

141st Field Artillery Battalion Readiness Center

Jackson Barracks
New Orleans, Louisiana



National Guard Bureau
Project No. 220027



Louisiana Army National Guard

***Volume 2 of 5
Appendixes A – I***

**35% Design Submittal
Preliminary Review Documents
3 May 2006**

**Broadmoor Design Group, Dean Duplantier, Architect,
A Professional Architectural Corporation /
Blich Knevel Architects, Inc. - A Joint Venture**

Table of Contents

Volume Two – Appendixes A - I

A. Disclaimer	A-1
B. Project Schedule (LAARNG Supplied)	B-1
C. DD Form 1390/1391	
1. Area Matrix	C-1
D. Existing Conditions	
1. OMS #12 – Original Construction Drawings	D-1
E. Storm Water Drainage Design Analysis and Calculations	
1. Roof Drainage Calculations	E-1
2. Site Drainage Area Calculations	E-3
3. Storm Sewer Calculations	E-4
F. Geotechnical Report	F-1
G. Declaration of Soil Bearing Capacity and Uniformity of Area Soil Conditions	G-1
H. Anti-Terrorism/Force Protection and Risk and Threat Analysis (LAARNG Supplied)	H-1
I. Structural Design Analysis and Calculations	
1. Code References	I-1
2. Standoff Review	I-2
3. Wind Analysis	I-3
4. Floor Beam Design	I-4
5. Column Investigation	I-5
6. Tie Force Review	I-6
7. Frame Design Along Line 3	I-7
8. Beam Uplift Design & Miscellaneous Designs	I-8
9. Assembly Hall Roof	I-9
10. Main Roof Design	I-10
11. Frame Design	I-11
12. Assembly Hall Frame	I-12
13. Miscellaneous Design	I-13
14. Central Plant Design	I-14

A. Disclaimer

These documents, including supporting documentation, calculations and design analysis, are conceptual in nature and are not suitable for construction. It is the intent of these documents to clearly delineate the baseline minimum scale, scope and quality of the project. It is the responsibility of the design-builder that his proposal provides for a complete and functional facility responding to relative Army National Guard criteria, recognized industry standards and applicable building codes regardless of the content of these conceptual specifications.

Further, it will be the responsibility of the successful design-builder and his architect-of-record to prepare complete construction documents responding to the fullest intent of the conceptual drawings and specifications.

B. Project Schedule

C. DD FORM 1390/91

C-1 Area Matrix

1. Room Description Matrix

- A. The Room Description Matrix indicating the 1390/91 Authorized Square Footages with the Actual Net Square Footages is indicated in the following schedule.
- B. The matrix also indicates the differences between authorized and actual square footages as well as the percentage of the actual to the authorized square footages.

Louisiana Army National Guard
 141st Readiness Center (RC)
 Jackson Barracks, New Orleans, Louisiana



Area Matix - Progress Review No. 5

Room Description Matrix

May 3, 2006

ROOM TITLE	UNIT ACTUAL NSF	EXTENDED ACTUAL NSF	1390/91 Authorized SF 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
SCHEDULE I						
Assembly Hall	7,404	7,404	7,500	96	99%	
Classrooms		7,348	7,520	172	98%	
Classroom 118	981					
Classroom 119	633					
Classroom 122	1,400					
Classroom 123	1,475					
Classroom 124	1,475					
Classroom 125	1,384					
Library/Classroom 120	300	300	300	0	100%	
Learning Center 120	301	301	300	-1	100%	
Swing Space Rental	0	0	0	0		
Indoor Firing Range	0	0	0	0		
Training Device/Simulation Center 214	2,138	2,138	2,138	0	100%	
Training Aid Storage 215 & 236	181	181	180	-1	101%	
Kitchen	0	0	0	0		
Break Area		967	976	9	99%	
Breakroom and Vending 117	544					
Breakroom 319	120					
Breakroom 329	120					
Breakroom 344	76					
Breakroom 418	107					
Vending Area	100	100	100	0	100%	
Toilets & Showers		3,851	3,462	-389	111%	
Men 104	435					Fixture count increase due to Assembly Hall
Women 105	504					Fixture count increase due to Assembly Hall
Men 204	259					Fixture count increase per Plumbing Code
Women 205	259					Fixture count increase per Plumbing Code
Women 216	511					Fixture count increase per Plumbing Code
Men 218	438					Fixture count increase per Plumbing Code
Men 220	519					Fixture count increase per Plumbing Code
Men 304	259					Fixture count increase per Plumbing Code
Women 305	259					Fixture count increase per Plumbing Code
Men 404	204					Fixture count increase per Plumbing Code
Women 405	204					Fixture count increase per Plumbing Code
Flammable Materials Storage	250	250	250	0	0%	Modular building located in area "D"
Family Support Office 113	394	394	400	6	99%	
RAPIDS Office	0	0	0	0		
Recruiting Office 112	391	391	400	9	98%	
Audio Visual Storage 126	201	201	200	-1	101%	

Area Matix - Progress Review No. 5

Room Description Matrix

May 3, 2006

ROOM TITLE	UNIT ACTUAL NSF	EXTENDED ACTUAL NSF	1390/91 Authorized SF 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
Table & Chair Storage		849	850	1	100%	
Table & Chair Storage 116	767					
Vestibule 136	82					
Physical Fitness Area	0	0	0	0		
Controlled Waste Handling Facility	300	300	300	0	100%	Modular building located in area "D"
Subtotal Schedule I	24,975	24,975	24,876	-99	100%	
SCHEDULE II						
1. Administrative Space						
a. Basic Space:						
HHB 1/141st Field Artillery Battalion	800	800	800	0	100%	
Battery A 1/141st Field Artillery Battalion	800	800	800	0	100%	
Battery B 1/141st Field Artillery Battalion	800	800	800	0	100%	
1st BN (TS) (256th eSB) 349th Rgt's	400	400	400	0	100%	
199th Fires Forward Support Co.	800	800	800	0	100%	
b. General Space:						
HHB 1/141st Field Artillery Battalion		7,397	7,280	-117	102%	
Admin Room 414	1,622					area per owner space plan
S-6 Room 415	204					area per owner space plan
JAG Room 416	150					area per owner space plan
Chaplin Room 417	124					area per owner space plan
Readiness Room 419	326					area per owner space plan
Administration Room 420	544					area per owner space plan
CSM Room 421	423					area per owner space plan
Commander Room 422	500					area per owner space plan
TOC Room 423	1,929					area per owner space plan
X-O Room 424	500					area per owner space plan
S-3 Room 425	423					area per owner space plan
Administration Room 426	544					area per owner space plan
Storage 428	108					area per owner space plan
Battery A 1/141st Field Artillery Battalion		6,902	6,760	-142	102%	
Admin. 318	3,852					area per owner space plan
Admin. 335	2,105					
1st Plat. Sgt. 320	199					area per owner space plan
Commander 321	261					area per owner space plan
Readiness Room 322	405					area per owner space plan
Storage 323	59					area per owner space plan
Storage 324	21					area per owner space plan
Battery B 1/141st Field Artillery Battalion		6,753	6,760	7	100%	

Louisiana Army National Guard
 141st Readiness Center (RC)
 Jackson Barracks, New Orleans, Louisiana



Area Matix - Progress Review No. 5
Room Description Matrix
May 3, 2006

ROOM TITLE	UNIT ACTUAL NSF	EXTENDED ACTUAL NSF	1390/91 Authorized SF 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
Admin. 328	3,876					area per owner space plan
Admin. 336	1,923					
1st Plat. Sgt. 330	199					area per owner space plan
Commander 331	261					area per owner space plan
Readiness Room 332	415					area per owner space plan
Storage 333	59					area per owner space plan
Storage 334	20					area per owner space plan
1st BN (TS) (256th eSB) 349th Rgt's 241	931	931	910	-21	102%	
199th Fires Forward Support Co.		3,249	3,250	1	100%	
Admin. 342	2,355					area per owner space plan
Readiness Room 343	282					
Storage 345	166					area per owner space plan
Commander 346	262					area per owner space plan
1st Plat. Sgt. 347	184					area per owner space plan
c. Special - Admin Allowances						
HH Battery, 1/141st Field Artillery	1,500	1,500	1,500	0	100%	
2. Unit Storage Space (Including Arms Vault)						
a. Heated Storage						
HHB 1/141st Field Artillery Battalion	2,435	2,680	2,400	-280	112%	
HHB Supply NCO 132	245					
Battery A 1/141st Field Artillery	2,435	2,691	2,400	-291	112%	
Battery A NCO 128	256					
Battery B 1/141st Field Artillery	2,435	2,691	2,400	-291	112%	
Battery B NCO 130	256					
1st BN (TS) (256th eSB 349th Rgt's	0	0	0	0	0%	
199th Fires Forward Support Co.	2,436	2,681	2,400	-281	112%	
Supply NCO 134	245					
Vault 212	1,206	1,206	0	-1,206		
2. Unit Storage (continued)						
b. Unheated Storage						
HHB 1/141st Field Artillery Battalion	0	0	2,449	2,449	0%	Combined w/ Heated Storage per LANG directive
Battery A 1/141st Field Artillery	0	0	0	0	0%	
Battery B 1/141st Field Artillery	0	0	0	0	0%	
1st BN (TS) (256th eSB 349th Rgt's	0	0	0	0	0%	
199th Fires Forward Support Co.	0	0	0	0	0%	
c. Temporary Storage						

Area Matix - Progress Review No. 5
Room Description Matrix
May 3, 2006

ROOM TITLE	UNIT ACTUAL NSF	EXTENDED ACTUAL NSF	1390/91 Authorized SF 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
Subtotal Unit Storage	11,949	11,949	12,049	100	99%	
3. Locker Room Space						
a. Basic Space	200	200	200	0	100%	
b. Individual Space		9,279	9,216	-63	101%	
Womens Lockers 217	1,721					
Vestibule 223	62					
Vestibule 232	58					
Mens Lockers 219	1,953					
Vestibule 233	69					
Vestibule 234	45					
Mens Lockers 221	5,268					
Vestibule 225	58					
Vestibule 226	45					
4. Special Functions						
Medical Section 313	382	382	400	18	96%	
Medical Section 313	382	382	400	18	96%	
CMDS 229	501	501	500	-1	100%	
Information Tech Support Activity 230	501	501	500	-1	100%	
Maint. Training Workbays	0	0	2,048	2,048	0%	See OMS 12 Renovation below
Supervisor's Office	0	0	100	100	0%	See OMS 12 Renovation below
Tool Room	0	0	200	200	0%	See OMS 12 Renovation below
Supply Room	0	0	300	300	0%	See OMS 12 Renovation below
Battery Room	0	0	200	200	0%	See OMS 12 Renovation below
Other	0	0	2,875	2,875	0%	See OMS 12 Renovation below
Subtotal Schedule II	53,526	53,526	59,048	5,522	91%	See OMS 12 Renovation below
Schedule I + Schedule II	78,501	78,501	83,924	5,423	94%	See OMS 12 Renovation below
Facility Maint. And Stor (3%)		3,389	2,518	-871	135%	
Audio Visual 111	225					
Janitor 114	98					
Storage 121	419					
Storage 222	33					
Janitor 224	33					
Janitor 228	100					
Storage 231	338					
Storage 337	696					
Storage 338	1,165					
Storage 413	282					See Central Plant below

Area Matix - Progress Review No. 5
Room Description Matrix
May 3, 2006

ROOM TITLE	UNIT ACTUAL NSF	EXTENDED ACTUAL NSF	1390/91 Authorized SF 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
Facility Mech/Elect Room (5%)		5,471	4,196	-1,275	130%	
Elec. 206	236					
Mech. 213	3,416					
Equip. Lift Equip. 227	71					
Elec. 235	53					
Elec. 306	99					
Mech. 314	431					
Mech. 315	431					
Elec. 406	99					
Mech. 411	243					
Mech. 412	243					
Water Heater Room 427	149					
Facility TELKECON/INFO RM (1%)		401	839	438	48%	
Comm. 207	65					
Audio Visual Equip. 242	140					
Comm. 307	98					
Comm. 407	98					
Total Schedule I & II	87,762	87,762	91,477	3,715	96%	
Facility Circulation (22%)		14,002	20,125	6,123	70%	
Atrium Lobby 100	721					
Elev. 101	94					
Stair No. 1 Room 102	344					
Stair No. 2 Room 103	354					
Vestibule 107	373					
Corridor 108	1,027					
Corridor 109	868					
Corridor 110	127					
Corridor 131	460					
Equip. Lift 137	80					
Atrium Lobby 200	224					
Corridor 208	1,050					
Corridor 209	941					
Corridor 210	936					
Vestibule 211	205					
Corridor 238	113					
Corridor 239	327					
Corridor 240	113					
Atrium Lobby 300	224					
Corridor 308	626					

Area Matix - Progress Review No. 5
Room Description Matrix
May 3, 2006

ROOM TITLE	UNIT ACTUAL NSF	EXTENDED ACTUAL NSF	1390/91 Authorized SF 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
Corridor 309	1,031					
Corridor 310	982					
Atrium Lobby 400	224					
Corridor 408	630					
Corridor 409	652					
Corridor 410	652					
Corridor 429	298					
Corridor 430	326					
Subtotal	101,764	101,764	111,602	9,838	91%	
Walls (10%)	10,283	10,283	11,160	877	92%	Area = 63% of 2nd. floor enclosed space
Central Plant	2,223	2,223				
OMS 12 Renovation	9,663	9,663				Exist. building exceeds programmed area by 1274 s.f.
TOTAL FACILITY AUTHORIZATION	123,933	123,933	122,762	-1,171	101%	Additional area due to OMS 12 Renovation

Area Matix - Progress Review No. 5
Room Description Matrix
May 3, 2006

ROOM TITLE	UNIT ACTUAL NSY	EXTENDED ACTUAL NSY	1390/91 Authorized SY 7-Mar-03	DIFFERENCE	% of Authorized	NOTES
Military Vehicle Parking			15,750 SY			
WHEELED	5,323	5,323	5,550	227	96%	
TRAILERS	1,008	1,008	1,050	42	96%	
TRACKED	3,091	3,091	3,225	134	96%	
EQUIPMENT > 30 FT	0	0	0	0		
FUEL & M977 HEMTT	672	672	700	28	96%	
HEMTT PLS/HET	5,011	5,011	5,225	214	96%	
TOTAL MV PARKING	15,105	15,105	15,750	645	96%	
Enclosed Military Vehicle Parking						
Ancillary Facility Support Items						
Wash Platform Access	0	0	250 SY	250	0%	Existing at OMS 12
Maint. Work Bay Access Apron	0	0	427 SY	427	0%	Existing at OMS 12
Service Access Apron	300	300	300 SY	0	100%	
Loading Dock Access	250	250	250 SY	0	100%	
Loading Ramp Access	250	250	250 SY	0	100%	
Fuel Storage and Dispensing System	0	0	0 SY	0		
With 0 ea. 3000 Gal Fuel Tank						
With 0 ea. 5000 Gal Fuel Tank						
With 0 ea. 7000 Gal Fuel Tank						
With 0 ea. 10000 Gal Fuel Tank						
With 0 ea. 20000 Gal Fuel Tank						
Fuel Stor and Disp System Access	0	0	0 SY	0		
Cont'd Waste Han Fac Access	150	150	150 SY	0	100%	
Track Vehicle Turning Pads	0	0	600 SY	600	0%	
Fuel Truck Containment Area	250	250	250 SY	0	100%	
MCOFT Pad	0	0	0 SY	0		
Access and Entrance Roads	2,166	2,166	5,000 SY	2,834	43%	Access roads contained in infrastructure contract
Unheated Vehicle Storage			0 SF			
Rigid Pavement	33,576	33,576	23,227 SY	-10,349	145%	Access roads contained in infrastructure contract
Flexible Pavement			16,128 SY			
POV Parking	15,281	15,281	16,128	847	95%	
Security Fencing	0	0	3,088 LF	0		Security fencing contained in infrastructure contract
Sidewalks	2,606	2,606	2,661 SY	55	98%	

D. Existing Conditions

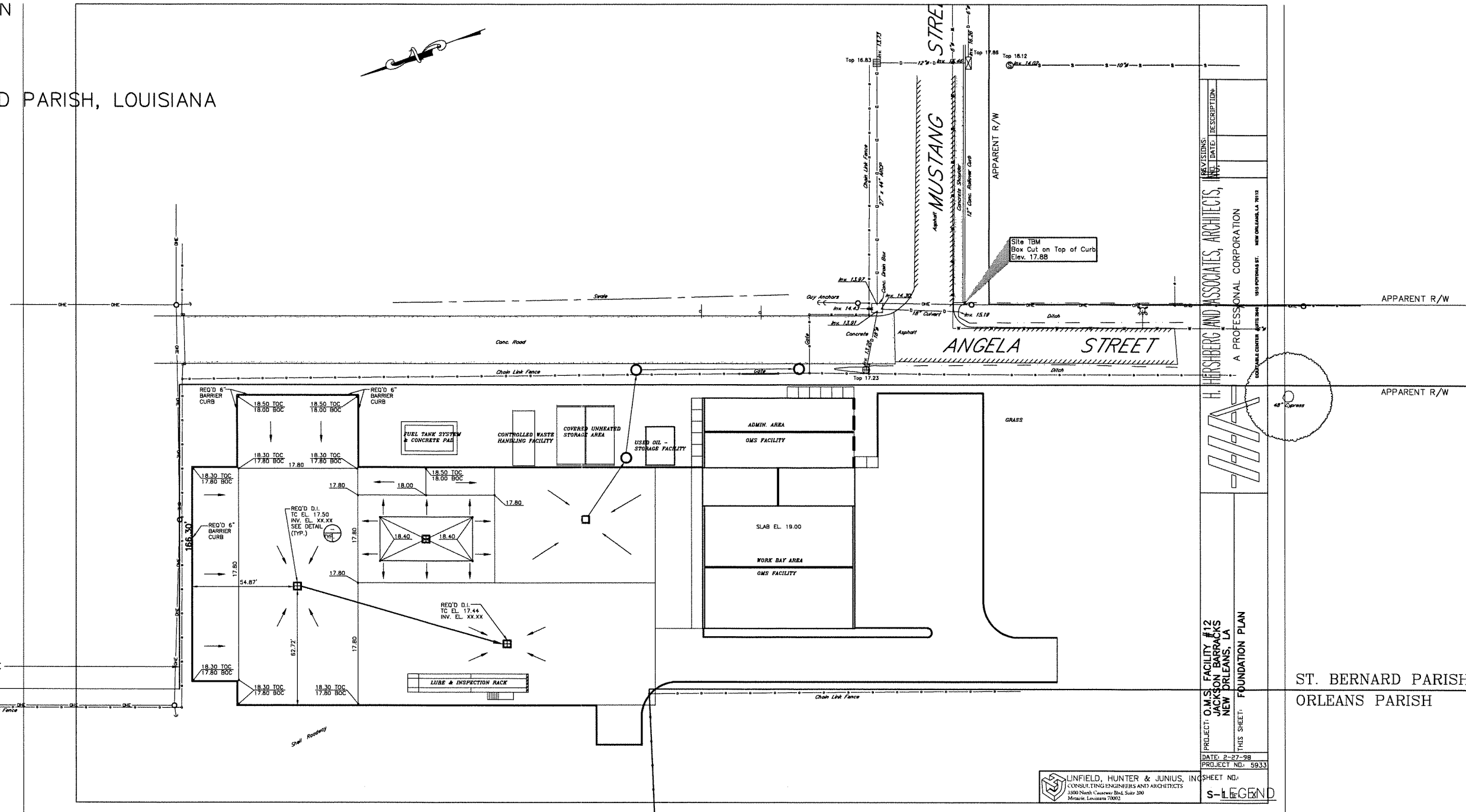
D-1 OMS #12 – Original Construction Drawings

1. **Survey** (prepared by Landmark Surveying, Inc., dated 12/8/1997, revised 1/27/98)
2. **Site Layout – C-1** (prepared by H. Hershberg and Associates, Architects, Inc., dated 12/17/1996)
3. **Foundation Plan & Details – S-1** (prepared by Linfield, Hunter, & Junius, Inc. as consultant for H. Hershberg and Associates, Architects, Inc., dated 2/27/1998)
4. **Disclaimer:** Attached drawings are for informational purposes only and are not to be considered a true representation of actual conditions at the project site.

PORTION OF GROUND SITUATED IN JACKSON BARRACKS, THIRD DISTRICT, CITY OF NEW ORLEANS, ORLEANS PARISH & ST. BERNARD PARISH, LOUISIANA

FLORIDA AVENUE (Side)

ST. BERNARD PARISH
ORLEANS PARISH



H. HERSHBERG AND ASSOCIATES, ARCHITECTS, A PROFESSIONAL CORPORATION
 PROJECT: O.M.S. FACILITY #12 JACKSON BARRACKS NEW ORLEANS, LA
 THIS SHEET: FOUNDATION PLAN
 DATE: 2-27-98
 PROJECT NO.: 5933

LINFELD, HUNTER & JUNIUS, INC. SHEET NO. 1
 CONSULTING ENGINEERS AND ARCHITECTS
 3500 North Causeway Blvd., Suite 200
 Metairie, Louisiana 70003

- SEWER MANHOLE
- SEWER LINE
- ⊕ DRAIN INLET ROUND
- ⊞ DRAIN INLET SQUARE
- ⊠ CATCH BASIN
- DRAIN LINE
- WOOD POLE
- OVERHEAD ELECTRIC
- SIGN
- TREE
- ⊕ FIRE HYDRANT
- WATER LINE

17.70' or +17.70'
 CAIRO DATUM ELEVATION

Call before you dig.
 1-800-978-3000

NOTE
 The locations of underground and other nonvisible utilities shown hereon have been determined from data and/or extracted from records made available to us by agencies controlling such records. Where found, the surface features of locations are shown. The ACTUAL nonvisible locations may vary from those shown hereon. Each agency should be contacted relative to the precise location of its underground installation prior to any reliance upon the accuracy of such locations shown hereon, including to excavation and digging.

There is no representation that all applicable servitudes and/or restrictions have been shown hereon. Any servitudes and/or restrictions shown on this plot are limited to those set forth in the description and/or information furnished the undersigned. A title or public record search for such information was not made by the undersigned in compiling the data for this survey.

I certify that this plot represents an actual ground survey made by me, or by those under my direction, that no visible encroachments exist either way across the property lines except as shown hereon and that this survey, and plot, are in accordance with the adopted Louisiana Minimum Standards for Property Boundary Survey for a Class C Survey, except for the following:
 (c) this is a topographic survey
 (b) no corners were set
 (c) all angles are 90°

LANDMARK SURVEYING, INC.
 1400 Delcambre Avenue, Suite A
 Harahan, Louisiana 70123

REVISED 1-27-98 TO SHOW INVERTS ON DRAIN BOX

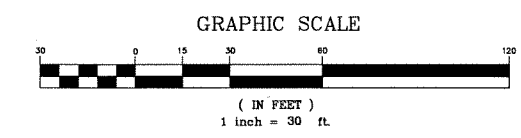
DATE: December 8, 1997
 SCALE: 1"=30'

JOB NO. 970657

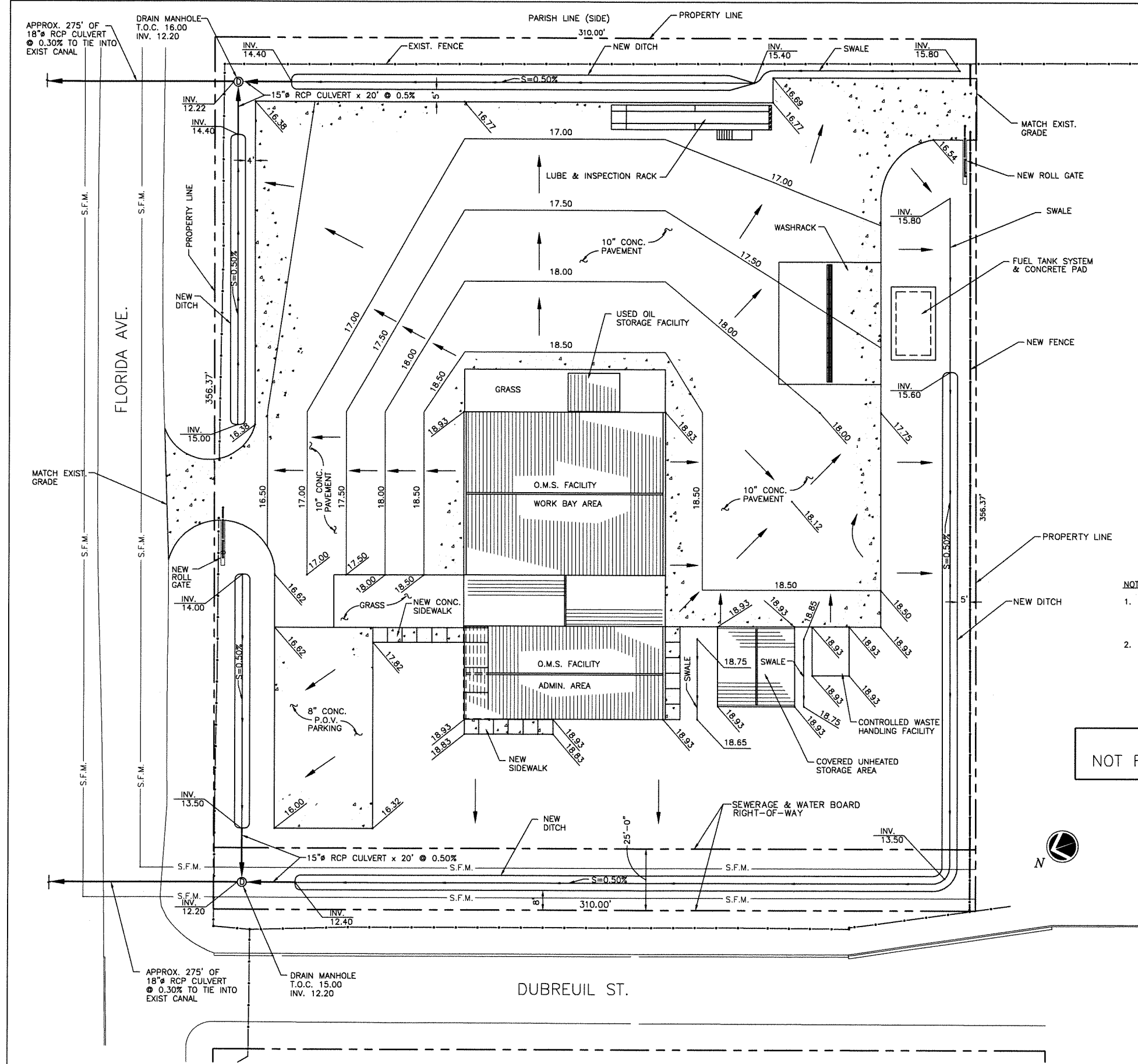
PROFESSIONAL LAND SURVEYOR

DRAWING NO. EE-2836



SURVEY MADE AT THE REQUEST OF:
 H. HERSHBERG & ASSOCIATES



DUBREUIL STREET (Side)



LEGEND

-  NEW CONCRETE PAVEMENT
-  FINISHED GRADE ELEVATION

NOTES

1. SITE DRAINAGE SYSTEM IS BASED ON THE ASSUMPTION THAT CULVERTS CAN BE PLACED OVER THE 66" SEWER FORCE MAINS. FURTHER INFORMATION IS REQUIRED FROM SEWERAGE & WATER IN ORDER TO COMPLETE FINAL DESIGN.
2. BE ADVISED THAT THIS SITE PLAN IS NOT OPERATIONAL UNTIL THE NATIONAL GUARD FULFILLS THE REQUIREMENTS OUTLINED IN THE LETTER SENT TO THE NATIONAL GUARD ON 12/16/96.

PRELIMINARY
NOT FOR CONSTRUCTION

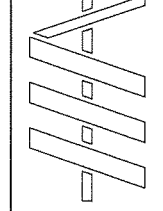


1 SITE LAYOUT
C1/C1 SCALE: 1"=20'

REV. NO.	DATE	DESCRIPTION

H. HERSHBERG AND ASSOCIATES, ARCHITECTS, INC.
A PROFESSIONAL CORPORATION

EQUITABLE CENTER SUITE 2640 1515 POYDRAS ST. NEW ORLEANS, LA 70112



PROJECT: COMMS. FACILITY #12
JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

THIS SHEET: SITE LAYOUT L A N

DATE: 12/17/96
PROJECT NO.: 5933
SHEET NO.:
8-1 OF 1

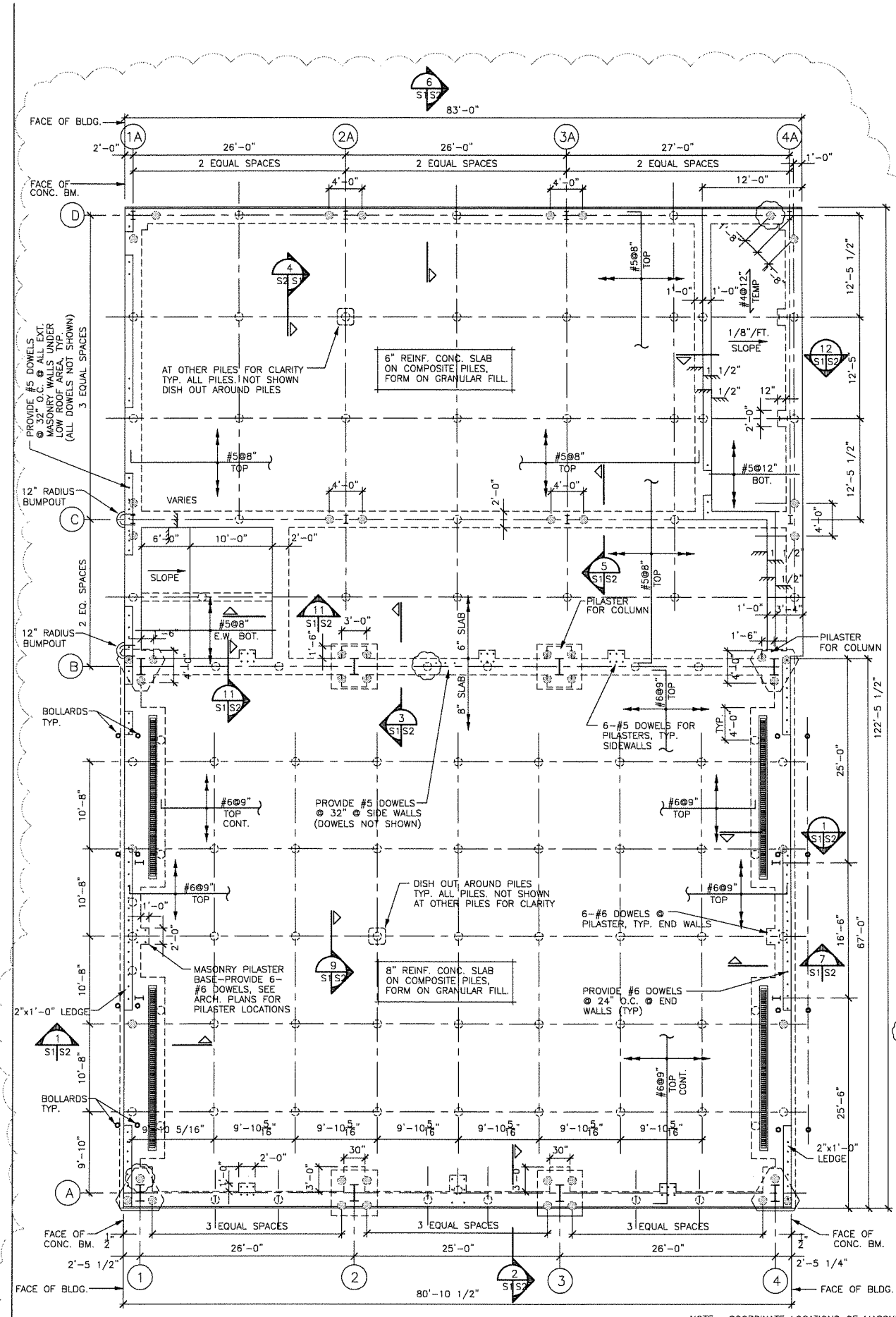
DESIGN LOADS	
ROOF LIVE:	20 PSF
WORK BAY AREA:	200 PSF OR M1074 TRUCK AXLE LOADS
ADMINISTRATIVE AREA FLOOR:	100 PSF
COVERED UNHEATED STORAGE BLDG. FLOOR:	500 PSF
WIND:	ASCE-7-95 120 MPH COASTAL EXPOSURE

PILING NOTES

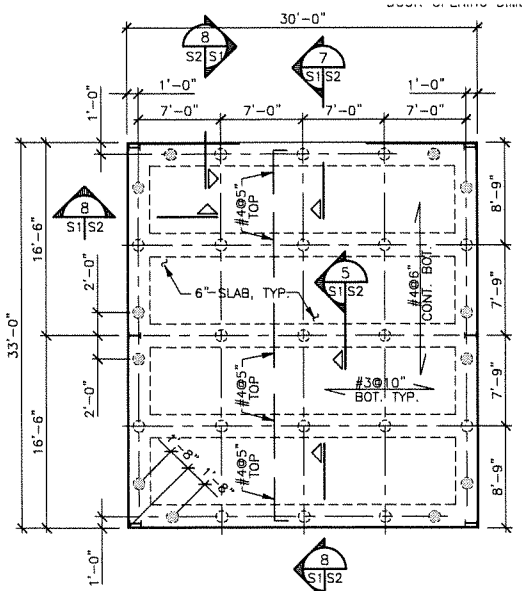
- PILES SHALL BE COMPOSITE PILES CONSISTING OF AN UNTREATED TIMBER SECTION AND A CONCRETE FILLED METAL CASING (CAN) PILES SHALL BE 75' LONG FROM TIP TO CUTOFF. IN NO CASE SHALL THE METAL CASING EXTEND LESS THAN 10' BELOW EXIST. GRADE. PILE CAPACITY = 16 TONS
- THE UNTREATED TIMBER SECTION SHALL CONFORM TO ASTM D-25, FRICTION PILE WITH 13 INCH MIN. BUTT DIA. AND MIN. TIP DIA. SHALL BE 7 INCHES.
- COMPOSITE CONNECTOR SHALL BE 12 GAGE MIN. MATERIAL WITH CROSS WEDGES OF 1/4 INCH MIN. MATERIAL (ARMO COMPOSITE PILE CONNECTOR OR APPROVED EQUAL.) METAL CASING SHALL BE 12", 16 GA. MIN. METAL THICKNESS.
- DRIVE PILES THEIR FULL LENGTH WITH A VULCAN NO.1 OR O6 HAMMER WITHOUT DAMAGING PILES.
- REMOVE ALL FOREIGN MATERIAL AND WATER FROM METAL CASING PRIOR TO PLACING CONCRETE. PLACE CONCRETE IN CLEAN AND DRY METAL CASING. CONCRETE SHALL BE 3000 PSI MIN. AT 28 DAYS.
- BROKEN, SHATTERED OR BROOMED PILES OR PILES MORE THAN 2% OUT OF PLUMB OR ANY PILE MORE THAN 3 INCHES OUT OF PLACE SHALL BE REMOVED OR LEFT IN PLACE AND A REPLACEMENT PILE DRIVEN AS DETERMINED BY ENGINEER.
- DRIVE THREE PROBE PILES AT LOCATIONS INDICATED OR INSTRUCTED. IT IS INTENDED THAT THE PROBE PILES WILL BE USED AS JOB PILES. CONTRACTOR SHALL PROVIDE TEST RIG AND TESTING LABORATORY SERVICES AND LOAD TEST ONE PILE AS PER THE ST. BERNARD PARISH BUILDING CODE, ARTICLE 2803.B, WHERE THE PILE IS LOADED TO FAILURE. LOAD TEST SHALL ALSO CONFORM TO ASTM D1143. PILES SHALL NOT BE TESTED UNTIL 14 DAYS AFTER THEY ARE DRIVEN.
- CONTRACTOR SHALL MONITOR PILE DRIVING VIBRATIONS TO DETERMINE THE EFFECTS ON STRUCTURES AND UTILITIES AND TO DETERMINE IF THE PILE DRIVING PROCEDURES SHOULD BE MODIFIED.

CONCRETE NOTES

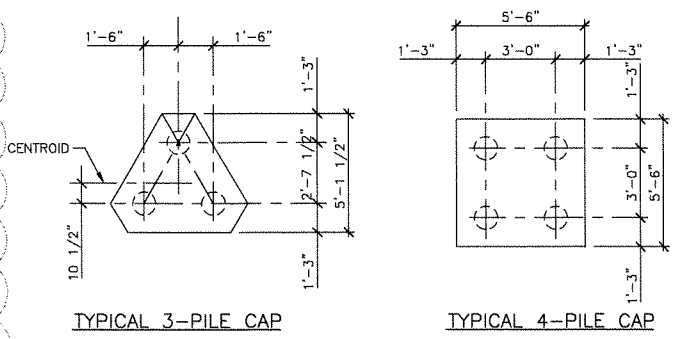
- ALL CONCRETE SHALL BE SAND AND GRAVEL ATTAINING A STRENGTH OF 4000 PSI AT 28 DAYS AGE CONFORMING TO ACI 318-83. CONCRETE FOR PILING MAY BE 3000 PSI.
- ALL REINFORCING BARS SHALL CONFORM TO ASTM A-615 GRADE 60 DEFORMED.
- REINFORCING BARS SHALL BE BENT AS SHOWN ON THE DRAWINGS AND SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH THE ACI 315. ALL ACCESSORIES SHALL BE PLASTIC TIPPED.
- UNLESS OTHERWISE NOTED, ALL SPLICES SHALL CONFORM TO ACI 318, BUT NOT LESS THAN 48 BAR DIAMETERS FOR TOP BARS AND 38 BAR DIAMETERS FOR BOTTOM BARS. STAGGER ALL SPLICES. DO NOT SPLICE IN AREAS OF HIGH BENDING STRESS. DO NOT CUT BARS TO ALLOW FOR PLUMBING OR OTHER OBSTRUCTIONS. PROVIDE CORNER BARS AT ALL CORNERS. HOOK ENDS OF BARS IN BEAMS TERMINATING AT OTHER BEAMS.
- CONCRETE STRUCTURAL DESIGN IS BASED UPON ACI 318-95.
- CHAMFER ALL EXPOSED CONCRETE EDGES EXPOSED TO VIEW 3/4" UNLESS NOTED OTHERWISE COORDINATE WITH ARCHITECTURAL DRAWINGS.
- FLOOR SLABS SHALL BE FINISHED TO A FLOOR FLATNESS/LEVELNESS NUMBER (F-NUMBER) OF FF18/FL15 IN ACCORDANCE WITH ACI 302.1R-89 AND ASTM E 1155.



1 FOUNDATION PLAN (O.M.S. BUILDING)
S-1 SCALE: 1/8" = 1'-0"



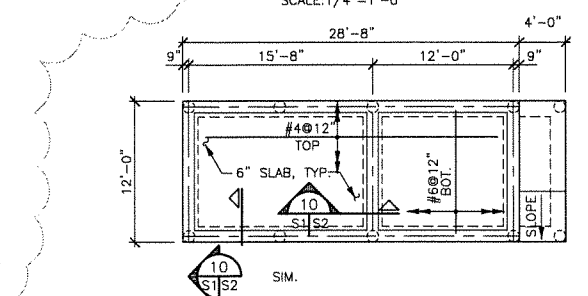
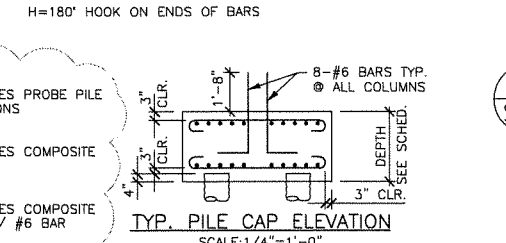
2 FOUNDATION PLAN (COVERED UNHEATED STORAGE)
S-1 SCALE: 1/8" = 1'-0" SEE ARCH. PLANS FOR LOCATIONS



A PILE CAP DETAILS
SCALE: 1/4" = 1'-0"

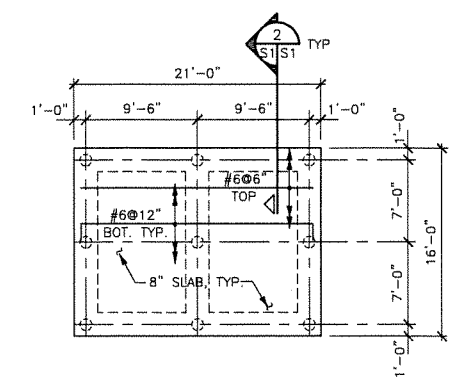
NO. PILES	DEPTH	REINFORCING		REMARKS
		LONG WAY	SHORT WAY	
3	3'-6"	5-#8H	3 WAYS	BOT. ONLY
4	3'-6"	10-#8H	10-#8H	TOP & BOT.

H=180° HOOK ON ENDS OF BARS

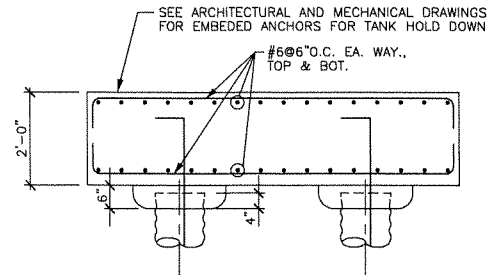


3 PLAN (CONTROLLED WASTE HANDLING FACILITY)
S-1 SCALE: 1/8" = 1'-0" SEE ARCH. PLANS FOR LOCATIONS

4 PLAN (FUEL TANK SYSTEM CONC. SLAB)
S-1 SCALE: 1/8" = 1'-0" SEE ARCH. PLANS FOR LOCATION



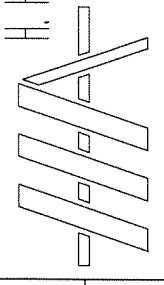
5 PLAN (USED OIL STORAGE FACILITY)
S-1 SCALE: 1/8" = 1'-0" SEE ARCH. PLANS FOR LOCATION



10 SECTION
SCALE: 1/2" = 1'-0"

NO.	DATE	DESCRIPTION
1	3/24/98	ROTTED BLDG. ADDED BOLLARDS

H. HERSBERG AND ASSOCIATES, ARCHITECTS,
A PROFESSIONAL CORPORATION
EQUITABLE CENTER SUITE 2640 1515 PONDRAIS ST. NEW ORLEANS, LA 70112



PROJECT: O.M.S. FACILITY #12 JACKSON BARRACKS NEW ORLEANS, LA
THIS SHEET: FOUNDATION PLAN

DATE: 2-27-98
PROJECT NO.: 5933

LINFIELD, HUNTER & JUNIUS, INC.
CONSULTING ENGINEERS AND ARCHITECTS
3500 North Causeway Blvd. Suite 200 Metairie, Louisiana 70002

SHEET NO.: S-1 OF: X

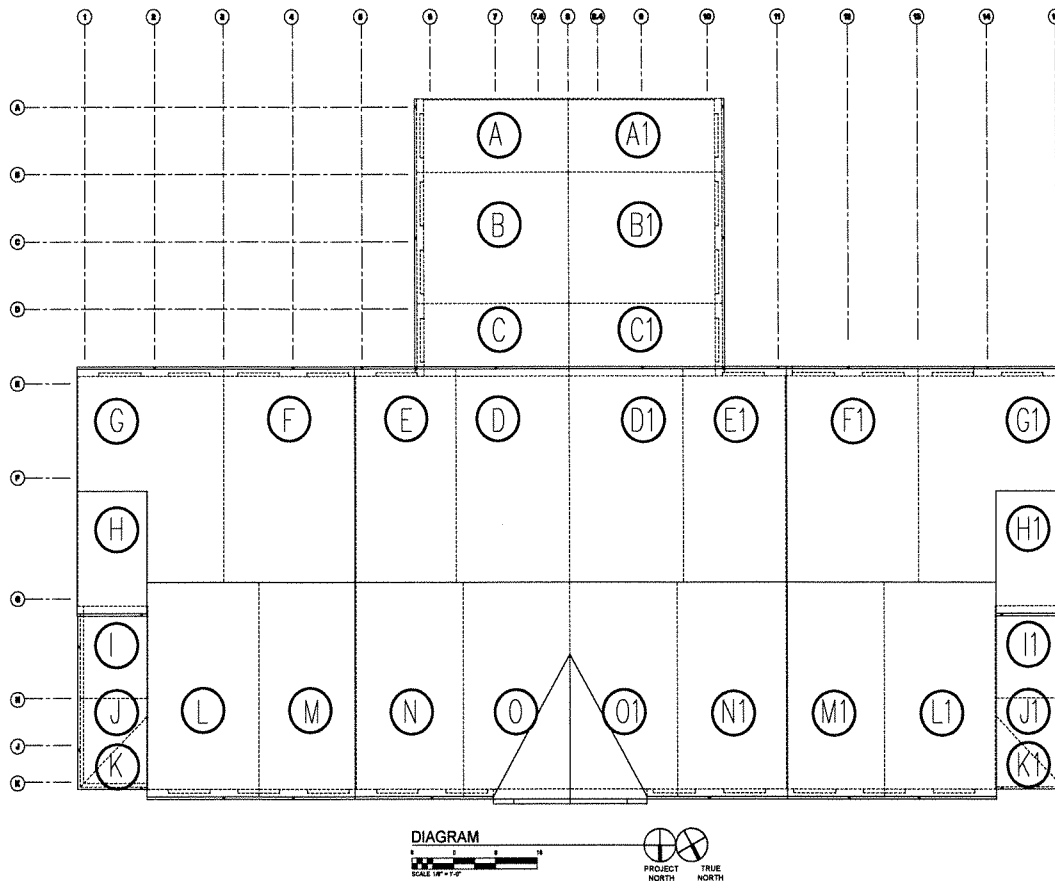
E. Storm Water Drainage Design Analysis and Calculations

E-1 Roof Drainage Calculations

1. Gutters and Downspouts – General

- A. Gutters and downspouts shall be sized in accordance with SMACNA recommendations (Sixth Edition, 2003). Calculations are for worst case downspout and gutter capacities for both the 141st Readiness Center and the Central Plant.
- B. Gutters & Downspouts for OMS #12 are to match the existing sizes.

2. Area Calculations – Main Roof



Area A = 879 sq ft	Area A1 = 879 sq ft	Area B = 1,568 sq ft	Area B1 = 1,568 sq ft
Area C = 781 sq ft	Area C1 = 781 sq ft	Area D = 1,890 sq ft	Area D1 = 1,890 sq ft
Area E = 1,711 sq ft	Area E1 = 1,711 sq ft	Area F = 2,196 sq ft	Area F1 = 2,196 sq ft

Area G = 1,961 sq ft	Area G1 = 1,961 sq ft	Area H = 667 sq ft	Area H1 = 667 sq ft
Area I = 426 sq ft	Area I1 = 426 sq ft	Area J = 276 sq ft	Area J1 = 276 sq ft
Area K = 182 sq ft	Area K1 = 182 sq ft	Area L = 1,876 sq ft	Area L1 = 1,876 sq ft
Area M = 1,614 sq ft	Area M1 = 1,614 sq ft	Area N = 1,822 sq ft	Area N1 = 1,822 sq ft
Area O = 1,794 sq ft	Area O1 = 1,794 sq ft		

A. Total Roof Coverage = 39,286 sq. ft. (3649.80 sq. m.)

3. Gutters

- A. Area drained per section of gutter (worst case = Area C + D or Area C1+ D1): 2,671 sq.ft. (248.14 sq.m.)
- B. Pitch factor (Table 1-1): 1.05 for 4:12 pitch
- C. 100 yr rainfall intensity (Table 1-2): 0.9 inches/hr (.277m/hr)
- D. Gutter Depth/Width ratio = 0.67
- E. Length of gutter per downspout = 22' (worst case)
- F. Area drained per downspout = 2,804.55 sq. ft. (260.55 sq. m.)
- G. Roof area x intensity = $2804.55 \times 10.9 = 30,569.60$
- H. According to Chart 1-1 of SMACNA Manual required width of gutter is 10". Gutter to be provided is 10" wide by 7" deep.

4. Downspouts

- A. Downspouts Requirement (Table 1-2): 1 sq. in. per 110 sq. ft.
- B. Area drained per downspout: $2671 \times 1.05 = 2,804.55$ sq. ft.
- C. Downspout size required: $2804.55/110 = 25.49$ sq. in.
- D. According to Table 1-3 of SMACNA Manual the required size of downspout is 25.49 sq. in. rectangular, (6" wide by 5" deep).

E-2 Site Drainage Area Calculations

<u>Area "C"</u>	<u>Calculations</u>	
BOUNDARY #	AREA (SQFT)	ACRES
A	11544.6	0.265
B	18622.17	0.411
C	10154.18	0.224
D	15229.52	0.336
E	8218.63	0.181
F	20555.31	0.453
G	20149.37	0.442
H	18971.59	0.418
I	22532.32	0.497
J	28470.26	0.628
K	25258.63	0.557
L	38312.31	0.845

Prepared by Krebs, Lasalle, Lemieux Consultants, Inc.

E-3 Storm Sewer Calculations

Area "C"

C = 0.3 Grass Area Q = Flow, CFS
C = 0.95 Pavement Area A = Area (Ac)
C = 1.00 Roof Area I = 5.3 in/hr
Q = ciA

- A. $Q_{\text{grass}} = (0.3) (5.3) (0.22) = 0.34$
 $Q_{\text{roof}} = (1.00) (5.3) (0.04) = 0.25$
Total = 0.60 cfs
- B. $Q_{\text{roof}} = (1.00) (5.3) (.108) = 0.57$
 $Q_{\text{pmvt}} = (0.95) (5.3) (.305) = 1.54$
Total = 2.1 cfs
- C. $Q_{\text{roof}} = (1.00) (5.3) (.044) = 0.233$
 $Q_{\text{pmvt}} = (0.95) (5.3) (.179) = 0.901$
Total = 1.1 cfs
- D. $Q = (1.00) (0.95) (5.3) (0.336) = 1.69$ cfs
- E. $Q = (0.3) (5.3) (0.181) = 0.28$ cfs
- F. $Q = (1.00) (0.3) (5.3) (0.453) = 0.72$ cfs
- G. $Q = (1.00) (0.3) (5.3) (0.442) = 0.70$ cfs
- H. $Q = (1.00) (0.3) (0.95) (5.3) (0.418) = 0.63$ cfs
- I. $Q = (1.00) (0.3) (0.95) (5.3) (0.497) = 0.75$ cfs
- J. $Q = (0.3) (5.3) (0.628) = 0.99$ cfs
- K. $Q = (0.3) (5.3) (0.557) = 0.88$ cfs
- L. $Q = (0.95) (5.3) (0.845) = 4.3$ cfs

Area "D"

C = 0.3 Grass Area Q = Flow, CFS
C = 0.95 Pavement Area A = Area (Ac)
C = 1.00 Roof Area I = 5.3 in/hr
Q = ciA

- A.1 $Q = (0.95) (5.3) (0.80) = 4.0$ cfs
A.2 $Q = (0.95) (5.3) (0.72) = 3.6$ cfs
A.3 $Q = (0.95) (5.3) (0.69) = 3.5$ cfs
- B.1 $Q = (0.95) (5.3) (1.1) = 5.5$ cfs
- C.1 $Q = (0.95) (5.3) (1.0) = 5.0$ cfs
C.2 $Q = (0.95) (5.3) (0.83) = 4.1$ cfs
C.3 $Q = (0.95) (5.3) (1.0) = 5.0$ cfs

Prepared by Krebs, Lasalle, Lemieux Consultants, Inc.

F. Geotechnical Report

Prepared by:

Professional Service Industries, Inc.

Dated February 28, 2006

February 28, 2006

Broadmoor Design Group
2740 North Arnoult Road
Metairie, Louisiana 70011

Attention: Mr. Dean Duplantier

Re: Geotechnical Engineering Report
Proposed Readiness Center
for the 1st Battalion
141st Field Artillery
Jackson Barracks
New Orleans, Louisiana
PSI File Number: 254-65023-1

Dear Mr. Duplantier:

Professional Service Industries, Inc. is pleased to transmit our Geotechnical Engineering Report for the referenced project. This report includes the results of field and laboratory testing, and recommendations for foundation and pavement design, as well as general site development.

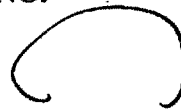
We appreciate the opportunity to perform this Geotechnical Study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,

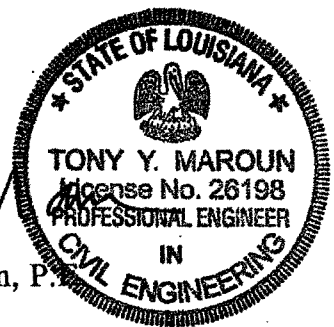
PROFESSIONAL SERVICE INDUSTRIES, INC.



Malay Ghose Hajra, Ph.D., P.E.
Department Manager
Geotechnical Services



Tony Y. Maroun, P.E.
Vice President



GEOTECHNICAL ENGINEERING REPORT

**PROPOSED READINESS CENTER
FOR THE 1ST BATTALION
141ST FIELD ARTILLERY
JACKSON BARRACKS
NEW ORLEANS, LOUISIANA**

PSI FILE NUMBER 254-65023-1

PREPARED FOR

**BROADMOOR DESIGN GROUP
2740 NORTH ARNOULT ROAD
METAIRIE, LOUISIANA 70011**

FEBRUARY 28, 2006

BY

**PROFESSIONAL SERVICE INDUSTRIES, INC.
724 CENTRAL AVENUE
JEFFERSON, LOUISIANA 70121**

TABLE OF CONTENTS

Page No.

EXECUTIVE SUMMARY	1
PROJECT INFORMATION	2
Project Authorization.....	2
Project Description.....	2
Purpose and Scope of Services	2
SITE AND SUBSURFACE CONDITIONS	3
Site Location and Description.....	3
Field Exploration.....	3
Drilling and Sampling Procedures	4
Laboratory Testing Program	4
Subsurface Conditions.....	5
Groundwater Information.....	5
RECOMMENDATIONS	5
General	5
Site Preparation.....	6
Pile Foundation	7
Floor Slab.....	7
Settlement.....	8
Group Effect	8
Pile Installation	8
Pile Driving Monitoring	8
Pile Load Test	9
Pavement Recommendations	9
CONSTRUCTION CONSIDERATIONS	11
Construction and Testing	11
Drainage Consideration	12
Excavations.....	12
REPORT LIMITATIONS	13
APPENDIX	
Boring Location Plan	
Records of Subsurface Exploration	
Key to Terms and Symbols Used on Logs	
Allowable Group Pile Capacity	

EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed Readiness Center that will be constructed within Jackson Barracks in New Orleans, Louisiana. A total of seven (7) borings were drilled at the site. This included three (3) borings (B-1 through B-3) to a depth of 100 feet within the proposed building area and four (4) shallow borings (P-1 through P-4) to a depth of six (6) feet in the proposed parking area.

Although no plan with the building location was provided, we understand the site for the proposed development is partially occupied by an existing structure that will be demolished to accommodate the new construction. In addition, a roadway crosses the proposed building and other portions occupied by a gravel parking area. The project will include the construction of a four (4) story structure with a structural steel frame and load bearing masonry walls having a plan area of approximately 30,000 to 40,000 square feet. The facility will be used to prepare and deploy troops; therefore, it will be a multi-purpose structure designed to accommodate troop equipment and armored and transport vehicles. Structural loading information provided to us indicates that maximum column and wall loads will be on the order of 300 kips and 6 kips per linear foot, respectively.

Detailed grading information was not available at the time this report was prepared. However, since the site is already developed, it is assumed that about two (2) feet of fill will be needed to achieve the building floor slab design elevation.

Based on the borings, about six (6) to ten (10) inches of brown silty topsoil with organics or 10 inches of gravel was encountered at the surface. Underlying the topsoil or gravel is a stratum of firm gray and brown lean to fat clay to depths of four (4) to six (6) feet and followed by soft dark gray and brown organic clay to depths ranging from 10 to 17 feet. The organic clay is generally underlain by very soft to soft gray fat clay to a depth of about 50 feet and followed by medium dense to very dense gray and tan poorly graded sand or clayey sand to at least 100 feet, the maximum depth explored. Groundwater was measured at depths ranging from four (4) to six (6) feet below the existing ground surface upon completion of drilling.

The results of this exploration indicate that the near surface soils at the site are poor in bearing quality and compressible in nature. These soils are not suitable for support of the proposed facility on a shallow foundation system. Therefore, a driven pile foundation system is recommended for support of the proposed building including the floor slab. Details related to site development, foundation and pavement design, and construction considerations are included in subsequent sections of this report.

The owner/designer should not rely solely on this Executive Summary and must read and evaluate the entire contents of this report prior to utilizing our engineering recommendations in preparation of design/construction documents.

PROJECT INFORMATION

Project Authorization

Professional Service Industries, Inc. (PSI) has completed a geotechnical exploration for the proposed Readiness Center to be constructed within Jackson Barracks in New Orleans, Louisiana. The exploration was accomplished in general accordance with PSI Proposal Number 254-650023 dated February 7, 2006. Authorization to proceed with the geotechnical investigation was given on February 15, 2006.

Project Description

The project includes the construction of a four (4) story structure with a structural steel frame and load bearing masonry walls having a plan area of approximately 30,000 to 40,000 square feet. The facility, which will be used to prepare and deploy troops will be a multi-purpose structure designed to accommodate equipment, armored and transport vehicles. No traffic loading information was available at the time this report was prepared. However, based on our experience with other Readiness Centers, we assumed that traffic will consist of military transport vehicles, water and fuel trucks and heavy wreckers. About 200 units will be using the facility once per month corresponding to Equivalent Single Axle Loading (ESAL₁₈) of about 160,000.

The geotechnical recommendations presented in this report are based on the available project information, building location, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to enable an evaluation of an acceptable foundation and pavement system for the proposed construction. The scope of service includes seven (7) borings drilled to depths of six (6) to 100 feet below the existing ground surface, select laboratory testing, and preparation of this geotechnical report. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- Foundation types, allowable pile capacities and an estimate of settlement;
- General pavement design criteria and pavement subgrade preparation;
- Site preparation;
- Comments regarding factors that will impact construction and performance of the proposed construction;
- Flexible and rigid pavement recommendations.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors and unusual or suspicious items or conditions are strictly for informational purposes. Prior to development, an environmental site assessment is advisable at this site.

In addition, PSI did not provide any service to investigate or detect the presence of moisture, mold, or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. The client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The client further acknowledges that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The site for the proposed Readiness Center is located in Area C within Jackson Barracks Military Facility in New Orleans, Louisiana. At the time of the field exploration, the project area was partially occupied by an existing building and a gravel parking area. A roadway, which bisects the building area, will be relocated and the existing building will be demolished to accommodate construction of the new facility. The ground surface appeared level, firm and dry at the time of our drilling operations.

Field Exploration

The field exploration, which was performed to evaluate the engineering characteristics of the foundation materials, included a reconnaissance of the project site, drilling test borings, and recovering soil samples. In addition, groundwater encountered in the test borings was also measured and recorded.

Three (3) borings (B-1 through B-3) were drilled to a depth of 100 feet in the building area and four (4) shallow borings (P-1 through P-4) were drilled to a depth of six (6) feet in the parking area. The boring depths are in reference to the existing ground surface at the time of the field exploration. The number and depth of borings were determined by Broadmoor Design Group and were located in the field by PSI personnel. The approximate locations of the borings are indicated on the plan included in the Appendix, which is a reproduction of a site plan provided by Broadmoor Design Group.

Drilling and Sampling Procedures

The borings were drilled with an ATV mounted drilling rig. Wet rotary and continuous flight auger techniques were used to advance the boreholes. Samples were generally obtained contiguously from the ground surface to a depth of ten feet and at maximum five-foot intervals thereafter. The parking lot borings were advanced using hand-augering technique. The drilling and sampling procedures were accomplished in general accordance with ASTM standard procedures.

Undisturbed samples of cohesive soils were generally obtained using thin-wall tube sampling procedures in general accordance with the procedures for "Thin-Walled Tube Geotechnical Sampling of Soils" (ASTM D1587). These samples were extruded in the field with a hydraulic ram.

For cohesionless soils and semi-cohesive soils, Standard Penetration Tests (SPT) were performed to obtain standard penetration values of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer, falling 30 inches, required to advance the split-barrel sampler one (1) foot into the soil. To perform the test and obtain a sample, the sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three (3) successive increments of six (6) inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density of cohesionless soils and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. Samples of granular soils were obtained utilizing a two (2) inch O.D. split-barrel sampler in general accordance with procedures for "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D-1586).

The samples were identified according to boring number and depth, placed in polyethylene plastic wrapping to protect against moisture loss, and transported to the laboratory in special containers to prevent disturbance. All of the samples obtained from the field exploration were identified and evaluated by experienced geotechnical personnel upon arrival to the laboratory.

Laboratory Testing Program

In addition to the field exploration, a supplemental laboratory testing program was conducted to evaluate additional pertinent engineering characteristics of the foundation materials necessary in analyzing the behavior of the foundation and pavement systems for the proposed facility.

The laboratory testing program included supplementary visual classification and water content tests on all the soil samples. In addition, selected samples were subjected to unconfined compression testing, percent passing the #200 sieve, and Atterberg Limits determination. Additional estimates of undrained shear-strength and unconfined

compressive strength were determined through the use of a hand torvane and a pocket penetrometer, respectively.

The laboratory testing program was conducted in general accordance with applicable ASTM Specifications. The results of these tests can be found on the accompanying boring logs located in the Appendix.

Subsurface Conditions

Based on the borings, about six (6) to ten (10) inches of brown silty topsoil with organics and about 10 inches of gravel was encountered at the project site. This was generally followed by firm gray and brown lean to fat clay to depths of four (4) to six (6) feet. Underlying the fat clay is a layer of soft dark gray and brown organic clay to depths ranging from 10 to 17 feet and followed by very soft to soft gray fat clay to a depth of about 50 feet. Below this, there was generally medium dense to very dense gray and tan poorly graded sand or clayey sand to at least 100 feet, the maximum depth explored.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistance, locations of the samples, and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring logs. The samples, which were not altered by laboratory testing, will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Information

Groundwater was measured at depths ranging from four (4) to six (6) feet below existing grade upon completion of drilling. The groundwater level presented in this report is the level that was encountered at the time of our field activities and may not have become fully static at the time of measurement. However, groundwater levels at this site may vary due to recent rainfall, proximity to bodies of water, or some mechanical control. We recommend that the Contractor determine the actual groundwater levels at the site at the time of the construction activities.

RECOMMENDATIONS

General

The type and depth of foundation suitable for a given structure primarily depends on several factors including the subsurface conditions, the function of the

structure, the loads it may carry, the cost of the foundation and the criteria set by the Design Engineer with respect to vertical and differential movements which the structure can withstand without damage.

The results of this exploration indicate that the near surface soils present at this site are compressible in nature and poor in bearing quality. In light of the soil conditions encountered at the site and the anticipated structural loads, it is recommended that a driven pile foundation system be used for support of the proposed building including the floor slab. Details related to site preparation and foundation design are discussed further below.

Site Preparation

Site preparation is expected to include, but not be limited to, the demolition and removal of the existing structures and foundation elements and pavements. Once the existing buildings and pavement have been removed, the utilities should be re-located as necessary. Furthermore, any topsoil, vegetation, and any other deleterious material should be removed from the areas to be developed and hauled off the site.

Consideration should be given to the presence of the existing foundations and their effect on the proposed construction. It is expected that the existing structure is pile supported. Therefore, a review of existing piles should be made to determine if they are in conflict with the new piles. If such conflict exists, the existing piles may have to be extracted to allow for installation of new piles. Otherwise, the existing piles could be left in place and cut off at least two (2) feet below the new pile supported foundation. Any existing pile located in the proposed pavement area should be cut off at least 3 feet below the pavement subgrade.

After removal of the topsoil, the exposed subgrade in the parking area should be proofrolled with a tandem axle dump truck or similar rubber tired vehicle. Soils, which are observed to rut or deflect excessively under the moving load should be undercut and replaced with properly compacted fill. The amount of undercutting will primarily depend on the site conditions at the time of construction. The proofrolling and undercutting activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather.

The fill should be placed in relatively uniform horizontal lifts and should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM Designation D698. Compaction requirements may be waived in the pile-supported areas.

The structural fill material could consist of locally available "pumped river sand" having less than 10 percent fines passing the #200 sieve. The fill should be placed in maximum lifts of eight (8) inches of loose material and should be compacted within the range of -1 to +3 percent of the optimum moisture content. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or

scarifying. Each lift of compacted structural fill should be tested by a representative of the geotechnical engineer prior to the placement of subsequent lifts.

Pile Foundation

The near surface soils are poor in bearing quality and compressible in nature. These soils are not suitable for support of the proposed building on a shallow foundation. In view of this, analyses were made with regard to a pile foundation system for support of the proposed building. Consideration was given to large treated timber piles (7" tip - 12" butt) installed at a minimum depth of 55 feet below existing site grades. The treated timber piles should conform to ASTM D25 for treatment, quality and dimensions discussed herein. The piles on this site will generally derive their support through "skin friction" along their embedded lengths as well as end bearing when tipped in the dense sand.

Taking into consideration the field and laboratory data, the estimated allowable pile compression and tension capacities are tabulated below. The recommended pile lengths are from the existing ground surface at the time of drilling; however a pile cutoff of up to 2 feet should not have an impact on the recommended capacities.

ALLOWABLE SINGLE PILE LOAD CAPACITY IN TONS* F.S. = 2.0 IN COMPRESSION, F.S. = 3.0 IN TENSION		
Pile Tip Embedment Below Existing Ground Surface (ft)*	Large Treated Timber Pile (7" tip - 12" butt)	
	Compression	Tension
55-60	25	11

*Capacities are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.

* Piles should be embedded into dense sand.

The estimated pile capacities include a factor of safety of two (2) in compression and three (3) in tension.

Floor Slab

The building floor slab, including the sidewalks and landings immediately adjacent to the building, should be pile supported. The floor slab should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage. It is also recommended that a polyethylene sheeting vapor barrier be provided at the floor slab/fill soil interface.

All utility lines in the building area should be hung from the slab. Hangers and connections used should be made of stainless steel, meeting the applicable Building Code. Flexible connections must be provided at the interface of pile supported and non-pile supported areas to accommodate at least eight (8) inches of settlement.

Settlement

It is estimated that long term total settlement of piles installed at a minimum of 3 feet center to center will be on the order of 1 inch. This estimate assumes that the maximum fill thickness will not exceed two (2) feet; however, settlement will depend on the amount of fill placed on the site. Differential settlement is anticipated to be on the order of 50 percent of the total settlement.

Group Effect

All piles should have a minimum center-to-center spacing of at least three (3) pile diameters. Group effect should be minimal for piles in clusters of up to six (6) piles spaced at a minimum of three (3) pile diameters. For larger pile clusters, group effect could become a factor and should be evaluated in accordance with the building code and the criteria given in the Appendix.

Pile Installation

Pile driving hammers used to drive the foundation piles should be selected according to pile type, length, size, and weight of pile, as well as potential vibrations resulting from pile driving operations. Care should be taken to assure that the hammer selected is capable of achieving the desired penetration without causing damage to the piles or causing excessive vibrations which could damage existing, nearby structures. Hammer with rated energy of 12,000 to 15,000 foot-pounds are satisfactory for the large timber piles.

Each pile should be driven to the desired tip elevation and driving resistance without interruption in the driving operations. Driving of the center piles in the cluster first will better facilitate driving operations. Accurate records of the final tip elevation and driving resistances should be obtained during the pile driving operations.

Some pile heaving may be experienced during installation of adjacent displacement type piles. It is therefore recommended that the tip elevation of the piles be recorded and if significant heave is noted after driving of subsequent piles, provisions must be made for reseating them.

Pile Driving Monitoring

It is recommended that the pile driving be monitored by the geotechnical engineer or his representative. Sometimes, premature refusal occurs due to poor performance of the hammer rather than from soil resistance. Any changes in hammer blow counts should be carefully examined before making any decisions about the pile penetration.

Pile Load Test

It is recommended that the pile capacity be verified with a pile load test. The pile should be tested in compression as outlined by ASTM D1143 and the local building code. The pile load test should be performed under the guidance of the soils engineer so that the data may be interpreted and the recommended pile capacities adjusted, if necessary, according to the load test results.

Pavement Recommendations

The performance of pavements depends upon several factors including (1) the characteristics of the supporting soils; (2) the magnitude and frequency of wheel load applications; (3) quality of construction materials; (4) the contractor's placement and workmanship abilities, and (5) the desired period of design life. PSI has evaluated both rigid and flexible pavements for this project.

Detailed grading information was not available at the time this report was prepared. Therefore, it is assumed that about two (2) feet of fill will be needed to achieve the parking area design grades. Detailed traffic loading information was not provided to us at this time. However, based on our experience with other Readiness Centers, we assumed that traffic could consist of military transport vehicles, fuel and water tankers, and heavy wreckers. It is assumed that these vehicles will be using the facility once per month corresponding to Equivalent Single Axle Loading (ESAL₁₈) of about 160,000. Light duty traffic consists mostly of daily cars and light trucks.

Our scope of services did not include extensive sampling for determination of Coefficient of Subgrade Reaction (K) and California Bearing Ratio (CBR) of existing subgrade or potential sources of imported fill for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement related design parameters that are considered to be typical for the area soil types.

The recommended pavement sections presented are considered typical and minimum for the assumed parameters in the general site area and anticipated traffic condition. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the owner and the project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life. The pavement subgrade should be prepared as discussed in the site preparation section of this report.

We have estimated that the near surface soils have a Coefficient of subgrade reaction (k) of 100 psi per inch, which could be used for rigid pavement design and a CBR of 3.0 for flexible pavement design. Additionally, we assumed the following:

CBR	3
Modulus of Subgrade Reaction, k	100 pci
Reliability	85%
Deviation	0.45 Asphalt 0.35 Rigid
Initial Serviceability	4.2
Terminal Serviceability	2.0
Modulus of Rupture	550 psi
Modulus of Elasticity	3.4×10^6 psi
Load Transfer	3.2 Dowels or Keys
Drainage Coefficient	1.0
Design Life	20 Years
Layer Coefficients	0.41 Asphalt 0.14 Base Course 0.08 Granular Structural Fill

Using the above parameters, the recommended pavement sections are as follows:

FLEXIBLE PAVEMENT		
E₁₈ : 160,000		
Pavement Materials	Minimum Thickness, Inches	
	Light Duty	Heavy Duty
Asphaltic Concrete Wearing Course	3	4
Compacted 610 Limestone Base	8	12
Compacted Structural Fill	12	12

RIGID PAVEMENT		
E₁₈ : 240,000		
Pavement Materials	Minimum Thickness, Inches	
	Light Duty	Heavy Duty
Portland Cement Concrete	6	7
Compacted Granular Fill	12	12

Portland Cement Concrete pavements should be utilized where waste disposal containers are located. The concrete paved area should be sufficiently large so that the front wheels of the collection truck are supported on the rigid pavement. In this area and in areas, which will be accessed by heavy trucks (solid waste trucks, delivery trucks, etc.), a minimum concrete pavement thickness of seven (7) inches underlain by 12 inches of sand base is recommended.

The asphaltic concrete should meet the requirements of the latest edition of Louisiana Standard Specifications for Roads and Bridges, and should be compacted to a minimum of 95 percent of the density of the laboratory molded specimen.

The crushed limestone base should meet the requirements of the latest edition of Louisiana Standard Specification for Roads and Bridges (LSSRB) Section 1003.03, and be compacted to at least 95 percent of the maximum dry density determined by ASTM D 698 (Standard Proctor) within 3 percent of optimum moisture content. The sand base could consist of "pumped river sand" having less than 10 percent fines passing a No. 200 sieve. The sand should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce the potential for cracking. Construction joints should be designed in accordance with current Portland Cement Association guidelines. Joints should be connected with smooth, greased or sleeved dowels and should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils. The design of steel reinforcement should be in accordance with accepted codes. The concrete should have a minimum flexural strength of 650 psi at 28 days. The concrete should also be designed with 3 ± 1 percent entrained air to improve workability and durability. Long term pavement performance requires good drainage and performance of periodic maintenance activities. Therefore, water should not be allowed to enter or exit the base to preserve its integrity and prolong the life of the pavement.

Due to the soil conditions at the site and long term settlement potential, it is recommended that a proper design be considered at the pavement and pile supported structures interface to accommodate the settlement of the pavement, provide a smooth transition from the pavement to the pile supported sidewalk, and avoid abrupt and excessive grade change. Taking into consideration the subsurface conditions at the site and the placement of about two (2) feet of fill in the parking area, settlement in the parking lot is estimated to be on the order of two (2) to three (3) inches over the life of the pavement. However, flexible connections, capable of accommodating at least six (6) inches of settlement, should be provided for lines exiting the building area to non-pile supported areas.

CONSTRUCTION CONSIDERATIONS

Construction and Testing

Many problems can be avoided or solved in the field if proper inspection and testing services are provided. It is recommended that the site preparation, foundation and pavement be monitored by the geotechnical engineer or his representative.

Drainage Consideration

Water should not be allowed to collect in excavations or on prepared subgrades in the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff.

Groundwater was encountered in the borings at depths ranging from four (4) to six (6) feet below existing grade during drilling. However, it is possible that seasonal variations will cause fluctuations, or a water table to be present in the upper soils at a later time. The Contractor should determine the groundwater level at the time of construction.

Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavation. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties compliance with local, state, and federal safety regulations.

REPORT LIMITATIONS

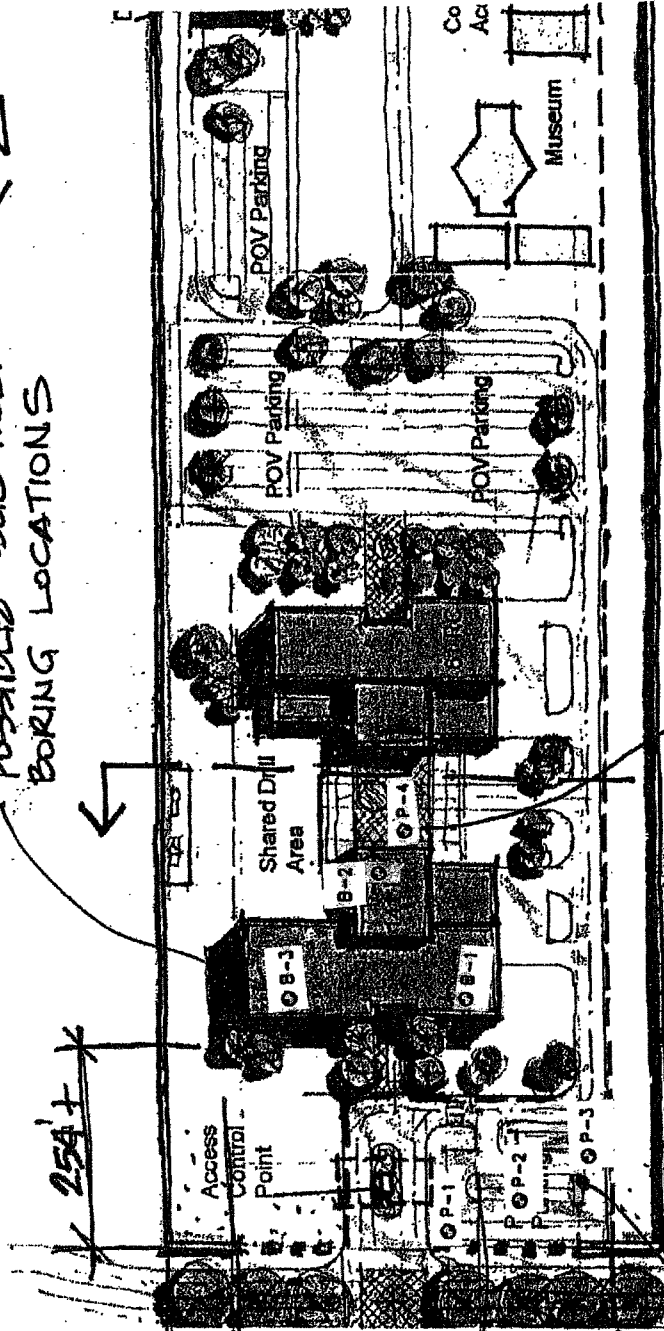
The recommendations submitted in this report are based on the available subsurface information obtained by PSI and details furnished by Broadmoor Design Group. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project. This report has been prepared for the specific use of Broadmoor Design Group for the specific application to the proposed Readiness Center to be constructed in Area C in Jackson Barracks in New Orleans, Louisiana.

