DESIMONE

Foundation Permit Submittal

Volume III – Tower Design

301 Mission Street
San Francisco, CA

Prepared for:

San Francisco Department of Building Inspection
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DeSimone Project #4069

May 24, 2005

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SECTION 8 – TOWER SUPERSTRUCTURE DESIGN

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8.1 Primary Shear Wall/ Outrigger System

8.1.1 Shear Walls

Load - Seismic load cases control the design of the shear walls. RSA analysis results are used to obtain seismic (E) forces. Gravity loads are calculated by hand and are shown in spreadsheet format. Load combos are per UBC 1612.2.1, with equation 12-6 controlling for all walls.

Vertical Steel Design - The tower's main concrete core is broken into 4 parts. The rectangular walls on the north and south side are designed as a single piece. This methodology assumes plain section remains plain for the whole rectangular shape and is justified by looking at the shell stress distributions for the rectangular core. The two walls on the east and west, connecting the north and south rectangular walls, are designed as separate straight walls. The ETABS pier definitions are set as required to extract the total force in the 4 parts. PCA column is used to determine the quantity and placement of vertical steel.

Horizontal Steel – Shear forces come directly from $V_U = V_E$ from ETABS. Pier definitions are set for each wall individually in order to extract design shears for each wall.

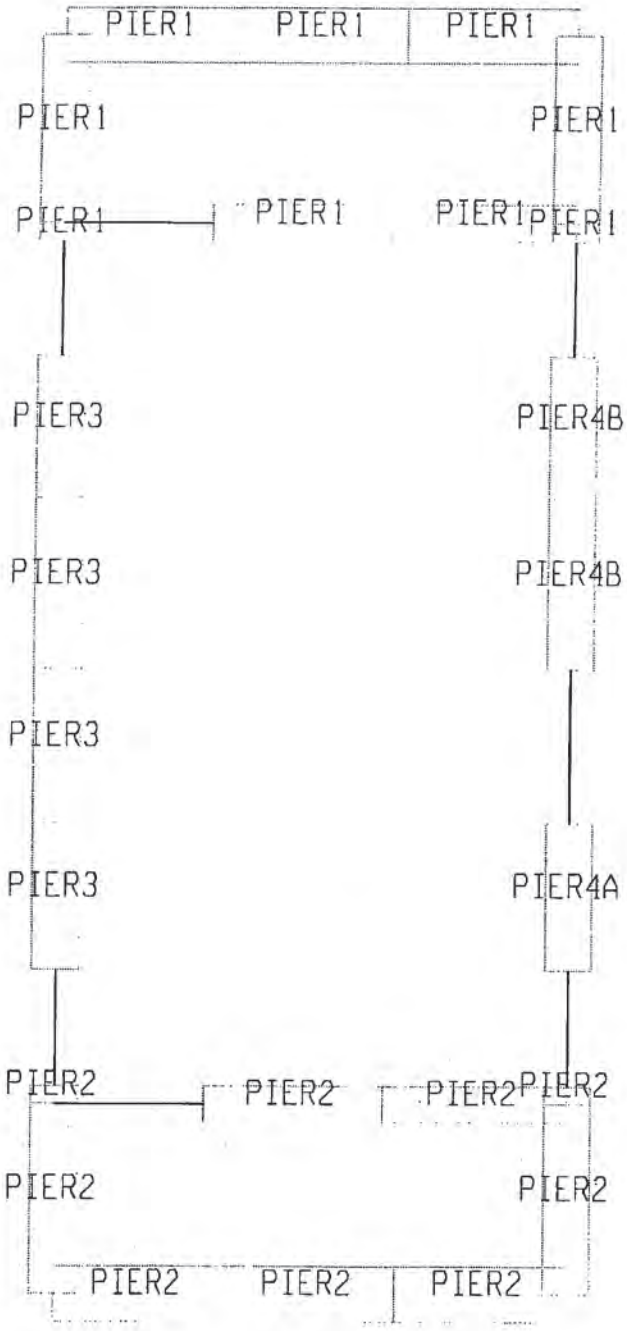
The excel spreadsheet shows calculations for the below ground walls (included in foundation permit) and above ground portion of the building (not included in foundation permit.)

Boundary Zone – UBC 1921.6.6.4 methodology was used for foundation permit boundary element length for walls from pile cap to ground level. 25% is the maximum length of boundary element required by code. Preliminary detailed analysis (similar to the methodology of UBC 1921.6.6.5) indicates that 30% boundary element length is required at the bottom of the tower and is therefore provided.

Per Jack Moehle of UC Berkeley, the shear reinforcing and confinement requirements do not have to be added in the boundary zone. Therefore the shear reinforcing can be counted as part of the required confining steel.

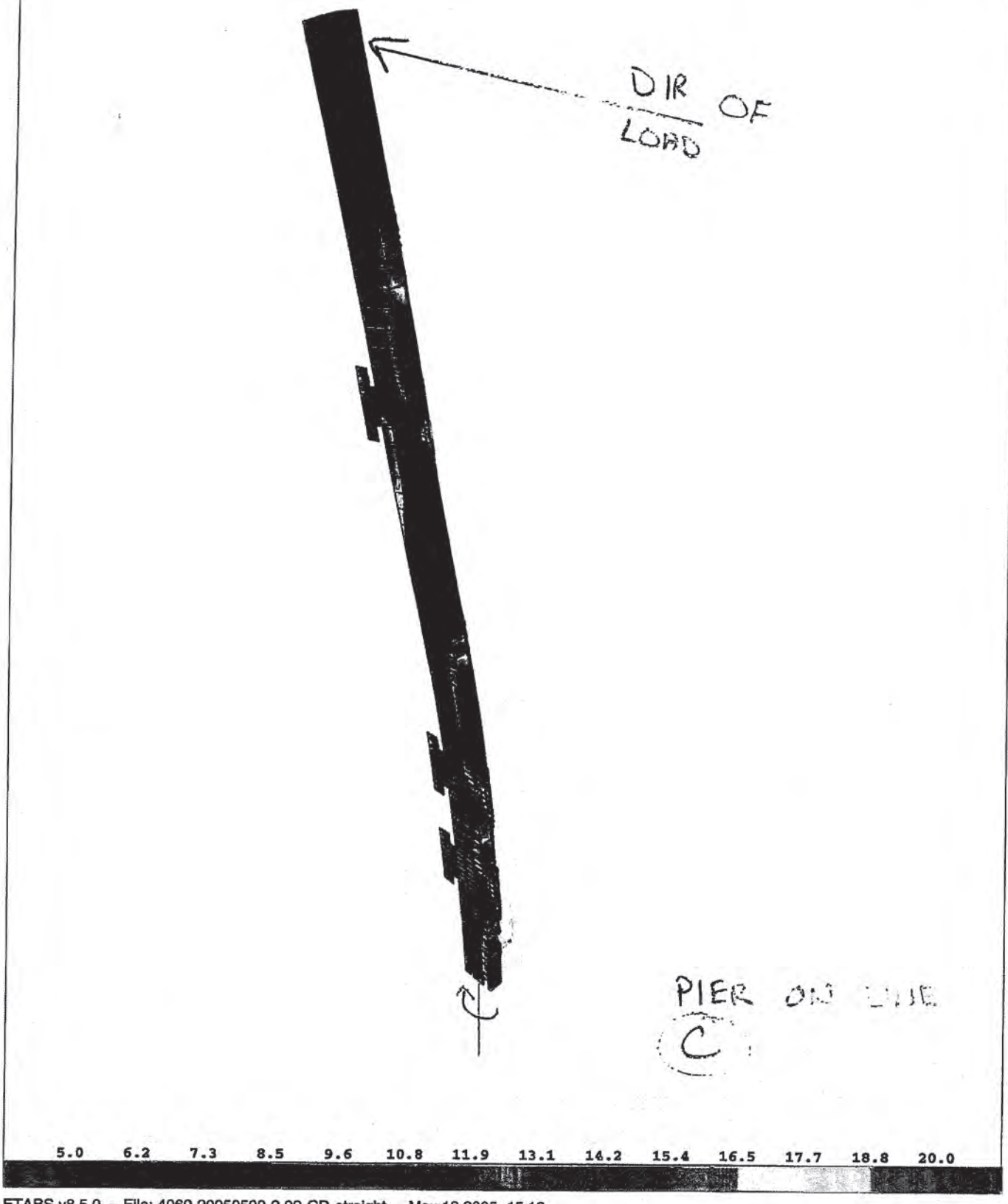
The excel spreadsheet shows calculations for the below ground walls (included in foundation permit) and above ground portion of the building (not included in foundation permit.)

PIER DEFINITION FOR VERTICAL STEEL DESIGN



ETABS

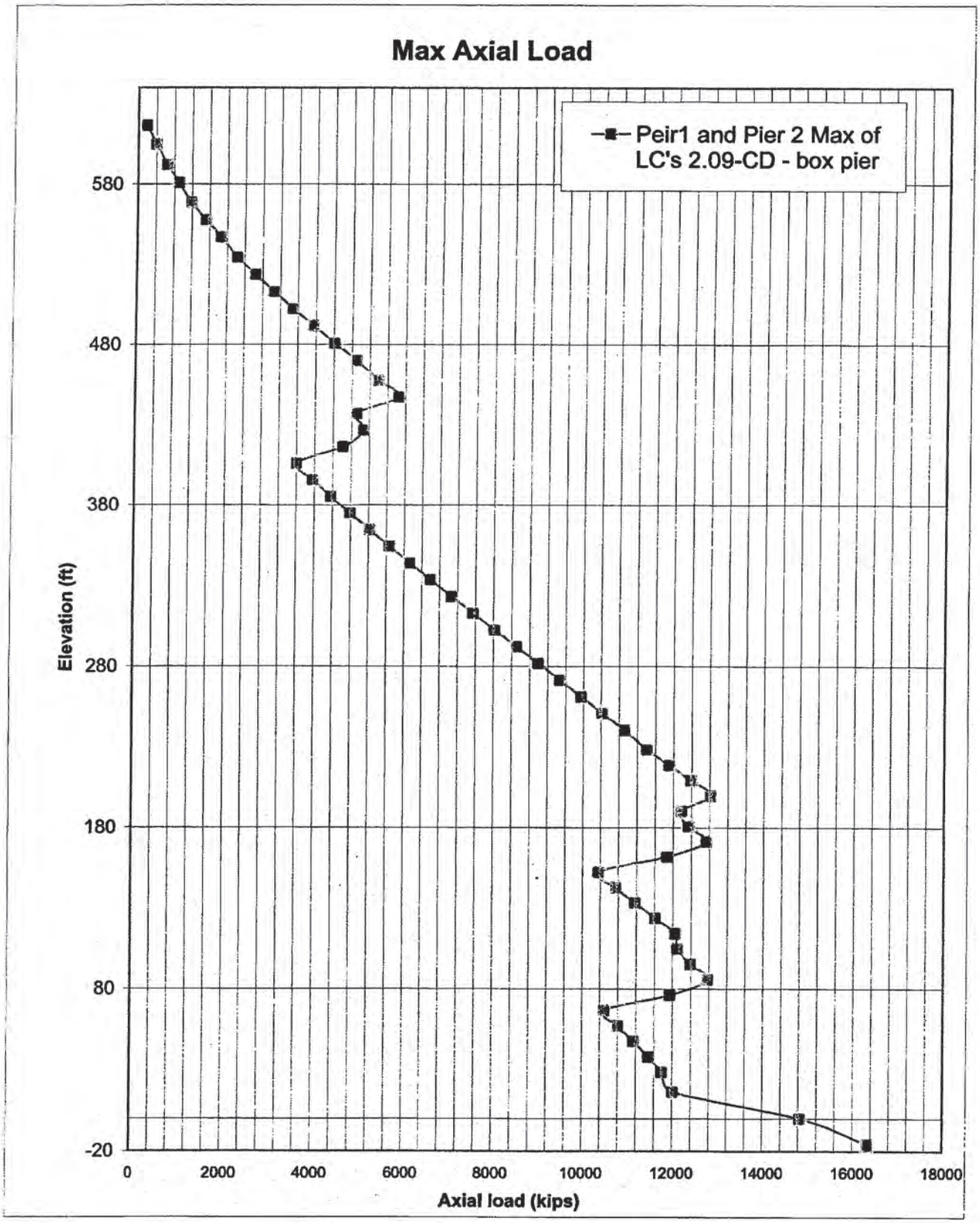
ENTIRE RECTANGULAR WALL ACTING AS ONE PIECE



ETABS v8.5.0 - File: 4069-20050509-2.09-CD-straight - May 12,2005 15:18
3-D View Resultant F22 Diagram (UBCX) - Kip-in Units

Q11-2

Print Date 5/9/2005



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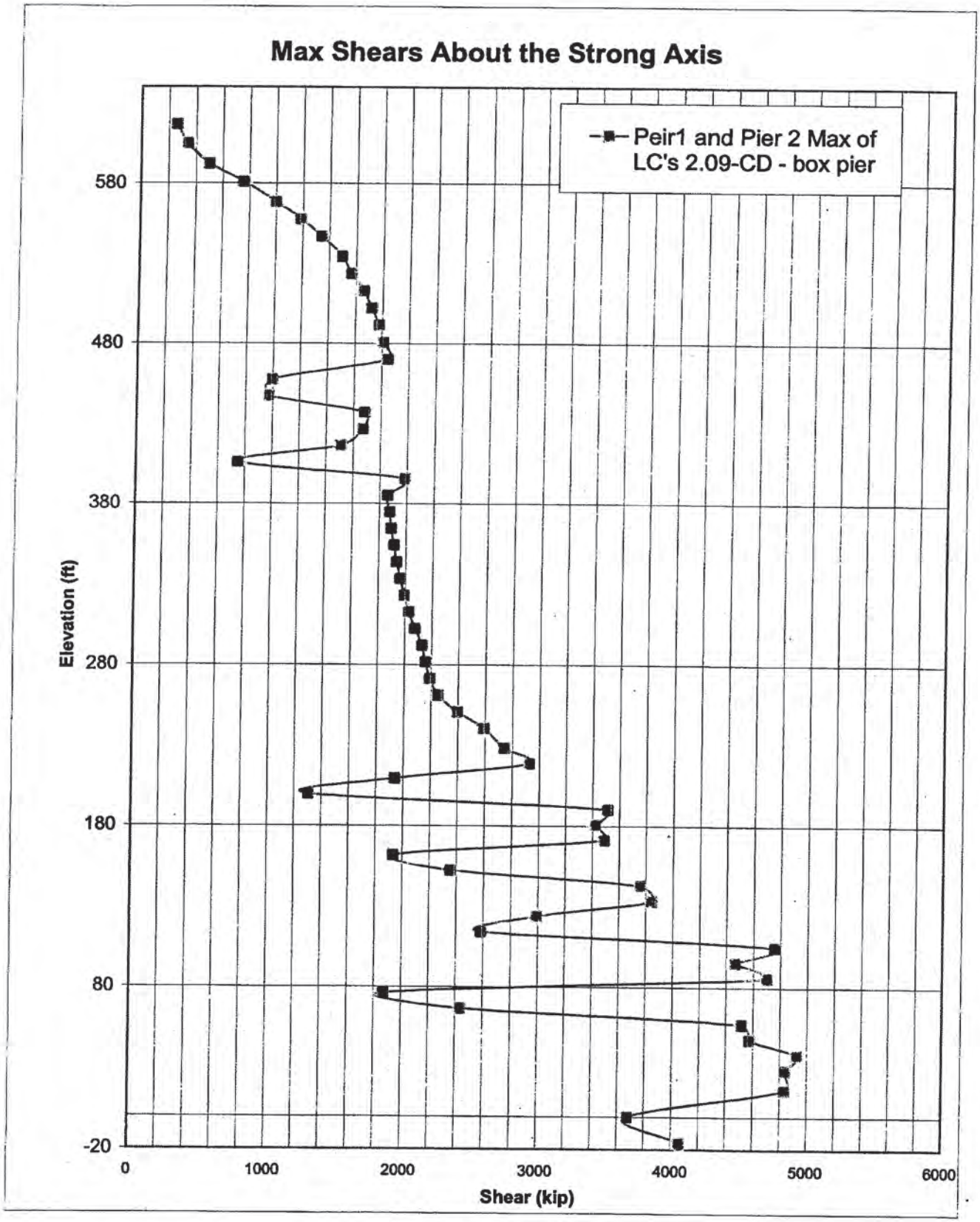
Print Date 5/9/2005



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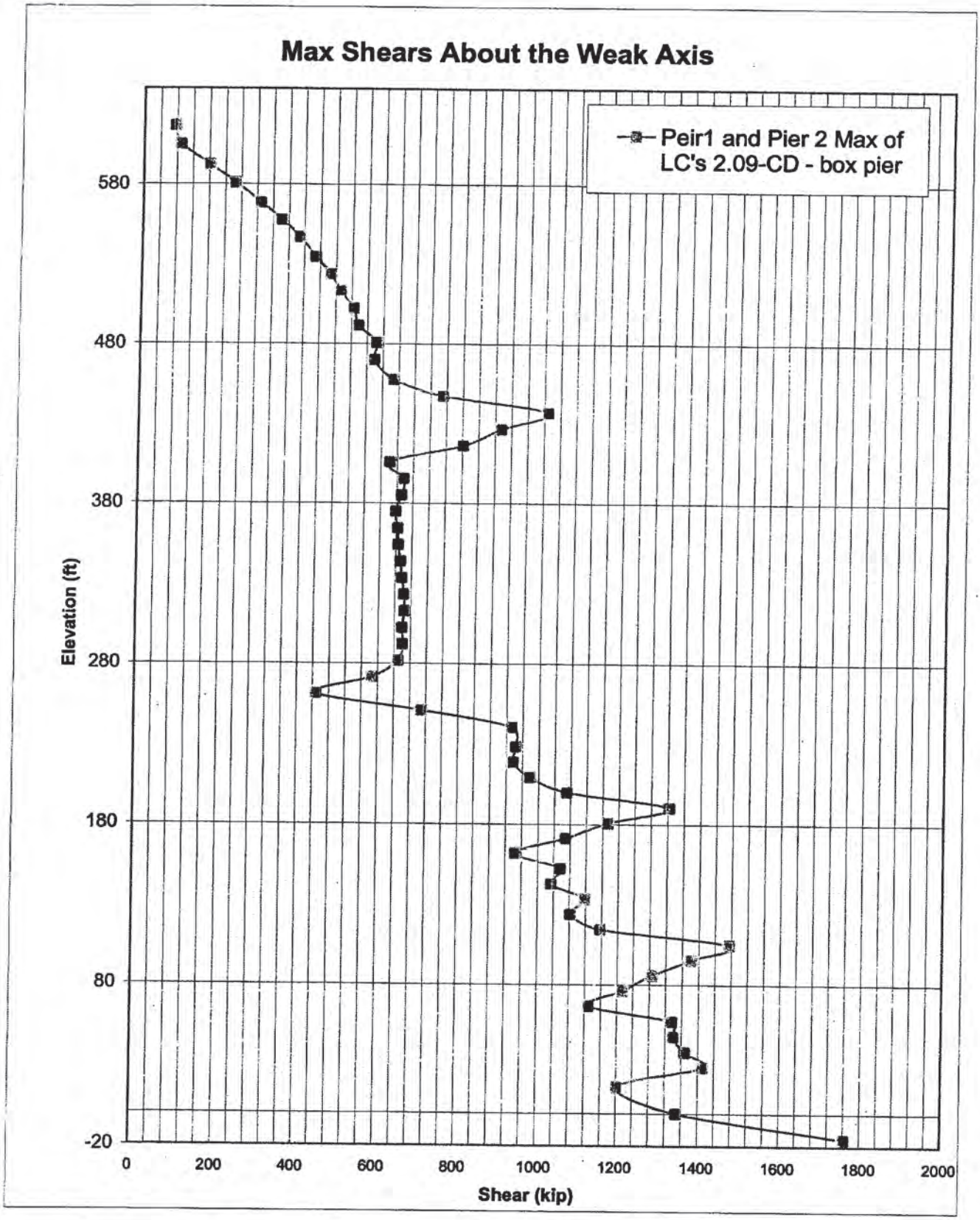

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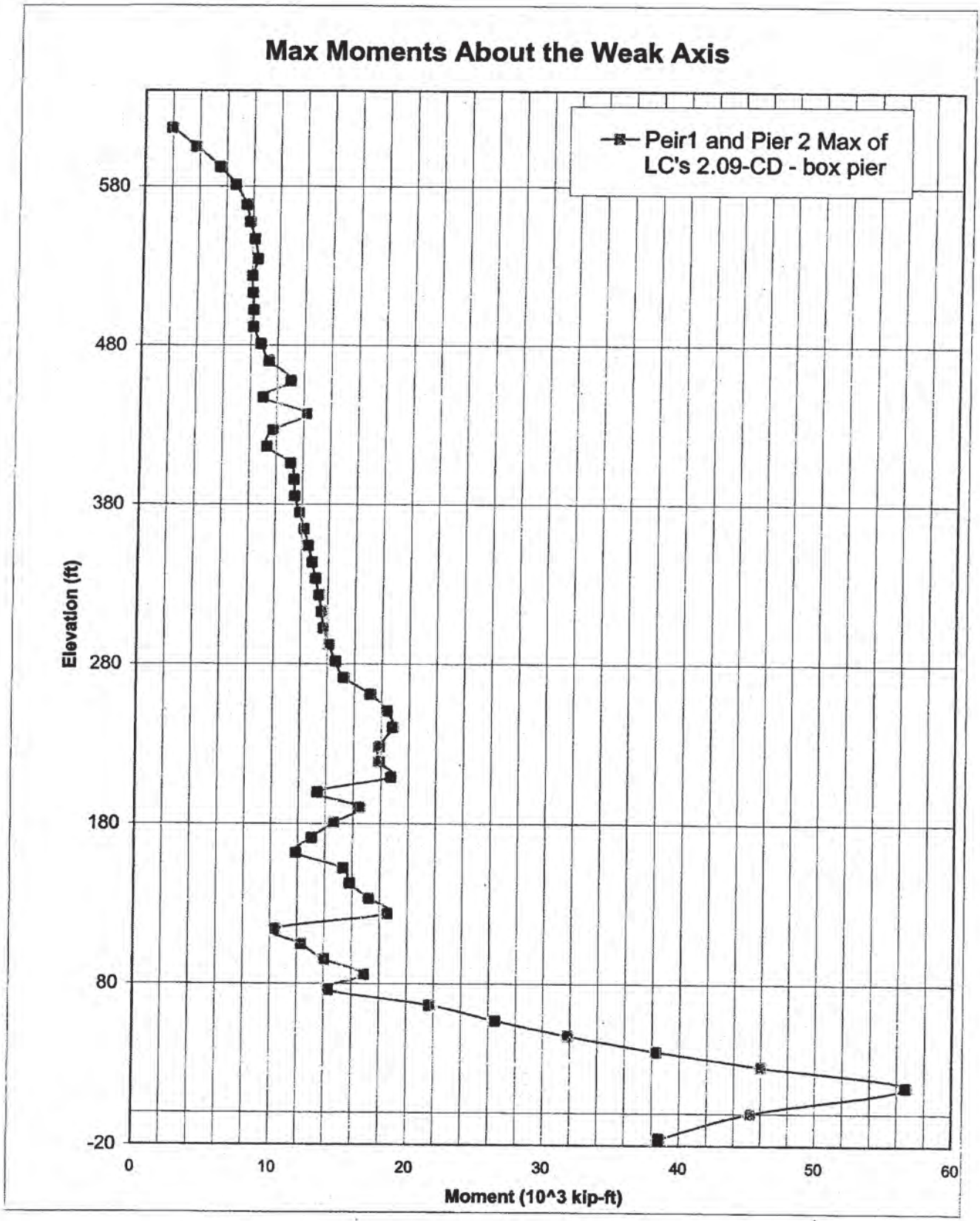
Print Date 5/9/2005



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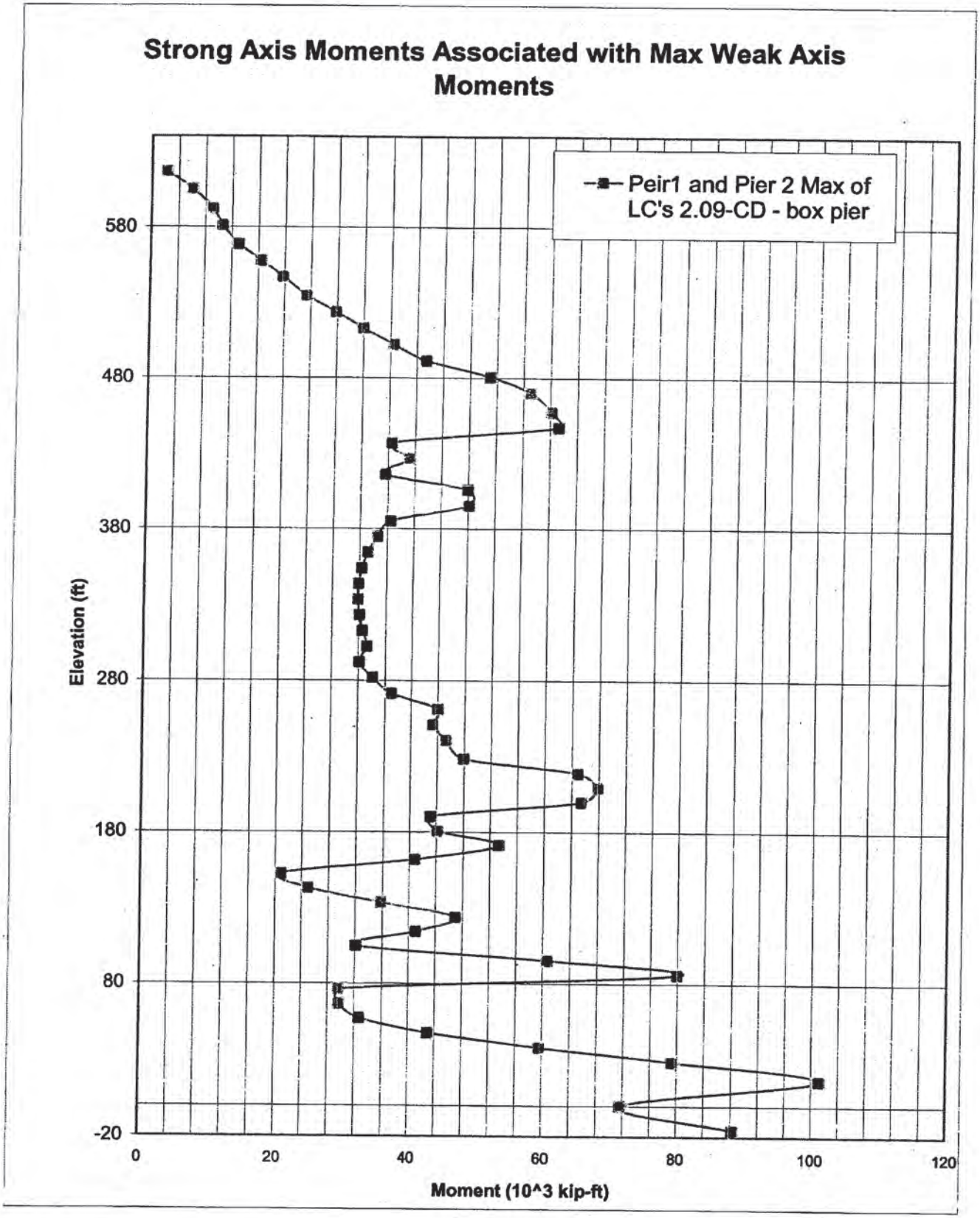

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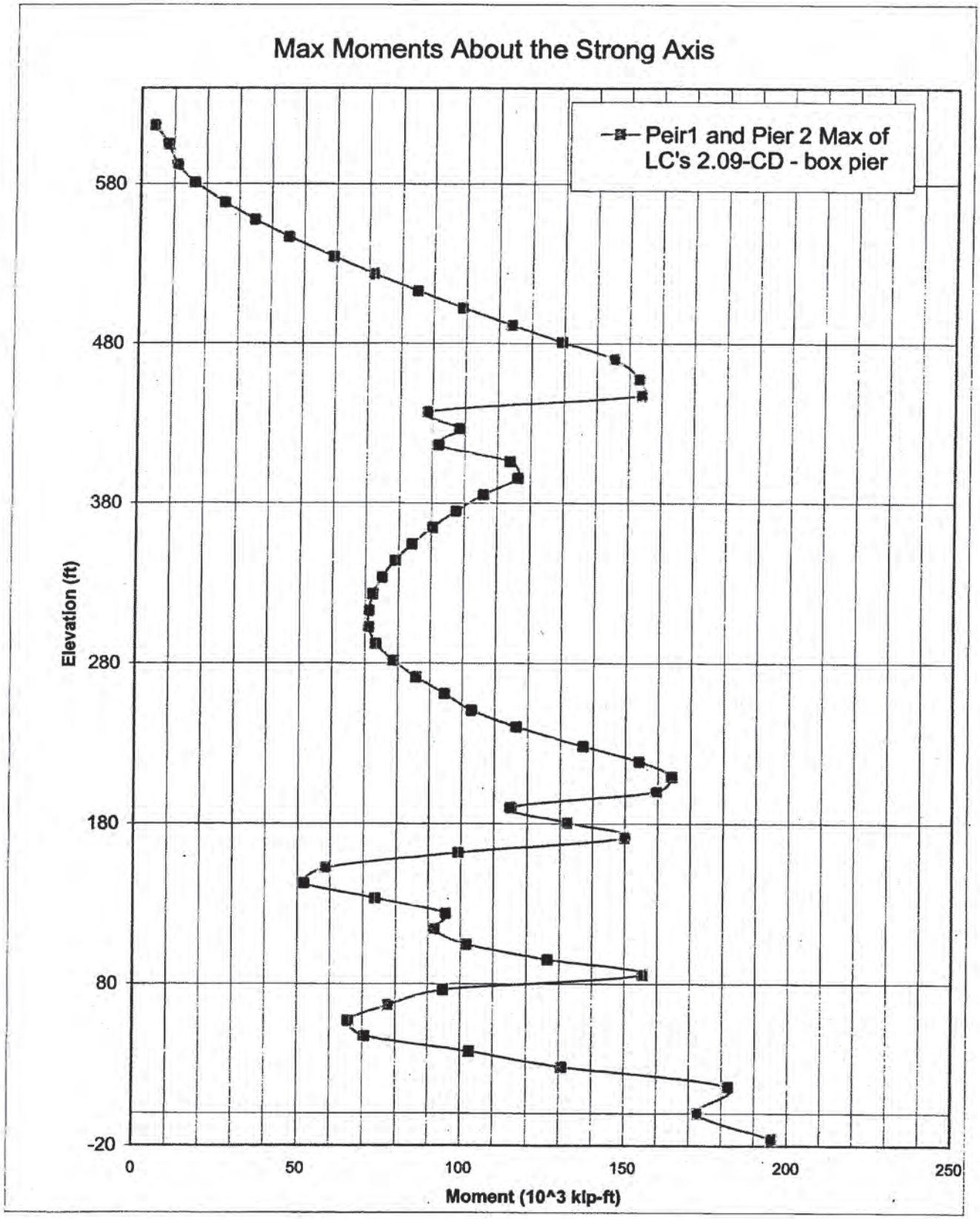

