposure. For other exposure and wind zone combinations refer to the following chart (where the stricken values are the unsuitable pressures for the tent):

30 M LOSBERGER FRAME TENT (29.00 FT MAXIMUM HEIGHT)  
ANSI/ASCE 7-98 WIND PRESSURES, q (psf)

Exposure	85 mph	90 mph	95 mph	100 mph
Class A	5.53	6.20	6.91	7.65
Class B	5.69	6.38	7.11	7.88
Class C	7.40	8.29	<del>9.24</del>	<del>10.24</del>
Class D	8.94	<del>10.03</del>	<del>11.17</del>	<del>12.38</del>

Table 0-1 30 m Losberger Frame Tent Allowable Exposure Chart

Exposure classes according to ANSI/ASCE 7-98, p. 14 are defined as follows:

#### Exposure A

Large city centers with at least 50% of the buildings having a height in excess of 70 feet. Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least one-half mile or 10 times the height of the building or structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.

#### Exposure B

Urban or sub-urban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Use of this exposure category shall be limited to those areas for which terrain representative of Exposure B prevails in the upwind direction for a distance of at least 1500 feet or 10 times the height of the building or structure, whichever is greater.

Exposure C

Open terrain with scattered obstructions having heights generally less than 30 feet. This category includes flat, open country and grasslands.

Exposure D

Flat, unobstructed areas exposed to wind flowing over large bodies of water. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1500 feet or 10 times the height of the building or structure, whichever is greater.

## TABLE OF CONTENTS

Evaluation Summary

Table of Contents

This report is a condensed and recompiled version of the original. Refer to the complete structural evaluation report for further details.

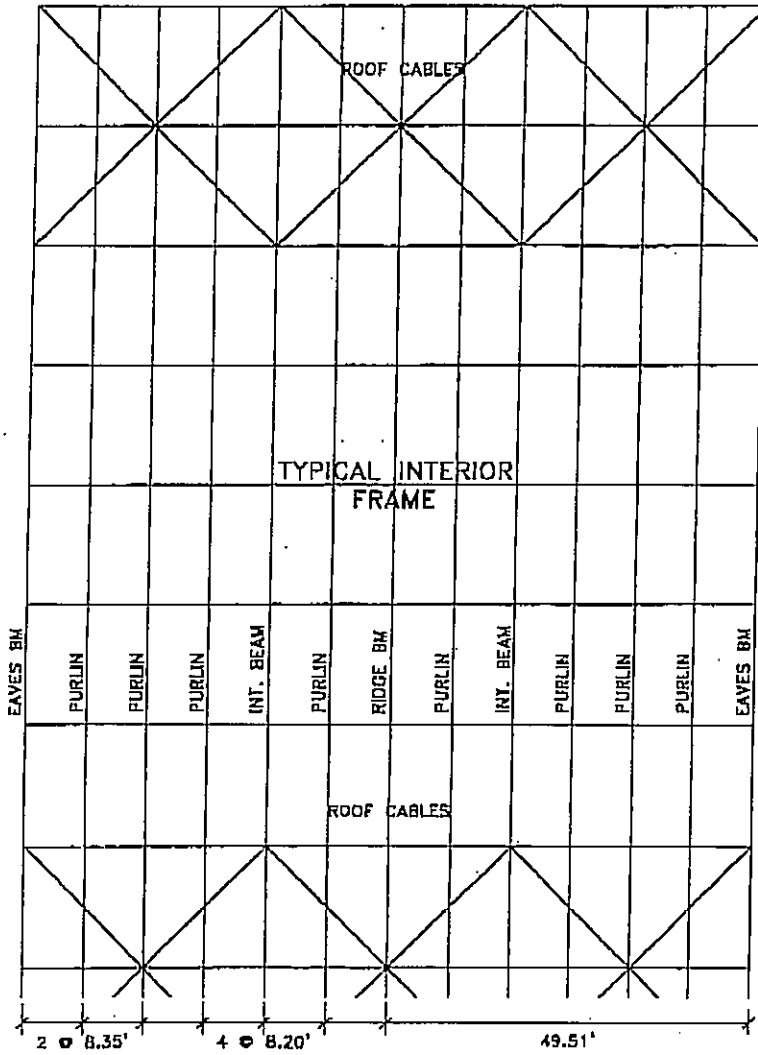
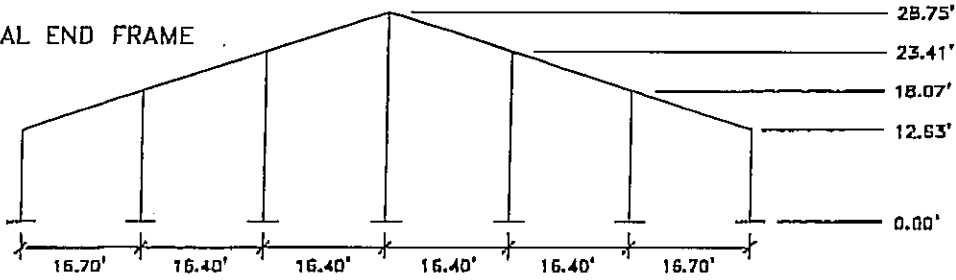
From Part 2	Structural Framing Plan
From Part 3	Section and Material Properties
3.1	Section Assignment
3.2	Section Properties
From Part 4	Load Assumptions
4.1	Dead Loads
4.2	Live Loads
4.3	Wind Loads
4.4	General Load Cases and Combinations
From Part 5	Structural Analysis and Results
5.2	ROBOT MILLENIUM Results
5.2.1	Displacements, Axial Forces, Bending Moments (Critical cases)
5.2.2	Maximum Applied Loads
5.2.3	Maximum Base Reactions



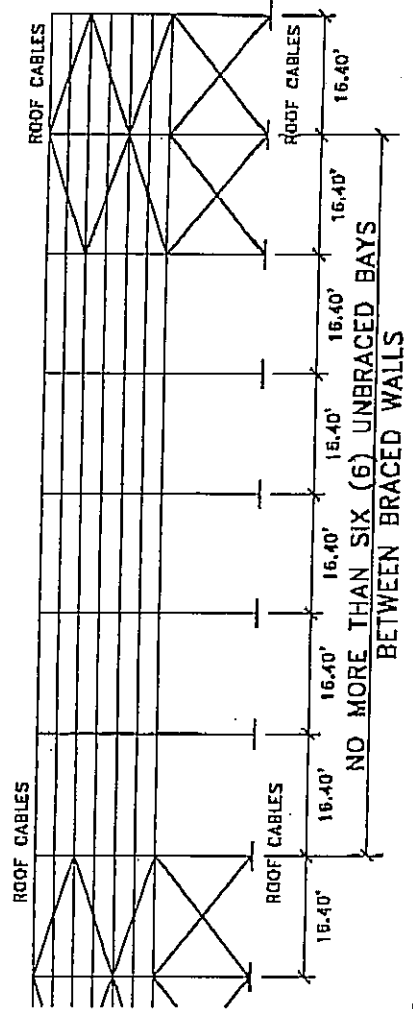
FTL DESIGN ENGINEERING STUDIO

PROJECT 30 METAL SIAMPLEX (98)	PROJECT # 23081	DESCRIPTION FIG 2/a - STRUCTURAL FRAMING PLAN	PAGE # 3
AUTHOR A.P	DATE		CHECKED BY

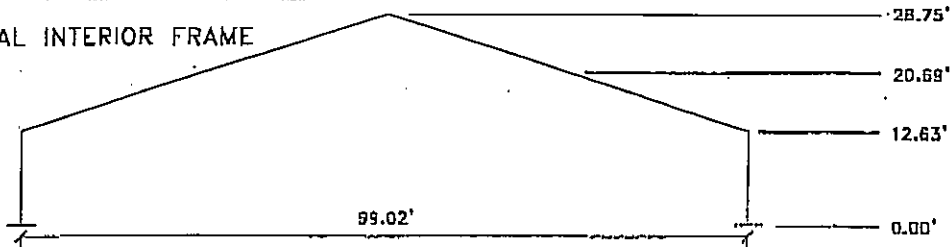
TYPICAL END FRAME



TYPICAL INTERIOR FRAME



TYPICAL INTERIOR FRAME





# LOSBERGER

312

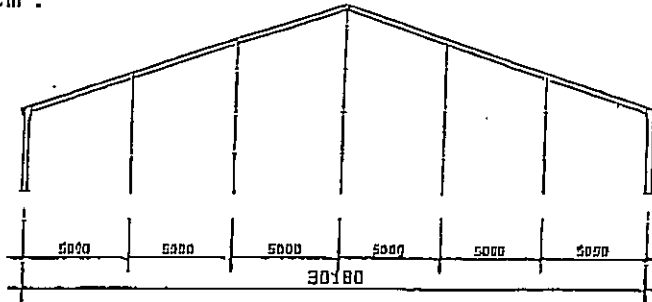
PROJ  
AUT

Fest- und Ausstellungshalle

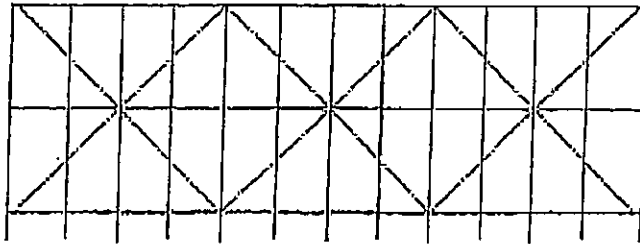
30.5/400

Rahmen-System :