APPENDIX

POSSIBLE SOIL DEEP BORING LOCATIONS



254'

82' BLDG. 141 156'

CLAIBORNE AVE.

~ 500' LIMITS OF WORK AREA OF SHALLOW BORINGS

ORLEANS PARISH

Boring Location

Professional Service Industries, Inc.
724 Central Ave
Jefferson, La 70121 ph. (504) 733-9411

Date: 2/28/06
Drawing Provided by: Broadmoor Design Group
PSI Project No.: 254-65023-1

Proposed Readiness Center
Jackson Barracks
New Orleans, Louisiana

Boring Location Diagram

LOG OF BORING B-1
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY

LOCATION: BUILDING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	Hatched		8" brown silty topsoil with organics		0.79	0.75		74	45			
			Firm dark gray Fat Clay -sand pockets, 2' to 4'				0.45		56			
5	Hatched		Soft gray Fat Clay		0.22		0.20	49	91			
			Soft dark gray Organic Clay with peat				0.15		107			
10	Hatched		Soft gray Fat Clay		0.09		0.10	46	96			
									0.15		79	
15	Hatched						0.15					
							0.21		0.15	61	67	
20	Hatched						0.20					
									0.20		43	
25	Hatched						0.20					
							0.25		0.20	66	57	
30	Hatched						0.25					
									0.25		67	
35	Hatched						0.25					
							0.37		0.25	61	64	
40	Hatched						0.25					
									0.25		70	
45	Hatched						0.25					
							0.30		0.25	60	68	
50	Hatched											

DEPTH OF BORING: 100 FEET

GROUNDWATER: Measured at 4' upon completion

DATE: 2/14/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING B-1 (continued)
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY

LOCATION: BUILDING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE		
55	Very dense gray poorly graded Sand	X		70					23			9		
60				86					22					
65				69					24					
70	Very dense gray Silty Sand	X		55					31			41		
75								109	20			28		
80								105	21					
85											29		19	
90							30				29			
95							39				28			34
100							32				27			
			Boring terminated at 100 feet											

DEPTH OF BORING: 100 FEET

DATE: 2/14/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING B-2
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY

LOCATION: BUILDING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organic Firm gray & brown Lean Clay w/pieces of gravel (Fill)				0.5		25			
			Firm gray and brown Fat Clay		0.64	0.5		74	45			
5			Soft dark gray Organic Clay				0.20		101			
			Soft gray Fat Clay		0.15		0.15	53	75			
10							0.20		88			
			Soft dark brown and black Peat		0.28		0.20	28	166			
15												
			Very soft to soft gray Fat Clay				0.15		50	49	29	
20												
					0.22		0.10	67	57			
25												
							0.20		79			
30												
					0.31		0.15	73	49			
35												
							0.20		65			
40												
					0.35		0.20	59	68			
45												
							0.30		72			
50												

DEPTH OF BORING: 100 FEET
 DATE: 2/14/06

GROUNDWATER: Measured at 6' upon completion

LOG OF BORING B-2 (continued)
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY

LOCATION: BUILDING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH 1st	HAND PENTROMETER 1st	TORVANE 1st	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
55	Medium dense to dense gray and tan poorly graded Sand			30					23			10	
60				33					23				
65				17					26				
70				30					29			12	
75				65					24				
80				-with clay layers, 78' to 80'	20				52				
85				-changes to clayey sand at 83'	43				25				21
90					48				21				
95				Dense gray Clayey Sand to sandy clay	44				29				
100					54				31				54
Boring terminated at 100 feet													

DEPTH OF BORING: 100 FEET

DATE: 2/14/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING B-3
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY

LOCATION: BUILDING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
		X	10" gravel and sand	83					8			
		X	Very dense gravel and Sand (Fill)									
		X	Soft gray Fat Clay	6					63			
5		X	Soft dark brown and black Organic Clay with peat	5					117			
					0.14		0.10	34	143	168	130	99
10			Very soft to soft gray and dark gray Fat Clay				0.15		81			
15							0.15		61			
20					0.20		0.10	66	61			
25							0.20		47			
30					0.29		0.15	71	52	58	36	
35							0.20		62			
40							0.25		58			
45							0.25		46			
50							0.25		73			

DEPTH OF BORING: 100 FEET

GROUNDWATER: Measured at 5' upon completion

DATE: 2/14/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING B-3 (continued)
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY

LOCATION: BUILDING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Medium dense to dense gray and tan Sand									
55		X		26					26			14
60		X		17					31			
65		X		33					27			21
70		X		41					20			
75		X		36					23			9
80		X		39					24			
85		X		21					32			34
90		X		45					22			
95		X		35					23			40
100		X		35					21			

Boring terminated at 100 feet

DEPTH OF BORING: 100 FEET
 DATE: 2/14/06

LOG OF BORING P-1
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER

LOCATION: PARKING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organics						39			
			Gray and brown Fat Clay with trace of organics						42			
5									51			
									53			
									84			
									79			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 FEET

GROUNDWATER: Not encountered

DATE: 2/22/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING P-2
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER

LOCATION: PARKING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
0	[Hatched Pattern]	[Checkered Pattern]	4" brown silty topsoil with organics						25				
1			Gray and brown Fat Clay						17				
2			-trace of organics, 2' to 4'							68			
3			-with sand pockets, 4' to 6'							70			
4										71			
5									70				
6			Boring terminated at 6 feet										
10													
15													
20													
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 22 FEET

GROUNDWATER: Not encountered

DATE: 2/22/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING P-3
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER

LOCATION: PARKING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" brown silty topsoil with organics						28			
			Gray Clayey Sand (Fill)						40			
			Gray and brown Fat Clay						79			
5									71			
									75			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 22 FEET

GROUNDWATER: Not encountered

DATE: 2/22/06



Geotechnical Consulting Services
 Jefferson, Louisiana

LOG OF BORING P-4
PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER

LOCATION: PARKING AREA

PSI PROJECT NO.: 254-65023

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	[Hatched pattern]	[Checkered pattern]	4" brown silty topsoil with organics						42				
			Gray and brown fat clay							48			
			-trace of organics, 4' to 6'	v						55			
5										82			
										79			
			Boring terminated at 6 feet										
10													
15													
20													
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 22 FEET

GROUNDWATER: Not encountered

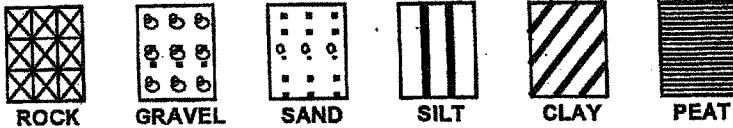
DATE: 2/22/06



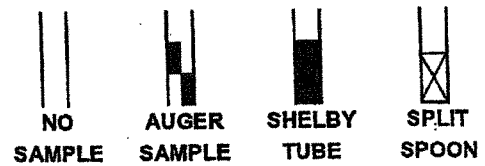
Geotechnical Consulting Services
 Jefferson, Louisiana

KEY TO TERMS AND SYMBOLS USED ON LOGS

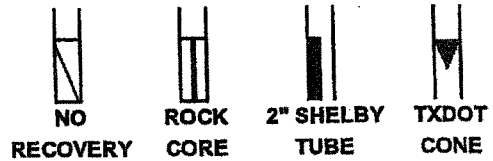
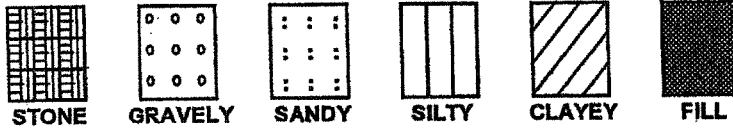
SOIL TYPE



SAMPLER TYPE



MODIFIERS



UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

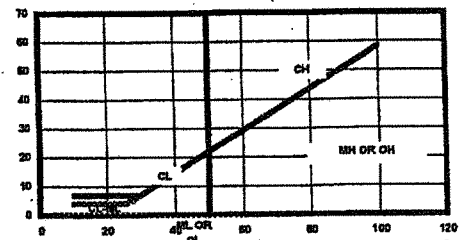
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 4 SIEVE	GRAVEL & GRAVELLY SOILS	CLEAN GRAVEL (LITTLE OR NO FINES)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		(LITTLE OR NO FINES)	GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
	SANDS	CLEAN SANDS (LITTLE FINES)	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
		(LITTLE FINES)	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS WITH APPRECIABLE FINES	CLEAN SANDS (LITTLE FINES)	SW	WELL GRADED SAND, GRAVELLY SAND (LITTLE FINES)
		(LITTLE FINES)	SP	POORLY GRADED SANDS, GRAVELLY SAND (L.FINES)
	SANDS WITH APPRECIABLE FINES	SANDS WITH APPRECIABLE FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
		(APPRECIABLE FINES)	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
	FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS & VERY FINE SANDS/ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS
OL			ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI	
SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
	CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS		
	OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT		
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN MADE SOIL MIXTURES	

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT ²
VERY SOFT	0. TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



ABBREVIATIONS

HP - HAND PENETROMETER UC - UNCONFINED COMPRESSION TEST
 TV - TORVANE UU - UNCONSOLIDATED UNDRAINED TRIAXIAL
 MV - MINIATURE VANE CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

BOUL- -DERS	GRAVEL		SAND			SILT OR CLAY	CLAY	
	COBBLES	COARSE	FINE	COARSE	MEDIUM			FINE
	152	76.2	19.1	4.76	2.0	0.42	0.074	0.002
					GRAIN SIZE IN MM			

▼ DELAYED GROUNDWATER LVL
 ▽ LEVEL GROUNDWATER ENCOUNTERED



Geotechnical Consulting Services

ALLOWABLE GROUP PILE CAPACITY*

$$Q_a = \frac{P \times L \times C}{(\text{FSF})} + \frac{2.6 q_u (1 + 0.2 w/b) A}{(\text{FSB})}$$

Q_a = Allowable load carrying capacity of group pile (pounds)

P = Perimeter distance of pile group (feet)

L = Length of pile, (feet)

C = Average weighted cohesion of soil along length of pile (PSF)

q_u = Average unconfined compressive strength of soil below pile tip (PSF)

w = Width of base of pile group, (feet)

b = Length of base of pile group, (feet)

A = Base area of pile group, (square feet)

(FSF) = Factor of safety for the friction area = 2

(FSB) = Factor of safety for the base area = 3

* The recommended single pile capacity should not be exceeded.

PILE SPACING**

In order to facilitate driving, minimum pile spacing shall be either 3 feet or as computed by the following formula, whichever is greater:

$$\text{SPAC} = 0.05 (L_1) + 0.025 (L_2) + 0.0125 (L_3)$$

SPAC = Center to Center of Pile (feet)

L_1 = Pile Penetration up to 100 feet

L_2 = Pile Penetration from 101 to 200 feet

L_3 = Pile Penetration pass 201 feet

** Greater pile spacing than the minimum value may be required in order to satisfy group effect as given by the above allowable group pile capacity formula.

G. Declaration of Soil Bearing Capacity and Uniformity of Area Soil Conditions

H. Anti-Terrorism/Force Protection and Risk and Threat Analysis (LAARNG Supplied)

I. Structural Design Analysis and Calculations

I-1 Code References

Prepared by:

Morphy, Makofsky, Inc.

(1 page follows)

141ST JACKSON BARRACKS

REFERENCED CODES & STANDARDS

⇒ IBC 2003 (Building code)

⇒ ASCE 7-02 (Loads)

⇒ ACI 318-05 (Concrete)

⇒ AISC - LRFD 3RD Edition (steel)
 & - ASD - 9TH Edition

• UFC 4-010-01 8 OCT. 2003

• UFC 4-023-03 25 JAN 2005

• UFC 4-020-03FA 1 MAR. 2005

• ACI 530-02

JLS

4-19-06

1



I-2 Standoff Review

Prepared by:

Morphy, Makofsky, Inc.

(4 pages follow)

APPENDIX B

DoD MINIMUM ANTITERRORISM STANDARDS FOR NEW AND EXISTING BUILDINGS

B-1 SITE PLANNING. Operational, logistic, and security requirements must be integrated into the overall design of buildings, equipment, landscaping, parking, roads, and other features. The most cost-effective solution for mitigating explosive effects on buildings is to keep explosives as far as possible from them. Standoff distance must be coupled with appropriate building hardening to provide the necessary level of protection to DoD personnel. The following standards detail minimum standoff distances that when achieved will allow for buildings to be built with minimal additional construction costs. Where these standoff distances cannot be achieved because land is unavailable, these standards allow for building hardening to mitigate the blast effects. Costs and requirements for building hardening are addressed in the *DoD Security Engineering Planning Manual*.

B-1.1 Standard 1. Minimum Standoff Distances. The minimum standoff distances apply to all new and existing (when triggered) DoD buildings covered by these standards. The minimum standoff distances are presented in Table B-1 and illustrated in Figures B-1 and B-2. Where the standoff distances in the "Conventional Construction Standoff Distance" column of Table B-1 can be met, conventional construction may be used for the buildings without a specific analysis of blast effects, except as otherwise required in these standards. Where those distances are not available, an engineer experienced in blast-resistant design should analyze the building and apply building hardening as necessary to mitigate the effects of the explosives indicated in Table B-1 at the achievable standoff distance to the appropriate level of protection. The appropriate levels of protection for each building category are shown in Table B-1, and are described in Tables 2-1 and 2-2 and in the *DoD Security Engineering Planning Manual*. For new buildings, standoff distances of less than those shown in the "Effective Standoff Distance" column in Table B-1 are not allowed. For existing buildings, the standoff distances in the "Effective Standoff Distance" column of Table B-1 will be provided except where doing so is not possible. In those cases, lesser standoff distances may be allowed where the required level of protection can be shown to be achieved through analysis or can be achieved through building hardening or other mitigating construction or retrofit as described in these standards and in the *DoD Security Engineering Design Manual*.

B-1.1.1 Controlled Perimeter. Measure the standoff distance from the controlled perimeter to the closest point on the building exterior or inhabited portion of the building.

B-1.1.2 Parking and Roadways. Standoff distances for parking and roadways are based on the assumption that there is a controlled perimeter at which larger vehicle bombs will be detected and kept from entering the controlled perimeter. Where there is a controlled perimeter, the standoff distances and explosive weight associated with parking and roadways in Table B-1 apply. If there is no controlled perimeter, assume that the larger explosive weights upon which the controlled perimeter standoff distances are based (explosive weight I from Table B-1) can access parking and roadways near

*have 50
or more people -*

**Table B-1 Minimum Standoff Distances
for New and Existing Buildings**

Location	Building Category	Standoff Distance or Separation Requirements			
		Applicable Level of Protection	Conventional Construction Standoff Distance	Effective Standoff Distance ⁽¹⁾	Applicable Explosive Weight ⁽²⁾
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter	Billeting	Low	45 m ⁽³⁾ (148 ft.)	25 m ⁽³⁾ (82 ft.)	I
	Primary Gathering Building	Low	45 m ⁽³⁾⁽⁴⁾ (148 ft.)	25 m ⁽³⁾⁽⁴⁾ (82 ft.)	I
	Inhabited Building	Very Low	25 m ⁽³⁾ (82 ft.)	10 m ⁽³⁾ (33 ft.)	I
Parking and Roadways within a Controlled Perimeter	Billeting	Low	25 m ⁽³⁾ (82 ft.)	10 m ⁽³⁾ (33 ft.)	II
	Primary Gathering Building	Low	25 m ⁽³⁾⁽⁴⁾ (82 ft.)	10 m ⁽³⁾⁽⁴⁾ (33 ft.)	II
	Inhabited Building	Very Low	10 m ⁽³⁾ (33 ft.)	10 m ⁽³⁾ (33 ft.)	II
Trash Containers	Billeting	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Primary Gathering Building	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Inhabited Building	Very Low	10 m (33 ft.)	10 m (33 ft.)	II

(1) Even with analysis, standoff distances less than those in this column are not allowed for new buildings, but are allowed for existing buildings if constructed/retrofitted to provide the required level of protection at the reduced standoff distance.

(2) See UFC 4-010-02, for the specific explosive weights (kg/pounds of TNT) associated with designations – I and II. UFC 4-010-02 is For Official Use Only (FOUO)

(3) For existing buildings, see paragraph B-1.1.2.2 for additional options.

(4) For existing family housing, see paragraph B-1.1.2.2.3 for additional options.

Figure B-1 Standoff Distances and Building Separation – Controlled Perimeter

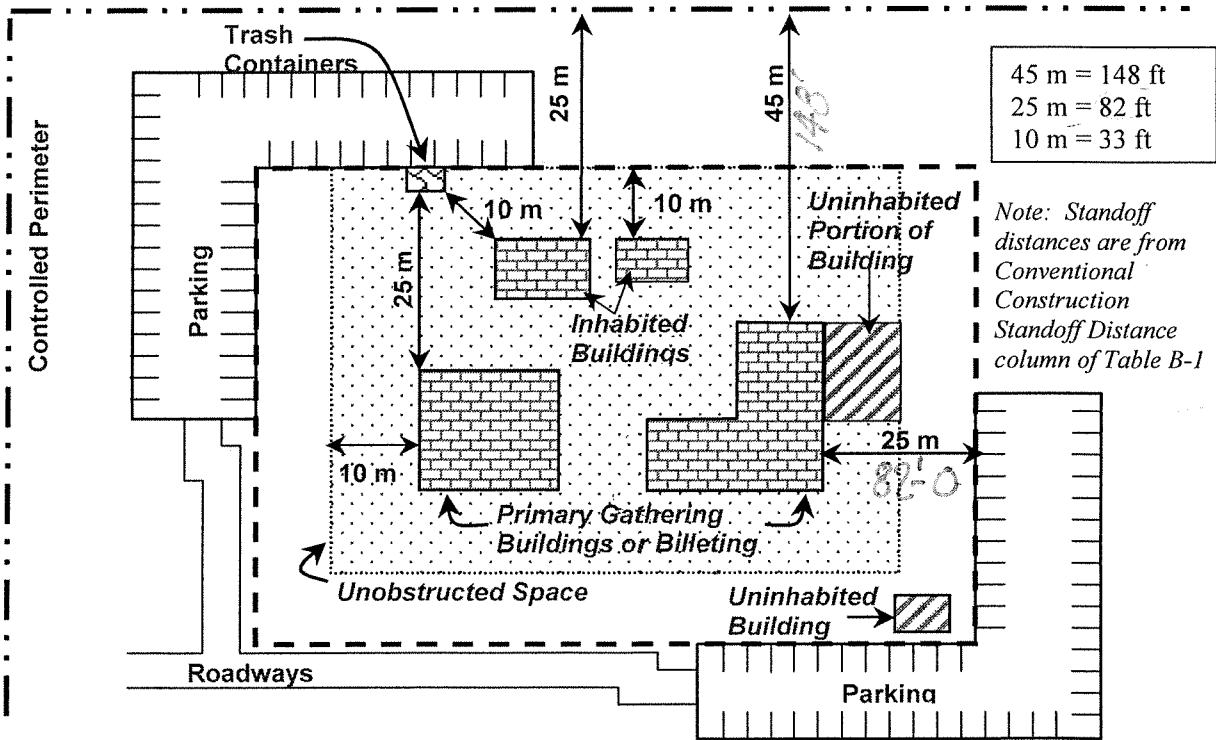
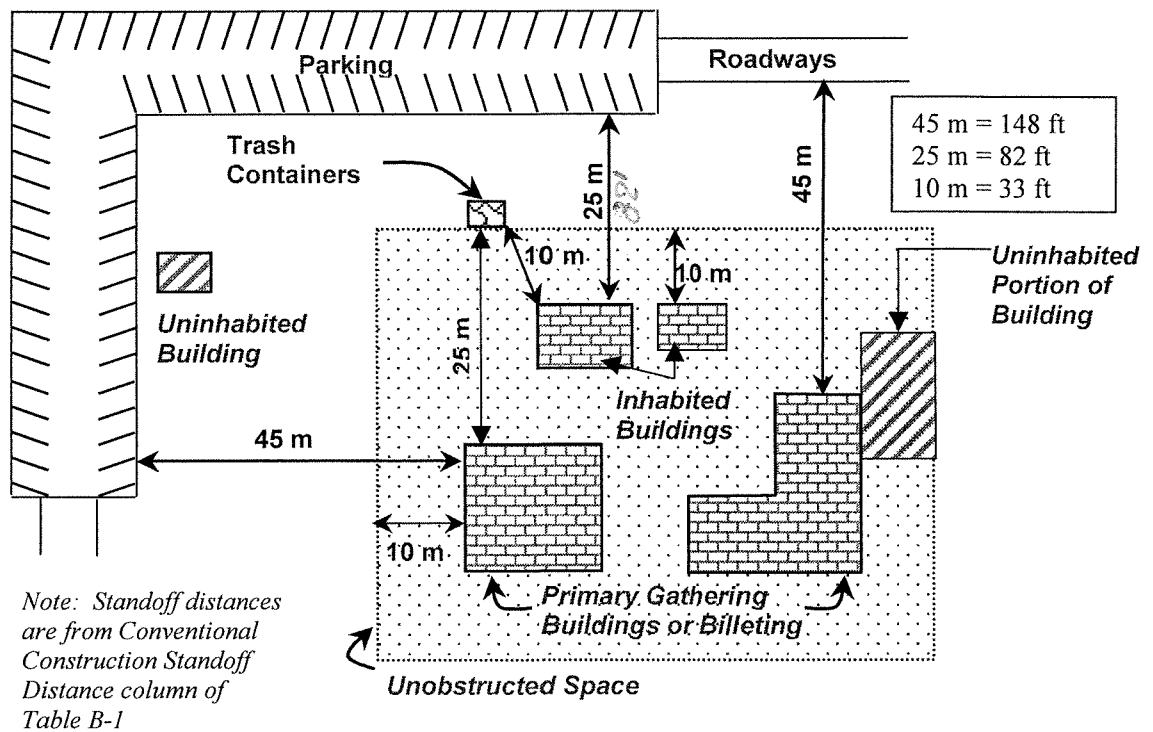


Figure B-2 Standoff Distances and Building Separation – No Controlled Perimeter



Blast resistance design / review

(1) Building has 50 or more people

⇒ Primary Gathering Building

(2) Building has controlled Perimeter.

⇒ Figure B-1

- 80'-0" from parking & road

- 148'-0" from Perimeter

⇒ EAST & West walls to be hardened

⇒ also near wall (south) by truck loading dock
⇒ hardened

JLC

3-30-06

5



I-3 Wind Analysis

Prepared by:

Morphy, Makofsky, Inc.

(9 pages follow)

1415'

wind design:

Basic wind speed: 130 mph

$I = 1.15$

H → 60

⇒ ASCE 7-05

Exposure B

enclosed bldg. ~~W~~ B

$G = 0.85$

$q_z = 0.00256 K_z K_{zt} K_d V^2 I$

$H_{tot} = 60 + 17 = 77'$

$K_{zt} = 1.0$ $K_d = 0.85$

case 2 $K_z = 0.91$

$q_z = 0.00256 \times 0.91 \times 1.0 \times 0.85 \times 130^2 \times 1.15$
 $= 38.5 \text{ psf}$

JL3	3-7-06	WI 6

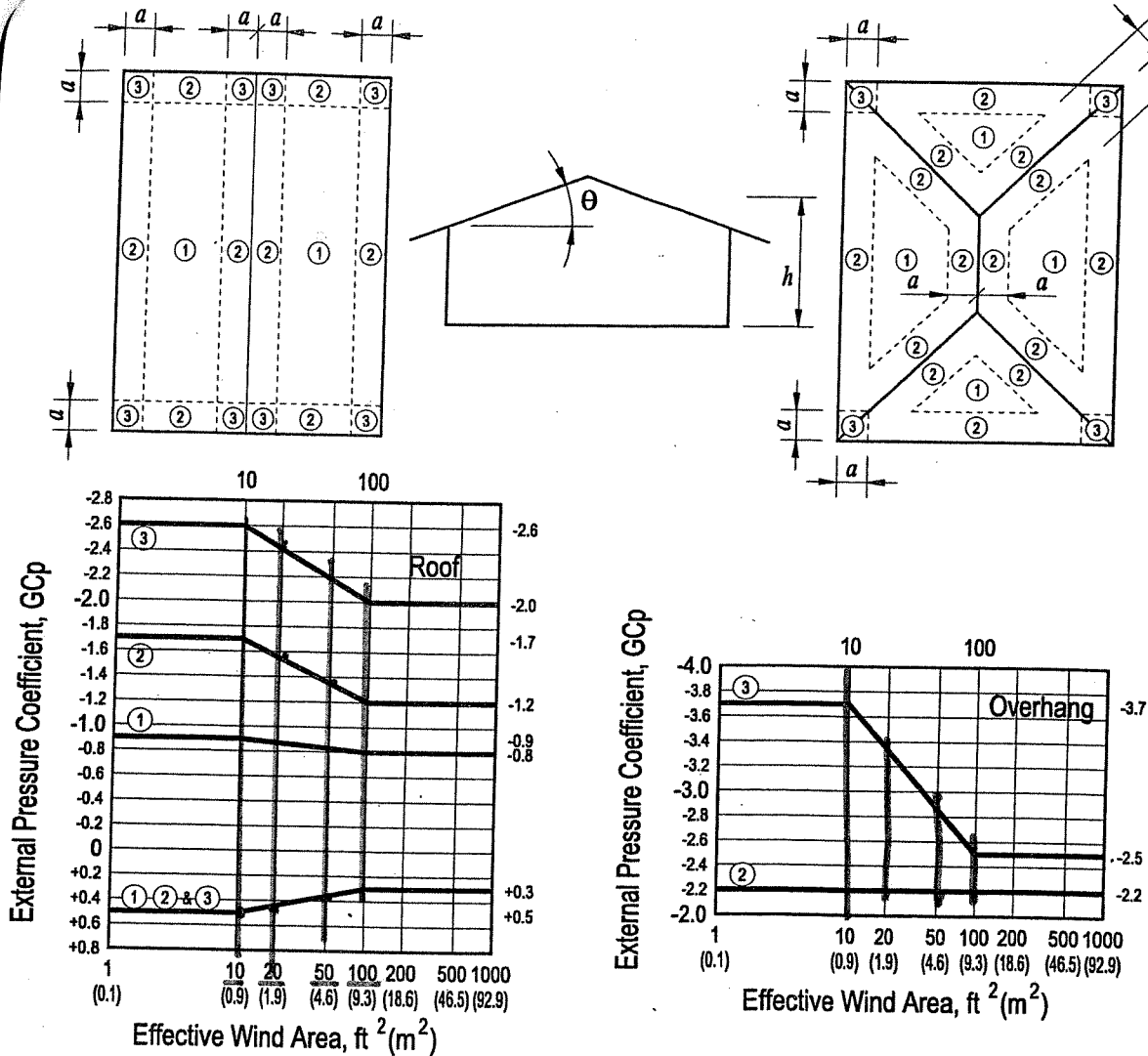


Figure 6-11C

External Pressure Coefficients, GC_p

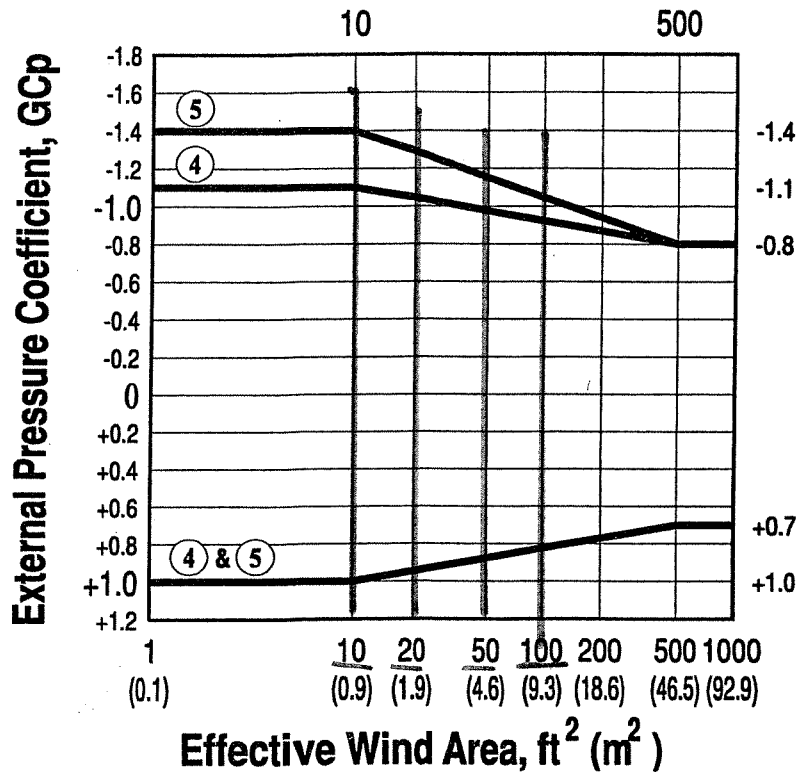
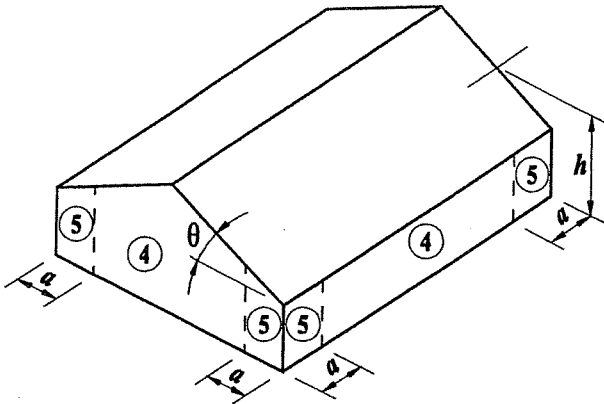
Enclosed, Partially Enclosed Buildings

Gable/Hip Roofs $7^\circ < \theta \leq 27^\circ$



Notes:

- Vertical scale denotes GC_p to be used with q_h .
- Horizontal scale denotes effective wind area, in square feet (square meters).
- Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
- Each component shall be designed for maximum positive and negative pressures.
- Values of GC_p for roof overhangs include pressure contributions from both upper and lower surfaces.
- For hip roofs with $7^\circ < \theta \leq 27^\circ$, edge/ridge strips and pressure coefficients for ridges of gabled roofs shall apply on each hip.
- For hip roofs with $\theta \leq 25^\circ$, Zone 3 shall be treated as Zone 2.
- Notation:
 - a : 10 percent of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).
 - h : Mean roof height, in feet (meters), except that eave height shall be used for $\theta \leq 10^\circ$.
 - θ : Angle of plane of roof from horizontal, in degrees.



Notes:

1. Vertical scale denotes GC_p to be used with q_h .
2. Horizontal scale denotes effective wind area, in square feet (square meters).
3. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
4. Each component shall be designed for maximum positive and negative pressures.
5. Values of GC_p for walls shall be reduced by 10% when $\theta \leq 10^\circ$.
6. Notation:
 - a : 10 percent of least horizontal dimension or $0.4h$, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m).
 - h : Mean roof height, in feet (meters), except that eave height shall be used for $\theta \leq 10^\circ$.
 - θ : Angle of plane of roof from horizontal, in degrees.

COMPONENT AND CLADDING WIND CALCULATOR

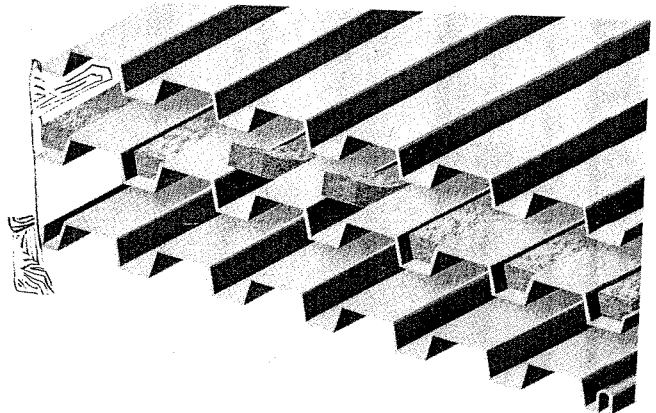
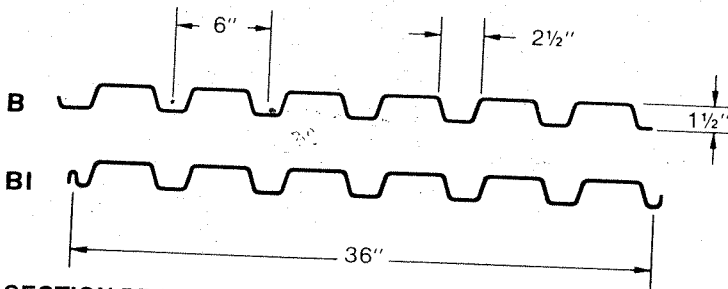
Qz = 38.5

Gcpi = 0.18

EWA	ZONE		1		2		3		4		5	
10	26.18	-41.58	26.18	-72.38	26.18	-107.03	45.43	-49.28	45.43	45.43	-60.83	
20	25.025	-39.655	26.18	-66.605	26.18	-103.18	43.505	-47.355	43.505	43.505	-56.98	
50	21.175	-38.5	26.18	-58.905	26.18	-91.63	41.58	-45.045	41.58	41.58	-51.205	
100	18.48	-37.73	26.18	-53.13	26.18	-83.93	38.115	-43.505	38.115	38.115	-47.355	

1.5 B, BI, BA, BIA

Maximum Sheet Length 42'-0
 Extra Charge for Lengths Under 6'-0
 Factory Mutual Approved (No. 0C847.AM, 0G1A4.AM,
 and 3Y1A6.AM) **
 ICBO Approved (No.3415)



SECTION PROPERTIES

Deck Type	Design Thick.	Weight (PSF)		I in ⁴ /ft	Sp in ³ /ft	Sn in ³ /ft	Fy KSI
		Ptd.	Galv.				
B24	0.0239	1.36	1.46	0.121	0.120	0.131	60
B22	0.0295	1.68	1.78	0.169	0.186	0.192	33
B21	0.0329	1.87	1.97	0.192	0.213	0.221	33
B20	0.0358	2.04	2.14	0.212	0.234	0.247	33
B19	0.0418	2.39	2.49	0.253	0.277	0.289	33
B18	0.0474	2.72	2.82	0.292	0.318	0.327	33
B16	0.0598	3.44	3.54	0.373	0.408	0.411	33

Type B (wide rib) deck provides excellent structural load carrying capacity per pound of steel utilized, and its nestable design eliminates the need for die-set ends.

1" or more rigid insulation is required for Type B deck.

Acoustical deck (Type BA, BIA) is particularly suitable in structures such as auditoriums, schools, and theatres where sound control is desirable. Acoustic perforations are located in the vertical webs where the load carrying properties are negligibly affected (less than 5%).

Inert, non-organic glass fiber sound absorbing batts are placed in the rib openings to absorb up to 65% of the sound striking the deck.

Batts are field installed and may require separation.

ACOUSTICAL INFORMATION

Deck Type	Absorption Coefficient						Noise Reduction Coefficient*
	125	250	500	1000	2000	4000	
1.5BA, 1.5BIA	.11	.20	.63	1.04	.66	.36	.65

* Source: Riverbank Acoustical Laboratories — RAL™ A94-185.
 Test was conducted with 1.5 inches of 1.65 pcf fiberglass insulation on 3 inch EPS Plaza deck for the SDI.

VERTICAL LOADS FOR TYPE 1.5B

No. of Spans	Deck Type	Max. SDI Const. Span	Allowable Total (Dead + Live) Uniform Load (PSF)											
			Span (ft.-in.)								C. to C. of Support			
			5'-0	5'-6	6'-0	6'-6	7'-0	7'-6	8'-0	8'-6	9'-0	9'-6	10'-0	
1	B 24	4'-8	66	52	42	36	30	27	24	21	20			
	B 22	5'-7	91	71	57	47	40	34	30	27	24			
	B 21	6'-0	104	81	64	53	44	38	33	29	26	22	20	
	B 20	6'-5	115	89	71	58	48	41	36	31	28	24	22	
	B 19	7'-1	139	107	85	69	57	48	41	36	31	28	25	23
	B 18	7'-8	162	124	98	79	65	55	47	41	36	32	29	26
2	B 24	5'-10	126	104	87	74	64	55	47	41	36	32	29	
	B 22	6'-11	102	85	71	61	52	46	41	36	32	28	26	
	B 21	7'-4	118	97	82	70	60	52	46	41	36	32	29	
	B 20	7'-9	132	109	91	78	67	59	51	46	41	36	33	29
	B 19	8'-5	154	127	107	91	79	69	60	53	48	43	39	33
	B 18	9'-1	174	144	121	103	89	78	69	60	53	48	43	39
3	B 24	10'-3	219	181	152	130	112	97	86	76	68	61	55	
	B 22	5'-10	130	100	79	65	54	45	39	34	31	27	25	
	B 21	6'-11	128	106	89	76	65	57	50	44	39	34	31	
	B 20	7'-4	147	122	102	87	75	65	56	49	42	38	34	
	B 19	7'-9	165	136	114	97	84	72	61	53	46	41	36	
	B 18	8'-5	193	159	134	114	98	84	71	61	53	47	41	
	B 18	9'-1	218	180	151	129	111	96	81	69	60	52	46	
	B 16	10'-3	274	226	190	162	140	119	100	85	73	64	56	

- Notes:
- Load tables are calculated using sectional properties based on the steel design thickness shown in the Steel Deck Institute (SDI) Design Manual.
 - Loads shown in the shaded areas are governed by the live load deflection not in excess of 1/240 of the span. A dead load of 10 PSF has been included.
 - ** Acoustical Deck is not covered under Factory Mutual

Main Wind Force Resisting System – Method 2		All Heights	
Figure 6-6 (con't)	External Pressure Coefficients, C_p	Walls & Roofs	
Enclosed, Partially Enclosed Buildings			

Wall Pressure Coefficients, C_p			
Surface	L/B	C_p	Use With
Windward Wall	All values	0.8	q_z
Leeward Wall	0-1	-0.5	q_h
	2	-0.3	
	≥ 4	-0.2	
Side Wall	All values	-0.7	q_h

Roof Pressure Coefficients, C_p , for use with q_h												
Wind Direction	Windward									Leeward		
	Angle, θ (degrees)									Angle, θ (degrees)		
	h/L	10	15	20	25	30	35	45	$\geq 60^\#$	10	15	≥ 20
Normal to ridge for $\theta \geq 10^\circ$	≤ 0.25	-0.7 -0.18	-0.5 0.0*	-0.3 0.2	-0.2 0.3	-0.2 0.3	0.0* 0.4	0.4	0.01 θ	-0.3	-0.5	-0.6
	0.5	-0.9 -0.18	-0.7 -0.18	-0.4 0.0*	-0.3 0.2	-0.2 0.2	-0.2 0.3	0.0* 0.4	0.01 θ	-0.5	-0.5	-0.6
	≥ 1.0	-1.3** -0.18	-1.0 -0.18	-0.7 -0.18	-0.5 0.0*	-0.3 0.2	-0.2 0.2	0.0* 0.3	0.01 θ	-0.7	-0.6	-0.6
Normal to ridge for $\theta < 10^\circ$ and Parallel to ridge for all θ	≤ 0.5	Horiz distance from windward edge				C_p		*Value is provided for interpolation purposes. **Value can be reduced linearly with area over which it is applicable as follows				
		0 to h/2				-0.9, -0.18						
		H/2 to h				-0.9, -0.18						
		h to 2h				-0.5, -0.18						
	≥ 1.0	> 2h				-0.3, -0.18		Area (sq ft)		Reduction Factor		
		0 to h/2				-1.3**, -0.18						
> h/2				-0.7, -0.18								
		≤ 100 (9.3 sq m)		1.0								
		200 (23.2 sq m)		0.9								
		≥ 1000 (92.9 sq m)		0.8								

Notes:

1. Plus and minus signs signify pressures acting toward and away from the surfaces, respectively.
 2. Linear interpolation is permitted for values of L/B, h/L and θ other than shown. Interpolation shall only be carried out between values of the same sign. Where no value of the same sign is given, assume 0.0 for interpolation purposes.
 3. Where two values of C_p are listed, this indicates that the windward roof slope is subjected to either positive or negative pressures and the roof structure shall be designed for both conditions. Interpolation for intermediate ratios of h/L in this case shall only be carried out between C_p values of like sign.
 4. For monoslope roofs, entire roof surface is either a windward or leeward surface.
 5. For flexible buildings use appropriate G_f as determined by Section 6.5.8.
 6. Refer to Figure 6-7 for domes and Figure 6-8 for arched roofs.
 7. Notation:
 B: Horizontal dimension of building, in feet (meter), measured normal to wind direction.
 L: Horizontal dimension of building, in feet (meter), measured parallel to wind direction.
 h: Mean roof height in feet (meters), except that eave height shall be used for $\theta \leq 10$ degrees.
 z: Height above ground, in feet (meters).
 G: Gust effect factor.
 q_p, q_h : Velocity pressure, in pounds per square foot (N/m^2), evaluated at respective height.
 θ : Angle of plane of roof from horizontal, in degrees.
 8. For mansard roofs, the top horizontal surface and leeward inclined surface shall be treated as leeward surfaces from the table.
 9. Except for MWFRS's at the roof consisting of moment resisting frames, the total horizontal shear shall not be less than that determined by neglecting wind forces on roof surfaces.
- #For roof slopes greater than 80° , use $C_p = 0.8$

Main Wind

$P = q G C_p - q_e G C_{pe}$ = constant

Roof $\theta = 18.9^\circ$

$G = 0.85$ $q_{ref} = 38.5$ psf Case 2 L/B = 2.8

NORTH-SOUTH DIRECTION

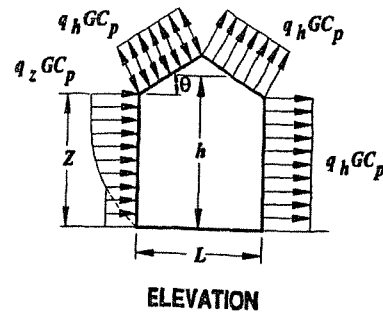
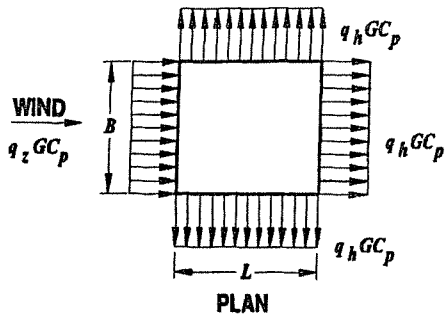
LEVEL	WINDWARD						LEEWARD					P
	H	K _H	q _H	G	C _p	q _w G _{C_p}	q _z	G	C _p	q _z G _{C_p}		
1-2 (14.67)	20.67	0.62	26.2	0.85	0.8	17.8	38.5	0.85	-0.28	-9.2	27	
2-3 (14.67)	35.33	0.73	30.9	"	0.8	21	"	"	-0.28	-9.2	30.2	
3-4 (14.67)	50	0.81	34.3	"	0.8	23.3	"	"	-0.28	-9.2	32.5	
4 - ATTIC	64.67	0.87	36.8	0.85	0.8	25.0	"	"	-0.28	-9.2	34.2	

PSF

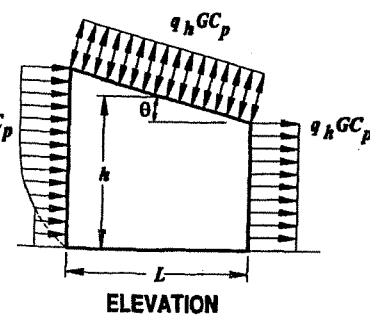
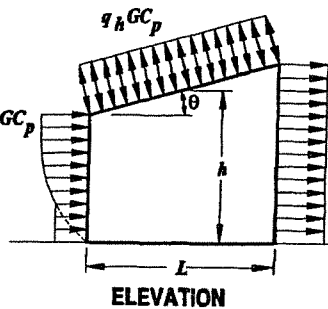
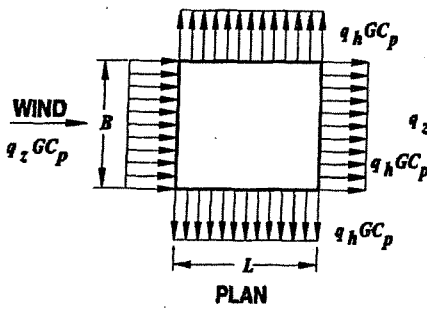
EAST-WEST DIRECTION L/B = 0.4

LEVEL	WINDWARD						LEEWARD					P
	H	K _H	q _H	G	C _p	q _w G _{C_p}	q _z	G	C _p	q _z G _{C_p}		
1-2	20.67	0.62	26.2	0.85	0.8	17.8	38.5	0.85	-0.5	-16.4	34.2	
2-3	35.33	0.73	30.9	"	0.8	21	"	"	"	"	37.4	
3-4	50	0.81	34.3	"	0.8	23.3	"	"	"	"	39.7	
4 - Attic	64.67	0.87	36.8	"	0.8	25.0	38.5	0.85	-0.5	"	41.4	

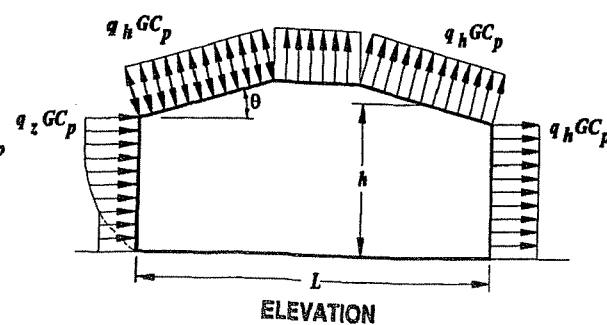
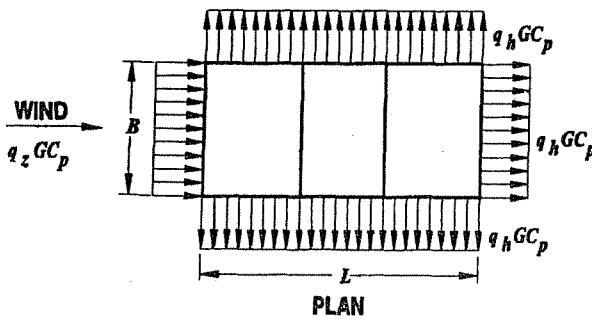
JL.S	3-15-06	1/2



GABLE, HIP ROOF



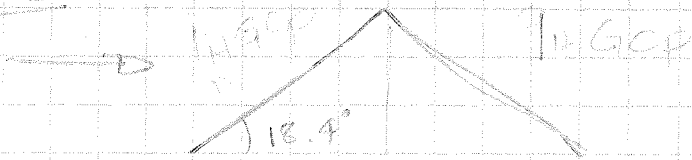
MONSLOPE ROOF (NOTE 4)



MANSARD ROOF (NOTE 8)

ROOF MLW.

N-S



$$h/L = 0.5$$

WIND.

Lee

$$V_w = 38.5$$

$$C_p = -0.5$$

$$C_p = -0.5 \text{ to } -0.1$$

$$0.1 = \text{windward side}$$

$$\Rightarrow P = 0.46 \times 38.5^2 \times 0.5 = \underline{15.1 \text{ PSF}}$$

DIAPHRAGM TO DISTRIBUTE LOADS EQUALLY TO EA. FRAME

JLS

3-16-06

14



I-4 Floor Beam Design

Prepared by:

Morphy, Makofsky, Inc.

(24 pages follow)

Fully Composite Beam Calculator

1. General Information

Member Size	-	w18x35
Length	(ft)	33.00
f_y	(ksi)	50
f_c	(ksi)	4
n	-	1

Location:

2nd Floor 33'-0 span Beam heavy load area

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	0.0

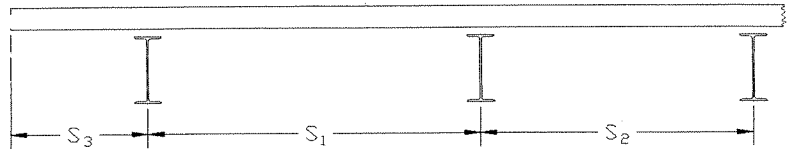
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	150.0

3. Beam Spacing

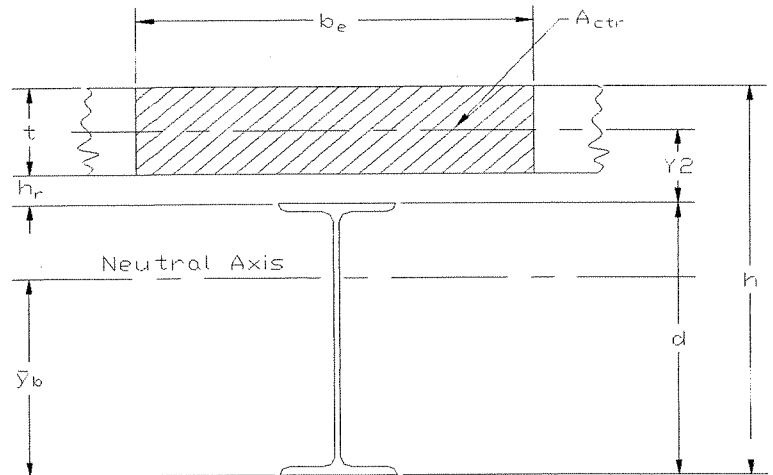
Beam Spacing - S_1	(ft)	6.23
Beam Spacing - S_2	(ft)	6.23
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.23

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	1.00 (ASD)
Load / Connector	(k)	1.00 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	7.23
Neutral Axis (y_b)	(in)	11.70
Moment of Inertia	(in ⁴)	1110

Fully Composite Beam Calculator

11/17/2017

Location: 2nd Floor 23' Wagon Beam Steel Moment Area

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	1.24		
Moment	(ft-k)	29.9		
Stress in Steel	(ksi)	21.1	< 33.3	ok
Deflection	(in)	0.42	1/ 366.7	

Composite Loading

Load	(klf)	1.90		
Moment	(ft-k)	48.4		
Stress in Steel	(ksi)	27.3	< 47	ok
Stress in Concrete	(ksi)	1.17	< 4.8	ok
Deflection	(in)	0.63	1/ 607	
DL Deflection	(in)	0.49	1/ 774	
LL Deflection	(in)	0.14	1/ 224	
Total Deflection	(in)	0.63	1/ 607	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	32.7		
Shear Stress in Steel	(ksi)	1.4	< 14	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	32.7	(steel governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	1.0625	< 1.75	ok
Studs Required	-	23	studs each side of max. moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	1.24		
Developed Moment	(ft-k)	29.8		
Allowable Moment	(ft-k)	24.375	> 29.8	ok

Construction & Composite Loading

Developed Load	(klf)	1.92		
Developed Moment	(ft-k)	52.4		
Allowable Moment	(ft-k)	45.1	> 52.4	ok
Plastic Neutral Axis	(in)	2.1		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	32.7		
Allowable Shear	(ksi)	13.1	> 1.4	ok

11. Shear Studs (LRFD Method)

Studs Required	-	23	studs each side of max. moment	
----------------	---	----	--------------------------------	--

16

Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 22'-0" span

Member Size - w12x16
 Length (ft) 22.00
 f_y (ksi) 50
 f_c (ksi) 4
 n -

WR2x27 TO be added to deck w/ 1/2" x 1/2" bolts

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	16

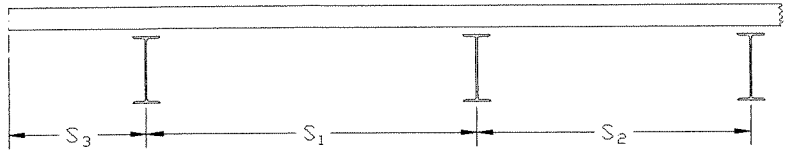
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

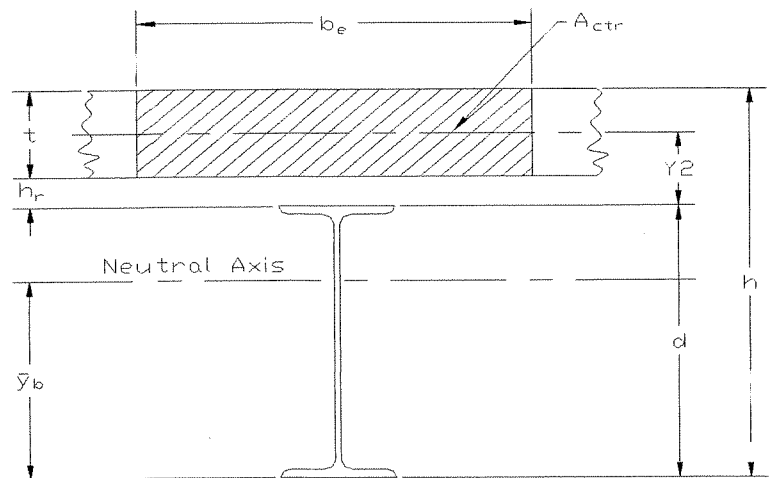
Beam Spacing - S_1 (ft) 6.67
 Beam Spacing - S_2 (ft) 6.67
 Edge Spacing - S_3 (ft) 0.00
 Contributory Width (ft) 6.67

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular (y/n) YES
 Concrete Depth (t) (in) 3.25
 Rib Height (h_r) (in) 1.50
 Rib Width (in) 1.75
 Height of Stud (in) 3.50
 Stud Diameter (in) 0.75
 Connectors / Rib - 1
 Load / Connector (k) 1.0 (ASD)
 Load / Connector (k) 1.0 (LRFD)



5. Transformed Sections

Effective Width (b_e) (in) 12.5
 Neutral Axis (\bar{y}_b) (in) 12.5
 Moment of Inertia (in⁴) 12.5

Fully Composite Beam Calculator



Location: 2nd Floor 22'-0" span

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	1.2		
Moment	(ft-k)	13.2		
Stress in Steel	(ksi)	21.7	< 36	ok
Deflection	(in)	0.30	1/ 144	

Composite Loading

Load	(klf)	1.2		
Moment	(ft-k)	13.2		
Stress in Steel	(ksi)	21.7	< 36	ok
Stress in Concrete	(ksi)	1.24	< 4.0	ok
Deflection	(in)	0.21	1/ 144	
DL Deflection	(in)	0.17	1/ 144	
LL Deflection	(in)	0.04	1/ 144	
Total Deflection	(in)	0.21	1/ 144	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	8.5		
Shear Stress in Steel	(ksi)	2.7	< 14	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	117.73	(steel governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	0.6438	< 0.75	no good
Studs Required	-	11	studs each side of member	

REVISION

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.24		
Developed Moment	(ft-k)	2.64		
Allowable Moment	(ft-k)	45.373	> 2.64	ok

Construction & Composite Loading

Developed Load	(klf)	1.27		
Developed Moment	(ft-k)	13.98		
Allowable Moment	(ft-k)	10.4	> 13.98	ok
Plastic Neutral Axis	(in)	1.07		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	8.5		
Allowable Shear	(ksi)	7.2	> 8.5	ok

11. Shear Studs (LRFD Method)

Studs Required	-	11	studs each side of member	
----------------	---	----	---------------------------	--

Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 39'-8 span

Member Size	-	w21x44
Length	(ft)	49.67
f_y	(ksi)	50
f_c	(ksi)	4
n	-	

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	0.0

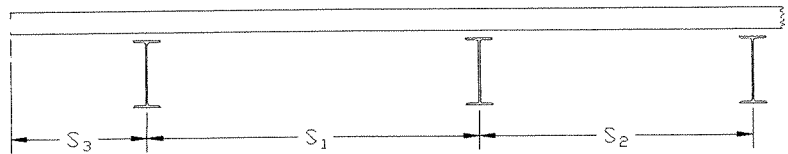
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

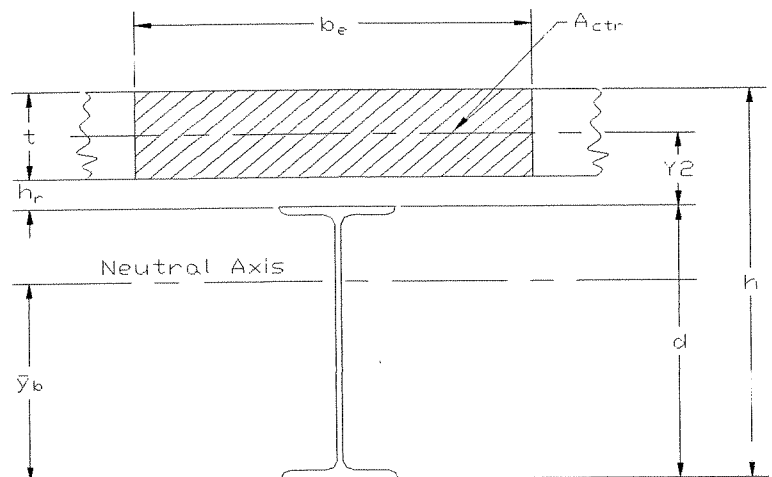
Beam Spacing - S_1	(ft)	6.67
Beam Spacing - S_2	(ft)	6.67
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	13.34

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	1.4 (ASD)
Load / Connector	(k)	1.7 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	13.34
Neutral Axis (\bar{y}_b)	(in)	11.87
Moment of Inertia	(in ⁴)	1110

Fully Composite Beam Calculator

12/11/14

Location: 2nd Floor 1914 main

6. Bending Calculations (ASD Method)

Construction Loading			
Load	(klf)	0.71	
Moment	(ft-k)	25.7	
Stress in Steel	(ksi)	14.7	< 15.0 ok
Deflection	(in)	1.76	1/ 17.1

Composite Loading			
Load	(klf)	1.70	
Moment	(ft-k)	124.0	
Stress in Steel	(ksi)	22.4	< 22.0 ok
Stress in Concrete	(ksi)	1.15	< 1.1 ok
Deflection	(in)	1.29	1/ 19.1
DL Deflection	(in)	1.03	1/ 16.1
LL Deflection	(in)	0.58	1/ 17.1
Total Deflection	(in)	1.75	1/ 17.1

7. Shear Calculations (ASD Method)

Composite Loading			
Shear	(k)	20.2	
Shear Stress in Steel	(ksi)	0.8	< 2.0 ok

8. Shear Studs (ASD Method)

Total Shear	(k)	32.5	(steel governs)
Reduction Factor	-	1.00	
Maximum Diameter	(in)	1.125	> 0.75 ok
Studs Required	-	20	studs each side of member

9. Bending Calculations (LRFD Method)

Construction Loading			
Developed Load	(klf)	0.78	
Developed Moment	(ft-k)	27.8	
Allowable Moment	(ft-k)	157.75	> 27.8 ok

Construction & Composite Loading			
Developed Load	(klf)	1.69	
Developed Moment	(ft-k)	170.4	
Allowable Moment	(ft-k)	579.7	> 170.4 ok
Plastic Neutral Axis	(in)	2.8	

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading			
Developed Shear	(k)	32.5	
Allowable Shear	(ksi)	171.0	> 32.5 ok

11. Shear Studs (LRFD Method)

Studs Required	-	20	studs each side of member
----------------	---	----	---------------------------

Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 27'-0 span

Member Size	-	w14x22
Length	(ft)	27.00
f_y	(ksi)	50
f_c	(ksi)	4
n	-	1

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	22

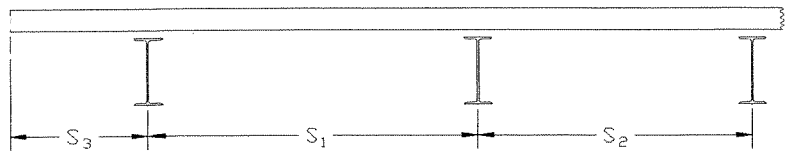
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

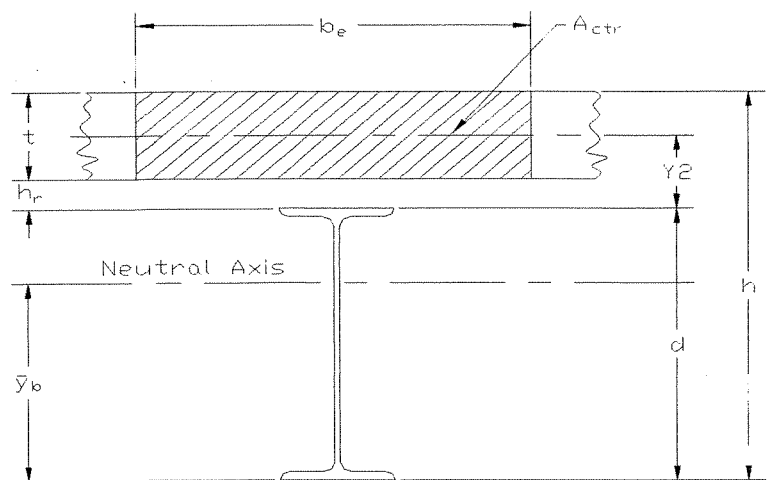
Beam Spacing - S_1	(ft)	6.67
Beam Spacing - S_2	(ft)	6.67
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.67

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	13.3 (ASD)
Load / Connector	(k)	13.3 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	66.7
Neutral Axis (y_b)	(in)	11.5
Moment of Inertia	(in ⁴)	1110

Fully Composite Beam Calculator

Job No. 99999

Location: 2nd Floor 17' Span

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	3.00		
Moment	(ft-k)	30.0		
Stress in Steel	(ksi)	11.7	< 16.0	ok
Deflection	(in)	0.50	1/ 1000	

Composite Loading

Load	(klf)	4.00		
Moment	(ft-k)	40.0		
Stress in Steel	(ksi)	10.7	< 16.0	ok
Stress in Concrete	(ksi)	7.2	< 14.0	ok
Deflection	(in)	0.73	1/ 1000	
DL Deflection	(in)	0.50	1/ 1000	
LL Deflection	(in)	0.23	1/ 1000	
Total Deflection	(in)	0.73	1/ 1000	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	10.7		
Shear Stress in Steel	(ksi)	3.4	< 13.0	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	107.23	(steel governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	0.875	< 0.75	ok
Studs Required	-	3	studs each side of max. moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	3.00		
Developed Moment	(ft-k)	31.8		
Allowable Moment	(ft-k)	130.0	> 31.8	ok

Construction & Composite Loading

Developed Load	(klf)	4.00		
Developed Moment	(ft-k)	38.4		
Allowable Moment	(ft-k)	130.4	> 38.4	ok
Plastic Neutral Axis	(in)	1.1		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	10.7		
Allowable Shear	(ksi)	13.0	> 10.7	ok

11. Shear Studs (LRFD Method)

Studs Required	-	3	studs each side of max. moment	
----------------	---	---	--------------------------------	--

Partially Composite Beam Calculator

10/14/21

XXXXXXXXXXXXXXXXXXXX - 10 *

Location: 2nd Floor 27'-0" span

Moment of Inertia (in⁴) 306

Minimum number of studs satisfied

12. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	0.70		
Moment	(ft-k)	18.3		
Stress in Steel	(ksi)	13.9	< 33	ok
Deflection	(in)	0.99	1/ 125	

Partially Composite Loading

Load	(klf)	0.70		
Moment	(ft-k)	18.3		
Stress in Steel	(ksi)	13.9	< 33	ok
Stress in Concrete	(ksi)	0.77	< 3.5	ok
Deflection	(in)	0.99	1/ 125	
DL Deflection	(in)	0.99	1/ 125	
LL Deflection	(in)	0.27	1/ 175	
Total Deflection	(in)	1.26	1/ 100	

13. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	14.7		
Shear Stress in Steel	(ksi)	2.1	< 19	ok

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.33		
Developed Moment	(ft-k)	9.18		
Allowable Moment	(ft-k)	104.5	> 9.18	ok

Construction & Composite Loading

Developed Load	(klf)	1.03		
Developed Moment	(ft-k)	28.1		
Allowable Moment	(ft-k)	174.0	> 28.1	ok
Plastic Neutral Axis	(in)	6.30		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	14.7		
Allowable Shear	(ksi)	85.0	> 14.7	ok

Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 48'-0" span Beam OVER CLASS ROOM

Member Size	-	W24X62
Length	(ft)	48.00
f_y	(ksi)	50
f_c	(ksi)	4
n	-	

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	0.0

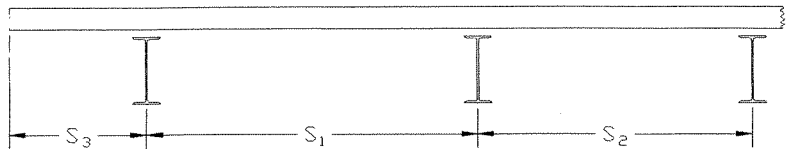
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

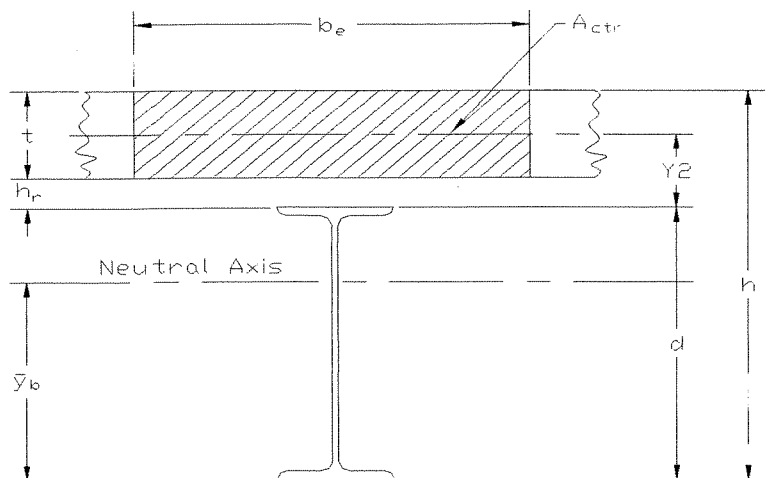
Beam Spacing - S_1	(ft)	6.67
Beam Spacing - S_2	(ft)	6.67
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.67

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	1.50 (ASD)
Load / Connector	(k)	1.50 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	66.67
Neutral Axis (y_b)	(in)	15.00
Moment of Inertia	(in ⁴)	712.50

Fully Composite Beam Calculator

9/24/2020

Location: 2nd Floor 4th Floor Beam 02189 CLASSROOM

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	5.00		
Moment	(ft-k)	73.7		
Stress in Steel	(ksi)	8.77	< 10.0	ok
Deflection	(in)	0.388	1/ 17.50	

Composite Loading

Load	(klf)	4.35		
Moment	(ft-k)	64.4		
Stress in Steel	(ksi)	7.33	< 10.0	ok
Stress in Concrete	(ksi)	1.17	< 3.0	ok
Deflection	(in)	0.321	1/ 18.7	
DL Deflection	(in)	0.198	1/ 25.0	
LL Deflection	(in)	0.123	1/ 32.0	
Total Deflection	(in)	0.321	1/ 18.7	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	20.0		
Shear Stress in Steel	(ksi)	2.77	< 10.0	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	141.20	(concrete governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	1.475	> 0.75	ok
Studs Required	-	30	studs each side of each moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	5.00		
Developed Moment	(ft-k)	73.7		
Allowable Moment	(ft-k)	170.4	> 73.7	ok

Construction & Composite Loading

Developed Load	(klf)	4.32		
Developed Moment	(ft-k)	62.1		
Allowable Moment	(ft-k)	150.0	> 62.1	ok
Plastic Neutral Axis	(in)	4.02		

Note: The PNA is taken from the top of the steel flange down.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	20.0		
Allowable Shear	(ksi)	11.9	> 2.77	ok

11. Shear Studs (LRFD Method)

Studs Required	-	30	studs each side of each moment	
----------------	---	----	--------------------------------	--

Alt class room upper beam

Core I: 49'-8"

~~Core II: W21 x 44~~

II: 27' x 27'

27'-0" W16 x 26

~~W21 x 44~~

uplift loads

$DL + 0.5 LL \Rightarrow 70 + 0.5 \times 50 = 95 \text{ PCF}$

$\times 6.67 = 634 \text{ PCF}$

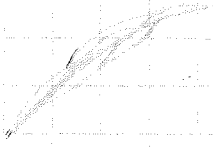
$P_u = 2.56^k$

$M_u = 57.8^{\text{kft}}$

$\phi = 2/313$

$\phi = 18$

Beam @ midpt.



	1/2	1/57/20	20



for the noted floor
 Total thickness 5"

NW	4.25" conc	Wax Floor	52
Deck			2
CLG.			5
PART.			20
STL			5
DL			85
LL	→ office		50

TL: 135 PSF

OTHER LIVE LOADS

- Lockers 15
- Med space 125 + 4'1" prds 50 PSF
- Storage
- Vault

	JLS	1/06	27

-421-2798

Typical floors

17" LT. WT.	5/5	4" o	38
Deck	(1 1/2")		2
STEEL			5
CLG			5
PARTITIONS			20
DL			70
LL			50 @ office
TL			20 PSF

Typ bm. spacing 6'-8" o.c.

OVER classroom span = 50'-0"

- SPAN 1 : 22'-8"
- 2 : 27'-0"
- 3 : 20'-0"
- 4 : 29'-8"

Walters 15' (note: no partition wall)

JACKSON BARRACKS	JLS	7/2/6	LB
INT. EX. RS.			