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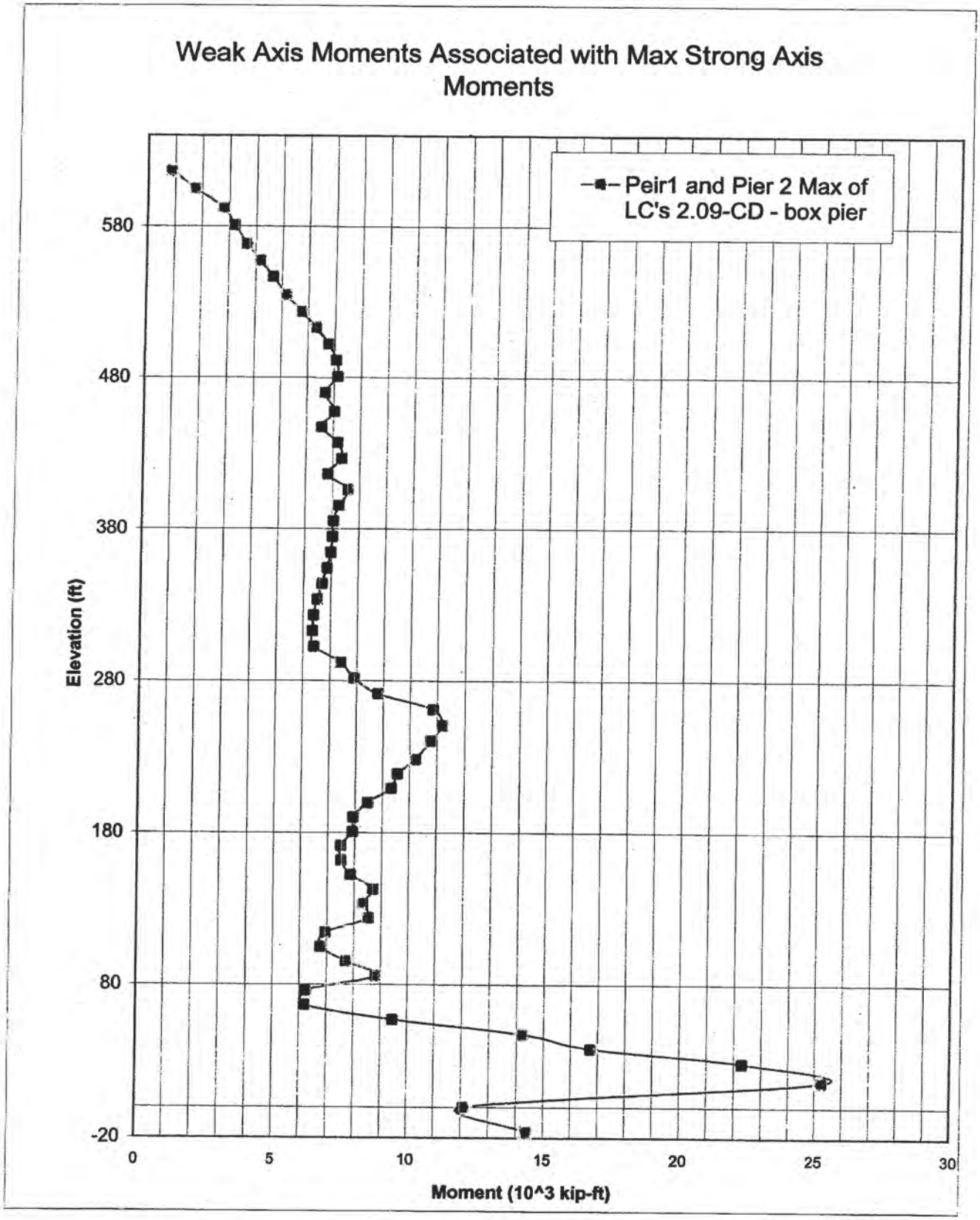
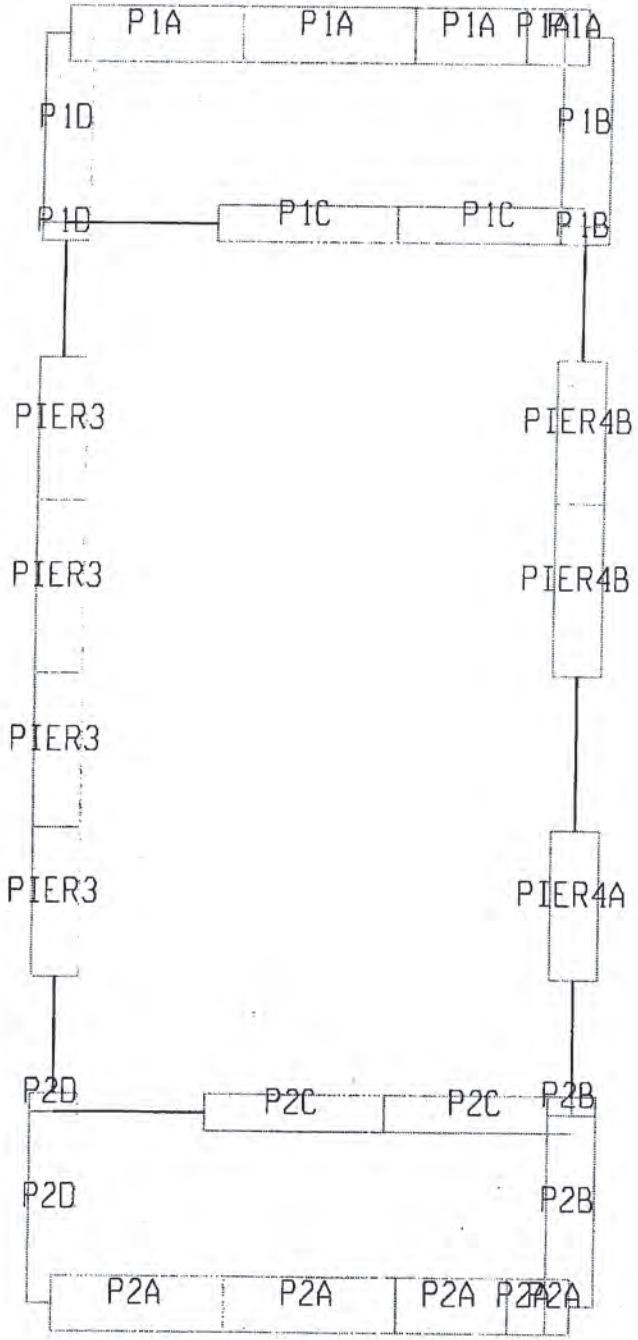


8.1.1-10

ETABS

Pier Definition For Shear And BE Steel Design



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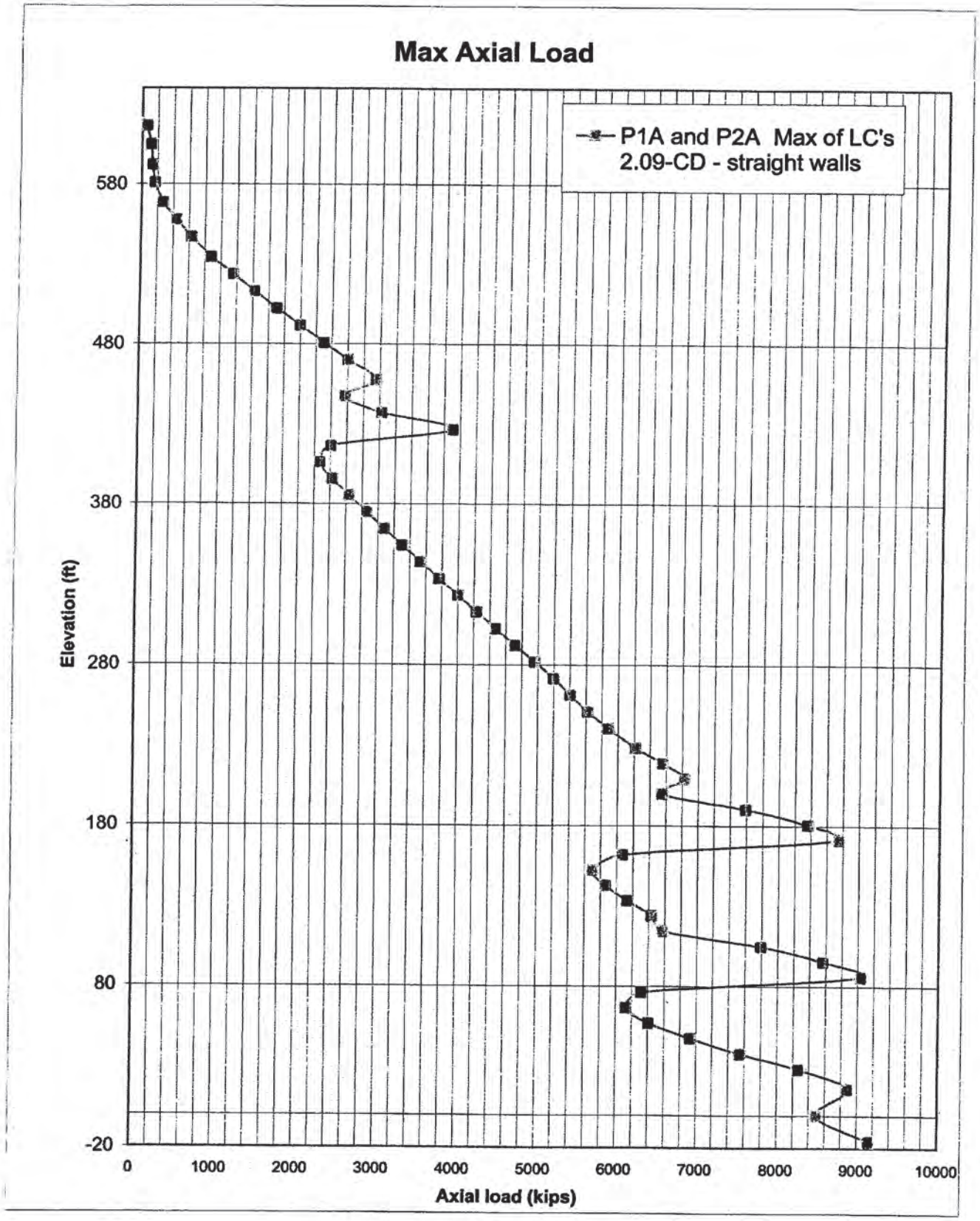
Plan View - 3 - Elevation 345 - Kip-in Units

8.11-11

Print Date 5/9/2005



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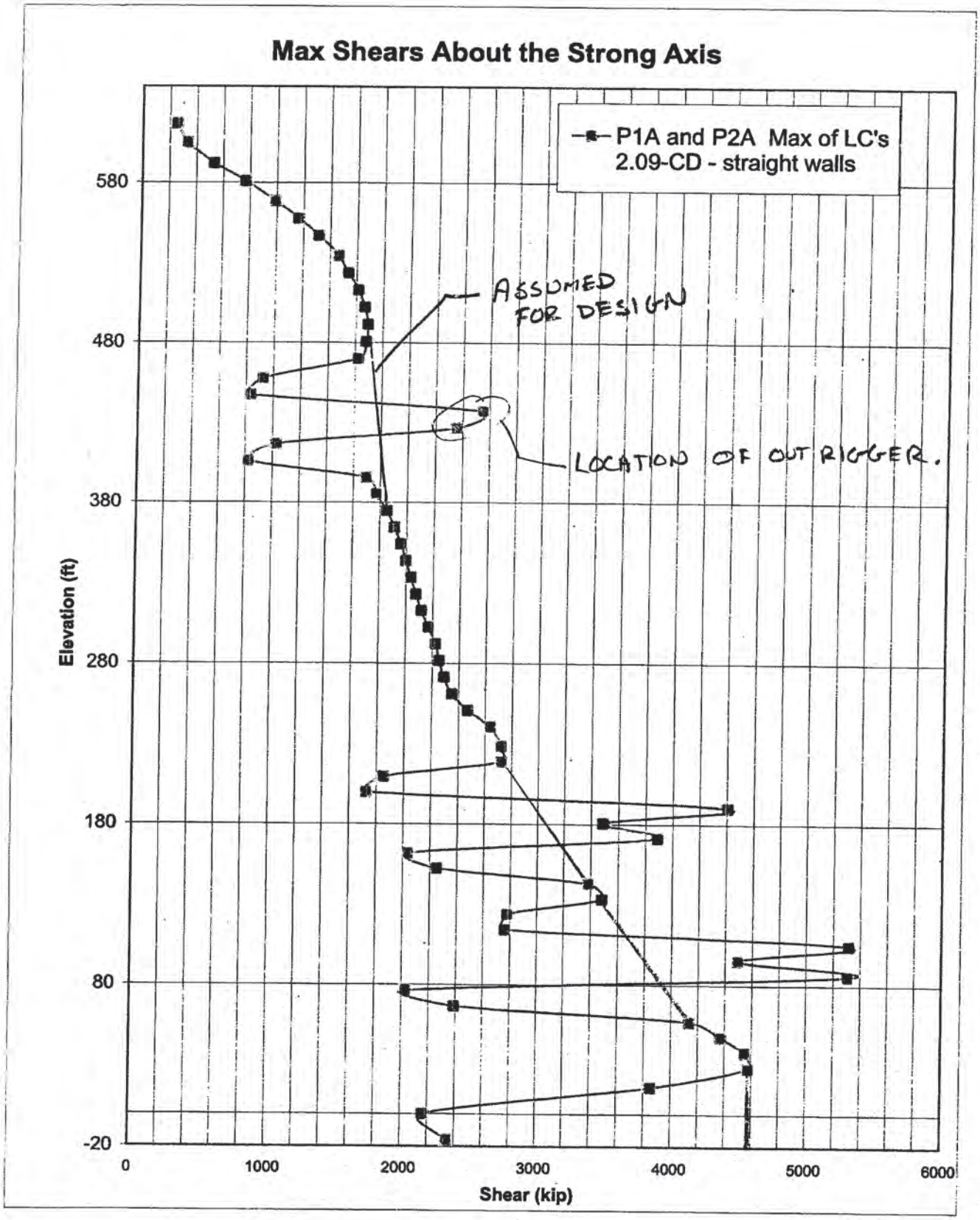

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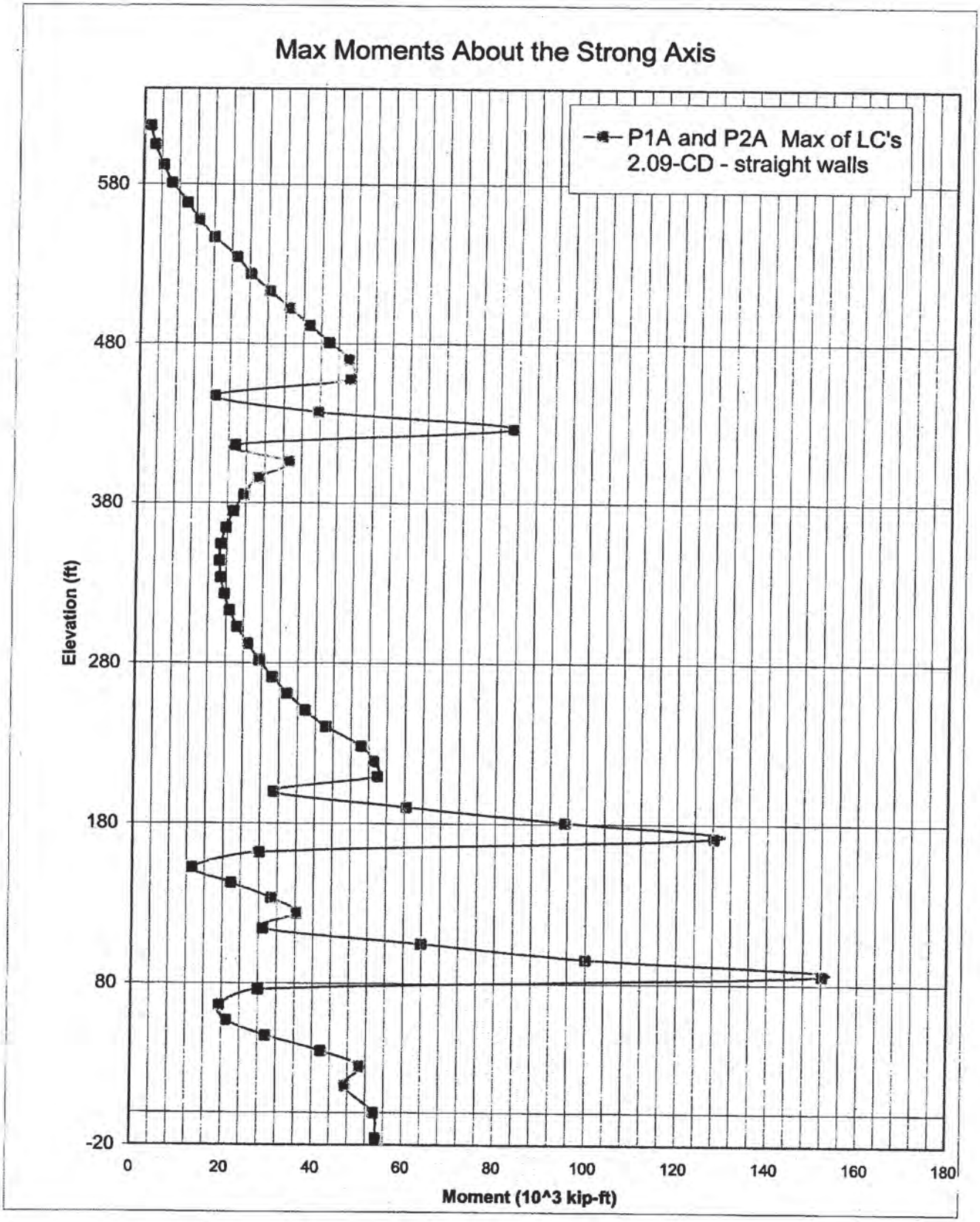

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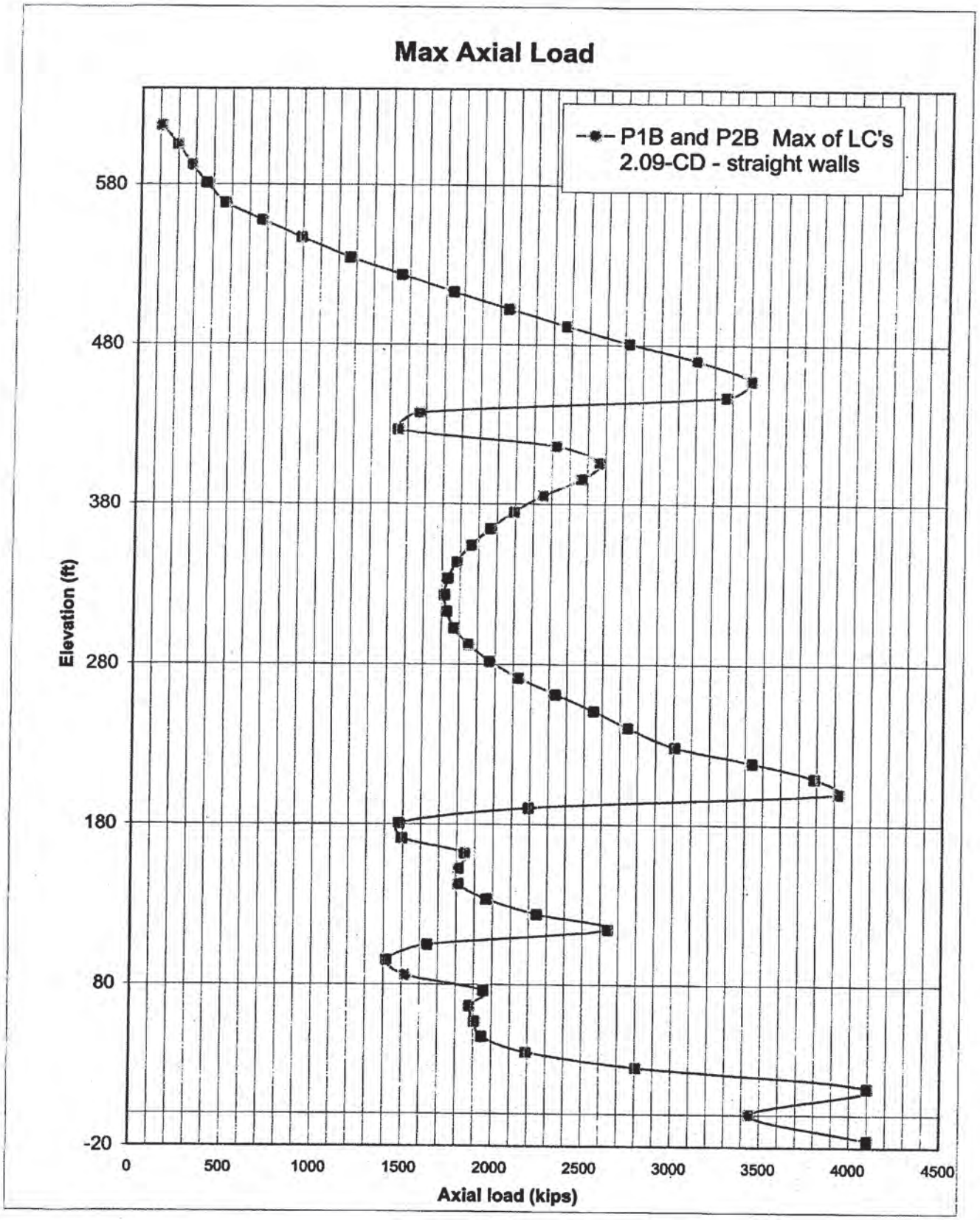

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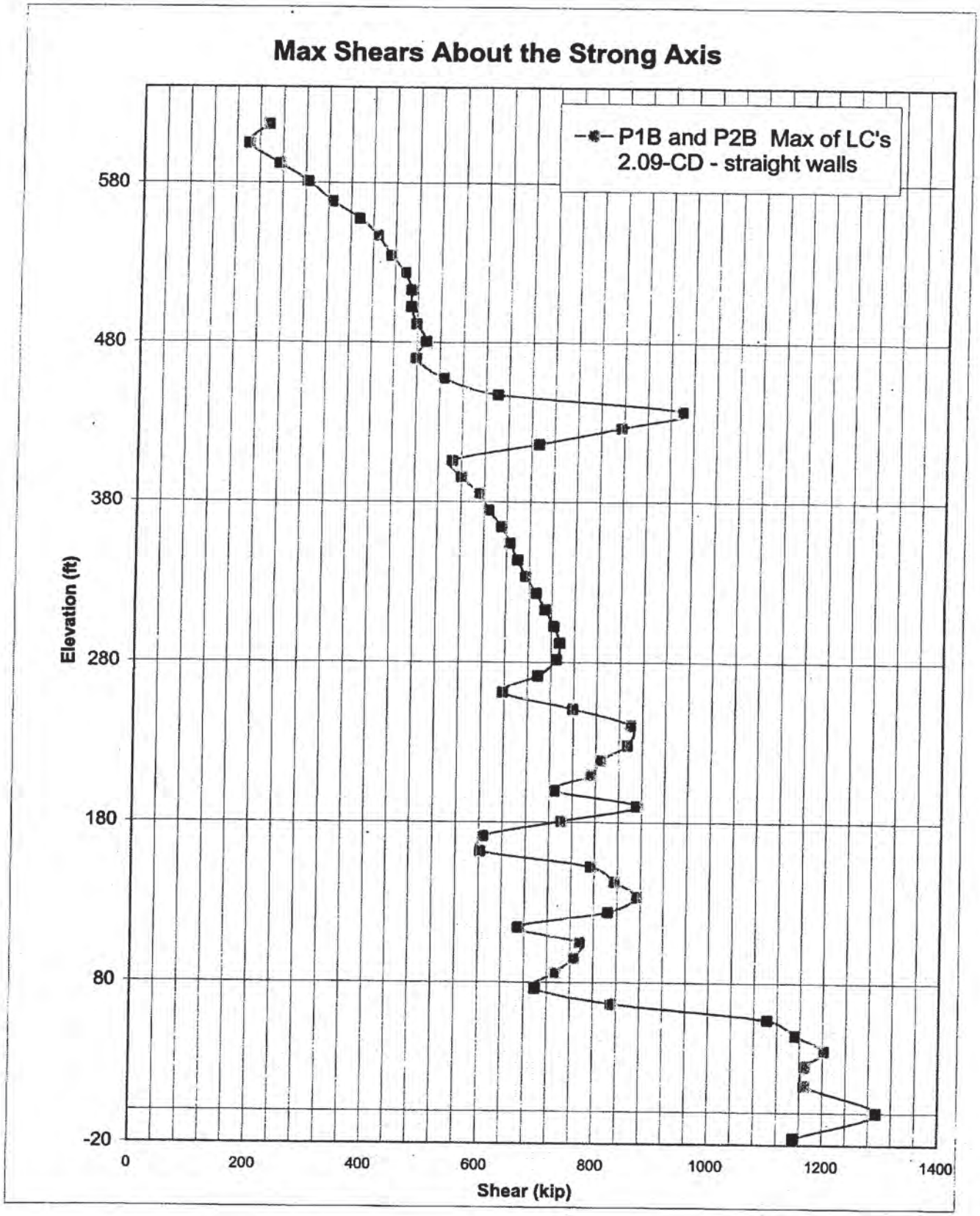

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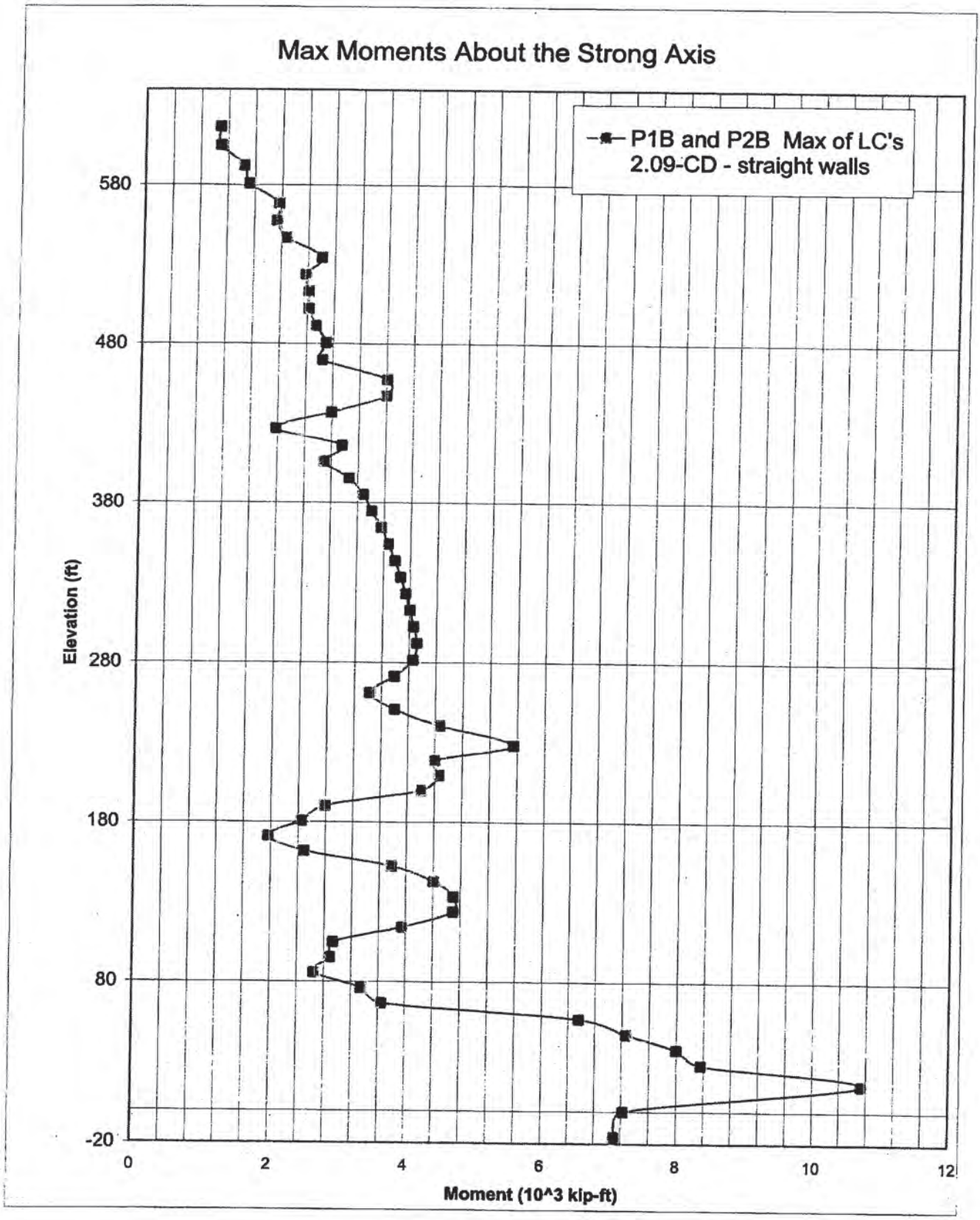