H = 1 : 350



Dachverband : H = 1 : 350



Vertikolverband : H = 1 : 350

Strebenverband



### Technische Daten :

Dachneigung : 18°  
 Traufhöhe : 3060  
 Firsthöhe : 8763  
 Binderabstand : 5000

Binderprofil : 300 x 120  
 Giebelstielprofil : 200 x 120  
 Gewicht pro m<sup>2</sup> : 8 kg  
 Längstes Gerüstteil : 10612

Statik : ja

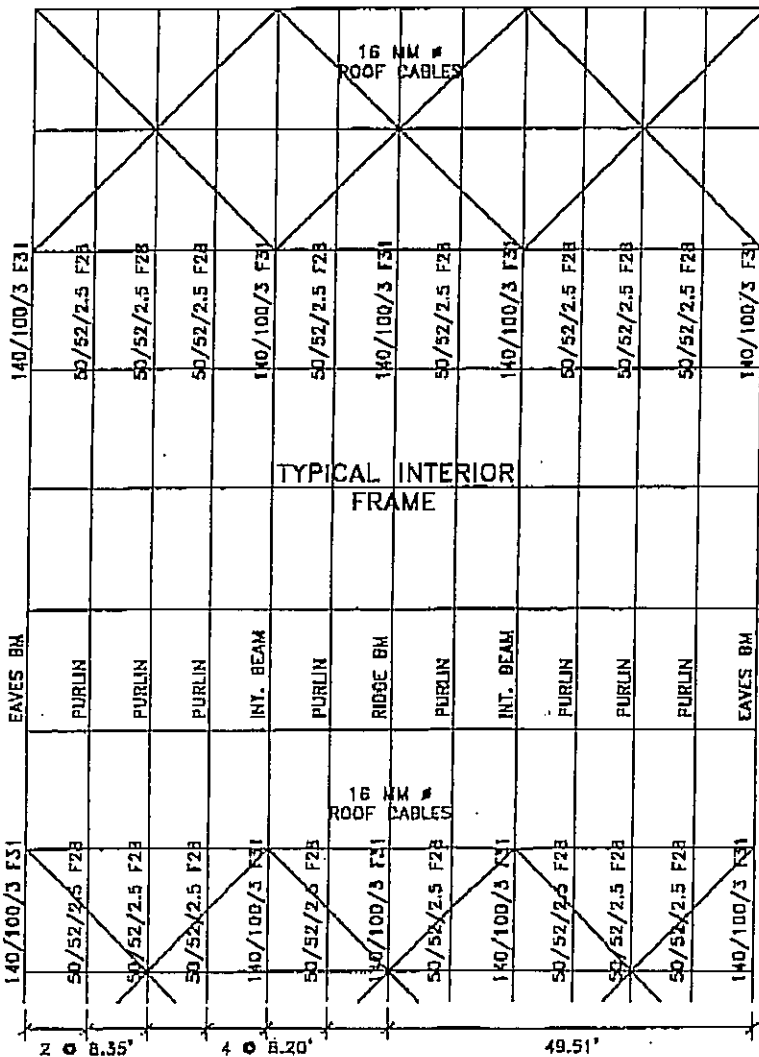
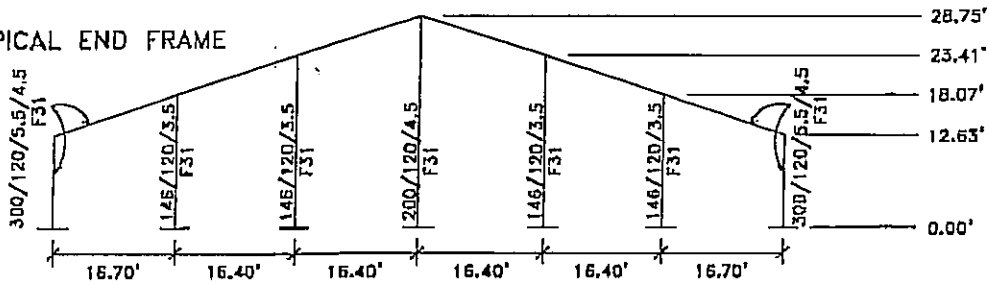
Prüfung : ja





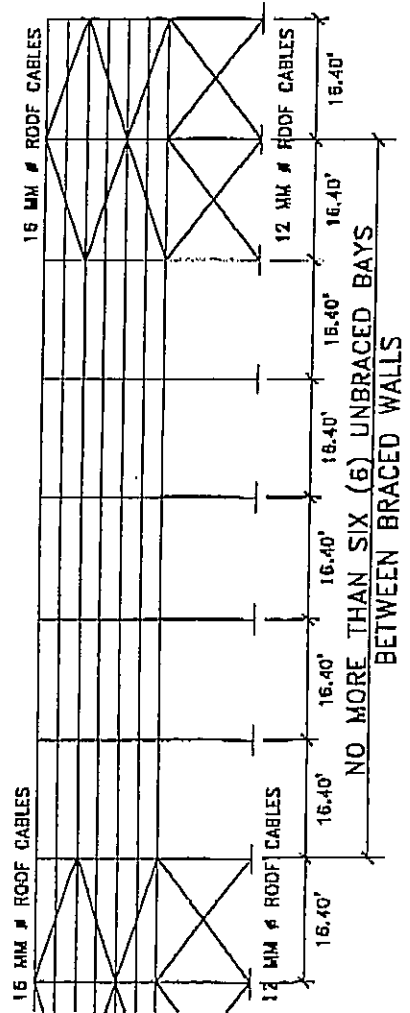
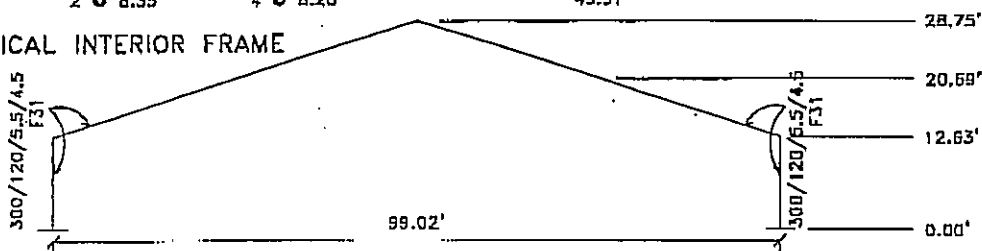
PROJECT 30M MAXI-FLEX (798)	PROJECT # 23081	DESCRIPTION FIG 3-1a - SECTION ASSIGNMENT	PAGE 6
AUTHOR AND	DATE		CHECKED BY