Fully Composite Beam Calculator

OPACK

1. General Information

Location: 2nd Floor 25'-8 span Beam ~~heavy load~~ area

Member Size	-	w14x22
Length	(ft)	25.67
f_y	(ksi)	50
f'_c	(ksi)	4
n	-	11

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	22

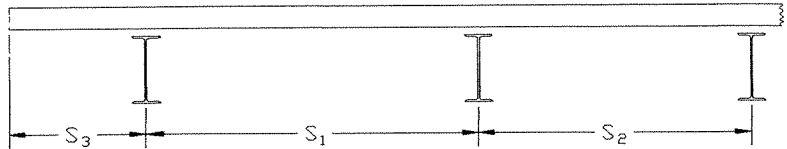
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

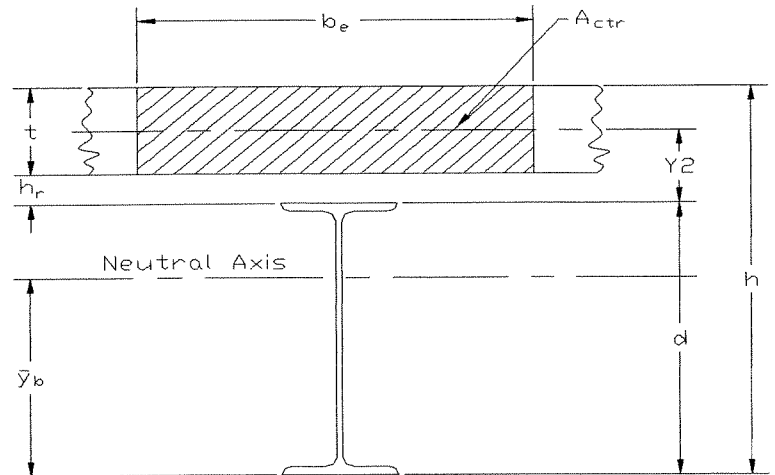
Beam Spacing - S_1	(ft)	6.23
Beam Spacing - S_2	(ft)	6.23
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.23

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	11.4 (ASD)
Load / Connector	(k)	21.9 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	74.76
Neutral Axis (y_b)	(in)	14.60
Moment of Inertia	(in ⁴)	720

29

Fully Composite Beam Calculator

w14x22

Location:

2nd Floor 25'-8 span Beam ~~10/10/10~~ ^{OFFICE.} area

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	0.27		
Moment	(ft-k)	22.5		
Stress in Steel	(ksi)	9.3	< 33.0	ok
Deflection	(in)	0.46	1/ 665.8	

Composite Loading

Load	(klf)	0.47		
Moment	(ft-k)	38.5		
Stress in Steel	(ksi)	18.7	< 45	ok
Stress in Concrete	(ksi)	0.23	< 1.8	ok
Deflection	(in)	0.22	1/ 1408	
DL Deflection	(in)	0.07	1/ 4224	
LL Deflection	(in)	0.15	1/ 2112	
Total Deflection	(in)	0.68	1/ 452	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	9.5		
Shear Stress in Steel	(ksi)	3.0	< 20	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	162.25	(steel governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	0.8375	> 0.75	ok
Studs Required	-	15	studs each side of max. moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.33		
Developed Moment	(ft-k)	27.0		
Allowable Moment	(ft-k)	124.5	> 27.0	ok

Construction & Composite Loading

Developed Load	(klf)	1.01		
Developed Moment	(ft-k)	83.1		
Allowable Moment	(ft-k)	252.4	> 83.1	ok
Plastic Neutral Axis	(in)	1.28		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	12.9		
Allowable Shear	(ksi)	85.3	> 12.9	ok

11. Shear Studs (LRFD Method)

Studs Required - 15 studs each side of max. moment

30

Fully Composite Beam Calculator

1. General Information

Member Size	-	w16x31
Length	(ft)	25.67
f_y	(ksi)	50
f'_c	(ksi)	4
n	-	11

Location: 2nd Floor 25'-8 span Beam heavy load area

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	31

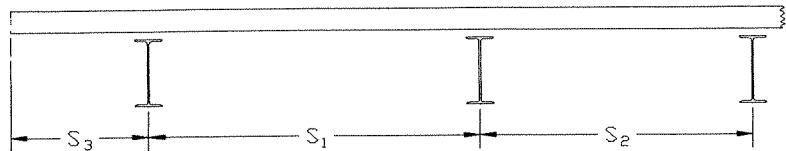
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	150.0

3. Beam Spacing

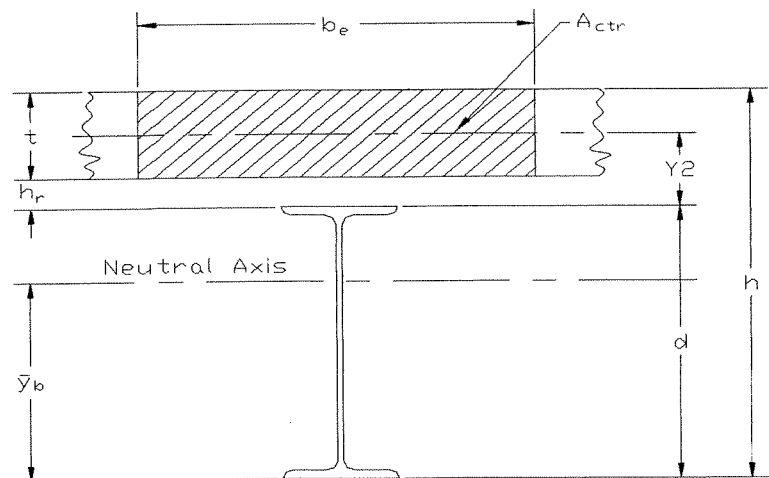
Beam Spacing - S_1	(ft)	6.23
Beam Spacing - S_2	(ft)	6.23
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.23

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	11.4 (ASD)
Load / Connector	(k)	21.9 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	74.76
Neutral Axis (y_b)	(in)	15.77
Moment of Inertia	(in ⁴)	1185

31

Fully Composite Beam Calculator

w16x31

Location: 2nd Floor 25'-8 span Beam heavy load area

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	0.28		
Moment	(ft-k)	23.3		
Stress in Steel	(ksi)	5.9	< 33.0	ok
Deflection	(in)	0.25	1/ 1215	

Composite Loading

Load	(klf)	1.09		
Moment	(ft-k)	89.8		
Stress in Steel	(ksi)	20.3	< 45	ok
Stress in Concrete	(ksi)	0.40	< 1.8	ok
Deflection	(in)	0.31	1/ 994	
DL Deflection	(in)	0.04	1/ 6955	
LL Deflection	(in)	0.27	1/ 1159	
Total Deflection	(in)	0.56	1/ 547	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	17.6		
Shear Stress in Steel	(ksi)	4.0	< 20	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	228	(steel governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	1.1	> 0.75	ok
Studs Required	-	20	studs each side of max. moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.34		
Developed Moment	(ft-k)	27.9		
Allowable Moment	(ft-k)	202.5	> 27.9	ok

Construction & Composite Loading

Developed Load	(klf)	2.01		
Developed Moment	(ft-k)	165.9		
Allowable Moment	(ft-k)	380.9	> 165.9	ok
Plastic Neutral Axis	(in)	1.79		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	25.9		
Allowable Shear	(ksi)	117.9	> 25.9	ok

11. Shear Studs (LRFD Method)

Studs Required	-	21	studs each side of max. moment	
----------------	---	----	--------------------------------	--

32

Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 49'-8 span Transfer Beam

Member Size	-	w30x132
Length	(ft)	49.67
f_y	(ksi)	50
f'_c	(ksi)	4
n	-	11

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	132

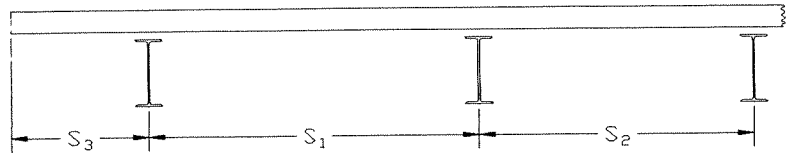
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

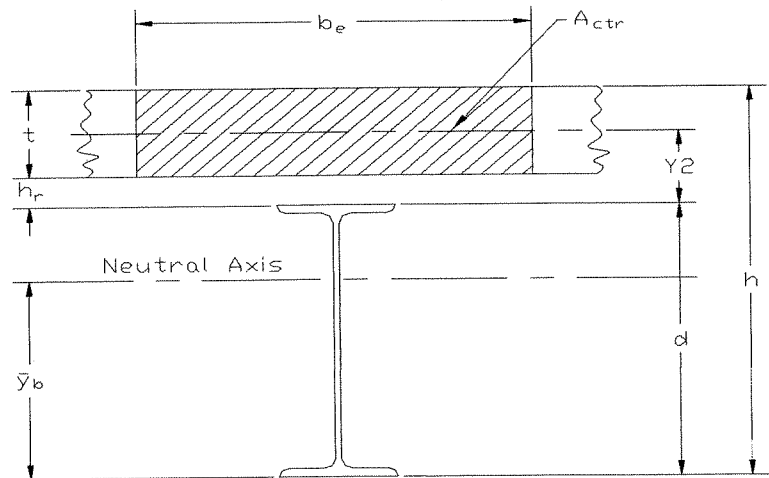
Beam Spacing - S_1	(ft)	6.67
Beam Spacing - S_2	(ft)	6.67
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.67

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	11.4 (ASD)
Load / Connector	(k)	21.9 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	80.04
Neutral Axis (y_b)	(in)	22.07
Moment of Inertia	(in ⁴)	10705

33

Fully Composite Beam Calculator

w30x132

Location: 2nd Floor 49'-8 span Transfer Beam

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	0.40		
Moment	(ft-k)	123.7		
Stress in Steel	(ksi)	3.9	< 33.0	ok
Deflection	(in)	0.33	1/ 1816	

Composite Loading

Load	(klf)	0.50		
Moment	(ft-k)	1344.2		
Stress in Steel	(ksi)	37.2	< 45	ok
Stress in Concrete	(ksi)	1.78	< 1.8	ok
Deflection	(in)	0.22	1/ 2701	
DL Deflection	(in)	0.07	1/ 8103	
LL Deflection	(in)	0.15	1/ 4052	
Total Deflection	(in)	0.55	1/ 1086	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	22.4		
Shear Stress in Steel	(ksi)	1.2	< 20	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	442.221	(concrete governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	2.5	> 0.75	ok
Studs Required	-	39	studs each side of max. moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.48		
Developed Moment	(ft-k)	148.4		
Allowable Moment	(ft-k)	1638.75	> 148.4	ok

Construction & Composite Loading

Developed Load	(klf)	1.19		
Developed Moment	(ft-k)	366.5		
Allowable Moment	(ft-k)	2183.2	> 366.5	ok
Plastic Neutral Axis	(in)	0.10		

Note: The PNA is taken from the bottom of the steel flange down.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	29.5		
Allowable Shear	(ksi)	503.3	> 29.5	ok

11. Shear Studs (LRFD Method)

Studs Required	-	41	studs each side of max. moment	
----------------	---	----	--------------------------------	--

34

Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 33'-0 span Beam

Member Size	-	w16x31
Length	(ft)	33.00
f_y	(ksi)	50
f_c	(ksi)	4
n	-	11

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	31

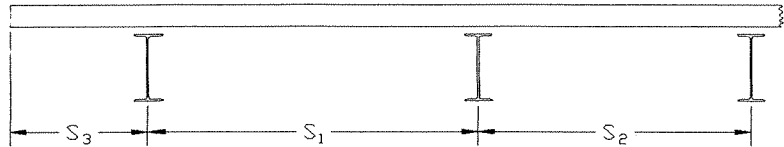
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

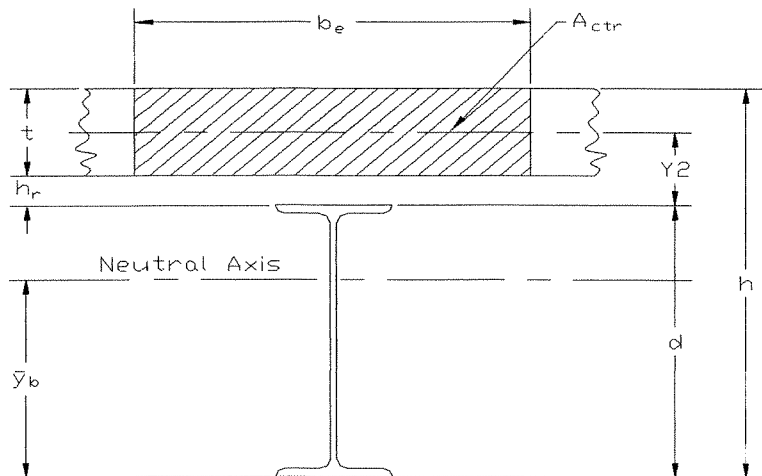
Beam Spacing - S_1	(ft)	6.67
Beam Spacing - S_2	(ft)	6.67
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.67

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	11.4 (ASD)
Load / Connector	(k)	21.9 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	80.04
Neutral Axis (y_{-b})	(in)	15.93
Moment of Inertia	(in ⁴)	1202

35

Fully Composite Beam Calculator

w16x31

Location: 2nd Floor 33'-0 span Beam

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	0.30		
Moment	(ft-k)	40.8		
Stress in Steel	(ksi)	10.4	< 33.0	ok
Deflection	(in)	0.74	1/ 537.9	

Composite Loading

Load	(klf)	0.50		
Moment	(ft-k)	68.1		
Stress in Steel	(ksi)	21.2	< 45	ok
Stress in Concrete	(ksi)	0.29	< 1.8	ok
Deflection	(in)	0.38	1/ 1034	
DL Deflection	(in)	0.13	1/ 3101	
LL Deflection	(in)	0.26	1/ 1551	
Total Deflection	(in)	1.12	1/ 354	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	13.2		
Shear Stress in Steel	(ksi)	3.0	< 20	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	228	(steel governs)
Reduction Factor	-	1.00	
Maximum Diameter	(in)	1.1	> 0.75 ok
Studs Required	-	20	studs each side of max. moment

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.36		
Developed Moment	(ft-k)	49.0		
Allowable Moment	(ft-k)	202.5	> 49.0	ok

Construction & Composite Loading

Developed Load	(klf)	1.09		
Developed Moment	(ft-k)	148.0		
Allowable Moment	(ft-k)	382.8	> 148.0	ok
Plastic Neutral Axis	(in)	1.68		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	17.9		
Allowable Shear	(ksi)	117.9	> 17.9	ok

11. Shear Studs (LRFD Method)

Studs Required	-	21	studs each side of max. moment
----------------	---	----	--------------------------------

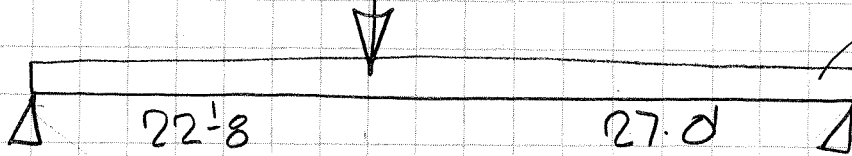
36

18:

have transfer girder @ 2nd floor.

$$P = 20 \times \frac{49.67}{2} \times 0.12 \cdot \frac{117.2^k}{2} = 59.6^k$$

Post. 59.6^k



PRE = 0.3^k
POST = 0.17^k

49.67'

P_{comp. moment} = ~~8k~~

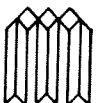
$$92.5^k \quad R: 7.45 \\ = w_{24 \times 55} L_0 = 9.74$$

Post. 36.66

31.46

$$M = 785.05^k$$

37



Roof & attic

SURF	38
deck	2
CLG	5
Roof deck	2
Steel deck & INS	3
Trusses	5

TDL	55
-----	----

LL (4:12)	20
-----------	----

TL	<u>75</u>
----	-----------

column load

To 2nd flr.
trans fm.

$$20 \times \frac{49.67}{2} \times \left(\overset{R}{75} + \overset{3}{120} \right) \times 0.195 = 96.86^K$$

$$M = 118993$$

W30x132

JLS

3-2-06

38



I-5 Column Investigation

Prepared by:

Morphy, Makofsky, Inc.

(4 pages follow)

Gravity load investigation @ Columns

Along line 120

12-E Floor Area = $20 \times \frac{25.67}{2} = 256.7 \text{ ft}^2$

2ND
(Lockers)

DL 50
LL 75

TL 125

$\Rightarrow P = 32.1 \text{ K}$

EXT. Wall BRICK # STD = 50 ^{PSF}
H = 14.67'

$\Rightarrow W = 0.73 \text{ K/ft}$

L = 20'
P = 14.7 K

3RD
ADMIN

DL 70
LL 50

TL 120

$\Rightarrow P = 30.8 \text{ K}$

Wall same as 2ND P = 14.7 K

4TH
ATTIC

DL 70
LL (ROOF) 20 + (ATTIC) 10 = 30

TL 100

$\Rightarrow P = 25.7 \text{ K}$
no wall

JLS

3-13-06

39



12-E CONT.

<u>1ST</u>	5" SLAB CONC BM.	63 25
	DL	88
	LL (STORAGE)	150
	<u>TL</u>	<u>238 PSF</u>

ass Area $\frac{1}{2}$ of above
 $P = \frac{1}{2} \times 256.7 \times 0.238$
 $= \underline{30.5^k}$

Wall	Brick	40	(Light wt. block fully grouted)
	CMU (SOLID GROUT)	75	
		<u>115 PSF</u>	

$H = 16.67 \rightarrow w/p = 1.92^k/ft$
 $\times 10' = \underline{19.2^k}$

Ext. conc wall

8" conc	$\times 4'$	= 0.4
BM 2'x2'		= 0.6
		<u>1</u>
		$\times 10'$
		<u>P = 10^k</u>

TOTAL

1 ST	10 + 19.2 + 30.5	= 59.7
2 ND	32.1 + 14.7	= 46.7
3	30.8 + 14.7	= 45.5
4	<u>25.7</u>	= 25.7
	<u>177.6</u>	

180^k

46^k/ft
4PA

JLS	B-13-06	40



F-12 $A = 20 \times \frac{1}{2} (25.67 + 33) = 586.7 \text{ ft}^2$
 interior col.

2ND $P_{\text{in}} = 0.125 \times 586.7 = 73.3 \text{ K}$

3RD $0.12 \times 586.7 = 70.4 \text{ K}$

4TH $0.1 \times 586.7 = 58.7 \text{ K}$

1ST assume 4 areas to col fly.

$P = 0.25 \times 586.7 \times 0.238 = 35 \text{ K}$

Tot:

1 ST	35
2	73.3
3	70.4
4	58.7
	<hr/>
	237.4K

\Rightarrow 46K per pile
 (5-6 PA)

w/LL reduction use 5 PA

JLS	3-13-06	41 ³



G-12

$$A = 20 \times \left(\frac{33 + 27}{2} \right) = 600 \text{ ft}^2$$

2ND

$$600 \times 0.125 = 75 \text{K}$$

3rd

$$600 \times 0.12 = 72$$

4th

$$600 \times 0.1 = 60$$

1ST

$$150 \times 0.238 = 35.7$$

Total

243K

5.3 pd
26 PA

H-12

JLS

3-13-03

42⁴



I-6 Tie Force Review

Prepared by:

Morphy, Makofsky, Inc.

(10 pages follow)

construction, a time effect factor λ is also included). Per the LRFD approach, the design tie strength must be greater than or equal to the required tie strength:

$$\text{Design Tie Strength} = \Phi R_n \geq \text{Required Tie Strength} \quad \text{Equation (3-1)}$$

where Φ = Strength reduction factor
 R_n = Nominal Tie Strength calculated with the appropriate material specific code, including over-strength factor Ω where applicable.

For the purposes of this UFC, all strength reduction factors, Φ , are taken as the appropriate material specific code value.

3-1.2 Required Tie Strength.

The required tie strength for horizontal and vertical ties is defined for each material type in Chapters 4 through 8. The structural elements used as ties must not only provide sufficient tie strength, but they must also be adequately connected so that the tie forces can be distributed throughout the rest of the building.

The design tie strengths are considered separately from the forces that are typically carried by each structural element due to live load, dead load, wind load, etc.; in other words, the design tie strength of the element or connection with no other loads acting must be greater than or equal to the required tie strength.

Some of the tie forces are based on the dead and live loads. In some cases, a structure may have different loads, such as a corridor load or office load, on the same floor. In such cases, use an averaged dead or live load, by computing the total force acting on the floor and dividing by the total plan area. When tie forces are based on a span L that varies along the length of a tie, the largest span in a continuous tie should be used for the tie force calculation.

3-1.3 Structural Elements and Connections With Inadequate Design Tie Strength.

If all of the structural elements and connections can be shown to provide the required tie strength, then the tie force requirement has been met. If the **vertical** design tie strength of any structural element or connection is less than the **vertical** required tie strength, the designer must either: 1) revise the design to meet the tie force requirements or 2) use the Alternate Path method to prove that the structure is capable of bridging over this deficient element. **Note that the AP method is not applied to structural elements or connections that cannot provide the horizontal required tie strength; in this case, the designer must redesign or retrofit the element and connection such that a sufficient design tie strength is developed.**

CHAPTER 3

DESIGN STRATEGIES

The progressive collapse design requirements employ two design/analysis approaches: Tie Forces (TF) and Alternate Path (AP). This chapter discusses the general procedures for these approaches.

3-1 TIE FORCES.

In the Tie Force approach, the building is mechanically tied together, enhancing continuity, ductility, and development of alternate load paths. Tie forces are typically provided by the existing structural elements and connections that are designed using conventional design procedures to carry the standard loads imposed upon the structure.

Depending upon the construction type, there are several horizontal ties that must be provided: internal, peripheral, and ties to edge columns, corner columns, and walls. Vertical ties are required in columns and load-bearing walls. Figure 3-1 illustrates these ties for frame construction. Note that these "tie forces" are not synonymous with "reinforcement ties" as defined in the 2002 version of the *Building Code Requirements for Structural Concrete* from the American Concrete Institute (ACI 318-02) for reinforced concrete design.

The load path for peripheral ties must be continuous around the plan geometry and, for internal ties, the path must be continuous from one edge to the other. Along a particular load path, different structural elements may be used to provide the required tie strength, providing that they are adequately connected; for instance, an internal tie strength may be provided by a series of beams on a beam line, provided that the connections to the intermediate elements (girders, beams or columns) can provide the required tie strength. Likewise, vertical ties must be continuous from the lowest level to the highest level. Horizontal ties to edge columns and walls do not have to be continuous, but they must be satisfactorily anchored back into the structure. For buildings that are composed of separate sub-structures or that incorporate expansion joints that create structurally independent sections, the tie force requirements are applied to each sub-structure or independent section, which are treated as separate units. Note that all tie force paths must be geometrically straight; changes in direction to accommodate openings or similar discontinuities are not allowed.


3-1.1 Load and Resistance Factor Design for Tie Forces.

Following the Load and Resistance Factor Design (LRFD) approach, the design tie strength provided by a member or its connections to other members is taken as the product of the strength reduction factor, Φ , and the nominal tie strength R_n calculated in accordance with the requirements and assumptions of applicable material specific codes, including an over-strength factor, Ω , as applicable. (Note that for wood

2-2 COMMON DESIGN REQUIREMENTS.

The following sections present design requirements that are common for all levels of protection (VLLOP through HLOP), for all new and existing construction.

2-2.1 Effective Column and Wall Height.



For all Levels of Protection, all multistory vertical load-carrying elements must be capable of supporting the vertical load after the loss of lateral support at any floor level (i.e., a laterally unsupported length equal to two stories must be used in the design or analysis). Use the load combination in Section 3-2.4.1 for the design or analysis. Use the appropriate strength reduction factors and over-strength factors as specified in Chapters 4 through 8.

2-2.2 Upward Loads on Floors and Slabs.

In each bay and at all floors and the roof, the slab/floor system must be able to withstand a net upward load of the following magnitude:

$$1.0 D + 0.5 L$$

where D = Dead load based on self-weight only (kN/m² or lb/ft²)
 L = Live load (kN/m² or lb/ft²)

Note that this load is applied to each bay, one at a time, i.e., the uplift loads are not applied concurrently to all bays. Design the floor system in each bay and its connections to the beams, girders, columns, capitals, etc, to carry this load. A load path from the slab to the foundation for this upward load does not need to be defined. Use the appropriate strength reduction factors and over-strength factors as specified in Chapters 4 through 8.

Table D-2 Required Tie Forces

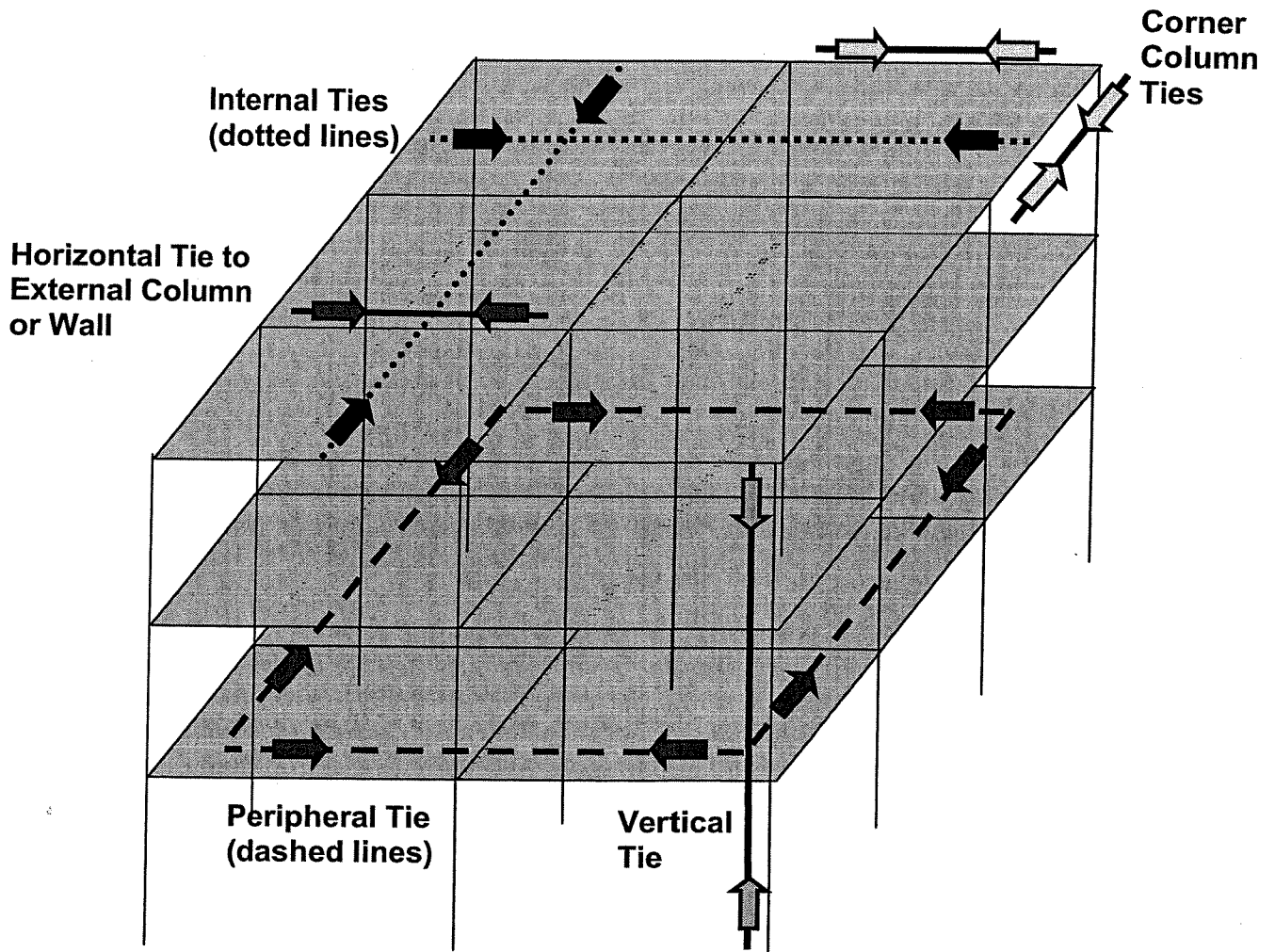
(VERTICAL SHEAR CONNECTION)

Tie type	Required Tie Force kN (kips)	Available Member/Detail	TF > TR _{req}
Peripheral ties	$0.25(1.2D+1.6L)s_iL$ But not less than 8.4 kips 28.3 kips	Spandrel and spandrel girder (and connections)	Yes
Internal ties	$0.5(1.2DL+1.6LL)s_iL$ 56.5 kips	Interior beams and girders (and connections)	Yes
Horizontal ties to columns	greater of $0.01(4)(A_{trib})(1.2DL+1.6LL)$ or Internal tie force 56.5 kips	Interior beams, girders, spandrels and spandrel girders (and connections)	Yes
Vertical ties to columns	$(A_{trib})(1.2DL+1.6LL)$ 113 kips	Continuous column connections	Yes

As an example for a connection calculation, consider the peripheral column to beam connection illustrated in Figure D-3. This connection has been detailed for the design loads associated with the example building perimeter column to beam loads.

46

Figure 3-1 Schematic of Tie Forces in a Frame Structure



Note: The required External Column, External Wall, and Corner Column tie forces may be provided partly or wholly by the same elements that are used to meet the Peripheral or Internal tie requirement.

Q7

1-3.4 Existing Design Guidelines.

1-3.4.1 British Standards.

England was the first nation to address progressive collapse explicitly in its building standards. The development was initiated by the collapse of the Ronan Point apartment building in 1968, and further motivated by the IRA bombing campaign. The British Standards employ three design approaches for resisting progressive collapse:

- Tie Forces (TF). This indirect design approach enhances continuity, ductility, and structural redundancy by requiring "ties" to keep the structure together in the event of an abnormal loading.
- Alternate Path (AP). This direct method requires that the designer prove that the structure is capable of bridging over a removed structural element and that the resulting extent of damage does not exceed the damage limits. The missing structural element is any element that cannot provide an adequate vertical tie force.
- Specific Local Resistance (SLR). This direct method requires that, for any structural element over which the building cannot bridge, the element must be designed as a "key" or "protected" element, capable of carrying a static pressure loading of 34 kN/m² (5 psi).

The British have employed this combined approach for almost 30 years and the effectiveness of the strategy has been illustrated in a number of deliberate attacks on buildings, as discussed in *The UK and European Regulations for Accidental Actions* by D.B. Moore (Moore 2003). Recent proposed modifications to the British Standards and draft Eurocode standards include a risk assessment procedure that will better correlate the level of design for progressive collapse to the particular structure.

1-3.4.2 United States Civilian Standards.

While general design guidance for reducing the potential of progressive collapse are discussed in ASCE 7-02, no quantifiable or enforceable requirements are put forth. Likewise, none of the major United States building codes (e.g., International Building Code, Uniform Building Code, Building Officials and Code Administrators) nor the structural design codes (e.g., American Institute of Steel Construction, American Concrete Institute, The Masonry Society, American Iron and Steel Institute, American Forest and Paper Association) provide specific design requirements.

1-3.4.3 United States Government Standards.

Design guidelines for resisting progressive collapse have been published by the Department of Defense (DoD) in 2001, in the *Interim Antiterrorism/Force Protection Construction Standards--Guidance on Structural Requirements* (ITG 2001), and, by the U.S. General Services Administration (GSA) in 2003, in the *Progressive Collapse Analysis and Design Guidelines for New Federal Office Buildings and Major Modernization Projects* (GSA 2003), to support their building activities. Both

approaches employ the AP method, but with specific modifications that are tailored for the typical threats and structures considered by each organization. This UFC replaces the previous DoD guidance (ITG 2001).

1-4 SUMMARY OF PROGRESSIVE COLLAPSE DESIGN PROCEDURE.

The design requirements presented in this UFC were developed such that two structural response modes are available to provide different levels of resistance to progressive collapse. The first level of progressive collapse design employs Tie Forces, which are based on a "catenary" response of the structure. The second level employs the Alternate Path method, in which the structural mode is "flexural", as the building must bridge across a removed element. A significant portion of the design guidelines and criteria in this UFC are based on the British Standards approach, as discussed in more detail in Appendix B.

For existing and new construction, the level of progressive collapse design for a structure is correlated to the Level of Protection (LOP) that the Project Planning Team develops and provides to the designer. At the lower LOPs [Very Low Level of Protection (VLLOP) and Low Level of Protection (LLOP)], only Indirect Design is employed, by specifying the required levels of Tie Forces. However, in the case that an adequate Tie Force cannot be developed in a vertical structural element, then the Alternate Path method is applied to verify that the structure can bridge over the deficient element. For Medium Level of Protection (MLOP) and High Level of Protection (HLOP), the Alternate Path method is also applied to verify satisfactory flexural resistance in addition to the catenary resistance provided by the Tie Forces. Finally, for MLOP and HLOP, additional ductility requirements are specified for ground floor perimeter vertical load-bearing elements, to improve the resistance to progressive collapse

It is expected that the majority of new and existing DoD facilities will be assigned VLLOP or LLOP ratings and the design to resist progressive collapse will require the application of only the Tie Force criteria. In general, these requirements will be met without much difficulty and can usually be satisfied by application of good connection detailing practice.

1-5 INSPECTION REQUIREMENTS.

Inspection requirements to verify conformance with this UFC are provided in Appendix G. These inspection requirements are modifications to the provisions of the 2003 International Building Code (2003 IBC), which cover construction documents, structural tests and special inspections for buildings that have been designed to resist progressive collapse.

1-6 SECURITY ENGINEERING UFC SERIES.

This UFC is one of a series of security engineering Unified Facilities Criteria that cover minimum standards, planning, preliminary design, and detailed design for security and antiterrorism. The manuals in this series are designed to be used

CHAPTER 2

PROGRESSIVE COLLAPSE DESIGN REQUIREMENTS FOR NEW AND EXISTING CONSTRUCTION

For both new and existing structures, the Project Planning Team will develop and provide the design criteria, which will include the Level of Protection, as determined by UFC 4-020-01. This LOP is used to define the corresponding level of progressive collapse design for new and existing construction as detailed in Section 2-1. Additional design requirements common to all construction types and all Levels of Protection are given in Section 2-2.

Chapter 3 "Design Strategies" provides the general requirements for applying the Tie Forces (TF) and Alternate Path (AP) approaches. The overall techniques for both the TF and AP approaches are the same for each construction type, but the details vary with material type. Chapters 4 through 8 provide the material specific design requirements. Finally, Appendix B provides insight into the development of these approaches.

2-1 DESIGN REQUIREMENTS FOR NEW AND EXISTING CONSTRUCTION.

The details of the design requirements for each LOP for new and existing construction are provided in the following sub-paragraphs.

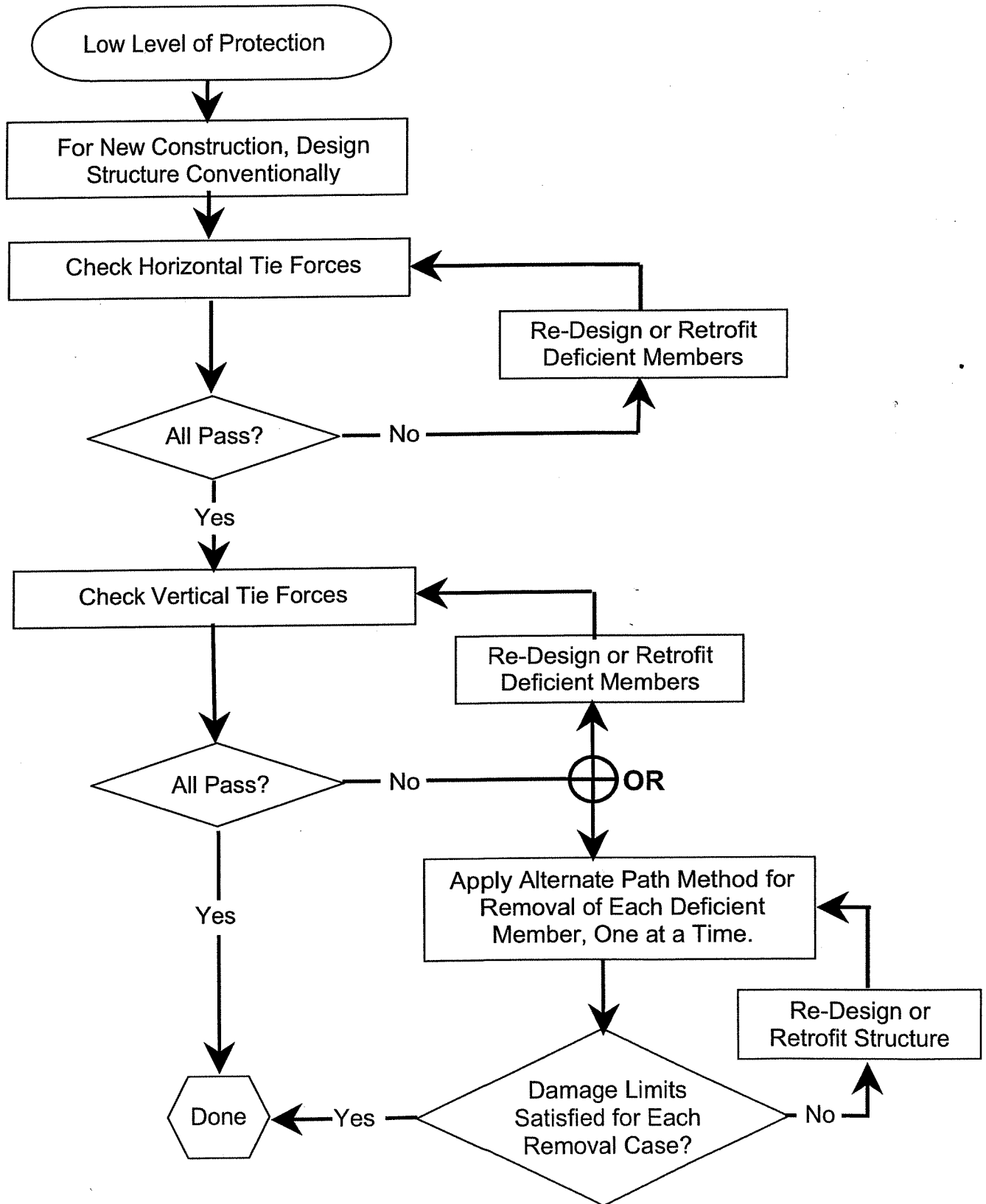
2-1.1 Very Low Level of Protection Design Requirement.

A structure with Very Low Level of Protection must provide adequate horizontal tie force capacity. The magnitudes of the horizontal tie forces vary with construction type and with location in the structure, as specified in Chapters 4 through 8. The designer cannot use the Alternate Path method to verify that the structure can bridge over an element with inadequate capacity. If a structural element does not provide the required horizontal tie force capacity, it must be re-designed in the case of new construction or retrofitted in the case of existing construction. This procedure is illustrated in the flowchart in Figure 2-1.

2-1.2 Low Level of Protection Design Requirement.

The design of a structure with a Low Level of Protection must incorporate both horizontal and vertical tie force capacities. However, if a vertical structural member cannot provide the required vertical tie force capacity, the designer must either re-design the member or use the AP method to prove that the structure can bridge over the element when it is removed. For elements with inadequate horizontal tie force capacity, the Alternate Path method cannot be used. In this case, the designer must re-design the element in the case of new construction or retrofit the element in the case of existing construction. This procedure is illustrated in the flowchart in Figure 2-2. The magnitudes and locations of each tie force vary with construction type, as shown in Chapters 4 through 8.

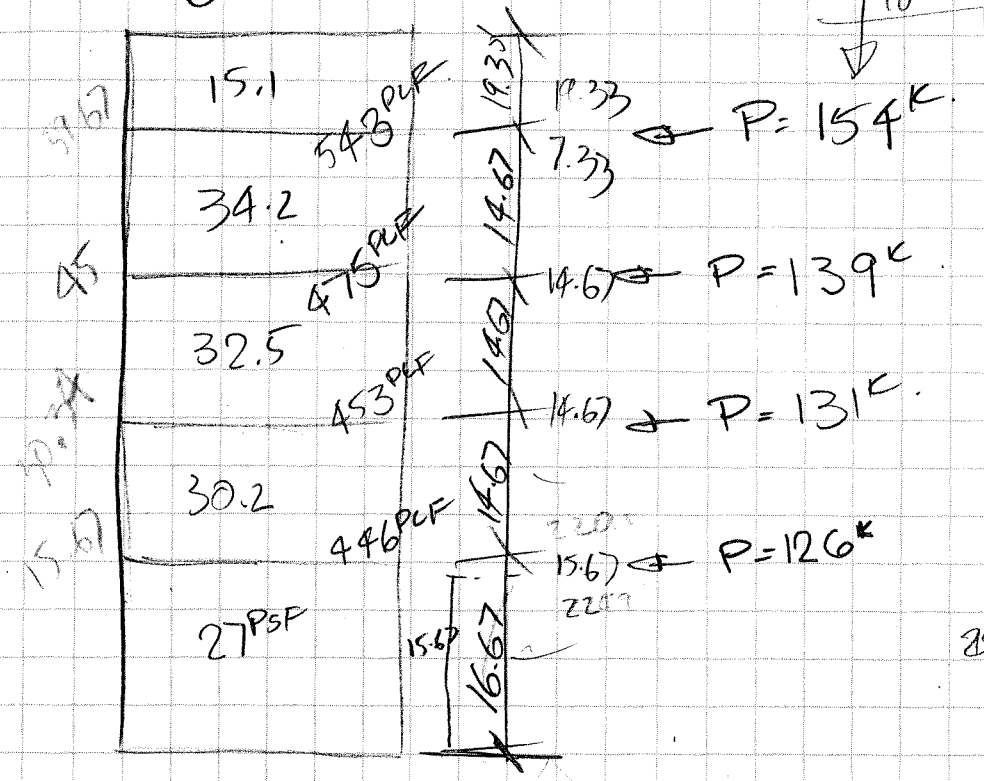
Figure 2-2 Design Process for LLOP in New and Existing Construction



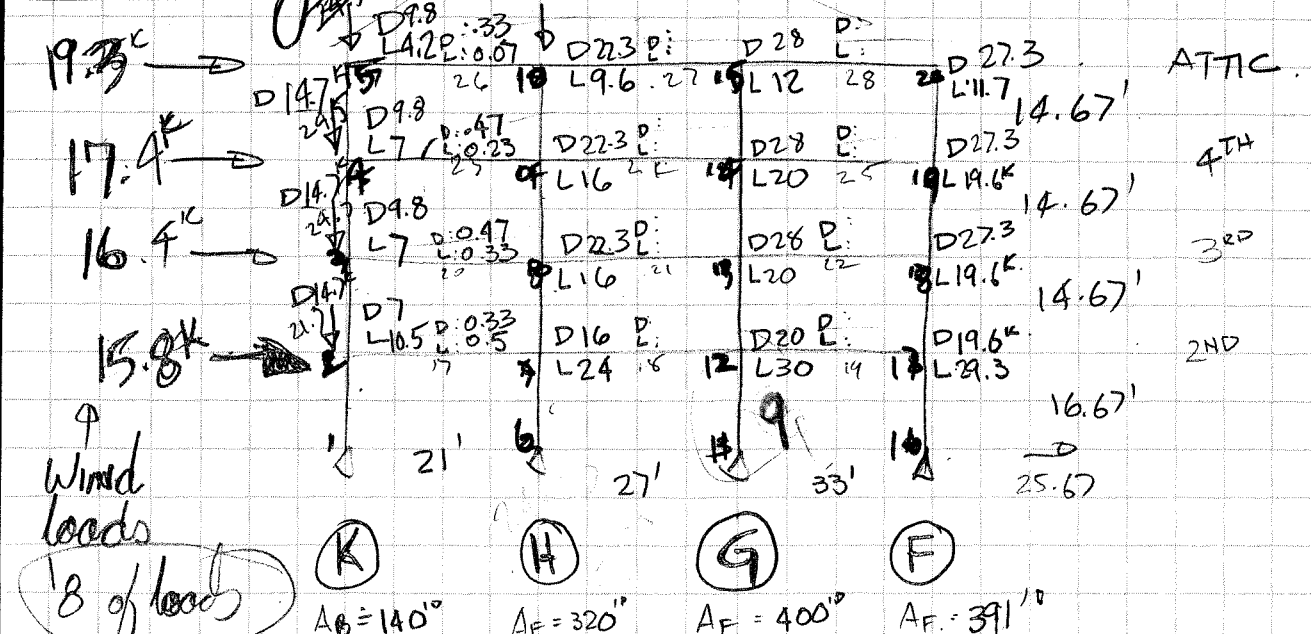
51

N-S
 Total Bldg width = 284' ±

Total floor loads
 ↓



Frame along 11



<p>Wind loads 8 of loads</p>	<p>(K) $A_B = 140''$</p>	<p>(H) $A_F = 320''$</p>	<p>(G) $A_F = 400''$</p>	<p>(F) $A_F = 391''$</p>
<p>$A_F = 10.5 \times 20 = 210''$</p>	<p>JLS</p>	<p>3-16-06</p>	<p>5V</p>	

I-7 Frame Design Along Line 3

Prepared by:

Morphy, Makofsky, Inc.

(27 pages follow)


```

*****
*                               *
*      STAAD.Pro                 *
*      Version 2003   Bld 1002.US *
*      Proprietary Program of    *
*      Research Engineers, Intl.  *
*      Date=   MAR 16, 2006      *
*      Time=   16:47:38         *
*                               *
*      USER ID: morphy makofsky inc *
*****

```

1. STAAD PLANE
2. START JOB INFORMATION
3. ENGINEER DATE 16-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 15.67 0; 3 0 30.33 0; 4 0 45 0; 5 0 59.67 0; 6 21 0 0
9. 7 21 15.67 0; 8 21 30.33 0; 9 21 45 0; 10 21 59.67 0; 11 48 0 0; 12 48 15.67 0
10. 13 48 30.33 0; 14 48 45 0; 15 48 59.67 0; 16 81 0 0; 17 81 15.67 0
11. 18 81 30.33 0; 19 81 45 0; 20 81 59.67 0
12. MEMBER INCIDENCES
13. 1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 6 7; 6 7 8; 7 8 9; 8 9 10; 9 11 12; 10 12 13
14. 11 13 14; 12 14 15; 13 16 17; 14 17 18; 15 18 19; 16 19 20; 17 2 7; 18 7 12
15. 19 12 17; 20 3 8; 21 8 13; 22 13 18; 23 4 9; 24 9 14; 25 14 19; 26 5 10
16. 27 10 15; 28 15 20
17. DEFINE MATERIAL START
18. ISOTROPIC STEEL
19. E 4.176E+006
20. POISSON 0.3
21. DENSITY 0.489024
22. ALPHA 6.5E-006
23. DAMP 0.03
24. END DEFINE MATERIAL
25. CONSTANTS
26. MATERIAL STEEL MEMB 1 TO 28
27. MEMBER PROPERTY AMERICAN
28. 1 TO 4 TABLE ST W14X61
29. 5 TO 8 13 TO 16 TABLE ST W18X76
30. 9 TO 12 TABLE ST W18X76
31. 17 20 23 TABLE ST W21X44
32. 18 19 TABLE ST W24X55
33. 21 22 24 25 TABLE ST W24X55
34. 26 TABLE ST W16X31
35. 27 28 TABLE ST W18X35
36. SUPPORTS
37. 1 6 11 16 FIXED
38. LOAD 1 DEAD LOAD
39. JOINT LOAD
40. 3 4 FY -24.5
41. 5 FY -9.8

53

STAAD PLANE

-- PAGE NO. 2

42. 2 FY -21.7
43. 8 TO 10 FY -22.3
44. 13 TO 15 FY -28
45. 18 TO 20 FY -27.3
46. 7 FY -16
47. 12 FY -20
48. 17 FY -19.6
49. MEMBER LOAD
50. 17 TO 19 26 TO 28 UNI GY -0.33
51. 20 TO 25 UNI GY -0.47
52. LOAD 2 LIVE LOAD
53. JOINT LOAD
54. 3 4 FY -7
55. 5 FY -4.2
56. 2 FY -10.5
57. 8 9 FY -16
58. 10 FY -9.6
59. 13 14 FY -20
60. 15 FY -12
61. 18 19 FY -19.6
62. 20 FY 11.7
63. 7 FY -24
64. 12 FY -30
65. 17 FY -29.3
66. MEMBER LOAD
67. 17 TO 19 UNI GY -0.5
68. 26 TO 28 UNI GY -0.07
69. 20 TO 22 UNI GY -0.33
70. 23 TO 25 UNI GY -0.23
71. LOAD 3 WIND
72. JOINT LOAD
73. 2 FX 15.8
74. 3 FX 16.4
75. 4 FX 17.4
76. 5 FX 19.3
77. LOAD COMB 4 DEAD LIVE
78. 1 1.0 2 0.7
79. LOAD COMB 5 DEAD LIVE WIND
80. 1 1.0 2 0.53 3 0.75
81. LOAD COMB 6 DEAD WIND
82. 1 0.6 3 1.0
83. LOAD COMB 7 DEAD LIVE -WIND
84. 1 1.0 2 0.53 3 -0.75
85. PERFORM ANALYSIS

54

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

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 20/ 28/ 4
ORIGINAL/FINAL BAND-WIDTH= 5/ 5/ 15 DOF
TOTAL PRIMARY LOAD CASES = 3, TOTAL DEGREES OF FREEDOM = 48
SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
REQRD/AVAIL. DISK SPACE = 12.1/ 25412.9 MB, EXMEM = 1664.4 MB

86. PRINT SUPPORT REACTION ALL

55

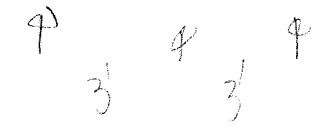
SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	1	0.34	96.34	0.00	0.00	0.00	-1.92
	2	0.61	40.48	0.00	0.00	0.00	-3.30
	3	-10.29	-28.06	0.00	0.00	0.00	101.74
	4	0.77	124.67	0.00	0.00	0.00	-4.23
	5	-7.05	96.74	0.00	0.00	0.00	72.64
	6	-10.09	29.74	0.00	0.00	0.00	100.59
	7	8.39	138.84	0.00	0.00	0.00	-79.97
6	1	0.25	122.32	0.00	0.00	0.00	-1.62
	2	0.39	92.69	0.00	0.00	0.00	-2.38
	3	-21.11	1.35	0.00	0.00	0.00	206.04
	4	0.52	187.20	0.00	0.00	0.00	-3.29
	5	-15.37	172.45	0.00	0.00	0.00	151.65
	6	-20.96	74.74	0.00	0.00	0.00	205.07
	7	16.28	170.44	0.00	0.00	0.00	-157.42
11	1	0.35	152.48	0.00	0.00	0.00	-2.03
	2	0.58	116.11	0.00	0.00	0.00	-3.20
	3	-21.24	6.25	0.00	0.00	0.00	205.48
	4	0.76	233.76	0.00	0.00	0.00	-4.27
	5	-15.27	218.71	0.00	0.00	0.00	150.38
	6	-21.02	97.74	0.00	0.00	0.00	204.26
	7	16.59	209.33	0.00	0.00	0.00	-157.83
16	1	-0.94	127.36	0.00	0.00	0.00	4.43
	2	-1.58	75.34	0.00	0.00	0.00	7.37
	3	-16.27	20.46	0.00	0.00	0.00	180.48
	4	-2.05	180.11	0.00	0.00	0.00	9.59
	5	-13.98	182.64	0.00	0.00	0.00	143.69
	6	-16.83	96.88	0.00	0.00	0.00	183.14
	7	10.42	151.95	0.00	0.00	0.00	-127.02

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

87. PRINT MAXFORCE ENVELOPE NSECTION 12 LIST 1 TO 28

6 PA



$9 \times 4 = 36$
 $8 \times 14 = 112$

$\frac{F}{b} = \frac{M}{I}$
 $\frac{209}{b} = \frac{157 \times 3}{300 \times 36}$ / OK

34.83 ± 13 48"
 $\frac{96 \pm 183 \times 3}{6} = \frac{183 \times 3}{6}$ need 18"
 16 ± 15.25 floor leads

31, 0 / OK

no torsion
 66

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	10.29	0.00	3	101.74	0.00	3			
	0.00	0.00	1	0.00	0.00	1	138.84 C	0.00	7
	-8.39	15.67	7	-79.97	0.00	7			
MIN	0.00	15.67	7	0.00	15.67	7	28.06 T	15.67	3
	7.78	0.00	3	55.26	14.66	7			
	0.00	0.00	1	0.00	0.00	1	97.74 C	0.00	7
2 MAX	0.00	14.66	7	-60.55	14.66	3			
	-7.18	14.66	7	0.00	14.66	7	17.44 T	14.66	3
	0.00	14.66	7	0.00	14.66	7			
3 MAX	5.39	0.00	3	43.22	14.67	7			
	0.00	0.00	1	0.00	0.00	1	56.35 C	0.00	7
	-5.35	14.67	7	-45.05	14.67	3			
MIN	0.00	14.67	7	0.00	14.67	7	8.51 T	14.67	3
	3.09	0.00	3	29.77	14.67	7			
	0.00	0.00	1	0.00	0.00	1	17.48 C	0.00	7
4 MAX	-3.72	14.67	7	-24.87	0.00	7			
	0.00	14.67	7	0.00	14.67	7	2.35 T	14.67	3
	0.00	14.67	7	0.00	14.67	7			
5 MAX	21.11	0.00	3	206.04	0.00	3			
	0.00	0.00	1	0.00	0.00	1	187.20 C	0.00	4
	-16.28	15.67	7	-157.42	0.00	7			
MIN	0.00	15.67	7	0.00	15.67	7	1.35 C	15.67	3
	17.35	0.00	3	121.19	0.00	3			
	0.00	0.00	1	0.00	0.00	1	137.79 C	0.00	4
6 MAX	-13.90	14.66	7	-133.14	14.66	3			
	0.00	14.66	7	0.00	14.66	7	0.72 C	14.66	3
	0.00	14.66	7	0.00	14.66	7			
7 MAX	12.07	0.00	3	82.30	14.67	7			
	0.00	0.00	1	0.00	0.00	1	87.17 C	0.00	4
	-10.05	14.67	7	-99.77	14.67	3			
MIN	0.00	14.67	7	0.00	14.67	7	0.46 C	14.67	3
	6.67	0.00	3	47.01	14.67	7			
	0.00	0.00	1	0.00	0.00	1	38.26 C	0.00	4
8 MAX	-6.02	14.67	7	-52.25	14.67	3			
	0.00	14.67	7	0.00	14.67	7	0.30 C	14.67	3
	0.00	14.67	7	0.00	14.67	7			
9 MAX	21.24	0.00	3	205.48	0.00	3			
	0.00	0.00	1	0.00	0.00	1	233.76 C	0.00	4
	0.00	0.00	1	0.00	0.00	1			

57

STAAD PLANE

-- PAGE NO. 6

MIN	-16.59	15.67	7	-157.83	0.00	7				
	0.00	15.67	7	0.00	15.67	7	6.25 C	15.67	3	
10 MAX	18.30	0.00	3	128.93	0.00	3				
	0.00	0.00	1	0.00	0.00	1	171.94 C	0.00	4	
MIN	-15.10	14.66	7	-139.30	14.66	3				
	0.00	14.66	7	0.00	14.66	7	4.08 C	14.66	3	
11 MAX	12.70	0.00	3	86.76	14.67	7				
	0.00	0.00	1	0.00	0.00	1	108.74 C	0.00	4	
MIN	-10.70	14.67	7	-104.54	14.67	3				
	0.00	14.67	7	0.00	14.67	7	2.02 C	14.67	3	
12 MAX	6.76	0.00	3	49.41	14.67	7				
	0.00	0.00	1	0.00	0.00	1	47.83 C	0.00	4	
MIN	-6.42	14.67	7	-51.78	14.67	3				
	0.00	14.67	7	0.00	14.67	7	0.55 C	14.67	3	
13 MAX	16.83	0.00	6	183.14	0.00	6				
	0.00	0.00	1	0.00	0.00	1	182.64 C	0.00	5	
MIN	-10.42	15.67	7	-127.02	0.00	7				
	0.00	15.67	7	0.00	15.67	7	20.46 C	15.67	3	
14 MAX	11.05	0.00	6	72.73	0.00	5				
	0.00	0.00	1	0.00	0.00	1	132.09 C	0.00	5	
MIN	-3.64	14.66	7	-91.35	14.66	6				
	0.00	14.66	7	0.00	14.66	7	12.65 C	14.66	3	
15 MAX	8.38	0.00	5	51.19	0.00	5				
	0.00	0.00	1	0.00	0.00	1	78.97 C	0.00	5	
MIN	-1.43	14.67	7	-73.84	14.67	6				
	0.00	14.67	7	0.00	14.67	7	6.03 C	14.67	3	
16 MAX	5.85	0.00	5	36.27	0.00	5				
	0.00	0.00	1	0.00	0.00	1	32.63 C	0.00	1	
MIN	1.12	14.67	2	-49.50	14.67	5				
	0.00	14.67	7	0.00	14.67	7	10.48 T	14.67	2	
17 MAX	13.84	0.00	7	118.40	21.00	6				
	0.00	0.00	1	0.00	0.00	1	13.29 C	0.00	3	
MIN	-14.59	21.00	5	-113.03	0.00	3				
	0.00	21.00	7	0.00	21.00	7	10.64 T	21.00	7	
18 MAX	15.42	0.00	7	146.28	27.00	6				
	0.00	0.00	1	0.00	0.00	1	9.53 C	0.00	3	
MIN	-15.63	27.00	5	-135.84	0.00	3				
	0.00	27.00	7	0.00	27.00	7	8.26 T	27.00	7	
19 MAX	15.94	0.00	7	151.25	33.00	6				
	0.00	0.00	1	0.00	0.00	1	6.59 C	0.00	3	
MIN	-15.42	33.00	5	-122.25	0.00	3				
	0.00	33.00	7	0.00	33.00	7	6.78 T	33.00	7	
20 MAX	13.18	0.00	7	104.58	21.00	6				
	0.00	0.00	1	0.00	0.00	1	14.01 C	0.00	3	

58

STAAD PLANE							-- PAGE NO. 7			
MIN	-13.76	21.00	5	-94.63	0.00	3	10.47 T	21.00	7	
	0.00	21.00	7	0.00	21.00	7				
21 MAX	15.22	0.00	7	133.79	27.00	6	8.73 C	0.00	3	
	0.00	0.00	1	0.00	0.00	1				
MIN	-15.20	27.00	5	-117.55	0.00	3	6.62 T	27.00	7	
	0.00	27.00	7	0.00	27.00	7				
22 MAX	15.78	0.00	7	137.87	33.00	5	3.13 C	0.00	3	
	0.00	0.00	1	0.00	0.00	1				
MIN	-15.43	33.00	5	-104.47	0.00	3	2.21 T	33.00	7	
	0.00	33.00	7	0.00	33.00	7				
23 MAX	10.65	0.00	7	75.27	21.00	6	15.10 C	0.00	3	
	0.00	0.00	1	0.00	0.00	1				
MIN	-11.02	21.00	5	-65.54	0.00	3	11.42 T	21.00	7	
	0.00	21.00	7	0.00	21.00	7				
24 MAX	12.58	0.00	7	98.42	0.00	7	9.70 C	0.00	3	
	0.00	0.00	1	0.00	0.00	1				
MIN	-12.40	27.00	5	-81.59	0.00	3	7.39 T	27.00	7	
	0.00	27.00	7	0.00	27.00	7				
25 MAX	13.24	0.00	7	108.06	33.00	5	3.77 C	0.00	3	
	0.00	0.00	1	0.00	0.00	1				
MIN	-13.08	33.00	5	-71.48	0.00	3	3.11 T	33.00	7	
	0.00	33.00	7	0.00	33.00	7				
26 MAX	5.46	0.00	7	32.94	21.00	5	16.90 C	0.00	6	
	0.00	0.00	1	0.00	0.00	1				
MIN	-5.78	21.00	5	-24.84	0.00	3	10.75 T	21.00	7	
	0.00	21.00	7	0.00	21.00	7				
27 MAX	6.49	0.00	7	43.18	27.00	5	10.70 C	0.00	6	
	0.00	0.00	1	0.00	0.00	1				
MIN	-6.50	27.00	5	-27.68	0.00	3	4.73 T	27.00	7	
	0.00	27.00	7	0.00	27.00	7				
28 MAX	7.26	0.00	7	51.04	0.00	7	5.85 C	0.00	5	
	0.00	0.00	1	0.00	0.00	1				
MIN	-7.10	33.00	5	-24.08	0.00	3	1.12 C	33.00	2	
	0.00	33.00	7	0.00	33.00	7				

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

88. PRINT JOINT DISPLACEMENTS LIST 2 TO 5 17 TO 20

59

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
2	1	-0.00265	-0.03490	0.00000	0.00000	0.00000	-0.00009
2	2	-0.00296	-0.01466	0.00000	0.00000	0.00000	-0.00018
3	0.58181	0.01017	0.00000	0.00000	0.00000	0.00000	-0.00257
4	-0.00472	-0.04516	0.00000	0.00000	0.00000	0.00000	-0.00022
5	0.43214	-0.03504	0.00000	0.00000	0.00000	0.00000	-0.00211
6	0.58022	-0.01077	0.00000	0.00000	0.00000	0.00000	-0.00262
7	-0.44058	-0.05029	0.00000	0.00000	0.00000	0.00000	0.00173
3	1	-0.00565	-0.05909	0.00000	0.00000	0.00000	-0.00013
2	-0.00446	-0.02314	0.00000	0.00000	0.00000	0.00000	-0.00011
3	1.21164	0.01608	0.00000	0.00000	0.00000	0.00000	-0.00216
4	-0.00877	-0.07529	0.00000	0.00000	0.00000	0.00000	-0.00021
5	0.90072	-0.05930	0.00000	0.00000	0.00000	0.00000	-0.00181
6	1.20825	-0.01938	0.00000	0.00000	0.00000	0.00000	-0.00224
7	-0.91674	-0.08341	0.00000	0.00000	0.00000	0.00000	0.00144
4	1	-0.00950	-0.07343	0.00000	0.00000	0.00000	-0.00012
2	-0.00520	-0.02807	0.00000	0.00000	0.00000	0.00000	-0.00010
3	1.68628	0.01896	0.00000	0.00000	0.00000	0.00000	-0.00154
4	-0.01314	-0.09307	0.00000	0.00000	0.00000	0.00000	-0.00019
5	1.25245	-0.07408	0.00000	0.00000	0.00000	0.00000	-0.00133
6	1.68058	-0.02509	0.00000	0.00000	0.00000	0.00000	-0.00161
7	-1.27696	-0.10252	0.00000	0.00000	0.00000	0.00000	0.00098
5	1	-0.01051	-0.07786	0.00000	0.00000	0.00000	-0.00023
2	-0.00370	-0.02977	0.00000	0.00000	0.00000	0.00000	-0.00007
3	2.02081	0.01976	0.00000	0.00000	0.00000	0.00000	-0.00129
4	-0.01310	-0.09869	0.00000	0.00000	0.00000	0.00000	-0.00028
5	1.50313	-0.07881	0.00000	0.00000	0.00000	0.00000	-0.00124
6	2.01450	-0.02695	0.00000	0.00000	0.00000	0.00000	-0.00143
7	-1.52807	-0.10845	0.00000	0.00000	0.00000	0.00000	0.00070
17	1	-0.00066	-0.03703	0.00000	0.00000	0.00000	0.00017
2	-0.00150	-0.02191	0.00000	0.00000	0.00000	0.00000	0.00029
3	0.56080	-0.00595	0.00000	0.00000	0.00000	0.00000	-0.00310
4	-0.00171	-0.05237	0.00000	0.00000	0.00000	0.00000	0.00038
5	0.41915	-0.05311	0.00000	0.00000	0.00000	0.00000	-0.00200
6	0.56041	-0.02817	0.00000	0.00000	0.00000	0.00000	-0.00300
7	-0.42205	-0.04418	0.00000	0.00000	0.00000	0.00000	0.00266
18	1	-0.00513	-0.06490	0.00000	0.00000	0.00000	0.00024
2	-0.00564	-0.03225	0.00000	0.00000	0.00000	0.00000	0.00015
3	1.19361	-0.00939	0.00000	0.00000	0.00000	0.00000	-0.00257
4	-0.00907	-0.08748	0.00000	0.00000	0.00000	0.00000	0.00034
5	0.88709	-0.08904	0.00000	0.00000	0.00000	0.00000	-0.00162
6	1.19054	-0.04833	0.00000	0.00000	0.00000	0.00000	-0.00243
7	-0.90332	-0.07495	0.00000	0.00000	0.00000	0.00000	0.00224
19	1	-0.00868	-0.08330	0.00000	0.00000	0.00000	0.00021
2	-0.00601	-0.03579	0.00000	0.00000	0.00000	0.00000	0.00012
3	1.66632	-0.01103	0.00000	0.00000	0.00000	0.00000	-0.00177
4	-0.01288	-0.10835	0.00000	0.00000	0.00000	0.00000	0.00029
5	1.23788	-0.11054	0.00000	0.00000	0.00000	0.00000	-0.00105
6	1.66111	-0.06101	0.00000	0.00000	0.00000	0.00000	-0.00164

60

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
	7	-1.26160	-0.09399	0.00000	0.00000	0.00000	0.00160
20	1	-0.01790	-0.09218	0.00000	0.00000	0.00000	0.00039
	2	-0.00665	-0.03294	0.00000	0.00000	0.00000	0.00006
	3	1.99134	-0.01144	0.00000	0.00000	0.00000	-0.00149
	4	-0.02256	-0.11523	0.00000	0.00000	0.00000	0.00044
	5	1.47208	-0.11821	0.00000	0.00000	0.00000	-0.00069
	6	1.98060	-0.06675	0.00000	0.00000	0.00000	-0.00125
	7	-1.51493	-0.10105	0.00000	0.00000	0.00000	0.00154

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

89. PRINT SECTION MAX DISPL NSECT 12 LIST 1 TO 28

61

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.07707	62.68	6	2439
2	0.02444	131.94	3	7198
3	0.02269	132.03	3	7758
4	0.01315	132.03	7	13382
5	0.07226	62.68	6	2602
6	0.02452	131.94	3	7173
7	0.02352	132.03	3	7484
8	0.01035	132.03	3	17007
9	0.07070	62.68	6	2659
10	0.02486	131.94	3	7077
11	0.02434	132.03	3	7231
12	0.00946	132.03	3	18608
13	0.08213	62.68	3	2289
14	0.02154	131.94	6	8167
15	0.02251	117.36	6	7819
16	0.01244	132.03	5	14150
17	0.06429	63.00	6	3919
18	0.07683	81.00	6	4217
19	0.16707	264.00	7	2370
20	0.05609	63.00	6	4493
21	0.06913	81.00	6	4686
22	0.15355	264.00	7	2578
23	0.04131	63.00	6	6099
24	0.05276	108.00	5	6141
25	0.12346	264.00	7	3207
26	0.04605	84.00	5	5472
27	0.06662	216.00	7	4863
28	0.17232	231.00	7	2298

***** END OF SECT DISPL RESULTS *****

90. PARAMETER
 91. CODE AISC
 92. BEAM 1 ALL
 93. FYLD 7200 ALL
 94. UNB 6 MEMB 17 TO 28
 95. UNT 1 MEMB 17 TO 28
 96. LY 2 MEMB 17 TO 28
 97. LZ 2 MEMB 17 TO 28
 98. LX 2 MEMB 17 TO 28
 99. CHECK CODE ALL

62

STAAD.Pro CODE CHECKING - (AISC)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W14 X61	PASS 138.84 C	AISC- H1-1 0.00	0.710 -79.97	7 0.00
2	ST W14 X61	PASS 97.74 C	AISC- H1-1 0.00	0.476 55.26	7 14.66
3	ST W14 X61	PASS 56.35 C	AISC- H1-1 0.00	0.316 43.22	7 14.67
4	ST W14 X61	PASS 17.48 C	AISC- H1-3 0.00	0.177 29.77	7 14.67
5	ST W18 X76	PASS 170.44 C	AISC- H1-1 0.00	0.797 -157.42	7 0.00
6	ST W18 X76	PASS 127.63 C	AISC- H1-1 0.00	0.537 106.57	7 14.66
7	ST W18 X76	PASS 81.27 C	AISC- H1-1 0.00	0.377 82.30	7 14.67
8	ST W18 X76	PASS 36.13 C	AISC- H1-3 0.00	0.213 47.01	7 14.67
9	ST W18 X76	PASS 218.71 C	AISC- H1-1 0.00	0.887 150.38	5 0.00
10	ST W18 X76	PASS 156.86 C	AISC- H1-1 0.00	0.620 114.44	7 14.66
11	ST W18 X76	PASS 100.28 C	AISC- H1-1 0.00	0.429 86.76	7 14.67
12	ST W18 X76	PASS 45.04 C	AISC- H1-3 0.00	0.239 49.41	7 14.67
13	ST W18 X76	PASS 182.64 C	AISC- H1-1 0.00	0.787 143.69	5 0.00
14	ST W18 X76	PASS 132.09 C	AISC- H1-1 0.00	0.496 -86.67	5 14.66
15	ST W18 X76	PASS 78.97 C	AISC- H1-1 0.00	0.346 -71.78	5 14.67
16	ST W18 X76	PASS 28.20 C	AISC- H1-3 0.00	0.204 -49.50	5 14.67
17	ST W21 X44	PASS 13.00 C	AISC- H1-3 0.00	0.617 118.40	6 21.00
18	ST W24 X55	PASS 9.06 C	AISC- H1-3 0.00	0.530 146.28	6 27.00
19	ST W24 X55	PASS 5.78 C	AISC- H1-3 0.00	0.541 151.25	6 33.00
20	ST W21 X44	PASS 13.95 C	AISC- H1-3 0.00	0.552 104.58	6 21.00
21	ST W24 X55	PASS 8.57 C	AISC- H1-3 0.00	0.486 133.79	6 27.00

63

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
22	ST W24 X55	PASS 2.49 C	AISC- H1-3 0.00	0.487 137.87	5 33.00
23	ST W21 X44	PASS 14.97 C	AISC- H1-3 0.00	0.411 75.27	6 21.00
24	ST W24 X55	PASS 9.53 C	AISC- H1-3 0.00	0.359 96.98	6 27.00
25	ST W24 X55	PASS 2.54 C	AISC- H1-3 0.00	0.383 108.06	5 33.00
26	ST W16 X31	PASS 16.90 C	AISC- H1-3 0.00	0.353 32.78	6 21.00
27	ST W18 X35	PASS 9.57 C	AISC- H1-3 0.00	0.338 43.18	5 27.00
28	ST W18 X35	PASS 5.85 C	AISC- H1-3 0.00	0.369 49.50	5 33.00

100. FINISH

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

**** DATE= MAR 16,2006 TIME= 16:47:39 ****

 * For questions on STAAD.Pro, please contact : *
 * By Email - North America : support@reiusa.com *
 * By Email - International : support@reiworld.com *
 * Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

64

2ND FL.

4^{3/4}" floor typ.
locker rooms

D
L

Locker
50
75.