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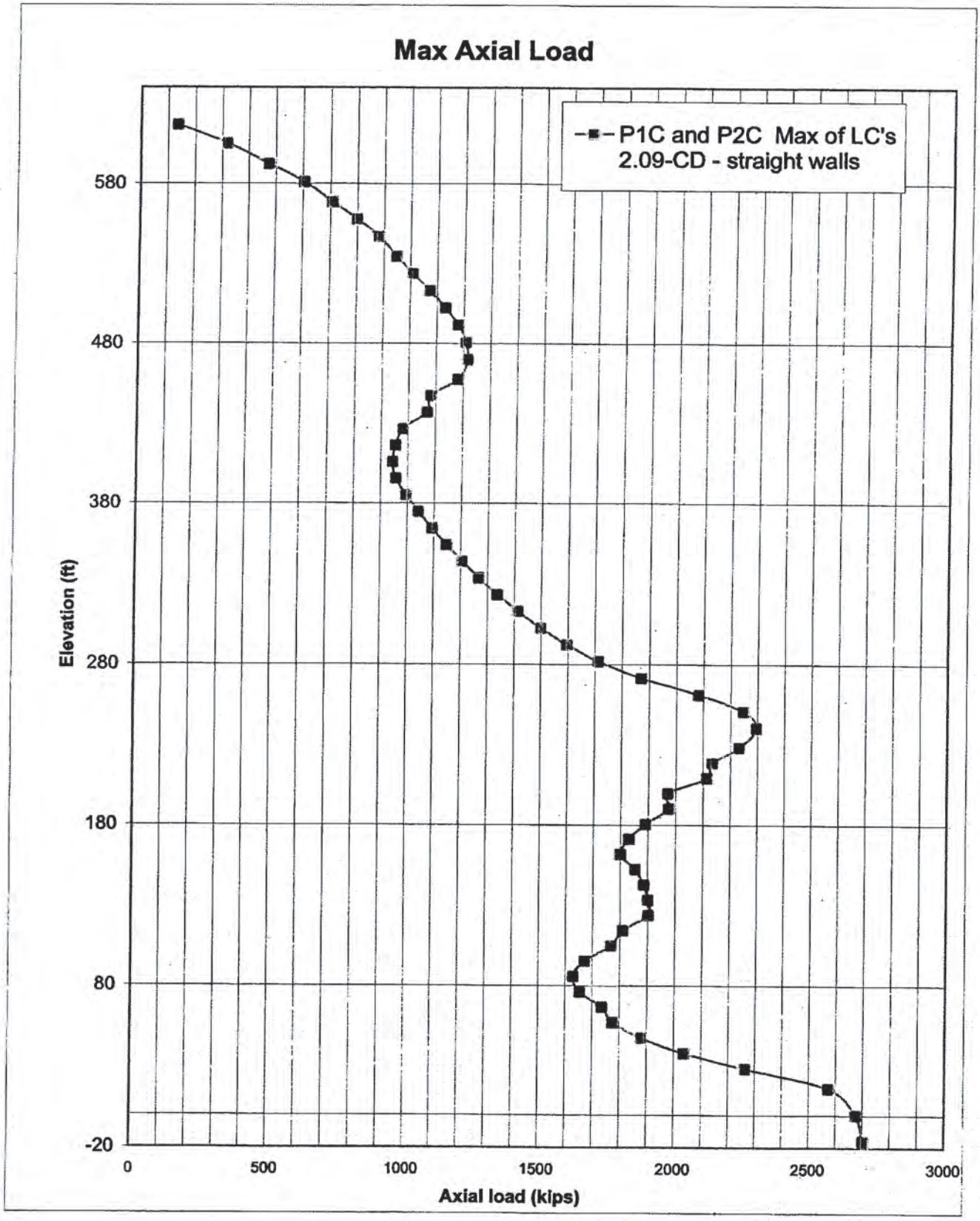

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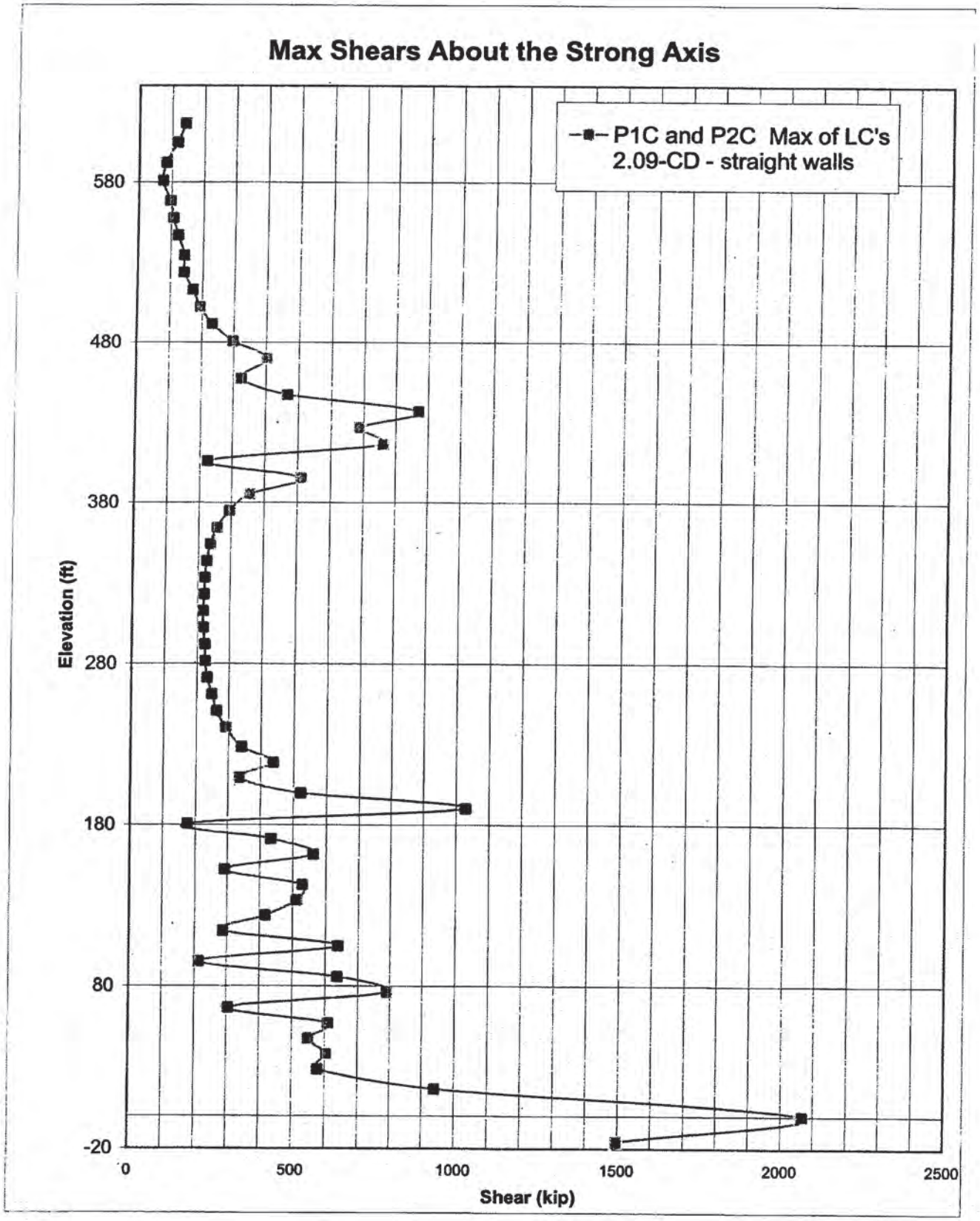

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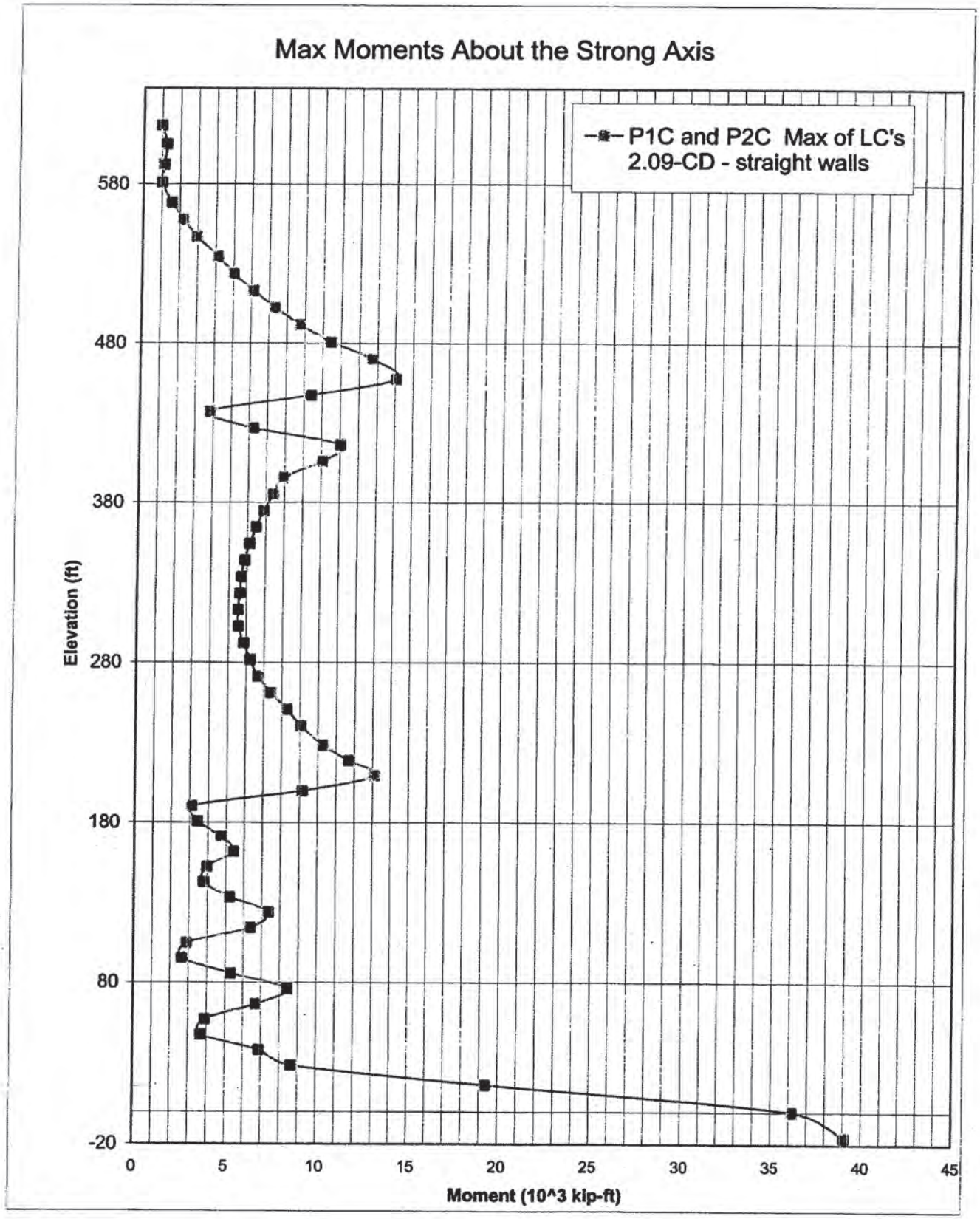

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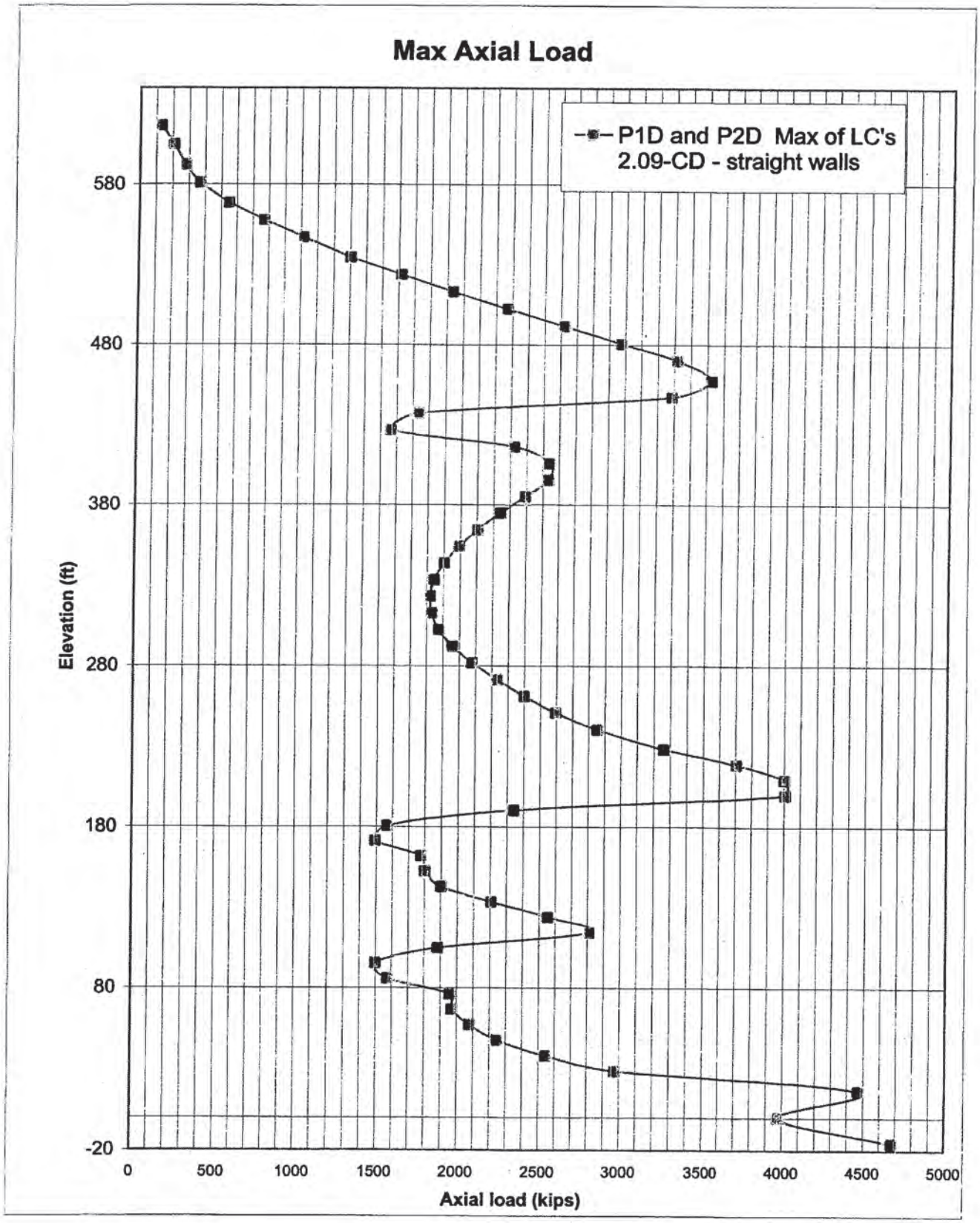

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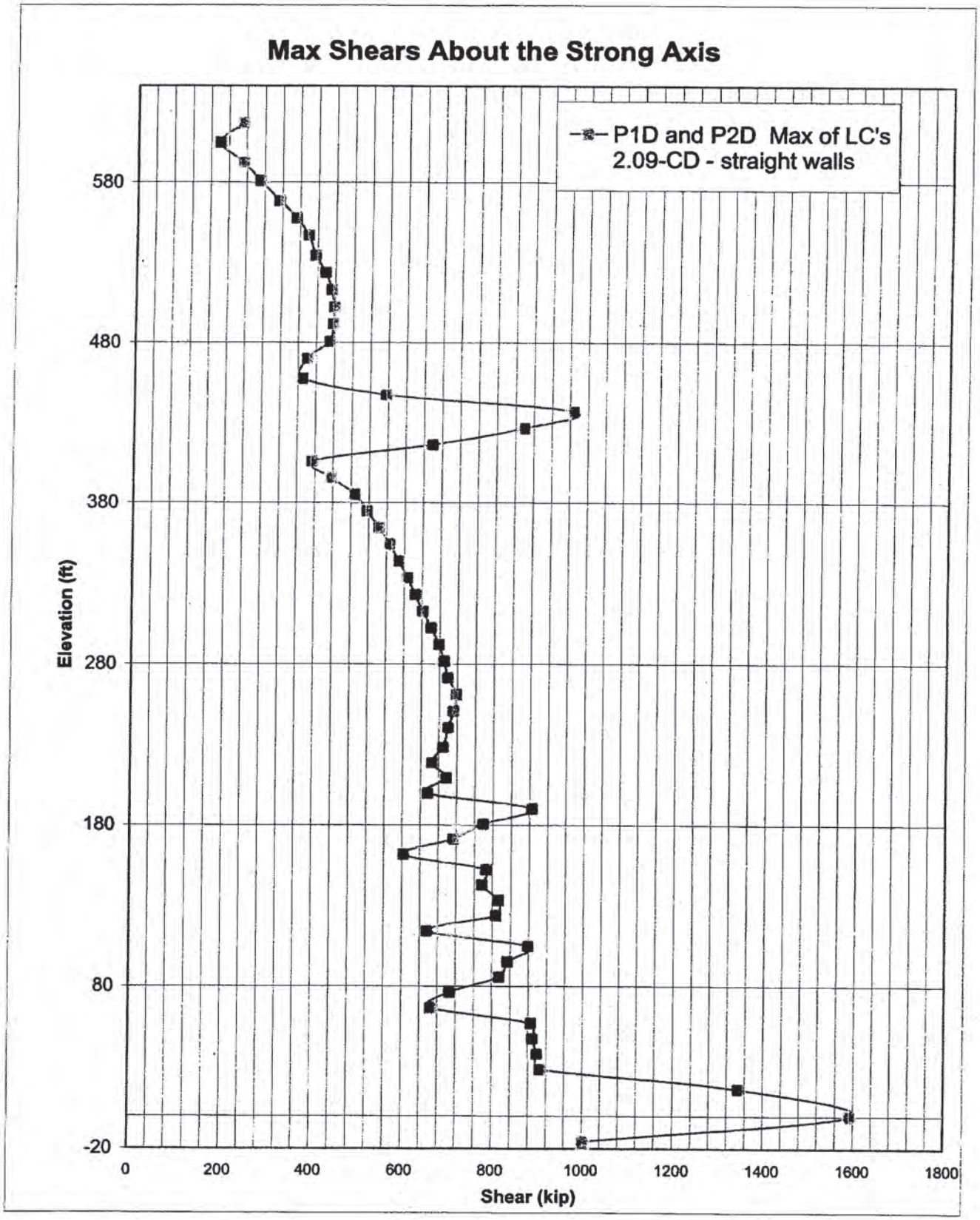

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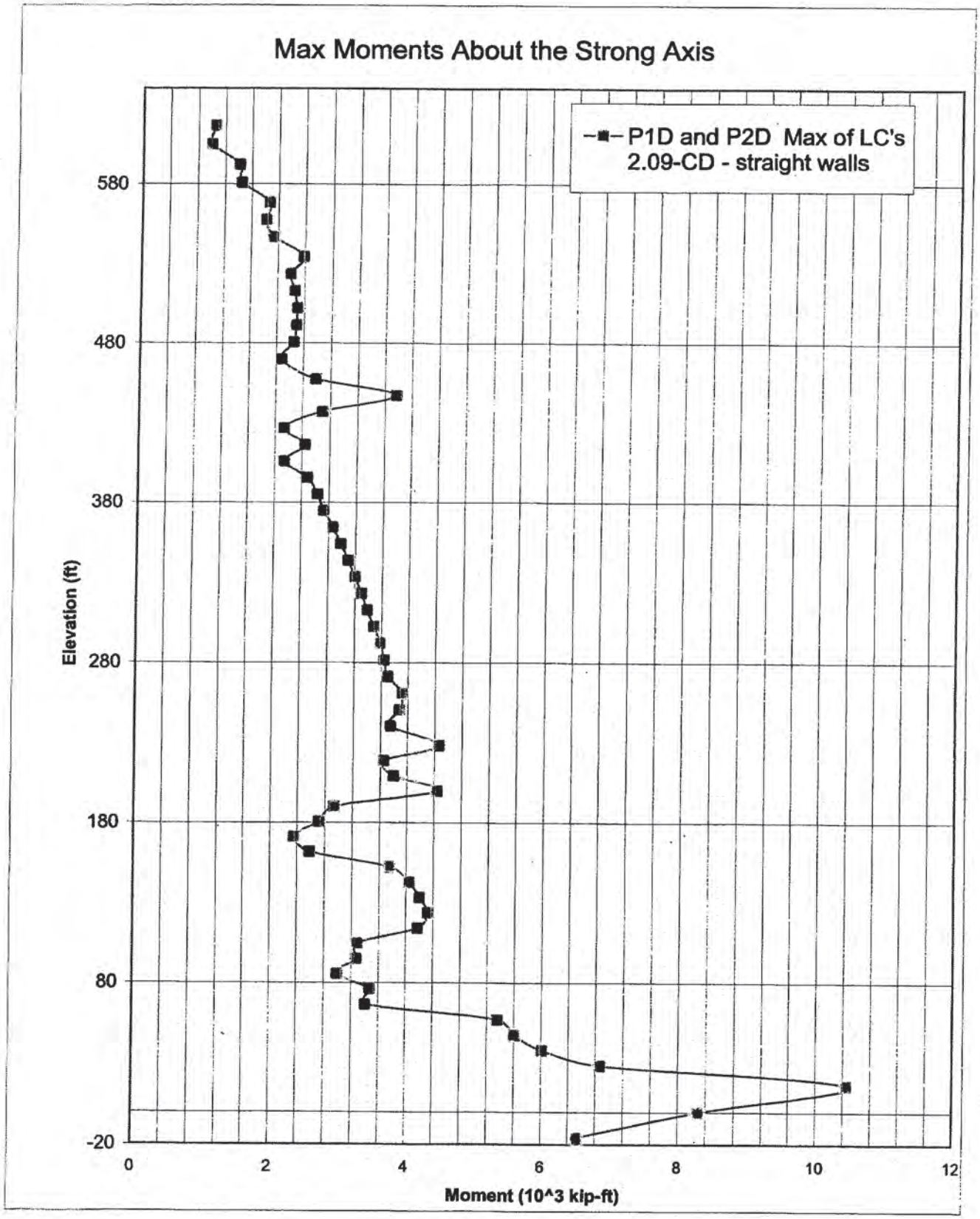

8.1.1-23

Print Date 5/18/2005

Unit Wt.	0.150	kcf
Min trib area from group	1647	ft² (For Tension)
Max trib area from group	1667	ft² (For Compression)
Live Load (40% corridor, 60% units)	64	psf

dif	dif	dif
1.0	1.0	1.0

Pier1 and Pier2

Floor	Usage	Flr. Ht. ft.	Elevation ft.	Width in	Length in	Min Trib A. sq. ft	Max Trib A. sq. ft	Cum Min Trib A. sq. ft	Cum Max Trib A. sq. ft	Floor DL psf	Red. LL psf	Total Steel Link Beams Trib Length incl. Embed ft	Wt. klf	Beam DL klps	Outrigger Length ft	Outrigger Weight klf	Outrigger DL klps	Misc. LL klps	Self Wt klps	Min Total DL klps	Min Cum LL klps	Max Total DL klps	Max Cum LL klps	Cum Reducible LL klps	LL % multiplier	Cum Red. LL klps	Cum Service klps	Cum Service klps	1.4(dl)D+0.5L Design klps	0.9*D Design klps	1.4(dl)D+1.7L Design klps
61	Cap	11.0	627.7	159	159	384	384	391	391	248	20				0	0	0		290	385	385	387	387	8	1.00	8	393	394	553	347	554
60	Mech	11.8	616.7	159	159	384	769	391	782	171	20				0	0	0		309	383	768	385	771	15	0.79	12	781	783	1101	692	1100
59	Roof	12.8	605.0	159	159	1471	2240	1491	2274	205	20				0	0	0		336	646	1414	650	1421	45	0.57	25	1439	1446	2031	1273	2033
58	Typ	11.3	592.2	159	159	1471	3712	1491	3765	128	64				0	0	0		296	493	1907	495	1916	139	0.50	69	1976	1985	2756	1716	2800
57	Typ	12.5	581.0	159	159	1471	5183	1491	5257	128	64				0	0	0		329	526	2433	528	2445	233	0.46	107	2540	2552	3523	2189	3604
56	Typ	10.8	568.5	159	159	1471	5183	1491	5257	128	64				0	0	0		283	480	2387	482	2399	233	0.46	107	2493	2506	3460	2148	3540
55	Typ	10.8	557.7	159	159	1471	6655	1491	6748	128	64				0	0	0		283	480	2866	482	2881	327	0.43	142	3008	3023	4162	2580	4275
54	Typ	12.5	547.0	159	159	1471	8126	1491	8240	128	64				0	1	0		329	526	3392	528	3409	421	0.42	176	3568	3585	4929	3053	5071
53	Typ	10.8	534.5	159	159	1471	9597	1491	9731	128	64				0	2	0		283	480	3872	482	3891	516	0.40	208	4080	4099	5630	3485	5801
52	Typ	10.8	523.7	159	159	1471	11069	1491	11222	128	64				0	3	0		283	480	4351	482	4374	610	0.40	244	4595	4618	6333	3916	6538
51	Typ	10.8	513.0	159	159	1471	12540	1491	12714	128	64				0	4	0		283	480	4831	482	4856	704	0.40	282	5113	5138	7036	4348	7277
50	Typ	10.8	502.2	159	159	1471	14012	1491	14205	128	64				0	5	0		283	480	5311	482	5338	798	0.40	319	5630	5657	7740	4780	8016
49	Typ	10.8	491.5	159	159	1471	15483	1491	15697	128	64				0	6	0		283	480	5790	482	5820	892	0.40	357	6147	6177	8443	5211	8755
48	Typ	10.8	480.7	159	159	1471	16955	1491	17188	128	64				0	7	0		283	480	6270	482	6303	987	0.40	395	6665	6697	9147	5643	9495
47	Mech	12.5	470.0	159	159	1471	18426	1491	18680	146.5	100				0	0	0		329	553	6823	556	6859	1134	0.40	453	7277	7312	9966	6141	10373
46	Typ	10.3	457.5	159	159	1471	19898	1491	20171	128	64				5.7	2.936	17		272	485	7309	488	7347	1228	0.40	491	7800	7838	10678	6578	11120
45	Typ	10.3	447.2	159	159	1471	21369	1491	21663	128	64				5.7	3.643	21		272	489	7798	492	7839	1322	0.40	529	8327	8367	11395	7018	11873
44	Typ	10.3	436.8	159	159	1471	22840	1491	23154	128	64				5.7	3.643	21		272	489	8287	492	8331	1416	0.40	566	8854	8897	12113	7459	12626
43	Typ	10.3	426.5	159	159	1471	24312	1491	24645	128	64				5.7	2.936	17		272	485	8773	488	8819	1510	0.40	604	9377	9423	12825	7896	13373
42	Typ	10.3	416.2	159	159	1471	25783	1491	26137	128	64				0	0	0		272	469	9242	471	9290	1605	0.40	642	9883	9932	13513	8317	14097
41	Typ	10.3	405.8	159	159	1471	27255	1491	27628	128	64				0	0	0		272	469	9710	471	9761	1699	0.40	679	10390	10441	14201	8739	14821
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39	Typ	10.3	385.2	159	159	1471	30198	1491	30611	128	64				0	0	0		272	469	10648	471	10704	1887	0.40	755	11403	11459	15577	9583	16268
38	Typ	10.3	374.8	159	159	1471	31669	1491	32103	128	64				0	0	0		272	469	11116	471	11175	1981	0.40	792	11909	11967	16265	10005	16992
37	Typ	10.3	364.5	159	159	1471	33140	1491	33594	128	64				0	0	0		272	469	11585	471	11646	2075	0.40	830	12415	12476	16953	10427	17716
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35	Typ	10.3	343.8	159	159	1471	36083	1491	36577	128	64				0	0	0		272	469	12523	471	12589	2264	0.40	905	13428	13494	18329	11270	19164
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33	Typ	10.3	323.2	159	159	1471	39026	1491	39560	128	64				0	0	0		272	469	13460	471	13531	2452	0.40	981	14441	14512	19705	12114	20611
32	Typ	10.3	312.8	159	159	1471	40498	1491	41051	128	64				0	0	0		272	469	13929	471	14003	2546	0.40	1018	14947	15021	20393	12536	21335
31	Typ	10.3	302.5	159	159	1471	41969	1491	42543	128	64				0	0	0		272	469	14397	471	14474	2640	0.40	1056	15454	15530	21081	12958	22059
30	Typ	10.3	292.2	159	159	1471	43441	1491	44034	128	64				0	0	0		272	469	14866	471	14945	2735	0.40	1094	15960	16039	21769	13379	22783
29	Typ	10.3	281.8	159	159	1471	44912	1491	45526	128	64				0	0	0		272	469	15335	471	15416	2829	0.40	1132	16466	16548	22457	13801	23506
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24	Mech	9.5	228.3	159	159	1471	52269	1491	52983	146.5	100				0	0	0		250	473	17732	476	17826	3353	0.40	1341	19073	19167	25984	15959	27237
23	Typ	9.5	218.8	159	159	1471	53741	1491	54474	128	64				0	0	0		250	446	18178	449	18275	3447	0.40	1379	19556	19654	26640	16380	27929
22	Typ	9.5	209.3	159	159	1471	55212	1491	55966	128	64				5.7	2.936	17		250	463	18640	465	18740	3541	0.40	1416	20057	20157	27319	16776	28644
21	Typ	9.5	198.8	159	159	1471	56683	1491	57457	128	64				5.7	3.643	21		250	467	19107	469	19210	3635	0.40	1454	20561	20664	28005	17196	29365
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18	Typ	9.5	171.3	159	159	1471	61098	1491	61931	128	64				5.7	2.936	17		250	463	20503	465	20613	3918	0.40	1567	22070	22180	30054	18453	31523
17	Typ	9.5	161.8	159	159	1471	62569	1491	63423	128	64				0	0	0		250	446	20949	449	21062	4012	0.40	1605	22554	22667	30710	18854	32215
16	Typ	9.5	152.3	159	159	1471	64041	1491	64914	128	64				0	0	0		250	446	21395	449	21510	4106	0.40	1642	23038	23153	31366	19256	32907
15	Typ	9.5	142.8	159	159	1471	65512	1491	66406	128	64				0	0	0		250	446	21841	449	21959	4200	0.40	1680	23521	23639	32022	19657	33599
14	Typ	9.5	133.3	159	159	1471	66984	1491	67897	128	64				0	0	0		250	446	22287	449	22407	4294	0.40	1718	24005	24125	32677	20058	34291
13	Typ	9.5	123.8	159	159	1471	68455	1491	69389	128	64				5.7	2.936	17		250	463	22750	465	22873	4388	0.40	1755	24505	24628	33357	20475	35006
12	Typ	9.5	114.3	159	159	1471	69926	1491	70880	128	64				5.7	3.643	21		250	467	23217	469	23342	4483	0.40	1793	25010	25135	34042	20895	35727
11	Typ	9.5	104.8	159	159	1471	71398	1491	72371	128	64				5.7	3.643	21		250	467	23683	469	23811	4577	0.40	1831	25514	25642	34727	21315	36448
10	Typ	9.5	95.3	159	159	1471	72869	1491	73863	128	64				5.7	3.643	21		250	467	24150	469	24281	4671	0.40	1868	26018	26149	35413	21735	37169
9	Typ	9.5	85.8	159	159	1471	74341	1491	75354	128	64				5.7	2.936	17		250	463	24613	465	24746	4765	0.40	1906	26519	26652	36092	22151	37885
8	Typ	9.5	76.3	159	159	1471	75812	1491	76846	128	64				0	0	0		250	446	25059	449	25194	4859	0.40	1944	27002	27138	36748	22553	38576
7	Typ	9.5	66.8	159	159	1471	77284	1491	78337	128	64				0	0	0		250	446	25505	449	25643	4954	0.40	1981	27486	27624	37404	22954	39268
6	Typ	9.5	57.3	159	159	1471	78755	1491	79829	128	64				0	0	0		250	446	25951	449	26091	5048	0.40	2019	27970	28111	38059	23356	39960
5	Typ	9.5	47.8	159	159	1471	80226	1491	81320	128	64				0	0	0		250	446	26397	449	26540	5142	0.40	2057	28453	28597	38715	23757	40652
4	Typ	9.5	38.3	159	159	1471	81698	1491	82811	128	64				0	0	0		250	446	26843	449	26988	5236	0.40	2094	28937	29083	39371	24158	41344
3	Typ	12.2	28.8	159	159	1471	83169	1491	84303	128	64				0	0	0		320	516	27359	519	27507	5330	0.40	2132	29491	29639	40126	24623	42135
2	Mech	16.6	16.6	159	159	1471	84641	1491	85794	146.5	100				0	0	0		437	660	28018	663	28170	5477	0.40	2191	30209	30361	41097	25217	43162
Ground	Public	15.8	0	159	159	1471	86112	1491	87286	187.5	100				0	0	0		415	698	28717	702	28872	5624	0.40	2250	30966	31122	42123	25845	44245
B1		0.0	-15.8											474			267	16946													