TYPICAL END FRAME



TYPICAL INTERIOR FRAME

TYPICAL INTERIOR FRAME



NO MORE THAN SIX (6) UNBRACED BAYS BETWEEN BRACED WALLS



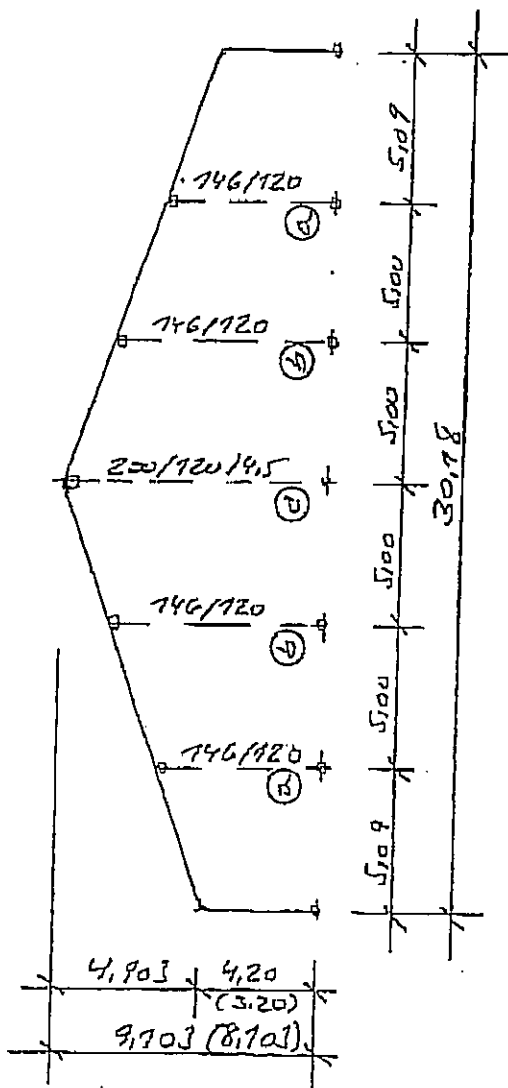
FTL DESIGN ENGINEERING STUDIO

PROJECT 3011 SGLA/PLEX (7-98)	PROJECT-N. 13081	DESCRIPTION FIG 3-16 SECTION ASSIGNMENT (END WORK)	PAGE# 7
AUTHOR AND	DATE		CHECKED BY

System Type 30/420 (30/320)

M = 1:250

Dachneigung 18°



Maße in Klammer ( ) für Type 320/320  
 Rahmenprofil:  
 Giebelstiele (gestrichelt)

Viernutprofil 300/120/5,5/4,5 AL Mg Sit F81  
 Viernutprofile gemäß obiger Eintragung AL Mg Sit F81



PROJECT 30 M MAXIFLEX (7-98)	PROJECT # 2308	DESCRIPTION FIG 3-1c: SECTION ASSIGNMENT (END BAY)	PAGES 8
AUTHOR A-D	DATE		CHECKED BY

Zellhallen Type 50/380 bis 10/320

139/3

alternativ:

Dachverband zu Zelltype 30/520 - 30/320

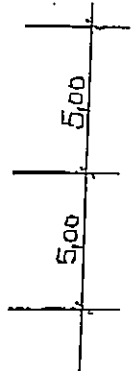
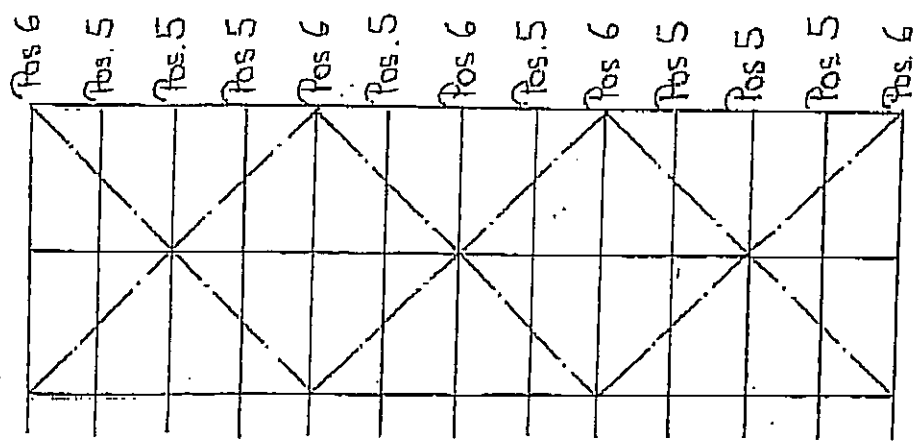
M = ca. 1:250

Alle Diagonalen:

Sell 16 DIN 3060-FE-verz. 1770 sZ

Pfetten (Pos.6, Stäbe 70-80 usw.): Pfettenprofil 140\*100\*3.0 Al Mg Si F31

Zwischenpfetten (Pos.5) Pfettenprofil 80\*80\*2,75 AL1/2 Si F28









PROJECT		PROJECT #	DESCRIPTION		PAGES
3014 MAXIGLEY (7-18)		23081	FIG-4-2 DEAD & LIVE LOADS		15
AUTHOR		DATE	CHECKED BY		
A.D					
<b>DEAD LOADS</b>					
Uniform Load Distribution on the Inclined Main Members	7.92 plf				
Weight of the Main Member		0.91 plf	16.40 ft	4.00 pcs	59.62 lbs
Weight of the Purlins and Beams		3.12 plf	16.40 ft	1.00 pc	51.12 lbs
		110.74 lbs	49.51 ft	0.85	
		0.21 psf	16.40 ft		
Weight of the Roof Fabric	2.13 plf				
Weight of Minor Components, Cables, Bolts, etc.	3.42 plf				
	3.50 plf				
<b>Total</b>	<b>16.97 plf</b>				
Point Load on the Ridge	61.12 lbs	3.12 plf	16.40 ft		
Weight of the Ridge Beam	51.12 lbs				
<b>Total</b>					
Point Load on the Eaves	61.12 lbs	3.12 plf	16.40 ft		
Weight of the Eaves Beam	42.61 lbs	0.21 psf	16.40 ft	12.17 ft	
Weight of the Wall Fabric	99.72 lbs				
<b>Total</b>					
<b>LIVE LOAD</b>					
Uniform Load Distribution on the Inclined Main Members	0.00 plf				
Weight of Snow					
<b>Point Loads on the Inclined Main Members</b>					
Weight of the Fixtures	250.00 lbs				
Left Rafter Midlength	500.00 lbs				
Ridge	250.00 lbs				
Right Rafter Midlength	1000.00 lbs				
<b>Total</b>					



PROJECT 30M MAXIPRO (7-98)	PROJECT # 23087	DESCRIPTION TABLE 4-1 ASCE 7-98 WIND LOADS	PAGE # 16
AUTHOR A.D	DATE		CHECKED BY

WIND LOADS (ASCE 7-98 / IBC 2001)

Mean Structure Height, h 20.51 ft  
Tributary Width, b 16.40 ft

Wind Pressure Equation from ANSI/ASCE 7-97  
 $q = 0.00256 (G_z K_z K_d K_e I) (V)^3$   
 where V, the wind velocities are:

- V1 = 65.00 mph
- V2 = 50.00 mph
- V3 = 65.00 mph
- V4 = 100.00 mph

I Factor	1.0	K <sub>z</sub>				0.31
K <sub>d</sub>	1.0					
G <sub>z</sub> factor	0.99					
K <sub>e</sub>	0.85					
K <sub>z</sub> factor	1 to 2 21.0	Exp A 0.85	Exp B 0.70	Exp C 0.91	Exp D 1.10	

EQUATION CONSTANTS

Exposure	q	I <sub>r</sub>	I <sub>c</sub>
Class A	0.00125773 (I <sub>r</sub> V) <sup>2</sup>	0.78	0.63
Class B	0.00125472 (I <sub>r</sub> V) <sup>2</sup>	0.78	0.70
Class C	0.00165314 (I <sub>r</sub> V) <sup>2</sup>	0.78	0.91
Class D	0.00203466 (I <sub>r</sub> V) <sup>2</sup>	0.70	1.10

WIND PRESSURES, q (psf)

Exposure	65 mph	80 mph	95 mph	100 mph
Class A	5.53	6.70	6.91	7.85
Class B	5.89	6.36	7.11	7.88
Class C	7.40	8.28	9.24	10.24
Class D	8.54	10.03	11.17	12.30

DISTRIBUTED WIND LOADS, P (psf)