Meck
D 50
L 150

3RD

office

D
L

70
50

4^{TR}

OFFICE

D
L

70
50

ATTIC

D
L

50
10

Roof

D
L

20
20

EXTERIOR wall

Brick 40

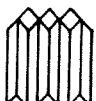
STUDS + sheath 10

DL. 50 PSF

JLS

3-16-06

65



Live load reduction

$$R = r(A - 150) \quad \text{or} \quad R = 23.1 \left(1 + \frac{D}{L_0} \right) \text{ (if)}$$

K-11

$$A = 140 \times 4 \\ = 560' \text{ } ^{17}$$

$$= 23.1 \left(1 + \frac{50}{75} \right) \\ = 38.6$$

max product

$$R = 0.08 \left(560 - 150 \right) \\ = \underline{\underline{32.8}}$$

$$K \leq 0.672$$

H-11

$$A_{IFUR} = 320' \quad A_T = 1280$$

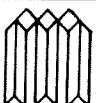
$$R = 0.08(1280 - 150) = 90.4$$

\Rightarrow max 38.6

$$\therefore K = 0.614$$

in model use 0.7 factor
(STAAD)

66



Frame along 3

$$AB = 460^{10}$$

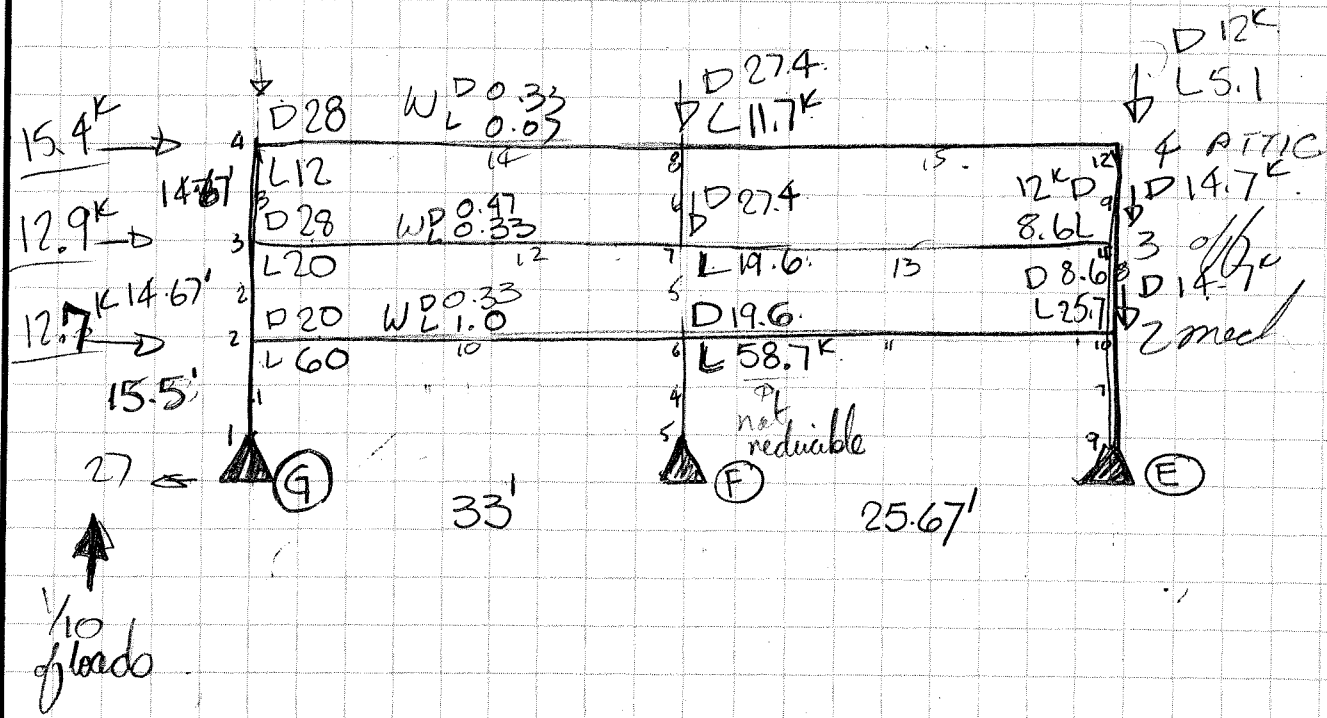
$$13.33 \cdot 29.33$$

$$AB = 391^{10}$$

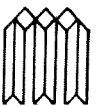
$$else$$

$$AB = 171^{10}$$

42/5
width
28.4'
frame



	JLS	3-16-06	67



```

*****
*
*          STAAD.Pro          *
*          Version 2003   Bld 1002.US   *
*          Proprietary Program of      *
*          Research Engineers, Intl.    *
*          Date=   MAR 17, 2006        *
*          Time=   13:23:28            *
*
*          USER ID: morphy makofsky inc *
*****

```

1. STAAD PLANE
2. START JOB INFORMATION
3. ENGINEER DATE 17-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 15.5 0; 3 0 30.17 0; 4 0 44.84 0; 5 33 0 0; 6 33 15.5 0
9. 7 33 30.17 0; 8 33 44.84 0; 9 58.67 0 0; 10 58.67 15.5 0; 11 58.67 30.17 0
10. 12 58.67 44.84 0
11. MEMBER INCIDENCES
12. 1 1 2; 2 2 3; 3 3 4; 4 5 6; 5 6 7; 6 7 8; 7 9 10; 8 10 11; 9 11 12; 10 2 6
13. 11 6 10; 12 3 7; 13 7 11; 14 4 8; 15 8 12
14. DEFINE MATERIAL START
15. ISOTROPIC STEEL
16. E 4.176E+006
17. POISSON 0.3
18. DENSITY 0.489024
19. ALPHA 6.5E-006
20. DAMP 0.03
21. END DEFINE MATERIAL
22. CONSTANTS
23. MATERIAL STEEL MEMB 1 TO 15
24. MEMBER PROPERTY AMERICAN
25. 1 TO 6 TABLE ST W18X76
26. 7 TO 9 TABLE ST W14X61
27. 10 12 TABLE ST W24X55
28. 11 13 TABLE ST W21X44
29. 14 TABLE ST W21X44
30. 15 TABLE ST W18X40
31. SUPPORTS
32. 1 5 9 FIXED
33. LOAD 1 DEAD
34. JOINT LOAD
35. 4 FY -28
36. 3 FY -28
37. 2 FY -20
38. 7 8 FY -27.4
39. 6 FY -19.6
40. 10 FY -23.1
41. 11 FY -26.7

68

42. 12 FY -12
 43. MEMBER LOAD
 44. 10 11 14 15 UNI GY -0.33
 45. 12 13 UNI GY -0.47
 46. LOAD 2 LIVE
 47. JOINT LOAD
 48. 4 FY -12
 49. 3 FY -20
 50. 2 FY -60
 51. 7 FY -19.6
 52. 8 FY -11.7
 53. 6 FY -58.7
 54. 10 FY -25.7
 55. 11 FY -8.6
 56. 12 FY -5.1
 57. MEMBER LOAD
 58. 10 11 UNI GY -1.
 59. 12 13 UNI GY -0.33
 60. 14 15 UNI GY -0.07
 61. LOAD 3 WIND
 62. JOINT LOAD
 63. 4 FX 15.4
 64. 3 FX 12.9
 65. 2 FX 12.7
 66. LOAD COMB 4 DEAD LIVE
 67. 1 1.0 2 1.0
 68. LOAD COMB 5 DAD LIVE WIND
 69. 1 1.0 2 0.75 3 0.75
 70. LOAD COMB 6 DEAD LIVE -WIND
 71. 2 0.75 3 -0.75 1 1.0
 72. LOAD COMB 7 DEAD WIND
 73. 3 1.0 1 0.6
 74. LOAD COMB 8 DEAD -WIND
 75. 1 0.6 3 -1.0
 76. PERFORM ANALYSIS

PROBLEM STATISTICS

 NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 12/ 15/ 3
 ORIGINAL/FINAL BAND-WIDTH= 4/ 4/ 12 DOF
 TOTAL PRIMARY LOAD CASES = 3, TOTAL DEGREES OF FREEDOM = 27
 SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
 REQD/AVAIL. DISK SPACE = 12.0/ 25388.9 MB, EXMEM = 1616.3 MB

77. PDELTA 2 ANALYSIS
 ++ Adjusting Displacements 13:23:28
 ++ Adjusting Displacements 13:23:28

69

78. PRINT MAXFORCE ENVELOPE NSECTION 30 LIST 1 TO 15

70

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	14.92	0.00	3	162.07	0.00	3			
	0.00	0.00	1	0.00	0.00	1	208.53 C	0.00	4
MIN	-15.48	15.50	8	-164.54	0.00	8			
	0.00	15.50	8	0.00	15.50	8	14.83 T	15.50	3
2 MAX	8.47	0.00	3	87.14	14.67	6			
	0.00	0.00	1	0.00	0.00	1	107.34 C	0.00	4
MIN	-11.53	14.67	6	-82.07	0.00	6			
	0.00	14.67	8	0.00	14.67	8	7.84 T	14.67	3
3 MAX	4.08	0.00	3	59.39	14.67	6			
	0.00	0.00	1	0.00	0.00	1	46.41 C	0.00	4
MIN	-6.81	14.67	6	-40.57	14.67	3			
	0.00	14.67	8	0.00	14.67	8	2.36 T	14.67	3
4 MAX	17.98	0.00	7	175.97	0.00	7			
	0.00	0.00	1	0.00	0.00	1	241.53 C	0.00	4
MIN	-17.51	15.50	8	-173.10	0.00	8			
	0.00	15.50	8	0.00	15.50	8	0.54 C	15.50	3
5 MAX	14.33	0.00	7	104.18	14.67	8			
	0.00	0.00	1	0.00	0.00	1	122.26 C	0.00	4
MIN	-13.22	14.67	8	-112.46	14.67	7			
	0.00	14.67	8	0.00	14.67	8	0.13 C	14.67	3
6 MAX	8.60	0.00	7	62.30	14.67	8			
	0.00	0.00	1	0.00	0.00	1	51.27 C	0.00	4
MIN	-7.05	14.67	8	-74.51	14.67	7			
	0.00	14.67	8	0.00	14.67	8	0.09 T	14.67	3
7 MAX	8.65	0.00	7	85.51	0.00	7			
	0.00	0.00	1	0.00	0.00	1	131.98 C	0.00	4
MIN	-8.01	15.50	8	-82.03	0.00	8			
	0.00	15.50	8	0.00	15.50	8	14.29 C	15.50	3
8 MAX	7.54	0.00	5	54.85	0.00	5			
	0.00	0.00	1	0.00	0.00	1	68.36 C	0.00	5
MIN	-5.29	14.67	8	-55.74	14.67	5			
	0.00	14.67	8	0.00	14.67	8	7.71 C	14.67	3
9 MAX	4.79	0.00	5	30.13	0.00	5			
	0.00	0.00	1	0.00	0.00	1	22.31 C	0.00	5

STAAD PLANE				-- PAGE NO.		5	
MIN	-2.47	14.67	8	-40.17	14.67	5	
	0.00	14.67	8	0.00	14.67	8	2.44 C 14.67 3
10 MAX	22.46	0.00	6	184.55	33.00	5	
	0.00	0.00	1	0.00	0.00	1	6.23 C 0.00 3
MIN	-23.68	33.00	5	-119.89	0.00	3	
	0.00	33.00	8	0.00	33.00	8	6.99 T 33.00 8
11 MAX	19.76	0.00	6	131.45	0.00	6	
	0.00	0.00	1	0.00	0.00	1	2.26 C 0.00 3
MIN	-17.84	25.67	5	-83.35	0.00	3	
	0.00	25.67	8	0.00	25.67	8	2.78 T 25.67 6
12 MAX	15.69	0.00	6	132.12	33.00	5	
	0.00	0.00	1	0.00	0.00	1	8.49 C 0.00 3
MIN	-16.20	33.00	5	-92.98	0.00	3	
	0.00	33.00	8	0.00	33.00	8	8.97 T 33.00 8
13 MAX	13.41	0.00	6	91.50	0.00	6	
	0.00	0.00	1	0.00	0.00	1	2.73 C 0.00 5
MIN	-12.90	25.67	5	-66.90	0.00	3	
	0.00	25.67	8	0.00	25.67	8	2.80 T 25.67 8
14 MAX	7.88	0.00	6	63.26	33.00	5	
	0.00	0.00	1	0.00	0.00	1	13.11 C 0.00 7
MIN	-8.27	33.00	5	-40.57	0.00	3	
	0.00	33.00	8	0.00	33.00	8	9.52 T 33.00 8
15 MAX	7.00	0.00	6	46.60	0.00	6	
	0.00	0.00	1	0.00	0.00	1	4.79 C 0.00 5
MIN	-6.48	25.67	5	-31.24	0.00	3	
	0.00	25.67	8	0.00	25.67	8	2.46 T 25.67 8

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

79. PRINT SUPPORT REACTION ALL

72

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	1	0.93	94.05	0.00	0.00	0.00	-4.12
	2	3.25	114.48	0.00	0.00	0.00	-14.58
	3	-14.96	-14.83	0.00	0.00	0.00	162.07
	4	4.18	208.53	0.00	0.00	0.00	-18.71
	5	-7.85	168.79	0.00	0.00	0.00	106.49
	6	14.59	191.03	0.00	0.00	0.00	-136.61
	7	-14.41	41.60	0.00	0.00	0.00	159.59
	8	15.52	71.26	0.00	0.00	0.00	-164.54
5	1	-0.40	108.95	0.00	0.00	0.00	2.40
	2	-1.41	132.58	0.00	0.00	0.00	7.75
	3	-17.74	0.54	0.00	0.00	0.00	174.54
	4	-1.80	241.53	0.00	0.00	0.00	10.14
	5	-14.76	208.79	0.00	0.00	0.00	139.11
	6	11.86	207.98	0.00	0.00	0.00	-122.69
	7	-17.98	65.91	0.00	0.00	0.00	175.97
	8	17.51	64.83	0.00	0.00	0.00	-173.10
9	1	-0.53	75.50	0.00	0.00	0.00	2.90
	2	-1.85	56.48	0.00	0.00	0.00	9.56
	3	-8.29	14.29	0.00	0.00	0.00	83.77
	4	-2.38	131.98	0.00	0.00	0.00	12.45
	5	-8.14	128.57	0.00	0.00	0.00	72.89
	6	4.30	107.14	0.00	0.00	0.00	-52.76
	7	-8.61	59.59	0.00	0.00	0.00	85.51
	8	7.97	31.01	0.00	0.00	0.00	-82.03

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

80. PRINT JOINT DISPLACEMENTS 2 3 4 10 11 12

73

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
2	1	0.00161	-0.02705	0.00000	0.00000	0.00000	-0.00018
	2	0.00492	-0.03293	0.00000	0.00000	0.00000	-0.00061
	3	0.48937	0.00427	0.00000	0.00000	0.00000	-0.00269
	4	0.00652	-0.05998	0.00000	0.00000	0.00000	-0.00079
	5	0.37232	-0.04855	0.00000	0.00000	0.00000	-0.00265
	6	-0.36173	-0.05494	0.00000	0.00000	0.00000	0.00138
	7	0.49033	-0.01196	0.00000	0.00000	0.00000	-0.00279
	8	-0.48841	-0.02050	0.00000	0.00000	0.00000	0.00258
3	1	0.00724	-0.04577	0.00000	0.00000	0.00000	-0.00023
	2	0.01246	-0.04343	0.00000	0.00000	0.00000	-0.00010
	3	1.02365	0.00640	0.00000	0.00000	0.00000	-0.00205
	4	0.01970	-0.08920	0.00000	0.00000	0.00000	-0.00033
	5	0.78432	-0.07354	0.00000	0.00000	0.00000	-0.00184
	6	-0.75115	-0.08314	0.00000	0.00000	0.00000	0.00124
	7	1.02799	-0.02106	0.00000	0.00000	0.00000	-0.00219
	8	-1.01930	-0.03386	0.00000	0.00000	0.00000	0.00192
4	1	0.01756	-0.05482	0.00000	0.00000	0.00000	-0.00036
	2	0.01070	-0.04701	0.00000	0.00000	0.00000	-0.00004
	3	1.39046	0.00704	0.00000	0.00000	0.00000	-0.00147
	4	0.02826	-0.10183	0.00000	0.00000	0.00000	-0.00040
	5	1.06843	-0.08480	0.00000	0.00000	0.00000	-0.00149
	6	-1.01726	-0.09536	0.00000	0.00000	0.00000	0.00072
	7	1.40100	-0.02585	0.00000	0.00000	0.00000	-0.00169
	8	-1.37993	-0.03993	0.00000	0.00000	0.00000	0.00126
5	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
6	1	0.00268	-0.03134	0.00000	0.00000	0.00000	0.00004
	2	0.00553	-0.03813	0.00000	0.00000	0.00000	0.00018
	3	0.48412	-0.00016	0.00000	0.00000	0.00000	-0.00214
	4	0.00821	-0.06947	0.00000	0.00000	0.00000	0.00022
	5	0.36991	-0.06005	0.00000	0.00000	0.00000	-0.00143
	6	-0.35626	-0.05982	0.00000	0.00000	0.00000	0.00178
	7	0.48572	-0.01896	0.00000	0.00000	0.00000	-0.00212
	8	-0.48251	-0.01865	0.00000	0.00000	0.00000	0.00217

74

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
7	1	0.00791	-0.05291	0.00000	0.00000	0.00000	0.00005
	2	0.00995	-0.04983	0.00000	0.00000	0.00000	0.00003
	3	1.01649	-0.00019	0.00000	0.00000	0.00000	-0.00174
	4	0.01786	-0.10275	0.00000	0.00000	0.00000	0.00008
	5	0.77774	-0.09043	0.00000	0.00000	0.00000	-0.00124
	6	-0.74700	-0.09014	0.00000	0.00000	0.00000	0.00138
	7	1.02124	-0.03194	0.00000	0.00000	0.00000	-0.00172
	8	-1.01174	-0.03156	0.00000	0.00000	0.00000	0.00177
8	1	0.01442	-0.06314	0.00000	0.00000	0.00000	0.00008
	2	0.00964	-0.05356	0.00000	0.00000	0.00000	0.00003
	3	1.37858	-0.00017	0.00000	0.00000	0.00000	-0.00114
	4	0.02406	-0.11670	0.00000	0.00000	0.00000	0.00011
	5	1.05559	-0.10344	0.00000	0.00000	0.00000	-0.00075
	6	-1.01229	-0.10319	0.00000	0.00000	0.00000	0.00096
	7	1.38723	-0.03805	0.00000	0.00000	0.00000	-0.00109
	8	-1.36993	-0.03772	0.00000	0.00000	0.00000	0.00119
9	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
	8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
10	1	0.00328	-0.02705	0.00000	0.00000	0.00000	0.00015
	2	0.00590	-0.02024	0.00000	0.00000	0.00000	0.00058
	3	0.48227	-0.00512	0.00000	0.00000	0.00000	-0.00231
	4	0.00918	-0.04729	0.00000	0.00000	0.00000	0.00072
	5	0.36941	-0.04607	0.00000	0.00000	0.00000	-0.00115
	6	-0.35400	-0.03839	0.00000	0.00000	0.00000	0.00231
	7	0.48424	-0.02135	0.00000	0.00000	0.00000	-0.00222
	8	-0.48030	-0.01111	0.00000	0.00000	0.00000	0.00240
11	1	0.00826	-0.04347	0.00000	0.00000	0.00000	0.00019
	2	0.00859	-0.02665	0.00000	0.00000	0.00000	0.00011
	3	1.01441	-0.00773	0.00000	0.00000	0.00000	-0.00184
	4	0.01685	-0.07011	0.00000	0.00000	0.00000	0.00031
	5	0.77551	-0.06925	0.00000	0.00000	0.00000	-0.00110
	6	-0.74611	-0.05765	0.00000	0.00000	0.00000	0.00166
	7	1.01937	-0.03381	0.00000	0.00000	0.00000	-0.00173
	8	-1.00945	-0.01835	0.00000	0.00000	0.00000	0.00196
12	1	0.01288	-0.04887	0.00000	0.00000	0.00000	0.00029
	2	0.00908	-0.02870	0.00000	0.00000	0.00000	0.00008
	3	1.37545	-0.00856	0.00000	0.00000	0.00000	-0.00117
	4	0.02196	-0.07757	0.00000	0.00000	0.00000	0.00037
	5	1.05128	-0.07682	0.00000	0.00000	0.00000	-0.00053
	6	-1.01189	-0.06397	0.00000	0.00000	0.00000	0.00122
	7	1.38318	-0.03789	0.00000	0.00000	0.00000	-0.00100
	8	-1.36771	-0.02076	0.00000	0.00000	0.00000	0.00134

75

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

81. PRINT SECTION MAX DISPL NSECT 30 LIST 1 TO 15

76

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.07255	69.75	7	2563
2	0.02200	124.70	8	8002
3	0.01797	117.36	8	9794
4	0.06278	62.00	8	2962
5	0.02248	132.03	7	7832
6	0.02008	124.70	7	8767
7	0.06675	62.00	8	2786
8	0.02386	132.03	7	7379
9	0.02275	124.70	7	7737
10	0.23058	148.50	5	1717
11	0.12929	205.36	6	2382
12	0.14726	148.50	5	2689
13	0.08569	205.36	6	3594
14	0.13156	148.50	5	3009
15	0.06316	205.36	6	4877

***** END OF SECT DISPL RESULTS *****

82. PARAMETER
83. CODE AISC
84. BEAM 1 ALL
85. FYLD 7200 ALL
86. LX 6 MEMB 10 TO 15
87. LY 2 MEMB 10 TO 15
88. LZ 2 MEMB 10 TO 15
89. UNB 6 MEMB 10 TO 15
90. UNT 1 MEMB 10 TO 15
91. CHECK CODE ALL

77

STAAD.Pro CODE CHECKING - (AISC)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W18 X76	PASS 191.03 C	AISC- H1-1 0.00	0.782 -136.61	6 0.00
2	ST W18 X76	PASS 103.58 C	AISC- H1-1 0.00	0.437 87.14	6 14.67
3	ST W18 X76	PASS 44.88 C	AISC- H1-3 0.00	0.268 59.39	6 14.67
4	ST W18 X76	PASS 208.79 C	AISC- H1-1 0.00	0.828 139.11	5 0.00
5	ST W18 X76	PASS 111.60 C	AISC- H1-1 0.00	0.475 -95.32	5 14.67
6	ST W18 X76	PASS 47.78 C	AISC- H1-3 0.00	0.286 -63.52	5 14.67
7	ST W14 X61	PASS 128.57 C	AISC- H1-1 0.00	0.646 72.89	5 0.00
8	ST W14 X61	PASS 68.36 C	AISC- H1-1 0.00	0.396 -55.74	5 14.67
9	ST W14 X61	PASS 22.31 C	AISC- H1-3 0.00	0.235 -40.17	5 14.67
10	ST W24 X55	PASS 2.86 C	AISC- H1-3 0.00	0.651 184.55	5 33.00
11	ST W21 X44	PASS 2.78 T	AISC- H2-1 0.00	0.651 131.45	6 0.00
12	ST W24 X55	PASS 7.81 C	AISC- H1-3 0.00	0.478 132.12	5 33.00
13	ST W21 X44	PASS 1.09 T	AISC- H2-1 0.00	0.451 91.50	6 0.00
14	ST W21 X44	PASS 12.23 C	AISC- H1-3 0.00	0.344 63.26	5 33.00
15	ST W18 X40	PASS 0.44 T	AISC- H2-1 0.00	0.276 46.60	6 0.00

92. FINISH

78

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

**** DATE= MAR 17,2006 TIME= 13:23:29 ****

* For questions on STAAD.Pro, please contact : *
* By Email - North America : support@reiusa.com *
* By Email - International : support@reiworld.com *
* Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

79

I-8 Beam Uplift Design & Miscellaneous Designs

Prepared by:

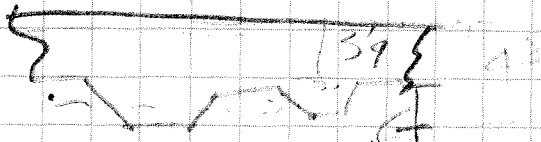
Morphy, Makofsky, Inc.

(11 pages follow)

3RD FLR. UPLIFT CHECK.

DL

4³/₄" LT. CONC.



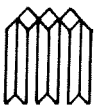
= 4" @ 115 PCF

→ 38 PSF

DECK	2
CLG.	5
PARTITIONS	20
STL	5

DL	70
LL (OFFICE)	50

			40



$$T_F = 1.0(70\text{psf}) + (.5)(50\text{psf})$$

95psf

6'-8" spans

$$= (95\text{psf})(6.66\text{ft}) = 634\text{ plf}$$

$$w = 634\text{ plf}$$

$$M = \frac{wl^2}{8} = \frac{86303.3\text{ ft-lb}}{86.3\text{ ft}}$$

$$S_s = 47.2\text{ in}^3$$

$$F_{act} = \frac{1035639\text{ in-lb}}{47.2\text{ in}^3} = 22\text{ ksi}$$

8/



allowable stress

$$F_b = 0.66 F_y$$

$$C_b = 1.0$$

$$\underline{\underline{W16 \times 31}}$$

$$r_T = 1.39 \text{ in}$$

$$\sqrt{\frac{102 \times 10^3 C_b}{50,000}} \leq \frac{l}{r_T} \leq \sqrt{\frac{510 \times 10^3 C_b}{50,000}}$$

$$45 \leq 284.89 \leq 10\phi$$

$$F_b = \frac{170 \times 10^3 C_b}{\left(\frac{l}{r_T}\right)^2} = 2.09$$

One Brace

$$\sqrt{\frac{102 \times 10^3 C_b}{50,000}}$$

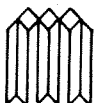
$$\frac{170 \times 10^3 C_b}{\left(\frac{189}{1.39}\right)^2} = 9.2$$

1/4 Braces $L_b = 8.25 \text{ ft}$

$$M_2 = 1035639 \text{ in-lb}$$

$$M_1 = \frac{(634 \text{ plf})(8.25 \text{ ft})}{2} (33 - 8.25) = 64727 \text{ ft-lb}$$

$$M_1 = 776729 \text{ in-lb}$$



62

$$C_b = 1.75 + 1.05 \left(\frac{776,729}{1035639} \right) + .3 \left(\frac{776,729}{1035639} \right)^2$$

$$C_b = 1.75 + .7875 + .16875$$

2.7 use 2.3

$$\sqrt{\frac{102 \times 10^3 C_b}{50}} \leq \frac{(8.25)(12)}{1.39} \leq \sqrt{\frac{510 \times 10^3 C_b}{50}}$$

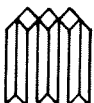
$$68.5 \leq 71.2 \leq 153.2$$

use

$$F_b = \left[\frac{2}{3} - \frac{F_y (L/r)^2}{1530 \times 10^3 C_b} \right] F_y \leq 0.60 F_y$$

$$F_b = \left[\frac{2}{3} - .072076 \right] = \underline{\underline{29.73}}$$

87



W24x62

50 ft span

$$S_s = 131$$

$$r_T = 1.71$$

$$w = 634 \text{ plf}$$

$$M = \frac{wl^2}{8} = 198,125 \text{ ft-lb}$$

$$F_{act} = \frac{(198,125)(12)}{131} = 14.2 \text{ ksi}$$

$$\sqrt{\frac{102 \times 10^3 C_6}{50}} \leq \frac{l}{r_T} \leq \sqrt{\frac{510 \times 10^3 C_6}{50}}$$

$$45 \leq 350.9 \leq 101$$

$$\frac{170 \times 10^3 \cdot 1.0}{(1/r_T)^2} = 1.38$$

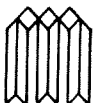
$$1/4 \text{ Braces} = 12.5 \text{ ft}$$

$$M_2 = 198,125$$

$$M_1 = \frac{(634)(12.5)}{2} (50 - 12.5)$$

$$M_1 = 148,594$$

84



$$C_b = 2.3$$

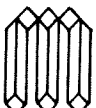
$$\sqrt{\frac{102 \times 10^3 (2.3)}{50}} \leq \frac{(12.5)(12)}{1.71} \leq \sqrt{\frac{510 \times 10^3 (2.3)}{50}}$$

$$68.5 \leq 87.72 \leq 153.2$$

$$F_b = \left[\frac{2}{3} - \frac{F_y \left(\frac{l}{r} \right)^2}{1530 \times 10^3 (2.3)} \right] F_y \leq .60 F_y$$

$$\left[\frac{2}{3} - .10933 \right] F_y = 27.8 \text{ Ksi}$$

85



Fully Composite Beam Calculator

1. General Information

Location: 2nd Floor 22'-8 span

Member Size	-	W12X22
Length	(ft)	22.67
f_y	(ksi)	50
f_c	(ksi)	4
n	-	11

2. Loading List

Construction Loads

Concrete	(pcf)	115
Decking	(psf)	2.0
Beams	(psf)	0.0
Girders	(psf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Member	(plf)	22

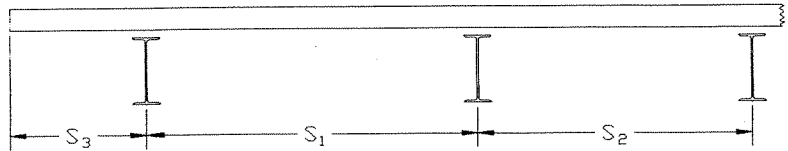
Composite Loads

Finish	(psf)	0.0
Ceiling	(psf)	5.0
Insulation	(psf)	0.0
Mechanical	(psf)	0.0
Partitions	(psf)	20.0
Wall	(plf)	0.0
Miscellaneous	(psf)	0.0
Miscellaneous	(plf)	0.0
Live Load	(psf)	50.0

3. Beam Spacing

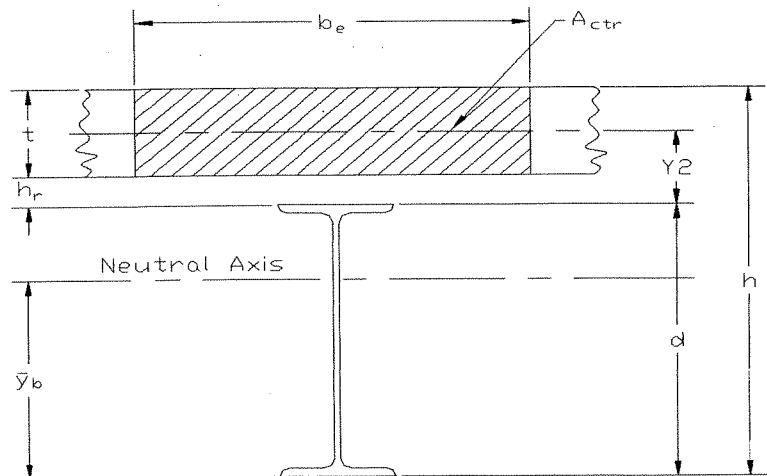
Beam Spacing - S_1	(ft)	6.67
Beam Spacing - S_2	(ft)	6.67
Edge Spacing - S_3	(ft)	0.00
Contributory Width	(ft)	6.67

(note: S_2 or S_3 must be zero.)



4. Decking

Perpendicular	(y/n)	YES
Concrete Depth (t)	(in)	3.25
Rib Height (h_r)	(in)	1.50
Rib Width	(in)	1.75
Height of Stud	(in)	3.50
Stud Diameter	(in)	0.75
Connectors / Rib	-	1
Load / Connector	(k)	11.4 (ASD)
Load / Connector	(k)	21.9 (LRFD)



5. Transformed Sections

Effective Width (b_e)	(in)	68.01
Neutral Axis (y_{-b})	(in)	13.17
Moment of Inertia	(in ⁴)	596

Handwritten signature or initials.

Fully Composite Beam Calculator

W12X22

Location: 2nd Floor 22'-8 span

6. Bending Calculations (ASD Method)

Construction Loading

Load	(klf)	0.29		
Moment	(ft-k)	18.7		
Stress in Steel	(ksi)	8.8	< 33.0	ok
Deflection	(in)	0.38	1/ 711.6	

Composite Loading

Load	(klf)	0.50		
Moment	(ft-k)	32.1		
Stress in Steel	(ksi)	17.4	< 45	ok
Stress in Concrete	(ksi)	0.23	< 1.8	ok
Deflection	(in)	0.17	1/ 1581	
DL Deflection	(in)	0.06	1/ 4742	
LL Deflection	(in)	0.11	1/ 2371	
Total Deflection	(in)	0.55	1/ 491	

7. Shear Calculations (ASD Method)

Composite Loading

Shear	(k)	9.0		
Shear Stress in Steel	(ksi)	2.8	< 20	ok

8. Shear Studs (ASD Method)

Total Shear	(k)	162	(steel governs)	
Reduction Factor	-	1.00		
Maximum Diameter	(in)	1.0625	> 0.75	ok
Studs Required	-	15	studs each side of max. moment	

9. Bending Calculations (LRFD Method)

Construction Loading

Developed Load	(klf)	0.35		
Developed Moment	(ft-k)	22.4		
Allowable Moment	(ft-k)	109.875	> 22.4	ok

Construction & Composite Loading

Developed Load	(klf)	1.08		
Developed Moment	(ft-k)	69.3		
Allowable Moment	(ft-k)	234.2	> 69.3	ok
Plastic Neutral Axis	(in)	1.40		

Note: The PNA is taken from the top of concrete.

10. Shear Calculations (LRFD Method)

Composite Loading

Developed Shear	(k)	12.2		
Allowable Shear	(ksi)	86.4	> 12.2	ok

11. Shear Studs (LRFD Method)

Studs Required	-	15	studs each side of max. moment	
----------------	---	----	--------------------------------	--

W24 x 62

$$w = 95 \times 6.67 = 0.63 \text{ K/ft}$$

$$M = 8 \times 0.63 \times 49.67^2 = 194.3 \text{ Kft}$$

$$f_b = \frac{194.3 \times 12}{132} = 17.7 \text{ ksi}$$

suppl. by min
L/RT

$$\frac{49.67 \times 0.5 \times 12}{1.68} = 177.4$$

$$C_b = 1.75$$

$$F_b = \frac{170 \times 10^3 \times 1.75}{177.4^2} = 9.45 \text{ ksi}$$

or $F_b = \frac{1 \times 10^3 \times 1.75}{24.83 \times 5.72} = 12.32 \text{ ksi}$
no good

@ 4 pt. $F_{b2} = \frac{1.75 \times 10^3}{12.5 \times 5.75} = 24.6 \text{ ksi} \checkmark \text{ OK}$

JLS

3-21-06

BB



W12x16

$$m = 8 \times 0.63 \times 22.67^2 = 40.47 \text{ ksi}$$

$$f_b = \frac{40.47 \times 12}{17.1} = 28.4 \text{ ksi}$$

No bracing $C_b = 1.0$

$$F_{cr} = \frac{22.67 \times 12}{0.96} = 283.4$$

$$\Rightarrow \bar{F}_b = \frac{170 \times 10^3}{283^2} = 2.1$$

$$\text{or } F_b = \frac{1 \times 10^3}{22.67 \times 11.3} = 3.9$$

brace @ mid pt

$$L/r_T = 142$$

$$F_{b1} = 8.4 \text{ ksi}$$

$$F_b = \frac{1 \times 10^3 \times 1.75}{11.33 \times 11.3} = 13.7 \text{ ksi}$$

4 pt

$$F_b = 27.2 \text{ ksi}$$

\Rightarrow need to increase beam size

W12x22 $f_b = \frac{40.47 \times 12}{25.4} = 19.1 \text{ ksi}$

$$F_b = \frac{1 \times 10^3 \times 1.75}{11.33 \times 7.19} = 20.9 \text{ ksi}$$

JLS

3-21-06

SA



W4x22

$$M = \frac{1}{8} \times 0.63 \times 27^2 = 54.7 \text{ k'}^1$$

$$f_b = \frac{54.7 \times 12}{29} = 22.6 \text{ ksi}$$

midpt $f_b = \frac{1 \times 10^3}{27 \times 8.2} = 4.5 \text{ ksi}$ *neglected*

$f_T = \frac{13.5 \times 12}{1.25} = 129.6$

$$F_b = \frac{170 \times 10^3 \times 175}{129.6^2} = 17.7 \text{ ksi}$$

$$\text{or } F_b = \frac{1 \times 10^3 \times 175}{13.5 \times 8.2} = 15.8 \text{ ksi} \checkmark$$

$$\Rightarrow @ \text{ 4 pt } F_b = 30 \text{ ksi} \checkmark \text{ ok.}$$

JLS

3-21-06

20



I-9 Assembly Hall Roof

Prepared by:

Morphy, Makofsky, Inc.

(5 pages follow)

JST AT ASSEMBLY Hall

DL	JST	5
	STRUCTURE	2
	INS	1
	ROOF DECK	2
	CLG	5

DL 15

LL 20

TL 35

WIND

end a = 10'

26	
-84	2.26
	53
2	18.5
	-38

$A_{jst} = 18 \times 6.33 = 120$

3. $D + 0.75(DTW) = 49.5$ gouS down

$0.6D - WL = 0.6 \times 15 - 84 = 75$ gouS

end of section

$W = 75 \times 6.14 = 460$ PCF $\Phi = 92$

$S_1 = 18.67'$

~~18.3~~

$S_2 = 21'$

~~20K3~~

91

JLS

3/23/06

AHI



Zone @ 2

$$0.6D - W = 0.6 \times 15 - 53 = 44 \text{ PSI}$$

$$D + .75(L+W) = 50 \text{ } \leftarrow \text{gov}$$
$$\times 6.14 = 307 \text{ PLF}$$

$$S = 21' \quad 14K3 \quad R 92$$

$$S = \cancel{18.5} \quad 19' \quad (16K2)$$
$$\Rightarrow 14 \quad 12K3$$

Zone 3

$$\Rightarrow 0.6 \times 15 - 38 = 29$$

$$\Rightarrow \cancel{0.4} 15 + .75(15 + 18.5) = 40 \text{ PSI}$$
$$W = 246 \quad R 92 \quad \uparrow \text{ gov}$$

$$S = 21' \quad (14K1) \quad R 92$$

JLS

3-23-06

AH2



Bm @ assembly hall

① ^{uplift} garning case

$$w = 20 \times 75 = 1.5^k$$

$$S = 18.42 \quad R = 13.8^k$$

$$M = 63.6^k \quad (\text{note uplift})$$

$$W12 \times 22 \quad f_b = 30 \text{ ksi}$$

$$A = 0.86 = 6/257 \quad \text{OK}$$

$$L = 6'6"$$

$$f_b = \frac{12 \times 10^3}{6.17 \times 7.9} = 22.7 \text{ ksi}$$

for
proof.

NO

$$W14 \times 22$$

$$f_b = 26.3 > F_b = 19.9 \quad \text{X}$$

$$W16 \times 31$$

$$f_b = 16.2 \text{ ksi} < F_b = 24.9 \text{ ksi} \quad \text{OK}$$

② $w = 50 \times 21 = 1.05^k$

$$M = 44.5^k \quad R = 9.67^k$$

$$W14 \times 22$$

$$A = 0.47 \quad \checkmark \quad 2/470$$

$$f_b = 18.4$$

$$L = 6'14" \quad F_b = 19.9^k \quad \checkmark \quad \text{OK}$$

JLS

3-23-06

93



③

$w = 75 \times 11.33 = 0.85 \text{ k/ft}$
 $s = 18.42'$

$R = 7.83 \text{ k}$

W14x22 $f_b = 14.9 \text{ ksi}$ $M = 36 \text{ k-ft}$
OK

④

$w = 50 \times 11.33 = 0.57 \text{ k/ft}$

$R = 5.3 \text{ k}$ $M = 24.2 \text{ k-ft}$

W12x16 $f_b = 17.0$ $F_b = 14.9 \text{ or } 23.7 \text{ ksi}$

OK
OK

⑤

$w = 40 \times 20 = 0.8 \text{ k/ft}$

W14x22 see ③

⑥

$w = 21 \times 40 = 0.84$

W14x22.

⑦

$w = 18.67'$

$w = 3.1 \times 75 = 0.23 \text{ k/ft}$
 $R = 2.15 \text{ k}$ $M = 10.1 \text{ k-ft}$

Hold
also frame
b/m

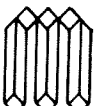
⑧

$w = 3.1 \times 50 = 0.16 \text{ k/ft}$

JLS.

3-23-06

94



Dynamic load case

$$1.2D + 0.5L + 0.2W$$

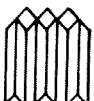
or

$$0.9D + 0.5L + 0.2W$$

Beams upward load

$$\underline{1.0D + 0.5L}$$

25

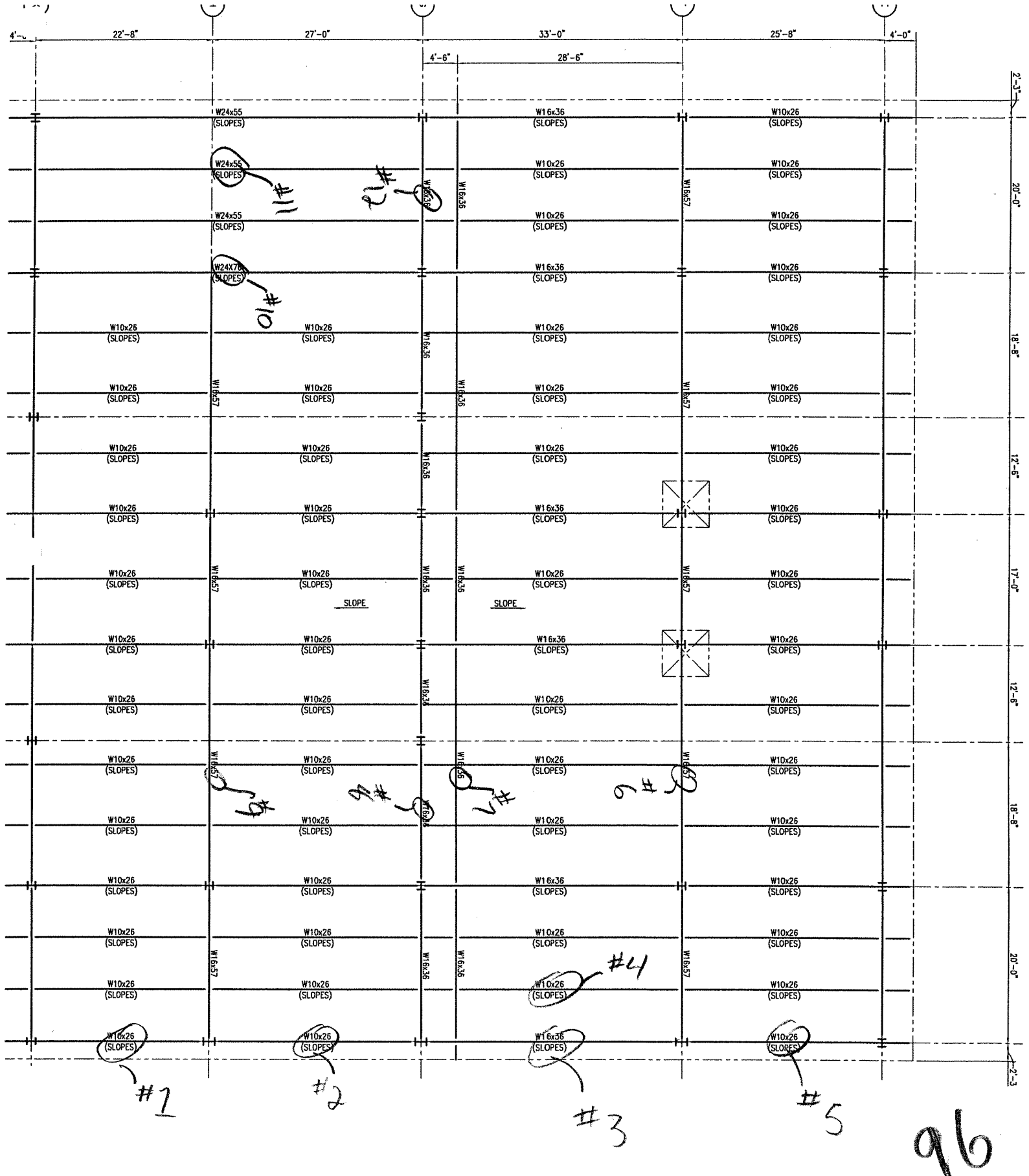


I-10 Main Roof Design

Prepared by:

Morphy, Makofsky, Inc.

(27 pages follow)



#1

#2

#3

#5

96

DEAD

STL	5	pst
MD	2	pst
INSUL	1	pst
METAL	2	pst
MISC	5	pst
<hr/>		

$$DL = 15 \text{ pst}$$

$$DL_f = 15 \times 1.05 = 15.8 \text{ pst}$$

$$LL_f = 20 \times 1.05 = 21.1 \text{ pst}$$

WIND

$$\begin{array}{r} +18.5 \\ -38 \end{array}$$

$$D+L = 36.9$$

$$D + .75(L+W) = 45.5 \text{ pst} \leftarrow \text{governs}$$

$$.6D + W = 27.98$$

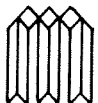
$$(45.5 \text{ pst})(8.5 \text{ feet}) = 386.75 \text{ plf}$$

390 plf

uplift

$$.6D - W = .6(15.8) - (38) = -28.5 \text{ pst}$$

$$(28.5)(8.5) = 245 \text{ plf}$$



BEAM #1



22'-8" span

$$M = \frac{(390)(22.7)^2}{8} = 25.1 \text{ Ft-kip}$$

$$\text{Req } S_x = \frac{(25.1)(12)}{33} = 9.2 \text{ in}^3$$

W10x12 $S_x = 10.9$

$$f_b = \frac{(25.1)(12)}{10.9} = 27.63 \text{ ksi}$$

Brace at $\frac{1}{4}$ for uplift 24 ft

$$M = \frac{(245)(22.7)^2}{168} = 15.8 \text{ Ft-kip} \quad f_b = 17.4 \text{ ksi}$$

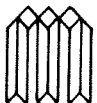
$$68.5 \leq \frac{(6)(12)}{.96} \leq 153$$

75

$$F_b = \left[\frac{2}{3} - \frac{50(75)^2}{1530 \times 10^3(0.3)} \right] 50 = 29.3 \text{ ksi}$$

G.K.

98



W10 x 17

$$S_x = 16.2$$

$$f_b = \frac{(25.1)(12)}{16.2} = 18.6 \text{ ksi}$$

$$\Delta = \frac{(18.6)(22.7)^2}{10 \times 10^3} = .958 \text{ o.k.}$$

$$\frac{l}{2410} = 1.135$$

Use W10 x 26

$$S_x = 27.9 \text{ in}^3$$

$$f_b = \frac{(25.1)(12)}{27.9} = 10.8$$

Check unbraced length $\frac{1}{2}$ point $r_T = 1.54$

$$\frac{l}{r_T} = \frac{(12)(12)}{1.54} = 93.5$$

$$C_b = 1.75$$

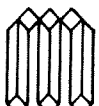
$$\sqrt{\frac{102 \times 10^3 (1.75)}{50}} = 59.75$$

$$\sqrt{\frac{510 \times 10^3 (1.75)}{50}} = 133.6$$

$$F_b = \left[\frac{2}{3} - \frac{F_y (93.5)^2}{1530 \times 10^3 C_b} \right] 50 = 25.2$$

Brace @ $\frac{1}{2}$ point

99



BEAM #2



27'-0" span

390 plf

$$M = \frac{(390)(27)^2}{8} = 35.5 \text{ ft-kip}$$

$$Req S_x = \frac{(35.5)(12)}{33} = 13.1 \text{ in}^3$$

W10x15

$$S_x = 13.8$$

$$f_b = \frac{(35.5)(12)}{13.8} = 30.47$$

Braced at 1/4 for uplift actual length 28.5

$$M = \frac{(245)(27)^2}{8} = 22.3 \text{ ft-k}$$

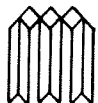
$$f_b = \frac{(22.3)(12)}{13.8} = 19.4 \text{ ksi}$$

$$68.5 \leq \frac{(7.125)(12)}{.99} \leq 153$$

$$68.5 \leq 86.4 \leq 153$$

$$F_b = \left[\frac{2}{3} - \frac{50(86.4)^2}{1530 \times 10^3 (2.3)} \right] 50 = 28.03 \text{ ksi}$$

O.K.



$$\Delta = \frac{F_b \times L^2}{d \times 10^3}$$

W10x26

$$S_x = 27.9$$

$$k_T = 1.5 < 1$$

$$F_b = \frac{(35.5)(12)}{27.9} = 15.3$$

$$\Delta = \frac{(15.3)(27)^2}{10 \times 10^3} =$$

$$\frac{l}{240} = 1.35 \text{ in}$$

$$\Delta = 1.12 \text{ in} < \frac{l}{240} \quad \text{o.k.}$$

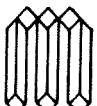
Check Unbraced length at $\frac{1}{2}$ point

$$F_b = \frac{(22.3)(12)}{27.9} = 9.6 \text{ ksi}$$

$$\frac{l}{k_T} = 111.04$$

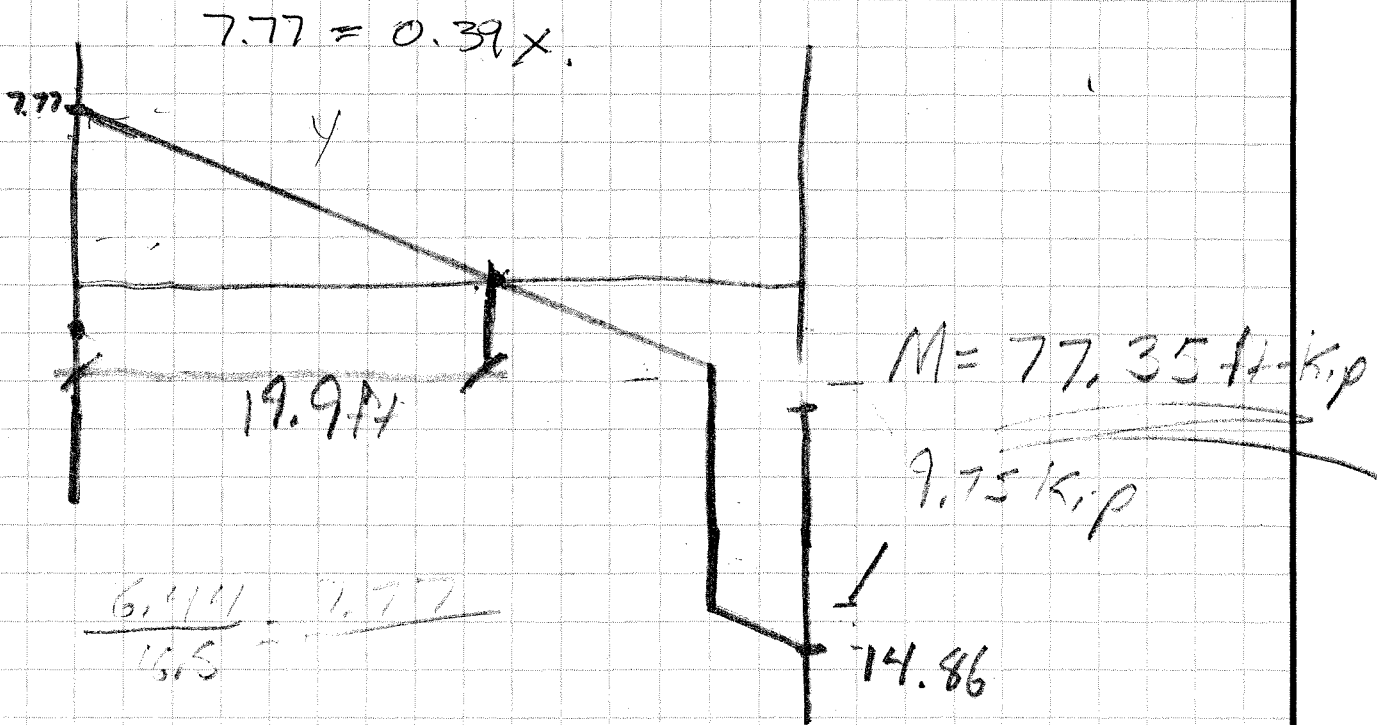
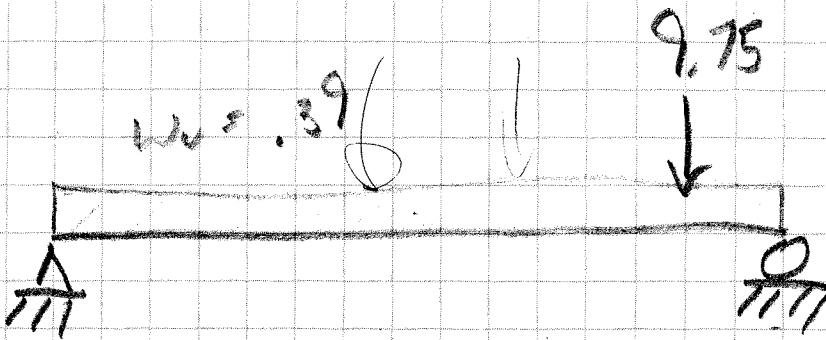
$$F_b = \left[\frac{2}{3} - \frac{50(111.04)^2}{1530 \times 10^3 \times 1.75} \right] 50 = 21.8 \text{ ksi}$$

Bruce @ $\frac{1}{2}$ point

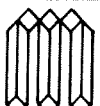


BEAM #3

~~Beam #1~~



102



$$\frac{77.35(12)}{33} = 28 \text{ in}^3$$

$$W14 \times 22 \quad S_x = 29.0 \text{ in}^3$$

$$f_b = \frac{77.35(12)}{29} = 32 \text{ ksi}$$

$$\frac{l}{240} = 1.65$$

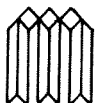
$$W16 \times 36 \quad S_x = 56.5$$

$$f_b = \frac{(77.35)(12)}{56.5} = 16.5$$

$$\frac{(16.5)(33^2)}{16 \times 10^3} = 1.12$$

Use 16 x 36

103



$$l = 30 \text{ ft} \quad W16 \times 36 \quad r_T = 1.79$$

Check unbraced length at $\frac{1}{2}$ point

$$15 \text{ ft}$$

$$\frac{(15)(12)}{r_T} = 100.6$$

$$M = \frac{(245)(245)^2}{8} = 24.9 \text{ ft-kips}$$

$$f_b = \frac{(24.9)(12)}{56.5} = 5.3$$

$$F_b = \frac{(170 \times 10^3)}{(100.6)^2} = 16.8$$

No Braces

104



BEAM #4

28'-6" span

$$M = \frac{(390)(28.5)^2}{8} = 39.6 \text{ ft-kip}$$

$$Req S_x = \frac{(39.6)(12)}{33} = 14.4 \text{ in}^3$$

Try W10x12

$$S_x = 16.2 \text{ in}^3$$

$$f_b = \frac{(39.6)(12)}{16.2} = 29.3 \text{ ksi}$$

Unbraced Length for upl. ft

$$M = \frac{(245)(28.5)^2}{8} = 24.9 \text{ ft-kip}$$

$$f_b = 14.5$$

Bridged at $\frac{1}{4}$
 $r_T = 1.51$

actual length = 34.8 ft

$$69.5 \leq \frac{(7.1)(12)}{1.01} \leq 153$$

84.7

$$\left[\frac{2}{3} - \frac{50(84.7)^2}{1530 \times 10^3 C_b} \right] 50 = 28.2 \text{ ksi}$$

o.k.



$$\frac{l}{240} = 1.43$$

$$\Delta = \frac{(29.3)(28.5)^2}{10 \times 10^3} = 2.38$$

W10x26

$$S_x = 27.9$$

$$f_b = \frac{(39.6)(12)}{27.9} = 17.03$$

$$\Delta = \frac{(17.03)(28.5)^2}{10 \times 10^3} = \underline{\underline{1.38 \text{ in o.k.}}}$$

Use W10x26

$$F_b = 18.5$$

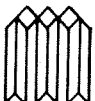
$$r_T = 1.54$$

$$\frac{l}{r_T} = \frac{(15)(12)}{1.54} = 116.9$$

$$F_b = \left[\frac{2}{3} - \frac{50(116.9)^2}{1530 \times 10^3 C_b} \right] = 20.6 \text{ Ksi}$$

Brace @ $\frac{1}{2}$ point

106



BEAM #5

②

$$W = 390 \text{ plf}$$

$$M = \frac{(390)(25.7)^2}{8} = 32.2 \text{ ft-kip}$$

$$R_{eq} \quad S_x = \frac{(32.2)(12)}{.33} = 11.8 \text{ in}^3$$

Try W10x15

$$S_x = 13.8 \text{ in}^3$$

$$f_b = \frac{(32.2)(12)}{13.8} = 28 \text{ ksi}$$

Check Unbraced length for upl. fl.

$$M = \frac{(245)(25.7)^2}{8} = 20.2 \text{ ft-kip} \quad f_b = 17.6$$

$$\sqrt{\frac{(102 \times 10^3)(1.0)}{50}} \leq \frac{(25.7)^2}{.99} \leq \sqrt{\frac{510 \times 10^3(1.0)}{50}}$$

$$45.2 \leq 311.5 \leq 100.99$$

Braced at Center

$$\frac{l}{r_T} = \frac{(12.85)12}{.99} = 155.8$$

$$\frac{l}{r_T} > \sqrt{\frac{510 \times 10^3(1.75)}{50}} = 133.6$$

TTT

101



$$F_b = \frac{170 \times 10^3 (1.75)}{\left(\frac{9}{17}\right)^2} = 12.25 \text{ ksi}$$

$$F_b = \frac{12 \times 10^3 (1.75)}{(12)(12.85)(9.25)} = 14.73 \text{ ksi} \quad \underline{\underline{\text{No Good}}}$$

Braided at $\frac{1}{8}$ points

$$C_b = 1.0$$

$$F_b = \frac{170 \times 10^3 (1.0)}{(103)^2} = 15.76 \text{ ksi}$$

$$F_b = \frac{12 \times 10^3 (1.0)}{(8.56)(12)(9.25)} = 12.61$$

Braided at $\frac{1}{4}$ points

$$C_b = 1.75 + 1.05(.75) + .3(.75)^2 \quad M_1 = 15.15 \quad M_2 = 20.2$$

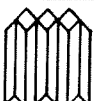
$$C_b = 2.3$$

$$\sqrt{\frac{102 \times 10^3 (2.3)}{50}} \leq \frac{(6.78)(12)}{.99} \leq \sqrt{\frac{510 \times 10^3 (2.3)}{50}}$$

$$64.5 \leq 82.2 \leq 153$$

$$F_b = \left[\frac{2}{3} - \frac{50 (82.2)^2}{1530 \times 10^3 (2.3)} \right] 50 = 28.5 \text{ ksi}$$

o.k.



$$\Delta = \frac{F_b L^2}{2 \times 10^3}$$

$$\frac{L}{240} = 1.28$$

$$\Delta = \frac{(28)(25.7)^2}{10 \times 10^3} = 1.85$$

Try W10x26

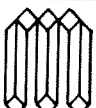
$$S_x = 27.9$$

$$= \frac{(32.2)(12)}{27.9} = 13.85 \text{ ksi}$$

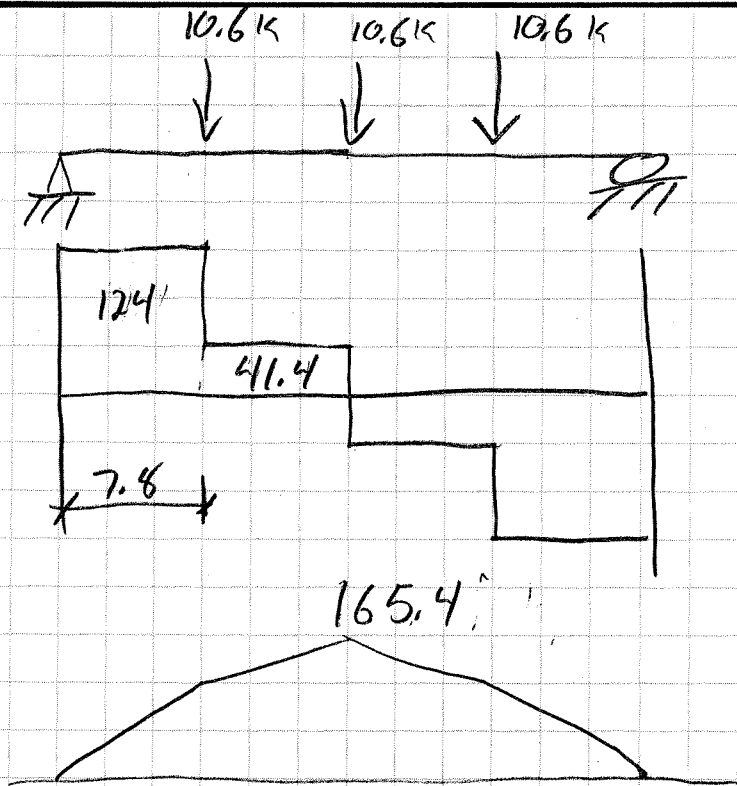
$$\Delta = \frac{(13.85)(25.7)}{10 \times 10^3} = .92 \text{ o.k.}$$

Brace @ $\frac{1}{2}$ point

101



BEAM #6



Beam #8

$$\frac{(10.6)^3}{2} = 15.9$$

$$S_x = \frac{(165.4)(12)}{33} = 60.14$$

Try 14 x 43

$$S_x = 62.7$$

$$f_b = \frac{(165.4)(12)}{62.7} = 31.7 \text{ ksi}$$

110



$$\frac{I}{240} = 1.56$$

$$16 \times 57$$

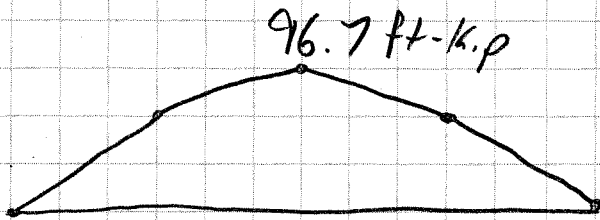
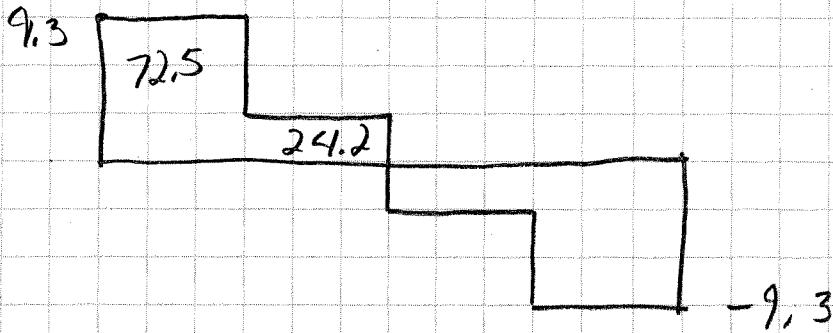
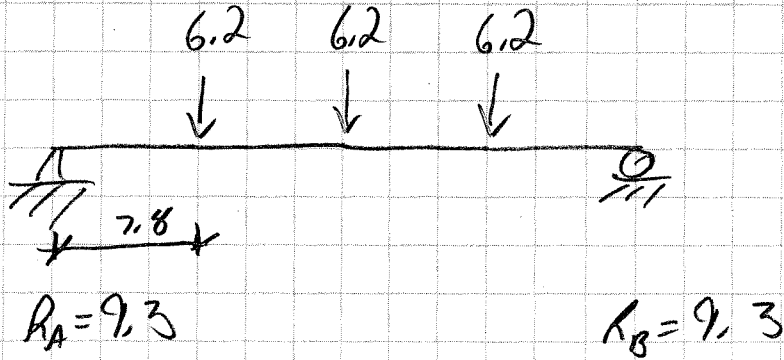
$$S_x = 92.7$$

$$\frac{(165.4)(12)}{92.7} = 21.4$$

$$\frac{(21.4)(31.2)^2}{16 \times 10^3} = 1.3 \text{ in}$$



BEAM # 7



$$S_{x req} = \frac{(96.7)(12)}{33} = 35.2 \text{ in}^3$$

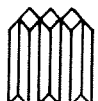
Try W14x26

$$S_x = 35.3$$

$$f_b = 32.9$$

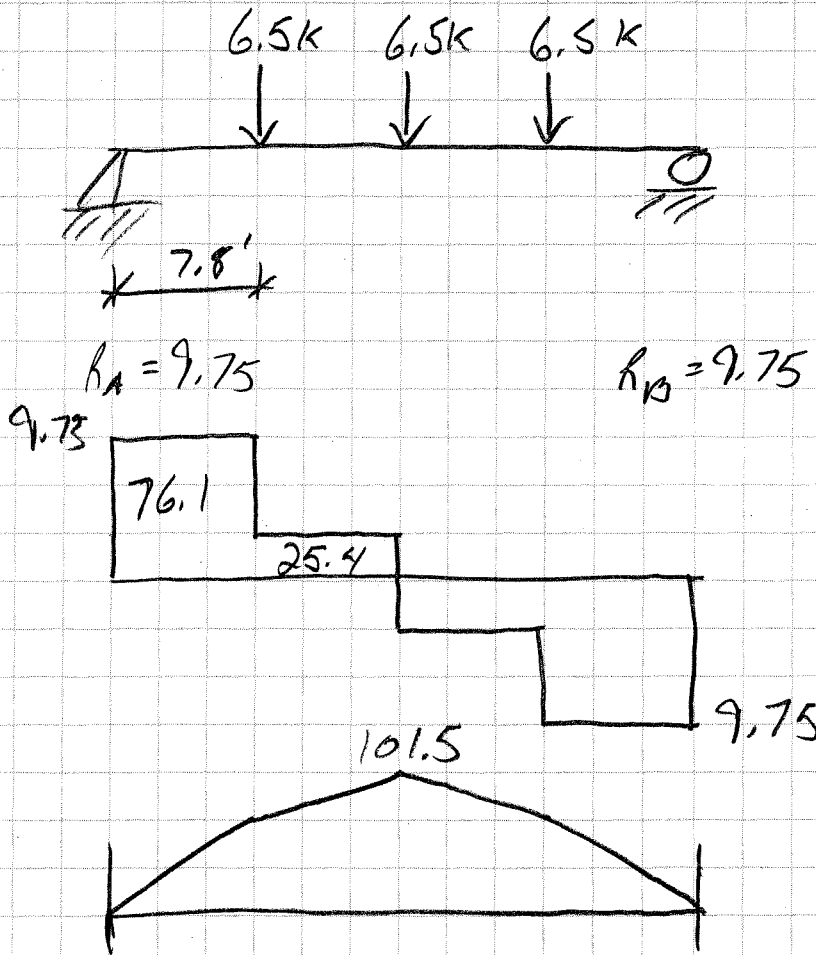
Use 16x36

112



BEAM #8

#5



$$S_{x_{req}} = \frac{(101.5)(12)}{33} = 37 \text{ in}^3$$

W14x30 $S_x = 42 \text{ in}^3$

$$f_b = \frac{(101.5)(12)}{42} = 29 \text{ ksi} \quad \text{o.k.}$$

1/3



$$\frac{I}{240} = 1.56$$

$$\Delta = \frac{(29)(31.2)^2}{14 \times 10^3}$$

Try 16×36

$$S_x = 56.5$$

$$f_b = \frac{(101.5)(12)}{56.5} = 21.6$$

$$\Delta = \frac{(21.6)(31.2)^2}{16 \times 10^3} = 1.31 \text{ in ok}$$

Use 16×36

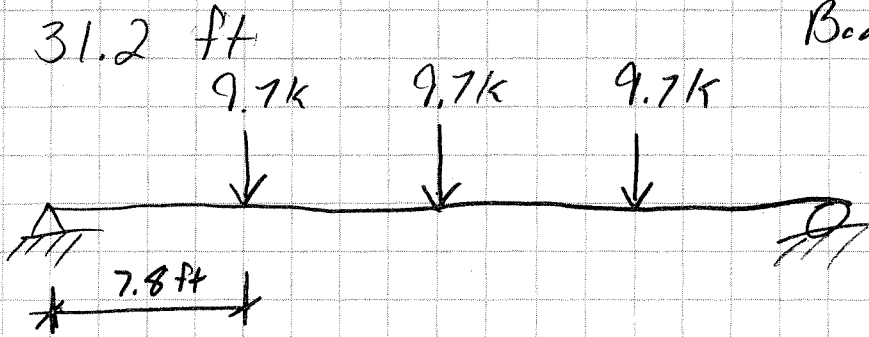
114



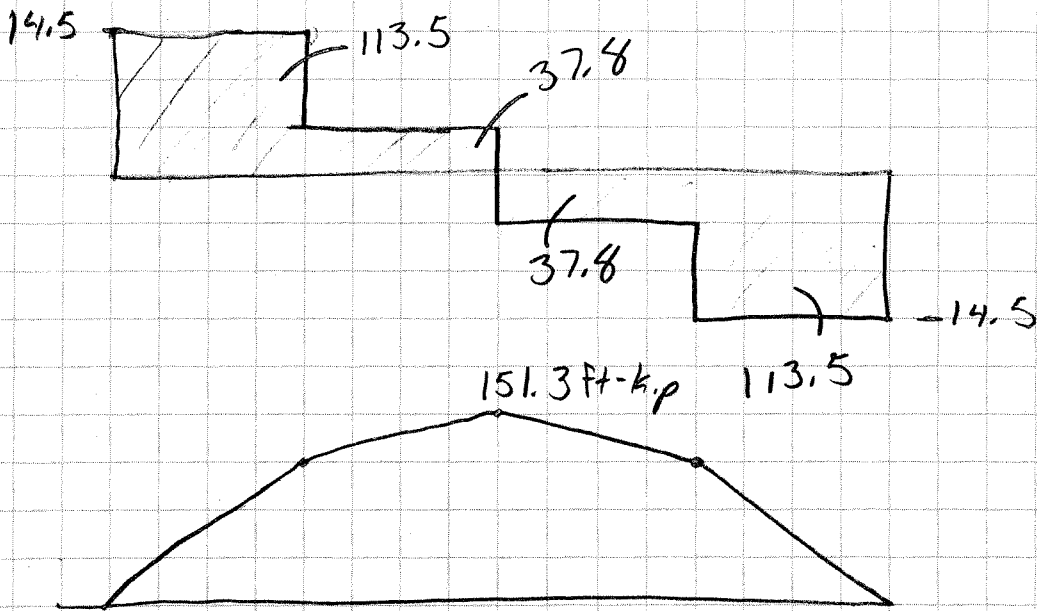
BEAM #9

span 31.2 ft

Beam #7



$$k_A = \frac{9.7 + 9.7 + 9.7}{2} = 14.55$$



$$\text{Req } S_x = \frac{(151.3)(12)}{3 \cdot 3} = 55.02 \text{ in}^3$$

$$\text{Try } 14 \times 43 \quad S_x = 62.7 \text{ in}^3$$

$$f_b = \frac{(151.3)(12)}{62.7} = 28.9 \quad \underline{\underline{0.15}}$$



115

$$\frac{I}{240} = 1.56 \text{ in}$$

$$\Delta = \frac{(28.09)(31.2)^2}{14 \times 10^3} = 1.95$$

Try 16x45

$$S_x = 72.7$$

$$f_b = \frac{(151.3)(12)}{72.7} = 24.9$$

$$\frac{(24.9)(31.2)^2}{16 \times 10^3} = 1.52 \text{ in}$$

Use 16x57

116



BEAM # 10

50 ft span

300 ft-kip

$$F_b = \frac{(300)(12)}{33} = 109$$

W24 x 76

$$S_x = 176$$

$$f_b = \frac{(300)(12)}{176} = 20.45 \text{ ksi}$$

$$\frac{I}{240} = 2.5$$

$$\frac{(20.45)(50)^2}{24 \times 10^3} = 2.13 \text{ in o.k.}$$

Use 24 x 76



$$l = 28.5 \quad P = 9.2 \text{ kips} \quad w_v = 245$$

$$M = 190 \text{ ft-kips} \quad F_b = 12.95$$

$$\frac{(28.5)(12)}{(k_T)} = 150.3$$

$$F_T = 2.29$$

$$\frac{170 \times 10^3 (1.75)}{(150)^2} = 13.34$$

ok no bracs

118



BEAM #11

Span 50'

$$w_u = 390 \text{ lb/ft}$$

$$\frac{(.39)(50)^2}{8} = 121.9 \text{ ft-Kip}$$

$$\frac{(121.9)(12)}{33} = 44.3$$

Try W18 x 35

$$57.6$$

$$\frac{(121.9)(12)}{57.6} =$$

$$f_b = 25.4 \text{ ksi}$$

Uplift

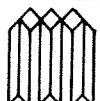
$$\frac{(.245)(50)^2}{8} = 76.6 \text{ ft-Kips}$$

$$f_b = \frac{(76.6)(12)}{57.6} = 15.9$$

Braced at 1/4 points

$$68.5 \leq \frac{(12.5)(12)}{1.49} \leq 153$$

$$f_b = \left[\frac{2}{3} - \frac{50(100.7)^2}{1530 \times 10^3 (2.3)} \right] 50 = 26.1 \text{ ksi}$$



W24 x 55

$$S_x = 114$$

$$\frac{l}{240} = 2.5$$

$$f_b = \frac{(121.9)(12)}{114} = 12.8 \text{ ksi}$$

$$\Delta = \frac{(12.8)(50)^2}{24 \times 10^3} = 1.33 \text{ o.k.}$$

Use W24 x 55

52.4 Check brace length $\frac{1}{2}$ brace:

$$\frac{(13.1)(12)}{1.68} = 93.57$$

$$f_b = 27.11$$

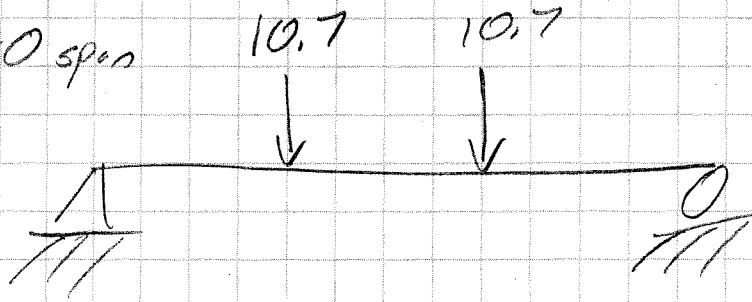
Brace at $\frac{1}{4}$ points

120



BEAM #12

20'-0" span



$$M = 71.69$$

$$S_x = \frac{(71.69)(12)}{33} = 26.1$$

W16x36

$$S_x = 56.5 \text{ in}^3$$

$$\frac{l}{240} = 1$$

$$f_b = \frac{(71.7)(12)}{56.5} = 15.23$$

$$\frac{(15.23)(20)^2}{16 \times 10^3} = .38 \text{ in o.k.}$$

121



Locked 2 floor unbraced

$$L = 15.67 + 14.67 = 30.33'$$

$$\frac{KL}{r} < 200$$

$$\Rightarrow r \geq \frac{1.0 \times 30.33 \times 12}{200} = 1.82$$

W14x61 $r_y = 2.45 \checkmark$ OK.

$$\frac{KL}{r} = 148.6$$

$$F_a = 174^k$$

7,8

$$P = 110^k \checkmark$$
 OK.

see LRFD manual

W18x76

$$r_y = 2.61$$

$$\lambda_c = \frac{KL}{r} \sqrt{\frac{F_y}{E}} = \frac{1.0 \times 30.33 \times 12}{2.61 \times 3.142} \sqrt{\frac{50}{29 \times 10^3}} = 1.84$$

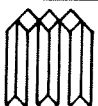
$$\Rightarrow F_c = 0.877 \times F_y = \frac{0.877}{1.84^2} \times 50 = 12.91 \text{ ksi}$$

$$\phi P_n = 0.85 \times 12.91 \times 22.3 = 245^k$$

JLS

3-17-06

122



I-11 Frame Design

Prepared by:

Morphy, Makofsky, Inc.