8.1.1-24

Level	Pier ID	Load Combo	Loc	P (kips)	V2 (kips)	V3 (kips)	T (kip-ft)	M2 (kip-ft)	M3 (kip-ft)	1.42DL+0.5LL (kips)	0.9*DL (kips)	P_{ucomp} (kips)	P_{utens} (kips)
61	PIER2	E30X100Y5 MAX	Top	190	191	76	4336	1964	2242	553	347	743	156
60	PIER2	E30X100Y5 MAX	Top	407	185	90	3728	3734	5931	1101	692	1508	285
59	PIER1	E30X100Y5 MAX	Top	642	184	155	4634	5519	9105	2031	1273	2672	631
58	PIER1	E30X100Y5 MAX	Top	904	292	226	5721	6652	10644	2756	1716	3660	812
57	PIER1	E30X100Y5 MAX	Top	1195	400	285	6753	7532	12720	3525	2189	4720	995
56	PIER2	E30X100Y5 MAX	Top	1516	476	343	7653	7797	16465	3460	2148	4976	632
55	PIER2	E30X100Y5 MAX	Top	1862	550	389	8503	8176	19804	4162	2580	6024	718
54	PIER2	E30X100Y5 MAX	Top	2237	626	429	9175	8426	23439	4929	3053	7166	816
53	PIER2	E30X100Y5 MAX	Top	2639	671	467	10002	8038	27850	5830	3485	8269	846
52	PIER2	E30X100Y5 MAX	Top	3058	717	493	10532	8114	31962	6333	3916	9391	858
51	PIER2	E30X100Y5 MAX	Top	3497	754	525	10902	8186	36531	7036	4348	10533	851
50	PIER2	E30X100Y5 MAX	Top	3951	789	539	11146	8190	41490	7740	4780	11691	828
49	PIER2	E30X100Y5 MAX	Top	4420	813	583	11197	8239	46835	8443	5211	12863	791
48	PIER2	E30X100Y5 MAX	Top	4899	848	580	10808	8226	52653	9147	5643	14046	744
47	PIER2	E30X100Y5 MAX	Top	5393	590	628	10518	8347	58811	9966	6141	15358	748
46	PIER2	E30X100Y5 MAX	Top	5847	560	751	12346	8993	61295	10678	6578	16525	731
45	PIER2	E30X100Y5 MAX	Top	4918	723	1010	12982	12220	36494	11395	7018	16314	2100
44	PIER2	E30X100Y5 MAX	Top	5078	898	896	12043	9789	39113	12113	7459	17191	2380
43	PIER2	E30X100Y5 MAX	Top	4630	603	802	12324	9329	35623	12825	7896	17454	3266
42	PIER2	E30X100Y5 MAX	Top	3609	527	622	11801	11098	47971	13513	8317	17121	4709
41	PIER2	E30X100Y5 MAX	Top	3962	971	658	12636	11372	48172	14201	8739	18163	4777
40	PIER2	E30X100Y5 MAX	Top	4367	922	653	14240	11253	44262	14889	9161	19255	4794
39	PIER2	E30X100Y5 MAX	Top	4790	932	638	14999	11289	41221	15577	9583	20366	4793
38	PIER2	E30X100Y5 MAX	Top	5226	942	644	15663	11398	38635	16265	10005	21491	4778
37	PIER2	E30X100Y5 MAX	Top	5674	956	646	16211	11511	36488	16953	10427	22627	4752
36	PIER2	E30X100Y5 MAX	Top	6132	969	653	16678	11631	34797	17641	10848	23773	4717
35	PIER2	E30X100Y5 MAX	Top	6597	984	657	17090	11760	33581	18329	11270	24926	4674
34	PIER2	E30X100Y5 MAX	Top	7068	1001	662	17444	11892	32847	19017	11692	26085	4624
33	PIER2	E30X100Y5 MAX	Top	7545	1021	664	17797	12044	32610	19705	12114	27250	4569
32	PIER2	E30X100Y5 MAX	Top	8027	1051	659	17644	12142	32667	20393	12536	28420	4509
31	PIER2	E30X100Y5 MAX	Top	8509	1069	661	17911	12342	33166	21081	12958	29589	4449
30	PIER2	E30X100Y5 MAX	Top	8991	1065	649	17978	12772	34439	21769	13379	30760	4389
29	PIER2	E30X100Y5 MAX	Top	9472	1058	586	18161	13472	36319	22457	13801	31929	4329
28	PIER2	E30X100Y5 MAX	Top	9949	1118	447	18522	14687	39130	23145	14223	33094	4274
27	PIER2	E30X100Y5 MAX	Top	10423	1203	710	18978	18386	43307	23833	14645	34256	4222
26	PIER2	E30X100Y5 MAX	Top	10919	1407	933	20152	18814	45295	24520	15066	35439	4147
25	PIER2	E30X100Y5 MAX	Top	11416	1505	934	19905	17820	46226	25279	15533	36695	4116
24	PIER2	E30X100Y5 MAX	Top	11905	1585	918	18668	16853	52841	25984	15959	37889	4054
23	PIER2	E30X100Y5 MAX	Top	12383	1128	949	16051	16782	61694	26640	16360	39023	3977
22	PIER2	E30X100Y5 MAX	Top	12825	687	1050	12051	13389	65461	27319	16776	40145	3951
21	PIER2	E30X100Y5 MAX	Top	12179	1743	1309	10578	16520	43043	28005	17196	40183	5018
20	PIER2	E30X100Y5 MAX	Top	12339	1875	1142	11851	14618	44152	28690	17616	41029	5277
19	PIER2	E30X100Y5 MAX	Top	12731	2016	1024	10501	13040	53333	29375	18037	42106	5305
18	PIER2	E30X100Y5 MAX	Top	11864	1068	900	11549	11882	40812	30054	18453	41919	6588
17	PIER2	E30X100Y5 MAX	Top	10355	1288	997	15432	13178	28464	30710	18854	41066	8499
16	PIER2	E30X100Y5 MAX	Top	10744	1984	979	19125	14515	21286	31366	19256	42110	8512
15	PIER2	E30X100Y5 MAX	Top	11168	2016	1062	19439	14249	23695	32022	19657	43190	8489
14	PIER2	E30X100Y5 MAX	Top	11615	1545	1000	17334	14542	37219	32677	20058	44292	8443
13	PIER2	E30X100Y5 MAX	Top	12053	1280	1151	11338	9974	47297	33357	20475	45410	8422
12	PIER2	E30X100Y5 MAX	Top	12100	2442	1415	9283	12126	32918	34042	20895	46142	8795
11	PIER2	E30X100Y5 MAX	Top	12389	2401	1332	9001	9851	46544	34727	21315	47116	8926
10	PIER2	E30X100Y5 MAX	Top	12773	2589	1245	10056	9262	63142	35413	21735	48186	8962
9	PIER2	E30X100Y5 MAX	Top	11939	1137	1161	11738	7677	49018	36092	22151	48032	10212
8	PIER2	E30X100Y5 MAX	Top	10493	1341	1072	15794	7271	27726	36748	22553	47241	12060
7	PIER2	E30X100Y5 MAX	Top	10805	2288	1268	22780	16015	28166	37404	22954	48208	12149
6	PIER2	E30X100Y5 MAX	Top	11149	2326	1282	25195	20092	33226	38059	23356	49208	12207
5	PIER2	E30X100Y5 MAX	Top	11478	2556	1310	26278	25581	44872	38715	23757	50193	12279
4	PIER2	E30X100Y5 MAX	Top	11772	1833	1384	21868	32509	64140	39371	24158	51143	12386
3	PIER2	E30X100Y5 MAX	Top	12012	1600	1126	21550	41314	78497	40126	24623	52138	12611
2	PIER1	E30X100Y5 MAX	Bottc	14842	1858	1068	29288	28261	78893	41097	25217	55938	10375
GROUND	PIER1	E30X100Y5 MAX	Bottc	16335	1952	1660	16459	38568	88297	42123	25845	58457	9510

8.1.1.-25

Level	Pier ID	Load Combo	Loc	P (kips)	V2 (kips)	V3 (kips)	T (kip-ft)	M2 (kip-ft)	M3 (kip-ft)	1.42DL+0.5LL (kips)	0.9*DL (kips)	P_{ucomp} (kips)	P_{utens} (kips)
61	PIER2	E30X100Y5 MAX	Top	190	191	76	4336	1964	2242	553	347	743	156
60	PIER1	E30X100Y5 MAX	Top	407	179	90	3853	3745	6077	1101	692	1508	285
59	PIER1	E30X100Y5 MAX	Top	642	184	155	4634	5519	9105	2031	1273	2672	631
58	PIER2	E30X100Y5 MAX	Top	904	286	225	5502	6690	10606	2756	1716	3660	812
57	PIER2	E30X100Y5 MAX	Top	1195	388	289	6490	7536	13050	3525	2189	4720	995
56	PIER2	E30X100Y5 MAX	Top	1516	476	343	7653	7797	16465	3460	2148	4976	632
55	PIER2	E30X100Y5 MAX	Top	1862	550	389	8503	8176	19804	4162	2580	6024	718
54	PIER2	E30X100Y5 MAX	Top	2237	626	429	9175	8426	23439	4929	3053	7166	816
53	PIER2	E30X100Y5 MAX	Top	2639	671	467	10002	8038	27850	5630	3485	8269	846
52	PIER2	E30X100Y5 MAX	Top	3058	717	493	10532	8114	31962	6333	3916	9391	858
51	PIER2	E30X100Y5 MAX	Top	3497	754	525	10902	8186	36531	7036	4348	10533	851
50	PIER2	E30X100Y5 MAX	Top	3951	789	539	11146	8190	41490	7740	4780	11691	828
49	PIER2	E30X100Y5 MAX	Bottom	4420	813	583	11253	8762	51072	8443	5211	12863	791
48	PIER2	E30X100Y5 MAX	Bottom	4899	848	580	10868	9403	57071	9147	5643	14046	744
47	PIER2	E30X100Y5 MAX	Bottom	5393	590	628	10596	11042	60225	9966	6141	15358	748
46	PIER2	E30X100Y5 MAX	Top	5847	560	751	12346	8993	61295	10678	6578	16525	731
45	PIER2	E30X100Y5 MAX	Top	4918	723	1010	12982	12220	36494	11395	7018	16314	2100
44	PIER2	E30X100Y5 MAX	Top	5078	898	896	12043	9789	39113	12113	7459	17191	2380
43	PIER2	E30X100Y5 MAX	Top	4630	603	802	12324	9329	35623	12825	7896	17454	3266
42	PIER2	E30X100Y5 MAX	Top	3609	527	622	11801	11098	47971	13513	8317	17121	4709
41	PIER2	E30X100Y5 MAX	Top	3962	971	658	12636	11372	48172	14201	8739	18163	4777
40	PIER1	E30X100Y5 MAX	Bottom	4347	939	645	14450	11449	36526	14889	9161	19235	4814
39	PIER1	E30X100Y5 MAX	Bottom	4762	943	629	15201	11824	34588	15577	9583	20338	4821
38	PIER1	E30X100Y5 MAX	Bottom	5189	948	635	15837	12195	33239	16265	10005	21453	4816
37	PIER1	E30X100Y5 MAX	Bottom	5625	955	636	16346	12518	32371	16953	10427	22578	4801
36	PIER1	E30X100Y5 MAX	Bottom	6069	962	640	16767	12822	31917	17641	10848	23710	4779
35	PIER1	E30X100Y5 MAX	Bottom	6519	971	642	17128	13093	31840	18329	11270	24847	4752
34	PIER1	E30X100Y5 MAX	Bottom	6972	981	645	17433	13360	32133	19017	11692	25989	4720
33	PIER1	E30X100Y5 MAX	Bottom	7428	994	645	17744	13559	32564	19705	12114	27133	4686
32	PIER1	E30X100Y5 MAX	Bottom	7886	1019	641	17589	13713	33253	20393	12536	28279	4650
31	PIER2	E30X100Y5 MAX	Bottom	8509	1069	661	17989	14111	32172	21081	12958	29589	4449
30	PIER2	E30X100Y5 MAX	Bottom	8991	1065	649	18051	14635	34158	21769	13379	30760	4389
29	PIER2	E30X100Y5 MAX	Bottom	9472	1058	586	18224	15216	37010	22457	13801	31929	4329
28	PIER1	E30X100Y5 MAX	Bottom	9678	1173	448	18998	17166	44013	23145	14223	32823	4545
27	PIER2	E30X100Y5 MAX	Top	10423	1203	710	18978	18386	43307	23833	14645	34256	4222
26	PIER2	E30X100Y5 MAX	Top	10919	1407	933	20152	18814	45295	24520	15066	35439	4147
25	PIER1	E30X100Y5 MAX	Top	11105	1440	944	19664	17843	47934	25279	15533	36384	4427
24	PIER2	E30X100Y5 MAX	Bottom	11905	1585	918	18739	17865	64883	25984	15959	37889	4054
23	PIER1	E30X100Y5 MAX	Bottom	12068	1110	979	16293	18718	67846	26640	16360	38708	4291
22	PIER2	E30X100Y5 MAX	Top	12825	687	1050	12051	13389	65461	27319	16776	40145	3951
21	PIER2	E30X100Y5 MAX	Top	12179	1743	1309	10578	16520	43043	28005	17196	40183	5018
20	PIER2	E30X100Y5 MAX	Top	12339	1875	1142	11851	14618	44152	28690	17616	41029	5277
19	PIER2	E30X100Y5 MAX	Top	12731	2016	1024	10501	13040	53333	29375	18037	42106	5305
18	PIER2	E30X100Y5 MAX	Top	11864	1068	900	11549	11882	40812	30054	18453	41919	6588
17	PIER1	E30X100Y5 MAX	Bottom	10100	1315	1054	16529	15318	20920	30710	18854	40810	8755
16	PIER1	E30X100Y5 MAX	Bottom	10509	1981	1034	19717	15819	24990	31366	19256	41875	8747
15	PIER1	E30X100Y5 MAX	Bottom	10941	2019	1118	20046	17209	35766	32022	19657	42962	8716
14	PIER1	E30X100Y5 MAX	Bottom	11400	1573	1082	17772	18557	46970	32677	20058	44077	8659
13	PIER2	E30X100Y5 MAX	Bottom	11827	1405	1150	11864	10357	41073	33357	20475	45184	8648
12	PIER1	E30X100Y5 MAX	Top	11884	2481	1475	9728	12333	32181	34042	20895	45926	9011
11	PIER1	E30X100Y5 MAX	Bottom	12182	2453	1382	9629	14024	60657	34727	21315	46909	9133
10	PIER1	E30X100Y5 MAX	Bottom	12584	2674	1287	10790	16890	79932	35413	21735	47997	9151
9	PIER1	E30X100Y5 MAX	Bottom	10509	952	1213	11831	14323	29539	36092	22151	46601	11643
8	PIER1	E30X100Y5 MAX	Bottom	10308	1365	1129	17462	21713	29730	36748	22553	47056	12244
7	PIER1	E30X100Y5 MAX	Bottom	10656	2336	1336	24252	26505	32728	37404	22954	48060	12298
6	PIER1	E30X100Y5 MAX	Bottom	11024	2382	1340	26727	31808	43003	38059	23356	49083	12332
5	PIER1	E30X100Y5 MAX	Bottom	11377	2434	1368	28066	38273	59608	38715	23757	50092	12380
4	PIER1	E30X100Y5 MAX	Bottom	11694	2469	1411	26215	46002	79348	39371	24158	51065	12464
3	PIER1	E30X100Y5 MAX	Bottom	11946	2313	1201	26230	56701	101248	40126	24623	52072	12677
2	PIER1	E30X100Y5 MAX	Top	12820	1855	1246	16486	45223	71611	41097	25217	53917	12396
GROU	PIER1	E30X100Y5 MAX	Bottom	16335	1952	1660	16459	38568	88297	42123	25845	58457	9510

Level	Pier ID	Load Combo	Loc	P (kips)	V2 (kips)	V3 (kips)	T (kip-ft)	M2 (kip-ft)	M3 (kip-ft)	1.42DL+0.5LL (kips)	0.9*DL (kips)	P_{ucomp} (kips)	P_{utens} (kips)
61	PIER1	E100X530Y MAX	Bottom	75	243	47	7712	870	4162	553	347	628	272
60	PIER1	E100X530Y MAX	Top	160	327	56	6945	1736	8258	1101	692	1261	532
59	PIER1	E100X530Y MAX	Top	251	496	66	8856	2783	11063	2031	1273	2282	1022
58	PIER2	E100X530Y MAX	Bottom	336	753	91	10507	3192	16492	2756	1716	3092	1380
57	PIER2	E100X530Y MAX	Bottom	441	990	119	12216	3689	25698	3525	2189	3966	1748
56	PIER2	E100X530Y MAX	Bottom	556	1168	135	14002	4176	34869	3460	2148	4016	1592
55	PIER2	E100X530Y MAX	Bottom	679	1320	154	15246	4672	45351	4162	2580	4841	1900
54	PIER2	E100X530Y MAX	Bottom	812	1465	167	16131	5174	59193	4929	3053	5741	2241
53	PIER2	E100X530Y MAX	Bottom	953	1533	181	17088	5753	71509	5630	3485	6583	2531
52	PIER2	E100X530Y MAX	Bottom	1101	1621	185	17567	6304	84907	6333	3916	7434	2815
51	PIER2	E100X530Y MAX	Bottom	1254	1678	191	17656	6781	99044	7036	4348	8291	3093
50	PIER2	E100X530Y MAX	Bottom	1413	1729	191	17330	7073	113832	7740	4780	9153	3366
49	PIER2	E100X530Y MAX	Bottom	1577	1762	220	16401	7135	129284	8443	5211	10020	3635
48	PIER1	E100X530Y MAX	Bottom	1768	1850	246	15107	6678	145326	9147	5643	10915	3875
47	PIER1	E100X530Y MAX	Bottom	1936	999	258	11665	7033	153167	9966	6141	11902	4205
46	PIER1	E100X530Y MAX	Top	2090	934	273	16351	6570	153893	10678	6578	12768	4487
45	PIER1	E100X530Y MAX	Bottom	1698	1683	362	16387	7171	88487	11395	7018	13093	5320
44	PIER1	E100X530Y MAX	Bottom	1843	1672	319	16529	7336	98496	12113	7459	13956	5616
43	PIER1	E100X530Y MAX	Bottom	1381	1479	292	16612	6827	91993	12825	7896	14205	6515
42	PIER1	E100X530Y MAX	Top	1368	748	235	13016	7583	113899	13513	8317	14881	6949
41	PIER1	E100X530Y MAX	Top	1487	1985	271	15574	7261	116293	14201	8739	15688	7252
40	PIER1	E100X530Y MAX	Top	1622	1862	251	19601	7064	105934	14889	9161	16510	7539
39	PIER1	E100X530Y MAX	Top	1761	1879	220	21623	7037	97638	15577	9583	17338	7822
38	PIER1	E100X530Y MAX	Top	1904	1890	219	23195	6986	90363	16265	10005	18169	8101
37	PIER1	E100X530Y MAX	Top	2049	1913	226	24405	6857	84135	16953	10427	19002	8377
36	PIER1	E100X530Y MAX	Top	2196	1935	233	25391	6685	78997	17641	10848	19837	8653
35	PIER1	E100X530Y MAX	Top	2343	1962	237	26232	6515	75061	18329	11270	20671	8928
34	PIER1	E100X530Y MAX	Top	2489	1994	240	26957	6391	72433	19017	11692	21506	9203
33	PIER1	E100X530Y MAX	Top	2635	2029	241	27648	6353	71244	19705	12114	22340	9479
32	PIER1	E100X530Y MAX	Top	2780	2076	241	27817	6406	71127	20393	12536	23173	9756
31	PIER1	E100X530Y MAX	Bottom	2920	2131	249	28529	7408	73323	21081	12958	24001	10038
30	PIER1	E100X530Y MAX	Bottom	3056	2155	256	28862	7916	78731	21769	13379	24825	10324
29	PIER1	E100X530Y MAX	Bottom	3185	2191	265	29081	8802	85691	22457	13801	25642	10616
28	PIER1	E100X530Y MAX	Bottom	3330	2256	304	29376	10849	94646	23145	14223	26475	10893
27	PIER1	E100X530Y MAX	Bottom	3488	2396	254	30084	11196	102985	23833	14645	27321	11157
26	PIER1	E100X530Y MAX	Bottom	3640	2581	362	30588	10750	116607	24520	15066	28160	11426
25	PIER1	E100X530Y MAX	Bottom	3789	2732	358	29494	10218	136928	25279	15533	29068	11744
24	PIER1	E100X530Y MAX	Bottom	3932	2927	372	26856	9556	154224	25984	15959	29916	12026
23	PIER2	E100X530Y MAX	Bottom	4413	1935	365	21091	9323	164334	26640	16360	31053	11947
22	PIER2	E100X530Y MAX	Top	4556	990	369	16500	8464	159459	27319	16776	31875	12220
21	PIER1	E100X530Y MAX	Bottom	3970	3515	450	14752	7935	115103	28005	17196	31974	13226
20	PIER1	E100X530Y MAX	Bottom	4072	3424	394	17058	7917	132188	28690	17616	32762	13544
19	PIER1	E100X530Y MAX	Bottom	4180	3491	382	13878	7486	149905	29375	18037	33555	13857
18	PIER1	E100X530Y MAX	Top	3914	1933	340	15774	7503	99172	30054	18453	33969	14539
17	PIER1	E100X530Y MAX	Top	3459	2357	389	22180	7851	58647	30710	18854	34170	15395
16	PIER1	E100X530Y MAX	Bottom	3563	3760	415	29714	8695	52049	31366	19256	34929	15693
15	PIER2	E100X530Y MAX	Bottom	4171	3792	435	29525	8318	73697	32022	19657	36192	15486
14	PIER2	E100X530Y MAX	Bottom	4321	2924	386	25362	8528	95486	32677	20058	36998	15738
13	PIER2	E100X530Y MAX	Top	4470	2312	412	14932	6949	91958	33357	20475	37827	16005
12	PIER2	E100X530Y MAX	Bottom	4560	4629	490	12640	6771	101915	34042	20895	38603	16334
11	PIER2	E100X530Y MAX	Bottom	4685	4336	469	10462	7714	126461	34727	21315	39412	16630
10	PIER2	E100X530Y MAX	Bottom	4816	4505	470	13276	8829	155693	35413	21735	40228	16919
9	PIER2	E100X530Y MAX	Top	4582	1822	461	15798	6233	94807	36092	22151	40674	17570
8	PIER1	E100X530Y MAX	Top	3573	2435	438	22478	6205	77813	36748	22553	40321	18980
7	PIER1	E100X530Y MAX	Top	3668	4515	517	36567	9463	65675	37404	22954	41072	19286
6	PIER2	E100X530Y MAX	Bottom	4391	4494	507	38313	14219	70678	38059	23356	42451	18964
5	PIER2	E100X530Y MAX	Bottom	4500	4925	525	39525	16738	102883	38715	23757	43215	19257
4	PIER1	E100X530Y MAX	Bottom	3978	4838	613	41946	22307	130903	39371	24158	43349	20181
3	PIER1	E100X530Y MAX	Bottom	4054	4832	544	43351	25264	182035	40126	24623	44180	20569
2	PIER1	E100X530Y MAX	Bottom	4995	3678	611	40945	12105	172685	41097	25217	46092	20222
GROU	PIER1	E100X530Y MAX	Bottom	5518	4056	624	22542	14369	195399	42123	25845	47641	20327

MAX OF LEVEL B1 → LEVEL 4

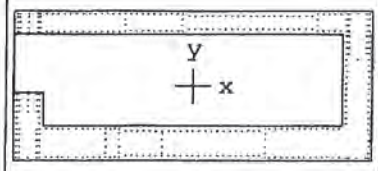
Print Date: 5/13/2005

PCA INPUT PILG FILE

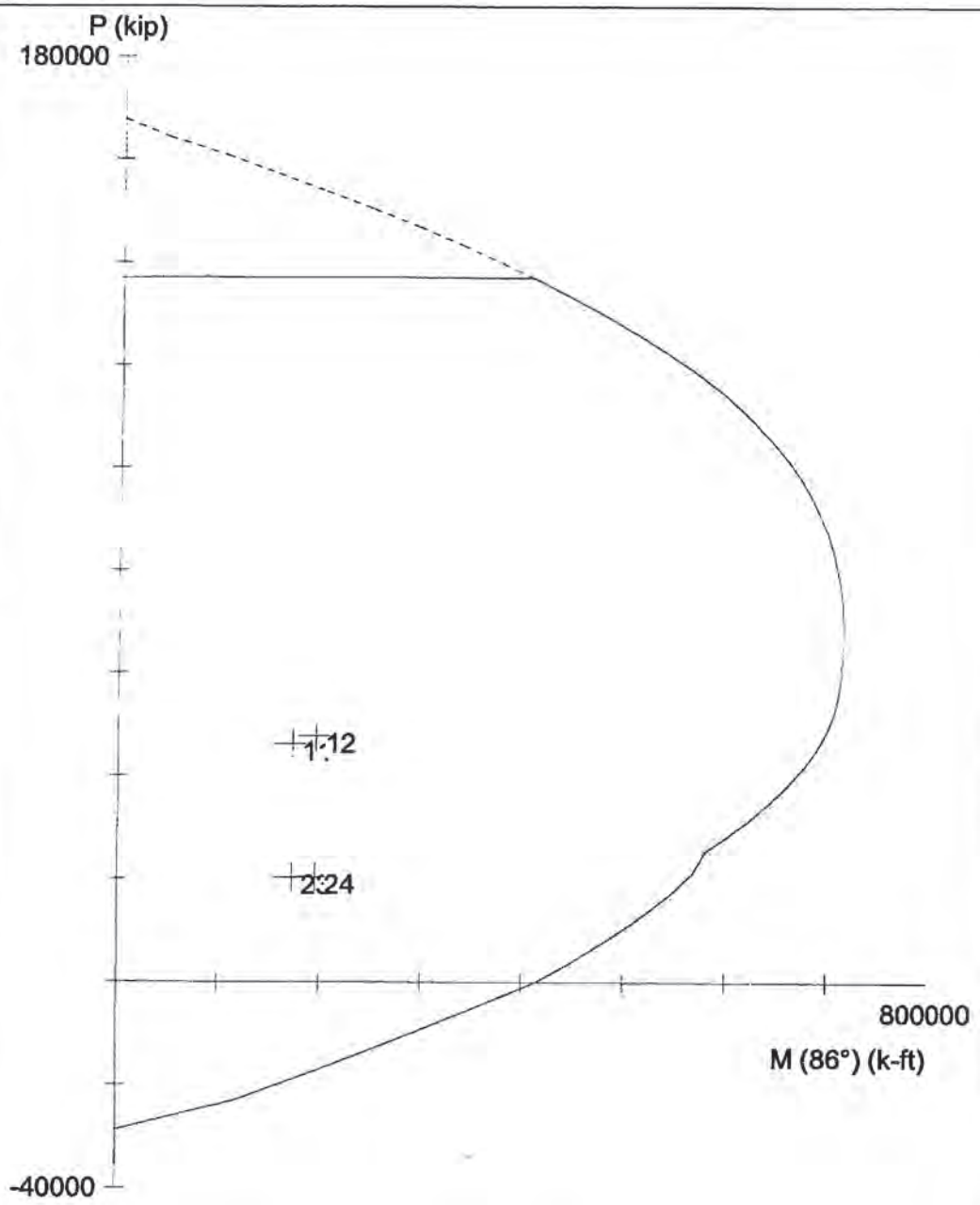
pca label (comp.)	pca label (tension)	Level	Pier ID	Load Combo	P	M2	M3	1.42DL+0 .5LL	0.9*DL	P_{ucomp}	P_{utens}	
1	13	4	PIER2	E30X100Y5 MAX	11772	32509	64140	39371	24158	51143	12386	MAX P
2	14	3	PIER2	E30X100Y5 MAX	12012	41314	78497	40126	24623	52138	12611	
3	15	2	PIER1	E30X100Y5 MAX	14842	28261	78893	41097	25217	55938	10375	
4	16	GROUND	PIER1	E30X100Y5 MAX	16335	38568	88297	42123	25845	58457	9510	
5	17	4	PIER1	E30X100Y5 MAX	11694	46002	79348	39371	24158	51065	12464	MAX M2
6	18	3	PIER1	E30X100Y5 MAX	11946	56701	101248	40126	24623	52072	12677	
7	19	2	PIER1	E30X100Y5 MAX	12820	45223	71611	41097	25217	53917	12396	
8	20	GROUND	PIER1	E30X100Y5 MAX	16335	38568	88297	42123	25845	58457	9510	
9	21	4	PIER1	E100X530Y MAX	3978	22307	130903	39371	24158	43349	20181	MAXM3
10	22	3	PIER1	E100X530Y MAX	4054	25264	182035	40126	24623	44180	20569	
11	23	2	PIER1	E100X530Y MAX	4995	12105	172685	41097	25217	46092	20222	
12	24	GROUND	PIER1	E100X530Y MAX	5518	14369	195399	42123	25845	47641	20327	