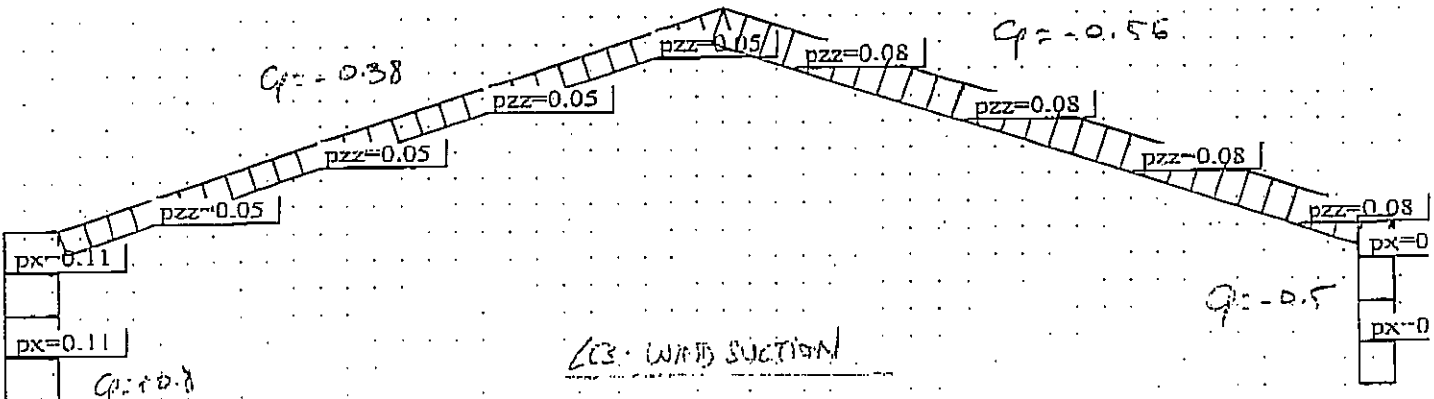
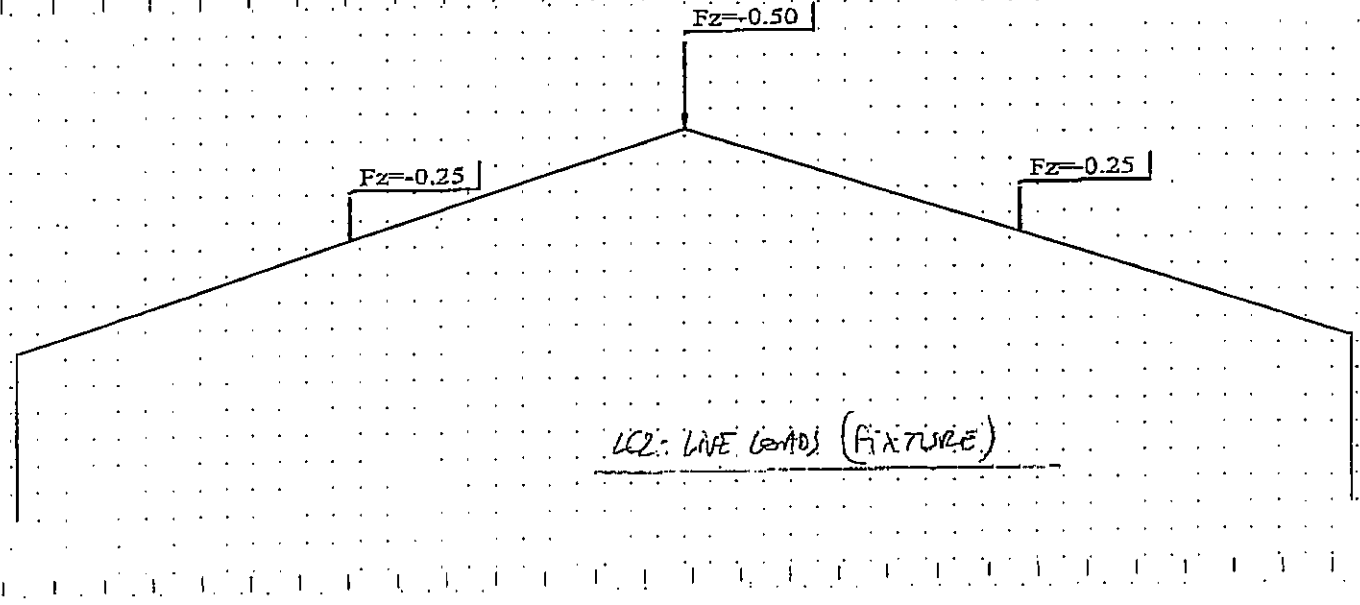
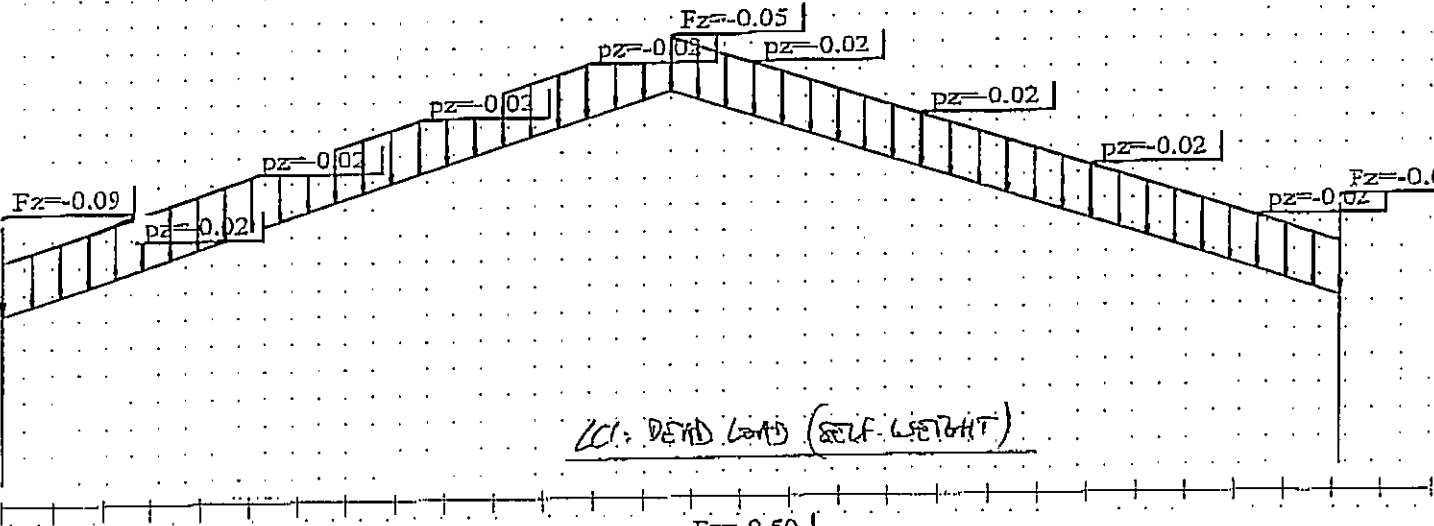
Exposure	65 mph	80 mph	95 mph	100 mph
Class A	90.59	101.88	113.29	125.53
Class B	81.38	104.67	115.62	129.22
Class C	121.37	138.87	151.80	167.80
Class D	146.71	184.47	193.28	203.05

LOAD CASES (0.00 EXPOSURE)

Case	q (psf)	P (psf)	Windward Wall		Windward Roof		Leeward Roof		Leeward Wall	
			w = C <sub>pw</sub> x P	C <sub>pw</sub>	w = C <sub>pr</sub> x P	C <sub>pr</sub>	w = C <sub>pl</sub> x P	C <sub>pl</sub>	w = C <sub>plw</sub> x P	C <sub>plw</sub>
WSUCTION	8.22	136.07	108.85	0.00	-51.70	-0.38	-76.20	-0.58	-88.03	-0.50
WPRESSURE	8.22	136.07	108.85	0.00	18.33	0.12	-76.20	-0.58	-88.03	-0.50
WPARALLEL	8.22	136.07	-95.25	-0.70	-95.25	-0.70	-95.25	-0.70	-95.25	-0.70