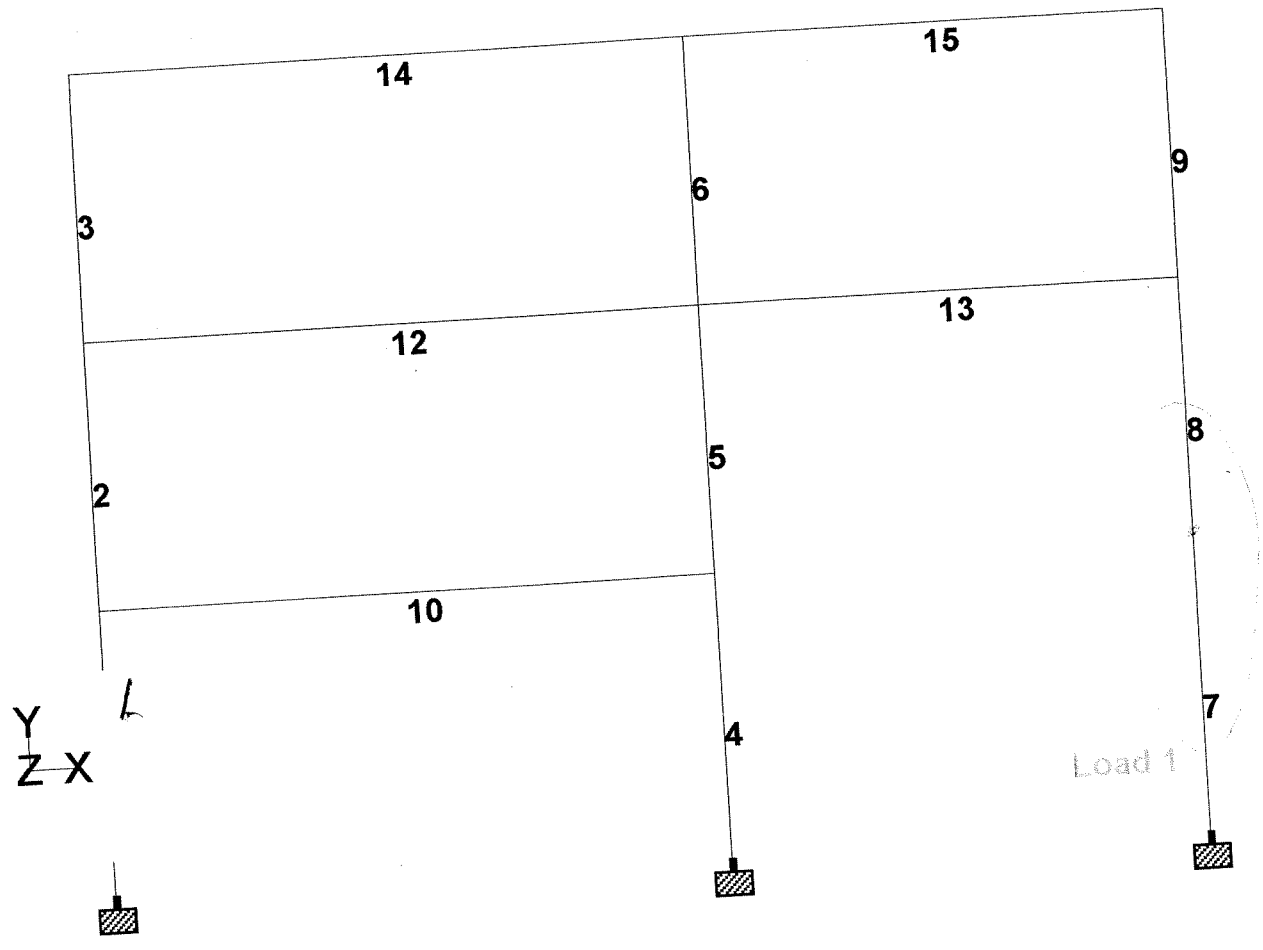
(88 pages follow)



Software licensed to morphy makofsky inc

Job No	Sheet No	Rev
	1	
Part		
Ref		
By	Date	Chd
	17-Mar-06	
File	FRAME-3-M1.std	Date/Time
		17-Mar-2006 15:50

Client



look

12-

```

*****
*
*          STAAD.Pro
*          Version 2003   Bld 1002.US
*          Proprietary Program of
*          Research Engineers, Intl.
*          Date=   MAR 17, 2006
*          Time=   15:50: 9
*
*          USER ID: morphy makofsky inc
*****

```

1. STAAD PLANE
2. START JOB INFORMATION
3. ENGINEER DATE 17-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 15.5 0; 3 0 30.17 0; 4 0 44.84 0; 5 33 0 0; 6 33 15.5 0
9. 7 33 30.17 0; 8 33 44.84 0; 9 58.67 0 0; 10 58.67 15.5 0; 11 58.67 30.17 0
10. 12 58.67 44.84 0
11. MEMBER INCIDENCES
12. 1 1 2; 2 2 3; 3 3 4; 4 5 6; 5 6 7; 6 7 8; 7 9 10; 8 10 11; 9 11 12; 10 2 6
13. 12 3 7; 13 7 11; 14 4 8; 15 8 12
14. DEFINE MATERIAL START
15. ISOTROPIC STEEL
16. E 4.176E+006
17. POISSON 0.3
18. DENSITY 0.489024
19. ALPHA 6.5E-006
20. DAMP 0.03
21. END DEFINE MATERIAL
22. CONSTANTS
23. MATERIAL STEEL MEMB 1 TO 10 12 TO 15
24. MEMBER PROPERTY AMERICAN
25. 1 TO 6 TABLE ST W18X76
26. 7 TO 9 TABLE ST W14X61
27. 10 12 TABLE ST W24X55
28. 13 TABLE ST W21X44
29. 14 TABLE ST W21X44
30. 15 TABLE ST W18X40
31. SUPPORTS
32. 1 5 9 FIXED
33. LOAD 1 DEAD
34. JOINT LOAD
35. 4 FY -28
36. 3 FY -28
37. 2 FY -20
38. 7 8 FY -27.4
39. 6 FY -19.6
40. 10 FY -23.1
41. 11 FY -26.7

124

STAAD PLANE

-- PAGE NO. 2

42. 12 FY -12
 43. MEMBER LOAD
 44. 10 14 15 UNI GY -0.33
 45. 12 13 UNI GY -0.47
 46. LOAD 2 LIVE
 47. JOINT LOAD
 48. 4 FY -12
 49. 3 FY -20
 50. 2 FY -60
 51. 7 FY -19.6
 52. 8 FY -11.7
 53. 6 FY -58.7
 54. 10 FY -25.7
 55. 11 FY -8.6
 56. 12 FY -5.1
 57. MEMBER LOAD
 58. 10 UNI GY -1.
 59. 12 13 UNI GY -0.33
 60. 14 15 UNI GY -0.07
 61. LOAD 3 WIND
 62. JOINT LOAD
 63. 4 FX 15.4
 64. 3 FX 12.9
 65. 2 FX 12.7
 66. LOAD COMB 4 DEAD LIVE WIND
 67. 1 1.2 2 0.5 3 0.2
 68. LOAD COMB 5 DEAD LIVE -WIND
 69. 1 1.2 2 0.5 3 -0.2
 70. 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 = 12/ 14/ 3
 ORIGINAL/FINAL BAND-WIDTH= 4/ 3/ 12 DOF
 TOTAL PRIMARY LOAD CASES = 3, TOTAL DEGREES OF FREEDOM = 27
 SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
 REQ'D/AVAIL. DISK SPACE = 12.0/ 25388.4 MB, EXMEM = 1626.6 MB

71. PDELTA 2 ANALYSIS
 ++ Adjusting Displacements 15:50:10
 ++ Adjusting Displacements 15:50:10

72. LOAD LIST 4 5
 73. PRINT MAXFORCE ENVELOPE NSECTION 30 LIST 1 TO 10 12 TO 15

125

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	0.40	0.00	4	53.46	15.50	5			
	0.00	0.00	4	0.00	0.00	4	174.12 C	0.00	5
	-7.13	15.50	5	-57.12	0.00	5			
MIN	0.00	15.50	5	0.00	15.50	5	166.91 C	15.50	4
2 MAX	-2.38	0.00	4	48.32	14.67	5			
	0.00	0.00	4	0.00	0.00	4	103.43 C	0.00	5
	-6.73	14.67	5	-50.42	0.00	5			
MIN	0.00	14.67	5	0.00	14.67	5	99.99 C	14.67	4
3 MAX	-3.37	0.00	4	40.76	14.67	5			
	0.00	0.00	4	0.00	0.00	4	46.98 C	0.00	5
	-4.80	14.67	5	-29.70	0.00	5			
MIN	0.00	14.67	5	0.00	14.67	5	46.00 C	14.67	4
4 MAX	6.54	0.00	4	52.82	0.00	4			
	0.00	0.00	4	0.00	0.00	4	186.46 C	0.00	4
	-0.71	15.50	5	-48.56	15.50	4			
MIN	0.00	15.50	5	0.00	15.50	5	182.57 C	15.50	5
5 MAX	6.79	0.00	4	54.68	0.00	4			
	0.00	0.00	4	0.00	0.00	4	116.94 C	0.00	4
	1.44	14.67	5	-44.99	14.67	4			
MIN	0.00	14.67	5	0.00	14.67	5	116.83 C	14.67	5
6 MAX	2.98	0.00	4	16.40	0.00	4			
	0.00	0.00	4	0.00	0.00	4	51.95 C	0.00	5
	-0.26	14.67	5	-27.29	14.67	4			
MIN	0.00	14.67	5	0.00	14.67	5	51.88 C	14.67	4
7 MAX	1.27	0.00	4	18.60	0.00	4			
	0.00	0.00	4	0.00	0.00	4	109.59 C	0.00	4
	-0.35	15.50	5	-9.12	0.00	5			
MIN	0.00	15.50	5	0.00	15.50	5	106.27 C	15.50	5
8 MAX	1.25	0.00	4	1.66	14.67	5			
	0.00	0.00	4	0.00	0.00	4	69.02 C	0.00	4
	-0.37	14.67	5	-19.40	14.67	4			
MIN	0.00	14.67	5	0.00	14.67	5	65.70 C	14.67	5
9 MAX	3.48	0.00	4	25.62	0.00	4			
	0.00	0.00	4	0.00	0.00	4	22.68 C	0.00	4

Below = 174k
✓ OK
[Signature]

126

STAAD PLANE

-- PAGE NO. 4

MIN	1.99	14.67	5	-25.40	14.67	4			
	0.00	14.67	5	0.00	14.67	5	21.64	C	14.67 5
10 MAX	16.70	0.00	5	103.89	0.00	5			
	0.00	0.00	4	0.00	0.00	4	0.25	T	0.00 4
MIN	-16.64	33.00	4	-51.67	18.70	5			
	0.00	33.00	5	0.00	33.00	5	2.14	T	33.00 5
12 MAX	12.85	0.00	5	89.91	33.00	4			
	0.00	0.00	4	0.00	0.00	4	1.59	C	0.00 4
MIN	-13.67	33.00	4	-38.22	14.30	4			
	0.00	33.00	5	0.00	33.00	5	0.64	T	33.00 5
13 MAX	11.00	0.00	5	57.67	0.00	5			
	0.00	0.00	4	0.00	0.00	4	2.23	T	0.00 4
MIN	-10.00	25.67	4	-25.22	15.40	5			
	0.00	25.67	5	0.00	25.67	5	2.35	T	25.67 5
14 MAX	7.38	0.00	5	47.47	33.00	4			
	0.00	0.00	4	0.00	0.00	4	6.45	C	0.00 4
MIN	-7.82	33.00	4	-23.47	14.30	4			
	0.00	33.00	5	0.00	33.00	5	1.73	C	33.00 5
15 MAX	6.37	0.00	5	33.55	0.00	5			
	0.00	0.00	4	0.00	0.00	4	3.48	C	0.00 4
MIN	-5.73	25.67	4	-13.56	14.55	5			
	0.00	25.67	5	0.00	25.67	5	1.99	C	25.67 5

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

74. PRINT SUPPORT REACTION ALL

127

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	4	-0.41	166.91	0.00	0.00	0.00	23.51
	5	7.14	174.12	0.00	0.00	0.00	-57.12
5	4	-6.54	186.46	0.00	0.00	0.00	52.82
	5	0.70	182.57	0.00	0.00	0.00	-26.16
9	4	-1.25	109.59	0.00	0.00	0.00	18.60
	5	0.35	106.27	0.00	0.00	0.00	-9.12

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

75. PRINT SECTION MAX DISPL NSECT 30 LIST 1 TO 10 12 TO 15

128

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.02746	93.00	4	6772
2	0.00974	58.68	4	18068
3	0.01038	124.70	5	16961
4	0.02781	85.25	5	6688
5	0.01837	80.69	5	9585
6	0.00845	124.70	4	20842
7	0.02538	77.50	4	7329
8	0.02610	102.69	4	6744
9	0.00968	51.35	5	18178
10	0.17841	214.50	5	2219
12	0.12150	181.50	4	3259
13	0.08056	179.69	5	3823
14	0.12761	181.50	4	3103
15	0.05638	179.69	5	5463

***** END OF SECT DISPL RESULTS *****

76. PARAMETER
77. CODE LRFD
78. BEAM 1 ALL
79. FYLD 7200 ALL
80. LX 6 MEMB 10 12 TO 15
81. LY 2 MEMB 10 12 TO 15
82. LZ 2 MEMB 10 12 TO 15
83. UNB 6 MEMB 10 12 TO 15
84. UNT 1 MEMB 10 12 TO 15
85. CHECK CODE ALL

129

STAAD.Pro CODE CHECKING - (LRF3)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W18 X76	PASS 174.12 C	LRFD-H1-1A-C 0.00	0.390 -57.12	5 0.00
2	ST W18 X76	PASS 103.43 C	LRFD-H1-1B-C 0.00	0.177 -50.42	5 0.00
3	ST W18 X76	PASS 46.98 C	LRFD-H1-1B-C 0.00	0.113 40.76	5 14.67
4	ST W18 X76	PASS 186.46 C	LRFD-H1-1A-C 0.00	0.404 52.82	4 0.00
5	ST W18 X76	PASS 116.94 C	LRFD-H1-1B-C 0.00	0.196 54.68	4 0.00
6	ST W18 X76	PASS 51.88 C	LRFD-H1-1B-C 0.00	0.092 -27.29	4 14.67
7	ST W14 X61	PASS 109.59 C	LRFD-H1-1A-C 0.00	0.269 18.60	4 0.00
8	ST W14 X61	PASS 69.02 C	LRFD-H1-1B-C 0.00	0.123 -19.40	4 14.67
9	ST W14 X61	PASS 22.68 C	LRFD-H1-1B-C 0.00	0.096 25.62	4 0.00
10	ST W24 X55	PASS 2.14 T	LRFD-H1-1B-T 0.00	0.219 103.89	5 0.00
12	ST W24 X55	PASS 1.59 C	LRFD-H1-1B-C 0.00	0.190 89.91	4 33.00

130

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
13	ST W21 X44	PASS 2.35 T	LRFD-H1-1B-T 0.00	0.174 57.67	5 0.00
14	ST W21 X44	PASS 6.45 C	LRFD-H1-1B-C 0.00	0.149 47.47	4 33.00
15	ST W18 X40	PASS 1.99 C	LRFD-H1-1B-C 0.00	0.124 33.55	5 0.00

***** END OF TABULATED RESULT OF DESIGN *****

86. FINISH

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

**** DATE= MAR 17,2006 TIME= 15:50:10 ****

* For questions on STAAD.Pro, please contact : *
* By Email - North America : support@reiusa.com *
* By Email - International : support@reiworld.com *
* Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

131

```

*****
*
*          STAAD.Pro          *
*          Version 2003      Bld 1002.US  *
*          Proprietary Program of        *
*          Research Engineers, Intl.     *
*          Date=   MAR 17, 2006         *
*          Time=   16:20:33             *
*
*          USER ID: morphy makofsky inc  *
*****
    
```

1. STAAD PLANE
2. START JOB INFORMATION SECOND FLOOR BEAMS MISSING
3. ENGINEER DATE 17-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 15.5 0; 3 0 30.17 0; 4 0 44.84 0; 5 33 0 0; 6 33 15.5 0
9. 7 33 30.17 0; 8 33 44.84 0; 9 58.67 0 0; 10 58.67 15.5 0; 11 58.67 30.17 0
10. 12 58.67 44.84 0
11. MEMBER INCIDENCES
12. 1 1 2; 2 2 3; 3 3 4; 4 5 6; 5 6 7; 6 7 8; 7 9 10; 8 10 11; 9 11 12; 12 3 7
13. 13 7 11; 14 4 8; 15 8 12
14. DEFINE MATERIAL START
15. ISOTROPIC STEEL
16. E 4.176E+006
17. POISSON 0.3
18. DENSITY 0.489024
19. ALPHA 6.5E-006
20. DAMP 0.03
21. END DEFINE MATERIAL
22. CONSTANTS
23. MATERIAL STEEL MEMB 1 TO 9 12 TO 15
24. MEMBER PROPERTY AMERICAN
25. 1 TO 6 TABLE ST W18X76
26. 7 TO 9 TABLE ST W14X61
27. 12 TABLE ST W24X55
28. 13 TABLE ST W21X44
29. 14 TABLE ST W21X44
30. 15 TABLE ST W18X40
31. SUPPORTS
32. 1 5 9 FIXED
33. LOAD 1 DEAD
34. JOINT LOAD
35. 4 FY -28
36. 3 FY -28
37. 2 FY -20
38. 7 8 FY -27.4
39. 6 FY -19.6
40. 10 FY -23.1
41. 11 FY -26.7

132

STAAD PLANE

-- PAGE NO. 2

42. 12 FY -12
 43. MEMBER LOAD
 44. 14 15 UNI GY -0.33
 45. 12 13 UNI GY -0.47
 46. LOAD 2 LIVE
 47. JOINT LOAD
 48. 4 FY -12
 49. 3 FY -20
 50. 2 FY -60
 51. 7 FY -19.6
 52. 8 FY -11.7
 53. 6 FY -58.7
 54. 10 FY -25.7
 55. 11 FY -8.6
 56. 12 FY -5.1
 57. MEMBER LOAD
 58. 12 13 UNI GY -0.33
 59. 14 15 UNI GY -0.07
 60. LOAD 3 WIND
 61. JOINT LOAD
 62. 4 FX 15.4
 63. 3 FX 12.9
 64. 2 FX 12.7
 65. LOAD COMB 4 DEAD LIVE WIND
 66. 1 1.2 2 0.5 3 0.2
 67. LOAD COMB 5 DEAD LIVE -WIND
 68. 1 1.2 2 0.5 3 -0.2
 69. PERFORM ANALYSIS

PROBLEM STATISTICS

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 12/ 13/ 3
 ORIGINAL/FINAL BAND-WIDTH= 4/ 3/ 12 DOF
 TOTAL PRIMARY LOAD CASES = 3, TOTAL DEGREES OF FREEDOM = 27
 SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
 REQD/AVAIL. DISK SPACE = 12.0/ 25388.4 MB, EXMEM = 1628.1 MB

70. PDELTA 2 ANALYSIS
 ++ Adjusting Displacements 16:20:33
 ++ Adjusting Displacements 16:20:33

71. LOAD LIST 4 5
 72. PRINT MAXFORCE ENVELOPE NSECTION 30 LIST 1 TO 9 12 TO 15

139

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	3.18	0.00	4	48.84	0.00	4			
	0.00	0.00	4	0.00	0.00	4	157.80 C	0.00	5
MIN	-4.76	15.50	5	-63.47	0.00	5			
	0.00	15.50	5	0.00	15.50	5	153.42 C	15.50	4
2 MAX	0.66	0.00	4	42.69	14.67	5			
	0.00	0.00	4	0.00	0.00	4	103.80 C	0.00	5
MIN	-2.20	14.67	5	-10.11	14.67	4			
	0.00	14.67	5	0.00	14.67	5	99.42 C	14.67	4
3 MAX	-3.97	0.00	4	42.40	14.67	5			
	0.00	0.00	4	0.00	0.00	4	47.04 C	0.00	5
MIN	-5.44	14.67	5	-37.41	0.00	5			
	0.00	14.67	5	0.00	14.67	5	45.90 C	14.67	4
4 MAX	3.22	0.00	4	51.99	0.00	4			
	0.00	0.00	4	0.00	0.00	4	170.02 C	0.00	4
MIN	-2.52	15.50	5	-43.79	0.00	5			
	0.00	15.50	5	0.00	15.50	5	170.01 C	15.50	5
5 MAX	3.21	0.00	4	32.19	14.67	5			
	0.00	0.00	4	0.00	0.00	4	117.15 C	0.00	4
MIN	-2.52	14.67	5	-45.10	14.67	4			
	0.00	14.67	5	0.00	14.67	5	117.14 C	14.67	5
6 MAX	3.69	0.00	4	23.31	0.00	4			
	0.00	0.00	4	0.00	0.00	4	51.93 C	0.00	5
MIN	0.38	14.67	5	-30.78	14.67	4			
	0.00	14.67	5	0.00	14.67	5	51.89 C	14.67	4
7 MAX	1.81	0.00	4	27.66	0.00	4			
	0.00	0.00	4	0.00	0.00	4	109.95 C	0.00	4
MIN	-0.91	15.50	5	-18.15	0.00	5			
	0.00	15.50	5	0.00	15.50	5	105.58 C	15.50	5
8 MAX	1.80	0.00	4	9.61	14.67	5			
	0.00	0.00	4	0.00	0.00	4	69.38 C	0.00	4
MIN	-0.93	14.67	5	-26.66	14.67	4			
	0.00	14.67	5	0.00	14.67	5	65.01 C	14.67	5
9 MAX	3.37	0.00	4	23.19	0.00	4			
	0.00	0.00	4	0.00	0.00	4	22.78 C	0.00	4

1374

STAAD PLANE						-- PAGE NO.		4	
MIN	1.98	14.67	5	-26.26	14.67	4			
	0.00	14.67	5	0.00	14.67	5	21.60 C	14.67	5
12 MAX	13.16	0.00	5	94.96	33.00	4			
	0.00	0.00	4	0.00	0.00	4	2.05 T	0.00	4
MIN	-14.14	33.00	4	-42.04	13.20	4			
	0.00	33.00	5	0.00	33.00	5	5.80 T	33.00	5
13 MAX	11.64	0.00	5	66.99	0.00	5			
	0.00	0.00	4	0.00	0.00	4	1.58 T	0.00	4
MIN	-10.26	25.67	4	-25.92	16.26	5			
	0.00	25.67	5	0.00	25.67	5	2.90 T	25.67	5
14 MAX	7.44	0.00	5	49.48	33.00	4			
	0.00	0.00	4	0.00	0.00	4	7.05 C	0.00	4
MIN	-7.92	33.00	4	-23.29	14.30	4			
	0.00	33.00	5	0.00	33.00	5	2.36 C	33.00	5
15 MAX	6.42	0.00	5	33.82	0.00	5			
	0.00	0.00	4	0.00	0.00	4	3.37 C	0.00	4
MIN	-5.83	25.67	4	-13.92	14.55	5			
	0.00	25.67	5	0.00	25.67	5	1.98 C	25.67	5

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

73. PRINT SUPPORT REACTION ALL

135

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	4	-3.20	153.42	0.00	0.00	0.00	48.84
	5	4.77	157.80	0.00	0.00	0.00	-63.47
5	4	-3.21	170.02	0.00	0.00	0.00	51.99
	5	2.52	170.01	0.00	0.00	0.00	-43.79
9	4	-1.78	109.95	0.00	0.00	0.00	27.66
	5	0.91	105.58	0.00	0.00	0.00	-18.15

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

74. PRINT SECTION MAX DISPL NSECT 30 LIST 1 TO 9 12 TO 15

136

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.03742	77.50	5	4970
2	0.03228	95.36	5	5453
3	0.01038	51.35	4	16960
4	0.03716	77.50	4	5005
5	0.02675	102.69	4	6581
6	0.00746	124.70	4	23590
7	0.03927	77.50	4	4736
8	0.03463	102.69	4	5083
9	0.01128	51.35	5	15612
12	0.13947	165.00	4	2839
13	0.07726	179.69	5	3987
14	0.12425	181.50	4	3187
15	0.05881	179.69	5	5237

***** END OF SECT DISPL RESULTS *****

- 75. PARAMETER
- 76. CODE LRFD
- 77. BEAM 1 ALL
- 78. FYLD 7200 ALL
- 79. LX 6 MEMB 12 TO 15
- 80. LY 2 MEMB 12 TO 15
- 81. LZ 2 MEMB 12 TO 15
- 82. UNB 6 MEMB 12 TO 15
- 83. UNT 1 MEMB 12 TO 15
- 84. CHECK CODE ALL

137

STAAD.Pro CODE CHECKING - (LRF3)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W18 X76	PASS 157.80 C	LRFD-H1-1A-C 0.00	0.373 -63.47	5 0.00
2	ST W18 X76	PASS 103.80 C	LRFD-H1-1B-C 0.00	0.163 42.69	5 14.67
3	ST W18 X76	PASS 47.04 C	LRFD-H1-1B-C 0.00	0.116 42.40	5 14.67
4	ST W18 X76	PASS 170.02 C	LRFD-H1-1A-C 0.00	0.375 51.99	4 0.00
5	ST W18 X76	PASS 117.15 C	LRFD-H1-1B-C 0.00	0.178 -45.10	4 14.67
6	ST W18 X76	PASS 51.89 C	LRFD-H1-1B-C 0.00	0.099 -30.78	4 14.67
7	ST W14 X61	PASS 109.95 C	LRFD-H1-1A-C 0.00	0.293 27.66	4 0.00
8	ST W14 X61	PASS 69.38 C	LRFD-H1-1B-C 0.00	0.144 -26.66	4 14.67
9	ST W14 X61	PASS 22.78 C	LRFD-H1-1B-C 0.00	0.098 -26.26	4 14.67
12	ST W24 X55	PASS 2.05 T	LRFD-H1-1B-T 0.00	0.200 94.96	4 33.00
13	ST W21 X44	PASS 2.90 T	LRFD-H1-1B-T 0.00	0.203 66.99	5 0.00

138

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
14	ST W21 X44	PASS 7.05 C	LRFD-H1-1B-C 0.00	0.155 49.48	4 33.00
15	ST W18 X40	PASS 1.98 C	LRFD-H1-1B-C 0.00	0.125 33.82	5 0.00

***** END OF TABULATED RESULT OF DESIGN *****

85. FINISH

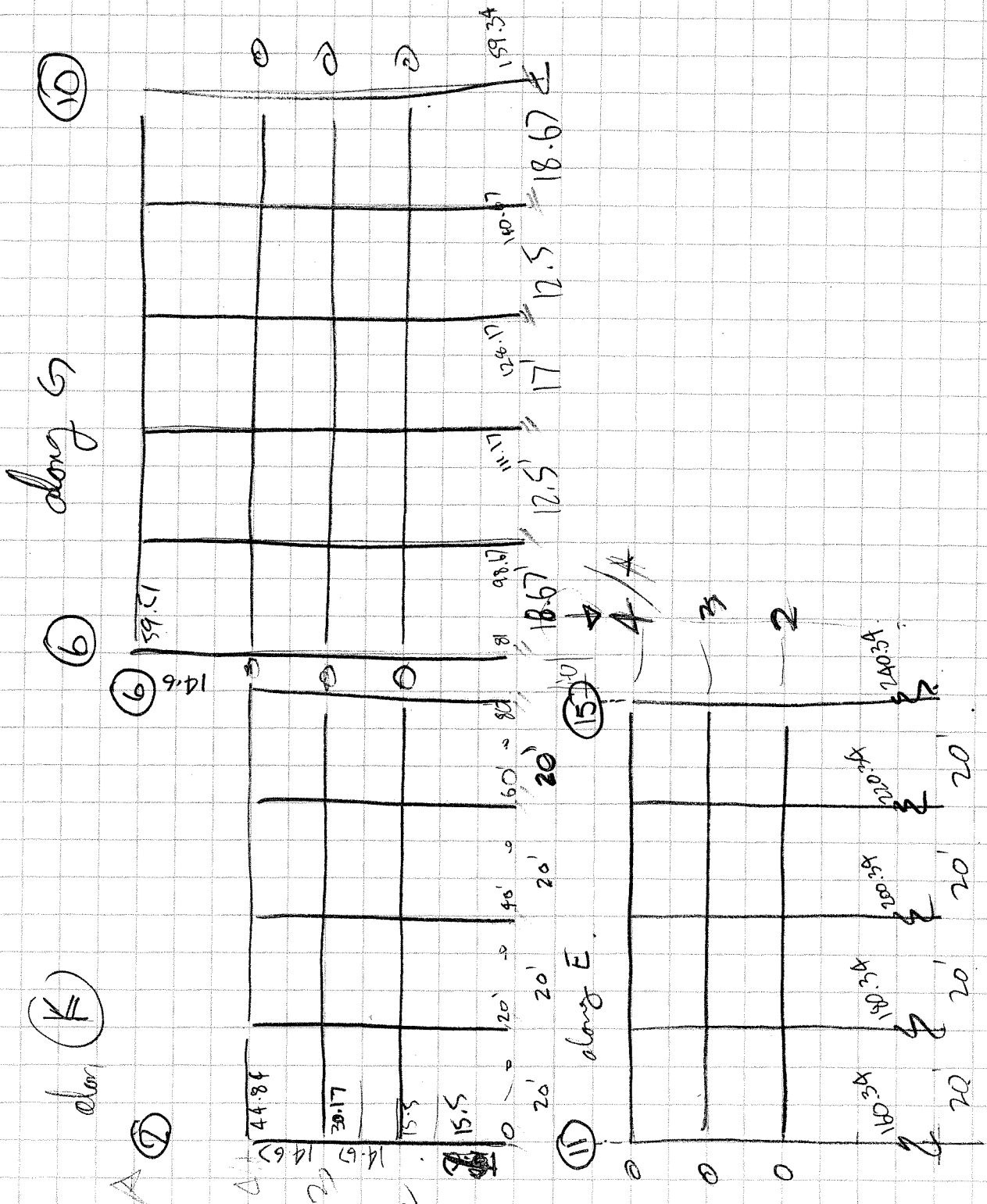
***** END OF THE STAAD.Pro RUN *****

**** DATE= MAR 17,2006 TIME= 16:20:34 ****

 * For questions on STAAD.Pro, please contact : *
 * By Email - North America : support@reiusa.com *
 * By Email - International : support@reiworld.com *
 * Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

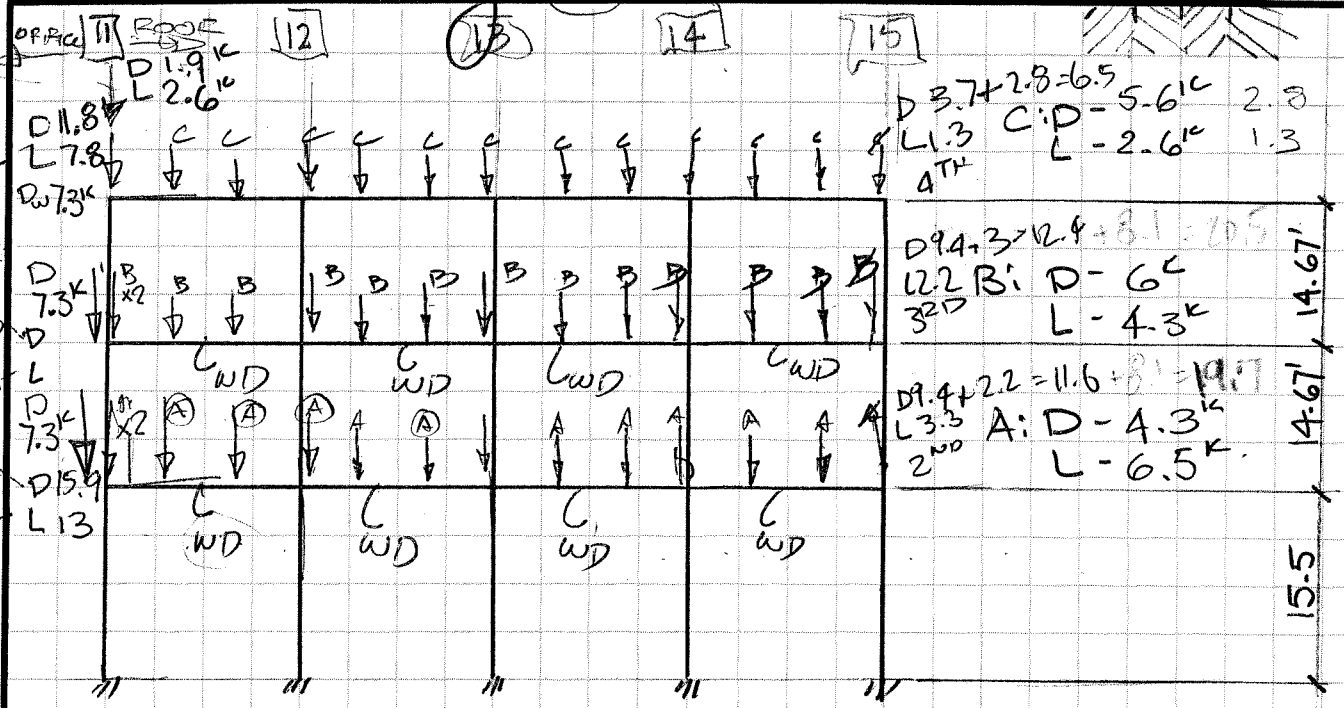
139

Main wind frame EAST WEST



JLS	3-25-06	140
-----	---------	-----

Frame along E



2ND LOCKER

DL	50
LL	75
TL	125

$WD = 0.73 \text{ k/ft}$

$A_{req} \sim \frac{25.17 \times 6.67}{2} = 86 \text{ in}^2$

3RD OFFICE

D	70
L	50
T	120

Walls?

$W_{wall} = 55$
 $B_{wall} = 40$
 $\rho = 95 \text{ \#/ft}^3$
 $\times 14.67 = 1.38 \text{ k/ft}$

4TH ATTIC

D	50
L	10
T	60

Roof

D	15
L	20
T	35

JLS 3-27-06 *KH*





Software licensed to morphy makofsky inc

Job No

Sheet No

1

Rev

Part

Job Title

Ref

By

Date 27-Mar-06

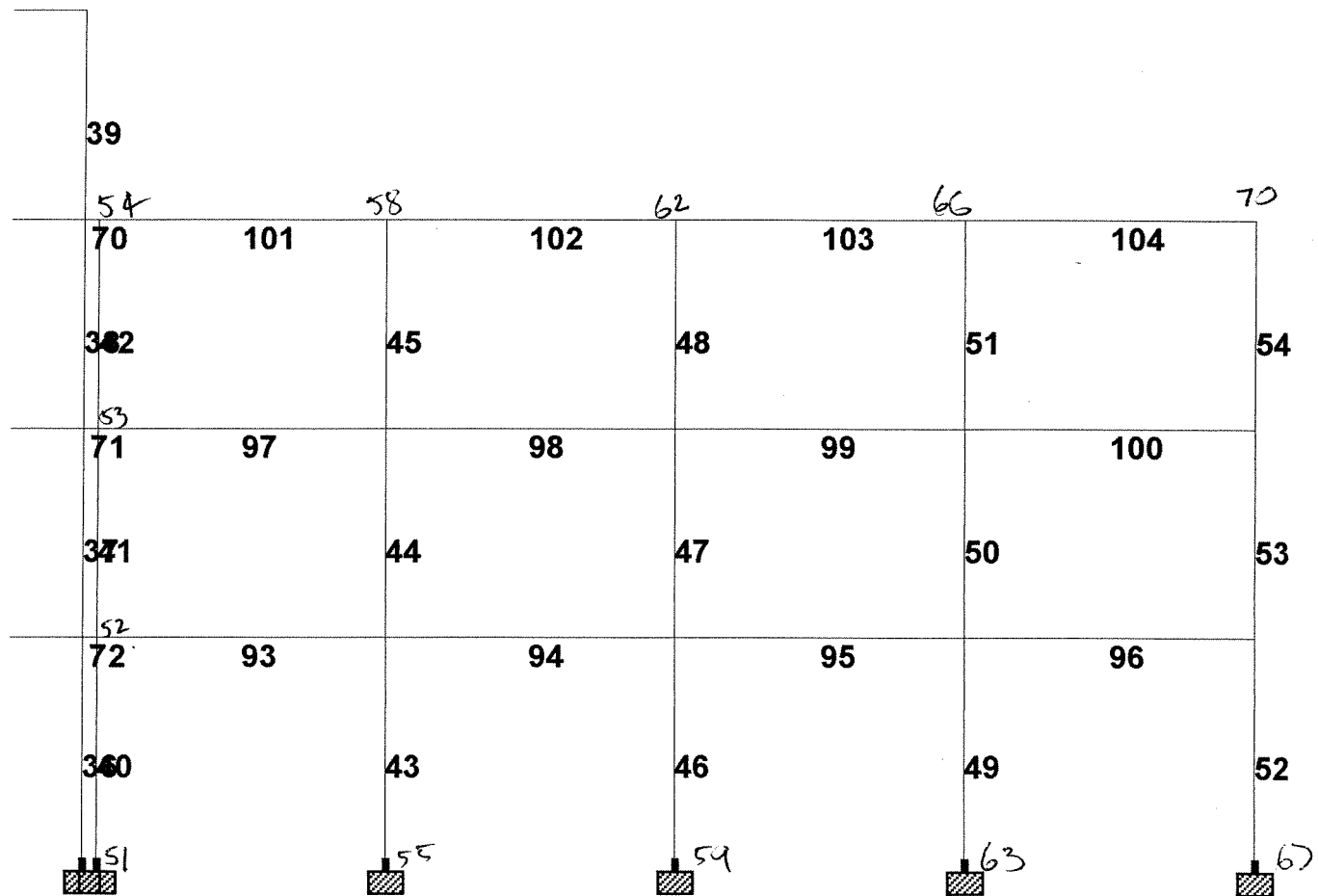
Chd

Client

File FR-E-W.std

Date/Time 29-Mar-2006 13:27

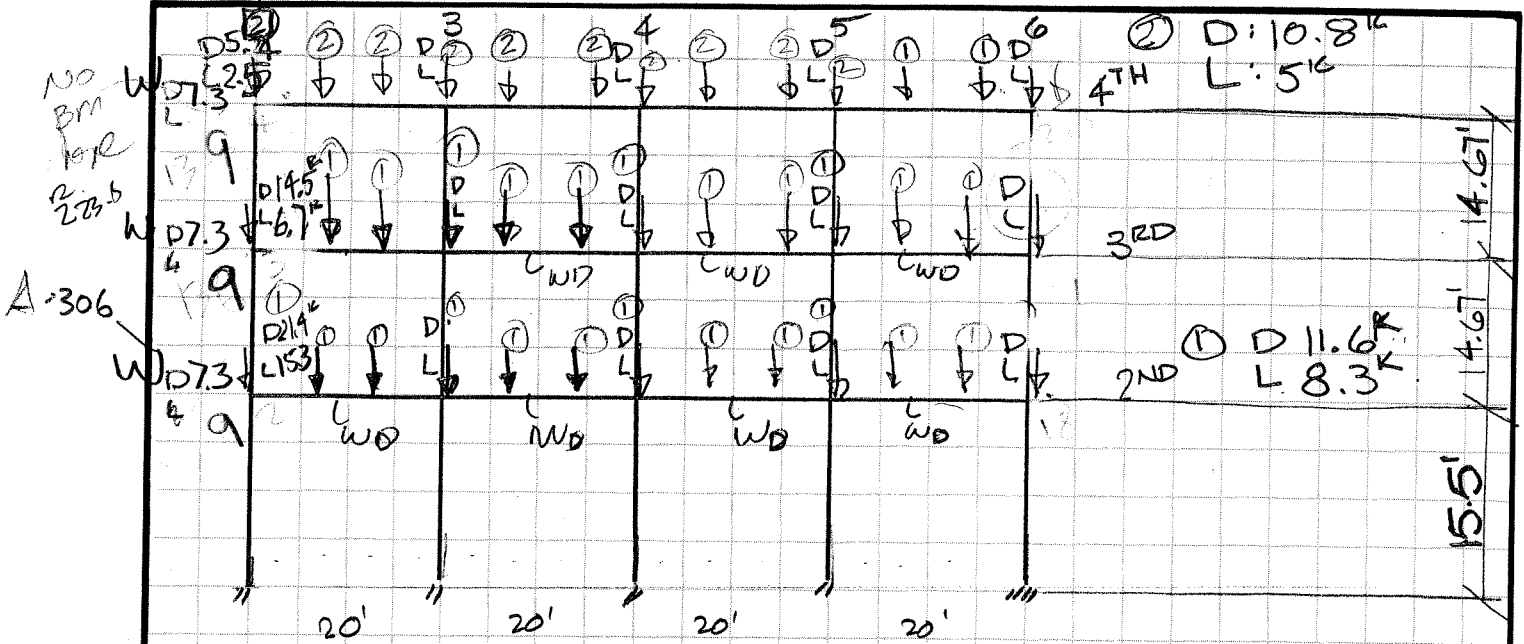
E



150
 60 K
 -158 K

142

K-FRAME



2ND: D 70
L 50
TL 120

3RD: D 70
L 50
TL 120

4TH OFFICE: D 70
L 50
TL 120

ATTIC: D 50
L 10
TL 60

ROOF: D 15
L 20
TL 35

Bay width = 49.67'
Area = 1660

EXT WALL
BRICK 40
STODete 10
D 50 PSF
x 14.67
= 734 PLF.

REVISE:
EXT WALL
BRICK 40
CMU (Reinf) 55
95 PSF
x 14.67
= 1,394 PLF

JLS 3-27-06

123





Software licensed to morphy makofsky inc

Job No

Sheet No

1

Rev

Part

Job Title

Ref

By

Date 27-Mar-06

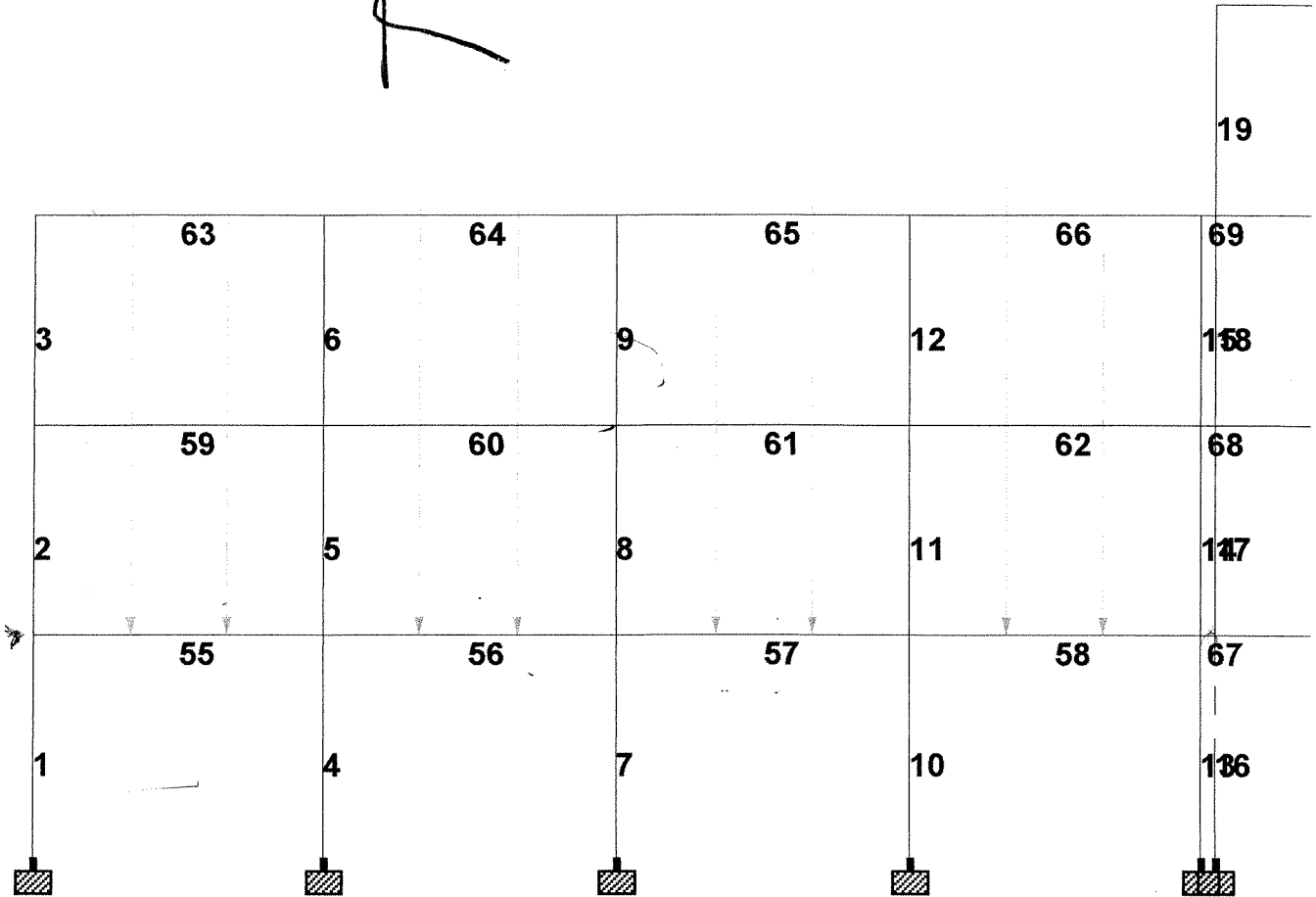
Chd

Client

File FR-E-W.std

Date/Time 29-Mar-2006 13:27

K



144

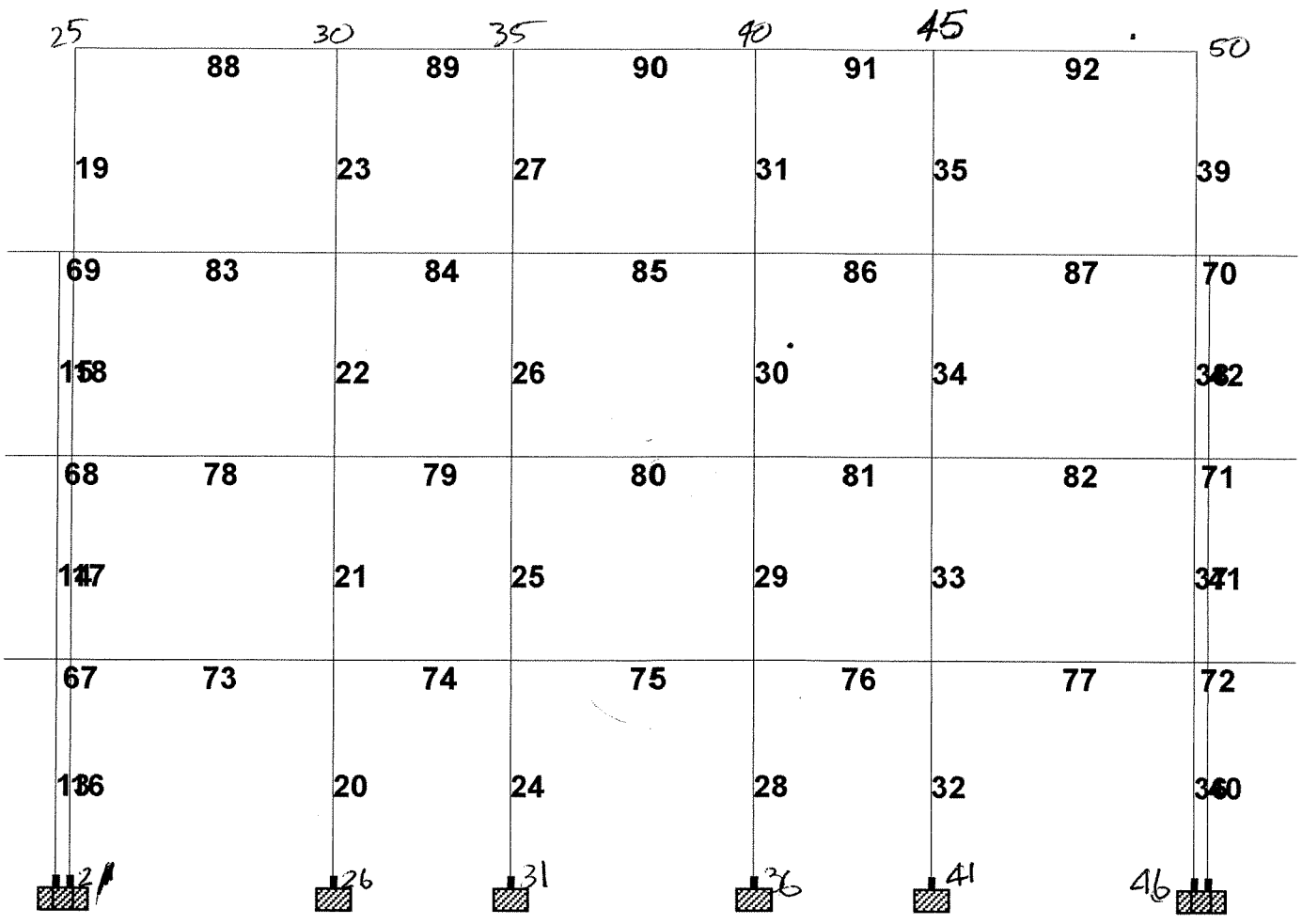
47
139



Software licensed to morphy makofsky inc

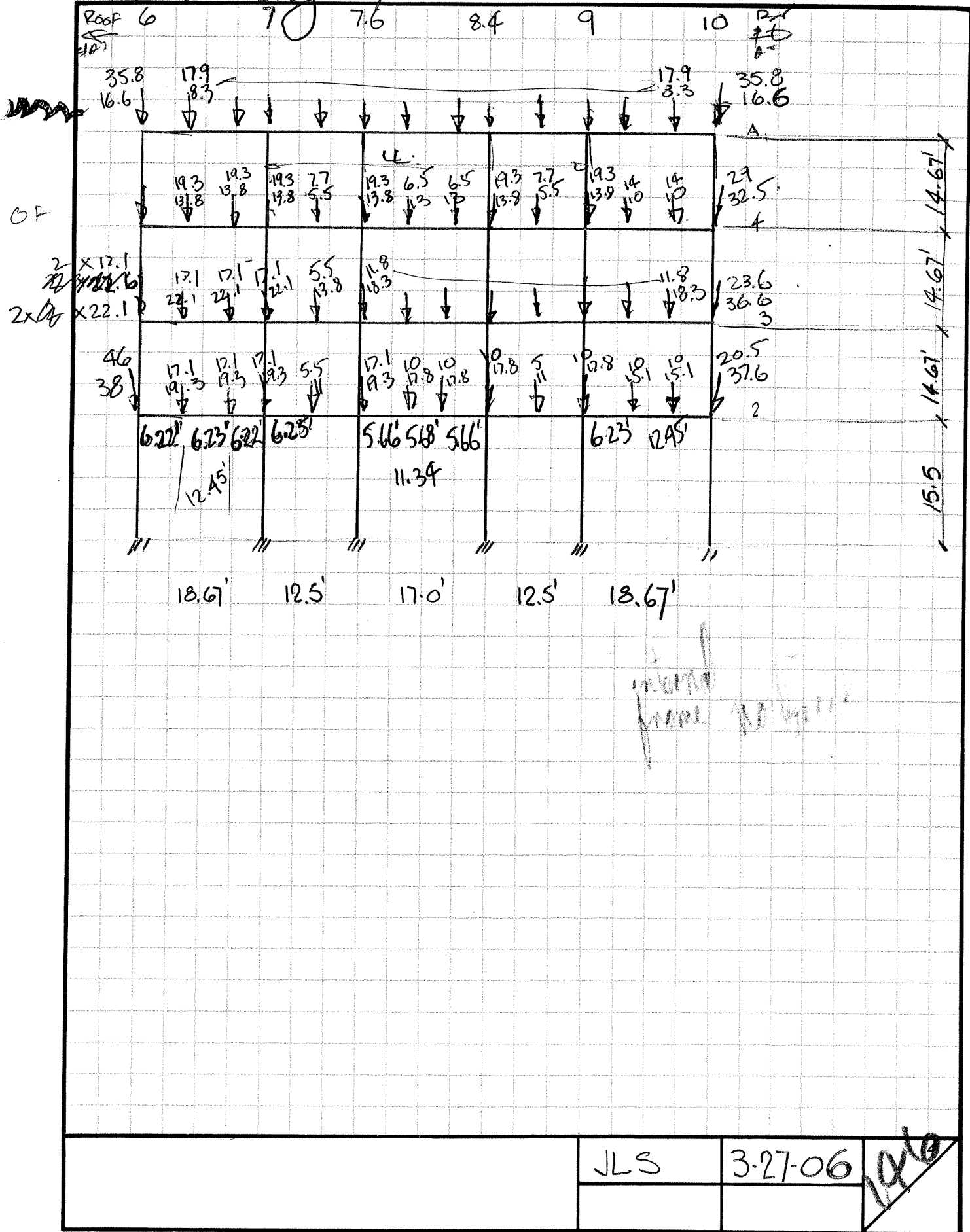
Job No	Sheet No 1	Rev
Part	Ref	
By	Date 27-Mar-06	Chd
Client	File FR-E-W.std	Date/Time 29-Mar-2006 13:27

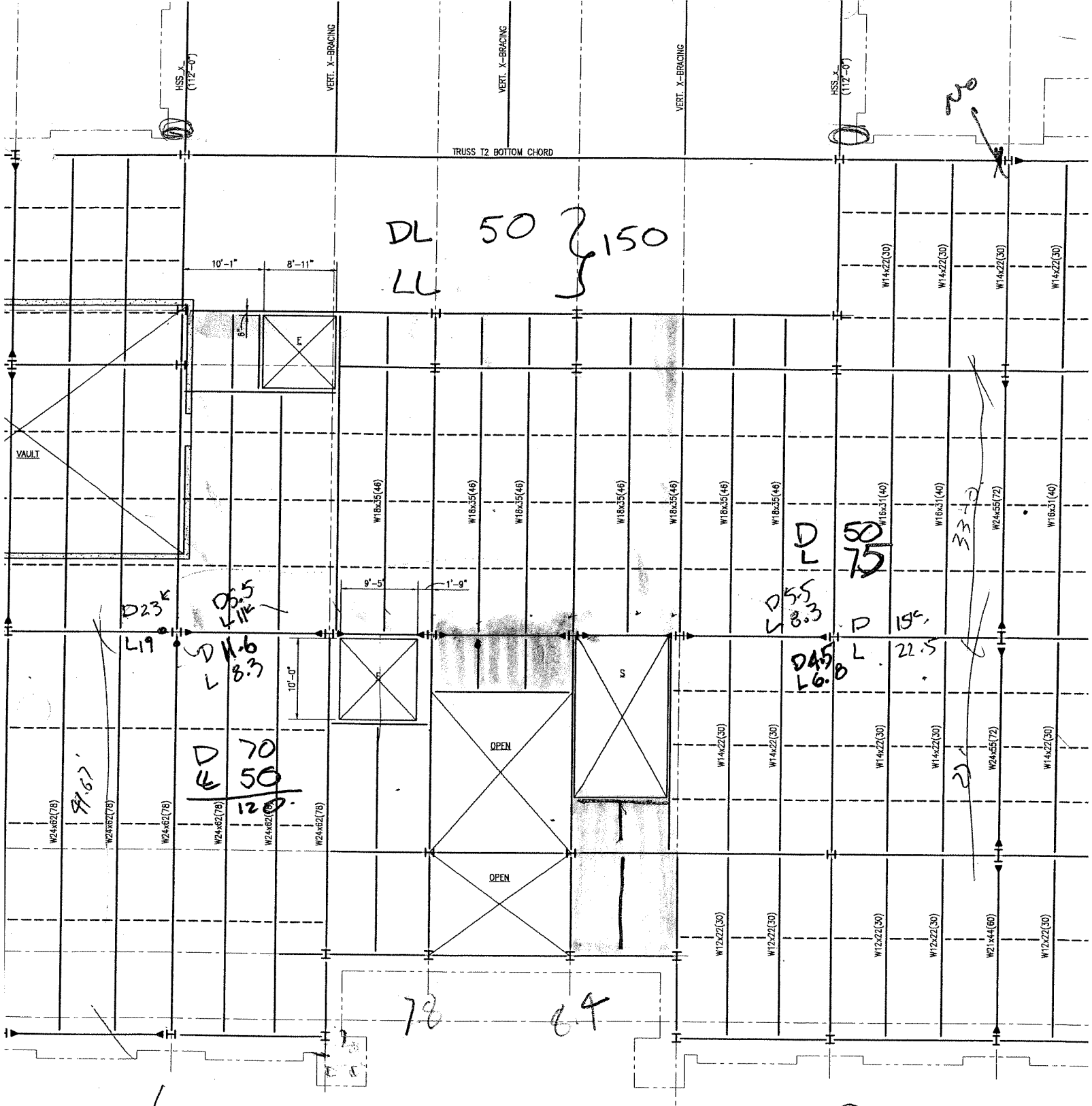
G



145

Frame along



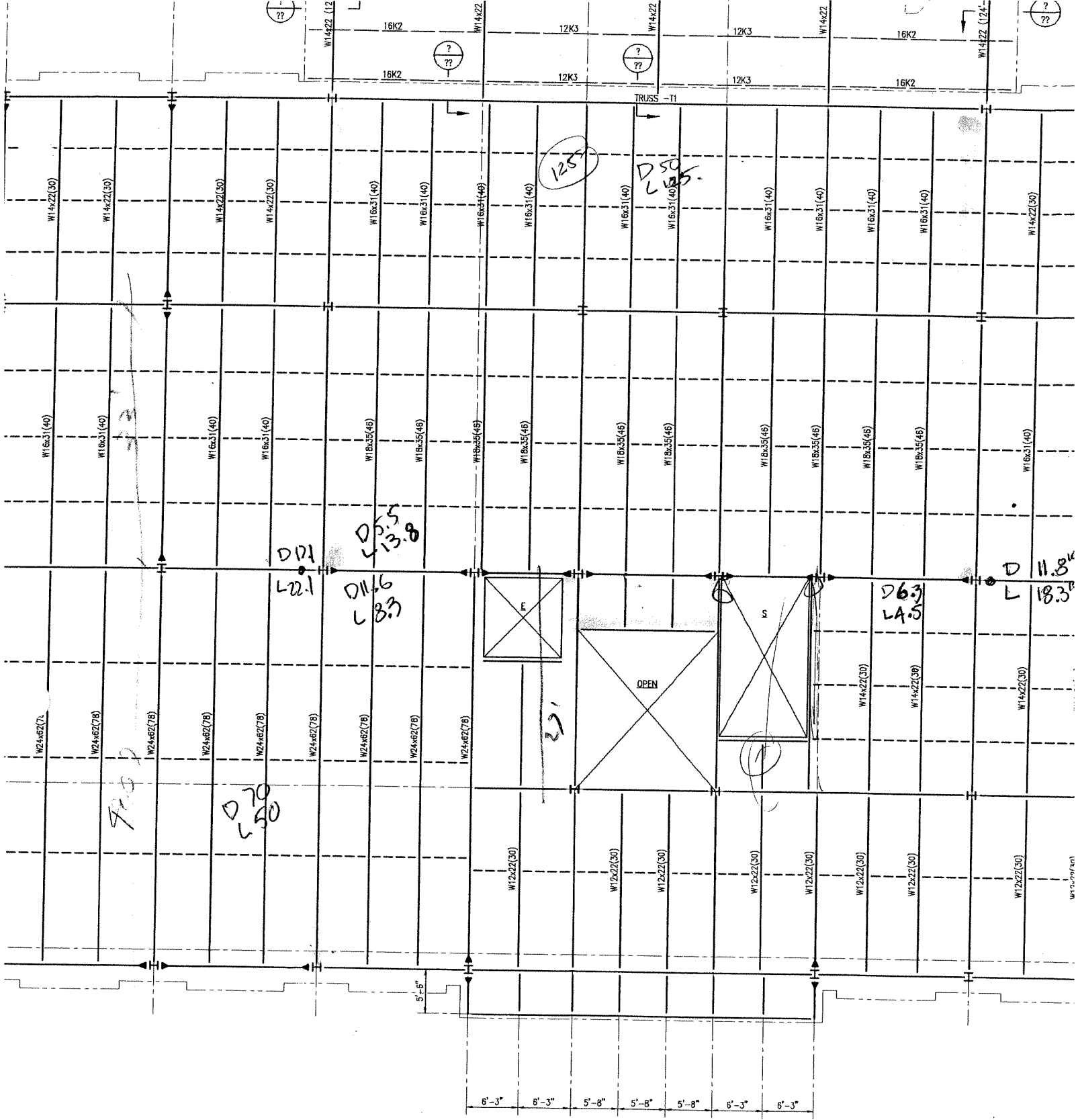


- PLAN NOTES, UNLESS NOTED OTHERWISE:
1. TOP OF SLAB EL. 116'-8"
 2. TOP OF STRUCTURAL STEEL EL. 115'-3 1/4"
 3. FLOOR SYSTEM CONSISTS OF LI. WT. CONCRETE ON 1/2" METAL FLOOR DECK, TOTAL THICKNESS EQUALS 4 3/4". REINF. W/6x8 - 10/10 W.W.M. PLACE 1" BELOW TOP OF CONCRETE.
 4. - INDICATES MOMENT CONNECTION. SEE SHT. S001 FOR DETAILS.

1 SECOND FLOOR FRAMING PLAN
S102 1/8"=1'-0"



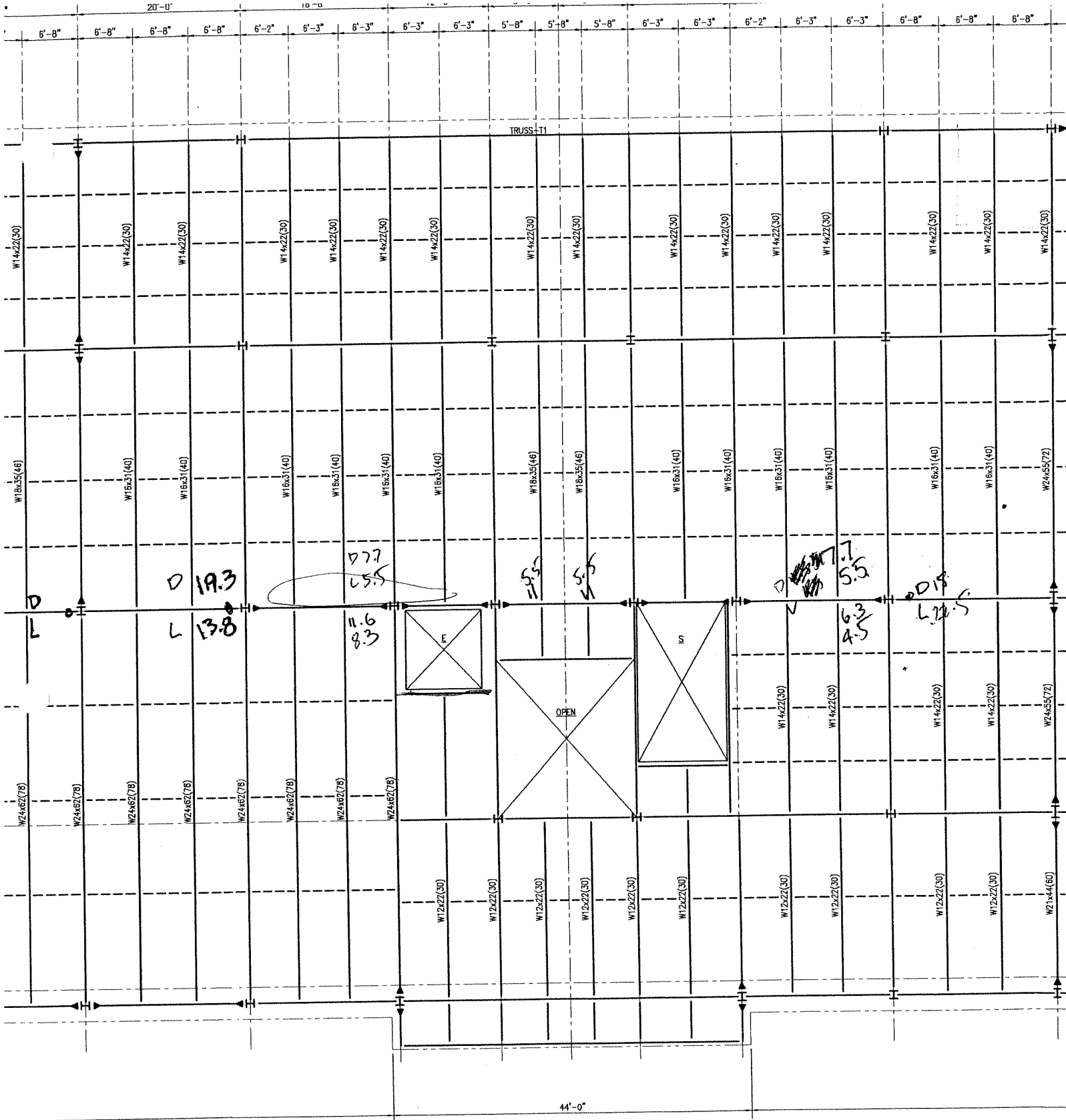
147



- PLAN NOTES: UNLESS NOTED OTHERWISE:
1. TOP OF SLAB EL. 131'-4"
 2. TOP OF STEEL EL. 129'-11 1/2"
 3. FLOOR SYSTEM CONSISTS OF LT. WT. CONCRETE ON 1 1/2" METAL FLOOR DECK, TOTAL THICKNESS EQUALS 4 1/2". REINF. W/6x6 - 10/10 W.W.M. PLACE 1" BELOW TOP OF CONCRETE.
 4. $\overrightarrow{\text{---}} \overleftarrow{\text{---}}$ - INDICATES MOMENT CONNECTION. SEE SHT. S001 FOR DETAILS.

① THIRD FLOOR & ATTIC FRAMING PLAN
 S103 1/8" = 1'-0"

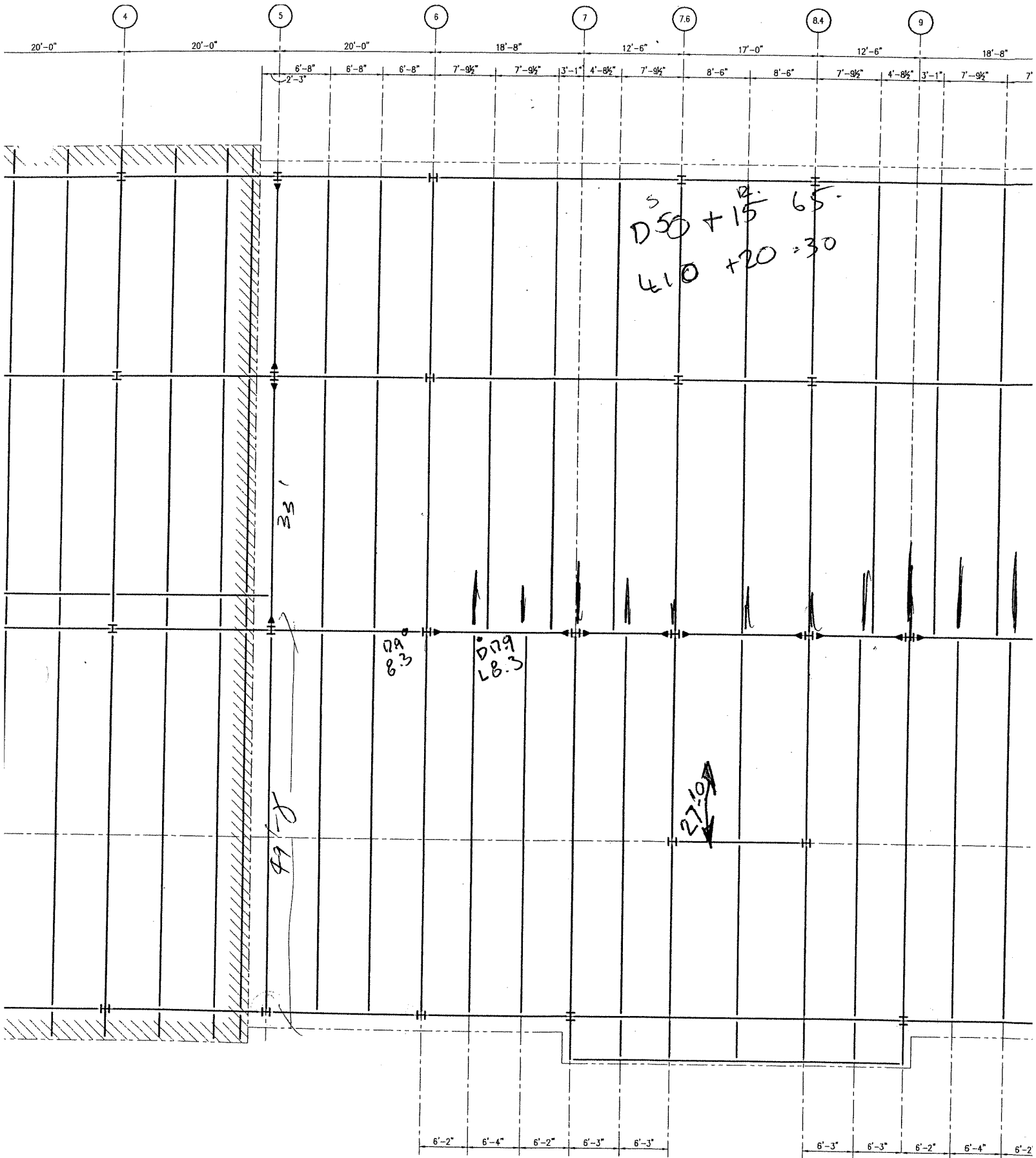
148





- PLAN NOTES: UNLESS NOTED OTHERWISE:
1. TOP OF SLAB EL. 146'-0"
 2. TOP OF STRUCTURAL STEEL EL. 144'-7 1/4"
 3. FLOOR SYSTEM CONSISTS OF LT. WT. CONCRETE ON 1/2" METAL FLOOR DECK, TOTAL THICKNESS EQUALS 4 3/4". REINF. W/6x6 - 10/10 W.W.M. PLACE 1" BELOW TOP OF CONCRETE.
 4. ———— INDICATES MOMENT CONNECTION. SEE SHT. S001 FOR DETAILS.
 5. [Diagonal Bracing Symbol] INDICATES AREA OF 1/2" METAL ROOF DECK.

1 FOURTH FLOOR & ATTIC
 S104 FRAMING PLAN 1/8"=1'-0"

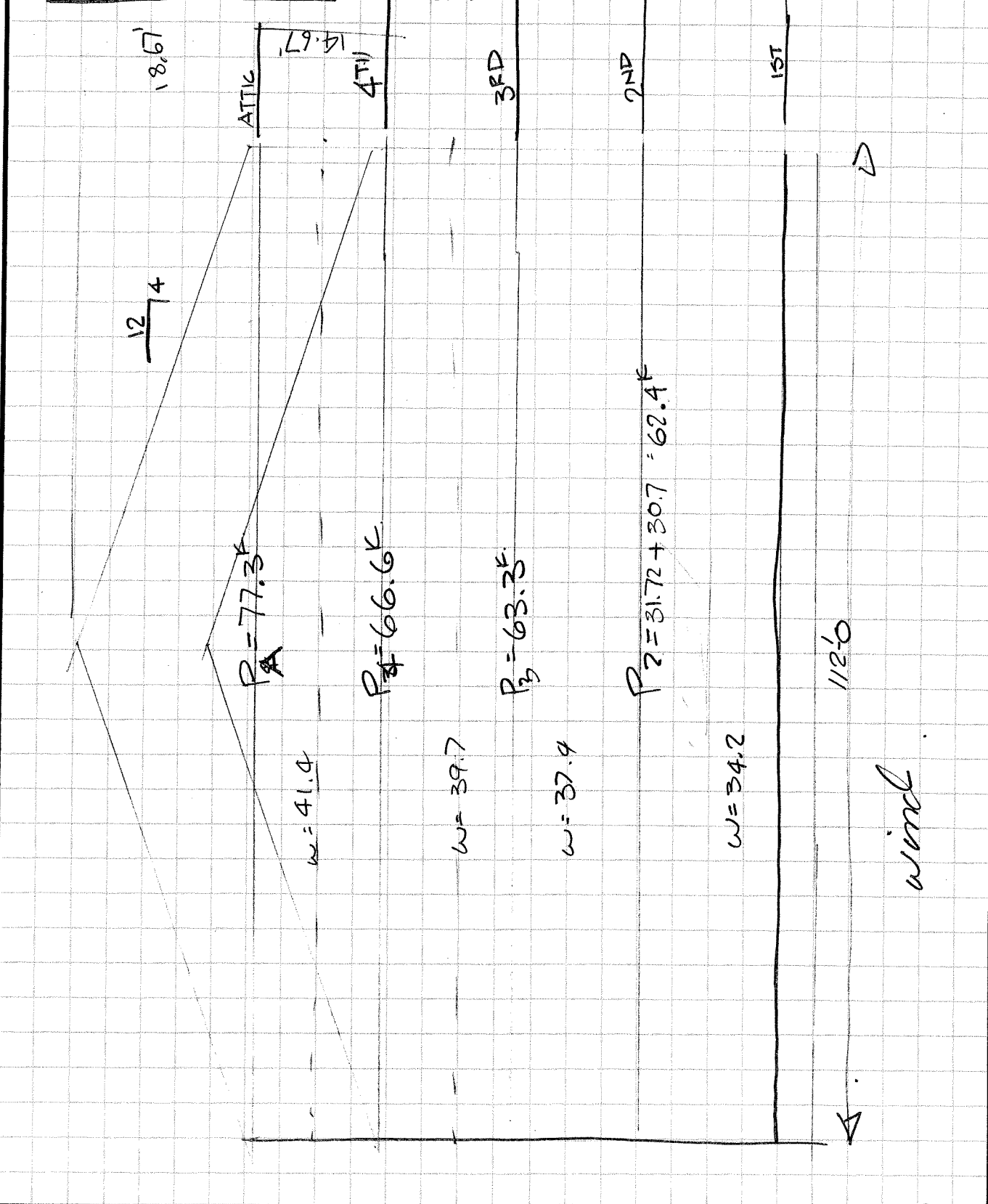
149



- PLAN NOTES: UNLESS NOTED OTHERWISE:
1. TOP OF SLAB EL. 160'-3 1/4"
 2. TOP OF STRUCTURAL STEEL EL. 159'-3 1/4"
 3. FLOOR SYSTEM CONSISTS OF LT. WT. CONCRETE ON 1 1/2" METAL FLOOR DECK, TOTAL THICKNESS EQUALS 4 1/4". REINF. W/6x6 - 10/10 W.W.M. PLACE 1" BELOW TOP OF CONCRETE.
 4.  INDICATES MOMENT CONNECTION. SEE SHT. S001 FOR DETAILS.
 5.  INDICATES AREA OF 1/2" METAL ROOF DECK.

150

wind east-west.



12/14

18.67'

ATTIC

14.67'

4TH

14.67

14.67

14.67

1ST

$P_A = 77.3^{\circ}F$

$P_4 = 66.6^{\circ}F$

$P_3 = 63.7^{\circ}F$

$P_2 = 31.72 + 30.7 = 62.4^{\circ}F$

$w = 41.4$

$w = 39.7$

$w = 37.9$

$w = 34.2$

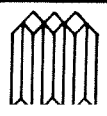
112'0"

wind

JLS

3-29-06

1ST



```

*****
*
*          STAAD.Pro
*          Version 2003   Bld 1002.US
*          Proprietary Program of
*          Research Engineers, Intl.
*          Date=  APR 17, 2006
*          Time=  16:28:23
*
*          USER ID: morphy makofsky inc
*****

```

w/cmu

1. STAAD PLANE
2. START JOB INFORMATION
3. ENGINEER DATE 27-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 15.5 0; 3 0 30.17 0; 4 0 44.84 0; 5 20 0 0; 6 20 15.5 0
9. 7 20 30.17 0; 8 20 44.84 0; 9 40 0 0; 10 40 15.5 0; 11 40 30.17 0
10. 12 40 44.84 0; 13 60 0 0; 14 60 15.5 0; 15 60 30.17 0; 16 60 44.84 0
11. 17 80 0 0; 18 80 15.5 0; 19 80 30.17 0; 20 80 44.84 0; 21 81 0 0; 22 81 15.5 0
12. 23 81 30.17 0; 24 81 44.84 0; 25 81 59.5 0; 26 99.67 0 0; 27 99.67 15.5 0
13. 28 99.67 30.17 0; 29 99.67 44.84 0; 30 99.67 59.5 0; 31 112.17 0 0
14. 32 112.17 15.5 0; 33 112.17 30.17 0; 34 112.17 44.84 0; 35 112.17 59.5 0
15. 36 129.17 0 0; 37 129.17 15.5 0; 38 129.17 30.17 0; 39 129.17 44.84 0
16. 40 129.17 59.5 0; 41 141.67 0 0; 42 141.67 15.5 0; 43 141.67 30.17 0
17. 44 141.67 44.84 0; 45 141.67 59.5 0; 46 160.34 0 0; 47 160.34 15.5 0
18. 48 160.34 30.17 0; 49 160.34 44.84 0; 50 160.34 59.5 0; 51 161.34 0 0
19. 52 161.34 15.5 0; 53 161.34 30.17 0; 54 161.34 44.84 0; 55 181.34 0 0
20. 56 181.34 15.5 0; 57 181.34 30.17 0; 58 181.34 44.84 0; 59 201.34 0 0
21. 60 201.34 15.5 0; 61 201.34 30.17 0; 62 201.34 44.84 0; 63 221.34 0 0
22. 64 221.34 15.5 0; 65 221.34 30.17 0; 66 221.34 44.84 0; 67 241.34 0 0
23. 68 241.34 15.5 0; 69 241.34 30.17 0; 70 241.34 44.84 0
24. MEMBER INCIDENCES
25. 1 1 2; 2 2 3; 3 3 4; 4 5 6; 5 6 7; 6 7 8; 7 9 10; 8 10 11; 9 11 12; 10 13 14
26. 11 14 15; 12 15 16; 13 17 18; 14 18 19; 15 19 20; 16 21 22; 17 22 23; 18 23 24
27. 19 24 25; 20 26 27; 21 27 28; 22 28 29; 23 29 30; 24 31 32; 25 32 33; 26 33 34
28. 27 34 35; 28 36 37; 29 37 38; 30 38 39; 31 39 40; 32 41 42; 33 42 43; 34 43 44
29. 35 44 45; 36 46 47; 37 47 48; 38 48 49; 39 49 50; 40 51 52; 41 52 53; 42 53 54
30. 43 55 56; 44 56 57; 45 57 58; 46 59 60; 47 60 61; 48 61 62; 49 63 64; 50 64 65
31. 51 65 66; 52 67 68; 53 68 69; 54 69 70; 55 2 6; 56 6 10; 57 10 14; 58 14 18
32. 59 3 7; 60 7 11; 61 11 15; 62 15 19; 63 4 8; 64 8 12; 65 12 16; 66 16 20
33. 67 18 22; 68 19 23; 69 20 24; 70 49 54; 71 48 53; 72 47 52; 73 22 27; 74 27 32
34. 75 32 37; 76 37 42; 77 42 47; 78 23 28; 79 28 33; 80 33 38; 81 38 43; 82 43 48
35. 83 24 29; 84 29 34; 85 34 39; 86 39 44; 87 44 49; 88 25 30; 89 30 35; 90 35 40
36. 91 40 45; 92 45 50; 93 52 56; 94 56 60; 95 60 64; 96 64 68; 97 53 57; 98 57 61
37. 99 61 65; 100 65 69; 101 54 58; 102 58 62; 103 62 66; 104 66 70
38. DEFINE MATERIAL START
39. ISOTROPIC STEEL
40. E 4.176E+006
41. POISSON 0.3

152

STAAD PLANE

-- PAGE NO. 2

42. DENSITY 0.489024
43. ALPHA 6.5E-006
44. DAMP 0.03
45. END DEFINE MATERIAL
46. CONSTANTS
47. MATERIAL STEEL MEMB 1 TO 104
48. MEMBER PROPERTY AMERICAN
49. 1 TO 15 TABLE ST W18X86
50. 16 TO 39 TABLE ST W14X74
51. 40 TO 54 TABLE ST W18X86
52. 55 TO 66 TABLE ST W27X114
53. 73 77 78 82 83 87 88 92 TABLE ST W27X114
54. 74 TO 76 79 TO 81 84 TO 86 89 TO 91 TABLE ST W24X68
55. 93 TO 100 TABLE ST W24X68
56. 101 TO 104 TABLE ST W21X57
57. MEMBER PROPERTY AMERICAN
58. 67 TO 72 PRIS YD 0.25 ZD 0.25
59. SUPPORTS
60. 1 5 9 13 17 21 26 31 36 41 46 51 55 59 63 67 FIXED
61. LOAD 1 DEAD
62. * K LINE FRAME
63. MEMBER LOAD
64. 55 TO 62 CON GY -11.6 6.67
65. 55 TO 62 CON GY -11.6 13.33
66. 63 TO 66 CON GY -10.8 6.67
67. 63 TO 66 CON GY -10.8 13.33
68. JOINT LOAD
69. 2 18 19 FY -37.1
70. 3 FY -28.4
71. 4 20 FY -12.7
72. 6 7 10 11 14 15 FY -11.6
73. 8 12 16 FY -10.8
74. MEMBER LOAD
75. 55 TO 62 UNI GY -1.39
76. * E LINE FRAME
77. MEMBER LOAD
78. 93 TO 96 CON GY -4.3 6.67
79. 93 TO 96 CON GY -4.3 13.33
80. 97 TO 100 CON GY -6 6.67
81. 97 TO 100 CON GY -6 13.33
82. 101 TO 104 CON GY -5.6 6.67
83. 101 TO 104 CON GY -5.6 13.33
84. JOINT LOAD
85. 52 FY -22.2
86. 53 FY -25.6
87. 54 FY -27.3
88. 68 FY -17.9
89. 69 FY -18.7
90. 70 FY -6.5
91. 56 60 64 FY -4.3
92. 57 61 65 FY -6
93. 58 62 66 FY -5.6
94. MEMBER LOAD
95. 93 TO 100 UNI GY -1.39
96. * G LINE FRAME
97. MEMBER LOAD

157

STAAD PLANE

-- PAGE NO. 3

98. 73 CON GY -17.1 6.22
99. 73 CON GY -17.1 12.45
100. 74 CON GY -5.5 6.25
101. 75 CON GY -10 5.66
102. 75 CON GY -10 11.34
103. 76 CON GY -5 6.25
104. 77 CON GY -10 6.23
105. 77 CON GY -10 12.45
106. 78 CON GY -17.1 6.22
107. 78 CON GY -17.1 12.45
108. 79 CON GY -5.5 6.25
109. 80 CON GY -11.8 5.66
110. 80 CON GY -11.8 11.34
111. 81 CON GY -11.8 6.25
112. 82 CON GY -11.8 6.23
113. 82 CON GY -11.8 12.45
114. 83 CON GY -19.3 6.22
115. 83 CON GY -19.3 12.45
116. 84 CON GY -7.7 6.25
117. 85 CON GY -6.5 5.66
118. 85 CON GY -6.5 11.34
119. 86 CON GY -7.7 6.25
120. 87 CON GY -14 6.23
121. 87 CON GY -14 12.45
122. 88 CON GY -17.9 6.22
123. 88 CON GY -17.9 12.45
124. 89 CON GY -17.9 6.25
125. 90 CON GY -17.9 5.66
126. 90 CON GY -17.9 11.34
127. 91 CON GY -17.9 6.25
128. 92 CON GY -17.9 6.23
129. 92 CON GY -17.9 12.45
130. JOINT LOAD
131. 22 FY -46
132. 23 FY -34.2
133. 24 FY -38.6
134. 25 FY -35.8
135. 47 FY -20.5
136. 48 FY -23.6
137. 49 FY -29
138. 50 FY -35.8
139. 27 32 FY -17.1
140. 37 42 FY -10
141. 28 FY -17.1
142. 33 38 43 FY -11.8
143. 29 34 39 44 FY -19.3
144. 30 35 40 45 FY -17.9
145. LOAD 2 LIVE
146. * K LINE FRAME
147. MEMBER LOAD
148. 55 TO 62 CON GY -8.3 6.67
149. 55 TO 62 CON GY -8.3 13.33
150. 63 TO 66 CON GY -5 6.67
151. 63 TO 66 CON GY -5 13.33
152. JOINT LOAD
153. 2 18 FY -15.3

154

154. 3 19 FY -6.7
155. 4 20 FY -2.5
156. 6 7 10 11 14 15 FY -8.3
157. 8 12 16 FY -5
158. * E LINE FRAME
159. MEMBER LOAD
160. 93 TO 96 CON GY -6.5 6.67
161. 93 TO 96 CON GY -6.5 13.33
162. 97 TO 100 CON GY -4.3 6.67
163. 97 TO 100 CON GY -4.3 13.33
164. 101 TO 104 CON GY -2.6 6.67
165. 101 TO 104 CON GY -2.6 13.33
166. JOINT LOAD
167. 52 FY -13
168. 53 FY -8.6
169. 54 FY -10.4
170. 68 FY -3.3
171. 69 FY -2.2
172. 70 FY -1.3
173. 56 60 64 FY -6.5
174. 57 61 65 FY -4.3
175. 58 62 66 FY -2.6
176. * G LINE FRAME
177. MEMBER LOAD
178. 73 CON GY -19.3 6.22
179. 73 CON GY -19.3 12.45
180. 74 CON GY -11 6.25
181. 75 CON GY -17.8 5.66
182. 75 CON GY -17.8 11.34
183. 76 CON GY -11 6.25
184. 77 CON GY -15.1 6.23
185. 77 CON GY -15.1 12.45
186. 78 CON GY -22.1 6.22
187. 78 CON GY -22.1 12.45
188. 79 CON GY -13.8 6.25
189. 80 CON GY -18.3 5.66
190. 80 CON GY -18.3 11.34
191. 81 CON GY -18.3 6.25
192. 82 CON GY -18.3 6.23
193. 82 CON GY -18.3 12.45
194. 83 CON GY -13.8 6.22
195. 83 CON GY -13.8 12.45
196. 84 CON GY -5.5 6.25
197. 85 CON GY -13 5.66
198. 85 CON GY -13 11.34
199. 86 CON GY -5.5 6.25
200. 87 CON GY -10 6.23
201. 87 CON GY -10 12.45
202. 88 CON GY -8.3 6.22
203. 88 CON GY -8.3 12.45
204. 89 CON GY -8.3 6.25
205. 90 CON GY -8.3 5.66
206. 90 CON GY -8.3 11.34
207. 91 CON GY -8.3 6.25
208. 92 CON GY -8.3 6.23
209. 92 CON GY -8.3 12.45