PCA LABEL 24 GOVERNS DESIGN

8.1.1-28



360 x 154 in



Code: ACI 318-95

Units: English

Run axis: Biaxial

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/13/05

Time: 16:12:48

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\CORE\P1LG.COL

Project:

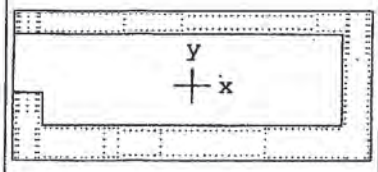
Column:

Engineer:

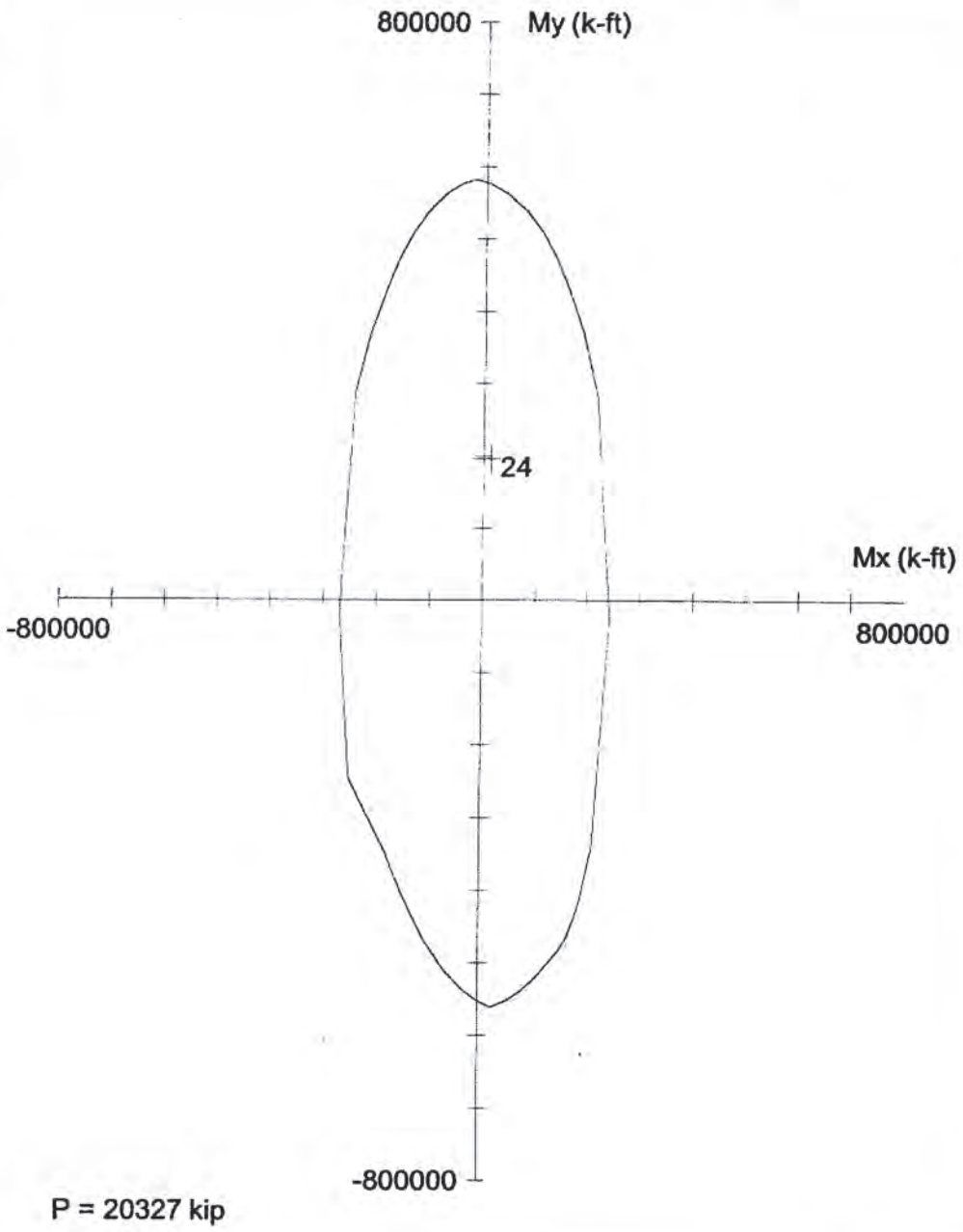
f'c = 10 ksi	fy = 75 ksi	Ag = 25446 in^2	366 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 426.48 in^2	Rho = 1.68%
fc = 8.5 ksi	e_rup = Infinity	Xo = 11.63 in	Ix = 8.45602e+007 in^4
e_u = 0.003 in/in		Yo = -8.27 in	Iy = 3.34865e+008 in^4
Beta1 = 0.65		Clear spacing = 0.97 in	Clear cover = N/A

8.1.1-29

Confinement: Tied phi(a) = 0.8 phi(b) = 0.9 phi(c) = 0.7



360 x 154 in



P = 20327 kip

Code: ACI 318-95

Units: English

Run axis: Biaxial

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/13/05

Time: 16:12:41

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\CORE\P1LG.COL

Project:

Column:		Engineer:	
f'c = 10 ksi	fy = 75 ksi	Ag = 25446 in^2	366 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 426.48 in^2	Rho = 1.68%
fc = 8.5 ksi	e_rup = Infinity	Xo = 11.63 in	Ix = 8.45602e+007 in^4
e_u = 0.003 in/in		Yo = -8.27 in	Iy = 3.34865e+008 in^4
Beta1 = 0.65		Clear spacing = 0.97 in	Clear cover = N/A

8.1.1-30

Confinement: Tied phi(a) = 0.8 phi(b) = 0.9 phi(c) = 0.7

General Information:

File Name: F:\PROJECTS\4069\PCA\TOWER\CURRENT\CORE\P1LG.COL
Project:
Column:
Code: ACI 318-95
Engineer:
Units: English

Run Option: Investigation
Run Axis: Biaxial
Slenderness: Not considered
Column Type: Structural

Material Properties:

f'c = 10 ksi
Ec = 5000 ksi
fc = 8.5 ksi
Ultimate strain = 0.003 in/in
Beta1 = 0.65
fy = 75 ksi
Es = 29000 ksi
Rupture strain = Infinity

Section:

Exterior Points

No.	X (in)	Y (in)	No.	X (in)	Y (in)	No.	X (in)	Y (in)
1	-180.0	77.0	2	-180.0	-77.0	3	180.0	-77.0
4	180.0	77.0						

Interior Points

No.	X (in)	Y (in)	No.	X (in)	Y (in)	No.	X (in)	Y (in)
1	-179.9	53.0	2	-179.9	-7.0	3	-150.0	-7.0
4	-150.0	-41.0	5	150.0	-41.0	6	150.0	53.0

Gross section area, Ag = 25446 in^2
Ix = 8.45602e+007 in^4
Iy = 3.34865e+008 in^4
Xo = 11.6293 in
Yo = -8.27093 in

Reinforcement:

Rebar Database: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.7

Pattern: Irregular

Total steel area, As = 426.48 in^2 at 1.68%

Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)
1.00	-93.2	-73.8	1.00	-93.2	-44.1	1.00	-99.2	-73.8
1.00	-99.2	-44.1	1.00	-105.2	-73.8	1.00	-105.2	-44.1
1.00	-110.5	-73.8	1.00	-110.5	-44.1	1.00	-116.5	-73.8
1.00	-116.5	-44.1	1.00	-124.5	-73.8	1.00	-124.5	-44.1
1.00	-130.5	-73.8	1.00	-130.5	-44.1	1.00	-135.2	-73.8
1.00	-135.2	-44.1	1.00	-141.2	-73.8	1.00	-141.2	-44.1
1.00	-147.2	-73.8	1.00	-147.2	-44.1	1.00	67.3	-71.8
1.00	67.3	-46.1	1.00	61.6	-71.8	1.00	61.6	-46.1
1.00	55.6	-71.8	1.00	55.6	-46.1	1.00	49.6	-71.8
1.00	49.6	-46.1	1.00	43.6	-71.8	1.00	43.6	-46.1
1.00	37.6	-71.8	1.00	37.6	-46.1	1.00	31.0	-71.8
1.00	31.0	-46.1	1.00	25.0	-71.8	1.00	25.0	-46.1
1.00	19.0	-71.8	1.00	19.0	-46.1	1.00	13.0	-71.8
1.00	13.0	-46.1	1.00	6.3	-71.8	1.00	6.3	-46.1

1.00	0.3	-71.8	1.00	0.3	-46.1	1.00	-5.7	-71.8
1.00	-5.7	-46.1	1.00	-12.1	-71.8	1.00	-12.1	-46.1
1.00	-18.1	-71.8	1.00	-18.1	-46.1	1.00	-24.1	-71.8
1.00	-24.1	-46.1	1.00	176.7	21.1	1.00	153.6	21.1
1.00	176.9	15.1	1.00	154.2	15.1	1.00	176.9	9.1
1.00	154.2	9.1	1.00	176.7	2.8	1.00	154.0	2.8
1.00	176.7	-2.9	1.00	154.0	-2.9	1.00	176.4	-8.9
1.00	153.6	-8.9	1.00	176.4	-14.9	1.00	153.6	-14.9
1.00	176.4	-20.9	1.00	153.6	-20.9	1.00	176.4	-26.9
1.00	153.6	-26.9	1.00	176.4	-32.9	1.00	153.6	-32.9
1.00	176.4	-38.9	1.00	153.6	-38.9	1.00	-4.4	58.2
1.00	-4.4	71.9	1.00	1.6	58.2	1.00	1.6	71.9
1.00	7.6	58.2	1.00	7.6	71.9	1.00	13.6	58.2
1.00	13.6	71.9	1.00	19.6	58.2	1.00	19.6	71.9
1.00	26.1	58.2	1.00	26.1	71.9	1.00	32.1	58.2
1.00	32.1	71.9	1.00	38.6	58.2	1.00	38.6	71.9
1.00	44.6	58.2	1.00	44.6	71.9	1.00	50.6	58.2
1.00	50.6	71.9	1.00	57.1	58.2	1.00	57.1	71.9
1.00	63.6	58.2	1.00	63.6	71.9	1.00	69.6	58.2
1.00	69.6	71.9	1.00	75.6	58.2	1.00	75.6	71.9
1.00	81.6	58.2	1.00	81.6	71.9	1.00	87.6	58.2
1.00	87.6	71.9	1.00	94.1	58.2	1.00	94.1	71.9
1.00	100.1	58.2	1.00	100.1	71.9	1.00	106.1	58.2
1.00	106.1	71.9	1.00	112.6	58.2	1.00	112.6	71.9
1.00	118.6	58.2	1.00	118.6	71.9	1.00	-111.1	55.8
1.00	-111.1	74.1	1.00	-117.6	55.8	1.00	-117.7	74.1
1.00	-123.6	55.8	1.00	-123.7	74.1	1.00	-129.6	55.8
1.00	-129.7	74.1	1.00	-135.6	55.8	1.00	-135.7	74.1
1.00	-141.6	55.8	1.00	-141.7	74.1	1.00	-147.6	55.8
1.00	-147.7	74.1	1.00	-104.6	55.8	1.00	-104.7	74.1
1.00	-98.6	55.8	1.00	-98.7	74.1	1.00	-92.6	55.8
1.00	-92.7	74.1	1.00	-86.6	55.8	1.00	-86.7	74.1
1.00	-80.6	55.8	1.00	-80.7	74.1	1.00	-74.6	55.8
1.00	-74.7	74.1	1.27	-165.0	55.2	1.27	-165.0	59.2
1.27	-153.7	59.2	1.27	-156.0	59.2	1.27	-173.9	59.2
1.27	-176.1	59.2	1.27	-153.7	70.5	1.27	-156.0	70.5
1.27	-165.0	70.5	1.27	-173.9	70.5	1.27	-176.1	70.5
1.27	-153.7	65.1	1.27	-156.0	65.1	1.27	-165.0	65.1
1.27	-173.9	65.1	1.27	-176.1	65.1	1.27	-153.7	55.1
1.27	-156.0	55.1	1.27	-173.9	55.1	1.27	-176.1	55.1
1.27	-153.7	74.1	1.27	-156.0	74.1	1.27	-165.0	74.1
1.27	-173.9	74.1	1.27	-176.1	74.1	1.27	-68.6	56.3
1.27	-68.7	73.6	1.27	-62.8	56.3	1.27	-62.9	73.6
1.27	-57.0	56.3	1.27	-57.1	73.6	1.27	-51.3	56.3
1.27	-51.3	73.6	1.27	-45.5	56.3	1.27	-45.5	73.6
1.27	-39.7	56.3	1.27	-39.7	73.6	1.27	-33.9	56.3
1.27	-33.9	73.6	1.27	-28.1	56.3	1.27	-28.2	73.6
1.27	-22.3	56.3	1.27	-22.4	73.6	1.27	-16.1	56.3
1.27	-16.2	73.6	1.27	-11.3	62.1	1.27	-11.3	67.8
1.27	-11.3	56.3	1.27	-11.4	73.7	1.27	-68.7	67.8
1.27	-68.7	62.5	1.27	176.7	27.1	1.27	153.6	27.1
1.27	165.1	27.1	1.27	153.7	33.1	1.27	156.0	33.1
1.27	173.9	33.1	1.27	176.5	33.1	1.27	153.7	39.1
1.27	156.0	39.1	1.27	173.9	39.1	1.27	176.5	39.1
1.27	153.7	45.1	1.27	156.0	45.1	1.27	173.9	45.1
1.27	176.5	45.1	1.27	153.7	51.1	1.27	156.0	51.1
1.27	173.9	51.1	1.27	176.5	51.1	1.27	153.7	56.4
1.27	156.0	56.4	1.27	173.9	56.4	1.27	176.5	56.4
1.27	153.7	62.4	1.27	156.0	62.4	1.27	173.9	62.4
1.27	176.5	62.4	1.27	153.7	68.4	1.27	156.0	68.4
1.27	173.9	68.4	1.27	176.5	68.4	1.27	153.7	73.9
1.27	156.0	73.9	1.27	165.0	73.9	1.27	173.9	73.6
1.27	176.5	73.6	1.27	147.4	56.2	1.27	147.6	73.6
1.27	141.6	56.2	1.27	141.8	73.6	1.27	135.8	56.2
1.27	136.0	73.6	1.27	130.0	56.2	1.27	130.2	73.6
1.27	124.4	67.8	1.27	124.4	62.1	1.27	124.4	56.2

1.27	124.6	73.6	1.27	73.3	-69.4	1.27	73.3	-62.7
1.27	73.3	-55.3	1.27	73.3	-48.7	1.27	73.3	-73.8
1.27	73.3	-44.1	1.27	77.3	-73.8	1.27	77.3	-44.1
1.27	83.3	-73.8	1.27	83.3	-44.1	1.27	89.3	-73.8
1.27	89.3	-44.1	1.27	95.3	-73.8	1.27	95.3	-44.1
1.27	101.3	-73.8	1.27	101.3	-44.1	1.27	107.3	-73.8
1.27	107.3	-44.1	1.27	112.6	-73.8	1.27	112.6	-44.1
1.27	118.6	-73.8	1.27	118.6	-44.1	1.27	124.6	-73.8
1.27	124.6	-44.1	1.27	130.6	-73.8	1.27	130.6	-44.1
1.27	135.2	-73.8	1.27	135.2	-44.1	1.27	141.2	-73.8
1.27	141.2	-44.1	1.27	153.1	-73.9	1.27	156.3	-73.9
1.27	165.2	-73.9	1.27	173.6	-73.9	1.27	176.8	-73.9
1.27	176.8	-69.1	1.27	176.8	-62.2	1.27	176.8	-56.0
1.27	176.8	-49.3	1.27	176.2	-44.9	1.27	147.2	-73.8
1.27	147.2	-44.1	1.27	-82.5	-73.8	1.27	-82.5	-44.1
1.27	-77.9	-73.8	1.27	-77.9	-44.1	1.27	-87.2	-69.4
1.27	-87.2	-62.7	1.27	-87.2	-55.3	1.27	-87.2	-48.7
1.27	-73.3	-69.4	1.27	-73.3	-62.7	1.27	-73.3	-55.3
1.27	-73.3	-48.7	1.27	-73.3	-73.8	1.27	-73.3	-44.1
1.27	-87.2	-73.8	1.27	-87.2	-44.1	1.27	-30.8	-69.4
1.27	-30.8	-62.7	1.27	-30.8	-55.3	1.27	-30.8	-48.7
1.27	-30.9	-71.8	1.27	-30.9	-46.1	1.27	-36.9	-71.8
1.27	-36.9	-46.1	1.27	-42.9	-71.8	1.27	-42.9	-46.1
1.27	-49.2	-71.8	1.27	-49.2	-46.1	1.27	-55.2	-71.8
1.27	-55.2	-46.1	1.27	-61.2	-71.8	1.27	-61.2	-46.1
1.27	-67.2	-71.8	1.27	-67.2	-46.1	1.27	-173.6	-69.1
1.27	-173.6	-62.2	1.27	-173.6	-56.0	1.27	-173.6	-49.3
1.27	-173.5	-44.9	1.27	-156.2	-69.1	1.27	-156.2	-62.2
1.27	-156.2	-56.0	1.27	-156.2	-49.3	1.27	-156.1	-44.9
1.27	-153.1	-69.1	1.27	-153.1	-62.2	1.27	-153.1	-56.0
1.27	-153.1	-49.3	1.27	-153.0	-44.9	1.27	-153.1	-73.9
1.27	-156.2	-73.9	1.27	-165.1	-73.9	1.27	-173.6	-73.9
1.27	-176.7	-73.9	1.27	-176.7	-69.1	1.27	-176.7	-62.2
1.27	-176.7	-56.0	1.27	-176.7	-49.3	1.27	-176.6	-44.9
1.27	-156.0	-26.9	1.27	-165.0	-26.9	1.27	-173.9	-26.9
1.27	-156.0	-20.9	1.27	-165.0	-20.9	1.27	-173.9	-20.9
1.27	-156.0	-14.9	1.27	-165.0	-14.9	1.27	-173.9	-14.9
1.27	-156.0	-8.9	1.27	-165.0	-8.9	1.27	-173.9	-8.9
1.27	-176.4	-8.9	1.27	-153.6	-8.9	1.27	-176.4	-14.9
1.27	-153.6	-14.9	1.27	-176.4	-20.9	1.27	-153.6	-20.9
1.27	-176.4	-26.9	1.27	-153.6	-26.9	1.27	-176.4	-32.9
1.27	-153.6	-32.9	1.27	-176.4	-38.9	1.27	-153.6	-38.9

Factored Loads and Moments with Corresponding Capacities: (see user's manual for notation)

No.	Pu kip	Mux k-ft	Muy k-ft	fMnx k-ft	fMny k-ft	fMn/Mu
1	51143.0	32509.0	64140.0	227118.7	447420.8	6.978
2	52138.0	41314.0	78497.0	231662.7	441476.9	5.620
3	55938.0	28261.0	78893.0	188615.5	527537.9	6.685
4	58457.0	38568.0	88297.0	213650.4	488337.4	5.532
5	51065.0	46002.0	79348.0	241748.9	418324.3	5.268
6	52072.0	56701.0	101248.0	239064.4	426657.3	4.215
7	53917.0	45223.0	71611.0	253718.5	401866.1	5.611
8	58457.0	38568.0	88297.0	213650.4	488337.4	5.532
9	43349.0	22307.0	130903.0	104603.0	620200.7	4.736
10	44180.0	25264.0	182035.0	89485.8	642137.2	3.528
11	46092.0	12105.0	172685.0	48544.3	692504.7	4.010
12	47641.0	14369.0	195399.0	51488.6	694072.8	3.552
13	12386.0	32509.0	64140.0	177850.0	351098.3	5.473
14	12611.0	41314.0	78497.0	180727.8	344070.1	4.381
15	10375.0	28261.0	78893.0	145472.6	406751.2	5.155
16	9510.0	38568.0	88297.0	161501.1	370735.3	4.197
17	12464.0	46002.0	79348.0	186557.6	321696.8	4.055

18	12677.0	56701.0	101248.0	185016.8	329853.9	3.259
19	12396.0	45223.0	71611.0	190942.9	301852.0	4.217
20	9510.0	38568.0	88297.0	161501.1	370735.3	4.197
21	20181.0	22307.0	130903.0	89622.7	527367.2	4.028
22	20569.0	25264.0	182035.0	74980.7	541393.7	2.974
23	20222.0	12105.0	172685.0	39433.6	562619.3	3.258
24	20327.0	14369.0	195399.0	41583.5	562013.0	2.876

*** Program completed as requested! ***

SHEAR WALL SHEAR CHECK

Etabs model: 2.09-CD-straight
Date: 5/12/2005
By: NJR
phi = 0.6

Pier1 and Pier2								Shear Reinforcement of Wall							Check design					
Wall ID	Story	Width in	Length in	f'_c psi	f_{ys} ksi	ϕ	V_n kips	A_{cp} in^2	$V_{n,max}$ = 10Acp*sqrt(f'c) kips	Check size of section $V_{n,max}$>(V_u/ϕ)	ϕV_s kips	$\rho_{req'd}$	Area of steel within spacing in^2	Spacing required in	Spacing provided in	$\rho_{provided}$	V_n=V_c+V_s kips	V_n = min of V_n=V_c+V_s or 10Acp*sqrt(f'c) kips	V_u/ϕV_n	Overstrength Provided (V_n+V_s)/V_u
P1B & P2B	61	30	151	7000	60	0.60	216	4530	3790	OK	456	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.22	7.70
	60	30	151	7000	60	0.60	182	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.18	9.14
	59	30	151	7000	60	0.60	235	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.23	7.09
	58	30	151	7000	60	0.60	284	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.28	5.85
	57	30	151	7000	60	0.60	327	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.33	5.09
	56	30	151	7000	60	0.60	376	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.38	4.43
	55	30	151	7000	60	0.60	408	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.41	4.08
	54	30	151	7000	60	0.60	433	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.43	3.84
	53	30	151	7000	60	0.60	456	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.46	3.64
	52	30	151	7000	60	0.60	469	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.47	3.54
	51	30	151	7000	60	0.60	469	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.47	3.55
	50	30	151	7000	60	0.60	479	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.48	3.47
	49	30	151	7000	60	0.60	498	4530	3790	OK	456	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.50	3.35
	48	30	151	7000	60	0.60	479	4530	3790	OK	456	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.48	3.47
	47	30	151	7000	60	0.60	527	4530	3790	OK	455	0.0026	1.20	16.0	12.0	0.003	1664	1664	0.53	3.16
	46	30	151	7000	60	0.60	621	4530	3790	OK	456	0.0026	1.20	16.0	12.0	0.003	1664	1664	0.62	2.68
	45	30	151	7000	60	0.60	942	4530	3790	OK	455	0.0030	1.20	13.4	12.0	0.003	1664	1664	0.94	1.77
	44	30	151	7000	60	0.60	838	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.84	1.99
	43	30	151	7000	60	0.60	894	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.89	2.40
	42	30	151	7000	60	0.60	544	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.55	3.06
	41	30	151	7000	60	0.60	560	4530	3790	OK	455	0.0026	1.20	16.0	12.0	0.003	1664	1664	0.56	2.97
	40	30	151	8000	60	0.60	592	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.57	2.90
	39	30	151	8000	60	0.60	609	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.59	2.82
	38	30	151	8000	60	0.60	631	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.61	2.72
	37	30	151	8000	60	0.60	646	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.63	2.66
	36	30	151	8000	60	0.60	660	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.64	2.60
	35	30	151	8000	60	0.60	674	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.65	2.55
	34	30	151	8000	60	0.60	693	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.67	2.48
	33	30	151	8000	60	0.60	709	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.69	2.42
	32	30	151	8000	60	0.60	724	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.70	2.37
	31	30	151	8000	60	0.60	736	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.71	2.34
	30	30	151	8000	60	0.60	730	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.71	2.35
	29	30	151	8000	60	0.60	698	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.68	2.46
	28	30	151	8000	60	0.60	638	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.62	2.69
	27	30	151	8000	60	0.60	759	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.74	2.26
	26	30	151	8000	60	0.60	859	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.83	2.00
	25	30	151	8000	60	0.60	855	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.83	2.01
	24	30	151	8000	60	0.60	808	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.78	2.12
	23	30	151	8000	60	0.60	792	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.77	2.17
	22	30	151	8000	60	0.60	729	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.71	2.36
	21	30	151	8000	60	0.60	872	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.85	1.97
	20	30	151	10000	60	0.60	742	4530	4530	OK	544	0.0025	1.20	16.0	12.0	0.003	1812	1812	0.68	2.44
	19	30	151	10000	60	0.60	608	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.23	7.38
	18	30	151	10000	60	0.60	603	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.22	7.44
	17	30	151	10000	60	0.60	794	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.29	5.85
	16	30	151	10000	60	0.60	835	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.31	5.37
	15	30	151	10000	60	0.60	874	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.32	5.13
	14	30	151	10000	60	0.60	824	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.31	5.44
	13	30	151	10000	60	0.60	689	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.25	6.71
	12	30	151	10000	60	0.60	777	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.29	5.78
	11	30	151	10000	60	0.60	767	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.28	5.85
	10	30	151	10000	60	0.60	734	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.27	6.11
	9	30	151	10000	60	0.60	700	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.26	6.41
	8	30	151	10000	60	0.60	832	4530	4530	OK	544	0.0025	1.58	18.0	4.0	0.013	4485	4485	0.31	5.39
	7	30	151	10000	60	0.60	1103	4530	4530	OK	544	0.0034	1.58	15.4	4.0	0.013	4485	4485	0.41	4.07
	6	30	151	10000	60	0.60	1151	4530	4530	OK	544	0.0037	1.58	14.1	4.0	0.013	4485	4485	0.43	3.90
	5	30	151	10000	60	0.60	1202	4530	4530	OK	544	0.0040	1.58	13.0	4.0	0.013	4485	4485	0.45	3.73
	4	30	151	10000	60	0.60	1169	4530	4530	OK	544	0.0038	1.58	13.7	4.0	0.013	4485	4485	0.43	3.84
	3	30	151	10000	60	0.60	1168	4530	4530	OK	544	0.0038	1.58	13.8	4.0	0.013	4485	4485	0.43	3.84
	2	30	151	10000	60	0.60	1294	4530	4530	OK	544	0.0046	1.58	11.4	4.0	0.013	4485	4485	0.46	3.47
	Ground	30	151	10000	60	0.60	1150	4530	4530	OK	544	0.0037	1.58	14.2	4.0	0.013	4485	4485	0.43	3.90