PROJECT 30/4 MANORLEX (7-98)	PROJECT # 23081	DESCRIPTION LOAD CASES	PAGE # 17
AUTHOR A-D	DATE		CHECKED BY

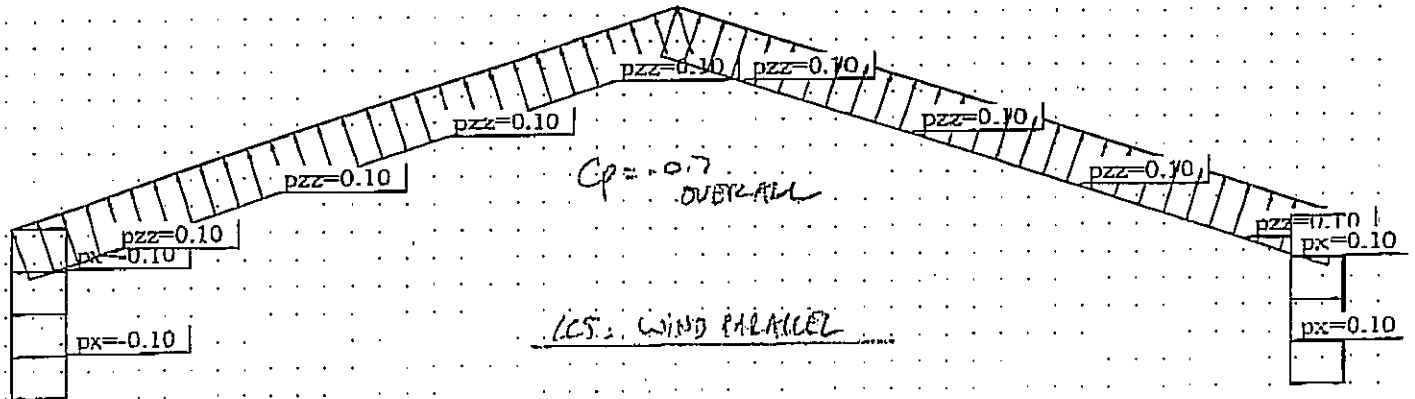
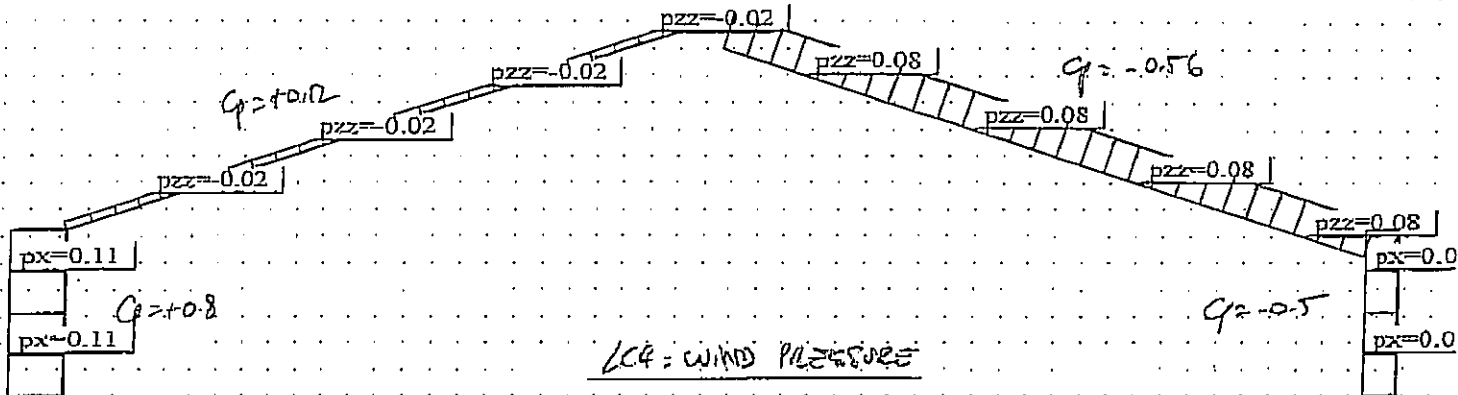






FTL DESIGN ENGINEERING STUDIO

PROJECT <b>211 MAXIPROX (7-98)</b>	PROJECT # <b>2387</b>	DESCRIPTION <b>LOAD CASES</b>	PAGE # <b>18</b>
AUTHOR <b>AJD</b>	DATE		CHECKED BY





FTL DESIGN ENGINEERING STUDIO

PROJECT	PROJECT #	DESCRIPTION	PAGE#
AUTHOR	DATE	LOAD CASE & COMBINATION SUMMARY	15
			CHECKED BY

LOAD CASE SUMMARY

Case No.	Description
1	Dead Loads
2	Live Loads
3	Wind Load Perpendicular to the Ridge Suction on the Windward Side of the Roof
4	Wind Load Perpendicular to the Ridge Positive Pressure on the Windward Side of the Roof
5	Wind Load Parallel to the Ridge Suction on All Sides

LOAD COMBINATION SUMMARY

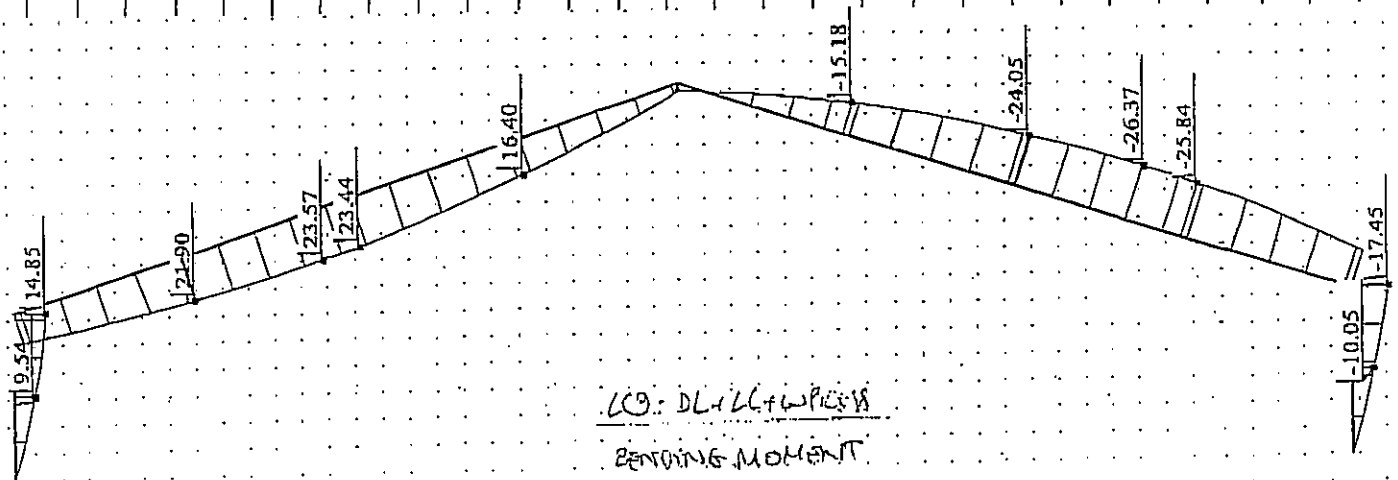
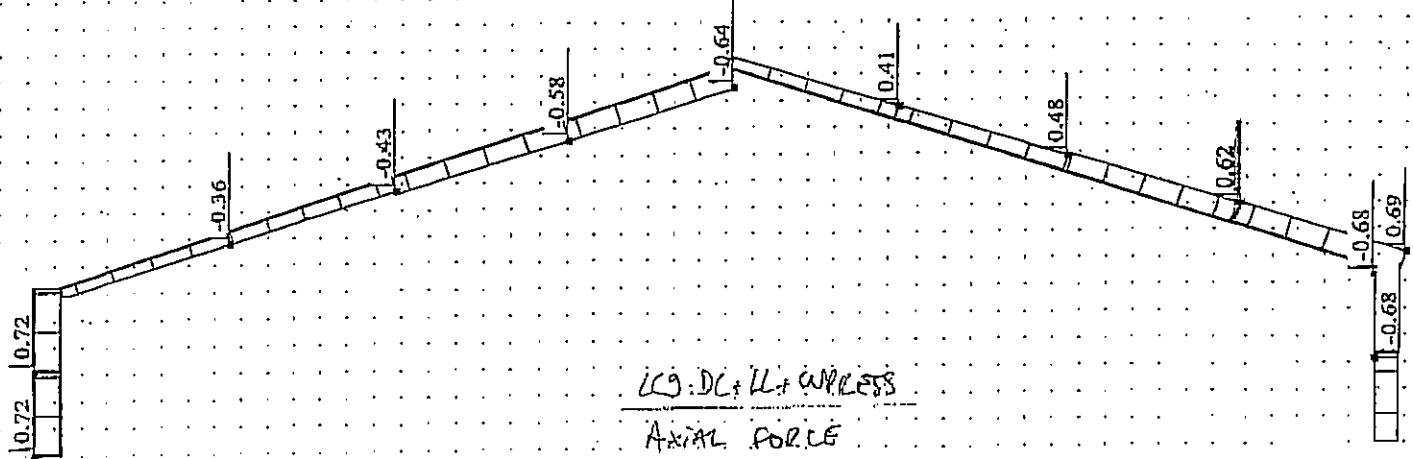
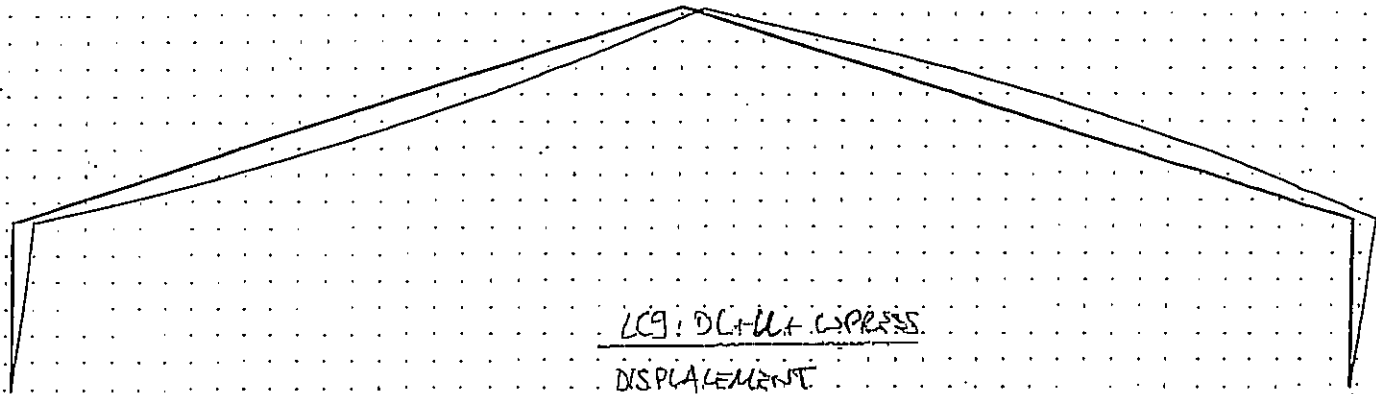
Case No.	Description
6	DL
7	DL + LL
8	DL + LL + WSUCTION
9	DL + LL + WPRESSURE
10	DL + LL + WPARALLEL
11	DL + WSUCTION
12	DL + WPRESSURE
13	DL + WPARALLEL