155

STAAD PLANE

-- PAGE NO. 5

210. JOINT LOAD
 211. 22 FY -38
 212. 23 FY -44.2
 213. 24 FY -27.2
 214. 25 FY -16.6
 215. 47 FY -37.6
 216. 48 FY -36.6
 217. 49 FY -32.5
 218. 50 FY -16.6
 219. 27 32 FY -19.3
 220. 37 42 FY -17.8
 221. 28 FY -22.1
 222. 33 38 43 FY -18.3
 223. 29 34 39 44 FY -13.8
 224. 30 35 40 45 FY -8.3
 225. LOAD 3 WIND
 226. JOINT LOAD
 227. 2 FX 62.4
 228. 3 FX 63.3
 229. 4 FX 66.6
 230. 25 FX 77.3
 231. LOAD COMB 4 DEAD LIVE
 232. 1 1.0 2 1.0
 233. LOAD COMB 5 DEAD LIVE WIND
 234. 1 1.0 2 0.75 3 0.75
 235. LOAD COMB 6 DEAD WIND
 236. 3 1.0 1 0.6
 237. LOAD COMB 7 DEAD -WIND
 238. 1 0.6 3 -1.0
 239. 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 = 70/ 104/ 16
 ORIGINAL/FINAL BAND-WIDTH= 5/ 5/ 15 DOF
 TOTAL PRIMARY LOAD CASES = 3, TOTAL DEGREES OF FREEDOM = 162
 SIZE OF STIFFNESS MATRIX = 3 DOUBLE KILO-WORDS
 REQRD/AVAIL. DISK SPACE = 12.2/ 24768.2 MB, EXMEM = 1636.7 MB

240. PDELTA 2 ANALYSIS
 ++ Adjusting Displacements 16:28:23
 ++ Adjusting Displacements 16:28:23

241. PRINT JOINT DISPLACEMENTS LIST 2 TO 4 25 42 TO 44 50 68 TO 70

156

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
2	1	-0.00229	-0.03404	0.00000	0.00000	0.00000	-0.00033
	2	-0.00146	-0.01122	0.00000	0.00000	0.00000	-0.00013
	3	0.43062	0.01022	0.00000	0.00000	0.00000	-0.00130
	4	-0.00375	-0.04526	0.00000	0.00000	0.00000	-0.00046
	5	0.31958	-0.03479	0.00000	0.00000	0.00000	-0.00140
	6	0.42924	-0.01020	0.00000	0.00000	0.00000	-0.00150
	7	-0.43200	-0.03064	0.00000	0.00000	0.00000	0.00111
3	1	0.00027	-0.05183	0.00000	0.00000	0.00000	-0.00032
	2	0.00025	-0.01638	0.00000	0.00000	0.00000	-0.00013
	3	0.77430	0.01505	0.00000	0.00000	0.00000	-0.00091
	4	0.00052	-0.06820	0.00000	0.00000	0.00000	-0.00046
	5	0.58118	-0.05282	0.00000	0.00000	0.00000	-0.00110
	6	0.77446	-0.01605	0.00000	0.00000	0.00000	-0.00110
	7	-0.77413	-0.04615	0.00000	0.00000	0.00000	0.00071
4	1	0.00393	-0.05719	0.00000	0.00000	0.00000	-0.00024
	2	0.00342	-0.01807	0.00000	0.00000	0.00000	-0.00014
	3	1.00347	0.01654	0.00000	0.00000	0.00000	-0.00050
	4	0.00735	-0.07526	0.00000	0.00000	0.00000	-0.00038
	5	0.75910	-0.05834	0.00000	0.00000	0.00000	-0.00072
	6	1.00583	-0.01777	0.00000	0.00000	0.00000	-0.00064
	7	-1.00111	-0.05085	0.00000	0.00000	0.00000	0.00035
25	1	-0.00184	-0.12445	0.00000	0.00000	0.00000	-0.00044
	2	0.00166	-0.07959	0.00000	0.00000	0.00000	-0.00024
	3	1.35060	0.00812	0.00000	0.00000	0.00000	-0.00055
	4	-0.00018	-0.20403	0.00000	0.00000	0.00000	-0.00068
	5	1.01236	-0.17805	0.00000	0.00000	0.00000	-0.00103
	6	1.34950	-0.06655	0.00000	0.00000	0.00000	-0.00082
	7	-1.35170	-0.08278	0.00000	0.00000	0.00000	0.00029
42	1	0.00010	-0.04024	0.00000	0.00000	0.00000	-0.00016
	2	0.00070	-0.03963	0.00000	0.00000	0.00000	-0.00021
	3	0.35662	0.00165	0.00000	0.00000	0.00000	-0.00041
	4	0.00080	-0.07988	0.00000	0.00000	0.00000	-0.00037
	5	0.26808	-0.06873	0.00000	0.00000	0.00000	-0.00062
	6	0.35667	-0.02249	0.00000	0.00000	0.00000	-0.00050
	7	-0.35656	-0.02580	0.00000	0.00000	0.00000	0.00031
43	1	0.00036	-0.07200	0.00000	0.00000	0.00000	-0.00014
	2	0.00060	-0.06626	0.00000	0.00000	0.00000	-0.00020
	3	0.68864	0.00274	0.00000	0.00000	0.00000	-0.00037
	4	0.00097	-0.13826	0.00000	0.00000	0.00000	-0.00033
	5	0.51730	-0.11964	0.00000	0.00000	0.00000	-0.00056
	6	0.68886	-0.04046	0.00000	0.00000	0.00000	-0.00045
	7	-0.68843	-0.04594	0.00000	0.00000	0.00000	0.00029
44	1	-0.00059	-0.09549	0.00000	0.00000	0.00000	-0.00018
	2	-0.00041	-0.07964	0.00000	0.00000	0.00000	-0.00012
	3	0.94272	0.00348	0.00000	0.00000	0.00000	-0.00040
	4	-0.00100	-0.17512	0.00000	0.00000	0.00000	-0.00030
	5	0.70614	-0.15260	0.00000	0.00000	0.00000	-0.00057
	6	0.94237	-0.05381	0.00000	0.00000	0.00000	-0.00050

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
7		-0.94307	-0.06077	0.00000	0.00000	0.00000	0.00029
50	1	-0.00447	-0.10339	0.00000	0.00000	0.00000	0.00048
	2	-0.00071	-0.07636	0.00000	0.00000	0.00000	0.00023
	3	1.30011	-0.00918	0.00000	0.00000	0.00000	-0.00053
	4	-0.00517	-0.17974	0.00000	0.00000	0.00000	0.00072
	5	0.97009	-0.16754	0.00000	0.00000	0.00000	0.00026
	6	1.29743	-0.07121	0.00000	0.00000	0.00000	-0.00024
	7	-1.30279	-0.05286	0.00000	0.00000	0.00000	0.00082
68	1	0.00288	-0.02137	0.00000	0.00000	0.00000	0.00027
	2	0.00158	-0.00495	0.00000	0.00000	0.00000	0.00013
	3	0.33301	-0.00649	0.00000	0.00000	0.00000	-0.00150
	4	0.00446	-0.02632	0.00000	0.00000	0.00000	0.00041
	5	0.25382	-0.02995	0.00000	0.00000	0.00000	-0.00075
	6	0.33474	-0.01931	0.00000	0.00000	0.00000	-0.00133
	7	-0.33129	-0.00633	0.00000	0.00000	0.00000	0.00166
69	1	-0.00087	-0.03318	0.00000	0.00000	0.00000	0.00031
	2	0.00009	-0.00739	0.00000	0.00000	0.00000	0.00008
	3	0.66541	-0.00971	0.00000	0.00000	0.00000	-0.00113
	4	-0.00077	-0.04056	0.00000	0.00000	0.00000	0.00039
	5	0.49826	-0.04600	0.00000	0.00000	0.00000	-0.00048
	6	0.66489	-0.02961	0.00000	0.00000	0.00000	-0.00094
	7	-0.66593	-0.01020	0.00000	0.00000	0.00000	0.00132
70	1	-0.00637	-0.03600	0.00000	0.00000	0.00000	0.00017
	2	-0.00311	-0.00829	0.00000	0.00000	0.00000	0.00011
	3	0.89505	-0.01068	0.00000	0.00000	0.00000	-0.00080
	4	-0.00949	-0.04429	0.00000	0.00000	0.00000	0.00028
	5	0.66258	-0.05023	0.00000	0.00000	0.00000	-0.00034
	6	0.89123	-0.03228	0.00000	0.00000	0.00000	-0.00069
	7	-0.89887	-0.01092	0.00000	0.00000	0.00000	0.00090

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

- 242. LOAD LIST 4 TO 7
- 243. PRINT MAXFORCE ENVELOPE NSECTION 24 LIST 1 TO 104

158

MEMBER FORCE ENVELOPE

 ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	20.73	0.00	6	190.50	0.00	6			
	0.00	0.00	4	0.00	0.00	4	178.53 C	0.00	4
MIN	-23.55	15.50	7	-204.49	0.00	7			
	0.00	15.50	7	0.00	15.50	7	40.24 C	15.50	6
2 MAX	9.66	0.00	6	119.03	14.67	7			
	0.00	0.00	4	0.00	0.00	4	95.62 C	0.00	4
MIN	-15.10	14.67	7	-102.56	0.00	7			
	0.00	14.67	7	0.00	14.67	7	24.37 C	14.67	6
3 MAX	6.46	0.00	6	88.65	14.67	7			
	0.00	0.00	4	0.00	0.00	4	29.41 C	0.00	4
MIN	-11.05	14.67	7	-73.45	0.00	7			
	0.00	14.67	7	0.00	14.67	7	7.20 C	14.67	6
4 MAX	25.52	0.00	6	210.60	0.00	6			
	0.00	0.00	4	0.00	0.00	4	229.80 C	0.00	4
MIN	-25.39	15.50	7	-210.40	0.00	7			
	0.00	15.50	7	0.00	15.50	7	90.07 C	15.50	7
5 MAX	20.02	0.00	6	145.27	14.67	7			
	0.00	0.00	4	0.00	0.00	4	138.70 C	0.00	4
MIN	-19.37	14.67	7	-149.59	14.67	6			
	0.00	14.67	7	0.00	14.67	7	55.82 C	14.67	7
6 MAX	13.74	0.00	6	103.38	14.67	7			
	0.00	0.00	4	0.00	0.00	4	48.69 C	0.00	4
MIN	-13.25	14.67	7	-106.66	14.67	6			
	0.00	14.67	7	0.00	14.67	7	19.16 C	14.67	7
7 MAX	24.16	0.00	6	201.70	0.00	6			
	0.00	0.00	4	0.00	0.00	4	221.03 C	0.00	4
MIN	-24.26	15.50	7	-202.52	0.00	7			
	0.00	15.50	7	0.00	15.50	7	93.50 C	15.50	7
8 MAX	19.06	0.00	6	142.77	14.67	7			
	0.00	0.00	4	0.00	0.00	4	134.39 C	0.00	4
MIN	-18.93	14.67	7	-143.66	14.67	6			
	0.00	14.67	7	0.00	14.67	7	56.57 C	14.67	7
9 MAX	13.71	0.00	6	105.33	14.67	7			
	0.00	0.00	4	0.00	0.00	4	47.27 C	0.00	4

159

STAAD PLANE				-- PAGE NO.		9	
MIN	-13.48	14.67	7	-107.07	14.67	6	
	0.00	14.67	7	0.00	14.67	7	19.29 C 14.67 7
10 MAX	23.83	0.00	6	197.99	0.00	6	
	0.00	0.00	4	0.00	0.00	4	234.61 C 0.00 4
MIN	-24.34	15.50	7	-200.65	0.00	7	
	0.00	15.50	7	0.00	15.50	7	90.36 C 15.50 6
11 MAX	19.34	0.00	6	151.29	14.67	7	
	0.00	0.00	4	0.00	0.00	4	142.33 C 0.00 4
MIN	-20.25	14.67	7	-145.71	0.00	7	
	0.00	14.67	7	0.00	14.67	7	55.03 C 14.67 6
12 MAX	13.96	0.00	6	114.38	14.67	7	
	0.00	0.00	4	0.00	0.00	4	50.10 C 0.00 4
MIN	-14.77	14.67	7	-108.59	14.67	6	
	0.00	14.67	7	0.00	14.67	7	18.63 C 14.67 6
13 MAX	21.08	0.00	6	182.95	0.00	6	
	0.00	0.00	4	0.00	0.00	4	284.26 C 0.00 4
MIN	-18.80	15.50	7	-172.24	0.00	7	
	0.00	15.50	7	0.00	15.50	7	110.10 C 15.50 7
14 MAX	15.48	0.00	6	108.16	0.00	6	
	0.00	0.00	4	0.00	0.00	4	184.25 C 0.00 4
MIN	-10.76	14.67	7	-118.89	14.67	6	
	0.00	14.67	7	0.00	14.67	7	67.71 C 14.67 6
15 MAX	11.93	0.00	6	80.53	0.00	6	
	0.00	0.00	4	0.00	0.00	4	78.28 C 0.00 4
MIN	-8.94	14.67	7	-94.45	14.67	6	
	0.00	14.67	7	0.00	14.67	7	22.88 C 14.67 6
16 MAX	11.33	0.00	6	98.05	0.00	6	
	0.00	0.00	4	0.00	0.00	4	307.20 C 0.00 4
MIN	-12.88	15.50	7	-105.67	0.00	7	
	0.00	15.50	7	0.00	15.50	7	101.55 C 15.50 6
17 MAX	8.13	0.00	6	85.63	14.67	7	
	0.00	0.00	4	0.00	0.00	4	207.15 C 0.00 4
MIN	-11.41	14.67	7	-81.80	0.00	7	
	0.00	14.67	7	0.00	14.67	7	66.97 C 14.67 6
18 MAX	4.19	0.00	6	56.03	14.67	7	
	0.00	0.00	4	0.00	0.00	4	124.31 C 0.00 4
MIN	-7.71	14.67	7	-57.11	0.00	7	
	0.00	14.67	7	0.00	14.67	7	41.95 C 14.67 6
19 MAX	10.36	0.00	6	108.03	14.66	7	
	0.00	0.00	4	0.00	0.00	4	76.74 C 0.00 4
MIN	-14.52	14.66	7	-104.84	0.00	7	
	0.00	14.66	7	0.00	14.66	7	22.79 C 14.66 6
20 MAX	13.78	0.00	6	109.31	0.00	6	
	0.00	0.00	4	0.00	0.00	4	313.38 C 0.00 4

160

STAAD PLANE

-- PAGE NO. 10

MIN	-12.50	15.50	7	-104.35	15.50	6			
	0.00	15.50	7	0.00	15.50	7	92.56 C	15.50	7
21 MAX	13.40	0.00	6	97.78	0.00	6			
	0.00	0.00	4	0.00	0.00	4	229.73 C	0.00	4
MIN	-10.60	14.67	7	-98.82	14.67	6			
	0.00	14.67	7	0.00	14.67	7	71.63 C	14.67	7
22 MAX	10.04	0.00	5	74.50	0.00	5			
	0.00	0.00	4	0.00	0.00	4	140.00 C	0.00	4
MIN	-6.77	14.67	7	-72.81	14.67	5			
	0.00	14.67	7	0.00	14.67	7	50.49 C	14.67	7
23 MAX	15.71	0.00	6	113.43	0.00	6			
	0.00	0.00	4	0.00	0.00	4	65.53 C	0.00	4
MIN	-12.73	14.66	7	-116.92	14.66	6			
	0.00	14.66	7	0.00	14.66	7	25.38 C	14.66	7
24 MAX	11.71	0.00	6	98.41	0.00	6			
	0.00	0.00	4	0.00	0.00	4	269.46 C	0.00	4
MIN	-12.29	15.50	7	-101.27	0.00	7			
	0.00	15.50	7	0.00	15.50	7	70.29 C	15.50	7
25 MAX	9.74	0.00	6	82.04	14.67	7			
	0.00	0.00	4	0.00	0.00	4	197.31 C	0.00	4
MIN	-10.98	14.67	7	-79.01	0.00	7			
	0.00	14.67	7	0.00	14.67	7	55.54 C	14.67	7
26 MAX	6.78	0.00	6	52.95	14.67	7			
	0.00	0.00	4	0.00	0.00	4	127.20 C	0.00	4
MIN	-7.41	14.67	7	-55.69	0.00	7			
	0.00	14.67	7	0.00	14.67	7	41.71 C	14.67	7
27 MAX	12.17	0.00	6	100.31	14.66	7			
	0.00	0.00	4	0.00	0.00	4	67.69 C	0.00	4
MIN	-13.22	14.66	7	-93.55	0.00	7			
	0.00	14.66	7	0.00	14.66	7	26.54 C	14.66	7
28 MAX	12.01	0.00	6	98.91	0.00	6			
	0.00	0.00	4	0.00	0.00	4	264.72 C	0.00	4
MIN	-11.38	15.50	7	-95.84	0.00	7			
	0.00	15.50	7	0.00	15.50	7	68.03 C	15.50	6
29 MAX	10.95	0.00	6	79.13	0.00	6			
	0.00	0.00	4	0.00	0.00	4	200.51 C	0.00	4
MIN	-9.73	14.67	7	-81.46	14.67	6			
	0.00	14.67	7	0.00	14.67	7	57.00 C	14.67	6
30 MAX	7.49	0.00	6	55.97	0.00	6			
	0.00	0.00	4	0.00	0.00	4	124.69 C	0.00	4
MIN	-6.86	14.67	7	-53.98	14.67	6			
	0.00	14.67	7	0.00	14.67	7	41.16 C	14.67	6
31 MAX	13.06	0.00	6	92.22	0.00	6			
	0.00	0.00	4	0.00	0.00	4	65.65 C	0.00	4

161

STAAD PLANE -- PAGE NO. 11

MIN	-11.97	14.66	7	-99.29	14.66	6				
	0.00	14.66	7	0.00	14.66	7	26.02 C	14.66	6	
32 MAX	11.99	0.00	6	98.14	0.00	6				
	0.00	0.00	4	0.00	0.00	4	271.49 C	0.00	4	
MIN	-12.67	15.50	7	-101.43	0.00	7				
	0.00	15.50	7	0.00	15.50	7	76.45 C	15.50	6	
33 MAX	11.21	0.00	6	92.63	14.67	7				
	0.00	0.00	4	0.00	0.00	4	209.68 C	0.00	4	
MIN	-12.59	14.67	7	-92.05	0.00	7				
	0.00	14.67	7	0.00	14.67	7	64.54 C	14.67	6	
34 MAX	7.65	0.00	6	67.51	14.67	7				
	0.00	0.00	4	0.00	0.00	4	132.38 C	0.00	4	
MIN	-9.21	14.67	7	-67.54	0.00	7				
	0.00	14.67	7	0.00	14.67	7	47.93 C	14.67	6	
35 MAX	12.48	0.00	6	111.73	14.66	7				
	0.00	0.00	4	0.00	0.00	4	67.34 C	0.00	4	
MIN	-14.92	14.66	7	-107.04	0.00	7				
	0.00	14.66	7	0.00	14.66	7	26.20 C	14.66	6	
36 MAX	11.41	0.00	6	94.72	0.00	6				
	0.00	0.00	4	0.00	0.00	4	250.90 C	0.00	4	
MIN	-10.48	15.50	7	-90.13	0.00	7				
	0.00	15.50	7	0.00	15.50	7	71.37 C	15.50	7	
37 MAX	11.27	0.00	5	80.71	0.00	5				
	0.00	0.00	4	0.00	0.00	4	183.29 C	0.00	4	
MIN	-8.58	14.67	7	-84.60	14.67	5				
	0.00	14.67	7	0.00	14.67	7	53.96 C	14.67	7	
38 MAX	8.72	0.00	5	65.09	0.00	5				
	0.00	0.00	4	0.00	0.00	4	120.92 C	0.00	4	
MIN	-4.96	14.67	7	-62.87	14.67	5				
	0.00	14.67	7	0.00	14.67	7	37.36 C	14.67	7	
39 MAX	13.51	0.00	6	96.26	0.00	6				
	0.00	0.00	4	0.00	0.00	4	76.25 C	0.00	4	
MIN	-9.94	14.66	7	-101.80	14.66	6				
	0.00	14.66	7	0.00	14.66	7	23.11 C	14.66	7	
40 MAX	14.19	0.00	6	142.47	0.00	6				
	0.00	0.00	4	0.00	0.00	4	237.49 C	0.00	4	
MIN	-16.15	15.50	7	-151.72	0.00	7				
	0.00	15.50	7	0.00	15.50	7	75.38 C	15.50	7	
41 MAX	6.34	0.00	6	85.50	14.67	7				
	0.00	0.00	4	0.00	0.00	4	165.82 C	0.00	4	
MIN	-10.64	14.67	7	-70.59	0.00	7				
	0.00	14.67	7	0.00	14.67	7	52.34 C	14.67	7	
42 MAX	5.38	0.00	6	60.55	14.67	7				
	0.00	0.00	4	0.00	0.00	4	84.33 C	0.00	4	

162

STAAD PLANE				-- PAGE NO. 12			
MIN	-7.76	14.67	7	-53.27	0.00	7	
	0.00	14.67	7	0.00	14.67	7	23.06 C 14.67 7
43 MAX	18.10	0.00	6	159.79	0.00	6	
	0.00	0.00	4	0.00	0.00	4	150.12 C 0.00 4
MIN	-17.73	15.50	7	-157.80	0.00	7	
	0.00	15.50	7	0.00	15.50	7	59.86 C 15.50 7
44 MAX	14.62	0.00	6	105.74	14.67	7	
	0.00	0.00	4	0.00	0.00	4	87.41 C 0.00 4
MIN	-13.91	14.67	7	-111.35	14.67	6	
	0.00	14.67	7	0.00	14.67	7	36.69 C 14.67 7
45 MAX	10.35	0.00	6	77.24	14.67	7	
	0.00	0.00	4	0.00	0.00	4	25.86 C 0.00 4
MIN	-9.74	14.67	7	-81.53	14.67	6	
	0.00	14.67	7	0.00	14.67	7	9.59 C 14.67 7
46 MAX	17.30	0.00	6	154.98	0.00	6	
	0.00	0.00	4	0.00	0.00	4	142.82 C 0.00 4
MIN	-17.18	15.50	7	-154.06	0.00	7	
	0.00	15.50	7	0.00	15.50	7	61.63 C 15.50 7
47 MAX	13.69	0.00	6	105.77	14.67	7	
	0.00	0.00	4	0.00	0.00	4	82.96 C 0.00 4
MIN	-13.81	14.67	7	-105.09	14.67	6	
	0.00	14.67	7	0.00	14.67	7	37.38 C 14.67 7
48 MAX	9.16	0.00	6	74.64	14.67	7	
	0.00	0.00	4	0.00	0.00	4	24.50 C 0.00 4
MIN	-9.39	14.67	7	-72.94	14.67	6	
	0.00	14.67	7	0.00	14.67	7	10.03 C 14.67 7
49 MAX	17.35	0.00	6	154.56	0.00	6	
	0.00	0.00	4	0.00	0.00	4	146.56 C 0.00 4
MIN	-17.34	15.50	7	-153.99	0.00	7	
	0.00	15.50	7	0.00	15.50	7	60.18 C 15.50 6
50 MAX	14.02	0.00	6	110.21	14.67	7	
	0.00	0.00	4	0.00	0.00	4	84.78 C 0.00 4
MIN	-14.53	14.67	7	-106.79	14.67	6	
	0.00	14.67	7	0.00	14.67	7	36.98 C 14.67 6
51 MAX	9.05	0.00	6	75.09	14.67	7	
	0.00	0.00	4	0.00	0.00	4	24.94 C 0.00 4
MIN	-9.47	14.67	7	-72.50	14.67	6	
	0.00	14.67	7	0.00	14.67	7	9.81 C 14.67 6
52 MAX	15.08	0.00	6	143.37	0.00	6	
	0.00	0.00	4	0.00	0.00	4	118.15 C 0.00 5
MIN	-12.64	15.50	7	-131.02	0.00	7	
	0.00	15.50	7	0.00	15.50	7	24.95 C 15.50 7
53 MAX	11.35	0.00	5	77.56	0.00	5	
	0.00	0.00	4	0.00	0.00	4	66.87 C 0.00 5

163

STAAD PLANE				-- PAGE NO. 13			
MIN	-6.01	14.67	7	-88.96	14.67	5	16.15 C 14.67 7
	0.00	14.67	7	0.00	14.67	7	
54 MAX	7.68	0.00	5	53.44	0.00	5	17.64 C 0.00 5
	0.00	0.00	4	0.00	0.00	4	
MIN	-3.14	14.67	7	-59.16	14.67	5	3.01 C 14.67 7
	0.00	14.67	7	0.00	14.67	7	
55 MAX	34.00	0.00	7	268.98	20.00	5	51.27 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-49.96	20.00	5	-193.37	0.00	6	53.91 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
56 MAX	34.11	0.00	4	240.51	20.00	5	45.79 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-42.86	20.00	5	-96.93	20.00	7	47.91 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
57 MAX	33.26	0.00	4	243.19	20.00	5	40.68 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-43.45	20.00	5	-95.57	0.00	6	42.57 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
58 MAX	38.04	0.00	4	246.09	20.00	6	36.18 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-42.21	20.00	5	-181.25	20.00	7	38.47 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
59 MAX	31.11	0.00	4	225.52	20.00	5	60.07 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-44.70	20.00	5	-128.06	6.67	5	59.21 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
60 MAX	33.62	0.00	4	216.49	20.00	5	53.79 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-40.70	20.00	5	-83.81	6.67	5	53.09 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
61 MAX	33.24	0.00	4	220.36	20.00	5	48.44 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-40.97	20.00	5	-83.54	6.67	5	47.65 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
62 MAX	37.97	0.00	4	200.43	0.00	7	43.05 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-38.93	20.00	5	-128.78	20.00	7	42.16 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
63 MAX	14.21	0.00	4	103.83	20.00	5	60.13 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	
MIN	-20.68	20.00	5	-74.95	6.67	5	55.54 T 20.00 7
	0.00	20.00	7	0.00	20.00	7	
64 MAX	15.50	0.00	4	107.17	20.00	5	46.39 C 0.00 6
	0.00	0.00	4	0.00	0.00	4	

164

STAAD PLANE				-- PAGE NO. 14			
MIN	-18.83	20.00	5	-46.88	6.67	5	
	0.00	20.00	7	0.00	20.00	7	42.29 T 20.00 7
65 MAX	15.37	0.00	4	110.44	20.00	5	
	0.00	0.00	4	0.00	0.00	4	32.68 C 0.00 6
MIN	-18.83	19.17	5	-43.60	6.67	5	
	0.00	20.00	7	0.00	20.00	7	28.81 T 20.00 7
66 MAX	18.06	0.00	4	97.76	20.00	5	
	0.00	0.00	4	0.00	0.00	4	18.72 C 0.00 6
MIN	-17.74	20.00	5	-63.09	20.00	7	
	0.00	20.00	7	0.00	20.00	7	14.04 T 20.00 7
67 MAX	18.86	0.00	7	10.59	0.00	4	
	0.00	0.00	4	0.00	0.00	4	30.59 C 0.00 6
MIN	-11.58	1.00	6	-8.38	1.00	7	
	0.00	1.00	7	0.00	1.00	7	30.44 T 1.00 7
68 MAX	32.54	0.00	4	17.80	0.00	4	
	0.00	0.00	4	0.00	0.00	4	39.50 C 0.00 6
MIN	-5.74	1.00	6	-14.74	1.00	4	
	0.00	1.00	7	0.00	1.00	7	40.34 T 1.00 7
69 MAX	49.54	0.00	4	25.89	0.00	4	
	0.00	0.00	4	0.00	0.00	4	6.99 C 0.00 5
MIN	2.65	1.00	6	-23.66	1.00	4	
	0.00	1.00	7	0.00	1.00	7	5.10 T 1.00 7
70 MAX	0.93	0.00	7	21.84	1.00	5	
	0.00	0.00	4	0.00	0.00	4	40.78 C 0.00 6
MIN	-42.15	1.00	5	-20.31	0.00	5	
	0.00	1.00	7	0.00	1.00	7	39.48 T 1.00 7
71 MAX	6.89	0.00	7	16.59	1.00	5	
	0.00	0.00	4	0.00	0.00	4	18.64 C 0.00 6
MIN	-29.96	1.00	5	-13.37	0.00	5	
	0.00	1.00	7	0.00	1.00	7	19.37 T 1.00 7
72 MAX	12.91	0.00	7	12.94	1.00	5	
	0.00	0.00	4	0.00	0.00	4	22.53 C 0.00 6
MIN	-22.23	1.00	5	-9.29	0.00	5	
	0.00	1.00	7	0.00	1.00	7	22.12 T 1.00 7
73 MAX	34.10	0.00	4	184.77	18.67	5	
	0.00	0.00	4	0.00	0.00	4	27.38 C 0.00 6
MIN	-44.22	17.89	5	-169.04	6.22	5	
	0.00	18.67	7	0.00	18.67	7	28.97 T 18.67 7
74 MAX	13.95	0.00	7	105.83	12.50	5	
	0.00	0.00	4	0.00	0.00	4	27.01 C 0.00 6
MIN	-15.59	12.50	5	-71.25	12.50	7	
	0.00	12.50	7	0.00	12.50	7	27.07 T 12.50 7
75 MAX	27.81	0.00	4	132.13	17.00	5	
	0.00	0.00	4	0.00	0.00	4	25.04 C 0.00 6

165

STAAD PLANE				-- PAGE NO.		15
MIN	-30.21	17.00	5	-77.79	5.67	5
	0.00	17.00	7	0.00	17.00	7
				25.76 T	17.00	7
76 MAX	13.45	0.00	7	91.92	0.00	7
	0.00	0.00	4	0.00	0.00	4
				23.97 C	0.00	6
MIN	-14.93	12.50	5	-69.78	0.00	6
	0.00	12.50	7	0.00	12.50	7
				24.10 T	12.50	7
77 MAX	26.63	0.00	4	152.77	18.67	6
	0.00	0.00	4	0.00	0.00	4
				23.18 C	0.00	6
MIN	-30.18	18.67	5	-128.19	18.67	7
	0.00	18.67	7	0.00	18.67	7
				24.02 T	18.67	7
78 MAX	36.98	0.00	4	172.78	18.67	5
	0.00	0.00	4	0.00	0.00	4
				35.57 C	0.00	6
MIN	-43.78	17.89	5	-162.47	6.22	5
	0.00	18.67	7	0.00	18.67	7
				36.64 T	18.67	7
79 MAX	11.07	0.00	7	101.15	12.50	5
	0.00	0.00	4	0.00	0.00	4
				31.84 C	0.00	6
MIN	-15.85	12.50	5	-50.85	12.50	7
	0.00	12.50	7	0.00	12.50	7
				32.82 T	12.50	7
80 MAX	29.81	0.00	4	135.14	17.00	5
	0.00	0.00	4	0.00	0.00	4
				28.89 C	0.00	6
MIN	-31.45	17.00	5	-76.50	5.67	5
	0.00	17.00	7	0.00	17.00	7
				29.25 T	17.00	7
81 MAX	15.33	0.00	4	96.23	12.50	5
	0.00	0.00	4	0.00	0.00	4
				25.43 C	0.00	6
MIN	-19.79	12.50	5	-48.64	0.00	6
	0.00	12.50	7	0.00	12.50	7
				26.38 T	12.50	7
82 MAX	32.44	0.00	4	136.32	18.67	5
	0.00	0.00	4	0.00	0.00	4
				21.87 C	0.00	6
MIN	-31.88	17.89	5	-113.11	12.45	4
	0.00	18.67	7	0.00	18.67	7
				22.99 T	18.67	7
83 MAX	31.31	0.00	4	164.38	18.67	5
	0.00	0.00	4	0.00	0.00	4
				12.97 C	0.00	6
MIN	-40.43	17.89	5	-154.25	6.22	5
	0.00	18.67	7	0.00	18.67	7
				11.91 T	18.67	7
84 MAX	13.30	0.00	7	89.35	12.50	5
	0.00	0.00	4	0.00	0.00	4
				19.01 C	0.00	6
MIN	-13.89	12.50	5	-60.96	12.50	7
	0.00	12.50	7	0.00	12.50	7
				17.87 T	12.50	7
85 MAX	19.70	0.00	4	106.19	17.00	5
	0.00	0.00	4	0.00	0.00	4
				24.40 C	0.00	6
MIN	-22.29	17.00	5	-56.72	17.00	7
	0.00	17.00	7	0.00	17.00	7
				23.69 T	17.00	7
86 MAX	12.65	0.00	7	80.54	0.00	7
	0.00	0.00	4	0.00	0.00	4
				29.97 C	0.00	6

166

STAAD PLANE

-- PAGE NO. 16

MIN	-13.95	12.50	5	-62.05	0.00	6			
	0.00	12.50	7	0.00	12.50	7	28.80	T	12.50 7
87 MAX	25.37	0.00	4	140.92	18.67	6			
	0.00	0.00	4	0.00	0.00	4	34.80	C	0.00 6
MIN	-29.22	18.67	5	-106.95	18.67	7			
	0.00	18.67	7	0.00	18.67	7	34.51	T	18.67 7
88 MAX	24.34	0.00	4	120.60	18.67	5			
	0.00	0.00	4	0.00	0.00	4	66.92	C	0.00 6
MIN	-32.28	18.67	5	-130.98	6.22	5			
	0.00	18.67	7	0.00	18.67	7	62.76	T	18.67 7
89 MAX	11.50	0.00	7	103.05	12.50	5			
	0.00	0.00	4	0.00	0.00	4	51.21	C	0.00 6
MIN	-18.93	12.50	5	-19.81	6.25	4			
	0.00	12.50	7	0.00	12.50	7	50.03	T	12.50 7
90 MAX	26.56	0.00	4	112.18	17.00	5			
	0.00	0.00	4	0.00	0.00	4	39.04	C	0.00 6
MIN	-28.07	17.00	5	-69.12	5.67	5			
	0.00	17.00	7	0.00	17.00	7	36.81	T	17.00 7
91 MAX	13.61	0.00	4	83.74	12.50	5			
	0.00	0.00	4	0.00	0.00	4	25.98	C	0.00 6
MIN	-16.60	12.50	5	-20.00	6.25	5			
	0.00	12.50	7	0.00	12.50	7	24.84	T	12.50 7
92 MAX	28.55	0.00	4	101.80	18.67	6			
	0.00	0.00	4	0.00	0.00	4	13.49	C	0.00 6
MIN	-27.99	18.67	5	-110.65	12.45	4			
	0.00	18.67	7	0.00	18.67	7	9.92	T	18.67 7
93 MAX	22.62	0.00	7	188.66	20.00	5			
	0.00	0.00	4	0.00	0.00	4	14.69	C	0.00 6
MIN	-34.57	20.00	5	-106.99	0.00	6			
	0.00	20.00	7	0.00	20.00	7	16.62	T	20.00 7
94 MAX	24.92	0.00	4	164.71	20.00	5			
	0.00	0.00	4	0.00	0.00	4	11.21	C	0.00 6
MIN	-30.66	20.00	5	-65.82	19.17	7			
	0.00	20.00	7	0.00	20.00	7	12.80	T	20.00 7
95 MAX	24.57	0.00	4	165.51	20.00	5			
	0.00	0.00	4	0.00	0.00	4	7.60	C	0.00 6
MIN	-30.94	20.00	5	-65.49	0.83	6			
	0.00	20.00	7	0.00	20.00	7	9.43	T	20.00 7
96 MAX	26.15	0.00	4	164.86	20.00	5			
	0.00	0.00	4	0.00	0.00	4	4.27	C	0.00 6
MIN	-30.90	20.00	5	-101.78	20.00	7			
	0.00	20.00	7	0.00	20.00	7	6.61	T	20.00 7
97 MAX	21.70	0.00	4	174.38	20.00	5			
	0.00	0.00	4	0.00	0.00	4	17.68	C	0.00 6

167

STAAD PLANE -- PAGE NO. 17

MIN	-32.85	20.00	5	-78.60	6.67	5				
	0.00	20.00	7	0.00	20.00	7	16.50	T	20.00	7
98 MAX	24.55	0.00	4	148.38	20.00	5				
	0.00	0.00	4	0.00	0.00	4	13.41	C	0.00	6
MIN	-29.08	20.00	5	-54.27	6.67	5				
	0.00	20.00	7	0.00	20.00	7	12.33	T	20.00	7
99 MAX	24.32	0.00	4	148.84	20.00	5				
	0.00	0.00	4	0.00	0.00	4	8.88	C	0.00	6
MIN	-29.28	20.00	5	-56.55	6.67	5				
	0.00	20.00	7	0.00	20.00	7	7.91	T	20.00	7
100 MAX	25.46	0.00	4	142.40	20.00	5				
	0.00	0.00	4	0.00	0.00	4	3.92	C	0.00	6
MIN	-28.88	20.00	5	-67.85	17.50	7				
	0.00	20.00	7	0.00	20.00	7	2.85	T	20.00	7
101 MAX	7.60	0.00	7	74.29	20.00	5				
	0.00	0.00	4	0.00	0.00	4	35.41	C	0.00	6
MIN	-11.90	20.00	5	-37.98	0.00	6				
	0.00	20.00	7	0.00	20.00	7	31.73	T	20.00	7
102 MAX	8.43	0.00	4	60.17	20.00	5				
	0.00	0.00	4	0.00	0.00	4	25.06	C	0.00	6
MIN	-10.11	20.00	5	-24.36	6.67	5				
	0.00	20.00	7	0.00	20.00	7	21.99	T	20.00	7
103 MAX	8.33	0.00	4	59.47	20.00	5				
	0.00	0.00	4	0.00	0.00	4	15.90	C	0.00	6
MIN	-10.17	20.00	5	-25.79	6.67	5				
	0.00	20.00	7	0.00	20.00	7	12.60	T	20.00	7
104 MAX	8.67	0.00	4	59.16	20.00	5				
	0.00	0.00	4	0.00	0.00	4	7.67	C	0.00	5
MIN	-10.17	20.00	5	-31.80	20.00	7				
	0.00	20.00	7	0.00	20.00	7	3.14	T	20.00	7

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

244. PRINT SUPPORT REACTION ALL

168

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	4	3.31	178.53	0.00	0.00	0.00	-16.58
	5	-13.61	137.22	0.00	0.00	0.00	132.77
	6	-20.83	40.24	0.00	0.00	0.00	190.50
	7	23.64	120.87	0.00	0.00	0.00	-204.49
5	4	-0.09	229.80	0.00	0.00	0.00	-0.25
	5	-19.17	219.16	0.00	0.00	0.00	157.73
	6	-25.50	105.98	0.00	0.00	0.00	210.60
	7	25.37	90.07	0.00	0.00	0.00	-210.40
9	4	0.15	221.03	0.00	0.00	0.00	-1.25
	5	-18.02	205.34	0.00	0.00	0.00	150.47
	6	-24.16	94.54	0.00	0.00	0.00	201.70
	7	24.26	93.50	0.00	0.00	0.00	-202.52
13	4	0.68	234.61	0.00	0.00	0.00	-3.65
	5	-17.46	210.57	0.00	0.00	0.00	146.20
	6	-23.85	90.36	0.00	0.00	0.00	197.99
	7	24.36	108.57	0.00	0.00	0.00	-200.65
17	4	-2.36	284.26	0.00	0.00	0.00	10.97
	5	-17.20	259.67	0.00	0.00	0.00	143.65
	6	-21.07	111.12	0.00	0.00	0.00	182.95
	7	18.80	110.10	0.00	0.00	0.00	-172.24
21	4	2.88	307.20	0.00	0.00	0.00	-14.17
	5	-6.61	270.92	0.00	0.00	0.00	64.18
	6	-11.34	101.55	0.00	0.00	0.00	98.05
	7	12.89	112.33	0.00	0.00	0.00	-105.67
26	4	-2.07	313.38	0.00	0.00	0.00	10.04
	5	-11.67	281.02	0.00	0.00	0.00	88.47
	6	-13.77	105.28	0.00	0.00	0.00	109.31
	7	12.49	92.56	0.00	0.00	0.00	-103.08
31	4	1.38	269.46	0.00	0.00	0.00	-6.78
	5	-7.83	241.63	0.00	0.00	0.00	69.20
	6	-11.69	87.85	0.00	0.00	0.00	98.41
	7	12.27	70.29	0.00	0.00	0.00	-101.27
36	4	-1.45	264.72	0.00	0.00	0.00	7.11
	5	-10.00	224.12	0.00	0.00	0.00	79.01
	6	-12.03	68.03	0.00	0.00	0.00	98.91
	7	11.40	84.63	0.00	0.00	0.00	-95.84
41	4	1.29	271.49	0.00	0.00	0.00	-6.21
	5	-8.15	233.60	0.00	0.00	0.00	69.50
	6	-12.00	76.45	0.00	0.00	0.00	98.14
	7	12.68	87.68	0.00	0.00	0.00	-101.43
46	4	-2.03	250.90	0.00	0.00	0.00	10.04
	5	-9.91	226.32	0.00	0.00	0.00	77.80
	6	-11.40	85.78	0.00	0.00	0.00	94.72
	7	10.46	71.37	0.00	0.00	0.00	-90.13
51	4	2.12	237.49	0.00	0.00	0.00	-9.82
	5	-9.36	221.60	0.00	0.00	0.00	101.03
	6	-14.17	96.07	0.00	0.00	0.00	142.47
	7	16.13	75.38	0.00	0.00	0.00	-151.72

169

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
55	4	-0.57	150.12	0.00	0.00	0.00	3.16
	5	-13.93	142.93	0.00	0.00	0.00	121.88
	6	-18.09	69.11	0.00	0.00	0.00	159.79
59	7	17.72	59.86	0.00	0.00	0.00	-157.80
	4	-0.17	142.82	0.00	0.00	0.00	1.42
	5	-13.08	132.91	0.00	0.00	0.00	117.14
	6	-17.30	61.83	0.00	0.00	0.00	154.98
63	7	17.18	61.63	0.00	0.00	0.00	-154.06
	4	-0.05	146.56	0.00	0.00	0.00	0.98
	5	-13.05	133.90	0.00	0.00	0.00	116.56
	6	-17.36	60.18	0.00	0.00	0.00	154.56
67	7	17.35	66.76	0.00	0.00	0.00	-153.99
	4	-3.04	103.82	0.00	0.00	0.00	15.44
	5	-13.15	118.15	0.00	0.00	0.00	117.05
	6	-15.03	76.19	0.00	0.00	0.00	143.37
	7	12.60	24.95	0.00	0.00	0.00	-131.02

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

245. PRINT SECTION MAX DISPL NSECT 12 LIST 1 TO 104

170

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.04965	46.50	6	3746
2	0.02098	132.03	7	8391
3	0.01659	132.03	7	10613
4	0.04075	46.50	7	4564
5	0.02136	132.03	6	8240
6	0.01783	132.03	6	9875
7	0.04020	46.50	7	4626
8	0.02136	132.03	6	8242
9	0.01828	132.03	6	9629
10	0.03866	46.50	6	4811
11	0.02164	132.03	7	8135
12	0.01896	132.03	7	9286
13	0.04456	46.50	7	4173
14	0.01908	132.03	6	9224
15	0.01727	132.03	7	10190
16	0.04193	46.50	6	4435
17	0.02397	132.03	7	7344
18	0.01506	44.01	7	11692
19	0.02916	131.94	7	6032
20	0.03766	46.50	7	4939
21	0.02553	132.03	6	6896
22	0.01982	44.01	5	8883
23	0.03159	131.94	6	5569
24	0.03844	46.50	6	4838
25	0.02256	132.03	7	7803
26	0.01575	44.01	7	11179
27	0.02946	131.94	7	5971
28	0.03765	46.50	7	4940
29	0.02197	132.03	6	8011
30	0.01535	44.01	6	11471
31	0.02940	131.94	6	5984
32	0.03488	46.50	6	5332
33	0.02368	132.03	7	7433
34	0.01702	44.01	7	10341
35	0.03103	131.94	7	5668
36	0.03786	46.50	7	4912
37	0.02375	132.03	5	7413
38	0.01778	44.01	5	9899
39	0.02907	131.94	6	6052
40	0.04647	62.00	6	4002
41	0.01608	132.03	7	10950
42	0.01302	117.36	6	13519
43	0.03797	46.50	7	4898
44	0.01728	132.03	6	10184
45	0.01435	132.03	6	12264
46	0.03796	46.50	6	4900
47	0.01682	132.03	6	10465
48	0.01355	132.03	7	12991
49	0.03729	46.50	6	4987

171

STAAD PLANE

-- PAGE NO. 21

50	0.01682	132.03	7	10468
51	0.01353	132.03	7	13015
52	0.04568	62.00	7	4072
53	0.01682	132.03	6	10468
54	0.01071	132.03	6	16434
55	0.05774	100.00	5	4156
56	0.02498	80.00	5	9609
57	0.02751	80.00	5	8725
58	0.04345	160.00	7	5523
59	0.04917	100.00	5	4880
60	0.02570	100.00	5	9338
61	0.02498	100.00	5	9609
62	0.03765	120.00	4	6375
63	0.03056	100.00	5	7852
64	0.01441	120.00	4	16660
65	0.01201	100.00	5	19989
66	0.01887	140.00	4	12719
67	0.00254	3.00	4	4718
68	0.00351	3.00	4	3416
69	0.00434	3.00	4	2765
70	0.00354	9.00	5	3391
71	0.00340	9.00	5	3531
72	0.00304	9.00	5	3945
73	0.06562	93.35	5	3413
74	0.01692	100.00	5	8863
75	0.05408	102.00	4	3772
76	0.01141	37.50	7	13144
77	0.04402	112.02	4	5089
78	0.06837	112.02	4	3277
79	0.01439	100.00	5	10424
80	0.05331	102.00	4	3827
81	0.00813	37.50	7	18444
82	0.04954	112.02	4	4522
83	0.06061	93.35	5	3696
84	0.01211	100.00	5	12387
85	0.03388	102.00	4	6022
86	0.00853	37.50	7	17586
87	0.04169	112.02	4	5374
88	0.05368	93.35	5	4173
89	0.01010	112.50	5	14845
90	0.04803	102.00	4	4247
91	0.00789	37.50	7	19003
92	0.05024	112.02	4	4459
93	0.06713	80.00	5	3575
94	0.03885	80.00	5	6177
95	0.04224	80.00	5	5681
96	0.05321	120.00	4	4510
97	0.05973	80.00	5	4017
98	0.03778	100.00	5	6351
99	0.04048	100.00	5	5928
100	0.05065	120.00	4	4738
101	0.03634	80.00	5	6605
102	0.02371	100.00	5	10123
103	0.02687	100.00	5	8931
104	0.03378	120.00	4	7104

172

***** END OF SECT DISPL RESULTS *****

- 246. PARAMETER
- 247. CODE AISC
- 248. BEAM 1 ALL
- 249. FYLD 7200 ALL
- 250. LY 7 MEMB 55 TO 66 73 TO 104
- 251. LZ 7 MEMB 55 TO 66 73 TO 104
- 252. LX 7 MEMB 55 TO 66 73 TO 104
- 253. UNT 2 MEMB 55 TO 66 73 TO 104
- 254. CHECK CODE ALL

173

STAAD.Pro CODE CHECKING - (AISC)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W18 X86	PASS 120.87 C	AISC- H1-1 0.00	0.656 -204.49	7 0.00
2	ST W18 X86	PASS 64.61 C	AISC- H1-3 0.00	0.405 119.03	7 14.67
3	ST W18 X86	PASS 19.63 C	AISC- H1-3 0.00	0.249 88.65	7 14.67
4	ST W18 X86	PASS 219.16 C	AISC- H1-1 0.00	0.750 157.73	5 0.00
5	ST W18 X86	PASS 130.78 C	AISC- H1-1 0.00	0.479 -114.81	5 14.67
6	ST W18 X86	PASS 20.89 C	AISC- H1-3 0.00	0.295 -106.66	6 14.67
7	ST W18 X86	PASS 205.34 C	AISC- H1-1 0.00	0.708 150.47	5 0.00
8	ST W18 X86	PASS 124.66 C	AISC- H1-1 0.00	0.455 -108.71	5 14.67
9	ST W18 X86	PASS 19.57 C	AISC- H1-3 0.00	0.293 -107.07	6 14.67
10	ST W18 X86	PASS 210.57 C	AISC- H1-1 0.00	0.709 146.20	5 0.00
11	ST W18 X86	PASS 64.77 C	AISC- H1-3 0.00	0.483 151.29	7 14.67
12	ST W18 X86	PASS 22.22 C	AISC- H1-3 0.00	0.316 114.38	7 14.67
13	ST W18 X86	PASS 259.67 C	AISC- H1-1 0.00	0.799 143.65	5 0.00
14	ST W18 X86	PASS 165.24 C	AISC- H1-1 0.00	0.532 -109.36	5 14.67
15	ST W18 X86	PASS 66.53 C	AISC- H1-3 0.00	0.313 -79.41	5 14.67
16	ST W14 X74	PASS 270.92 C	AISC- H1-1 0.00	0.833 64.18	5 0.00
17	ST W14 X74	PASS 207.15 C	AISC- H1-1 0.00	0.610 47.43	4 14.67
18	ST W14 X74	PASS 124.31 C	AISC- H1-1 0.00	0.421 -46.59	4 0.00
19	ST W14 X74	PASS 39.82 C	AISC- H1-3 0.00	0.473 108.03	7 14.66
20	ST W14 X74	PASS 281.02 C	AISC- H1-1 0.00	0.950 -92.53	5 15.50
21	ST W14 X74	PASS 207.07 C	AISC- H1-1 0.00	0.766 -96.24	5 14.67

174

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
22	ST W14 X74	PASS 129.62 C	AISC- H1-1 0.00	0.520 74.50	5 0.00
23	ST W14 X74	PASS 61.60 C	AISC- H1-3 0.00	0.504 -103.46	5 14.66
24	ST W14 X74	PASS 241.63 C	AISC- H1-1 0.00	0.780 69.20	5 0.00
25	ST W14 X74	PASS 177.97 C	AISC- H1-1 0.00	0.524 -41.09	5 14.67
26	ST W14 X74	PASS 116.99 C	AISC- H1-1 0.00	0.347 -28.31	5 14.67
27	ST W14 X74	PASS 26.54 C	AISC- H1-3 0.00	0.416 100.31	7 14.66
28	ST W14 X74	PASS 224.12 C	AISC- H1-1 0.00	0.770 79.01	5 0.00
29	ST W14 X74	PASS 172.25 C	AISC- H1-1 0.00	0.616 -74.10	5 14.67
30	ST W14 X74	PASS 109.54 C	AISC- H1-1 0.00	0.406 52.71	5 0.00
31	ST W14 X74	PASS 59.72 C	AISC- H1-3 0.00	0.435 -85.14	5 14.66
32	ST W14 X74	PASS 233.60 C	AISC- H1-1 0.00	0.762 69.50	5 0.00
33	ST W14 X74	PASS 182.85 C	AISC- H1-1 0.00	0.559 -48.69	5 14.67
34	ST W14 X74	PASS 53.26 C	AISC- H1-3 0.00	0.358 -67.54	7 0.00
35	ST W14 X74	PASS 28.84 C	AISC- H1-3 0.00	0.462 111.73	7 14.66
36	ST W14 X74	PASS 226.32 C	AISC- H1-1 0.00	0.772 77.80	5 0.00
37	ST W14 X74	PASS 169.67 C	AISC- H1-1 0.00	0.643 -84.60	5 14.67
38	ST W14 X74	PASS 116.69 C	AISC- H1-1 0.00	0.461 65.09	5 0.00
39	ST W14 X74	PASS 76.24 C	AISC- H1-1 0.00	0.477 -99.87	5 14.66
40	ST W18 X86	PASS 221.60 C	AISC- H1-1 0.00	0.635 101.03	5 0.00
41	ST W18 X86	PASS 165.82 C	AISC- H1-1 0.00	0.374 -32.85	4 0.00
42	ST W18 X86	PASS 80.44 C	AISC- H1-3 0.00	0.231 -34.64	5 14.67
43	ST W18 X86	PASS 142.93 C	AISC- H1-1 0.00	0.527 121.88	5 0.00
44	ST W18 X86	PASS 41.56 C	AISC- H1-3 0.00	0.344 -111.35	6 14.67

175

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
45	ST W18 X86	PASS 11.39 C	AISC- H1-3 0.00	0.217 -81.53	6 14.67
46	ST W18 X86	PASS 132.91 C	AISC- H1-1 0.00	0.497 117.14	5 0.00
47	ST W18 X86	PASS 77.86 C	AISC- H1-3 0.00	0.331 -78.22	5 14.67
48	ST W18 X86	PASS 10.03 C	AISC- H1-3 0.00	0.198 74.64	7 14.67
49	ST W18 X86	PASS 133.90 C	AISC- H1-1 0.00	0.498 116.56	5 0.00
50	ST W18 X86	PASS 39.77 C	AISC- H1-3 0.00	0.338 110.21	7 14.67
51	ST W18 X86	PASS 10.64 C	AISC- H1-3 0.00	0.200 75.09	7 14.67
52	ST W18 X86	PASS 76.19 C	AISC- H1-3 0.00	0.490 143.37	6 0.00
53	ST W18 X86	PASS 66.87 C	AISC- H1-3 0.00	0.337 -88.96	5 14.67
54	ST W18 X86	PASS 17.64 C	AISC- H1-3 0.00	0.175 -59.16	5 14.67
55	ST W27 X114	PASS 36.63 C	AISC- H1-3 0.00	0.602 268.98	5 20.00
56	ST W27 X114	PASS 32.89 C	AISC- H1-3 0.00	0.539 240.51	5 20.00
57	ST W27 X114	PASS 29.30 C	AISC- H1-3 0.00	0.540 243.19	5 20.00
58	ST W27 X114	PASS 36.18 C	AISC- H1-3 0.00	0.554 246.09	6 20.00
59	ST W27 X114	PASS 45.51 C	AISC- H1-3 0.00	0.522 225.52	5 20.00
60	ST W27 X114	PASS 40.71 C	AISC- H1-3 0.00	0.498 216.49	5 20.00
61	ST W27 X114	PASS 36.82 C	AISC- H1-3 0.00	0.501 220.36	5 20.00
62	ST W27 X114	PASS 43.05 C	AISC- H1-3 0.00	0.459 196.64	6 20.00
63	ST W27 X114	PASS 48.48 C	AISC- H1-3 0.00	0.272 103.83	5 20.00
64	ST W27 X114	PASS 37.85 C	AISC- H1-3 0.00	0.267 107.17	5 20.00
65	ST W27 X114	PASS 27.31 C	AISC- H1-3 0.00	0.261 110.44	5 20.00
66	ST W27 X114	PASS 17.51 C	AISC- H1-3 0.00	0.224 97.76	5 20.00

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 67).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

176

STAAD PLANE

-- PAGE NO. 26

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 68).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 69).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 70).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 71).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 72).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

73	ST	W27 X114	PASS	AISC- H1-3	0.373	5
		18.21 C		0.00	184.77	18.67
74	ST	W24 X68	PASS	AISC- H1-3	0.354	5
		19.60 C		0.00	105.83	12.50
75	ST	W24 X68	PASS	AISC- H1-3	0.549	5
		17.16 C		0.00	132.13	17.00
76	ST	W24 X68	PASS	AISC- H1-3	0.292	5
		17.25 C		0.00	86.36	12.50
77	ST	W27 X114	PASS	AISC- H1-3	0.317	6
		23.18 C		0.00	152.77	18.67
78	ST	W27 X114	PASS	AISC- H1-3	0.359	5
		26.02 C		0.00	172.78	18.67
79	ST	W24 X68	PASS	AISC- H1-3	0.347	5
		23.00 C		0.00	101.15	12.50
80	ST	W24 X68	PASS	AISC- H1-3	0.569	5
		21.29 C		0.00	135.14	17.00
81	ST	W24 X68	PASS	AISC- H1-3	0.323	5
		18.22 C		0.00	96.23	12.50
82	ST	W27 X114	PASS	AISC- H1-3	0.277	5
		15.71 C		0.00	136.32	18.67
83	ST	W27 X114	PASS	AISC- H1-3	0.327	5
		12.04 C		0.00	164.38	18.67
84	ST	W24 X68	PASS	AISC- H1-3	0.298	5
		16.01 C		0.00	89.35	12.50
85	ST	W24 X68	PASS	AISC- H1-3	0.454	5
		20.21 C		0.00	106.19	17.00
86	ST	W24 X68	PASS	AISC- H1-3	0.280	5
		24.36 C		0.00	77.84	12.50
87	ST	W27 X114	PASS	AISC- H1-3	0.308	6
		34.80 C		0.00	140.92	18.67
88	ST	W27 X114	PASS	AISC- H1-3	0.291	5
		53.86 C		0.00	120.60	18.67
89	ST	W24 X68	PASS	AISC- H1-3	0.386	5
		39.86 C		0.00	103.05	12.50
90	ST	W24 X68	PASS	AISC- H1-3	0.501	5
		31.98 C		0.00	112.18	17.00
91	ST	W24 X68	PASS	AISC- H1-3	0.291	5
		20.81 C		0.00	83.74	12.50
92	ST	W27 X114	PASS	AISC- H1-3	0.209	6
		13.49 C		0.00	101.80	18.67

177

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
93	ST W24 X68	PASS 9.93 C	AISC- H1-3 0.00	1.000 188.66	5 20.00
94	ST W24 X68	PASS 7.57 C	AISC- H1-3 0.00	0.871 164.71	5 20.00
95	ST W24 X68	PASS 4.65 C	AISC- H1-3 0.00	0.869 165.51	5 20.00
96	ST W24 X68	PASS 1.81 C	AISC- H1-3 0.00	0.860 164.86	5 20.00
97	ST W24 X68	PASS 14.10 C	AISC- H1-3 0.00	0.934 174.38	5 20.00
98	ST W24 X68	PASS 10.86 C	AISC- H1-3 0.00	0.792 148.38	5 20.00
99	ST W24 X68	PASS 7.35 C	AISC- H1-3 0.00	0.788 148.84	5 20.00
100	ST W24 X68	PASS 3.66 C	AISC- H1-3 0.00	0.747 142.40	5 20.00
101	ST W21 X57	PASS 29.18 C	AISC- H1-3 0.00	0.871 74.29	5 20.00
102	ST W21 X57	PASS 20.85 C	AISC- H1-3 0.00	0.698 60.17	5 20.00
103	ST W21 X57	PASS 14.20 C	AISC- H1-3 0.00	0.673 59.47	5 20.00
104	ST W21 X57	PASS 7.67 C	AISC- H1-3 0.00	0.652 59.16	5 20.00

255. FINISH

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

**** DATE= APR 17,2006 TIME= 16:28:24 ****

 * For questions on STAAD.Pro, please contact : *
 * By Email - North America : support@reiusa.com *
 * By Email - International : support@reiworld.com *
 * Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

178

```

*****
*
*          STAAD.Pro
*          Version 2003   Bld 1002.US
*          Proprietary Program of
*          Research Engineers, Intl.
*          Date=   MAR 30, 2006
*          Time=   7:54: 2
*
*          USER ID: morphy makofsky inc
*****

```

OLD STUDS on left in email

1. STAAD PLANE
2. START JOB INFORMATION
3. ENGINEER DATE 27-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 15.5 0; 3 0 30.17 0; 4 0 44.84 0; 5 20 0 0; 6 20 15.5 0
9. 7 20 30.17 0; 8 20 44.84 0; 9 40 0 0; 10 40 15.5 0; 11 40 30.17 0
10. 12 40 44.84 0; 13 60 0 0; 14 60 15.5 0; 15 60 30.17 0; 16 60 44.84 0
11. 17 80 0 0; 18 80 15.5 0; 19 80 30.17 0; 20 80 44.84 0; 21 81 0 0; 22 81 15.5 0
12. 23 81 30.17 0; 24 81 44.84 0; 25 81 59.5 0; 26 99.67 0 0; 27 99.67 15.5 0
13. 28 99.67 30.17 0; 29 99.67 44.84 0; 30 99.67 59.5 0; 31 112.17 0 0
14. 32 112.17 15.5 0; 33 112.17 30.17 0; 34 112.17 44.84 0; 35 112.17 59.5 0
15. 36 129.17 0 0; 37 129.17 15.5 0; 38 129.17 30.17 0; 39 129.17 44.84 0
16. 40 129.17 59.5 0; 41 141.67 0 0; 42 141.67 15.5 0; 43 141.67 30.17 0
17. 44 141.67 44.84 0; 45 141.67 59.5 0; 46 160.34 0 0; 47 160.34 15.5 0
18. 48 160.34 30.17 0; 49 160.34 44.84 0; 50 160.34 59.5 0; 51 161.34 0 0
19. 52 161.34 15.5 0; 53 161.34 30.17 0; 54 161.34 44.84 0; 55 181.34 0 0
20. 56 181.34 15.5 0; 57 181.34 30.17 0; 58 181.34 44.84 0; 59 201.34 0 0
21. 60 201.34 15.5 0; 61 201.34 30.17 0; 62 201.34 44.84 0; 63 221.34 0 0
22. 64 221.34 15.5 0; 65 221.34 30.17 0; 66 221.34 44.84 0; 67 241.34 0 0
23. 68 241.34 15.5 0; 69 241.34 30.17 0; 70 241.34 44.84 0
24. MEMBER INCIDENCES
25. 1 1 2; 2 2 3; 3 3 4; 4 5 6; 5 6 7; 6 7 8; 7 9 10; 8 10 11; 9 11 12; 10 13 14
26. 11 14 15; 12 15 16; 13 17 18; 14 18 19; 15 19 20; 16 21 22; 17 22 23; 18 23 24
27. 19 24 25; 20 26 27; 21 27 28; 22 28 29; 23 29 30; 24 31 32; 25 32 33; 26 33 34
28. 27 34 35; 28 36 37; 29 37 38; 30 38 39; 31 39 40; 32 41 42; 33 42 43; 34 43 44
29. 35 44 45; 36 46 47; 37 47 48; 38 48 49; 39 49 50; 40 51 52; 41 52 53; 42 53 54
30. 43 55 56; 44 56 57; 45 57 58; 46 59 60; 47 60 61; 48 61 62; 49 63 64; 50 64 65
31. 51 65 66; 52 67 68; 53 68 69; 54 69 70; 55 2 6; 56 6 10; 57 10 14; 58 14 18
32. 59 3 7; 60 7 11; 61 11 15; 62 15 19; 63 4 8; 64 8 12; 65 12 16; 66 16 20
33. 67 18 22; 68 19 23; 69 20 24; 70 49 54; 71 48 53; 72 47 52; 73 22 27; 74 27 32
34. 75 32 37; 76 37 42; 77 42 47; 78 23 28; 79 28 33; 80 33 38; 81 38 43; 82 43 48
35. 83 24 29; 84 29 34; 85 34 39; 86 39 44; 87 44 49; 88 25 30; 89 30 35; 90 35 40
36. 91 40 45; 92 45 50; 93 52 56; 94 56 60; 95 60 64; 96 64 68; 97 53 57; 98 57 61
37. 99 61 65; 100 65 69; 101 54 58; 102 58 62; 103 62 66; 104 66 70
38. DEFINE MATERIAL START
39. ISOTROPIC STEEL
40. E 4.176E+006
41. POISSON 0.3

179

42. DENSITY 0.489024
 43. ALPHA 6.5E-006
 44. DAMP 0.03
 45. END DEFINE MATERIAL
 46. CONSTANTS
 47. MATERIAL STEEL MEMB 1 TO 104
 48. MEMBER PROPERTY AMERICAN
 49. 1 TO 15 TABLE ST W18X86 ✓
 50. 16 TO 39 TABLE ST W14X74 ✓
 51. 40 TO 54 TABLE ST W18X86 ✓
 52. 55 TO 66 TABLE ST W27X114 ✓
 53. 73 77 78 82 83 87 88 92 TABLE ST W27X114 ✓
 54. 74 TO 76 79 TO 81 84 TO 86 89 TO 91 TABLE ST W24X68 ✓
 55. 93 TO 100 TABLE ST W24X68 ✓
 56. 101 TO 104 TABLE ST W21X57 ✓
 57. MEMBER PROPERTY AMERICAN
 58. 67 TO 72 PRIS YD 0.25 ZD 0.25
 59. SUPPORTS
 60. 1 5 9 13 17 21 26 31 36 41 46 51 55 59 63 67 FIXED
 61. LOAD 1 DEAD
 62. * K LINE FRAME
 63. MEMBER LOAD
 64. 55 TO 62 CON GY -11.6 6.67
 65. 55 TO 62 CON GY -11.6 13.33
 66. 63 TO 66 CON GY -10.8 6.67
 67. 63 TO 66 CON GY -10.8 13.33
 68. JOINT LOAD
 69. 2 18 FY -28.7
 70. 3 19 FY -21.8
 71. 4 20 FY -12.7
 72. 6 7 10 11 14 15 FY -11.6
 73. 8 12 16 FY -10.8
 74. MEMBER LOAD
 75. 55 TO 62 UNI GY -0.734
 76. * E LINE FRAME
 77. MEMBER LOAD
 78. 93 TO 96 CON GY -4.3 6.67
 79. 93 TO 96 CON GY -4.3 13.33
 80. 97 TO 100 CON GY -6 6.67
 81. 97 TO 100 CON GY -6 13.33
 82. 101 TO 104 CON GY -5.6 6.67
 83. 101 TO 104 CON GY -5.6 13.33
 84. JOINT LOAD
 85. 52 FY -15.9
 86. 53 FY -19.3
 87. 54 FY -21
 88. 68 FY -11.6
 89. 69 FY -12.4
 90. 70 FY -6.5
 91. 56 60 64 FY -4.3
 92. 57 61 65 FY -6
 93. 58 62 66 FY -5.6
 94. MEMBER LOAD
 95. 93 TO 100 UNI GY -0.734
 96. * G LINE FRAME
 97. MEMBER LOAD

COLUMNS

K LINE

G LINE.