SHEAR WALL SHEAR CHECK

Etabs model: 2.09-CD-straight
Date: 5/12/2005
By: NJR
$\phi V = 0.6$

Pier1 and Pier2								Shear Reinforcement of Wall							Check design					
Wall ID	Story	Width in	Length in	f'_c psi	f_{ys} ksi	ϕ	V_n kips	A_{cv} in^2	$V_{n,max}$ = 10Acp*sqrt(f'c) kips	Check size of section $V_{n,max}<(V_n/\phi)$	ϕV_n kips	$\rho_{req'd}$	Area of steel within spacing in^2	Spacing required in	Spacing provided in	$\rho_{provided}$	V_c+V_s kips	V_n = min of V_c+V_s or 10Acp*sqrt(f'c) kips	$V_u/\phi V_n$	Overstrength Provided $(V_c+V_s)/V_u$
P1C & P2C	61	24	248	7000	60	0.60	142	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.10	17.46
	60	24	248	7000	60	0.60	118	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.08	21.08
	59	24	248	7000	60	0.60	85	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.06	29.36
	58	24	248	7000	60	0.60	74	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.05	33.46
	57	24	248	7000	60	0.60	98	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.07	25.44
	56	24	248	7000	60	0.60	108	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.07	22.97
	55	24	248	7000	60	0.60	123	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.08	20.27
	54	24	248	7000	60	0.60	143	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.10	17.40
	53	24	248	7000	60	0.60	143	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.10	17.37
	52	24	248	7000	60	0.60	170	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.11	14.59
	51	24	248	7000	60	0.60	194	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.13	12.78
	50	24	248	7000	60	0.60	232	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.16	10.70
	49	24	248	7000	60	0.60	297	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.20	8.36
	48	24	248	7000	60	0.60	403	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.27	6.16
	47	24	248	7000	60	0.60	326	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.22	7.62
	46	24	248	7000	60	0.60	468	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.31	5.31
	45	24	248	7000	60	0.60	871	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.58	2.85
	44	24	248	7000	60	0.60	686	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.46	3.62
	43	24	248	7000	60	0.60	782	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.51	3.26
	42	24	248	7000	60	0.60	224	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.15	11.08
	41	24	248	7000	60	0.60	512	5952	4980	OK	598	0.0025	1.20	18.0	12.0	0.004	2484	2484	0.34	4.85
	40	24	248	8000	60	0.60	356	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.23	7.17
	39	24	248	8000	60	0.60	295	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.19	8.66
	38	24	248	8000	60	0.60	257	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.17	9.94
	37	24	248	8000	60	0.60	238	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.16	10.73
	36	24	248	8000	60	0.60	227	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.15	11.24
	35	24	248	8000	60	0.60	222	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.15	11.49
	34	24	248	8000	60	0.60	221	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.14	11.54
	33	24	248	8000	60	0.60	218	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.14	11.71
	32	24	248	8000	60	0.60	219	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.14	11.65
	31	24	248	8000	60	0.60	224	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.15	11.38
	30	24	248	8000	60	0.60	226	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.15	11.29
	29	24	248	8000	60	0.60	233	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.15	10.98
	28	24	248	8000	60	0.60	248	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.16	10.29
	27	24	248	8000	60	0.60	263	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.17	9.71
	26	24	248	8000	60	0.60	291	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.19	8.76
	25	24	248	8000	60	0.60	341	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.22	7.49
	24	24	248	8000	60	0.60	438	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.29	5.83
	23	24	248	8000	60	0.60	334	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.22	7.64
	22	24	248	8000	60	0.60	522	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.34	4.89
	21	24	248	8000	60	0.60	1030	5952	5324	OK	639	0.0025	1.20	18.0	12.0	0.004	2553	2553	0.67	2.48
	20	24	248	10000	60	0.60	176	5952	5952	OK	714	0.0025	1.20	18.0	12.0	0.004	2678	2678	0.11	15.21
	19	24	248	10000	60	0.60	433	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.12	16.32
	18	24	248	10000	60	0.60	562	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.16	12.58
	17	24	248	10000	60	0.60	292	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.08	24.19
	16	24	248	10000	60	0.60	529	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.15	13.36
	15	24	248	10000	60	0.60	512	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.14	13.81
	14	24	248	10000	60	0.60	418	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.12	16.89
	13	24	248	10000	60	0.60	289	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.08	24.48
	12	24	248	10000	60	0.60	638	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.18	11.08
	11	24	248	10000	60	0.60	215	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.06	32.91
	10	24	248	10000	60	0.60	637	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.18	11.10
	9	24	248	10000	60	0.60	791	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.22	8.94
	8	24	248	10000	60	0.60	306	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.09	23.12
	7	24	248	10000	60	0.60	609	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.17	11.80
	6	24	248	10000	60	0.60	550	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.15	12.85
	5	24	248	10000	60	0.60	606	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.17	11.67
	4	24	248	10000	60	0.60	579	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.16	12.21
	3	24	248	10000	60	0.60	941	5952	5952	OK	714	0.0025	1.58	18.0	4.0	0.016	7068	5952	0.26	7.51
	2	24	248	10000	60	0.60	2088	5952	5952	OK	714	0.0063	1.58	10.4	4.0	0.016	7068	5952	0.58	3.37
	Ground	24	248	10000	60	0.60	1497	5952	5952	OK	714	0.0037	1.58	18.0	4.0	0.016	7068	5952	0.42	4.72

SHEAR WALL SHEAR CHECK

Etabs model: 2.09-CD-straight
Date: 5/12/2005
By: NJR
phi = 0.6

Pier1 and Pier2								Shear Reinforcement of Wall							Check design					
Wall ID	Story	Width in	Length in	f'_c psi	f_{ye} ksi	ϕ	V_e kips	A_{cv} in^2	$V_{n,max}$ = 10Acp*sqrt(f'c) kips	Check size of section $V_{n,max}<(V_e/\phi)$	ϕV_c kips	$\rho_{req'd}$	Area of steel within spacing in^2	Spacing required in	Spacing provided in	$\rho_{provided}$	V_n+V_c kips	V_n = min of V_n+V_c or 10Acp*sqrt(f'c) kips	$V_n/\phi V_e$	Overstrength Provided $(V_n+V_c)/V_e$
P1D & P2D	61	30	151	7000	60	0.60	232	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.23	7.16
	60	30	151	7000	60	0.60	181	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.18	9.18
	59	30	151	7000	60	0.60	233	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.23	7.14
	58	30	151	7000	60	0.60	271	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.27	6.14
	57	30	151	7000	60	0.60	314	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.31	5.30
	56	30	151	7000	60	0.60	353	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.35	4.71
	55	30	151	7000	60	0.60	380	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.38	4.38
	54	30	151	7000	60	0.60	396	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.40	4.21
	53	30	151	7000	60	0.60	418	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.42	3.98
	52	30	151	7000	60	0.60	432	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.43	3.85
	51	30	151	7000	60	0.60	438	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.44	3.80
	50	30	151	7000	60	0.60	436	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.44	3.82
	49	30	151	7000	60	0.60	430	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.43	3.87
	48	30	151	7000	60	0.60	381	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.38	4.36
	47	30	151	7000	60	0.60	371	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.37	4.49
	46	30	151	7000	60	0.60	556	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.58	2.99
	45	30	151	7000	60	0.60	988	4530	3790	OK	455	0.0031	1.20	12.7	12.0	0.003	1664	1664	0.97	1.72
	44	30	151	7000	60	0.60	860	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.86	1.94
	43	30	151	7000	60	0.60	660	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.66	2.52
	42	30	151	7000	60	0.60	396	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.40	4.22
	41	30	151	7000	60	0.60	436	4530	3790	OK	455	0.0025	1.20	16.0	12.0	0.003	1664	1664	0.44	3.81
	40	30	151	8000	60	0.60	488	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.47	3.52
	39	30	151	8000	60	0.60	516	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.50	3.32
	38	30	151	8000	60	0.60	544	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.53	3.16
	37	30	151	8000	60	0.60	567	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.55	3.03
	36	30	151	8000	60	0.60	588	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.57	2.92
	35	30	151	8000	60	0.60	606	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.59	2.82
	34	30	151	8000	60	0.60	626	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.61	2.74
	33	30	151	8000	60	0.60	643	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.62	2.67
	32	30	151	8000	60	0.60	661	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.64	2.60
	31	30	151	8000	60	0.60	679	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.66	2.53
	30	30	151	8000	60	0.60	690	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.67	2.49
	29	30	151	8000	60	0.60	699	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.68	2.46
	28	30	151	8000	60	0.60	718	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.70	2.39
	27	30	151	8000	60	0.60	712	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.69	2.41
	26	30	151	8000	60	0.60	700	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.68	2.45
	25	30	151	8000	60	0.60	689	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.67	2.49
	24	30	151	8000	60	0.60	685	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.67	2.49
	23	30	151	8000	60	0.60	697	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.68	2.46
	22	30	151	8000	60	0.60	656	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.64	2.62
	21	30	151	8000	60	0.60	886	4530	4052	OK	486	0.0025	1.20	16.0	12.0	0.003	1716	1716	0.86	1.94
	20	30	151	10000	60	0.60	779	4530	4530	OK	544	0.0025	1.20	16.0	12.0	0.003	1812	1812	0.72	2.33
	19	30	151	10000	60	0.60	714	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.27	6.28
	18	30	151	10000	60	0.60	606	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.22	7.42
	17	30	151	10000	60	0.60	786	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.29	5.71
	16	30	151	10000	60	0.60	777	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.29	5.77
	15	30	151	10000	60	0.60	814	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.30	5.51
	14	30	151	10000	60	0.60	808	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.30	5.55
	13	30	151	10000	60	0.60	656	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.24	6.83
	12	30	151	10000	60	0.60	879	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.33	5.10
	11	30	151	10000	60	0.60	834	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.31	5.38
	10	30	151	10000	60	0.60	816	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.30	5.49
	9	30	151	10000	60	0.60	707	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.26	6.35
	8	30	151	10000	60	0.60	806	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.25	6.73
	7	30	151	10000	60	0.60	888	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.33	5.06
	6	30	151	10000	60	0.60	890	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.33	5.04
	5	30	151	10000	60	0.60	900	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.33	4.98
	4	30	151	10000	60	0.60	907	4530	4530	OK	544	0.0025	1.58	16.0	4.0	0.013	4485	4485	0.34	4.95
	3	30	151	10000	60	0.60	1348	4530	4530	OK	544	0.0049	1.58	10.7	4.0	0.013	4485	4485	0.50	3.33
	2	30	151	10000	60	0.60	1593	4530	4530	OK	544	0.0064	1.58	8.2	4.0	0.013	4485	4485	0.59	2.82
	Ground	30	151	10000	60	0.60	1002	4530	4530	OK	544	0.0028	1.58	18.0	4.0	0.013	4485	4485	0.37	4.47

5/13/2005

Shear wall boundary element check
DCE #: 4069
Date: 5/13/2005

Width of BE hoop h_x = 33.9 in
Perimeter of wall = 408 in

[redacted]

Wall ID:	P1A		Loads based on Max. Axial																								Confinement in width						
Floor	f'_c	f_y	P_E	P_{Store} 1.42DL+0.5L	P_u	M_u	V_u (k)	A_g	$P_u/(A_g f'_c)$	A_{sh}	Shear L_w	Symmetry 1=sym 0=un-sym	$M_u/V_u l_w$	$V_u/(A_{cv}*sqrt(f'_c))$	Conclusion	P_c[1]	P_u/P_c	Length of B.E. Req'd	A_{sh}/s Req'd	B.E.[2] Length used (l_{be})	New A_{sh}/s Req'd	legs	Ash	s (spacing)	Ash/s act	ok/ng	min diam long bars allowed	long spacing of legs	% of Length	A_{sh} Req.	Area of hoops	Legs in addition to outer hoop	Area of added legs	Ash act	ok/ng
	psi	ksi	kips	kips	kips	kip-ft	kips	in^2		in^2	in					kips		in	in/in	in	in/in		in^2	in	in/in		in	in		in^2	in^2		in^2	in^2	
61	7000	75	61	216	277	1316	197	12744	0.003	12744	354	1	0.23	0.18	NOT REQ'D	75827	0.00	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
60	7000	75	116	429	545	2115	191	12744	0.006	12744	354	1	0.36	0.18	NOT REQ'D	75827	0.01	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
59	7000	75	138	792	929	2751	220	12744	0.010	12744	354	1	0.42	0.21	NOT REQ'D	75827	0.01	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
58	7000	75	169	1074	1243	3365	310	12744	0.014	12744	354	1	0.37	0.29	NOT REQ'D	75827	0.02	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
57	7000	75	274	1374	1649	4517	409	12744	0.018	12744	354	1	0.37	0.38	NOT REQ'D	75827	0.02	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
56	7000	75	442	1349	1791	5412	501	12744	0.020	12744	354	1	0.37	0.47	NOT REQ'D	75827	0.02	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
55	7000	75	632	1623	2254	6541	580	12744	0.025	12744	354	1	0.38	0.54	NOT REQ'D	75827	0.03	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
54	7000	75	882	1922	2804	6267	658	12744	0.031	12744	354	1	0.43	0.62	NOT REQ'D	75827	0.04	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
53	7000	75	1159	2195	3354	9406	711	12744	0.038	12744	354	1	0.45	0.67	NOT REQ'D	75827	0.04	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
52	7000	75	1425	2469	3893	10919	757	12744	0.044	12744	354	1	0.49	0.71	NOT REQ'D	75827	0.05	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
51	7000	75	1706	2743	4449	12504	794	12744	0.050	12744	354	1	0.53	0.74	NOT REQ'D	75827	0.06	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
50	7000	75	1998	3018	5015	14143	826	12744	0.056	12744	354	1	0.56	0.77	NOT REQ'D	75827	0.07	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
49	7000	75	2301	3292	5593	15857	841	12744	0.063	12744	354	1	0.64	0.79	NOT REQ'D	75827	0.07	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
48	7000	75	2606	3566	6172	17506	853	12744	0.069	12744	354	1	0.70	0.80	NOT REQ'D	75827	0.08	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
47	7000	75	2952	3885	6837	17770	858	12744	0.077	12744	354	1	0.92	0.82	NOT REQ'D	75827	0.09	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
46	7000	75	2570	4163	6733	6715	830	12744	0.075	12744	354	1	0.36	0.59	NOT REQ'D	75827	0.09	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
45	7000	75	3025	4443	7468	17045	1272	12744	0.084	12744	354	1	0.45	1.19	NOT REQ'D	75827	0.10	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
44	7000	75	3909	4722	8631	32909	1240	12744	0.097	12744	354	1	0.50	1.16	NOT REQ'D	75827	0.11	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
43	7000	75	2406	5000	7406	8728	692	12744	0.063	12744	354	1	0.43	0.65	NOT REQ'D	75827	0.10	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
42	7000	75	2271	5268	7539	11781	650	12744	0.085	12744	354	1	0.61	0.61	NOT REQ'D	75827	0.10	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
41	7000	75	2432	5536	7968	9510	965	12744	0.089	12744	354	1	0.33	0.92	NOT REQ'D	75827	0.11	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
40	8000	75	2636	5805	8442	8742	1012	12744	0.083	12744	354	1	0.29	0.89	NOT REQ'D	86659	0.10	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
39	8000	75	2855	6073	8928	8307	1040	12744	0.088	12744	354	1	0.27	0.91	NOT REQ'D	86659	0.10	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
38	8000	75	3078	6341	9419	8018	1061	12744	0.092	12744	354	1	0.26	0.93	NOT REQ'D	86659	0.11	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
37	8000	75	3305	6609	9914	7902	1060	12744	0.097	12744	354	1	0.25	0.95	NOT REQ'D	86659	0.11	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
36	8000	75	3534	6878	10411	8084	1094	12744	0.102	12744	354	1	0.25	0.96	PROVIDE B.E.	86659	0.12	53	0.51	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
35	8000	75	3765	7146	10911	8422	1109	12744	0.107	12744	354	1	0.28	0.97	PROVIDE B.E.	86659	0.13	53	0.51	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
34	8000	75	4001	7414	11415	8120	1130	12744	0.112	12744	354	1	0.24	0.99	PROVIDE B.E.	86659	0.13	53	0.51	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
33	8000	75	4235	7682	11920	8678	1152	12744	0.117	12744	354	1	0.26	1.01	PROVIDE B.E.	86659	0.14	53	0.51	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
32	8000	75	4473	7951	12423	9444	1178	12744	0.122	12744	354	1	0.27	1.03	PROVIDE B.E.	86659	0.14	53	0.51	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
31	8000	75	4714	8219	12933	10427	1197	12744	0.127	12744	354	1	0.30	1.05	PROVIDE B.E.	86659	0.15	53	0.51	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
30	8000	75	4963	8487	13450	11452	1198	12744	0.132	12744	354	1	0.32	1.05	PROVIDE B.E.	86659	0.16	54	0.52	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
29	8000	75	5197	8755	13953	12882	1218	12744	0.137	12744	354	1	0.35	1.07	PROVIDE B.E.	86659	0.16	55	0.53	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
28	8000	75	5404	9023	14427	14310	1282	12744	0.142	12744	354	1	0.38	1.13	PROVIDE B.E.	86659	0.17	56	0.54	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
27	8000	75	5621	9292	14913	15629	1337	12744	0.146	12744	354	1	0.40	1.17	PROVIDE B.E.	86659	0.17	57	0.55	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
26	8000	75	5882	9560	15442	17781	1544	12744	0.151	12744	354	1	0.39	1.35	PROVIDE B.E.	86659	0.18	58	0.56	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
25	8000	75	6219	9855	16075	22029	1628	12744	0.156	12744	354	1	0.46	1.43	PROVIDE B.E.	86659	0.19	59	0.57	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
24	8000	75	6555	10130	16686	22998	1627	12744	0.164	12744	354	1	0.48	1.43	PROVIDE B.E.	86659	0.19	61	0.58	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
23	8000	75	6829	10386	17215	23580	1220	12744	0.169	12744	354	1	0.66	1.07	PROVIDE B.E.	86659	0.20	62	0.59	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
22	8000	75	6551	10651	17202	13931	1137	12744	0.169	12744	354	1	0.42	1.00	PROVIDE B.E.	86659	0.20	62	0.59	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
21	8000	75	7592	10918	18510	23456	2464	12744	0.182	12744	354	1	0.32	2.16	PROVIDE B.E.	86659	0.21	64	0.62	108	1.04	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.30	0.31	4	0.60	3.02	OK
20	10000	75	8361	11185	19547	40152	2032	12744	0.153	12744	354	1	0.67	1.69	PROVIDE B.E.	106324	0.18	58	0.70	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
19	10000	75	8746	11452	20199	60532	2315	12744	0.156	12744	354	1	0.89	1.82	PROVIDE B.E.	106324	0.19	60	0.71	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
18	10000	75	6074	11717	17781	12802	1208	12744	0.140	12744	354	1	0.36	0.95	PROVIDE B.E.	106324	0.16	56	0.67	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
17	10000	75	5696	11973	17668	8256	1364	12744	0.139	12744	354	1	0.16	1.06	PROVIDE B.E.	106324	0.16	55	0.67	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
16	10000	75	5864	12229	18092	11367	1927	12744	0.142	12744	354	1	0.20	1.51	PROVIDE B.E.	106324	0.17	56	0.67	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
15	10000	75	6132	12484	18617	16117	1974	12744	0.146	12744	354	1	0.28	1.55	PROVIDE B.E.	106324	0.17	57	0.68	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
14	10000	75	6433	12740	19173	18851	1982	12744	0.150	12744	354	1	0.40	1.24	PROVIDE B.E.	106324	0.18	58	0.69	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
13	10000	75	6569	13005	19673	11562	1632	12744	0.154	12744	354	1	0.24	1.28	PROVIDE B.E.	106324	0.18	59	0.70	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
12	10000	75	7793	13272	21065	27232	3074	12744	0.165	12744	354	1	0.30	2.41	PROVIDE B.E.	106324	0.19	61	0.73	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
11	10000	75	8863	13539	22103	47876	2582	12744	0.173	12744	354	1	0.63	2.03	PROVIDE B.E.	106324	0.20	63	0.76	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
10	10000	75	9036	13806	22842	77522	3049	12744	0.179	12744	354	1	0.86	2.39	PROVIDE B.E.	106324	0.21	64	0.77	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
9	10000	75	8315	14071	20386	15164	1347	12744	0.160	12744	354	1	0.36	1.06	PROVIDE B.E.	106324	0.19	60	0.72	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
8	10000	75	8121	14327	20448	8564	1524	12744	0.160	12744	354	1	0.19	1.20	PROVIDE B.E.	106324	0.19	60	0.72	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
7	10000	75	8407	14582	20990	12690	2376	12744	0.165	12744	354	1	0.18	1.87	PROVIDE B.E.	106324	0.19	61	0.73	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
6	10000	75	8930	14836	21788	17567	2526	12744	0.171	12744	354	1	0.24	1.98	PROVIDE B.E.	106324	0.20	62	0.75	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
5	10000	75	7545	15094	22639	23098	2603	12744	0.178	12744	354	1	0.30	2.04	PROVIDE B.E.	106324	0.21	64	0.76	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
4	10000	75	8265	15349	23614	28582	2585	12744	0.185	12744	354	1	0.37	2.03	PROVIDE B.E.	106324	0.22	65	0.78	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
3	10000	75	8880	15644	24524	24007	2034	12744	0.192	12744	354	1	0.40	1.60	PROVIDE B.E.	106324	0.23	67	0.80	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
2	10000	75	8488	16022	24511	25027	1133	12744	0.192	12744	354	1	0.75	0.89	PROVIDE B.E.	106324	0.23	67	0.80	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK
Ground	10000	75	9141	16422	25584	22861	961	12744	0.201	12744	354	1	0.81	0.75	PROVIDE B.E.	106324	0.24	68	0.82	108	1.30	19	0.47	4	2.21	OK	0.667	5.7	0.31	1.63	0.31	4	0.60	3.02	OK

5/13/2005

Shear wall boundary element check
DCE #: 4069
Date: 5/13/2005

Width of BE hoop h_c = 27.9 in
Perimeter of wall = 908 in

Wall ID:	P1B		Loads based on Max. Axial																												Confinement in width					
Floor	f'_c	fy	P_E	P_{Grav} 1.42DL+0.5L	P_m	M_u	V_u (k)	A_g	$P_u/(A_g f'_c)$	A_{cv}	Shear L_w	Symmetry 1=sym 0=un-sym	$M_u/V_u l_w$	$V_u/(A_{cv}*3\sqrt{(f'_c)})$	Conclusion	P_s [1]	P_u/P_s	Length of B.E. Req'd	A_{sh}/s Req'd	B.E.[2] Length used (h_c)	New A_{sh}/s Req'd	legs	Ash	s (spacing)	Ash/s act	ok/ng	min diam long bars allowed	long spacing of legs	% of Length	A_{sh} Req.	Area of hoops	Legs in addition to outer hoop	Area of added legs	Ash act	ok/ng
	psi	ksi	kips	kips	kips	kip-ft	kips	in^2		in^2	in					kips		in	in/in	in	in/in		in^2	in	in/in		in	in		in^2	in^2		in^2	in^2	
61	7000	75	109	92	201	554	108	4530	0.006	4530	151	1	0.41	0.28	NOT REQ'D	26954	0.01	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
60	7000	75	200	183	383	586	92	4530	0.012	4530	151	1	0.49	0.24	NOT REQ'D	26954	0.01	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
59	7000	75	278	338	816	747	151	4530	0.019	4530	151	1	0.39	0.40	NOT REQ'D	26954	0.02	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
58	7000	75	361	458	819	875	210	4530	0.026	4530	151	1	0.33	0.55	NOT REQ'D	26954	0.03	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
57	7000	75	467	586	1053	1948	325	4530	0.033	4530	151	1	0.48	0.86	NOT REQ'D	26954	0.04	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
56	7000	75	572	575	1248	1908	399	4530	0.039	4530	151	1	0.41	0.97	NOT REQ'D	26954	0.05	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
55	7000	75	894	892	1586	2058	402	4530	0.050	4530	151	1	0.41	1.06	NOT REQ'D	26954	0.06	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
54	7000	75	1184	820	1984	2964	424	4530	0.063	4530	151	1	0.45	1.12	NOT REQ'D	26954	0.07	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
53	7000	75	1455	936	2391	2337	446	4530	0.075	4530	151	1	0.41	1.18	NOT REQ'D	26954	0.09	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
52	7000	75	1742	1053	2796	2380	458	4530	0.088	4530	151	1	0.41	1.21	NOT REQ'D	26954	0.10	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
51	7000	75	2050	1170	3220	2370	457	4530	0.102	4530	151	1	0.41	1.21	PROVIDE B.E.	26954	0.12	23	0.19	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
50	7000	75	2375	1287	3662	2272	441	4530	0.115	4530	151	1	0.41	1.16	PROVIDE B.E.	26954	0.14	23	0.19	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
49	7000	75	2721	1404	4125	2165	427	4530	0.130	4530	151	1	0.40	1.13	PROVIDE B.E.	26954	0.15	23	0.19	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
48	7000	75	3102	1521	4623	1825	367	4530	0.146	4530	151	1	0.40	0.97	PROVIDE B.E.	26954	0.17	24	0.20	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
47	7000	75	3467	1657	5065	2478	362	4530	0.160	4530	151	1	0.54	0.95	PROVIDE B.E.	26954	0.19	26	0.21	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
46	7000	75	3270	1776	5048	3517	584	4530	0.159	4530	151	1	0.47	1.57	PROVIDE B.E.	26954	0.18	25	0.21	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
45	7000	75	1595	1895	3460	2595	931	4530	0.109	4530	151	1	0.22	2.48	PROVIDE B.E.	26954	0.13	23	0.19	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
44	7000	75	1449	2014	3464	1982	824	4530	0.109	4530	151	1	0.18	2.17	PROVIDE B.E.	26954	0.13	23	0.19	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
43	7000	75	2322	2133	4455	2095	655	4530	0.140	4530	151	1	0.25	1.73	PROVIDE B.E.	26954	0.13	23	0.19	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
42	7000	75	2566	2247	4813	1715	399	4530	0.152	4530	151	1	0.35	1.05	PROVIDE B.E.	26954	0.17	24	0.20	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
41	7000	75	2467	2362	4829	2179	391	4530	0.152	4530	151	1	0.44	1.03	PROVIDE B.E.	26954	0.18	25	0.21	75	0.63	13	0.39	4	1.27	OK	0.667	5.8	0.50	0.94	0.31	3	0.60	2.42	OK
40	8000	75	2254	2476	4736	2624	479	4530	0.131	4530	151	1	0.43	1.18	PROVIDE B.E.	30804	0.16	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
39	8000	75	2093	2590	4684	2816	539	4530	0.129	4530	151	1	0.43	1.33	PROVIDE B.E.	30804	0.15	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
38	8000	75	1964	2705	4668	3152	587	4530	0.129	4530	151	1	0.43	1.45	PROVIDE B.E.	30804	0.15	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
37	8000	75	1860	2819	4679	3332	623	4530	0.129	4530	151	1	0.42	1.54	PROVIDE B.E.	30804	0.15	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
36	8000	75	1783	2934	4717	3479	652	4530	0.130	4530	151	1	0.42	1.61	PROVIDE B.E.	30804	0.15	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
35	8000	75	1735	3048	4763	3601	674	4530	0.132	4530	151	1	0.42	1.66	PROVIDE B.E.	30804	0.16	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
34	8000	75	1717	3162	4880	3702	693	4530	0.135	4530	151	1	0.42	1.71	PROVIDE B.E.	30804	0.16	23	0.22	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
33	8000	75	1729	3277	5006	3794	707	4530	0.138	4530	151	1	0.43	1.75	PROVIDE B.E.	30804	0.16	24	0.23	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
32	8000	75	1772	3391	5163	3889	724	4530	0.142	4530	151	1	0.43	1.79	PROVIDE B.E.	30804	0.17	24	0.23	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
31	8000	75	1862	3506	5358	3949	733	4530	0.148	4530	151	1	0.43	1.81	PROVIDE B.E.	30804	0.17	24	0.23	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
30	8000	75	1973	3620	5692	3833	728	4530	0.154	4530	151	1	0.43	1.79	PROVIDE B.E.	30804	0.18	25	0.24	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
29	8000	75	2129	3735	5864	3736	686	4530	0.162	4530	151	1	0.43	1.70	PROVIDE B.E.	30804	0.19	26	0.25	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
28	8000	75	2338	3849	6188	3267	612	4530	0.171	4530	151	1	0.42	1.51	PROVIDE B.E.	30804	0.20	26	0.25	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
27	8000	75	2554	3963	6517	3701	748	4530	0.180	4530	151	1	0.39	1.85	PROVIDE B.E.	30804	0.21	27	0.26	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
26	8000	75	2743	4078	6821	4023	812	4530	0.188	4530	151	1	0.39	2.00	PROVIDE B.E.	30804	0.22	28	0.27	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
25	8000	75	3008	4204	7212	4647	765	4530	0.199	4530	151	1	0.48	1.89	PROVIDE B.E.	30804	0.23	29	0.28	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
24	8000	75	3442	4321	7763	3326	693	4530	0.214	4530	151	1	0.36	1.71	PROVIDE B.E.	30804	0.25	30	0.29	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
23	8000	75	3769	4430	8219	3053	612	4530	0.227	4530	151	1	0.40	1.51	PROVIDE B.E.	30804	0.27	31	0.30	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
22	8000	75	3924	4543	8467	3185	585	4530	0.254	4530	151	1	0.43	1.47	PROVIDE B.E.	30804	0.27	32	0.31	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
21	8000	75	2195	4657	6852	1784	416	4530	0.189	4530	151	1	0.17	2.01	PROVIDE B.E.	30804	0.22	28	0.27	75	0.72	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.07	0.31	3	0.60	2.42	OK
20	10000	75	1481	4771	6252	2451	742	4530	0.138	4530	151	1	0.26	1.64	PROVIDE B.E.	38505	0.16	24	0.28	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
19	10000	75	1498	4885	6383	1757	543	4530	0.141	4530	151	1	0.29	1.20	PROVIDE B.E.	38505	0.17	24	0.29	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
18	10000	75	1845	4998	6843	2347	545	4530	0.151	4530	151	1	0.34	1.20	PROVIDE B.E.	38505	0.18	25	0.30	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
17	10000	75	1811	5107	6918	3486	723	4530	0.153	4530	151	1	0.38	1.60	PROVIDE B.E.	38505	0.18	25	0.30	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
16	10000	75	1808	5216	7025	4123	771	4530	0.155	4530	151	1	0.43	1.79	PROVIDE B.E.	38505	0.18	25	0.30	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
15	10000	75	1965	5325	7290	4686	874	4530	0.161	4530	151	1	0.43	1.93	PROVIDE B.E.	38505	0.19	26	0.31	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
14	10000	75	2246	5434	7680	3185	620	4530	0.170	4530	151	1	0.41	1.37	PROVIDE B.E.	38505	0.20	28	0.32	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
13	10000	75	2844	5547	8191	2300	383	4530	0.181	4530	151	1	0.48	0.84	PROVIDE B.E.	38505	0.21	27	0.33	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
12	10000	75	1643	5661	7304	2663	692	4530	0.161	4530	151	1	0.31	1.53	PROVIDE B.E.	38505	0.19	26	0.31	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
11	10000	75	1417	5775	7192	2613	686	4530	0.159	4530	151	1	0.30	1.51	PROVIDE B.E.	38505	0.19	26	0.31	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
10	10000	75	1521	5889	7410	2390	658	4530	0.164	4530	151	1	0.29	1.45	PROVIDE B.E.	38505	0.19	26	0.31	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
9	10000	75	1955	6002	7957	1697	380	4530	0.176	4530	151	1	0.40	0.84	PROVIDE B.E.	38505	0.21	27	0.32	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
8	10000	75	1878	6111	7989	3431	771	4530	0.176	4530	151	1	0.35	1.70	PROVIDE B.E.	38505	0.21	27	0.32	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
7	10000	75	1905	6220	8125	6168	1018	4530	0.179	4530	151	1	0.46	2.25	PROVIDE B.E.	38505	0.21	27	0.33	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
6	10000	75	1946	6329	8275	6907	1078	4530	0.183	4530	151	1	0.51	2.39	PROVIDE B.E.	38505	0.21	28	0.33	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
5	10000	75	2191	6436	8630	6004	992	4530	0.190	4530	151	1	0.44	2.19	PROVIDE B.E.	38505	0.22	28	0.34	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
4	10000	75	2807	6547	9354	5460	916	4530	0.206	4530	151	1	0.47	2.03	PROVIDE B.E.	38505	0.24	30	0.36	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
3	10000	75	4100	6673	10773	7833	1165	4530	0.238	4530	151	1	0.53	2.58	PROVIDE B.E.	38505	0.26	32	0.39	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
2	10000	75	3447	6834	10281	7226	1294	4530	0.227	4530	151	1	0.44	2.86	PROVIDE B.E.	38505	0.27	31	0.38	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK
Ground	10000	75	4104	7006	11198	4258	827	4530	0.245	4530	151	1	0.41	1.82	PROVIDE B.E.	38505	0.29	33	0.40	75	0.90	13	0.39	4	1.27	OK	0.667	5.8	0.50	1.34	0.31	3	0.60	2.42	OK