FTL DESIGN ENGINEERING STUDIO

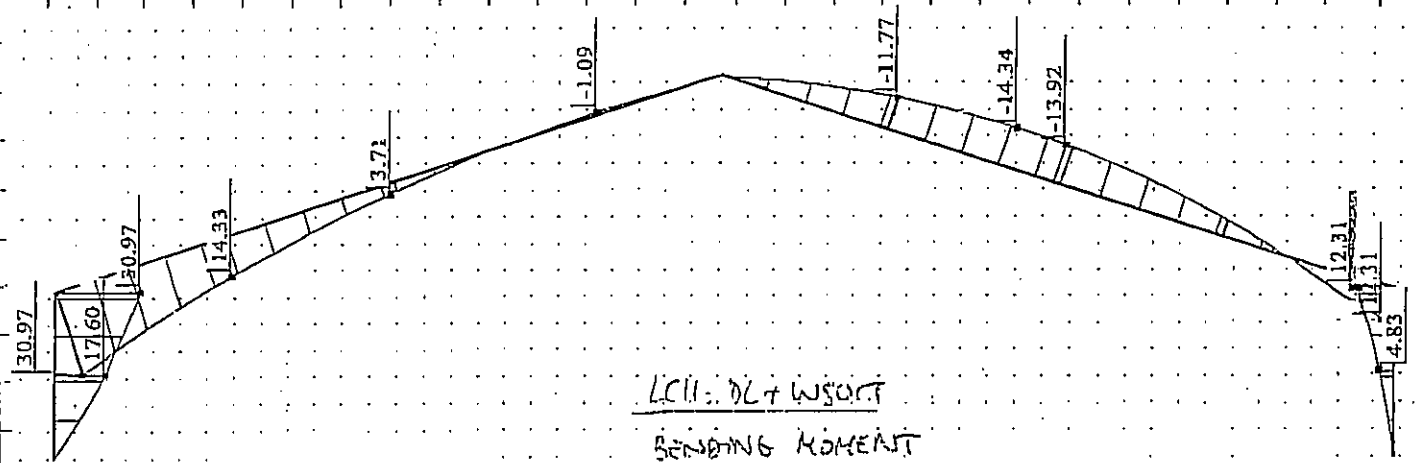
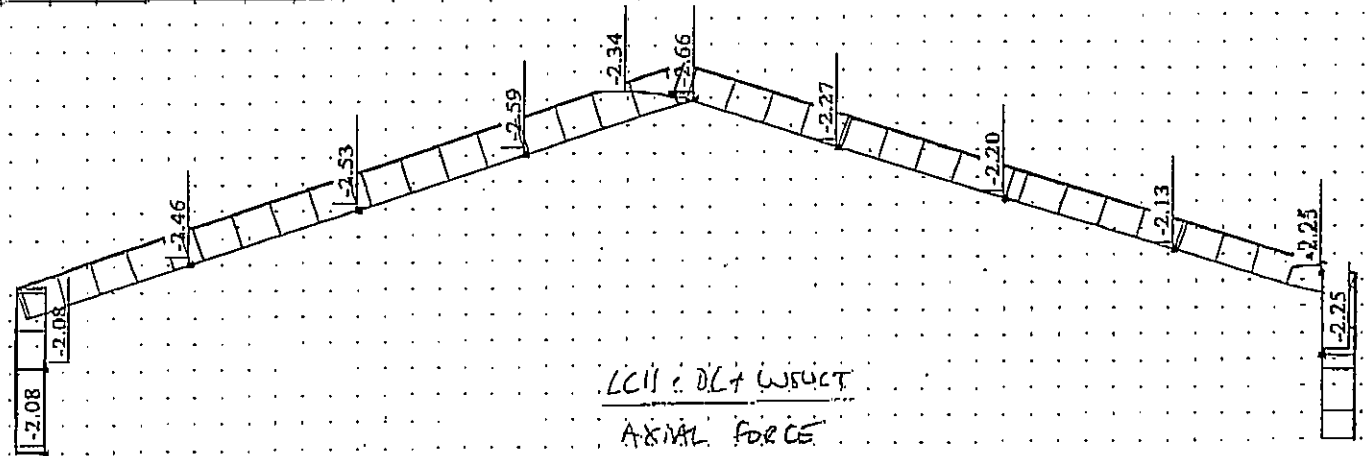
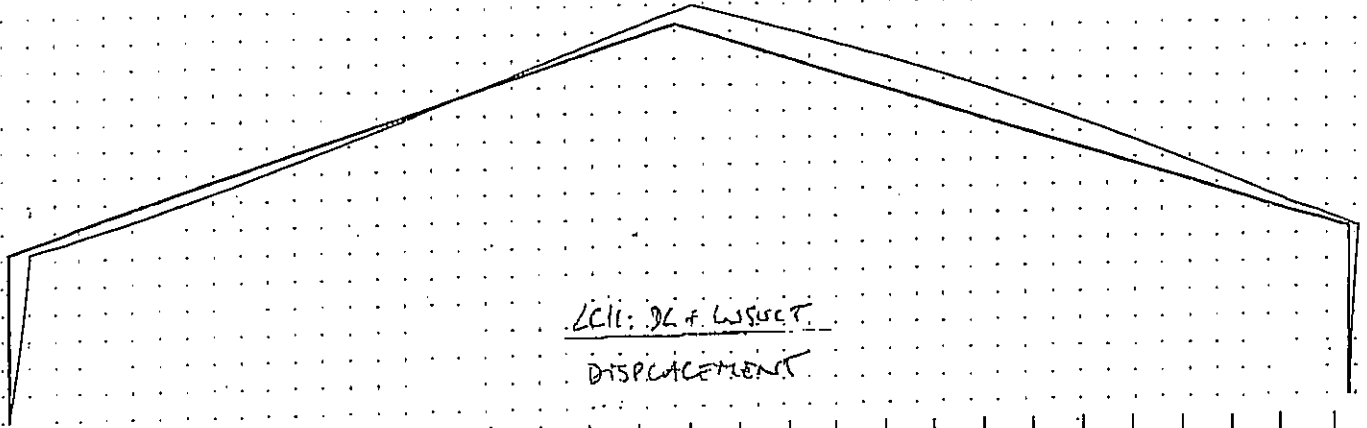
PROJECT	PROJECT # 23087	DESCRIPTION LC9: DL+LL+WPRESS	PAGE # 27
AUTHOR	DATE		CHECKED BY