E LINE
E LINE

100

STAAD PLANE

-- PAGE NO. 3

98. 73 CON GY -17.1 6.22
99. 73 CON GY -17.1 12.45
100. 74 CON GY -5.5 6.25
101. 75 CON GY -10 5.66
102. 75 CON GY -10 11.34
103. 76 CON GY -5 6.25
104. 77 CON GY -10 6.23
105. 77 CON GY -10 12.45
106. 78 CON GY -17.1 6.22
107. 78 CON GY -17.1 12.45
108. 79 CON GY -5.5 6.25
109. 80 CON GY -11.8 5.66
110. 80 CON GY -11.8 11.34
111. 81 CON GY -11.8 6.25
112. 82 CON GY -11.8 6.23
113. 82 CON GY -11.8 12.45
114. 83 CON GY -19.3 6.22
115. 83 CON GY -19.3 12.45
116. 84 CON GY -7.7 6.25
117. 85 CON GY -6.5 5.66
118. 85 CON GY -6.5 11.34
119. 86 CON GY -7.7 6.25
120. 87 CON GY -14 6.23
121. 87 CON GY -14 12.45
122. 88 CON GY -17.9 6.22
123. 88 CON GY -17.9 12.45
124. 89 CON GY -17.9 6.25
125. 90 CON GY -17.9 5.66
126. 90 CON GY -17.9 11.34
127. 91 CON GY -17.9 6.25
128. 92 CON GY -17.9 6.23
129. 92 CON GY -17.9 12.45
130. JOINT LOAD
131. 22 FY -46
132. 23 FY -34.2
133. 24 FY -38.6
134. 25 FY -35.8
135. 47 FY -20.5
136. 48 FY -23.6
137. 49 FY -29
138. 50 FY -35.8
139. 27 32 FY -17.1
140. 37 42 FY -10
141. 28 FY -17.1
142. 33 38 43 FY -11.8
143. 29 34 39 44 FY -19.3
144. 30 35 40 45 FY -17.9
145. LOAD 2 LIVE
146. * K LINE FRAME
147. MEMBER LOAD
148. 55 TO 62 CON GY -8.3 6.67
149. 55 TO 62 CON GY -8.3 13.33
150. 63 TO 66 CON GY -5 6.67
151. 63 TO 66 CON GY -5 13.33
152. JOINT LOAD
153. 2 18 FY -15.3

181

STAAD PLANE

-- PAGE NO. 4

154. 3 19 FY -6.7
155. 4 20 FY -2.5
156. 6 7 10 11 14 15 FY -8.3
157. 8 12 16 FY -5
158. * E LINE FRAME
159. MEMBER LOAD
160. 93 TO 96 CON GY -6.5 6.67
161. 93 TO 96 CON GY -6.5 13.33
162. 97 TO 100 CON GY -4.3 6.67
163. 97 TO 100 CON GY -4.3 13.33
164. 101 TO 104 CON GY -2.6 6.67
165. 101 TO 104 CON GY -2.6 13.33
166. JOINT LOAD
167. 52 FY -13
168. 53 FY -8.6
169. 54 FY -10.4
170. 68 FY -3.3
171. 69 FY -2.2
172. 70 FY -1.3
173. 56 60 64 FY -6.5
174. 57 61 65 FY -4.3
175. 58 62 66 FY -2.6
176. * G LINE FRAME
177. MEMBER LOAD
178. 73 CON GY -19.3 6.22
179. 73 CON GY -19.3 12.45
180. 74 CON GY -11 6.25
181. 75 CON GY -17.8 5.66
182. 75 CON GY -17.8 11.34
183. 76 CON GY -11 6.25
184. 77 CON GY -15.1 6.23
185. 77 CON GY -15.1 12.45
186. 78 CON GY -22.1 6.22
187. 78 CON GY -22.1 12.45
188. 79 CON GY -13.8 6.25
189. 80 CON GY -18.3 5.66
190. 80 CON GY -18.3 11.34
191. 81 CON GY -18.3 6.25
192. 82 CON GY -18.3 6.23
193. 82 CON GY -18.3 12.45
194. 83 CON GY -13.8 6.22
195. 83 CON GY -13.8 12.45
196. 84 CON GY -5.5 6.25
197. 85 CON GY -13 5.66
198. 85 CON GY -13 11.34
199. 86 CON GY -5.5 6.25
200. 87 CON GY -10 6.23
201. 87 CON GY -10 12.45
202. 88 CON GY -8.3 6.22
203. 88 CON GY -8.3 12.45
204. 89 CON GY -8.3 6.25
205. 90 CON GY -8.3 5.66
206. 90 CON GY -8.3 11.34
207. 91 CON GY -8.3 6.25
208. 92 CON GY -8.3 6.23
209. 92 CON GY -8.3 12.45

182

STAAD PLANE

-- PAGE NO. 5

210. JOINT LOAD
 211. 22 FY -38
 212. 23 FY -44.2
 213. 24 FY -27.2
 214. 25 FY -16.6
 215. 47 FY -37.6
 216. 48 FY -36.6
 217. 49 FY -32.5
 218. 50 FY -16.6
 219. 27 32 FY -19.3
 220. 37 42 FY -17.8
 221. 28 FY -22.1
 222. 33 38 43 FY -18.3
 223. 29 34 39 44 FY -13.8
 224. 30 35 40 45 FY -8.3
 225. LOAD 3 WIND
 226. JOINT LOAD
 227. 2 FX 62.4
 228. 3 FX 63.3
 229. 4 FX 66.6
 230. 25 FX 77.3
 231. LOAD COMB 4 DEAD LIVE
 232. 1 1.0 2 1.0
 233. LOAD COMB 5 DEAD LIVE WIND
 234. 1 1.0 2 0.75 3 0.75
 235. LOAD COMB 6 DEAD WIND
 236. 3 1.0 1 0.6
 237. LOAD COMB 7 DEAD -WIND
 238. 1 0.6 3 -1.0
 239. 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 = 70/ 104/ 16
 ORIGINAL/FINAL BAND-WIDTH= 5/ 5/ 15 DOF
 TOTAL PRIMARY LOAD CASES = 3, TOTAL DEGREES OF FREEDOM = 162
 SIZE OF STIFFNESS MATRIX = 3 DOUBLE KILO-WORDS
 REQD/AVAIL. DISK SPACE = 12.2/ 25060.4 MB, EXMEM = 1553.1 MB

240. PDELTA 2 ANALYSIS
 ++ Adjusting Displacements 7:54: 3
 ++ Adjusting Displacements 7:54: 3

241. PRINT JOINT DISPLACEMENTS LIST 2 TO 4 25 42 TO 44 50 68 TO 70

183

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
2	1	-0.00201	-0.02720	0.00000	0.00000	0.00000	-0.00026
2	2	-0.00146	-0.01122	0.00000	0.00000	0.00000	-0.00013
3	3	0.43062	0.01022	0.00000	0.00000	0.00000	-0.00130
4	4	-0.00347	-0.03842	0.00000	0.00000	0.00000	-0.00039
5	5	0.31986	-0.02795	0.00000	0.00000	0.00000	-0.00133
6	6	0.42941	-0.00610	0.00000	0.00000	0.00000	-0.00146
7	7	-0.43182	-0.02654	0.00000	0.00000	0.00000	0.00115
3	1	-0.00015	-0.04196	0.00000	0.00000	0.00000	-0.00025
2	2	0.00025	-0.01638	0.00000	0.00000	0.00000	-0.00013
3	3	0.77430	0.01505	0.00000	0.00000	0.00000	-0.00091
4	4	0.00010	-0.05833	0.00000	0.00000	0.00000	-0.00038
5	5	0.58076	-0.04295	0.00000	0.00000	0.00000	-0.00103
6	6	0.77420	-0.01013	0.00000	0.00000	0.00000	-0.00106
7	7	-0.77439	-0.04022	0.00000	0.00000	0.00000	0.00076
4	1	0.00356	-0.04730	0.00000	0.00000	0.00000	-0.00025
2	2	0.00342	-0.01807	0.00000	0.00000	0.00000	-0.00014
3	3	1.00347	0.01654	0.00000	0.00000	0.00000	-0.00050
4	4	0.00698	-0.06537	0.00000	0.00000	0.00000	-0.00039
5	5	0.75872	-0.04844	0.00000	0.00000	0.00000	-0.00073
6	6	1.00560	-0.01184	0.00000	0.00000	0.00000	-0.00065
7	7	-1.00134	-0.04492	0.00000	0.00000	0.00000	0.00035
25	1	-0.00167	-0.11863	0.00000	0.00000	0.00000	-0.00046
2	2	0.00166	-0.07959	0.00000	0.00000	0.00000	-0.00024
3	3	1.35060	0.00812	0.00000	0.00000	0.00000	-0.00055
4	4	-0.00002	-0.19822	0.00000	0.00000	0.00000	-0.00070
5	5	1.01252	-0.17223	0.00000	0.00000	0.00000	-0.00105
6	6	1.34960	-0.06306	0.00000	0.00000	0.00000	-0.00083
7	7	-1.35160	-0.07929	0.00000	0.00000	0.00000	0.00028
42	1	0.00033	-0.04006	0.00000	0.00000	0.00000	-0.00015
2	2	0.00070	-0.03963	0.00000	0.00000	0.00000	-0.00021
3	3	0.35662	0.00165	0.00000	0.00000	0.00000	-0.00041
4	4	0.00103	-0.07970	0.00000	0.00000	0.00000	-0.00036
5	5	0.26832	-0.06855	0.00000	0.00000	0.00000	-0.00062
6	6	0.35682	-0.02239	0.00000	0.00000	0.00000	-0.00050
7	7	-0.35642	-0.02569	0.00000	0.00000	0.00000	0.00032
43	1	0.00033	-0.07168	0.00000	0.00000	0.00000	-0.00013
2	2	0.00060	-0.06626	0.00000	0.00000	0.00000	-0.00020
3	3	0.68864	0.00274	0.00000	0.00000	0.00000	-0.00037
4	4	0.00093	-0.13794	0.00000	0.00000	0.00000	-0.00033
5	5	0.51726	-0.11932	0.00000	0.00000	0.00000	-0.00055
6	6	0.68884	-0.04027	0.00000	0.00000	0.00000	-0.00044
7	7	-0.68845	-0.04575	0.00000	0.00000	0.00000	0.00029
44	1	-0.00066	-0.09505	0.00000	0.00000	0.00000	-0.00017
2	2	-0.00041	-0.07964	0.00000	0.00000	0.00000	-0.00012
3	3	0.94272	0.00348	0.00000	0.00000	0.00000	-0.00040
4	4	-0.00107	-0.17469	0.00000	0.00000	0.00000	-0.00029
5	5	0.70607	-0.15217	0.00000	0.00000	0.00000	-0.00056
6	6	0.94232	-0.05355	0.00000	0.00000	0.00000	-0.00050

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
50	7	-0.94312	-0.06051	0.00000	0.00000	0.00000	0.00029
	1	-0.00461	-0.09788	0.00000	0.00000	0.00000	0.00050
	2	-0.00071	-0.07636	0.00000	0.00000	0.00000	0.00023
	3	1.30011	-0.00918	0.00000	0.00000	0.00000	-0.00053
	4	-0.00531	-0.17423	0.00000	0.00000	0.00000	0.00073
	5	0.96995	-0.16203	0.00000	0.00000	0.00000	0.00028
	6	1.29735	-0.06790	0.00000	0.00000	0.00000	-0.00023
68	7	-1.30288	-0.04955	0.00000	0.00000	0.00000	0.00083
	1	0.00238	-0.01503	0.00000	0.00000	0.00000	0.00018
	2	0.00158	-0.00495	0.00000	0.00000	0.00000	0.00013
	3	0.33301	-0.00649	0.00000	0.00000	0.00000	-0.00150
	4	0.00396	-0.01998	0.00000	0.00000	0.00000	0.00032
	5	0.25333	-0.02362	0.00000	0.00000	0.00000	-0.00084
	6	0.33444	-0.01551	0.00000	0.00000	0.00000	-0.00139
69	7	-0.33159	-0.00253	0.00000	0.00000	0.00000	0.00161
	1	0.00009	-0.02384	0.00000	0.00000	0.00000	0.00022
	2	0.00009	-0.00739	0.00000	0.00000	0.00000	0.00008
	3	0.66541	-0.00971	0.00000	0.00000	0.00000	-0.00113
	4	0.00019	-0.03122	0.00000	0.00000	0.00000	0.00029
	5	0.49922	-0.03666	0.00000	0.00000	0.00000	-0.00057
	6	0.66546	-0.02401	0.00000	0.00000	0.00000	-0.00100
70	7	-0.66535	-0.00460	0.00000	0.00000	0.00000	0.00126
	1	-0.00546	-0.02664	0.00000	0.00000	0.00000	0.00020
	2	-0.00311	-0.00829	0.00000	0.00000	0.00000	0.00011
	3	0.89505	-0.01068	0.00000	0.00000	0.00000	-0.00080
	4	-0.00857	-0.03493	0.00000	0.00000	0.00000	0.00031
	5	0.66350	-0.04087	0.00000	0.00000	0.00000	-0.00031
	6	0.89178	-0.02667	0.00000	0.00000	0.00000	-0.00068
	7	-0.89832	-0.00531	0.00000	0.00000	0.00000	0.00092

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

242. LOAD LIST 4 TO 7

243. PRINT MAXFORCE ENVELOPE NSECTION 24 LIST 1 TO 104

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	21.02	0.00	6	191.92	0.00	6			
	0.00	0.00	4	0.00	0.00	4	151.57 C	0.00	4
MIN	-23.26	15.50	7	-203.07	0.00	7			
	0.00	15.50	7	0.00	15.50	7	24.06 C	15.50	6
2 MAX	10.25	0.00	6	114.73	14.67	7			
	0.00	0.00	4	0.00	0.00	4	82.98 C	0.00	4
MIN	-14.52	14.67	7	-98.30	0.00	7			
	0.00	14.67	7	0.00	14.67	7	16.78 C	14.67	6
3 MAX	6.73	0.00	6	87.68	14.67	7			
	0.00	0.00	4	0.00	0.00	4	29.30 C	0.00	4
MIN	-10.78	14.67	7	-70.43	0.00	7			
	0.00	14.67	7	0.00	14.67	7	7.13 C	14.67	6
4 MAX	25.49	0.00	6	210.47	0.00	6			
	0.00	0.00	4	0.00	0.00	4	202.33 C	0.00	4
MIN	-25.42	15.50	7	-210.53	0.00	7			
	0.00	15.50	7	0.00	15.50	7	73.59 C	15.50	7
5 MAX	19.92	0.00	6	146.07	14.67	7			
	0.00	0.00	4	0.00	0.00	4	125.06 C	0.00	4
MIN	-19.48	14.67	7	-148.79	14.67	6			
	0.00	14.67	7	0.00	14.67	7	47.64 C	14.67	7
6 MAX	13.71	0.00	6	103.45	14.67	7			
	0.00	0.00	4	0.00	0.00	4	48.86 C	0.00	4
MIN	-13.28	14.67	7	-106.59	14.67	6			
	0.00	14.67	7	0.00	14.67	7	19.26 C	14.67	7
7 MAX	24.16	0.00	6	201.73	0.00	6			
	0.00	0.00	4	0.00	0.00	4	194.94 C	0.00	4
MIN	-24.26	15.50	7	-202.49	0.00	7			
	0.00	15.50	7	0.00	15.50	7	77.84 C	15.50	7
8 MAX	19.04	0.00	6	142.85	14.67	7			
	0.00	0.00	4	0.00	0.00	4	121.27 C	0.00	4
MIN	-18.94	14.67	7	-143.58	14.67	6			
	0.00	14.67	7	0.00	14.67	7	48.70 C	14.67	7
9 MAX	13.71	0.00	6	105.30	14.67	7			
	0.00	0.00	4	0.00	0.00	4	47.13 C	0.00	4

166

STAAD PLANE				-- PAGE NO.		9	
MIN	-13.48	14.67	7	-107.09	14.67	6	
	0.00	14.67	7	0.00	14.67	7	19.21 C 14.67 7
10 MAX	23.87	0.00	6	198.18	0.00	6	
	0.00	0.00	4	0.00	0.00	4	207.08 C 0.00 4
MIN	-24.30	15.50	7	-200.46	0.00	7	
	0.00	15.50	7	0.00	15.50	7	73.84 C 15.50 6
11 MAX	19.42	0.00	6	150.65	14.67	7	
	0.00	0.00	4	0.00	0.00	4	128.63 C 0.00 4
MIN	-20.16	14.67	7	-145.17	14.67	6	
	0.00	14.67	7	0.00	14.67	7	46.82 C 14.67 6
12 MAX	13.99	0.00	6	114.30	14.67	7	
	0.00	0.00	4	0.00	0.00	4	50.25 C 0.00 4
MIN	-14.73	14.67	7	-108.67	14.67	6	
	0.00	14.67	7	0.00	14.67	7	18.72 C 14.67 6
13 MAX	20.77	0.00	6	181.49	0.00	6	
	0.00	0.00	4	0.00	0.00	4	259.43 C 0.00 4
MIN	-19.11	15.50	7	-173.70	0.00	7	
	0.00	15.50	7	0.00	15.50	7	95.20 C 15.50 7
14 MAX	14.82	0.00	6	103.34	0.00	6	
	0.00	0.00	4	0.00	0.00	4	170.63 C 0.00 4
MIN	-11.42	14.67	7	-114.02	14.67	6	
	0.00	14.67	7	0.00	14.67	7	59.54 C 14.67 6
15 MAX	11.59	0.00	6	78.16	14.67	7	
	0.00	0.00	4	0.00	0.00	4	81.40 C 0.00 4
MIN	-9.28	14.67	7	-92.92	14.67	6	
	0.00	14.67	7	0.00	14.67	7	24.75 C 14.67 6
16 MAX	11.29	0.00	6	97.86	0.00	6	
	0.00	0.00	4	0.00	0.00	4	296.89 C 0.00 4
MIN	-12.92	15.50	7	-105.86	0.00	7	
	0.00	15.50	7	0.00	15.50	7	95.37 C 15.50 6
17 MAX	8.04	0.00	6	86.37	14.67	7	
	0.00	0.00	4	0.00	0.00	4	199.89 C 0.00 4
MIN	-11.51	14.67	7	-82.42	0.00	7	
	0.00	14.67	7	0.00	14.67	7	62.62 C 14.67 6
18 MAX	4.08	0.00	6	56.84	14.67	7	
	0.00	0.00	4	0.00	0.00	4	121.42 C 0.00 4
MIN	-7.82	14.67	7	-57.93	0.00	7	
	0.00	14.67	7	0.00	14.67	7	40.21 C 14.67 6
19 MAX	10.26	0.00	6	108.74	14.66	7	
	0.00	0.00	4	0.00	0.00	4	76.89 C 0.00 4
MIN	-14.62	14.66	7	-105.59	0.00	7	
	0.00	14.66	7	0.00	14.66	7	22.88 C 14.66 6
20 MAX	13.77	0.00	6	109.24	0.00	6	
	0.00	0.00	4	0.00	0.00	4	312.74 C 0.00 4

187

STAAD PLANE

-- PAGE NO. 10

MIN	-12.51	15.50	7	-104.21	15.50	6				
	0.00	15.50	7	0.00	15.50	7	92.18 C	15.50	7	
21 MAX	13.37	0.00	6	97.55	0.00	6				
	0.00	0.00	4	0.00	0.00	4	229.16 C	0.00	4	
MIN	-10.63	14.67	7	-98.54	14.67	6				
	0.00	14.67	7	0.00	14.67	7	71.29 C	14.67	7	
22 MAX	9.96	0.00	5	73.91	0.00	5				
	0.00	0.00	4	0.00	0.00	4	139.57 C	0.00	4	
MIN	-6.82	14.67	7	-72.17	14.67	5				
	0.00	14.67	7	0.00	14.67	7	50.23 C	14.67	7	
23 MAX	15.65	0.00	6	113.00	0.00	6				
	0.00	0.00	4	0.00	0.00	4	65.31 C	0.00	4	
MIN	-12.79	14.66	7	-116.46	14.66	6				
	0.00	14.66	7	0.00	14.66	7	25.25 C	14.66	7	
24 MAX	11.71	0.00	6	98.41	0.00	6				
	0.00	0.00	4	0.00	0.00	4	269.64 C	0.00	4	
MIN	-12.29	15.50	7	-101.26	0.00	7				
	0.00	15.50	7	0.00	15.50	7	70.40 C	15.50	7	
25 MAX	9.74	0.00	6	82.05	14.67	7				
	0.00	0.00	4	0.00	0.00	4	197.46 C	0.00	4	
MIN	-10.98	14.67	7	-79.02	0.00	7				
	0.00	14.67	7	0.00	14.67	7	55.64 C	14.67	7	
26 MAX	6.78	0.00	6	52.96	14.67	7				
	0.00	0.00	4	0.00	0.00	4	127.32 C	0.00	4	
MIN	-7.41	14.67	7	-55.70	0.00	7				
	0.00	14.67	7	0.00	14.67	7	41.77 C	14.67	7	
27 MAX	12.17	0.00	6	100.31	14.66	7				
	0.00	0.00	4	0.00	0.00	4	67.76 C	0.00	4	
MIN	-13.22	14.66	7	-93.55	0.00	7				
	0.00	14.66	7	0.00	14.66	7	26.58 C	14.66	7	
28 MAX	12.01	0.00	6	98.94	0.00	6				
	0.00	0.00	4	0.00	0.00	4	264.90 C	0.00	4	
MIN	-11.38	15.50	7	-95.81	0.00	7				
	0.00	15.50	7	0.00	15.50	7	68.14 C	15.50	6	
29 MAX	10.94	0.00	6	79.10	0.00	6				
	0.00	0.00	4	0.00	0.00	4	200.66 C	0.00	4	
MIN	-9.73	14.67	7	-81.44	14.67	6				
	0.00	14.67	7	0.00	14.67	7	57.09 C	14.67	6	
30 MAX	7.50	0.00	6	55.98	0.00	6				
	0.00	0.00	4	0.00	0.00	4	124.80 C	0.00	4	
MIN	-6.86	14.67	7	-53.98	14.67	6				
	0.00	14.67	7	0.00	14.67	7	41.22 C	14.67	6	
31 MAX	13.07	0.00	6	92.24	0.00	6				
	0.00	0.00	4	0.00	0.00	4	65.72 C	0.00	4	

STAAD PLANE				-- PAGE NO. 11			
MIN	-11.97	14.66	7	-99.30	14.66	6	
	0.00	14.66	7	0.00	14.66	7	26.06 C 14.66 6
32 MAX	12.01	0.00	6	98.24	0.00	6	
	0.00	0.00	4	0.00	0.00	4	270.89 C 0.00 4
MIN	-12.65	15.50	7	-101.33	0.00	7	
	0.00	15.50	7	0.00	15.50	7	76.09 C 15.50 6
33 MAX	11.23	0.00	6	92.41	14.67	7	
	0.00	0.00	4	0.00	0.00	4	209.15 C 0.00 4
MIN	-12.56	14.67	7	-91.89	0.00	7	
	0.00	14.67	7	0.00	14.67	7	64.22 C 14.67 6
34 MAX	7.70	0.00	6	67.15	14.67	7	
	0.00	0.00	4	0.00	0.00	4	131.98 C 0.00 4
MIN	-9.16	14.67	7	-67.21	0.00	7	
	0.00	14.67	7	0.00	14.67	7	47.70 C 14.67 6
35 MAX	12.54	0.00	6	111.28	14.66	7	
	0.00	0.00	4	0.00	0.00	4	67.13 C 0.00 4
MIN	-14.86	14.66	7	-106.63	0.00	7	
	0.00	14.66	7	0.00	14.66	7	26.07 C 14.66 6
36 MAX	11.45	0.00	6	94.92	0.00	6	
	0.00	0.00	4	0.00	0.00	4	241.72 C 0.00 4
MIN	-10.44	15.50	7	-89.93	0.00	7	
	0.00	15.50	7	0.00	15.50	7	65.86 C 15.50 7
37 MAX	11.39	0.00	5	81.51	0.00	5	
	0.00	0.00	4	0.00	0.00	4	176.52 C 0.00 4
MIN	-8.51	14.67	7	-85.56	14.67	5	
	0.00	14.67	7	0.00	14.67	7	49.89 C 14.67 7
38 MAX	8.90	0.00	5	66.34	0.00	5	
	0.00	0.00	4	0.00	0.00	4	117.46 C 0.00 4
MIN	-4.86	14.67	7	-64.17	14.67	5	
	0.00	14.67	7	0.00	14.67	7	35.28 C 14.67 7
39 MAX	13.61	0.00	6	97.02	0.00	6	
	0.00	0.00	4	0.00	0.00	4	76.40 C 0.00 4
MIN	-9.84	14.66	7	-102.50	14.66	6	
	0.00	14.66	7	0.00	14.66	7	23.20 C 14.66 7
40 MAX	14.59	0.00	6	144.40	0.00	6	
	0.00	0.00	4	0.00	0.00	4	215.80 C 0.00 4
MIN	-15.75	15.50	7	-149.79	0.00	7	
	0.00	15.50	7	0.00	15.50	7	62.36 C 15.50 7
41 MAX	7.19	0.00	6	79.25	14.67	7	
	0.00	0.00	4	0.00	0.00	4	154.16 C 0.00 4
MIN	-9.80	14.67	7	-64.47	0.00	7	
	0.00	14.67	7	0.00	14.67	7	45.35 C 14.67 7
42 MAX	5.78	0.00	6	59.02	14.67	7	
	0.00	0.00	4	0.00	0.00	4	81.74 C 0.00 4

189

STAAD PLANE

-- PAGE NO. 12

MIN	-7.36	14.67	7	-50.59	14.67	6			
	0.00	14.67	7	0.00	14.67	7	21.50 C	14.67	7
43 MAX	18.07	0.00	6	159.67	0.00	6			
	0.00	0.00	4	0.00	0.00	4	123.11 C	0.00	4
MIN	-17.76	15.50	7	-157.92	0.00	7			
	0.00	15.50	7	0.00	15.50	7	43.65 C	15.50	7
44 MAX	14.55	0.00	6	106.26	14.67	7			
	0.00	0.00	4	0.00	0.00	4	73.94 C	0.00	4
MIN	-13.98	14.67	7	-110.83	14.67	6			
	0.00	14.67	7	0.00	14.67	7	28.61 C	14.67	7
45 MAX	10.33	0.00	6	77.23	14.67	7			
	0.00	0.00	4	0.00	0.00	4	25.93 C	0.00	4
MIN	-9.76	14.67	7	-81.54	14.67	6			
	0.00	14.67	7	0.00	14.67	7	9.63 C	14.67	7
46 MAX	17.29	0.00	6	154.95	0.00	6			
	0.00	0.00	4	0.00	0.00	4	116.65 C	0.00	4
MIN	-17.19	15.50	7	-154.09	0.00	7			
	0.00	15.50	7	0.00	15.50	7	45.93 C	15.50	7
47 MAX	13.71	0.00	6	105.65	14.67	7			
	0.00	0.00	4	0.00	0.00	4	69.85 C	0.00	4
MIN	-13.79	14.67	7	-105.21	14.67	6			
	0.00	14.67	7	0.00	14.67	7	29.51 C	14.67	7
48 MAX	9.16	0.00	6	74.64	14.67	7			
	0.00	0.00	4	0.00	0.00	4	24.45 C	0.00	4
MIN	-9.39	14.67	7	-72.94	14.67	6			
	0.00	14.67	7	0.00	14.67	7	10.00 C	14.67	7
49 MAX	17.37	0.00	6	154.62	0.00	6			
	0.00	0.00	4	0.00	0.00	4	119.56 C	0.00	4
MIN	-17.32	15.50	7	-153.93	0.00	7			
	0.00	15.50	7	0.00	15.50	7	43.98 C	15.50	6
50 MAX	14.13	0.00	6	109.37	14.67	7			
	0.00	0.00	4	0.00	0.00	4	71.34 C	0.00	4
MIN	-14.42	14.67	7	-107.63	14.67	6			
	0.00	14.67	7	0.00	14.67	7	28.91 C	14.67	6
51 MAX	9.06	0.00	6	75.19	14.67	7			
	0.00	0.00	4	0.00	0.00	4	25.05 C	0.00	4
MIN	-9.46	14.67	7	-72.40	14.67	6			
	0.00	14.67	7	0.00	14.67	7	9.88 C	14.67	6
52 MAX	14.69	0.00	6	141.46	0.00	6			
	0.00	0.00	4	0.00	0.00	4	93.16 C	0.00	5
MIN	-13.03	15.50	7	-132.94	0.00	7			
	0.00	15.50	7	0.00	15.50	7	9.96 C	15.50	7
53 MAX	10.09	0.00	5	68.41	0.00	5			
	0.00	0.00	4	0.00	0.00	4	54.34 C	0.00	5

190

STAAD PLANE

-- PAGE NO. 13

MIN	-6.77	14.67	7	-81.73	14.67	6			
	0.00	14.67	7	0.00	14.67	7	8.63 C	14.67	7
54 MAX	7.15	0.00	5	47.03	0.00	5			
	0.00	0.00	4	0.00	0.00	4	17.55 C	0.00	5
MIN	-3.45	14.67	7	-57.92	14.67	5			
	0.00	14.67	7	0.00	14.67	7	2.95 C	14.67	7
55 MAX	30.45	0.00	7	255.70	0.00	7			
	0.00	0.00	4	0.00	0.00	4	51.57 C	0.00	6
MIN	-42.77	20.00	5	-200.71	0.00	6			
	0.00	20.00	7	0.00	20.00	7	53.61 T	20.00	7
56 MAX	27.48	0.00	4	218.94	20.00	5			
	0.00	0.00	4	0.00	0.00	4	46.00 C	0.00	6
MIN	-36.37	20.00	5	-109.87	20.00	7			
	0.00	20.00	7	0.00	20.00	7	47.69 T	20.00	7
57 MAX	26.77	0.00	4	220.15	20.00	5			
	0.00	0.00	4	0.00	0.00	4	40.88 C	0.00	6
MIN	-36.82	20.00	5	-108.46	0.00	6			
	0.00	20.00	7	0.00	20.00	7	42.37 T	20.00	7
58 MAX	31.97	0.00	7	238.91	20.00	6			
	0.00	0.00	4	0.00	0.00	4	36.42 C	0.00	6
MIN	-36.29	20.00	5	-188.43	20.00	7			
	0.00	20.00	7	0.00	20.00	7	38.22 T	20.00	7
59 MAX	25.18	0.00	4	200.67	20.00	5			
	0.00	0.00	4	0.00	0.00	4	59.76 C	0.00	6
MIN	-37.50	20.00	5	-124.38	0.00	6			
	0.00	20.00	7	0.00	20.00	7	59.53 T	20.00	7
60 MAX	27.00	0.00	4	194.82	20.00	5			
	0.00	0.00	4	0.00	0.00	4	53.55 C	0.00	6
MIN	-34.20	20.00	5	-77.14	6.67	5			
	0.00	20.00	7	0.00	20.00	7	53.33 T	20.00	7
61 MAX	26.75	0.00	4	197.33	20.00	5			
	0.00	0.00	4	0.00	0.00	4	48.22 C	0.00	6
MIN	-34.34	20.00	5	-76.44	6.67	5			
	0.00	20.00	7	0.00	20.00	7	47.87 T	20.00	7
62 MAX	30.75	0.00	4	189.61	20.00	6			
	0.00	0.00	4	0.00	0.00	4	42.78 C	0.00	6
MIN	-33.02	20.00	5	-135.81	20.00	7			
	0.00	20.00	7	0.00	20.00	7	42.44 T	20.00	7
63 MAX	14.10	0.00	4	104.42	20.00	5			
	0.00	0.00	4	0.00	0.00	4	59.86 C	0.00	6
MIN	-20.79	19.17	5	-75.83	6.67	5			
	0.00	20.00	7	0.00	20.00	7	55.81 T	20.00	7
64 MAX	15.56	0.00	4	106.63	20.00	5			
	0.00	0.00	4	0.00	0.00	4	46.15 C	0.00	6

191

STAAD PLANE				-- PAGE NO. 14			
MIN	-18.77	19.17	5	-46.58	6.67	5	
	0.00	20.00	7	0.00	20.00	7	42.53 T 20.00 7
65 MAX	15.29	0.00	4	111.31	20.00	5	
	0.00	0.00	4	0.00	0.00	4	32.44 C 0.00 6
MIN	-18.90	19.17	5	-43.70	6.67	5	
	0.00	20.00	7	0.00	20.00	7	29.05 T 20.00 7
66 MAX	18.15	0.00	4	96.84	20.00	5	
	0.00	0.00	4	0.00	0.00	4	18.45 C 0.00 6
MIN	-17.66	20.00	5	-63.64	20.00	7	
	0.00	20.00	7	0.00	20.00	7	14.32 T 20.00 7
67 MAX	21.16	0.00	4	12.07	0.00	4	
	0.00	0.00	4	0.00	0.00	4	30.48 C 0.00 6
MIN	-9.72	1.00	6	-9.36	1.00	7	
	0.00	1.00	7	0.00	1.00	7	30.54 T 1.00 7
68 MAX	37.00	0.00	4	19.96	0.00	4	
	0.00	0.00	4	0.00	0.00	4	39.55 C 0.00 6
MIN	-3.07	1.00	6	-17.04	1.00	4	
	0.00	1.00	7	0.00	1.00	7	40.29 T 1.00 7
69 MAX	52.75	0.00	4	27.52	0.00	4	
	0.00	0.00	4	0.00	0.00	4	7.09 C 0.00 5
MIN	4.57	1.00	6	-25.23	1.00	4	
	0.00	1.00	7	0.00	1.00	7	5.04 T 1.00 7
70 MAX	-1.33	0.00	7	23.76	1.00	5	
	0.00	0.00	4	0.00	0.00	4	40.85 C 0.00 6
MIN	-45.90	1.00	5	-22.14	0.00	5	
	0.00	1.00	7	0.00	1.00	7	39.41 T 1.00 7
71 MAX	4.84	0.00	7	18.18	1.00	5	
	0.00	0.00	4	0.00	0.00	4	18.71 C 0.00 6
MIN	-33.36	1.00	5	-15.18	0.00	5	
	0.00	1.00	7	0.00	1.00	7	19.30 T 1.00 7
72 MAX	11.44	0.00	7	14.05	1.00	5	
	0.00	0.00	4	0.00	0.00	4	22.38 C 0.00 6
MIN	-24.68	1.00	5	-10.63	0.00	5	
	0.00	1.00	7	0.00	1.00	7	22.27 T 1.00 7
73 MAX	34.16	0.00	4	183.85	18.67	5	
	0.00	0.00	4	0.00	0.00	4	27.22 C 0.00 6
MIN	-44.17	17.89	5	-169.32	6.22	5	
	0.00	18.67	7	0.00	18.67	7	29.13 T 18.67 7
74 MAX	13.94	0.00	7	105.83	12.50	5	
	0.00	0.00	4	0.00	0.00	4	26.82 C 0.00 6
MIN	-15.62	12.50	5	-71.25	12.50	7	
	0.00	12.50	7	0.00	12.50	7	27.25 T 12.50 7
75 MAX	27.81	0.00	4	132.12	17.00	5	
	0.00	0.00	4	0.00	0.00	4	24.85 C 0.00 6

192

STAAD PLANE				-- PAGE NO. 15			
MIN	-30.21	17.00	5	-77.79	5.67	5	
	0.00	17.00	7	0.00	17.00	7	25.95 T 17.00 7
76 MAX	13.47	0.00	7	91.92	0.00	7	
	0.00	0.00	4	0.00	0.00	4	23.78 C 0.00 6
MIN	-14.91	12.50	5	-69.78	0.00	6	
	0.00	12.50	7	0.00	12.50	7	24.30 T 12.50 7
77 MAX	26.59	0.00	4	152.81	18.67	6	
	0.00	0.00	4	0.00	0.00	4	23.00 C 0.00 6
MIN	-30.23	18.67	5	-128.14	18.67	7	
	0.00	18.67	7	0.00	18.67	7	24.21 T 18.67 7
78 MAX	37.08	0.00	4	171.19	18.67	5	
	0.00	0.00	4	0.00	0.00	4	35.60 C 0.00 6
MIN	-43.68	18.67	5	-162.81	6.22	5	
	0.00	18.67	7	0.00	18.67	7	36.61 T 18.67 7
79 MAX	11.05	0.00	7	101.13	12.50	5	
	0.00	0.00	4	0.00	0.00	4	31.86 C 0.00 6
MIN	-15.90	12.50	5	-50.87	12.50	7	
	0.00	12.50	7	0.00	12.50	7	32.81 T 12.50 7
80 MAX	29.81	0.00	4	135.12	17.00	5	
	0.00	0.00	4	0.00	0.00	4	28.91 C 0.00 6
MIN	-31.45	17.00	5	-76.51	5.67	5	
	0.00	17.00	7	0.00	17.00	7	29.24 T 17.00 7
81 MAX	15.38	0.00	4	95.71	12.50	5	
	0.00	0.00	4	0.00	0.00	4	25.45 C 0.00 6
MIN	-19.75	12.50	5	-48.63	0.00	6	
	0.00	12.50	7	0.00	12.50	7	26.36 T 12.50 7
82 MAX	32.34	0.00	4	136.72	18.67	5	
	0.00	0.00	4	0.00	0.00	4	21.91 C 0.00 6
MIN	-31.98	18.67	5	-113.33	12.45	4	
	0.00	18.67	7	0.00	18.67	7	22.95 T 18.67 7
83 MAX	31.47	0.00	4	162.38	18.67	5	
	0.00	0.00	4	0.00	0.00	4	13.04 C 0.00 6
MIN	-40.27	17.89	5	-154.23	6.22	5	
	0.00	18.67	7	0.00	18.67	7	11.84 T 18.67 7
84 MAX	13.28	0.00	7	89.31	12.50	5	
	0.00	0.00	4	0.00	0.00	4	19.07 C 0.00 6
MIN	-13.94	12.50	5	-60.98	12.50	7	
	0.00	12.50	7	0.00	12.50	7	17.81 T 12.50 7
85 MAX	19.70	0.00	4	106.18	17.00	5	
	0.00	0.00	4	0.00	0.00	4	24.47 C 0.00 6
MIN	-22.29	17.00	5	-56.73	17.00	7	
	0.00	17.00	7	0.00	17.00	7	23.63 T 17.00 7
86 MAX	12.67	0.00	7	80.51	0.00	7	
	0.00	0.00	4	0.00	0.00	4	30.03 C 0.00 6

193

STAAD PLANE

-- PAGE NO. 16

MIN	-13.90	12.50	5	-62.07	0.00	6				
	0.00	12.50	7	0.00	12.50	7	28.73	T	12.50	7
87 MAX	25.23	0.00	4	141.37	18.67	6				
	0.00	0.00	4	0.00	0.00	4	34.87	C	0.00	6
MIN	-29.35	18.67	5	-106.51	18.67	7				
	0.00	18.67	7	0.00	18.67	7	34.44	T	18.67	7
88 MAX	24.49	0.00	4	118.97	18.67	5				
	0.00	0.00	4	0.00	0.00	4	67.02	C	0.00	6
MIN	-32.13	18.67	5	-130.74	6.22	5				
	0.00	18.67	7	0.00	18.67	7	62.66	T	18.67	7
89 MAX	11.46	0.00	7	103.04	12.50	5				
	0.00	0.00	4	0.00	0.00	4	51.37	C	0.00	6
MIN	-19.00	11.98	5	-20.24	6.25	4				
	0.00	12.50	7	0.00	12.50	7	49.87	T	12.50	7
90 MAX	26.55	0.00	4	112.19	17.00	5				
	0.00	0.00	4	0.00	0.00	4	39.20	C	0.00	6
MIN	-28.08	17.00	5	-69.13	5.67	5				
	0.00	17.00	7	0.00	17.00	7	36.65	T	17.00	7
91 MAX	13.67	0.00	4	82.92	12.50	5				
	0.00	0.00	4	0.00	0.00	4	26.13	C	0.00	6
MIN	-16.53	12.50	5	-20.41	6.25	5				
	0.00	12.50	7	0.00	12.50	7	24.69	T	12.50	7
92 MAX	28.40	0.00	4	102.50	18.67	6				
	0.00	0.00	4	0.00	0.00	4	13.59	C	0.00	6
MIN	-28.13	18.67	5	-110.40	12.45	4				
	0.00	18.67	7	0.00	18.67	7	9.82	T	18.67	7
93 MAX	18.92	0.00	7	164.89	20.00	5				
	0.00	0.00	4	0.00	0.00	4	14.98	C	0.00	6
MIN	-27.63	20.00	5	-116.66	0.00	6				
	0.00	20.00	7	0.00	20.00	7	16.32	T	20.00	7
94 MAX	18.32	0.00	4	143.07	20.00	5				
	0.00	0.00	4	0.00	0.00	4	11.46	C	0.00	6
MIN	-24.14	20.00	5	-78.70	20.00	7				
	0.00	20.00	7	0.00	20.00	7	12.55	T	20.00	7
95 MAX	18.04	0.00	4	143.23	20.00	5				
	0.00	0.00	4	0.00	0.00	4	7.88	C	0.00	6
MIN	-24.36	20.00	5	-78.40	0.00	6				
	0.00	20.00	7	0.00	20.00	7	9.15	T	20.00	7
96 MAX	19.60	0.00	7	151.67	20.00	6				
	0.00	0.00	4	0.00	0.00	4	4.64	C	0.00	6
MIN	-24.74	20.00	5	-111.38	20.00	7				
	0.00	20.00	7	0.00	20.00	7	6.24	T	20.00	7
97 MAX	17.11	0.00	7	150.65	20.00	5				
	0.00	0.00	4	0.00	0.00	4	17.30	C	0.00	6

194

STAAD PLANE

-- PAGE NO. 17

MIN	-25.91	20.00	5	-84.10	0.00	6			
	0.00	20.00	7	0.00	20.00	7	16.87	T	20.00 7
98 MAX	17.96	0.00	4	126.72	20.00	5			
	0.00	0.00	4	0.00	0.00	4	13.09	C	0.00 6
MIN	-22.55	20.00	5	-53.93	20.00	7			
	0.00	20.00	7	0.00	20.00	7	12.66	T	20.00 7
99 MAX	17.78	0.00	4	126.57	20.00	5			
	0.00	0.00	4	0.00	0.00	4	8.54	C	0.00 6
MIN	-22.70	20.00	5	-52.75	20.00	7			
	0.00	20.00	7	0.00	20.00	7	8.26	T	20.00 7
100 MAX	18.49	0.00	4	126.63	20.00	5			
	0.00	0.00	4	0.00	0.00	4	3.47	C	0.00 6
MIN	-22.74	20.00	5	-75.10	20.00	7			
	0.00	20.00	7	0.00	20.00	7	3.30	T	20.00 7
101 MAX	7.57	0.00	7	74.60	20.00	5			
	0.00	0.00	4	0.00	0.00	4	35.09	C	0.00 6
MIN	-11.95	20.00	5	-38.36	0.00	6			
	0.00	20.00	7	0.00	20.00	7	32.06	T	20.00 7
102 MAX	8.45	0.00	4	59.98	20.00	5			
	0.00	0.00	4	0.00	0.00	4	24.76	C	0.00 6
MIN	-10.09	20.00	5	-24.23	6.67	5			
	0.00	20.00	7	0.00	20.00	7	22.30	T	20.00 7
103 MAX	8.30	0.00	4	59.79	20.00	5			
	0.00	0.00	4	0.00	0.00	4	15.60	C	0.00 6
MIN	-10.19	20.00	5	-25.80	6.67	5			
	0.00	20.00	7	0.00	20.00	7	12.91	T	20.00 7
104 MAX	8.75	0.00	4	57.92	20.00	5			
	0.00	0.00	4	0.00	0.00	4	7.15	C	0.00 5
MIN	-10.08	20.00	5	-32.54	20.00	7			
	0.00	20.00	7	0.00	20.00	7	3.45	T	20.00 7

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

244. PRINT SUPPORT REACTION ALL

195

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	4	2.83	151.57	0.00	0.00	0.00	-14.21
	5	-14.09	110.26	0.00	0.00	0.00	135.14
	6	-21.12	24.06	0.00	0.00	0.00	191.92
	7	23.35	104.70	0.00	0.00	0.00	-203.07
5	4	-0.03	202.33	0.00	0.00	0.00	-0.47
	5	-19.12	191.69	0.00	0.00	0.00	157.51
	6	-25.47	89.50	0.00	0.00	0.00	210.47
	7	25.40	73.59	0.00	0.00	0.00	-210.53
9	4	0.15	194.94	0.00	0.00	0.00	-1.20
	5	-18.03	179.25	0.00	0.00	0.00	150.52
	6	-24.16	78.89	0.00	0.00	0.00	201.73
	7	24.26	77.84	0.00	0.00	0.00	-202.49
13	4	0.61	207.08	0.00	0.00	0.00	-3.34
	5	-17.53	183.04	0.00	0.00	0.00	146.51
	6	-23.89	73.84	0.00	0.00	0.00	198.18
	7	24.32	92.05	0.00	0.00	0.00	-200.46
17	4	-1.86	259.43	0.00	0.00	0.00	8.53
	5	-16.69	234.83	0.00	0.00	0.00	141.22
	6	-20.77	96.22	0.00	0.00	0.00	181.49
	7	19.11	95.20	0.00	0.00	0.00	-173.70
21	4	2.94	296.89	0.00	0.00	0.00	-14.48
	5	-6.55	260.61	0.00	0.00	0.00	63.87
	6	-11.31	95.37	0.00	0.00	0.00	97.86
	7	12.93	106.15	0.00	0.00	0.00	-105.86
26	4	-2.05	312.74	0.00	0.00	0.00	9.93
	5	-11.65	280.38	0.00	0.00	0.00	88.36
	6	-13.76	104.89	0.00	0.00	0.00	109.24
	7	12.50	92.18	0.00	0.00	0.00	-103.14
31	4	1.38	269.64	0.00	0.00	0.00	-6.77
	5	-7.83	241.81	0.00	0.00	0.00	69.21
	6	-11.69	87.96	0.00	0.00	0.00	98.41
	7	12.27	70.40	0.00	0.00	0.00	-101.26
36	4	-1.45	264.90	0.00	0.00	0.00	7.16
	5	-10.01	224.30	0.00	0.00	0.00	79.05
	6	-12.03	68.14	0.00	0.00	0.00	98.94
	7	11.39	84.73	0.00	0.00	0.00	-95.81
41	4	1.26	270.89	0.00	0.00	0.00	-6.05
	5	-8.17	233.00	0.00	0.00	0.00	69.66
	6	-12.02	76.09	0.00	0.00	0.00	98.24
	7	12.66	87.32	0.00	0.00	0.00	-101.33
46	4	-2.09	241.72	0.00	0.00	0.00	10.37
	5	-9.97	217.15	0.00	0.00	0.00	78.13
	6	-11.44	80.28	0.00	0.00	0.00	94.92
	7	10.43	65.86	0.00	0.00	0.00	-89.93
51	4	1.46	215.80	0.00	0.00	0.00	-6.60
	5	-10.02	199.91	0.00	0.00	0.00	104.25
	6	-14.57	83.06	0.00	0.00	0.00	144.40
	7	15.73	62.36	0.00	0.00	0.00	-149.79

297K 1/4 90

= 216K
 ⇒ 5PA


196

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
55	4	-0.52	123.11	0.00	0.00	0.00	2.95
	5	-13.88	115.92	0.00	0.00	0.00	121.68
	6	-18.06	52.90	0.00	0.00	0.00	159.67
59	7	17.75	43.65	0.00	0.00	0.00	-157.92
	4	-0.16	116.65	0.00	0.00	0.00	1.36
	5	-13.07	106.74	0.00	0.00	0.00	117.09
63	6	-17.29	46.13	0.00	0.00	0.00	154.95
	7	17.19	45.93	0.00	0.00	0.00	-154.09
	4	-0.08	119.56	0.00	0.00	0.00	1.09
67	5	-13.08	106.90	0.00	0.00	0.00	116.67
	6	-17.38	43.98	0.00	0.00	0.00	154.62
	7	17.33	50.56	0.00	0.00	0.00	-153.93
	4	-2.39	78.83	0.00	0.00	0.00	12.24
	5	-12.50	93.16	0.00	0.00	0.00	113.85
	6	-14.64	61.19	0.00	0.00	0.00	141.46
	7	12.99	9.96	0.00	0.00	0.00	-132.94

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

245. PRINT SECTION MAX DISPL NSECT 12 LIST 1 TO 104

197

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.04925	46.50	6	3776
2	0.02040	132.03	7	8628
3	0.01713	132.03	7	10275
4	0.04068	46.50	7	4572
5	0.02126	132.03	6	8280
6	0.01792	132.03	6	9825
7	0.04020	46.50	7	4627
8	0.02135	132.03	6	8247
9	0.01828	132.03	6	9627
10	0.03860	46.50	6	4818
11	0.02155	132.03	7	8169
12	0.01906	132.03	7	9235
13	0.04412	46.50	7	4215
14	0.01843	132.03	6	9552
15	0.01735	132.03	6	10145
16	0.04202	46.50	6	4426
17	0.02422	132.03	7	7266
18	0.01527	44.01	7	11526
19	0.02932	131.94	7	6001
20	0.03763	46.50	7	4943
21	0.02542	132.03	6	6924
22	0.01970	44.01	5	8935
23	0.03145	131.94	6	5594
24	0.03844	46.50	6	4838
25	0.02256	132.03	7	7802
26	0.01575	44.01	7	11180
27	0.02946	131.94	7	5971
28	0.03764	46.50	7	4941
29	0.02197	132.03	6	8013
30	0.01535	44.01	6	11470
31	0.02940	131.94	6	5984
32	0.03486	46.50	6	5335
33	0.02359	132.03	7	7461
34	0.01695	44.01	7	10383
35	0.03089	131.94	7	5694
36	0.03792	46.50	7	4904
37	0.02409	132.03	5	7307
38	0.01806	44.01	5	9747
39	0.02920	131.94	6	6023
40	0.04564	62.00	6	4075
41	0.01522	132.03	7	11566
42	0.01203	117.36	6	14629
43	0.03792	46.50	7	4905
44	0.01722	132.03	6	10225
45	0.01446	132.03	6	12172
46	0.03796	46.50	6	4900
47	0.01683	132.03	6	10457
48	0.01354	132.03	7	13000
49	0.03723	46.50	6	4995

198

STAAD PLANE

-- PAGE NO. 21

50	0.01671	132.03	6	10537
51	0.01365	132.03	7	12893
52	0.04488	62.00	7	4143
53	0.01604	132.03	6	10975
54	0.01163	132.03	6	15135
55	0.05200	80.00	5	4615
56	0.02225	80.00	5	10786
57	0.02466	80.00	5	9732
58	0.03999	160.00	7	6002
59	0.04290	100.00	5	5594
60	0.02236	100.00	5	10734
61	0.02161	80.00	5	11104
62	0.03205	160.00	7	7488
63	0.03097	100.00	5	7750
64	0.01434	120.00	4	16736
65	0.01194	100.00	5	20108
66	0.01897	140.00	4	12652
67	0.00269	3.00	4	4459
68	0.00376	3.00	4	3191
69	0.00459	3.00	4	2617
70	0.00383	9.00	5	3130
71	0.00354	9.00	5	3387
72	0.00312	9.00	5	3849
73	0.06588	93.35	5	3400
74	0.01684	100.00	5	8906
75	0.05408	102.00	4	3772
76	0.01138	37.50	7	13184
77	0.04425	112.02	4	5062
78	0.06878	112.02	4	3257
79	0.01425	100.00	5	10527
80	0.05332	102.00	4	3826
81	0.00807	37.50	7	18583
82	0.04987	112.02	4	4492
83	0.06086	93.35	5	3681
84	0.01194	100.00	5	12566
85	0.03389	102.00	4	6018
86	0.00845	37.50	7	17744
87	0.04204	112.02	4	5329
88	0.05377	93.35	5	4166
89	0.00993	112.50	5	15103
90	0.04804	102.00	4	4246
91	0.00779	37.50	7	19245
92	0.05037	112.02	4	4448
93	0.05692	80.00	5	4216
94	0.03230	80.00	5	7429
95	0.03561	80.00	5	6739
96	0.04571	180.00	7	5250
97	0.04939	80.00	5	4859
98	0.03011	80.00	5	7971
99	0.03268	80.00	5	7343
100	0.03885	120.00	4	6178
101	0.03682	80.00	5	6517
102	0.02355	100.00	5	10189
103	0.02673	100.00	5	8980
104	0.03474	120.00	4	6908

199

***** END OF SECT DISPL RESULTS *****

- 246. PARAMETER
- 247. CODE AISC
- 248. BEAM 1 ALL
- 249. FYLD 7200 ALL
- 250. LY 7 MEMB 55 TO 66 73 TO 104
- 251. LZ 7 MEMB 55 TO 66 73 TO 104
- 252. LX 7 MEMB 55 TO 66 73 TO 104
- 253. UNT 2 MEMB 55 TO 66 73 TO 104
- 254. CHECK CODE ALL

200

STAAD.Pro CODE CHECKING - (AISC)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W18 X86	PASS	AISC- H1-2	0.627	7
		104.70 C	0.00	-203.07	0.00
2	ST W18 X86	PASS	AISC- H1-3	0.381	7
		57.03 C	0.00	114.73	14.67
3	ST W18 X86	PASS	AISC- H1-3	0.247	7
		19.56 C	0.00	87.68	14.67
4	ST W18 X86	PASS	AISC- H1-1	0.696	5
		191.69 C	0.00	157.51	0.00
5	ST W18 X86	PASS	AISC- H1-3	0.456	6
		53.64 C	0.00	-148.79	14.67
6	ST W18 X86	PASS	AISC- H1-3	0.295	6
		21.00 C	0.00	-106.59	14.67
7	ST W18 X86	PASS	AISC- H1-1	0.657	5
		179.25 C	0.00	150.52	0.00
8	ST W18 X86	PASS	AISC- H1-3	0.436	6
		49.20 C	0.00	-143.58	14.67
9	ST W18 X86	PASS	AISC- H1-3	0.293	6
		19.49 C	0.00	-107.09	14.67
10	ST W18 X86	PASS	AISC- H1-1	0.656	5
		183.04 C	0.00	146.51	0.00
11	ST W18 X86	PASS	AISC- H1-3	0.466	7
		56.56 C	0.00	150.65	14.67
12	ST W18 X86	PASS	AISC- H1-3	0.316	7
		22.31 C	0.00	114.30	14.67
13	ST W18 X86	PASS	AISC- H1-1	0.746	5
		234.83 C	0.00	141.22	0.00
14	ST W18 X86	PASS	AISC- H1-1	0.490	5
		151.62 C	0.00	-101.24	14.67
15	ST W18 X86	PASS	AISC- H1-3	0.313	5
		69.66 C	0.00	-76.86	14.67
16	ST W14 X74	PASS	AISC- H1-1	0.807	5
		260.61 C	0.00	63.87	0.00
17	ST W14 X74	PASS	AISC- H1-1	0.597	4
		199.89 C	0.00	48.65	14.67
18	ST W14 X74	PASS	AISC- H1-1	0.418	4
		121.42 C	0.00	-47.96	0.00
19	ST W14 X74	PASS	AISC- H1-3	0.475	7
		39.91 C	0.00	108.74	14.66
20	ST W14 X74	PASS	AISC- H1-1	0.948	5
		280.38 C	0.00	-92.30	15.50
21	ST W14 X74	PASS	AISC- H1-1	0.763	5
		206.50 C	0.00	-95.77	14.67

201

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
22	ST W14 X74	PASS 129.19 C	AISC- H1-1 0.00	0.517 73.91	5 0.00
23	ST W14 X74	PASS 61.38 C	AISC- H1-3 0.00	0.501 -102.68	5 14.66
24	ST W14 X74	PASS 241.81 C	AISC- H1-1 0.00	0.780 69.21	5 0.00
25	ST W14 X74	PASS 178.12 C	AISC- H1-1 0.00	0.524 -41.07	5 14.67
26	ST W14 X74	PASS 117.10 C	AISC- H1-1 0.00	0.347 -28.29	5 14.67
27	ST W14 X74	PASS 26.58 C	AISC- H1-3 0.00	0.416 100.31	7 14.66
28	ST W14 X74	PASS 224.30 C	AISC- H1-1 0.00	0.771 79.05	5 0.00
29	ST W14 X74	PASS 172.40 C	AISC- H1-1 0.00	0.616 -74.05	5 14.67
30	ST W14 X74	PASS 109.65 C	AISC- H1-1 0.00	0.407 52.72	5 0.00
31	ST W14 X74	PASS 59.79 C	AISC- H1-3 0.00	0.435 -85.15	5 14.66
32	ST W14 X74	PASS 233.00 C	AISC- H1-1 0.00	0.761 69.66	5 0.00
33	ST W14 X74	PASS 182.32 C	AISC- H1-1 0.00	0.559 -49.06	5 14.67
34	ST W14 X74	PASS 53.03 C	AISC- H1-3 0.00	0.357 -67.21	7 0.00
35	ST W14 X74	PASS 28.72 C	AISC- H1-3 0.00	0.460 111.28	7 14.66
36	ST W14 X74	PASS 217.15 C	AISC- H1-1 0.00	0.751 78.13	5 0.00
37	ST W14 X74	PASS 162.89 C	AISC- H1-1 0.00	0.631 -85.56	5 14.67
38	ST W14 X74	PASS 113.22 C	AISC- H1-1 0.00	0.457 66.34	5 0.00
39	ST W14 X74	PASS 76.38 C	AISC- H1-1 0.00	0.481 -101.03	5 14.66
40	ST W18 X86	PASS 199.91 C	AISC- H1-1 0.00	0.600 104.25	5 0.00
41	ST W18 X86	PASS 144.18 C	AISC- H1-1 0.00	0.337 -34.39	5 14.67
42	ST W18 X86	PASS 77.84 C	AISC- H1-3 0.00	0.233 -37.20	5 14.67
43	ST W18 X86	PASS 52.90 C	AISC- H1-3 0.00	0.485 159.67	6 0.00
44	ST W18 X86	PASS 70.22 C	AISC- H1-3 0.00	0.339 -87.38	5 14.67

202

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
45	ST W18 X86	PASS 11.44 C	AISC- H1-3 0.00	0.217 -81.54	6 14.67
46	ST W18 X86	PASS 46.13 C	AISC- H1-3 0.00	0.461 154.95	6 0.00
47	ST W18 X86	PASS 29.51 C	AISC- H1-3 0.00	0.308 105.65	7 14.67
48	ST W18 X86	PASS 10.00 C	AISC- H1-3 0.00	0.198 74.64	7 14.67
49	ST W18 X86	PASS 50.56 C	AISC- H1-3 0.00	0.467 -153.93	7 0.00
50	ST W18 X86	PASS 31.70 C	AISC- H1-3 0.00	0.321 109.37	7 14.67
51	ST W18 X86	PASS 10.70 C	AISC- H1-3 0.00	0.200 75.19	7 14.67
52	ST W18 X86	PASS 61.19 C	AISC- H1-3 0.00	0.457 141.46	6 0.00
53	ST W18 X86	PASS 54.34 C	AISC- H1-3 0.00	0.291 -79.60	5 14.67
54	ST W18 X86	PASS 17.55 C	AISC- H1-3 0.00	0.172 -57.92	5 14.67
55	ST W27 X114	PASS 37.12 C	AISC- H1-3 0.00	0.551 244.03	5 20.00
56	ST W27 X114	PASS 33.25 C	AISC- H1-3 0.00	0.494 218.94	5 20.00
57	ST W27 X114	PASS 29.64 C	AISC- H1-3 0.00	0.493 220.15	5 20.00
58	ST W27 X114	PASS 36.42 C	AISC- H1-3 0.00	0.539 238.91	6 20.00
59	ST W27 X114	PASS 44.99 C	AISC- H1-3 0.00	0.470 200.67	5 20.00
60	ST W27 X114	PASS 40.32 C	AISC- H1-3 0.00	0.452 194.82	5 20.00
61	ST W27 X114	PASS 36.45 C	AISC- H1-3 0.00	0.453 197.33	5 20.00
62	ST W27 X114	PASS 42.78 C	AISC- H1-3 0.00	0.444 189.61	6 20.00
63	ST W27 X114	PASS 48.03 C	AISC- H1-3 0.00	0.273 104.42	5 20.00
64	ST W27 X114	PASS 37.45 C	AISC- H1-3 0.00	0.265 106.63	5 20.00
65	ST W27 X114	PASS 26.90 C	AISC- H1-3 0.00	0.263 111.31	5 20.00
66	ST W27 X114	PASS 17.05 C	AISC- H1-3 0.00	0.221 96.84	5 20.00

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 67).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

203

STAAD PLANE

-- PAGE NO. 26

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 68).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 69).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 70).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 71).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

THIS VERSION DOES NOT DESIGN PRISMATIC SECTIONS (MEMBER 72).
PLEASE DEFINE THE PROPERTIES THROUGH A USER TABLE GENERAL SECTION.

73	ST	W27 X114	PASS	AISC- H1-3	0.370	5
		17.94 C		0.00	183.85	18.67
74	ST	W24 X68	PASS	AISC- H1-3	0.354	5
		19.29 C		0.00	105.83	12.50
75	ST	W24 X68	PASS	AISC- H1-3	0.549	5
		16.84 C		0.00	132.12	17.00
76	ST	W24 X68	PASS	AISC- H1-3	0.290	5
		16.92 C		0.00	86.07	12.50
77	ST	W27 X114	PASS	AISC- H1-3	0.317	6
		23.00 C		0.00	152.81	18.67
78	ST	W27 X114	PASS	AISC- H1-3	0.356	5
		26.07 C		0.00	171.19	18.67
79	ST	W24 X68	PASS	AISC- H1-3	0.347	5
		23.02 C		0.00	101.13	12.50
80	ST	W24 X68	PASS	AISC- H1-3	0.569	5
		21.32 C		0.00	135.12	17.00
81	ST	W24 X68	PASS	AISC- H1-3	0.321	5
		18.26 C		0.00	95.71	12.50
82	ST	W27 X114	PASS	AISC- H1-3	0.278	5
		15.78 C		0.00	136.72	18.67
83	ST	W27 X114	PASS	AISC- H1-3	0.323	5
		12.16 C		0.00	162.38	18.67
84	ST	W24 X68	PASS	AISC- H1-3	0.298	5
		16.11 C		0.00	89.31	12.50
85	ST	W24 X68	PASS	AISC- H1-3	0.454	5
		20.32 C		0.00	106.18	17.00
86	ST	W24 X68	PASS	AISC- H1-3	0.279	5
		24.47 C		0.00	77.26	12.50
87	ST	W27 X114	PASS	AISC- H1-3	0.309	6
		34.87 C		0.00	141.37	18.67
88	ST	W27 X114	PASS	AISC- H1-3	0.288	5
		54.03 C		0.00	118.97	18.67
89	ST	W24 X68	PASS	AISC- H1-3	0.387	5
		40.12 C		0.00	103.04	12.50
90	ST	W24 X68	PASS	AISC- H1-3	0.501	5
		32.24 C		0.00	112.19	17.00
91	ST	W24 X68	PASS	AISC- H1-3	0.289	5
		21.07 C		0.00	82.92	12.50
92	ST	W27 X114	PASS	AISC- H1-3	0.211	6
		13.59 C		0.00	102.50	18.67

204

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
93	ST W24 X68	PASS 10.43 C	AISC- H1-3 0.00	0.877 164.89	5 20.00
94	ST W24 X68	PASS 7.99 C	AISC- H1-3 0.00	0.759 143.07	5 20.00
95	ST W24 X68	PASS 5.11 C	AISC- H1-3 0.00	0.754 143.23	5 20.00
96	ST W24 X68	PASS 4.64 C	AISC- H1-3 0.00	0.797 151.67	6 20.00
97	ST W24 X68	PASS 13.47 C	AISC- H1-3 0.00	0.809 150.65	5 20.00
98	ST W24 X68	PASS 10.32 C	AISC- H1-3 0.00	0.679 126.72	5 20.00
99	ST W24 X68	PASS 6.78 C	AISC- H1-3 0.00	0.671 126.57	5 20.00
100	ST W24 X68	PASS 2.92 C	AISC- H1-3 0.00	0.664 126.63	5 20.00
101	ST W21 X57	PASS 28.64 C	AISC- H1-3 0.00	0.873 74.60	5 20.00
102	ST W21 X57	PASS 20.34 C	AISC- H1-3 0.00	0.695 59.98	5 20.00
103	ST W21 X57	PASS 13.70 C	AISC- H1-3 0.00	0.675 59.79	5 20.00
104	ST W21 X57	PASS 7.15 C	AISC- H1-3 0.00	0.638 57.92	5 20.00

255. FINISH

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

**** DATE= MAR 30,2006 TIME= 7:54: 4 ****

 * For questions on STAAD.Pro, please contact : *
 * By Email - North America : support@reiusa.com *
 * By Email - International : support@reiworld.com *
 * Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

205

B-3.1.2.2 **Glazing Frame Bite.** The glazing shall have a minimum frame bite of 9.5-mm (3/8-in) for structurally glazed systems and 25-mm (1-in) for window systems that are not structurally glazed.

B-3.1.2.3 **Connection Design.** Equivalent static design loads for connections of the window, skylight, or doorframe to the surrounding walls or roof, hardware and associated connections, and glazing stop connections shall be 75 kilopascals (10.8 lbs per square inch) for glazing panels with a vision area less than or equal to 1.0 square meters (10.8 square feet) and 30 kilopascals (4.4 lbs per square inch) for glazing panels with a vision area greater than 1.0 square meters (10.8 square feet) but less than or equal to 3.0 square meters (32 square feet). Loads shall be applied to the surface of the glazing and frame. Connections and hardware may be designed based on ultimate strength for steel and 0.2% offset yield strength for aluminum.

B-3.1.2.4 **Supporting Structural Elements.** Design supporting wall and roof elements and their connections based on their ultimate capacities. In addition, because the resulting dynamic loads are likely to be dissipated through multiple mechanisms, it is not necessary to account for reactions from the supporting wall or roof elements in the design of the remainder of the structure.

B-3.1.3 **Mitigation.** Where the minimum standoff distances cannot be met, provide glazing and frames that will provide an equivalent level of protection to that provided by the glazing and frames as described above and in Tables 2-1 and 2-2 for the applicable explosive weight in Table B-1.

B-3.1.4 **Window, Skylight, and Glazed Door Replacement Projects.** Whenever window, skylight, or door glazing is being replaced in existing inhabited buildings as part of a planned window or glazing replacement project, whether or not the building meets the triggers in paragraph 1-6.2, install glazing and frames that meet all of the requirements above.

B-3.2 **Standard 11. Building Entrance Layout.** The areas outside of installations are commonly not under the direct control of the installations. Where the main entrances to buildings face installation perimeters, people entering and exiting the buildings are vulnerable to being fired upon from vantage points outside the installations. To mitigate those vulnerabilities apply the following measures:

B-3.2.1 **New Buildings.** For new inhabited buildings, ensure that the main entrance to the building does not face an installation perimeter or other uncontrolled vantage points with direct lines of sight to the entrance or provide means to block the lines of sight.

B-3.2.2 **Existing Buildings.** For existing inhabited buildings where the main entrance faces an installation perimeter, either use a different entrance as the main entrance or screen that entrance to limit the ability of potential aggressors to target people entering and leaving the building.

B-3.3 **Standard 12. Exterior Doors.** For all new and existing buildings covered by these standards, ensure that all exterior doors into inhabited areas open outwards.

TIE force design

Horiz forces @ Column

0.01 A - (1.2 D + 1.6 L) \Rightarrow 56.5 K \leftarrow LRFD
 x 4x
 3RD

D 70 x 1.2 84

L 50 x 1.6 80

164 PSF

Tie beams

3RD FLR.

INTERNAL TIES

$P = 0.5 \times 0.164 \times 49.67 \times 20 = 81.5^K$

W24x62. L=20.5" n=7 @ 3/4" ϕ

L 4 x 3 1/2 x 5/16

weld 1/4" to beam.

tensile per bolt $\frac{81.5}{7} = 11.6^K/\text{bolt}$

$\leftarrow 29.8^K$

bearing $\phi_c = \phi 2.4 d b F_u = 0.75 \times 2.4 \times \frac{3}{4} \times \frac{7}{16} \times 58 \text{ OK}$
 $= 39^K \gg \text{bolt tension } \checkmark$
 OK

	JLS	3-31-06	207
--	-----	---------	-----



Block shear of beam.

$$\phi R_n = 304^k \quad \text{Table 10-2} \quad \checkmark \text{OK}$$

$$S_{net} = 44.1 \quad \text{Table 9-2}$$

$$\phi R_n = \frac{0.75 \times 50 \times 44.1}{4.5} = 378^k \quad \checkmark \text{OK}$$

$$\phi R_v = \phi \frac{0.6 \times F_y A_{gv}}{t}$$

Table 9-3b

$$\rightarrow 439^k / \text{in.}$$

$$439 \times 7.6 = 192^k \quad \text{OK}$$

Col. is continuous $P = 0.164 \times 20 \times 49.6 \times 5 = 81.5$

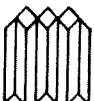
$$f_a = \frac{81.5}{22.3} = 18.176$$

$$= 8.2^k \quad \checkmark \text{OK}$$

JLS

3/31/06

202



members 10 & 11

$$P = 146.3^k$$

$$M = 28^k$$

W 18x86

$$f_c = \frac{146.3}{25.3} = 5.78^{ksi}$$

$$\frac{P}{A_g} = \frac{28 \times 12}{166} = 2.0^{ksi}$$

$$\Rightarrow \begin{array}{r} 5.78 \\ 7.84 \\ 0.73 \end{array} + \frac{0.85 \times 2}{1 - \frac{7.84}{6.88}} \cdot 15.8 =$$

$$= 0.86 < 1$$

SOK

member 20 & 21

$$P = 236.4 \quad M = 18.6^k$$

W 14x74

$$f_c = \frac{236.4}{21.8} = 10.84^{ksi}$$

$$\frac{KL}{r} = \frac{30.17 \times 12}{2.48}$$

$$f_y = 18.6 / 12 = 2.0$$

NO good $\Rightarrow F_c = 7.01$

comb.

$$10.84$$

$$F_0 = \frac{1 \times 10^3}{30.17 \times 12} = 24.3$$

$$\frac{KL}{r} = \frac{30.17 \times 12}{6.04} = 59.9$$

$$F_{ev} = 41.6$$

W 14x90

$$\frac{KL}{r} = \frac{30.17 \times 12}{5.7} = 97.8$$

$$F_a = 15.17 \quad f_a = \frac{236.4}{26.5} = 8.9^{ksi}$$

$$\frac{KL}{r} = 58.9$$

$$\Rightarrow F_{ev} = 43$$

$$15.17 + \frac{0.85 \times 2}{1 - 89} \cdot 24.3 =$$

$$59$$

$$0.08$$

$$= 0.67 < 1$$

SOK

JLS

3/31/06

209



Cal 1

$$L = 15.5 + 14.67 = 30.17$$

$$P = 128.4 \text{ k}$$

W18x86

$$f_a = \frac{128.4}{25.3}$$

$$= 5.06 \text{ ksi}$$

$$\frac{Kc}{r} = \frac{1.0 \times 30.17 \times 12}{2.63}$$

$$= 138$$

$$\Rightarrow f_a = 7.84 \text{ ksi}$$

$$\frac{Kc_y}{r_o} = \frac{30.17 \times 12}{7.77} = 466$$

$$M = 83.7 \text{ k-ft}$$

$$f_b = \frac{83.7 \times 12}{166} = 6.05 \text{ ksi}$$

$$f_b = \frac{1 \times 10^3}{30.17 \times 2.15} = 15.8$$

$$F_d = \frac{12 \pi^2 E}{23 \times 966^2} = 68.8$$

com.

$$\frac{5.06}{7.84} + 0.85 \times \frac{6.05}{(1 - \frac{5.06}{68.8}) 15.8}$$

$$= 0.645 + 0.351$$

$$= 0.996 < 1 \quad \checkmark \text{ OK}$$

JLS

3/31/06

210



I-12 Assembly Hall Frame

Prepared by:

Morphy, Makofsky, Inc.

(17 pages follow)



Software licensed to morphy makofsky inc

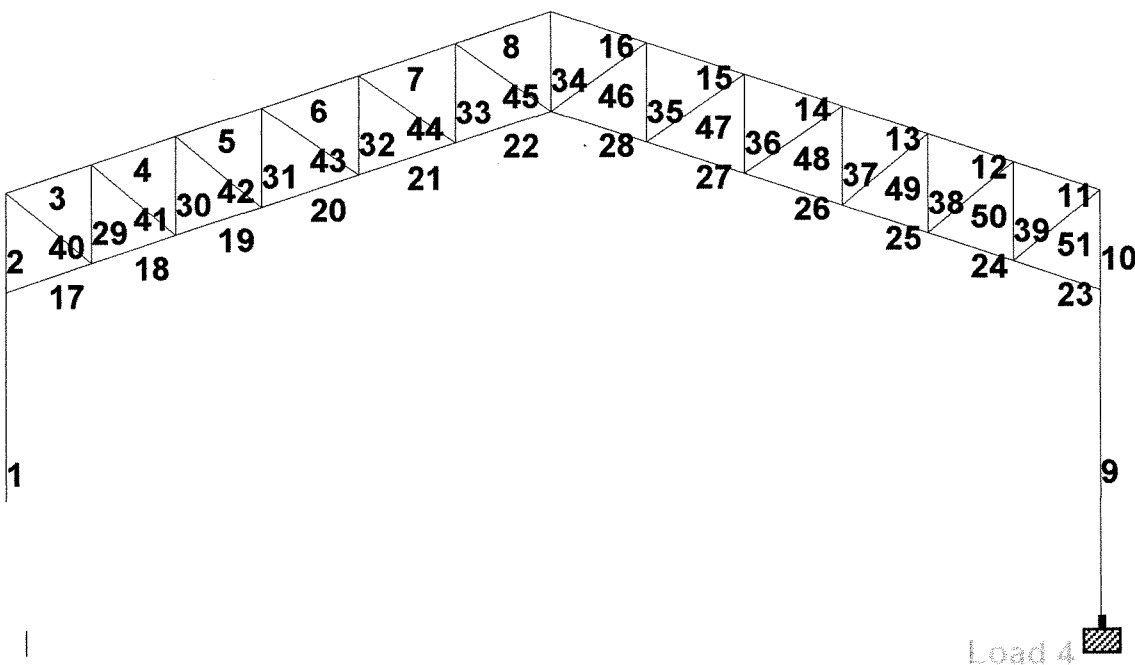
Job No Sheet No **1** Rev

Part

Job Title Ref

By Date **24-Mar-06** Chd

Client File **ASSHFR.std** Date/Time **25-Mar-2006 11:00**



211

ASSEMBLY HALL

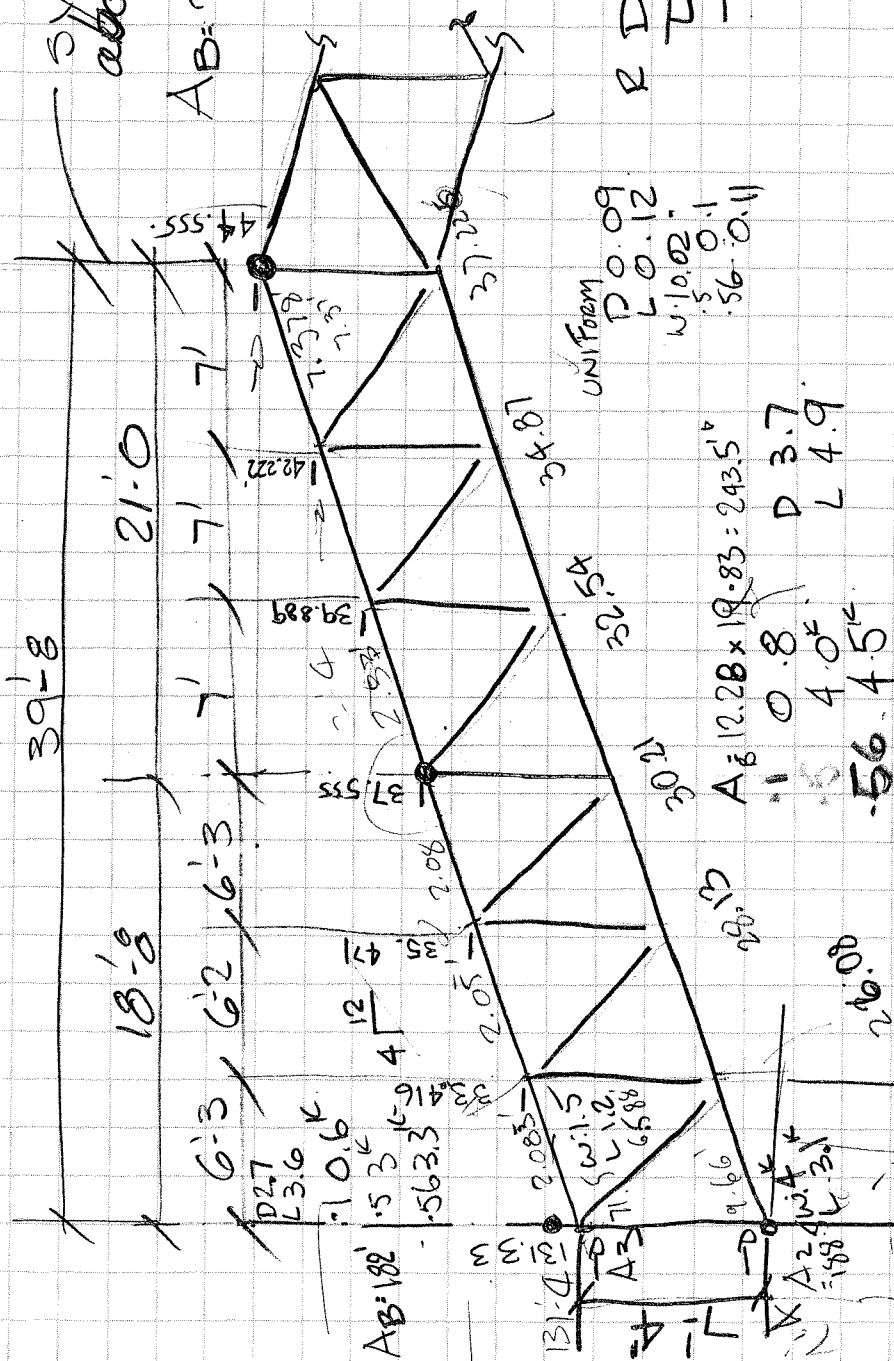
Symmetrical about ϕ

AB = 257.9' ϕ 3.9
 L 5.2
 .5 0.85
 .56 4.27k

R D : 15
 L : 20

max width
 19' 5" @ C

WIND : 1 : 3.3 PSF
 .5 : 16.4 PSF
 .56 : 18.3 PSF



UNIFORM
 D 0.09
 L 0.12
 W 10.02
 .5 0.1
 .56 0.11

A₆ = 12.28 x 19.83 = 243.5'²
 D 3.7
 L 4.9
 0.8
 4.0
 56.45

37.4 PSF TOG
 wind 21 PSF
 downward 16.4 PSF

21

JLS

3/24/06

2/2

```

*****
*
*          STAAD.Pro
*          Version 2003   Bld 1002.US
*          Proprietary Program of
*          Research Engineers, Intl.
*          Date=   MAR 25, 2006
*          Time=   11: 0: 5
*
*          USER ID: morphy makofsky inc
*****

```

1. STAAD PLANE
2. START JOB INFORMATION
3. ENGINEER DATE 24-MAR-06
4. END JOB INFORMATION
5. INPUT WIDTH 79
6. UNIT FEET KIP
7. JOINT COORDINATES
8. 1 0 0 0; 2 0 24 0; 3 0 31.33 0; 4 6.25 33.416 0; 5 12.42 35.471 0
9. 6 18.67 37.555 0; 7 25.67 39.889 0; 8 32.67 42.222 0; 9 39.67 44.555 0
10. 10 79.34 0 0; 11 79.34 24 0; 12 79.34 31.33 0; 13 73.09 33.416 0
11. 14 66.92 35.471 0; 15 60.67 37.555 0; 16 53.67 39.889 0; 17 46.67 42.222 0
12. 18 6.25 26.086 0; 19 12.42 28.141 0; 20 18.67 30.225 0; 21 25.67 32.559 0
13. 22 32.67 34.892 0; 23 39.67 37.225 0; 24 73.09 26.086 0; 25 66.92 28.141 0
14. 26 60.67 30.225 0; 27 53.67 32.559 0; 28 46.67 34.892 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 10 11; 10 11 12
17. 11 12 13; 12 13 14; 13 14 15; 14 15 16; 15 16 17; 16 17 9; 17 2 18; 18 18 19
18. 19 19 20; 20 20 21; 21 21 22; 22 22 23; 23 11 24; 24 24 25; 25 25 26; 26 26 27
19. 27 27 28; 28 28 23; 29 4 18; 30 5 19; 31 6 20; 32 7 21; 33 8 22; 34 9 23
20. 35 17 28; 36 16 27; 37 15 26; 38 14 25; 39 13 24; 40 3 18; 41 4 19; 42 5 20
21. 43 6 21; 44 7 22; 45 8 23; 46 17 23; 47 16 28; 48 15 27; 49 14 26; 50 13 25
22. 51 12 24
23. DEFINE MATERIAL START
24. ISOTROPIC STEEL
25. E 4.176E+006
26. POISSON 0.3
27. DENSITY 0.489024
28. ALPHA 6.5E-006
29. DAMP 0.03
30. END DEFINE MATERIAL
31. CONSTANTS
32. MATERIAL STEEL MEMB 1 TO 51
33. MEMBER PROPERTY AMERICAN
34. 1 2 9 10 TABLE ST W21X73
35. 3 TO 7 11 TO 16 TABLE T W10X33
36. 17 TO 28 TABLE T W8X24
37. 29 TO 51 TABLE LD L40405
38. 8 TABLE T W10X33
39. SUPPORTS
40. 1 10 FIXED
41. LOAD 1 DEAD

213

STAAD PLANE

-- PAGE NO. 2

42. JOINT LOAD
43. 3 12 FY -2.7
44. 6 15 FY -3.7
45. 9 FY -3.9
46. MEMBER LOAD
47. 3 TO 8 11 TO 16 UNI GY -0.09
48. SELFWEIGHT Y -1
49. LOAD 2 LIVE
50. JOINT LOAD
51. 3 12 FY -3.6
52. 6 15 FY -4.9
53. 9 FY -5.2
54. MEMBER LOAD
55. 3 TO 8 11 TO 16 UNI GY -0.12
56. LOAD 3 WIND 1
57. JOINT LOAD
58. 3 FX 1.5
59. 12 FX 1.2
60. 2 FX 4
61. 11 FX 3.1
62. MEMBER LOAD
63. 1 CON GX 4.9 12
64. 9 CON GX 3.8 12
65. 3 CON Y 0.6 0.01
66. 6 CON Y 0.8 0.01
67. 8 CON Y 0.43 7.37
68. 16 CON Y 2.35 7.37
69. 14 CON Y 4.5 0.01
70. 11 CON Y 3.3 0.01
71. 3 TO 8 UNI Y 0.02
72. 11 TO 16 UNI Y 0.11
73. LOAD 4 WIND 2
74. JOINT LOAD
75. 3 FX 1.5
76. 12 FX 1.2
77. 2 FX 4
78. 11 FX 3.1
79. MEMBER LOAD
80. 1 CON GX 4.9 12
81. 9 CON GX 3.8 12
82. 3 CON Y 3 0.01
83. 6 CON Y 4 0.01
84. 8 CON Y 2.1 7.37
85. 16 CON Y 2.35 7.37
86. 14 CON Y 4.5 0.01
87. 11 CON Y 3.3 0.01
88. 3 TO 8 UNI Y 0.1
89. 11 TO 16 UNI Y 0.11
90. LOAD COMB 5 DEAD LIVE
91. 1 1.0 2 1.0
92. LOAD COMB 6 DEAD LIVE WIND 1
93. 1 1.0 2 0.75 3 0.75
94. LOAD COMB 7 DEAD WIND 1
95. 1 0.6 3 1.0
96. LOAD COMB 8 DEAD LIVE WIND2
97. 1 1.0 2 0.75 4 0.75

2/4

STAAD PLANE

-- PAGE NO. 3

98. LOAD COMB 9 DEAD WIND 2
99. 4 1.0 1 0.6
100. PERFORM ANALYSIS

PROBLEM STATISTICS

NUMBER OF JOINTS/MEMBER+ELEMENTS/SUPPORTS = 28/ 51/ 2
ORIGINAL/FINAL BAND-WIDTH= 16/ 3/ 12 DOF
TOTAL PRIMARY LOAD CASES = 4, TOTAL DEGREES OF FREEDOM = 78
SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
REQRD/AVAIL. DISK SPACE = 12.1/ 25109.4 MB, EXMEM = 1560.9 MB

101. PDELTA 2 ANALYSIS
++ Adjusting Displacements 11: 0: 6
++ Adjusting Displacements 11: 0: 6

102. LOAD LIST 5 TO 9
103. PRINT SUPPORT REACTION ALL

215

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	5	9.72	33.19	0.00	0.00	0.00	-106.34
	6	-2.16	23.17	0.00	0.00	0.00	34.72
	7	-11.34	2.26	0.00	0.00	0.00	138.88
	8	-2.02	18.06	0.00	0.00	0.00	27.92
10	9	-11.16	-4.56	0.00	0.00	0.00	129.81
	5	-9.72	33.19	0.00	0.00	0.00	106.34
	6	-14.58	22.76	0.00	0.00	0.00	173.12
	7	-10.98	1.71	0.00	0.00	0.00	138.24
	8	-12.20	20.32	0.00	0.00	0.00	142.15
	9	-7.81	-1.54	0.00	0.00	0.00	96.95