5/13/2005

Shear wall boundary element check
DCE #: 4069
Date: 5/13/2005

Width of BE hoop h_x = 21.9 in
Perimeter of wall = 908 in

Notes:
1) Assists in vertical shear design
2) h_x is dimension center to center of BE confining hoops

Wall ID:	P1C		Loads based on Max. Axial																																	
																													Confinement in width								
Floor	f'_c	f_y	P_c	P_{grav} 1.42DL+0.5L	P_c	M_c	V_w (k)	A_g	$P_c/(A_g f'_c)$	A_{cv}	Shear L_w	Symmetry 1=sym 0=un-sym	$M_c/V_c L_w$	$V_w/(A_{cv}*\sqrt{f'_c})$	Conclusion	P_o'	P_c/P_o	Length of B.E. Req'd	A_{sh}/s Req'd	B.E.[2] Length used (h_x)	New A_{sh}/s Req'd	legs	Ash	s (spacing)	Ash/s act	ok/ng	min diam long bars allowed	long spacing of legs	% of Length	A_{sh} Req.	Area of hoops	Legs in addition to outer hoop	Area of added legs	Ash act	ok/ng
	psi	ksi	kips	kips	kips	kip-ft	kips	in^2		in^2	in					kips		in	in/in	in	in/in		in^2	in	in/in		in	in		in^2	in^2		in^2	in^2	
61	7000	75	136	151	287	754	139	5952	0.007	5952	248	1	0.26	0.28	NOT REQ'D	35414	0.01	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
60	7000	75	319	301	620	665	118	5952	0.015	5952	248	1	0.36	0.23	NOT REQ'D	35414	0.02	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
59	7000	75	475	555	1030	659	84	5952	0.025	5952	248	1	0.49	0.17	NOT REQ'D	35414	0.03	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
58	7000	75	605	753	1358	624	74	5952	0.033	5952	248	1	0.54	0.15	NOT REQ'D	35414	0.04	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
57	7000	75	709	963	1672	1087	79	5952	0.040	5952	248	1	0.66	0.16	NOT REQ'D	35414	0.05	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
56	7000	75	800	945	1745	1294	81	5952	0.042	5952	248	1	0.77	0.15	NOT REQ'D	35414	0.05	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
55	7000	75	882	1137	2019	1564	87	5952	0.048	5952	248	1	0.87	0.17	NOT REQ'D	35414	0.06	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
54	7000	75	948	1346	2294	1999	98	5952	0.055	5952	248	1	1.00	0.19	NOT REQ'D	35414	0.06	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
53	7000	75	1009	1536	2547	2253	100	5952	0.061	5952	248	1	1.09	0.20	NOT REQ'D	35414	0.07	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
52	7000	75	1074	1730	2804	2629	112	5952	0.067	5952	248	1	1.14	0.23	NOT REQ'D	35414	0.08	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
51	7000	75	1132	1922	3064	3047	123	5952	0.073	5952	248	1	1.20	0.25	NOT REQ'D	35414	0.09	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
50	7000	75	1180	2114	3294	3528	137	5952	0.079	5952	248	1	1.25	0.27	NOT REQ'D	35414	0.09	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
49	7000	75	1211	2306	3517	4140	161	5952	0.084	5952	248	1	1.24	0.32	NOT REQ'D	35414	0.09	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
48	7000	75	1218	2498	3714	4949	196	5952	0.089	5952	248	1	1.21	0.40	NOT REQ'D	35414	0.10	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
47	7000	75	1182	2722	3904	5564	191	5952	0.094	5952	248	1	1.41	0.38	NOT REQ'D	35414	0.10	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
46	7000	75	1084	2916	4090	5726	245	5952	0.096	5952	248	1	0.74	0.49	NOT REQ'D	35414	0.11	n/a	n/a		n/a				n/a		n/a	n/a	n/a	n/a					n/a	n/a
45	7000	75	1071	3112	4184	1826	377	5952	0.100	5952	248	1	0.23	0.76	PROVIDE B.E.	35414	0.12	37	0.31	57	0.46	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.74	0.31	2	0.60	1.82	OK
44	7000	75	982	3308	4290	2572	337	5952	0.103	5952	248	1	0.37	0.66	PROVIDE B.E.	35414	0.12	37	0.31	57	0.46	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.74	0.31	2	0.60	1.82	OK
43	7000	75	955	3503	4458	4416	361	5952	0.107	5952	248	1	0.59	0.73	PROVIDE B.E.	35414	0.13	37	0.31	57	0.46	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.74	0.31	2	0.60	1.82	OK
42	7000	75	944	3691	4634	4043	156	5952	0.111	5952	248	1	1.25	0.31	PROVIDE B.E.	35414	0.13	37	0.31	57	0.46	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.74	0.31	2	0.60	1.82	OK
41	7000	75	957	3879	4835	3312	237	5952	0.116	5952	248	1	0.67	0.48	PROVIDE B.E.	35414	0.14	37	0.31	57	0.46	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.74	0.31	2	0.60	1.82	OK
40	8000	75	995	4066	5062	3159	205	5952	0.106	5952	248	1	0.75	0.38	PROVIDE B.E.	40474	0.13	37	0.36	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
39	8000	75	1043	4254	5296	3007	190	5952	0.111	5952	248	1	0.77	0.36	PROVIDE B.E.	40474	0.13	37	0.36	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
38	8000	75	1095	4442	5537	2867	181	5952	0.116	5952	248	1	0.77	0.34	PROVIDE B.E.	40474	0.14	37	0.36	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
37	8000	75	1149	4630	5779	2732	177	5952	0.121	5952	248	1	0.75	0.33	PROVIDE B.E.	40474	0.14	37	0.36	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
36	8000	75	1206	4818	6024	2660	176	5952	0.127	5952	248	1	0.73	0.33	PROVIDE B.E.	40474	0.15	37	0.36	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
35	8000	75	1268	5006	6274	2607	176	5952	0.132	5952	248	1	0.72	0.33	PROVIDE B.E.	40474	0.16	38	0.36	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
34	8000	75	1336	5194	6530	2562	177	5952	0.137	5952	248	1	0.71	0.33	PROVIDE B.E.	40474	0.16	39	0.37	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
33	8000	75	1413	5382	6795	2538	177	5952	0.143	5952	248	1	0.69	0.33	PROVIDE B.E.	40474	0.17	39	0.38	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
32	8000	75	1500	5570	7070	2543	181	5952	0.148	5952	248	1	0.68	0.34	PROVIDE B.E.	40474	0.17	40	0.39	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
31	8000	75	1597	5758	7356	2572	192	5952	0.154	5952	248	1	0.67	0.36	PROVIDE B.E.	40474	0.18	41	0.39	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
30	8000	75	1714	5946	7609	2593	210	5952	0.161	5952	248	1	0.67	0.39	PROVIDE B.E.	40474	0.19	42	0.40	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
29	8000	75	1871	6134	8005	3066	225	5952	0.168	5952	248	1	0.66	0.42	PROVIDE B.E.	40474	0.20	43	0.41	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
28	8000	75	2062	6322	8404	3118	210	5952	0.176	5952	248	1	0.72	0.39	PROVIDE B.E.	40474	0.21	44	0.43	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
27	8000	75	2248	6508	8756	3636	211	5952	0.184	5952	248	1	0.84	0.40	PROVIDE B.E.	40474	0.22	45	0.44	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
26	8000	75	2297	6697	8994	3808	210	5952	0.189	5952	248	1	0.88	0.39	PROVIDE B.E.	40474	0.22	46	0.44	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
25	8000	75	2234	6904	9138	3912	229	5952	0.192	5952	248	1	0.83	0.43	PROVIDE B.E.	40474	0.23	47	0.45	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
24	8000	75	2136	7097	9232	4086	240	5952	0.194	5952	248	1	0.82	0.45	PROVIDE B.E.	40474	0.23	47	0.45	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
23	8000	75	2115	7276	9381	4044	215	5952	0.197	5952	248	1	1.04	0.40	PROVIDE B.E.	40474	0.23	47	0.45	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
22	8000	75	1972	7462	9433	3658	335	5952	0.198	5952	248	1	0.53	0.63	PROVIDE B.E.	40474	0.23	48	0.46	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
21	8000	75	1976	7649	9624	1365	518	5952	0.202	5952	248	1	0.13	0.97	PROVIDE B.E.	40474	0.24	48	0.46	57	0.55	10	0.40	4	0.99	OK	0.667	5.7	0.23	0.84	0.31	2	0.60	1.82	OK
20	10000	75	1890	7836	9726	1456	176	5952	0.163	5952	248	1	0.40	0.30	PROVIDE B.E.	50592	0.19	42	0.51	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
19	10000	75	1831	8023	9854	2218	298	5952	0.168	5952	248	1	0.36	0.50	PROVIDE B.E.	50592	0.19	43	0.51	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
18	10000	75	1800	8209	10009	2673	353	5952	0.168	5952	248	1	0.37	0.59	PROVIDE B.E.	50592	0.20	43	0.52	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
17	10000	75	1854	8388	10242	2229	184	5952	0.172	5952	248	1	0.58	0.31	PROVIDE B.E.	50592	0.20	44	0.52	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
16	10000	75	1886	8567	10453	1692	238	5952	0.176	5952	248	1	0.34	0.40	PROVIDE B.E.	50592	0.21	44	0.53	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
15	10000	75	1902	8748	10648	1930	235	5952	0.179	5952	248	1	0.40	0.39	PROVIDE B.E.	50592	0.21	45	0.54	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
14	10000	75	1903	8925	10828	2845	233	5952	0.182	5952	248	1	0.59	0.39	PROVIDE B.E.	50592	0.21	45	0.54	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
13	10000	75	1811	9111	10922	2682	266	5952	0.184	5952	248	1	0.49	0.45	PROVIDE B.E.	50592	0.22	45	0.54	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
12	10000	75	1768	9298	11066	1261	421	5952	0.186	5952	248	1	0.15	0.71	PROVIDE B.E.	50592	0.22	46	0.55	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
11	10000	75	1872	9486	11157	1213	215	5952	0.187	5952	248	1	0.27	0.36	PROVIDE B.E.	50592	0.22	46	0.55	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
10	10000	75	1830	9672	11302	2430	428	5952	0.190	5952	248	1	0.28	0.72	PROVIDE B.E.	50592	0.22	46	0.56	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
9	10000	75	1655	9858	11512	3606	515	5952	0.193	5952	248	1	0.36	0.88	PROVIDE B.E.	50592	0.23	47	0.56	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
8	10000	75	1737	10037	11774	2977	306	5952	0.198	5952	248	1	0.47	0.51	PROVIDE B.E.	50592	0.23	47	0.57	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
7	10000	75	1777	10218	11993	2402	399	5952	0.201	5952	248	1	0.29	0.67	PROVIDE B.E.	50592	0.24	48	0.58	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
6	10000	75	1881	10395	12276	2311	434	5952	0.206	5952	248	1	0.26	0.73	PROVIDE B.E.	50592	0.24	48	0.58	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
5	10000	75	2037	10574	12611	3408	443	5952	0.212	5952	248	1	0.37	0.74	PROVIDE B.E.	50592	0.25	50	0.59	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
4	10000	75	2265	10753	13016	3685	484	5952	0.219	5952	248	1	0.37	0.81	PROVIDE B.E.	50592	0.26	51	0.61	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
3	10000	75	2574	10960	13533	3308	445	5952	0.227	5952	248	1	0.90	0.75	PROVIDE B.E.	50592	0.27	52	0.62	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
2	10000	75	2676	11225	13900	14902	1148	5952	0.234	5952	248	1	0.63	1.92	PROVIDE B.E.	50592	0.27	53	0.63	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK
Ground	10000	75	2703	11505	14208	14158	673	5952	0.239	5952	248	1	1.02	1.13	PROVIDE B.E.	50592	0.28	53	0.64	57	0.68	10	0.40	4	0.99	OK	0.667	5.7	0.23	1.05	0.31	2	0.60	1.82	OK

Shear wall boundary element check
DCE #: 4069
Date: 5/13/2005

Width of BE hoop h_x= 27.0 in
Perimeter of wall = 908 in

Wall ID:	P1D		Loads based on Max. Axial																														Confinement in width					
Floor	f'_c	fy	P_E	P_{Shear} 1.42DL+0.5L	P_U	M_u	V_u (k)	A_g	$P_u/(A_g f'_c)$	A_{sh}	Shear L_w	Symmetry 1=sym 0=un-sym	$M_u/V_u L_w$	$V_u/(A_{cv}*sqrt(f'_c))$	Conclusion	P_o'	P_u/P_o	Length of B.E. Req'd	A_{sh}/s Req'd	B.E.' Length used (h_c)	New A_{sh}/s Req'd	legs	Ash	s (spacing)	Ash/s act	ok/ng	min diam long bars allowed	long spacing of legs	% of Length	A_{sh} Req.	Area of hoops	Legs in addition to outer hoop	Area of added legs	Ash act	ok/ng
	psi	ksi	kips	kips	kips	kip-ft	kips	in²		in²	in					kips		in	in/in	in	in/in		in²	in	in/in		in	in		in²	in²		in²	in²	
61	7000	75	130	92	222	1060	232	4530	0.007	4530	151	1	0.36	0.61	NOT REQ'D	26954	0.01	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
60	7000	75	209	183	392	513	123	4530	0.012	4530	151	1	0.33	0.32	NOT REQ'D	26954	0.01	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
59	7000	75	281	338	619	786	184	4530	0.020	4530	151	1	0.38	0.43	NOT REQ'D	26954	0.02	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
58	7000	75	371	458	829	826	198	4530	0.026	4530	151	1	0.33	0.52	NOT REQ'D	26954	0.03	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
57	7000	75	582	586	1138	1780	297	4530	0.038	4530	151	1	0.46	0.76	NOT REQ'D	26954	0.04	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
56	7000	75	774	575	1349	1742	337	4530	0.043	4530	151	1	0.41	0.89	NOT REQ'D	26954	0.05	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
55	7000	75	1015	692	1708	1837	360	4530	0.054	4530	151	1	0.41	0.95	NOT REQ'D	26954	0.06	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
54	7000	75	1305	820	2124	2264	376	4530	0.067	4530	151	1	0.46	0.99	NOT REQ'D	26954	0.06	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
53	7000	75	1620	936	2556	2073	396	4530	0.081	4530	151	1	0.42	1.04	NOT REQ'D	26954	0.08	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
52	7000	75	1937	1053	2990	2130	408	4530	0.094	4530	151	1	0.41	1.08	NOT REQ'D	26954	0.09	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
51	7000	75	2272	1170	3442	2159	413	4530	0.109	4530	151	1	0.41	1.09	NOT REQ'D	26954	0.11	n/a	n/a		n/a				n/a	n/a	n/a	n/a	n/a	n/a				n/a	n/a
50	7000	75	2621	1287	3908	2147	411	4530	0.123	4530	151	1	0.41	1.09	PROVIDE B.E.	26954	0.13	23	0.19	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
49	7000	75	2977	1404	4381	2108	405	4530	0.138	4530	151	1	0.41	1.07	PROVIDE B.E.	26954	0.15	23	0.19	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
48	7000	75	3321	1521	4842	1768	358	4530	0.153	4530	151	1	0.39	0.95	PROVIDE B.E.	26954	0.16	24	0.20	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
47	7000	75	3529	1657	5187	1929	285	4530	0.184	4530	151	1	0.54	0.75	PROVIDE B.E.	26954	0.19	26	0.22	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
46	7000	75	3288	1778	5064	3770	556	4530	0.160	4530	151	1	0.54	1.47	PROVIDE B.E.	26954	0.19	26	0.21	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
45	7000	75	1735	1895	3630	2608	944	4530	0.114	4530	151	1	0.22	2.49	PROVIDE B.E.	26954	0.13	23	0.19	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
44	7000	75	1507	2014	3581	2094	842	4530	0.113	4530	151	1	0.20	2.22	PROVIDE B.E.	26954	0.13	23	0.19	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
43	7000	75	2324	2133	4457	1929	644	4530	0.141	4530	151	1	0.24	1.70	PROVIDE B.E.	26954	0.17	24	0.20	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
42	7000	75	2543	2247	4790	1948	321	4530	0.151	4530	151	1	0.41	0.85	PROVIDE B.E.	26954	0.18	25	0.21	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
41	7000	75	2537	2362	4898	2307	406	4530	0.154	4530	151	1	0.45	1.07	PROVIDE B.E.	26954	0.18	25	0.21	73	0.61	13	0.38	4	1.22	OK	0.667	5.6	0.48	0.94	0.31	3	0.60	2.42	OK
40	8000	75	2394	2476	4870	2591	466	4530	0.134	4530	151	1	0.42	1.21	PROVIDE B.E.	30804	0.16	23	0.22	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
39	8000	75	2244	2590	4834	2733	516	4530	0.133	4530	151	1	0.42	1.27	PROVIDE B.E.	30804	0.16	23	0.22	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
38	8000	75	2108	2705	4813	2869	544	4530	0.133	4530	151	1	0.42	1.34	PROVIDE B.E.	30804	0.16	23	0.22	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
37	8000	75	1993	2819	4813	2988	567	4530	0.133	4530	151	1	0.42	1.40	PROVIDE B.E.	30804	0.16	23	0.22	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
36	8000	75	1904	2934	4838	3098	589	4530	0.133	4530	151	1	0.42	1.45	PROVIDE B.E.	30804	0.16	23	0.22	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
35	8000	75	1845	3048	4893	3200	608	4530	0.135	4530	151	1	0.42	1.50	PROVIDE B.E.	30804	0.16	23	0.22	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
34	8000	75	1821	3162	4983	3295	626	4530	0.138	4530	151	1	0.42	1.54	PROVIDE B.E.	30804	0.16	24	0.23	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
33	8000	75	1831	3277	5107	3385	643	4530	0.141	4530	151	1	0.42	1.59	PROVIDE B.E.	30804	0.17	24	0.23	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
32	8000	75	1875	3391	5299	3482	661	4530	0.145	4530	151	1	0.42	1.63	PROVIDE B.E.	30804	0.17	24	0.23	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
31	8000	75	1958	3506	5494	3578	679	4530	0.151	4530	151	1	0.42	1.68	PROVIDE B.E.	30804	0.18	25	0.24	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
30	8000	75	2080	3620	5700	3646	690	4530	0.157	4530	151	1	0.42	1.70	PROVIDE B.E.	30804	0.19	25	0.24	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
29	8000	75	2231	3735	5905	3703	699	4530	0.165	4530	151	1	0.42	1.72	PROVIDE B.E.	30804	0.19	25	0.25	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
28	8000	75	2401	3849	6250	3875	713	4530	0.172	4530	151	1	0.43	1.76	PROVIDE B.E.	30804	0.20	27	0.26	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
27	8000	75	2595	3963	6558	3851	712	4530	0.181	4530	151	1	0.43	1.76	PROVIDE B.E.	30804	0.21	27	0.26	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
26	8000	75	2853	4078	6931	3741	700	4530	0.191	4530	151	1	0.42	1.73	PROVIDE B.E.	30804	0.22	28	0.27	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
25	8000	75	3261	4204	7465	4390	689	4530	0.206	4530	151	1	0.51	1.70	PROVIDE B.E.	30804	0.24	30	0.28	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
24	8000	75	3707	4321	8028	3211	645	4530	0.222	4530	151	1	0.40	1.59	PROVIDE B.E.	30804	0.26	31	0.30	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
23	8000	75	4003	4430	8433	2790	573	4530	0.233	4530	151	1	0.39	1.41	PROVIDE B.E.	30804	0.27	32	0.31	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
22	8000	75	4008	4543	8551	3619	546	4530	0.236	4530	151	1	0.53	1.35	PROVIDE B.E.	30804	0.28	32	0.31	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
21	8000	75	2343	4657	7000	2003	849	4530	0.193	4530	151	1	0.19	2.09	PROVIDE B.E.	30804	0.23	28	0.27	73	0.70	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.07	0.31	3	0.60	2.42	OK
20	10000	75	1568	4771	8339	2720	779	4530	0.140	4530	151	1	0.26	1.72	PROVIDE B.E.	38505	0.16	24	0.29	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
19	10000	75	1493	4885	8378	2356	714	4530	0.141	4530	151	1	0.26	1.56	PROVIDE B.E.	38505	0.17	24	0.29	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
18	10000	75	1778	4995	8774	2585	805	4530	0.150	4530	151	1	0.34	1.33	PROVIDE B.E.	38505	0.18	25	0.30	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
17	10000	75	1803	5107	8810	3753	786	4530	0.153	4530	151	1	0.38	1.73	PROVIDE B.E.	38505	0.18	25	0.30	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
16	10000	75	1901	5216	7117	4031	777	4530	0.157	4530	151	1	0.41	1.71	PROVIDE B.E.	38505	0.18	25	0.30	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
15	10000	75	2207	5325	7532	4201	812	4530	0.166	4530	151	1	0.41	1.79	PROVIDE B.E.	38505	0.20	26	0.31	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
14	10000	75	2556	5434	7990	4284	805	4530	0.176	4530	151	1	0.42	1.78	PROVIDE B.E.	38505	0.21	27	0.32	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
13	10000	75	2612	5547	8339	4178	856	4530	0.185	4530	151	1	0.51	1.45	PROVIDE B.E.	38505	0.22	28	0.33	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
12	10000	75	1882	5661	7543	3280	879	4530	0.167	4530	151	1	0.30	1.94	PROVIDE B.E.	38505	0.20	26	0.31	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
11	10000	75	1499	5775	7275	3184	808	4530	0.161	4530	151	1	0.31	1.78	PROVIDE B.E.	38505	0.19	26	0.31	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
10	10000	75	1573	5889	7462	2906	786	4530	0.165	4530	151	1	0.29	1.73	PROVIDE B.E.	38505	0.19	26	0.31	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
9	10000	75	1958	6002	7960	3431	680	4530	0.176	4530	151	1	0.40	1.50	PROVIDE B.E.	38505	0.21	27	0.32	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
8	10000	75	1970	6111	8081	3394	660	4530	0.178	4530	151	1	0.41	1.48	PROVIDE B.E.	38505	0.21	27	0.33	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
7	10000	75	2077	6220	8297	5358	686	4530	0.163	4530	151	1	0.48	1.96	PROVIDE B.E.	38505	0.22	28	0.33	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
6	10000	75	2248	6329	8576	5597	846	4530	0.169	4530	151	1	0.53	1.87	PROVIDE B.E.	38505	0.22	28	0.34	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
5	10000	75	2543	6438	8981	5965	830	4530	0.198	4530	151	1	0.57	1.83	PROVIDE B.E.	38505	0.23	29	0.35	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
4	10000	75	2974	6547	9521	5158	907	4530	0.210	4530	151	1	0.45	2.00	PROVIDE B.E.	38505	0.25	30	0.36	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
3	10000	75	4470	8673	11143	9284	1348	4530	0.248	4530	151	1	0.55	2.97	PROVIDE B.E.	38505	0.29	33	0.40	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
2	10000	75	3972	8634	10806	6207	1080	4530	0.239	4530	151	1	0.46	2.38	PROVIDE B.E.	38505	0.28	33	0.39	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK
Ground	10000	75	4676	7065	11681	4186	870	4530	0.258	4530	151	1	0.38	1.92	PROVIDE B.E.	38505	0.30	34	0.41	73	0.88	13	0.38	4	1.22	OK	0.667	5.6	0.48	1.34	0.31	3	0.60	2.42	OK

Project 301 MISSION Page ____ Of ____

Project No. ____ Date 1/7/05

Item COMBINE SHEAR & CONFINEMENT RECT PIER LOWER 10 LEVELS By NJR Ch'kd ____

(ETABS NEW RIGS 1.01)

TIES = GR 75

for Vert s = 4"

CONFINEMENT

DETERMINE Ash req through 36" WIDTH

$A_{sh} = 0.09\, s\, h_c\, f'_c/(f_y \cdot 1000)$

$= 0.09\,(4)(33.9)(10{,}000)/(75{,}000)$

$A_{sh_{req}} = 1.63\ in^2$

SHEAR

(OPTION 1) $V_u = 4267$ kips

$\phi V_n = \phi A_{cv}(2.0\sqrt{f'_c} + \rho_n f_y)$

$4267k = (0.6)(12960\ in^2)(2.0\sqrt{10000} + \rho_n(75{,}000))$

$\rho_n = 0.00465$

@ 4" O.C. VERT $\Rightarrow A_{sv} = \rho_n(A_{c\perp}) = 0.00465(36")(4")$

$A_{sv_{req}} = 0.669\ in^2$

4"

(OPTION 2) (WALLACE PEER)

$V_{expected} = \omega_v \frac{m_o}{m_u} V_{u\,(STATIC\ LOAD)}$ $V_{u\,STATIC\,LOAD} = 3462$ kips (UBC×5M)

$= (5/3)(2)\,V_u$

$= 3.33\,V_u$

$= 3.33\,(3462\ kips)$

$= 11528$ kips

Set $\phi V_n = V_{expected}$ $(\phi = 0.85)$

$11528k = (0.85)(12960)(2.0\sqrt{10{,}000} + \rho_n(75{,}000))$

$\rho_n = 0.01128$

$A_{sv_{req}} = 0.01128(36")(4")$

$= 1.625\ in^2$

$A_{sv_{req}} = 1.625\ in^2$

8.1.1-43

DESIMONE

Project 301 Page ____ Of ____

Project No. 4069D Date 1/7/05

Item ____ By NJR Ch'kd ____

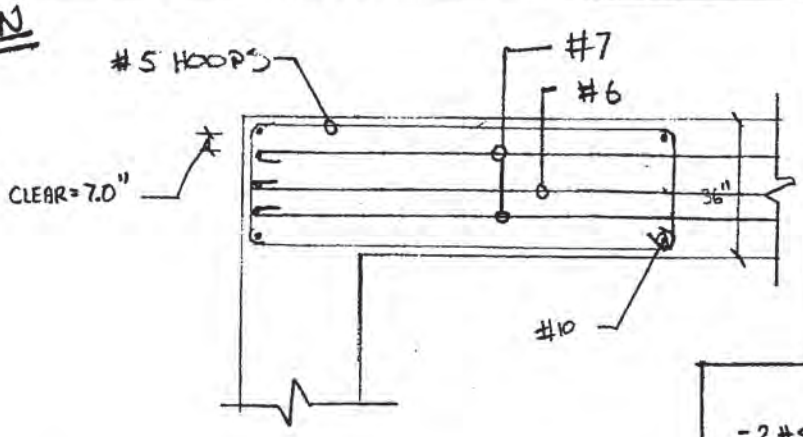
∴ Min (un-conservative CODE BASED) HORZ STEEL REQ = $1.63in^2 + 0.67in^2$