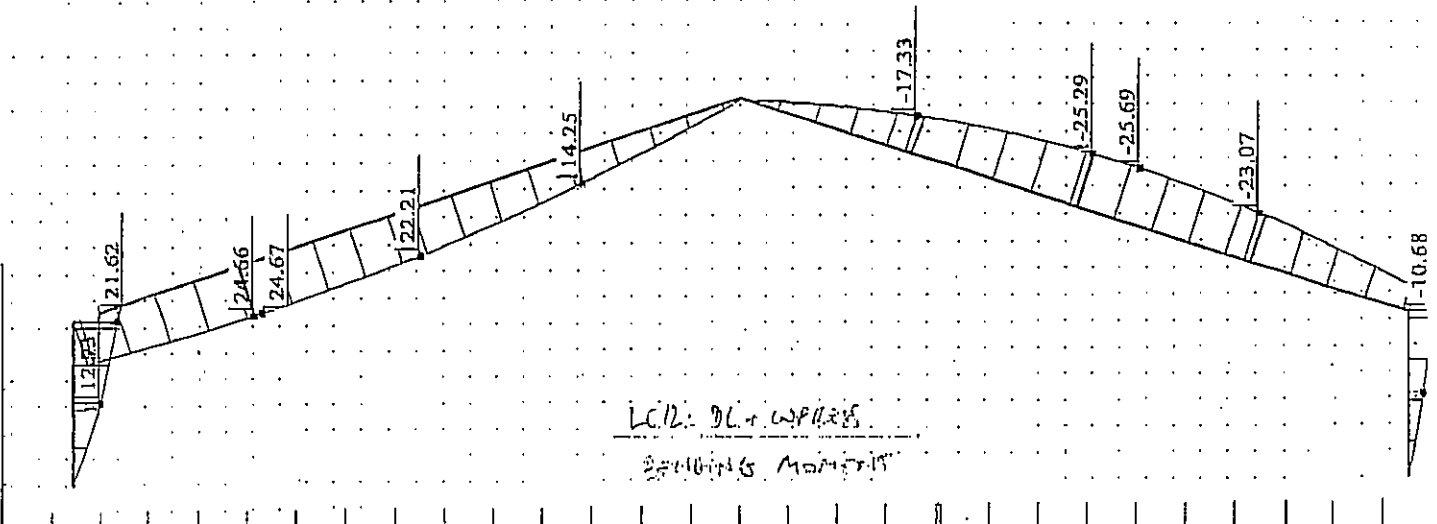
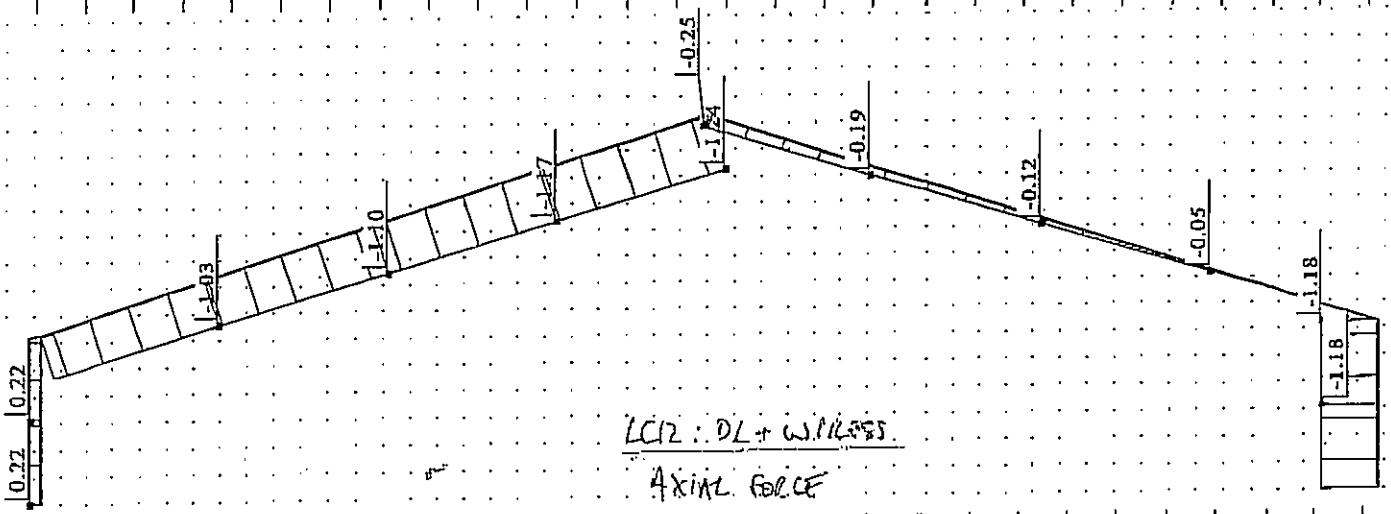
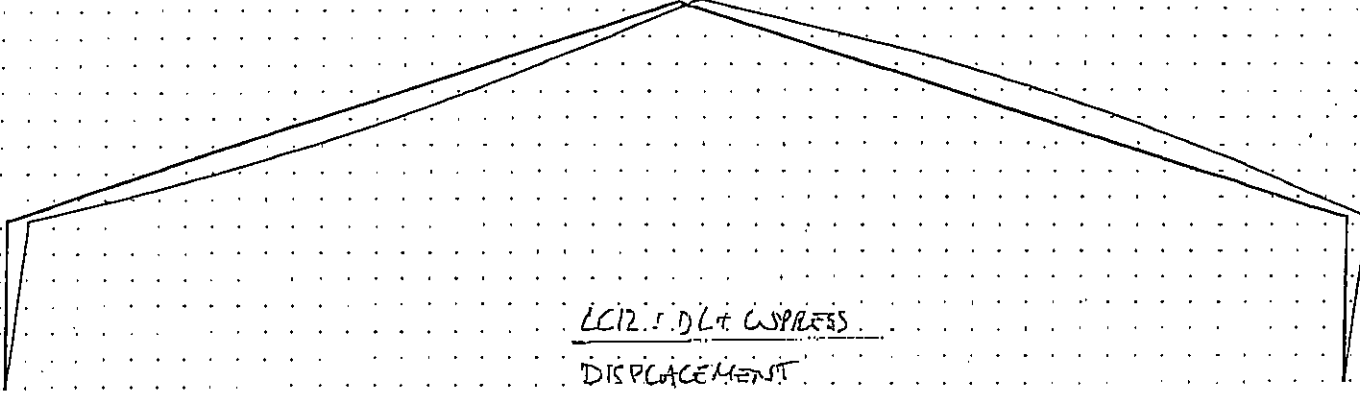
FTL DESIGN ENGINEERING STUDIO