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

104. PRINT MAXFORCE ENVELOPE NSECTION 12 LIST 1 TO 51

216

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	11.32	0.00	7	138.88	0.00	7			
	0.00	0.00	5	0.00	0.00	5	33.19 C	0.00	5
	-9.73	24.00	5	-106.34	0.00	5			
MIN	0.00	24.00	9	0.00	24.00	9	5.61 T	24.00	9
	17.11	0.00	5	126.59	0.00	5			
	0.00	0.00	5	0.00	0.00	5	22.33 C	0.00	5
2 MAX	-10.63	7.33	9	-77.99	0.00	9			
	0.00	7.33	9	0.00	7.33	9	1.56 T	7.33	9
	0.79	0.00	5	1.11	0.00	5			
3 MAX	0.00	0.00	5	0.00	0.00	5	12.10 C	0.00	7
	-3.13	0.00	9	-0.34	3.84	5			
	0.00	6.59	9	0.00	6.59	9	0.01 C	6.59	5
4 MAX	0.76	0.00	5	0.92	0.00	5			
	0.00	0.00	5	0.00	0.00	5	19.88 C	0.00	6
	-0.64	6.50	5	-0.40	3.25	5			
MIN	0.00	6.50	9	0.00	6.50	9	4.25 C	6.50	9
	0.76	0.00	5	0.85	0.00	5			
	0.00	0.00	5	0.00	0.00	5	32.28 C	0.00	5
5 MAX	-0.66	6.59	5	-0.47	3.29	5			
	0.00	6.59	9	0.00	6.59	9	0.52 C	6.59	9
	0.79	0.00	5	0.85	7.38	5			
6 MAX	0.00	0.00	5	0.00	0.00	5	38.77 C	0.00	5
	-4.15	0.00	9	-0.64	3.69	5			
	0.00	7.38	9	0.00	7.38	9	2.90 T	7.38	9
7 MAX	0.81	0.00	5	0.89	0.00	5			
	0.00	0.00	5	0.00	0.00	5	43.14 C	0.00	5
	-0.78	7.38	5	-0.63	3.69	5			
MIN	0.00	7.38	9	0.00	7.38	9	4.89 T	7.38	9
	2.25	7.38	9	1.02	7.38	5			
	0.00	0.00	5	0.00	0.00	5	45.47 C	0.00	5
8 MAX	-0.84	7.38	5	-0.62	3.69	5			
	0.00	7.38	9	0.00	7.38	9	6.78 T	7.38	9
	14.58	0.00	6	173.12	0.00	6			
9 MAX	0.00	0.00	5	0.00	0.00	5	33.19 C	0.00	5

217

STAAD PLANE -- PAGE NO. 6

MIN	4.00	22.00	9	-142.65	24.00	6				
	0.00	24.00	9	0.00	24.00	9	2.59	T	24.00	9
10 MAX	-6.10	0.00	9	0.28	7.33	9				
	0.00	0.00	5	0.00	0.00	5	22.33	C	0.00	5
MIN	-19.29	7.33	6	-141.95	0.00	6				
	0.00	7.33	9	0.00	7.33	9	5.29	T	7.33	9
11 MAX	0.79	0.00	5	1.11	0.00	5				
	0.00	0.00	5	0.00	0.00	5	0.49	C	0.00	5
MIN	-3.49	0.00	9	-0.34	3.84	5				
	0.00	6.59	9	0.00	6.59	9	12.77	T	6.59	7
12 MAX	0.76	0.00	5	0.92	0.00	5				
	0.00	0.00	5	0.00	0.00	5	17.09	C	0.00	5
MIN	-0.64	6.50	5	-0.40	3.25	5				
	0.00	6.50	9	0.00	6.50	9	11.67	T	6.50	7
13 MAX	0.76	0.00	5	0.85	0.00	5				
	0.00	0.00	5	0.00	0.00	5	32.28	C	0.00	5
MIN	-0.66	6.59	5	-0.47	3.29	5				
	0.00	6.59	9	0.00	6.59	9	11.31	T	6.59	9
14 MAX	0.79	0.00	5	0.85	7.38	5				
	0.00	0.00	5	0.00	0.00	5	38.77	C	0.00	5
MIN	-4.68	0.00	9	-0.64	3.69	5				
	0.00	7.38	9	0.00	7.38	9	10.95	T	7.38	9
15 MAX	0.81	0.00	5	0.89	0.00	5				
	0.00	0.00	5	0.00	0.00	5	43.14	C	0.00	5
MIN	-0.78	7.38	5	-0.63	3.69	5				
	0.00	7.38	9	0.00	7.38	9	8.91	T	7.38	9
16 MAX	2.53	7.38	9	1.02	7.38	5				
	0.00	0.00	5	0.00	0.00	5	45.47	C	0.00	5
MIN	-0.84	7.38	5	-0.62	3.69	5				
	0.00	7.38	9	0.00	7.38	9	6.69	T	7.38	9
17 MAX	0.18	0.00	5	0.69	0.00	5				
	0.00	0.00	5	0.00	0.00	5	28.31	C	0.00	5
MIN	-0.09	6.59	9	-0.30	0.00	9				
	0.00	6.59	9	0.00	6.59	9	13.63	T	6.59	9
18 MAX	0.09	0.00	5	0.19	0.00	5				
	0.00	0.00	5	0.00	0.00	5	9.93	C	0.00	5
MIN	-0.03	6.50	9	-0.13	6.50	5				
	0.00	6.50	9	0.00	6.50	9	13.26	T	6.50	7
19 MAX	0.09	0.00	5	0.18	0.00	5				
	0.00	0.00	5	0.00	0.00	5	6.44	T	0.00	9
MIN	-0.03	6.59	9	-0.16	6.59	5				
	0.00	6.59	9	0.00	6.59	9	13.99	T	6.59	6
20 MAX	0.07	0.00	5	0.08	0.00	5				
	0.00	0.00	5	0.00	0.00	5	2.93	T	0.00	9

218

STAAD PLANE

-- PAGE NO. 7

MIN	-0.03	7.38	8	-0.11	5.53	5			
	0.00	7.38	9	0.00	7.38	9	23.30 T	7.38	6
21 MAX	0.05	0.00	5	0.04	0.00	8			
	0.00	0.00	5	0.00	0.00	5	1.08 T	0.00	9
MIN	-0.04	7.38	6	-0.09	4.92	5			
	0.00	7.38	9	0.00	7.38	9	28.30 T	7.38	5
22 MAX	0.06	0.00	5	0.06	7.38	7			
	0.00	0.00	5	0.00	0.00	5	0.66 C	0.00	9
MIN	-0.04	7.38	6	-0.12	5.53	5			
	0.00	7.38	9	0.00	7.38	9	32.65 T	7.38	5
23 MAX	0.18	0.00	5	0.70	0.00	6			
	0.00	0.00	5	0.00	0.00	5	30.27 C	0.00	6
MIN	0.01	6.59	9	-0.26	6.59	5			
	0.00	6.59	9	0.00	6.59	9	7.37 C	6.59	9
24 MAX	0.09	0.00	5	0.19	0.00	5			
	0.00	0.00	5	0.00	0.00	5	17.37 C	0.00	6
MIN	-0.02	6.50	9	-0.13	6.50	5			
	0.00	6.50	9	0.00	6.50	9	8.10 C	6.50	9
25 MAX	0.09	0.00	5	0.18	0.00	5			
	0.00	0.00	5	0.00	0.00	5	13.17 C	0.00	7
MIN	-0.02	6.59	9	-0.16	6.59	5			
	0.00	6.59	9	0.00	6.59	9	6.69 T	6.59	5
26 MAX	0.07	0.00	5	0.11	0.00	6			
	0.00	0.00	5	0.00	0.00	5	11.70 C	0.00	7
MIN	-0.02	7.38	8	-0.11	5.53	5			
	0.00	7.38	9	0.00	7.38	9	21.86 T	7.38	5
27 MAX	0.06	0.00	6	0.09	0.00	7			
	0.00	0.00	5	0.00	0.00	5	7.37 C	0.00	7
MIN	-0.03	7.38	5	-0.09	4.92	5			
	0.00	7.38	9	0.00	7.38	9	28.30 T	7.38	5
28 MAX	0.06	0.00	6	0.08	0.00	7			
	0.00	0.00	5	0.00	0.00	5	4.80 C	0.00	9
MIN	-0.03	7.38	8	-0.12	5.53	5			
	0.00	7.38	9	0.00	7.38	9	32.65 T	7.38	5
29 MAX	0.02	0.00	9	0.28	7.33	5			
	0.00	0.00	5	0.00	0.00	5	20.28 C	7.33	5
MIN	-0.08	7.33	5	-0.31	0.00	5			
	0.00	7.33	9	0.00	7.33	9	4.22 T	0.00	9
30 MAX	0.02	0.00	9	0.20	7.33	5			
	0.00	0.00	5	0.00	0.00	5	18.48 C	7.33	5
MIN	-0.06	7.33	5	-0.23	0.00	5			
	0.00	7.33	9	0.00	7.33	9	4.11 T	0.00	9
31 MAX	0.01	0.00	9	0.17	7.33	5			
	0.00	0.00	5	0.00	0.00	5	16.70 C	7.33	5

219

STAAD PLANE				-- PAGE NO.		8			
MIN	-0.05	7.33	5	-0.17	0.00	5	4.05 T	0.00	9
	0.00	7.33	9	0.00	7.33	9			
32 MAX	0.01	0.00	7	0.07	7.33	5	6.21 C	7.33	5
	0.00	0.00	5	0.00	0.00	5			
MIN	-0.01	7.33	5	-0.05	7.33	7	2.98 T	0.00	7
	0.00	7.33	9	0.00	7.33	9			
33 MAX	0.01	0.00	7	0.06	7.33	5	4.16 C	7.33	5
	0.00	0.00	5	0.00	0.00	5			
MIN	0.00	7.33	5	-0.05	7.33	7	3.49 T	0.00	7
	0.00	7.33	9	0.00	7.33	9			
34 MAX	0.04	0.00	7	0.19	0.00	7	2.14 C	7.33	9
	0.00	0.00	5	0.00	0.00	5			
MIN	0.00	7.33	5	-0.10	7.33	7	17.72 T	0.00	5
	0.00	7.33	9	0.00	7.33	9			
35 MAX	0.01	0.00	6	0.04	0.00	7	6.02 C	7.33	6
	0.00	0.00	5	0.00	0.00	5			
MIN	0.00	7.33	9	-0.06	7.33	5	2.13 C	0.00	9
	0.00	7.33	9	0.00	7.33	9			
36 MAX	0.02	0.00	6	0.08	0.00	7	7.20 C	7.33	6
	0.00	0.00	5	0.00	0.00	5			
MIN	0.01	7.33	9	-0.07	7.33	6	1.95 C	0.00	9
	0.00	7.33	9	0.00	7.33	9			
37 MAX	0.05	0.00	5	0.17	0.00	5	16.70 C	7.33	5
	0.00	0.00	5	0.00	0.00	5			
MIN	0.00	7.33	9	-0.17	7.33	5	0.71 T	0.00	9
	0.00	7.33	9	0.00	7.33	9			
38 MAX	0.06	0.00	5	0.23	0.00	5	18.48 C	7.33	5
	0.00	0.00	5	0.00	0.00	5			
MIN	0.00	7.33	9	-0.20	7.33	5	0.85 T	0.00	9
	0.00	7.33	9	0.00	7.33	9			
39 MAX	0.08	0.00	5	0.31	0.00	5	20.28 C	7.33	5
	0.00	0.00	5	0.00	0.00	5			
MIN	0.00	7.33	9	-0.28	7.33	5	0.96 T	0.00	9
	0.00	7.33	9	0.00	7.33	9			
40 MAX	0.06	0.00	8	0.17	8.16	5	4.47 C	8.16	9
	0.00	0.00	5	0.00	0.00	5			
MIN	-0.07	8.16	5	-0.06	6.80	9	22.64 T	0.00	5
	0.00	8.16	9	0.00	8.16	9			
41 MAX	0.04	0.00	8	0.11	8.12	5	4.40 C	8.12	9
	0.00	0.00	5	0.00	0.00	5			
MIN	-0.07	8.12	5	-0.09	2.71	6	20.67 T	0.00	5
	0.00	8.12	9	0.00	8.12	9			
42 MAX	0.04	0.00	8	0.07	8.16	5	4.35 C	8.16	9
	0.00	0.00	5	0.00	0.00	5			

220

STAAD PLANE -- PAGE NO. 9

MIN	-0.07	8.16	5	-0.11	2.72	5			
	0.00	8.16	9	0.00	8.16	9	18.75 T	0.00	5
43 MAX	0.05	0.00	8	0.07	0.00	9			
	0.00	0.00	5	0.00	0.00	5	3.32 C	8.60	7
MIN	-0.08	8.60	5	-0.15	2.87	5			
	0.00	8.60	9	0.00	8.60	9	7.51 T	0.00	5
44 MAX	0.06	0.00	6	0.05	0.00	9			
	0.00	0.00	5	0.00	0.00	5	3.93 C	8.60	7
MIN	-0.06	8.60	5	-0.12	3.58	5			
	0.00	8.60	9	0.00	8.60	9	5.11 T	0.00	5
45 MAX	0.08	0.00	5	0.09	8.60	9			
	0.00	0.00	5	0.00	0.00	5	4.59 C	8.60	7
MIN	-0.05	8.60	6	-0.17	5.73	5			
	0.00	8.60	9	0.00	8.60	9	2.78 T	0.00	5
46 MAX	0.08	0.00	5	0.09	8.60	9			
	0.00	0.00	5	0.00	0.00	5	2.70 T	8.60	5
MIN	-0.05	8.60	8	-0.17	5.73	5			
	0.00	8.60	9	0.00	8.60	9	5.98 T	0.00	6
47 MAX	0.05	0.00	8	0.06	8.60	7			
	0.00	0.00	5	0.00	0.00	5	2.66 T	8.60	9
MIN	-0.06	8.60	6	-0.12	3.58	5			
	0.00	8.60	9	0.00	8.60	9	7.28 T	0.00	6
48 MAX	0.05	0.00	6	0.09	0.00	9			
	0.00	0.00	5	0.00	0.00	5	2.45 T	8.60	9
MIN	-0.08	8.60	5	-0.15	2.87	5			
	0.00	8.60	9	0.00	8.60	9	8.65 T	0.00	6
49 MAX	0.04	0.00	8	0.08	8.16	6			
	0.00	0.00	5	0.00	0.00	5	0.64 C	8.16	9
MIN	-0.07	8.16	5	-0.11	2.72	5			
	0.00	8.16	9	0.00	8.16	9	18.75 T	0.00	5
50 MAX	0.04	0.00	6	0.11	8.12	5			
	0.00	0.00	5	0.00	0.00	5	0.79 C	8.12	9
MIN	-0.07	8.12	5	-0.08	2.71	5			
	0.00	8.12	9	0.00	8.12	9	20.67 T	0.00	5
51 MAX	0.03	0.00	5	0.19	8.16	6			
	0.00	0.00	5	0.00	0.00	5	0.96 C	8.16	9
MIN	-0.08	8.16	6	-0.03	2.04	7			
	0.00	8.16	9	0.00	8.16	9	22.64 T	0.00	5

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

- 105. PARAMETER
- 106. CODE AISC
- 107. FYLD 7200 MEMB 1 TO 28
- 108. UNB 1 MEMB 3 TO 8 11 TO 16

STAAD PLANE

-- PAGE NO. 10

109. BEAM 1 ALL

110. CHECK CODE ALL

222

STAAD.Pro CODE CHECKING - (AISC)

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
1	ST W21 X73	PASS 31.44 C	AISC- H1-1 0.00	0.971 127.28	5 24.00
2	ST W21 X73	PASS 22.33 C	AISC- H1-3 0.00	0.348 126.59	5 0.00
3	T W10 X33	PASS 9.38 C	AISC- H1-3 0.00	0.253 0.88	6 0.00
4	T W10 X33	PASS 17.09 C	AISC- H1-1 0.00	0.320 0.92	5 0.00
5	T W10 X33	PASS 32.28 C	AISC- H1-1 0.00	0.465 0.85	5 0.00
6	T W10 X33	PASS 38.24 C	AISC- H1-1 0.00	0.562 0.85	5 7.38
7	T W10 X33	PASS 43.14 C	AISC- H1-1 0.00	0.629 0.89	5 0.00
8	T W10 X33	PASS 44.94 C	AISC- H1-1 0.00	0.679 1.02	5 7.38
*	9 ST W21 X73	FAIL 22.76 C	AISC- H1-2 0.00	1.180 173.12	6 0.00
10	ST W21 X73	PASS 11.27 C	AISC- H1-3 0.00	0.364 -141.95	6 0.00
11	T W10 X33	PASS 0.49 C	AISC- H1-3 0.00	0.214 1.11	5 0.00
12	T W10 X33	PASS 17.09 C	AISC- H1-1 0.00	0.320 0.92	5 0.00
13	T W10 X33	PASS 32.28 C	AISC- H1-1 0.00	0.465 0.85	5 0.00
14	T W10 X33	PASS 38.24 C	AISC- H1-1 0.00	0.562 0.85	5 7.38
15	T W10 X33	PASS 43.14 C	AISC- H1-1 0.00	0.629 0.89	5 0.00
16	T W10 X33	PASS 44.94 C	AISC- H1-1 0.00	0.679 1.02	5 7.38
17	T W8X 24	PASS 28.31 C	AISC- H1-1 0.00	0.746 0.69	5 0.00
18	T W8X 24	PASS 9.93 C	AISC- H1-3 0.00	0.214 0.19	5 0.00
19	T W8X 24	PASS 13.99 T	AISC- H2-1 0.00	0.171 -0.10	6 6.04
20	T W8X 24	PASS 23.29 T	AISC- H2-1 0.00	0.251 -0.08	6 4.92
21	T W8X 24	PASS 28.29 T	AISC- H2-1 0.00	0.299 -0.09	5 4.92

223

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
22	T W8X 24	PASS 32.64 T	AISC- H2-1 0.00	0.353 -0.12	5 5.53
23	T W8X 24	PASS 30.27 C	AISC- H1-1 0.00	0.791 0.70	6 0.00
24	T W8X 24	PASS 17.37 C	AISC- H1-1 0.00	0.316 0.16	6 0.00
25	T W8X 24	PASS 13.17 C	AISC- H1-1 0.00	0.221 0.07	7 0.00
26	T W8X 24	PASS 21.86 T	AISC- H2-1 0.00	0.245 -0.11	5 5.53
27	T W8X 24	PASS 28.29 T	AISC- H2-1 0.00	0.299 -0.09	5 4.92
28	T W8X 24	PASS 32.64 T	AISC- H2-1 0.00	0.353 -0.12	5 5.53
29	LD L40 405	PASS 20.16 C	AISC- H1-1 0.00	0.324 -0.31	5 0.00
30	LD L40 405	PASS 18.37 C	AISC- H1-1 0.00	0.283 -0.23	5 0.00
31	LD L40 405	PASS 16.70 C	AISC- H1-1 0.00	0.248 0.17	5 7.33
32	LD L40 405	PASS 6.21 C	AISC- H1-3 0.00	0.095 0.07	5 7.33
33	LD L40 405	PASS 4.16 C	AISC- H1-3 0.00	0.066 0.06	5 7.33
34	LD L40 405	PASS 17.72 T	AISC- H2-1 0.00	0.170 0.00	5 0.00
35	LD L40 405	PASS 6.02 C	AISC- H1-3 0.00	0.089 -0.06	6 7.33
36	LD L40 405	PASS 7.20 C	AISC- H1-3 0.00	0.107 -0.07	6 7.33
37	LD L40 405	PASS 16.70 C	AISC- H1-1 0.00	0.248 -0.17	5 7.33
38	LD L40 405	PASS 18.37 C	AISC- H1-1 0.00	0.283 0.23	5 0.00
39	LD L40 405	PASS 20.16 C	AISC- H1-1 0.00	0.324 0.31	5 0.00
40	LD L40 405	PASS 22.55 T	AISC- H2-1 0.00	0.253 0.17	5 8.16
41	LD L40 405	PASS 20.58 T	AISC- H2-1 0.00	0.222 0.11	5 8.12
42	LD L40 405	PASS 18.73 T	AISC- H2-1 0.00	0.204 -0.11	5 2.72
43	LD L40 405	PASS 7.48 T	AISC- H2-1 0.00	0.105 -0.15	5 2.87
44	LD L40 405	PASS 5.07 T	AISC- H2-1 0.00	0.075 -0.12	5 3.58

224

ALL UNITS ARE - KIP FEET (UNLESS OTHERWISE NOTED)

MEMBER	TABLE	RESULT/ FX	CRITICAL COND/ MY	RATIO/ MZ	LOADING/ LOCATION
45	LD L40 405	PASS	AISC- H1-3	0.079	7
		4.59 C	0.00	0.07	8.60
46	LD L40 405	PASS	AISC- H2-1	0.083	6
		5.92 T	0.00	-0.12	5.73
47	LD L40 405	PASS	AISC- H2-1	0.090	6
		7.25 T	0.00	-0.09	3.58
48	LD L40 405	PASS	AISC- H2-1	0.105	5
		7.48 T	0.00	-0.15	2.87
49	LD L40 405	PASS	AISC- H2-1	0.204	5
		18.73 T	0.00	-0.11	2.72
50	LD L40 405	PASS	AISC- H2-1	0.222	5
		20.58 T	0.00	0.11	8.12
51	LD L40 405	PASS	AISC- H2-1	0.253	5
		22.55 T	0.00	0.17	8.16

111. PRINT JOINT DISPLACEMENTS LIST 2 3 6 9 11 12 15 23

225

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
2	5	-0.33133	-0.01493	0.00000	0.00000	0.00000	-0.00078
	6	0.22948	-0.01030	0.00000	0.00000	0.00000	-0.00150
	7	0.59450	-0.00080	0.00000	0.00000	0.00000	-0.00132
	8	0.16897	-0.00794	0.00000	0.00000	0.00000	-0.00113
	9	0.51381	0.00235	0.00000	0.00000	0.00000	-0.00082
3	5	-0.16397	-0.01804	0.00000	0.00000	0.00000	-0.00223
	6	0.38290	-0.01289	0.00000	0.00000	0.00000	-0.00182
	7	0.65336	-0.00154	0.00000	0.00000	0.00000	-0.00049
	8	0.28706	-0.00982	0.00000	0.00000	0.00000	-0.00141
	9	0.52558	0.00255	0.00000	0.00000	0.00000	0.00006
6	5	-0.00441	-0.58346	0.00000	0.00000	0.00000	-0.00203
	6	0.49070	-0.43836	0.00000	0.00000	0.00000	-0.00134
	7	0.65812	-0.07642	0.00000	0.00000	0.00000	-0.00002
	8	0.37449	-0.34593	0.00000	0.00000	0.00000	-0.00110
	9	0.50317	0.04682	0.00000	0.00000	0.00000	0.00029
9	5	0.00000	-0.84841	0.00000	0.00000	0.00000	0.00000
	6	0.47270	-0.56645	0.00000	0.00000	0.00000	0.00039
	7	0.63027	-0.01640	0.00000	0.00000	0.00000	0.00052
	8	0.36793	-0.46929	0.00000	0.00000	0.00000	0.00014
	9	0.49057	0.11315	0.00000	0.00000	0.00000	0.00019
11	5	0.33133	-0.01493	0.00000	0.00000	0.00000	0.00078
	6	0.67131	-0.01011	0.00000	0.00000	0.00000	-0.00050
	7	0.60656	-0.00055	0.00000	0.00000	0.00000	-0.00134
	8	0.53677	-0.00898	0.00000	0.00000	0.00000	-0.00032
	9	0.42718	0.00095	0.00000	0.00000	0.00000	-0.00110
12	5	0.16397	-0.01804	0.00000	0.00000	0.00000	0.00223
	6	0.60449	-0.01166	0.00000	0.00000	0.00000	0.00112
	7	0.66316	0.00010	0.00000	0.00000	0.00000	-0.00045
	8	0.47415	-0.01047	0.00000	0.00000	0.00000	0.00101
	9	0.48938	0.00168	0.00000	0.00000	0.00000	-0.00060
15	5	0.00441	-0.58346	0.00000	0.00000	0.00000	0.00203
	6	0.49929	-0.33791	0.00000	0.00000	0.00000	0.00137
	7	0.66187	0.05752	0.00000	0.00000	0.00000	0.00007
	8	0.38451	-0.29437	0.00000	0.00000	0.00000	0.00114
	9	0.50883	0.11557	0.00000	0.00000	0.00000	-0.00024
23	5	0.00000	-0.85954	0.00000	0.00000	0.00000	0.00000
	6	0.49210	-0.57394	0.00000	0.00000	0.00000	0.00023
	7	0.65613	-0.01676	0.00000	0.00000	0.00000	0.00031
	8	0.37785	-0.47551	0.00000	0.00000	0.00000	0.00012
	9	0.50380	0.11447	0.00000	0.00000	0.00000	0.00017

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

226

112. FINISH

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

**** DATE= MAR 25,2006 TIME= 11: 0: 6 ****

* For questions on STAAD.Pro, please contact : *
* By Email - North America : support@reiusa.com *
* By Email - International : support@reiworld.com *
* Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

I-13 Miscellaneous Design

Prepared by:

Morphy, Makofsky, Inc.

(10 pages follow)

1st Floor slab — NOT assembly Hall

5" SLAB	core + storage lights	125		
DL	63	$\times 1.2$	=	76
U	125	$\times 1.6$	=	200
				<u>276</u>

Typical span 10'-0" ϕ TO ϕ BM.

\therefore clear span = 8'-0"

Positive

END span
in

$$m = 11wl^2 = \frac{1}{11} \times 0.28 \times 8^2 = 1.63 \text{ KI}$$

$$\Rightarrow A_{sreq} = \frac{1.63}{4 \times 3.75} = 0.11 \text{ in}^2$$

$A_{s, min} = 0.0018 \times 5 \times 12 = 0.11 \text{ in}^2$ end interior moment bars \therefore positive gov. S

Negative

END span

$$m = 19wl^2 = 1.99 \text{ KI}$$

$$A_{sn} = \frac{1.99}{4 \times 4} = 0.124 \text{ in}^2$$

in $m = 11wl^2 \Rightarrow$ as above

- #4 @ 12" $\Rightarrow 0.2 \text{ in}^2$
- #3 @ 12" $\Rightarrow 0.11 \text{ in}^2$ \leftarrow
- #4 @ 15" $\Rightarrow 0.16 \text{ in}^2$

Note min steel gov. \therefore OK

JLS	4/4/06.	
-----	---------	--



$$\text{if } f_s = \frac{2}{3} f_y = 40 \text{ ksi}$$

$$S = 15 \times \frac{40,000}{40,000} - 2.5 \text{ cu}$$

$$= 15 - 2.5 = 12.5''$$

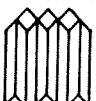
of 6d cc = 1''

$$\text{or } 12 = \frac{40}{40}$$
$$= \underline{\underline{12''}}$$

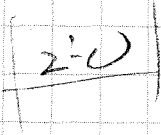
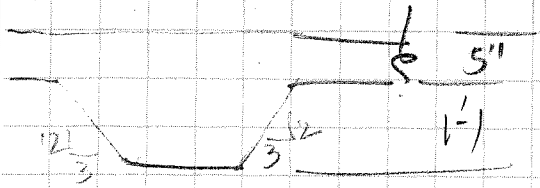
JS

4-4-06

2/1



Bm design @ storage & office.



$$Bm_{WT} = 2.25 \times 1.09 \times 0.15 = 0.378$$

$$\times 1.2 = 0.44 \text{ k/ft}$$

slab

$$D = 10 \times 0.076 = 0.76 + 0.44 = 1.2$$

$$C = 10 \times 0.2 = 2$$

$$TL = 3.2 \text{ k/ft}$$

BTWN Columns

$$+ \text{Mend} = \frac{1}{11} 3.2 \times 19^2 = 105 \text{ k-ft}$$

$$A_{sr} = \frac{105}{f_y \times 19.5} = 1.34$$

$$A_{sm} = 1.58 \quad 4\text{-}\#6$$

$$V_0 = \frac{1.15 \times 3.2 \times 19}{2} = 34.96 \text{ k}$$

$$\phi V_c = 0.75 \times 2 \times \sqrt{4000} \times 19 \times 24 = 43.3 \text{ k}$$

$$\frac{\phi V_c}{2} < V_0 \Rightarrow \text{min. } A_{sr,m} \text{ req'd}$$

$$= 0.083 \times 24 \times 10 = 0.2 \text{ in}^2$$

$$\Rightarrow \#3 @ 10"$$

$$\text{Negative M} = \frac{1}{9} \times 3.2 \times 19^2 = 128.4 \text{ k-ft}$$

$$\Rightarrow A_s = 1.53 \text{ in}^2$$

2-#6 const
1-#8 x 12'-6" cont on pile.

JLS

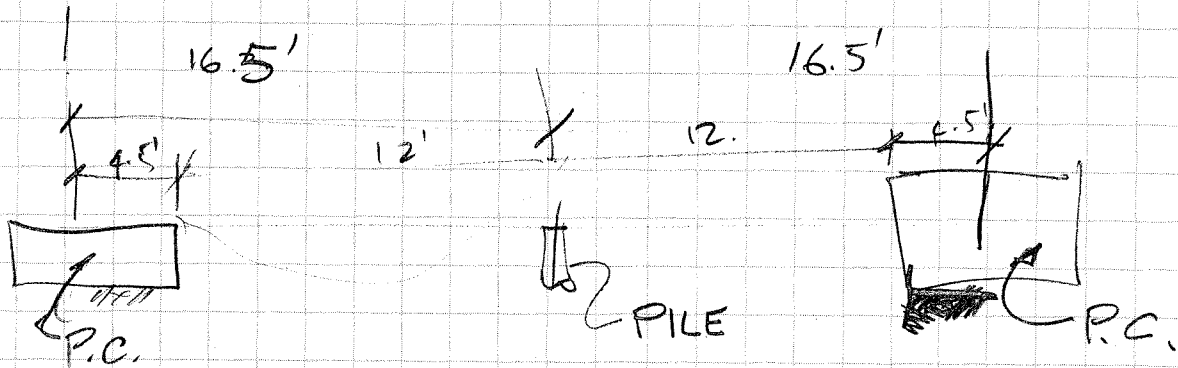
4/4/06

220



BM @ COL

worst case.



$$-m. = \frac{1}{8} w l^2 = \frac{1}{8} \times 3.2 \times 12^2 = 57.6 \text{ k}'$$

$$A_{s, \text{req}} = 0.8 \text{ in}^2$$

$$A_{s, \text{min}} = 1.5 \text{ in}^2$$

TOP 2 - #8

bot 4 - #6

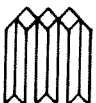
$$V_u = \frac{1.15 \times 3.2 \times 12}{2} = 22 \text{ k}$$

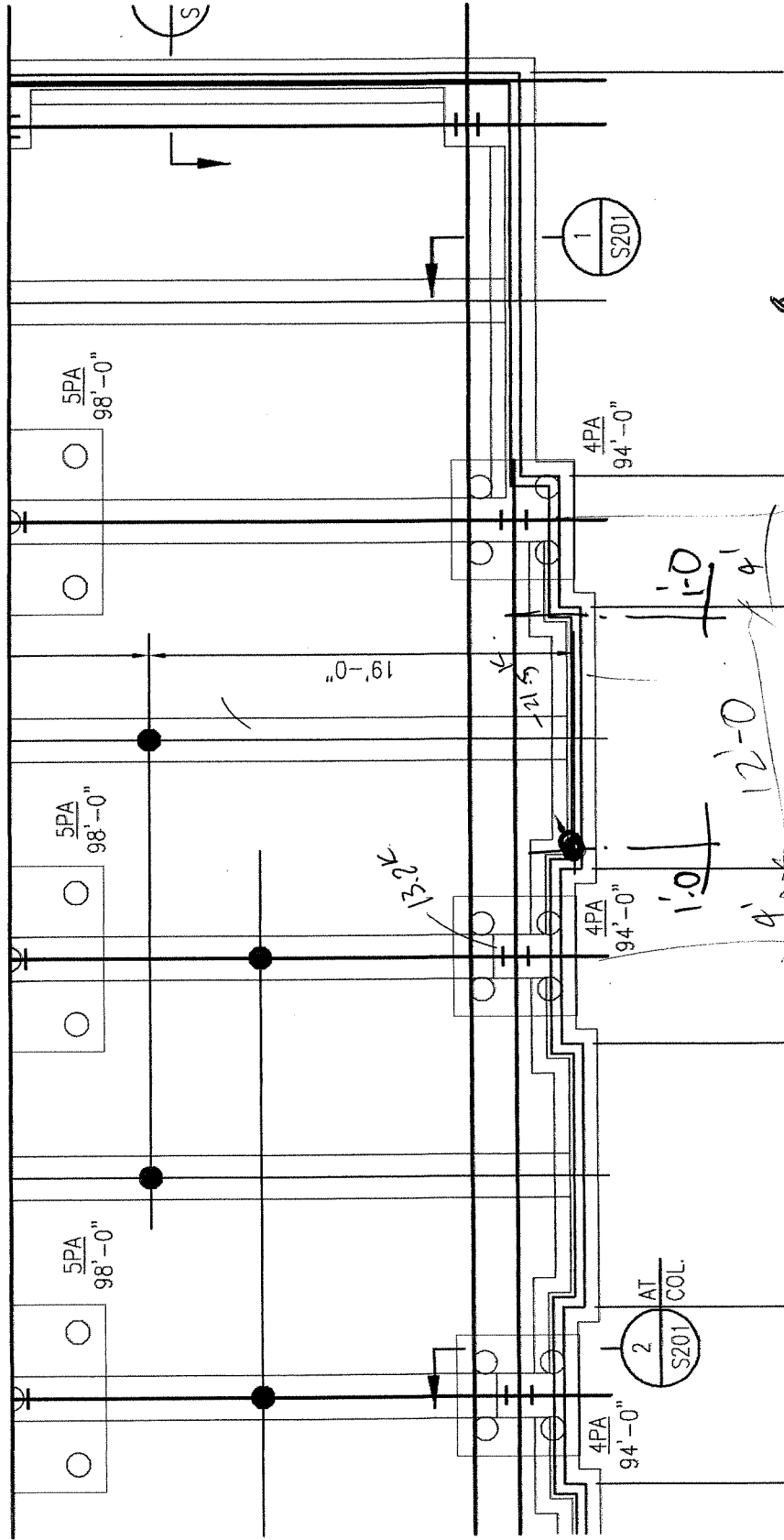
see prev

JLS

4-4-06

231





BRICK - 0.64
 CMU - 0.88
 C.B. - 0.6
 G.W. - 0.3

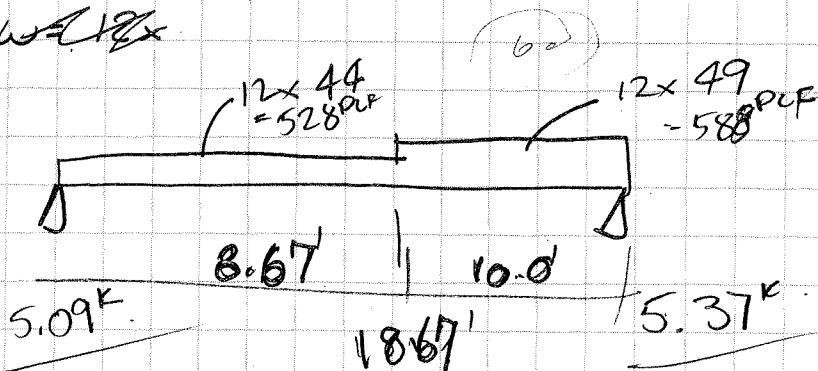
 2.42 (1/1)

2+1.16 = 91
 12.42
 21.8
 +10.75 ✓

232

Horizontal wall suppt @ Assembly hall

Corner. $s = 18.67'$
 $w = 12x$



$\pi \cdot 9.13' \Rightarrow M = 24.52'$

$\frac{L}{600} \Rightarrow \frac{5 \times 18.67 \times 12}{600} = \frac{5 \times 0.588 \times 12 \times 12^4 \times 1728}{384 \times 29 \times 10^3 \times I}$
 $I = 125.33 \text{ in}^4$

$15510 \times 8 \times 0.3125$

$f_b = \frac{25.62 \times 12}{30.8} = \frac{10^k}{\text{in}^2}$

$d \approx 0.36" \times \frac{L}{619} \checkmark \text{ OK}$

$\frac{L}{600}$

interior $s = 21.2$ $w = 0.528x$

$M = 29.58'$

$A = 0.53" \Rightarrow \frac{L}{480} \text{ (NO)}$

Not TS 12x8x1/4 wt = 33 $I = 196$ $\pm 10 \times 8 \times 36 \text{ wt} = 36$

use -

JLS	4/4/06	273
-----	--------	-----

e Number
for this job

Note # suffix
in Gen Note list

File names for these notes
are prefixed "GN"

06018

JACK BAE. 141ST R.C.
BLITCH/BROADMOOR

11/4/04
TO JLS

~~C4. MODIFIED CLASS 5 TREATED TIMBER POLES:~~

~~THIS NOTE VOID~~

C5. PILES:

WOOD-CONCRETE COMPOSITE PILES (

A. SYMBOL ON PLAN:

B. SYMBOL IN DETAILS:

C. TIP PENETRATION BELOW FIRST FLOOR ELEVATION: 60.0 FEET

ASSUMES EXIST. G.D. = 0.00 FEET

D. LOWER TIMBER SECTION:

1. TYPE: UNTREATED TIMBER PILE, A.S.T.M. D25

2. MINIMUM TIP DIAMETER: 7"

3. MINIMUM DIAMETER 3'-0" FROM BUTT: 12"

4. LENGTH: 48 FEET

E. CONCRETE UPPER SECTION:

1. TYPE: CAST-IN-PLACE CONCRETE

2. STRENGTH: 3000 P.S.I. AT 28 DAYS

3. CASING: SEE SPECIFICATIONS

4. CONNECTOR: SEE SPECIFICATIONS

5. LENGTH: AS REQUIRED TO EXTEND FROM BUTT OF TIMBER
LOWER SECTION TO CUT-OFF ELEVATIONS.

6. REINFORCING: REFER TO DRAWING 45

F. PREDRILL: To ELEVATION (-) 10.0 feet with a 6" diameter bit.

G. HAMMER: VULCAN NO. 1 (15,000 ft.-lbs. per blow)

H. EXPLORATORY PILES: 15 TOTAL - LAST 3 TO BE LOCATED AFTER FIRST 12 ARE DRIVE

I. LOAD TEST: TWO - REFER TO SPECIFICATIONS

J. DESIGN LOAD: 25 TONS

~~C6. PILES:~~

~~WOOD-CONCRETE COMPOSITE PILES~~

~~A. TIP PENETRATION BELOW EXISTING GROUND SURFACE: 80'-0"~~

~~B. LOWER TIMBER SECTION:~~

~~1. TYPE: UNTREATED TIMBER PILE, A.S.T.M. D25~~

~~2. MINIMUM TIP DIAMETER: 7"~~

~~3. MINIMUM DIAMETER 3'-0" FROM BUTT: 13"~~

~~4. LENGTH: 66 FEET~~

~~C. CONCRETE UPPER SECTION:~~

~~1. TYPE: CAST-IN-PLACE CONCRETE~~

~~2. STRENGTH: 3,000 P.S.I. AT 28 DAYS~~

~~3. CASING: SEE SPECIFICATIONS~~

~~4. CONNECTOR: SEE SPECIFICATIONS~~

~~5. LENGTH: AS REQUIRED TO EXTEND FROM TOP OF TIMBER
LOWER SECTION TO CUT-OFF ELEVATIONS.~~

~~D. PREDRILL: 50 FEET WITH 8" DIA. 4 BLADE FISH TAIL BIT~~

~~E. HAMMER: VULCAN NO. 1~~

~~F. EXPLORATORY PILES: NONE REQUIRED~~

~~G. LOAD TEST: NONE REQUIRED~~

~~H. DESIGN LOAD: $\frac{(7+13) \text{ TT} \times 66 \times 150}{2 \times 12} = 26,000 \text{ LBS} = 13 \text{ TONS}$~~

ABOVE ALSO APPLIES

TO 06020

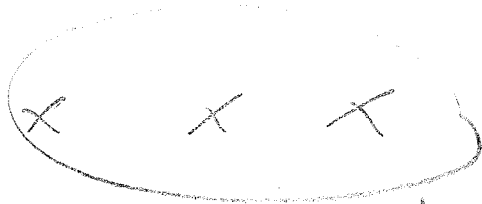
BILLETIC 5

11/4/06

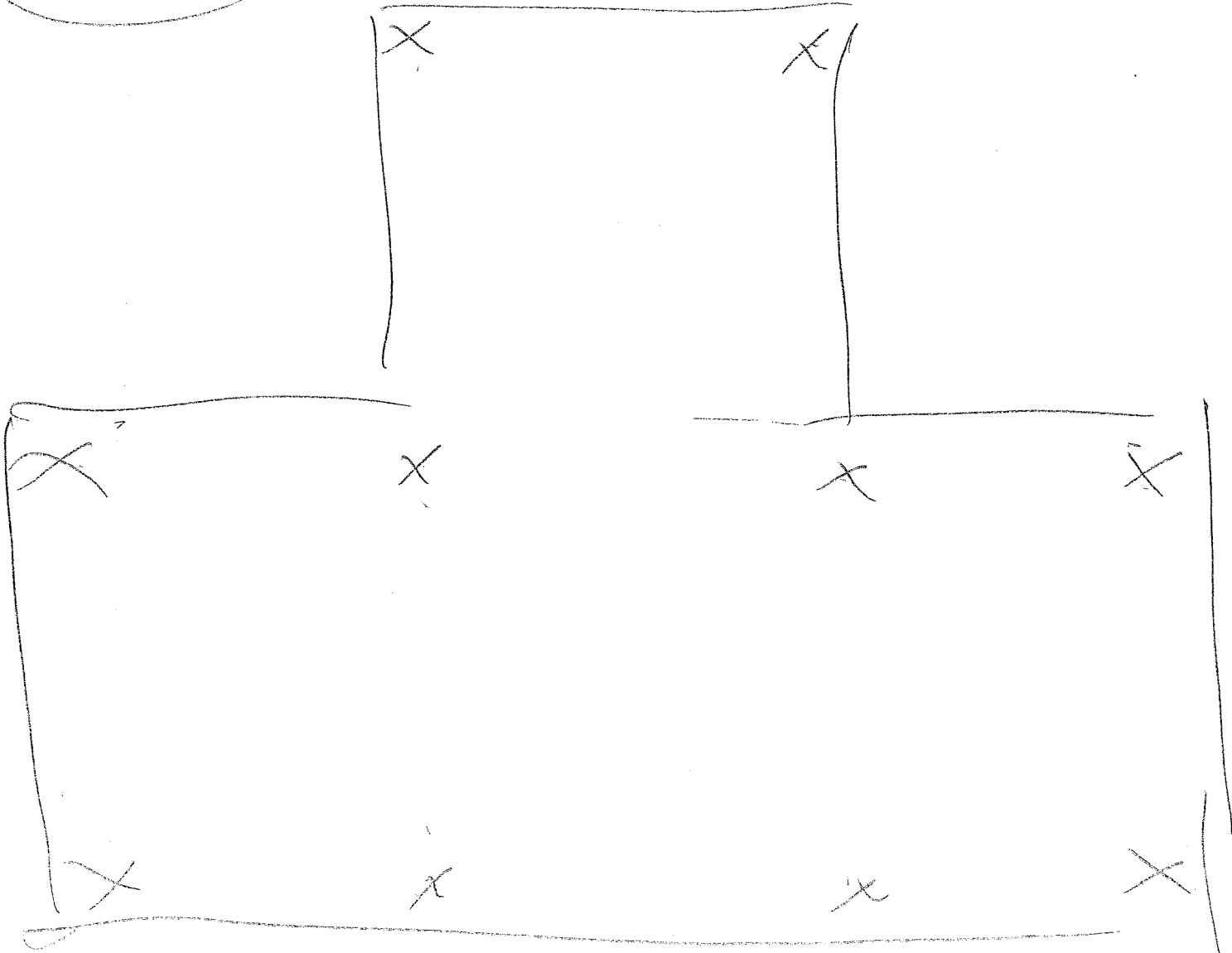
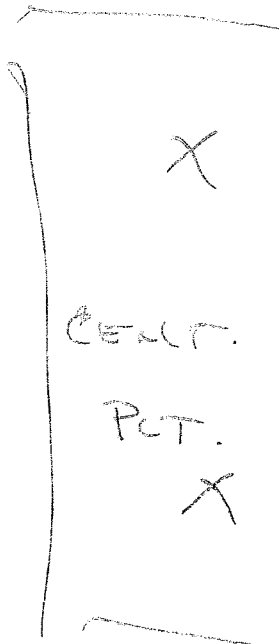
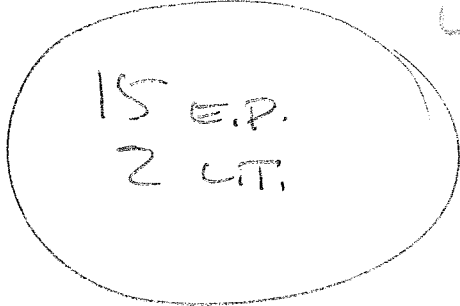
23A

14/ST

3/30/06

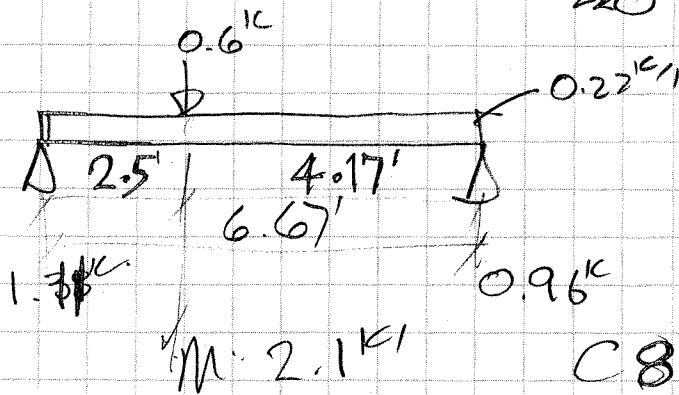
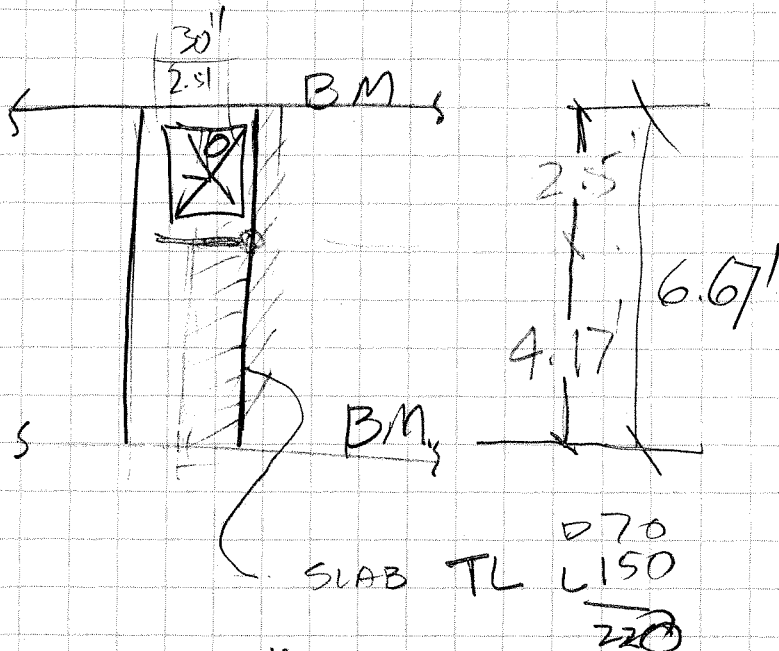


LOCATED AFTER 15 12 DRIVE



235

Framing @ SLAB OPNG



L 4 x 4 x 3/8

$$f_b = \frac{2.1 \times 12}{1.52} = 16.5 \text{ ksi} \checkmark$$

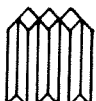
$$\Delta = 0.18" \text{ } \frac{1}{400} \text{ } \checkmark \text{ } \text{OK}$$



JLS

4-10-06

2/10



Seismic

$$S_{ms} = F_a S_s \quad 0.325 \quad S_s = 13 \quad i.g. \quad F_a = 2.5$$

$$S_{m1} = F_v S_1 \quad \frac{0.193}{0.193} \quad S_1 = 0.55 \quad i.g. \quad F_v = 3.5$$

site class E

$$S_{os} = \frac{2}{3} \times 0.325 = 0.$$

$$S_{D1} = \frac{4}{3} \times 0.193 = 0.117$$

JLS

4-20-06

237

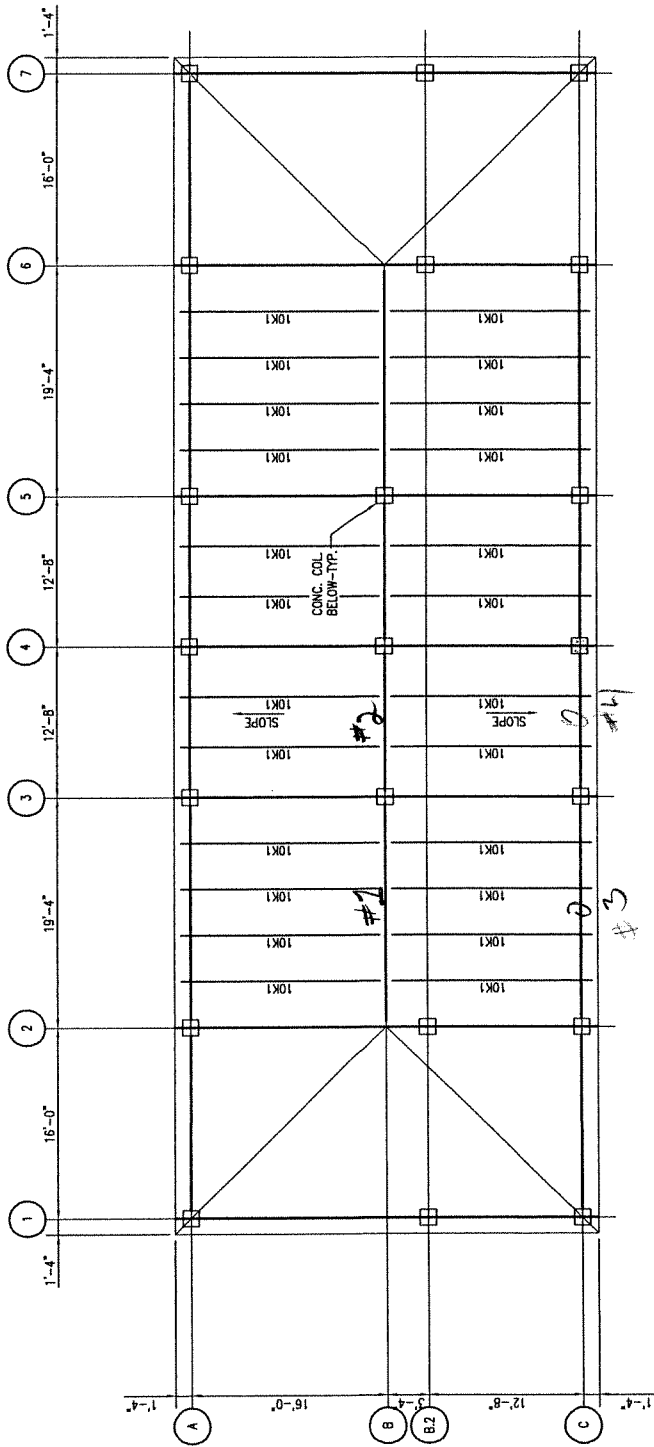


I-14 Central Plant Design

Prepared by:

Morphy, Makofsky, Inc.

(24 pages follow)



238

Loads

DL

STL	5	psf
MD	2	psf
INSUL	1	psf
METAL	2	psf
MISC	5	psf

$$DL = 15 \text{ psf}$$

$$D_{up} = 15 \times 1.05 = 15.8 \text{ psf}$$

$$LL_p = 20 \times 1.05 = 21.1 \text{ psf}$$

Wind

$$+ 18.5$$

$$- 38$$

$$D + L = 36.9 \text{ psf}$$

$$D + .75(21.1 + 18.5) = 45.5 \text{ psf}$$

$$.6D + W = 27.98$$

$$(45.5 \text{ psf})(4.5 \text{ ft}) = 205 \text{ plf}$$

uplift

$$.6D - W = .6(15.8) - (38) = -28.5 \text{ psf}$$

$$(28.5 \text{ psf})(4.5 \text{ ft}) = 128.25 \text{ use } 130 \text{ plf}$$



16 ft span

TL = 205 pld

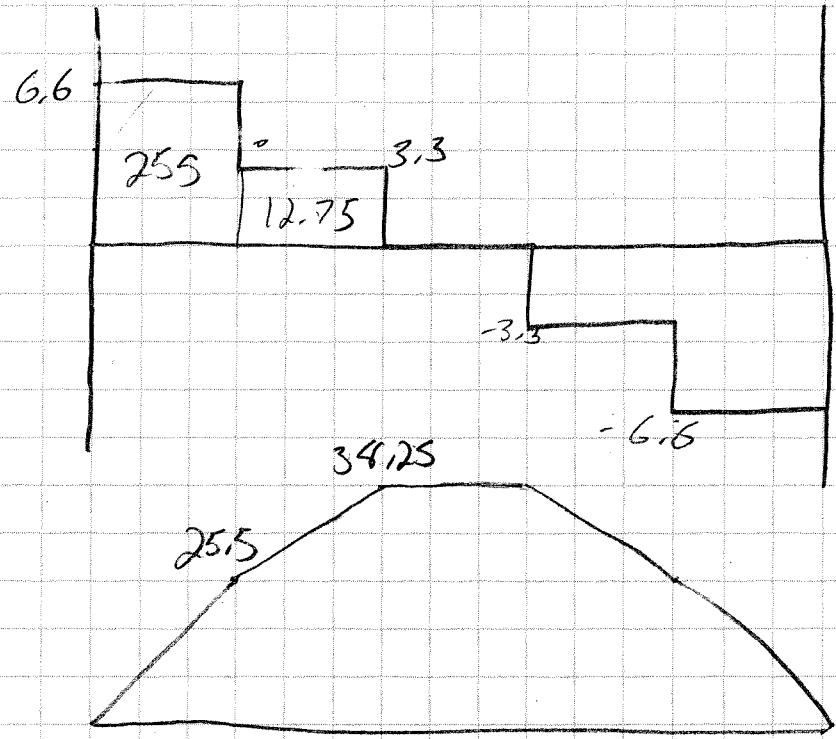
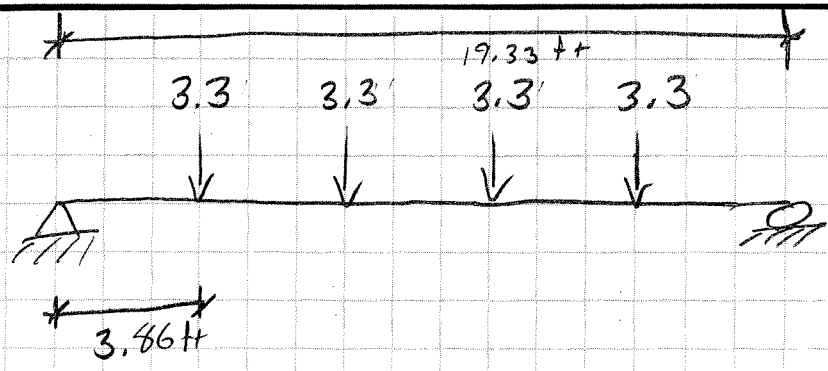
LL =

U_{sv} 10k1

240



Beam #1



$$S_x = \frac{(38.25/12)}{33} = 13.9 \quad 14 \text{ in}^3$$

Try W12x22

$$S_x = 25.4 \quad \frac{I}{240} = .96 \text{ in}$$

deflection

$$F_b = \frac{(38.25)(12)}{25.4} = 18.2 \text{ Ksi}$$

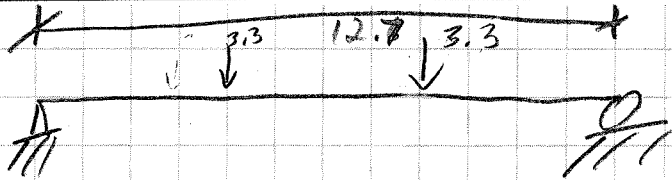
$$\Delta = \frac{(18.2)(19.33)^2}{12 \times 10^3} = .566 \text{ in}$$

ok

Use W12x22

241

#2 + #4



14.85 ft-kip

$$S_x = \frac{(15)(12)}{33} = 5.45$$

W12 x 14

$$S_x = 14.9 \text{ in}^3$$

$$\frac{(15)(12)}{14.9} = 12 \text{ ksi}$$

$$\Delta = \frac{(12)(12.7)^2}{12 \times 10^3} = .16$$

$$\frac{L}{240} = .63$$

W12 x 14

242



19.3 ft-kip

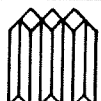
$$S_x = \frac{(19.3)(12)}{33} = 7.2$$

Try W12 x 14 $S_x = 14.9$

$$f_b = \frac{(19.3)(12)}{14.9} = 15.6$$

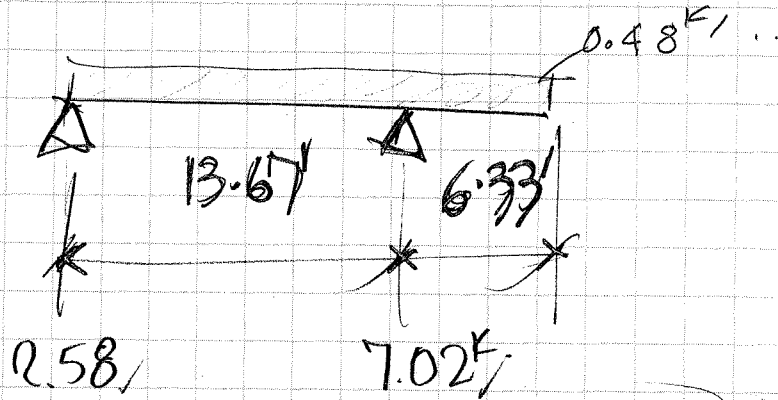
$$\Delta = \frac{(15.6)(19.33)^2}{12 \times 10^3} = .49$$

Use W12 x 14



287

Cooling tower support framing plan.



$$M_1 = 6.94 \text{ k-ft}$$

$$M_0 = 9.62 \text{ k-ft}$$

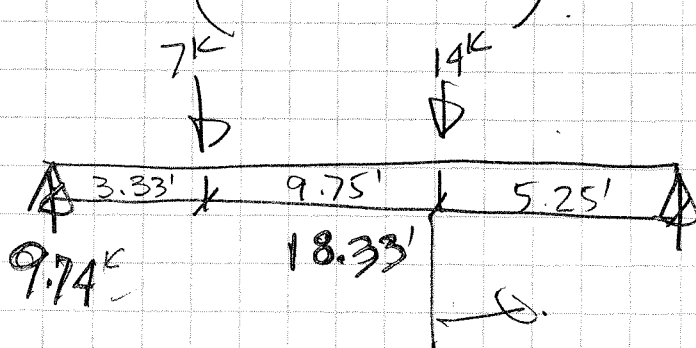
W12x40 $f_b = \frac{9.62 \times 12}{51.9}$

$$= 2.23 \text{ ksi} \quad 4.5 \text{ in.}$$

$$F_b = \frac{1 \times 10^3}{6.33 \times 2.9} = 54.5$$

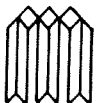
W12x30 $f_b = 3 \text{ ksi}$ $F_b = 36 \text{ OK} \Rightarrow 30 \text{ ksi}$ gowns

(if doubled) OK ✓



W14x43 $f_b = 11.3 \text{ ksi}$
 $F_b = 16.9 \text{ ksi}$
 $11.26 \text{ k} \cdot M = 59.1 \text{ k-ft}$
 W14x34 $f_b = 14.6 \text{ ksi}$
 $(18.33) \Rightarrow F_b = 11.9 \text{ ksi}$

JLS 4-20-06



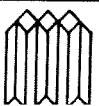
P-25^c



H-10-0

P6 STD
OK

245



2ND FLR SLAB

6" con
clg

75
5

DL

80

$\times 1.2 = 96$

LL

150

$\times 1.6 = 240$

336

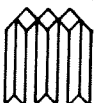
$18 \times 0.34 \times 10.67^2 = 4.84 \text{K}$

$A_{sreq} = \frac{4.84}{4 \times 4.75} = 0.25 \text{in}^2$

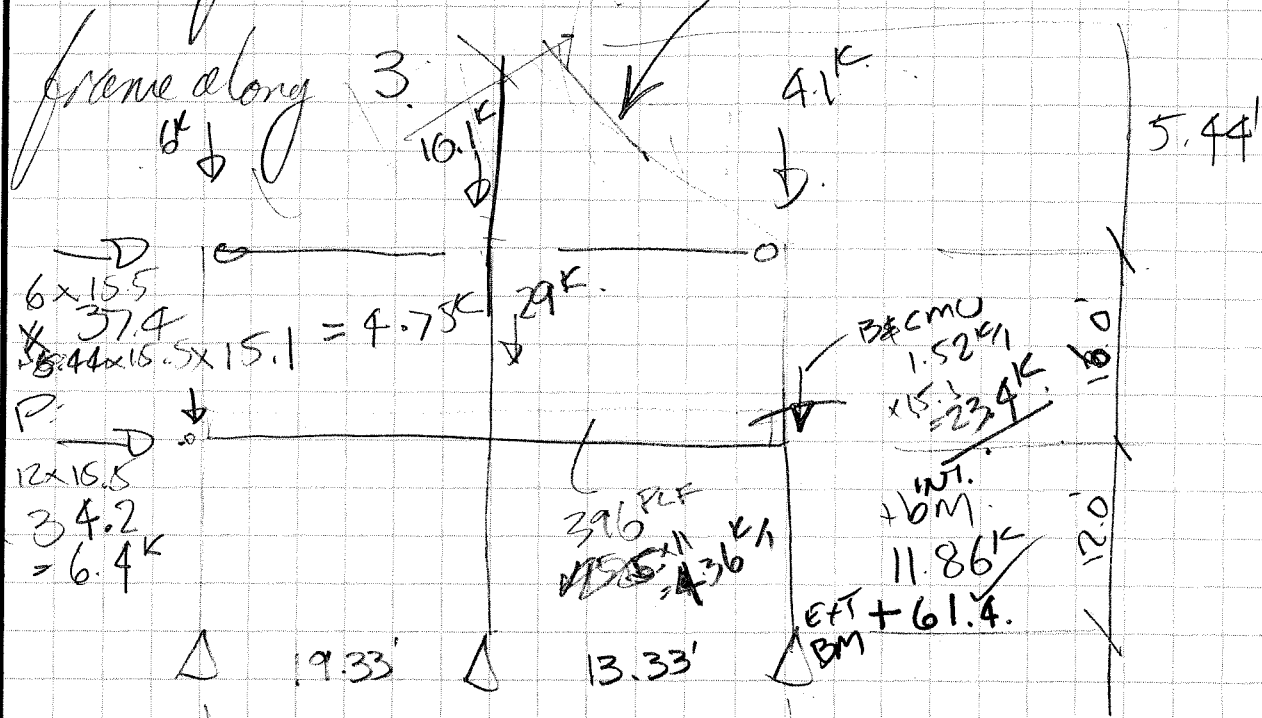
$\# 4 @ 10" = 0.24$

$\rightarrow \# 4 @ 9"$

240



Central plant



~
23.4
BM
+ 17.2

bay width - $\frac{18.33 + 12.67}{2} = 15.5$

6" SLAB.
BM'S
CLG

75'
50
5

Do not reduce
live load in
wind axis for
mech units.

DL	130	x 1.2	156
LL	150	x 1.6	240
	280		396

JLS	4-21-06	247
-----	---------	-----



Column.

$$P_m = 126^k$$

$$m = 66^k$$

24" x 24" core

8-#8 OK.

Bm's

$$M_w = 178^k$$

$$V_u = 49^k$$

$$A_{s req} = \frac{178}{4 \times 21} = 2.2''^2$$

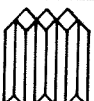
\Rightarrow 3-#8 & T#B

$$A_{s w} = 1.67''$$

$$\phi V_c = 0.75 \times 2 \sqrt{4000} \times 21 \times 24 = 478^k$$

\Rightarrow #4 @ 12
will
work

240



```

*****
*
*          STAAD.Pro          *
*          Version 2003      Bld 1002.US  *
*          Proprietary Program of        *
*          Research Engineers, Intl.      *
*          Date=    APR 21, 2006        *
*          Time=    8:23:33            *
*
*          USER ID: morphy makofsky inc  *
*****

```

1. STAAD PLANE
2. START JOB INFORMATION
3. JOB NAME JACKSON 141ST
4. JOB CLIENT BROAD/BLITCH
5. JOB NO 06018
6. ENGINEER NAME JLS
7. ENGINEER DATE 21-APR-06
8. END JOB INFORMATION
9. INPUT WIDTH 79
10. UNIT FEET KIP
11. JOINT COORDINATES
12. 1 0 0 0; 2 0 12 0; 3 0 28 0; 4 19.33 0 0; 5 19.33 12 0; 6 19.33 28 0
13. 7 32.66 0 0; 8 32.66 12 0; 9 32.66 28 0
14. MEMBER INCIDENCES
15. 1 1 2; 2 2 3; 3 4 5; 4 5 6; 5 7 8; 6 8 9; 7 2 5; 8 5 8; 9 3 6; 10 6 9
16. DEFINE MATERIAL START
17. ISOTROPIC CONCRETE
18. E 453600
19. POISSON 0.17
20. DENSITY 0.14999
21. ALPHA 5.5E-006
22. DAMP 0.05
23. ISOTROPIC STEEL
24. E 4.176E+006
25. POISSON 0.3
26. DENSITY 0.489024
27. ALPHA 6.5E-006
28. DAMP 0.03
29. END DEFINE MATERIAL
30. CONSTANTS
31. MATERIAL CONCRETE MEMB 1 TO 8
32. MATERIAL STEEL MEMB 9 10
33. MEMBER PROPERTY AMERICAN
34. 1 TO 8 PRIS YD 2 ZD 2
35. MEMBER PROPERTY AMERICAN
36. 9 10 TABLE ST W12X35
37. SUPPORTS
38. 1 4 7 PINNED
39. LOAD 1 DEAD LIVE
40. JOINT LOAD
41. 2 FY -40.6

249

STAAD PLANE

-- PAGE NO. 2

42. 5 FY -29
43. 8 FY -96.7
44. 3 FY -6
45. 6 FY -10.1
46. 9 FY -4.1
47. MEMBER LOAD
48. 7 8 UNI GY -4.36
49. LOAD 2 DEAD LIVE WIND
50. JOINT LOAD
51. 2 FY -40.6
52. 5 FY -29
53. 8 FY -35.3
54. 3 FY -6
55. 6 FY -10.1
56. 9 FY -4.1
57. 2 FX 6.4
58. 3 FX 4.8
59. MEMBER LOAD
60. 7 8 UNI GY -4.36
61. 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 = 9/ 10/ 3
ORIGINAL/FINAL BAND-WIDTH= 3/ 3/ 10 DOF
TOTAL PRIMARY LOAD CASES = 2, TOTAL DEGREES OF FREEDOM = 21
SIZE OF STIFFNESS MATRIX = 1 DOUBLE KILO-WORDS
REQRD/AVAIL. DISK SPACE = 12.0/ 24676.7 MB, EXMEM = 1585.5 MB

62. PRINT SUPPORT REACTION ALL

250

SUPPORT REACTIONS -UNIT KIP FEET STRUCTURE TYPE = PLANE

JOINT	LOAD	FORCE-X	FORCE-Y	FORCE-Z	MOM-X	MOM-Y	MOM Z
1	1	4.33	86.13	0.00	0.00	0.00	0.00
	2	1.40	81.54	0.00	0.00	0.00	0.00
4	1	-2.42	116.70	0.00	0.00	0.00	0.00
	2	-7.11	112.10	0.00	0.00	0.00	0.00
7	1	-1.91	126.07	0.00	0.00	0.00	0.00
	2	-5.49	73.86	0.00	0.00	0.00	0.00

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

63. PRINT MAXFORCE ENVELOPE NSECTION 24 LIST 1 TO 10

251

MEMBER FORCE ENVELOPE

ALL UNITS ARE KIP FEET

MAX AND MIN FORCE VALUES AMONGST ALL SECTION LOCATIONS

MEMB	FY/ FZ	DIST DIST	LD LD	MZ/ MY	DIST DIST	LD LD	FX	DIST	LD
1 MAX	-1.40	0.00	2	51.95	12.00	1			
	0.00	0.00	1	0.00	0.00	1	86.13 C	0.00	1
	MIN	-4.33	12.00	1	0.00	0.00	1		
	0.00	12.00	2	0.00	12.00	2	81.54 C	12.00	2
2 MAX	-1.77	0.00	2	0.85	16.00	1			
	0.00	0.00	1	0.00	0.00	1	6.02 C	0.00	1
	MIN	-2.63	16.00	1	-41.24	0.00	1		
	0.00	16.00	2	0.00	16.00	2	5.45 C	16.00	2
3 MAX	7.11	0.00	2	0.00	0.00	1			
	0.00	0.00	1	0.00	0.00	1	116.70 C	0.00	1
	MIN	2.42	12.00	1	-85.32	12.00	2		
	0.00	12.00	2	0.00	12.00	2	112.10 C	12.00	2
4 MAX	4.04	0.00	2	48.16	0.00	2			
	0.00	0.00	1	0.00	0.00	1	9.72 C	0.00	1
	MIN	1.50	16.00	1	-16.54	16.00	2		
	0.00	16.00	2	0.00	16.00	2	9.08 C	16.00	2
5 MAX	5.49	0.00	2	0.00	0.00	2			
	0.00	0.00	1	0.00	0.00	1	126.07 C	0.00	1
	MIN	1.91	12.00	1	-65.91	12.00	2		
	0.00	12.00	2	0.00	12.00	2	73.86 C	12.00	2
6 MAX	2.52	0.00	2	30.04	0.00	2			
	0.00	0.00	1	0.00	0.00	1	5.67 C	0.00	2
	MIN	1.13	16.00	1	-10.32	16.00	2		
	0.00	16.00	2	0.00	16.00	2	4.47 C	16.00	1
7 MAX	39.51	0.00	1	178.35	19.33	2			
	0.00	0.00	1	0.00	0.00	1	6.04 C	0.00	2
	MIN	-48.79	19.33	2	-94.65	8.05	2		
	0.00	19.33	2	0.00	19.33	2	1.70 C	19.33	1
8 MAX	33.21	0.00	1	95.95	13.33	2			
	0.00	0.00	1	0.00	0.00	1	2.97 C	0.00	2
	MIN	-32.89	13.33	2	-32.36	7.78	1		
	0.00	13.33	2	0.00	13.33	2	0.78 C	13.33	1
9 MAX	0.02	0.00	1	5.98	19.33	2			
	0.00	0.00	1	0.00	0.00	1	6.57 C	0.00	2

252

STAAD PLANE -- PAGE NO. 5

MIN	-0.55	19.33	2	-4.66	0.00	2			
	0.00	19.33	2	0.00	19.33	2	2.63 C	19.33	1
10 MAX	-0.37	0.00	1	10.32	13.33	2			
	0.00	0.00	1	0.00	0.00	1	2.52 C	0.00	2
MIN	-1.57	13.33	2	-10.56	0.00	2			
	0.00	13.33	2	0.00	13.33	2	1.13 C	13.33	1

***** END OF FORCE ENVELOPE FROM INTERNAL STORAGE *****

64. PRINT JOINT DISPLACEMENTS ALL

259

JOINT DISPLACEMENT (INCH RADIANS) STRUCTURE TYPE = PLANE

JOINT	LOAD	X-TRANS	Y-TRANS	Z-TRANS	X-ROTAN	Y-ROTAN	Z-ROTAN
1	1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00009
	2	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00054
2	1	0.01058	-0.00684	0.00000	0.00000	0.00000	-0.00042
	2	0.08591	-0.00647	0.00000	0.00000	0.00000	-0.00071
3	1	0.02203	-0.00747	0.00000	0.00000	0.00000	0.00011
	2	0.16206	-0.00705	0.00000	0.00000	0.00000	-0.00021
4	1	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00016
	2	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00086
5	1	0.01036	-0.00926	0.00000	0.00000	0.00000	0.00012
	2	0.08514	-0.00890	0.00000	0.00000	0.00000	-0.00002
6	1	0.01999	-0.01029	0.00000	0.00000	0.00000	-0.00011
	2	0.15696	-0.00986	0.00000	0.00000	0.00000	-0.00043
7	1	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00014
	2	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00080
8	1	0.01029	-0.01001	0.00000	0.00000	0.00000	0.00008
	2	0.08488	-0.00586	0.00000	0.00000	0.00000	-0.00015
9	1	0.01938	-0.01048	0.00000	0.00000	0.00000	-0.00009
	2	0.15561	-0.00646	0.00000	0.00000	0.00000	-0.00041

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

65. PRINT SECTION MAX DISPL NSECT 12 LIST 1 TO 10

254

MAX MEMBER SECTION DISPLACEMENTS

UNIT= INCH FOR FPS AND CM FOR METRIC/SI SYSTEM

MEMBER	MAX DISP	LOCATION	LOAD	L/DISPL
1	0.00952	84.00	1	15124
2	0.01319	80.00	1	14557
3	0.01564	84.00	2	9209
4	0.01095	64.00	2	17530
5	0.01208	84.00	2	11921
6	0.00683	64.00	2	28106
7	0.05166	96.65	2	4490
8	0.00640	93.31	1	24987
9	0.01131	173.97	2	20517
10	0.00649	39.99	2	24665

***** END OF SECT DISPL RESULTS *****

66. FINISH

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

**** DATE= APR 21,2006 TIME= 8:23:34 ****

 * For questions on STAAD.Pro, please contact : *
 * By Email - North America : support@reiusa.com *
 * By Email - International : support@reiworld.com *
 * Tel. (USA) : 714-974-2500 ; Fax (USA) : 714-974-4771 *

255

Chiller Mech Central Plant

2ND

6" SLAB

BM'S

CLG

75

30

5

DL

110

LL

150

(use to approx pile cap)

TL

260 PSF

ROOF

STRUT DECK

INS. & ARCH. DECK

JST.

STL

2

3

5

5

DL

15

LL

20

35

EXT. WALL

BRICK 40

BLOCK 55

95 PSF

1-2 12'
2-Roof 12'

> 24'

w. 2.28%

JLS

4/5/06

256



col 3-B

$$A = 12.67 \times 16 = 203'0$$

$$P_{2 \times 12} = 203(35 + 260) = 59.9'0$$

+ 15'0

3-B

$$A = 16 \times (9.67 + 6.33) = 256'0$$

$$P_{2 \times 12} = 76'0$$

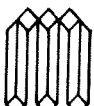
$$3PA = 46 \times 3 = 138'0 \text{ cap}$$

col 24" x 24" ok

JLS

4/5/06

257



3A

$$A = 9 \times 16 = 144'$$

$$P = 0.345 \times 144 + 16 \times 2.28 = 86'$$

1ST FLOOR

$$\frac{144 \times 0.013}{}$$

31k

3PA

~ 138k

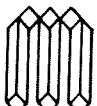
117k

→

JLS

4/5/06

258



1ST FLOOR

5" SUAB
BM

63
25

DL

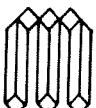
88

LL

125^{PSE} Light STORAGE

213^{PSE}

259



PLAZA.



5' SURB

Bm

63
25

DL

88

$\times 1.2$

106

LL

100

$\times 1.6$

160

TL 188

266

Bms @ 10.5'

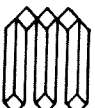
w. 2nd

⇒ Pile @ 25'-0" @ center.

LL3

4/10/06

260



Generator

- 38,000 #

Loik = 10,000 #

fuel diesel

$$12500 \text{ gal} \times 67 = 83750 \text{ #}$$

131,750 #

132K

JLS 4/21/06 261