PROJECT	PROJECT #	DESCRIPTION LC11: DGT CONSTRUCTION	PAGE# 29
AUTHOR	DATE		CHECKED BY





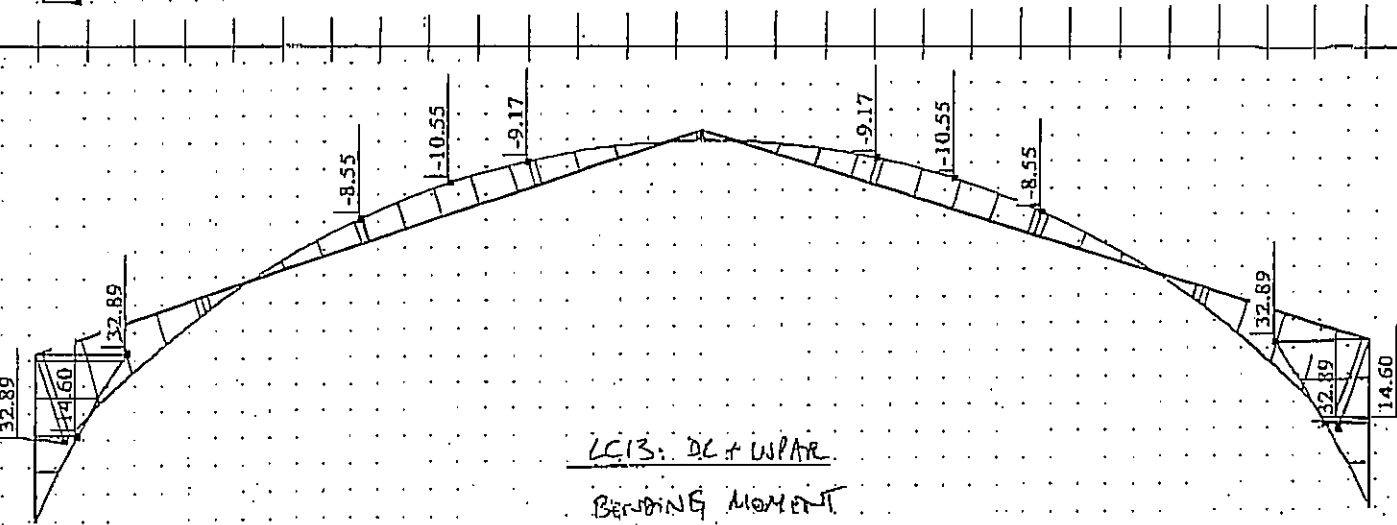
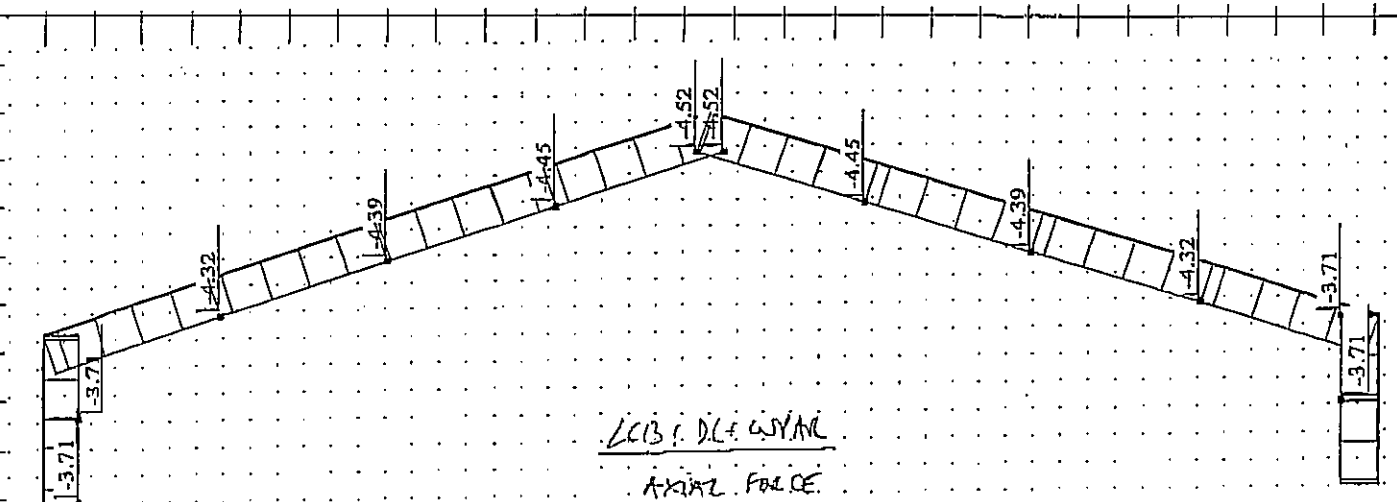
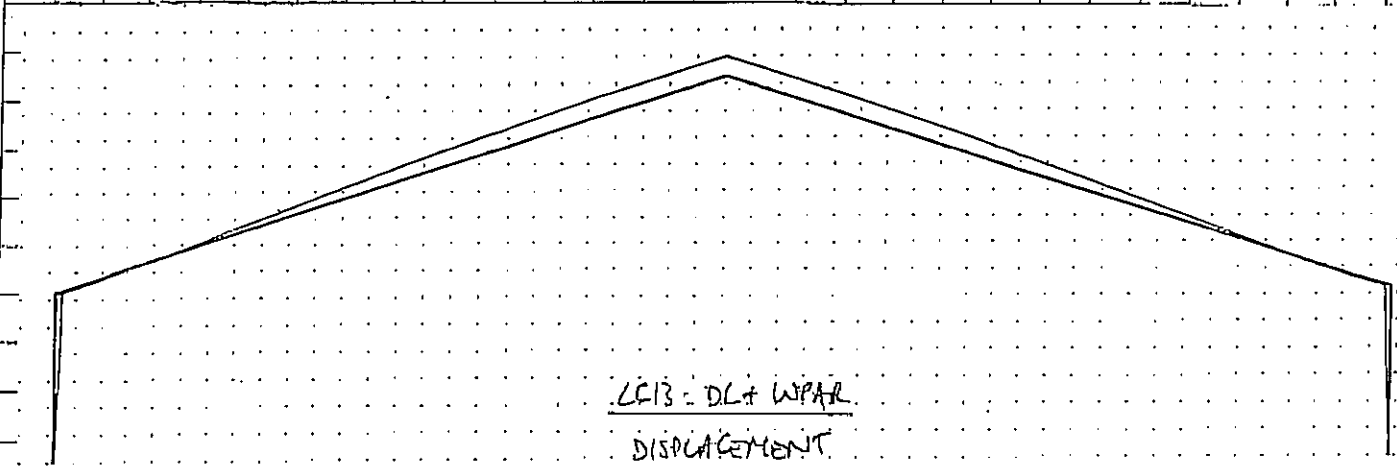
PROJECT	PROJECT #	DESCRIPTION LC12: DL + W/PRESSURE	PAGE# 30
AUTHOR	DATE		CHECKED BY





FTL DESIGN ENGINEERING STUDIO

PROJECT 304 MAXIFLEX (7-98)	PROJECT # 73081	DESCRIPTION LC13: DL+WPARALLEL	PAGE# 31
AUTHOR A.19	DATE		CHECKED BY



FTL DESIGN ENGINEERING STUDIO



PROJECT	PROJECT #	DESCRIPTION <i>ASCE 7-98: RAFTER LOADS</i>	PAGE# <b>32</b>
AUTHOR	DATE		CHECKED BY

30 M LOSBERGER FRAME TENT  
15-Mar-04

**RAFTER LOADS**

Load Combination (#)	C (K)	T (K)	M (Kft)	Nature	Segment	Length (ft)	Unity Check (%)
6	-1.000		9.400	End Moment	Eave	52.056	46
7	-1.670		16.170	End Moment	Eave	52.056	
8		1.790	-24.200	End Moment	Eave	52.056	
9	-0.480	0.480	23.570 26.370	Center Moment and Tension Center Moment and Compression	Middle Middle	52.056 52.056	64
10		3.650	-26.120	End Moment	Eave	52.056	
11		2.460	-30.970	End Moment	Eave	52.056	
12		0.120 1.030	25.690 24.670	Center Moment and Tension Center Moment and Tension	Middle Middle	52.056 52.056	
13		4.320	32.890	End Moment	Eave	52.056	77



FYL DESIGN ENGINEERING STUDIO



PROJECT	PROJECT #	DESCRIPTION ASCE 7-98: COLUMN LOADS	REVISION
AUTHOR	DATE		CHECKED BY

30 M LOSBERGER FRAME TENT  
15-Mar-04

COLUMN LOADS

Load Combination (#)	C (K)	T (K)	M (Kft)	Nature	Segment	Length (ft)	Unity Check (%)
6	-1.000		9.400	End Moment	Eave	12.467	39
7	-1.500		16.170	End Moment	Eave	12.467	
8		1.580	-24.200	End Moment	Eave	12.467	49
9	-0.720	0.680	-14.850 17.450	End Moment End Moment	Eave Eave	12.467 12.467	
10		3.210	-26.120	End Moment	Eave	12.467	76
11		2.080	30.970	End Moment	Eave	12.467	
12	-0.220		-21.620	End Moment	Eave	12.467	49
13		3.710	32.890	End Moment	Eave	12.467	



PROJECT 30M MAXIPLEX (798)	PROJECT # 23081	DESCRIPTION ASCE 7-98 : BASE REACTIONS	PAGES 34
AUTHOR A.D.	DATE		CHECKED BY

30 M LOSBERGER FRAME TENT  
15-Mar-04

MAXIMUM BASE REACTIONS

Criteria	ANSI/ASCE 7-93 Load Combination	Fx (K)	Fy (K)
Maximum Vertical Download	LC # 7: DL + LL		1.500
Maximum Vertical Uplift	LC # 13: DL + WPARALLEL		-3.710
Maximum Horizontal Shear	LC # 11: DL + WSUCTION	-3.160	