$A_{SH_{min}} = 2.3\ in^2$

MAX (Gaurenteed NO SHEAR FAILURE CAPACITY DESIGN) = $1.63in^2 + 1.625in^2$

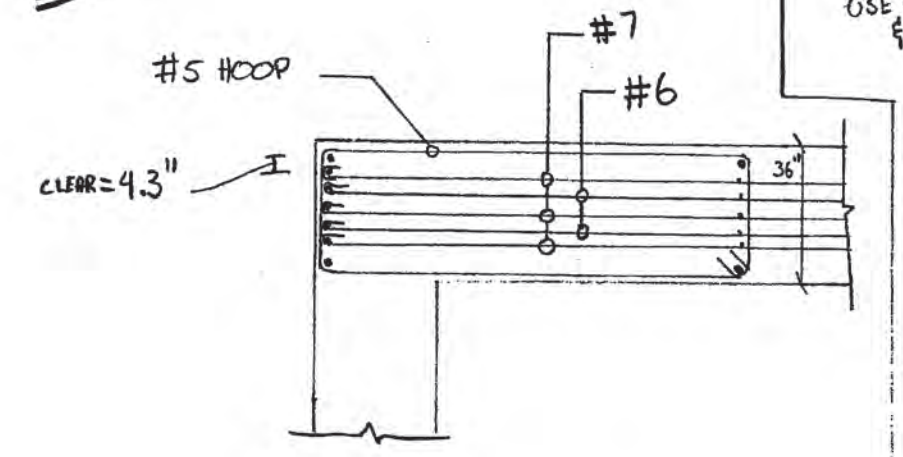
$A_{SH_{MAX}} = 3.3\ in^2$

MIN



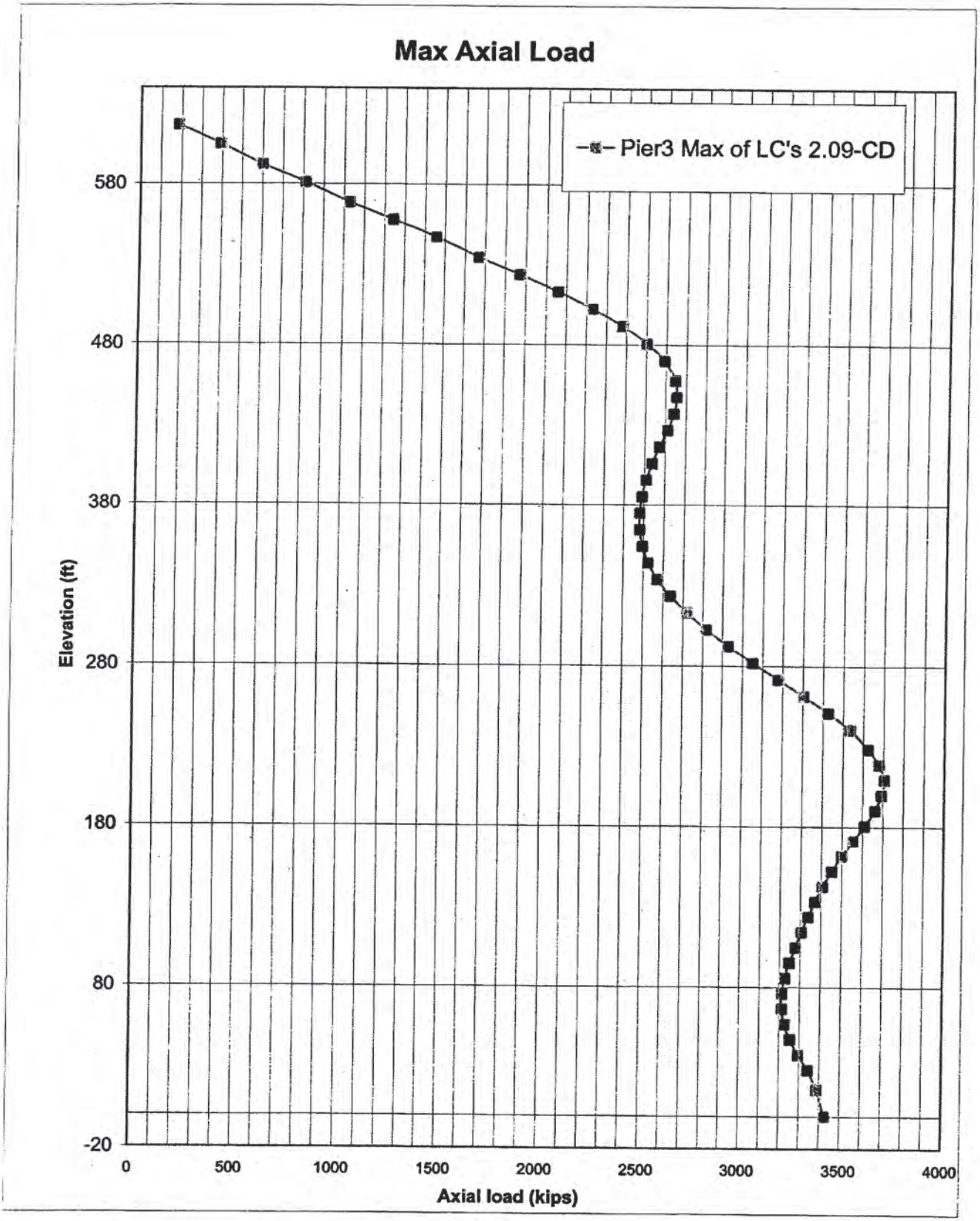
	MIN	MAX
	2.3	3.3
-2#5(0.62)	1.68	2.68
∴	2#9 ($2.0in^2$)	∴ 3#9 ($3.0\ in^2$)
	3#8 ($2.37in^2$)	4#8 ($3.16\ in^2$)
	3#7 ($1.8in^2$)	5#7 ($3.0\ in^2$)
USE 2#7 & 1#6	($1.64in^2$)	USE 3#7, 2#6 ($2.68\ in^2$)

MAX



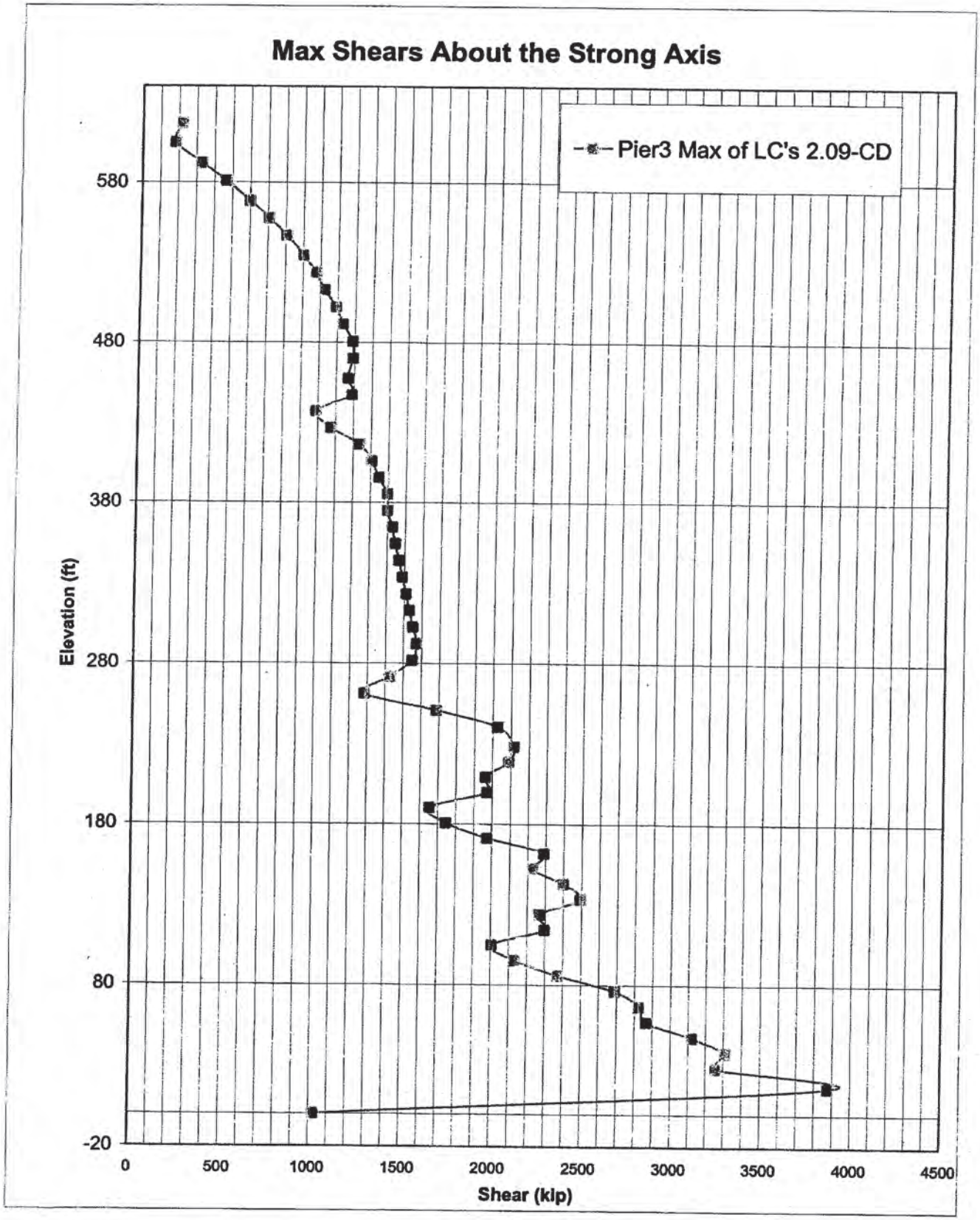
8.1.1-44

Print Date 5/9/2005



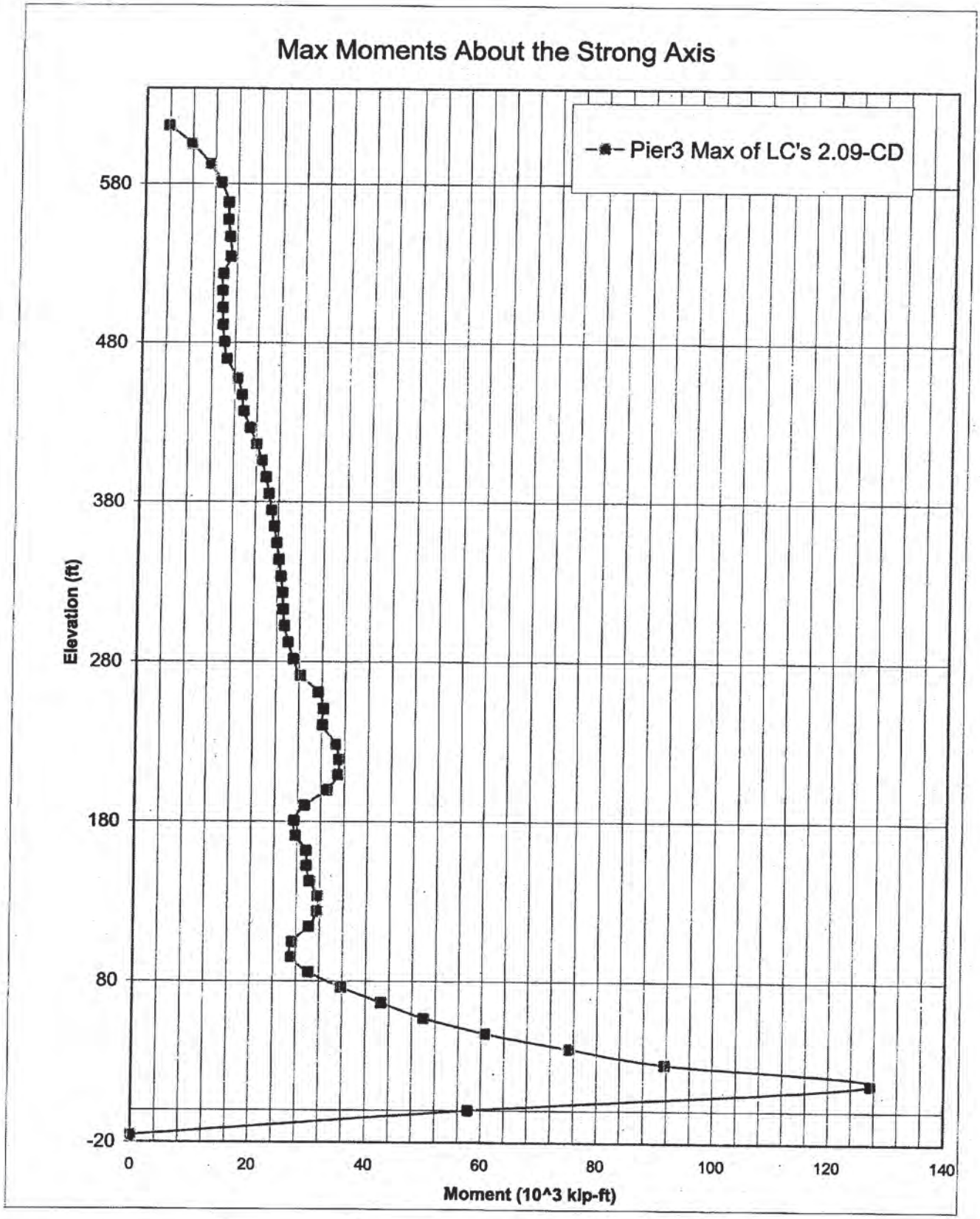
8.1.1-45

Print Date 5/9/2005



8.1.1-46

Print Date 5/9/2005



8.1.1-47

Print Date 5/16/2005

Unit Wt.	0.150	kcf
Min trib area from group	1160	ft² (For Tension)
Max trib area from group	1165	ft² (For Compression)
Live Load (40% corridor, 60% units)	64	psf

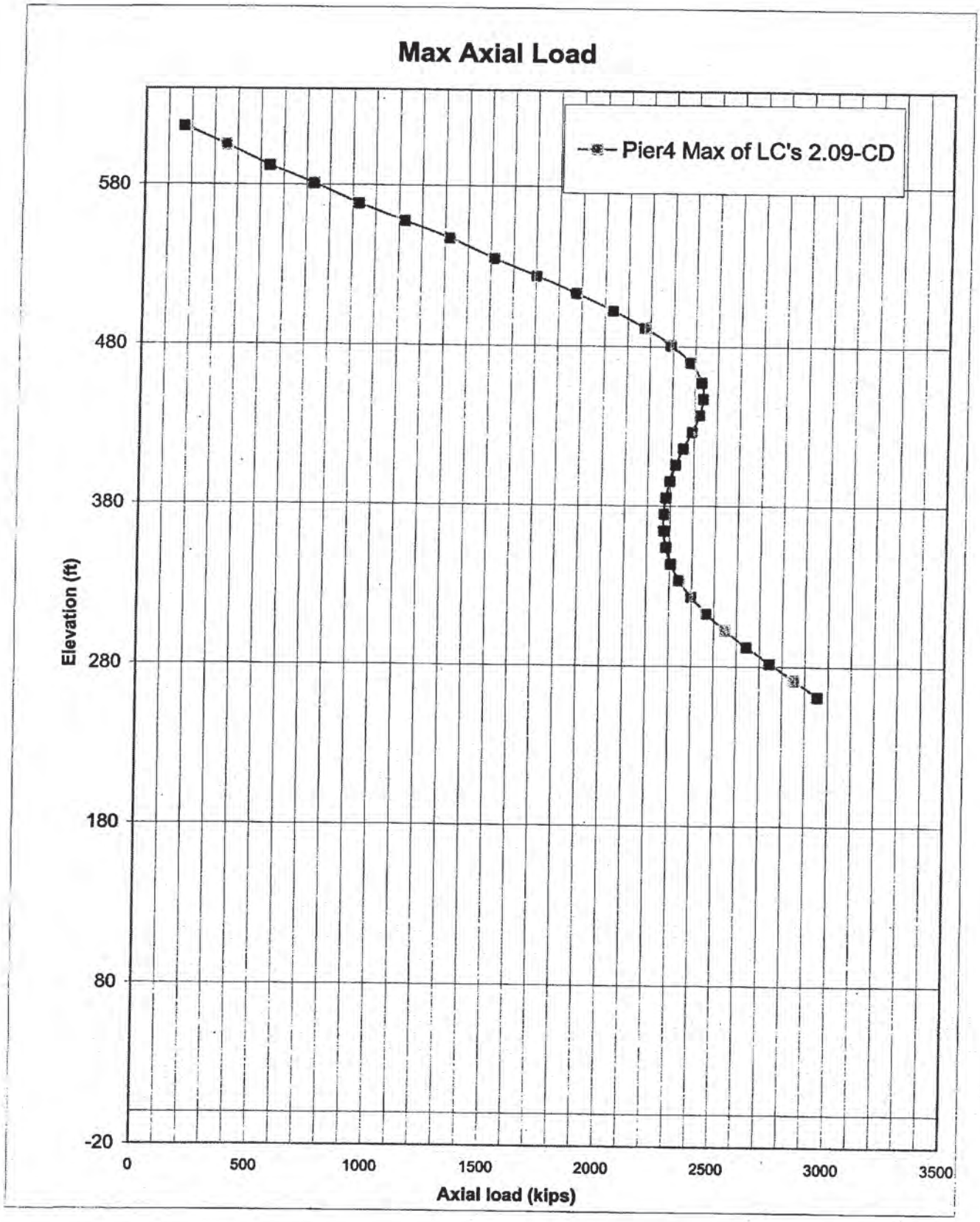
dlf	dlf	dlf
1.0	1.0	1.0

Pier3 (3A &3B)

Floor	Usage	Flr. Ht. ft.	Elevation ft.	Width in	Length in	Trib A. sq. ft	Cum Trib A. sq. ft	Trib A. sq. ft	Cum Trib A. sq. ft	Floor DL psf	Red. LL psf	Total Steel Link Beams Trib Length incl. Embed ft	Wt. klf	Beam DL klps	Outrigger Length ft	Outrigger Weight klf	Outrigger DL klps	Misc. LL klps	Self Wt klps	Min Total DL klps	Min Cum DL klps	Max Total DL klps	Max Cum DL klps	Cum Reducible LL klps	LL % multiplier	Cum Red. LL klps	Cum Service klps	Cum Service klps	1.42(dl)D+0.5L Design klps	0.9*D Design klps	1.4(dl)D+1.7L Design klps
61	Cap	11.0	627.7	30	404	310	310	312	312	248	20				0	0	0		139	216	216	216	216	6	1.00	6	222	222	310	194	313
60	Mech	11.8	616.7	30	404	310	620	312	624	171	20	12.6	0.654	8	0	0	0		148	219	425	220	426	12	0.85	11	436	437	610	383	615
59	Roof	12.6	605.0	30	404	1076	1696	1081	1705	205	20	12.6	0.654	8	0	0	0		161	390	815	391	817	34	0.61	21	836	838	1170	734	1179
58	Typ	11.3	592.2	30	404	1076	2772	1081	2786	128	64	12.6	0.654	8	0	0	0		142	288	1103	289	1106	103	0.53	55	1158	1161	1597	993	1641
57	Typ	12.5	581.0	30	404	1076	3848	1081	3866	128	64	12.6	0.654	8	0	0	0		158	304	1407	304	1410	172	0.49	84	1491	1494	2044	1266	2117
56	Typ	10.8	568.5	30	404	1076	3848	1081	3866	128	64	12.6	0.654	8	0	0	0		136	282	1385	282	1388	172	0.49	84	1469	1472	2013	1246	2087
55	Typ	10.8	557.7	30	404	1076	4924	1081	4947	128	64	12.6	0.654	8	0	0	0		136	282	1667	282	1670	240	0.46	112	1778	1782	2427	1500	2528
54	Typ	12.5	547.0	30	404	1076	6000	1081	6028	128	64	12.6	0.654	8	0	0	0		158	304	1970	304	1975	309	0.44	137	2108	2112	2873	1773	2998
53	Typ	10.8	534.5	30	404	1076	7076	1081	7109	128	64	12.6	0.654	8	0	0	0		136	282	2252	282	2257	378	0.43	162	2414	2419	3286	2027	3435
52	Typ	10.8	523.7	30	404	1076	8151	1081	8190	128	64	12.6	0.654	8	0	0	0		136	282	2534	282	2539	447	0.42	186	2720	2725	3699	2280	3873
51	Typ	10.8	513.0	30	404	1076	9227	1081	9271	128	64	12.6	0.654	8	0	0	0		136	282	2815	282	2821	516	0.41	210	3025	3031	4111	2534	4306
50	Typ	10.8	502.2	30	404	1076	10303	1081	10351	128	64	12.6	0.654	8	0	0	0		136	282	3097	282	3104	585	0.40	234	3334	3338	4524	2787	4743
49	Typ	10.8	491.5	30	404	1076	11379	1081	11432	128	64	12.6	0.654	8	0	0	0		136	282	3379	282	3386	654	0.40	261	3640	3648	4939	3041	5185
48	Typ	10.8	480.7	30	404	1076	12455	1081	12513	128	64	12.6	0.654	8	0	0	0		136	282	3660	282	3668	722	0.40	289	3949	3957	5354	3294	5627
47	Mech	12.5	470.0	30	404	1076	13530	1081	13594	146.5	100	12.6	0.654	8	0	0	0		158	324	3984	324	3993	830	0.40	332	4316	4325	5836	3586	6154
46	Typ	10.3	457.5	30	404	1076	14606	1081	14675	128	64	12.6	0.654	8	0	0	0		130	276	4260	277	4270	899	0.40	360	4620	4629	6243	3834	6589
45	Typ	10.3	447.2	30	404	1076	15682	1081	15756	128	64	12.6	0.654	8	0	0	0		130	276	4537	277	4547	968	0.40	387	4924	4934	6650	4083	7024
44	Typ	10.3	436.8	30	404	1076	16758	1081	16836	128	64	12.6	0.654	8	0	0	0		130	276	4813	277	4824	1037	0.40	415	5228	5239	7057	4332	7458
43	Typ	10.3	426.5	30	404	1076	17834	1081	17917	128	64	12.6	0.654	8	0	0	0		130	276	5090	277	5101	1105	0.40	442	5532	5543	7464	4581	7893
42	Typ	10.3	416.2	30	404	1076	18910	1081	18998	128	64	12.6	0.654	8	0	0	0		130	276	5366	277	5378	1174	0.40	470	5836	5848	7872	4829	8328
41	Typ	10.3	405.8	30	404	1076	19985	1081	20079	128	64	12.6	0.654	8	0	0	0		130	276	5642	277	5655	1243	0.40	497	6140	6152	8279	5078	8762
40	Typ	10.3	395.5	30	404	1076	21061	1081	21160	128	64	12.6	0.654	8	0	0	0		130	276	5919	277	5932	1312	0.40	525	6444	6457	8686	5327	9197
39	Typ	10.3	385.2	30	404	1076	22137	1081	22241	128	64	12.6	0.654	8	0	0	0		130	276	6195	277	6209	1381	0.40	552	6748	6762	9093	5576	9632
38	Typ	10.3	374.8	30	404	1076	23213	1081	23321	128	64	12.6	0.654	8	0	0	0		130	276	6472	277	6486	1450	0.40	580	7051	7066	9500	5824	10066
37	Typ	10.3	364.5	30	404	1076	24289	1081	24402	128	64	12.6	0.654	8	0	0	0		130	276	6748	277	6763	1519	0.40	607	7355	7371	9908	6073	10501
36	Typ	10.3	354.2	30	404	1076	25365	1081	25483	128	64	12.6	0.654	8	0	0	0		130	276	7024	277	7040	1587	0.40	635	7659	7675	10315	6322	10936
35	Typ	10.3	343.8	30	404	1076	26440	1081	26564	128	64	12.6	0.654	8	0	0	0		130	276	7301	277	7317	1656	0.40	663	7963	7980	10722	6571	11371
34	Typ	10.3	333.5	30	404	1076	27516	1081	27645	128	64	12.6	0.654	8	0	0	0		130	276	7577	277	7594	1725	0.40	690	8267	8284	11129	6819	11805
33	Typ	10.3	323.2	30	404	1076	28592	1081	28726	128	64	12.6	0.654	8	0	0	0		130	276	7854	277	7871	1794	0.40	718	8571	8589	11536	7068	12240
32	Typ	10.3	312.8	30	404	1076	29668	1081	29806	128	64	12.6	0.654	8	0	0	0		130	276	8130	277	8148	1863	0.40	745	8875	8894	11943	7317	12675
30	Typ	10.3	302.5	30	404	1076	30744	1081	30887	128	64	12.6	0.654	8	0	0	0		130	276	8406	277	8426	1932	0.40	773	9179	9198	12351	7566	13109
29	Typ	10.3	292.2	30	404	1076	31820	1081	31968	128	64	12.6	0.654	8	0	0	0		130	276	8683	277	8703	2001	0.40	800	9483	9503	12758	7815	13544
28	Typ	10.3	281.8	30	404	1076	32895	1081	33049	128	64	12.6	0.654	8	0	0	0		130	276	8959	277	8980	2069	0.40	828	9787	9807	13165	8063	13979
27	Typ	10.3	271.5	30	404	1076	33971	1081	34130	128	64	12.6	0.654	8	0	0	0		130	276	9236	277	9257	2138	0.40	855	10091	10112	13572	8312	14413
26	Typ	10.3	261.2	30	404	1076	35047	1081	35211	128	64	12.6	0.654	8	0	0	0		130	276	9512	277	9534	2207	0.40	883	10395	10417	13979	8561	14848
25	Typ	12.3	250.8	30	404	1076	36123	1081	36291	128	64	12.6	0.591	7	0	0	0		130	276	9788	276	9810	2276	0.40	910	10698	10720	14385	8809	15282
24	Mech	9.5	238.5	30	404	1076	37199	1081	37372	128	64	12.6	0.591	7	0	0	0		155	300	10087	300	10110	2345	0.40	938	11025	11048	14826	9079	15749
23	Typ	9.5	218.8	30	404	1076	39350	1081	39534	128	64	12.6	0.591	7	0	0	0		120	285	10372	286	10396	2452	0.40	981	11353	11377	15253	9335	16222
22	Typ	9.5	209.3	30	404	1076	40426	1081	40615	128	64	12.6	0.591	7	0	0	0		120	265	10638	266	10662	2521	0.40	1009	11646	11670	15644	9574	16641
21	Typ	9.5	199.8	30	404	1076	41502	1081	41696	128	64	12.6	0.591	7	0	0	0		120	265	10903	266	10928	2590	0.40	1036	11939	11964	16035	9812	17060
20	Typ	9.5	190.3	30	404	1076	42578	1081	42776	128	64	12.6	0.591	7	0	0	0		120	265	11168	266	11193	2659	0.40	1064	12231	12257	16426	10051	17479
19	Typ	9.5	180.8	30	404	1076	43654	1081	43857	128	64	12.6	0.591	7	0	0	0		120	265	11433	266	11459	2728	0.40	1091	12524	12550	16817	10290	17898
18	Typ	9.5	171.3	30	404	1076	44730	1081	44938	128	64	12.6	0.591	7	0	0	0		120	265	11698	266	11725	2797	0.40	1119	12817	12843	17209	10528	18316
17	Typ	9.5	161.8	30	404	1076	45805	1081	46019	128	64	12.6	0.591	7	0	0	0		120	265	11963	266	11991	2866	0.40	1146	13109	13137	17600	10767	18735
16	Typ	9.5	152.3	30	404	1076	46881	1081	47100	128	64	12.6	0.591	7	0	0	0		120	265	12228	266	12256	2934	0.40	1174	13402	13430	17991	11005	19154
15	Typ	9.5	142.8	30	404	1076	47957	1081	48181	128	64	12.6	0.591	7	0	0	0		120	265	12493	266	12522	3003	0.40	1201	13694	13723	18382	11244	19573
14	Typ	9.5	133.3	30	404	1076	49033	1081	49261	128	64	12.6	0.591	7	0	0	0		120	265	12758	266	12788	3072	0.40	1229	13987	14017	18773	11482	19992
13	Typ	9.5	123.8	30	404	1076	50109	1081	50342	128	64	12.6	0.591	7	0	0	0		120	265	13023	266	13053	3141	0.40	1256	14280	14310	19164	11721	20411
12	Typ	9.5	114.3	30	404	1076	51185	1081	51423	128	64	12.6	0.591	7	0	0	0		120	265	13288	266	13319	3210	0.40	1284	14572	14603	19555	11960	20829
11	Typ	9.5	104.8	30	404	1076	52260	1081	52504	128	64	12.6	0.591	7	0	0	0		120	265	13554	266	13585	3279	0.40	1311	14865	14896	19946	12198	21248
10	Typ	9.5	95.3	30	404	1076	53336	1081	53585	128	64	12.6	0.591	7	0	0	0		120	265	13819	266	13851	3347	0.40	1339	15158	15190	20337	12437	21667
9	Typ	9.5	85.8	30	404	1076	54412	1081	54666	128	64	12.6	0.591	7	0	0	0		120	265	14084	266	14116	3416	0.40	1367	15450	15483	20728	12675	22086
8	Typ	9.5	76.3	30	404	1076	55488	1081	55746	128	64	12.6	0.591	7	0	0	0		120	265	14349	266	14382	3485	0.40	1394	15743	15776	21120	12914	22505
7	Typ	9.5	66.8	30	404	1076	56564	1081	56827	128	64	12.6	0.591	7	0	0	0		120	265	14614	266	14648	3554	0.40	1422	16036	16069	21511	13153	22924
6	Typ	9.5	57.3	30	404	1076	57640	1081	57908	128	64	12.6	0.591	7	0	0	0		120	265	14879	266	14914	3623	0.40	1449	16328	16363	21902	13391	23343
5	Typ	9.5	47.8	30	404	1076	58715	1081	58989	128	64	12.6	0.591	7	0	0	0		120	265	15144	266	15179	3692	0.40	1477	16621	16656	22293	13630	23761
4	Typ	9.5	38.3	30	404	1076	59791	1081	60070	128	64	12.6	0.591	7	0	0	0		120	265	15409	266	15445	3761	0.40	1504	16913	16949	22684	13868	24180
3	Typ	12.2	28.8	30	404	1076	60867	1081	61151	128	64	12.6	0.591	7	0	0	0		120	265	15674	266	15711	3829	0.40	1532	17206	17243	23075	14107	24599
2	Mech	16.6	16.6	30	303	1097	61964	1102	62252	146.5	100	12.6	0.591	7	0	0	0		154	299	15973	299	16010	3898	0.40	1559	17532	17569	23514	14376	25065
Ground	Public	15.8	0	30	391	1079	63043	1084	63336	187.5	100	12.6	0.591	7	0	0	0		157	325	16298	326	16336	4008	0.40	1603	17901	17939	23999	14668	25596
B1		0.0	-15.8																192	402	16700	403	16739	4116	0.40	1646	18347	18385	24593	15030	26234
														474			0	8065												

8.1.1-48

Print Date 5/9/2005



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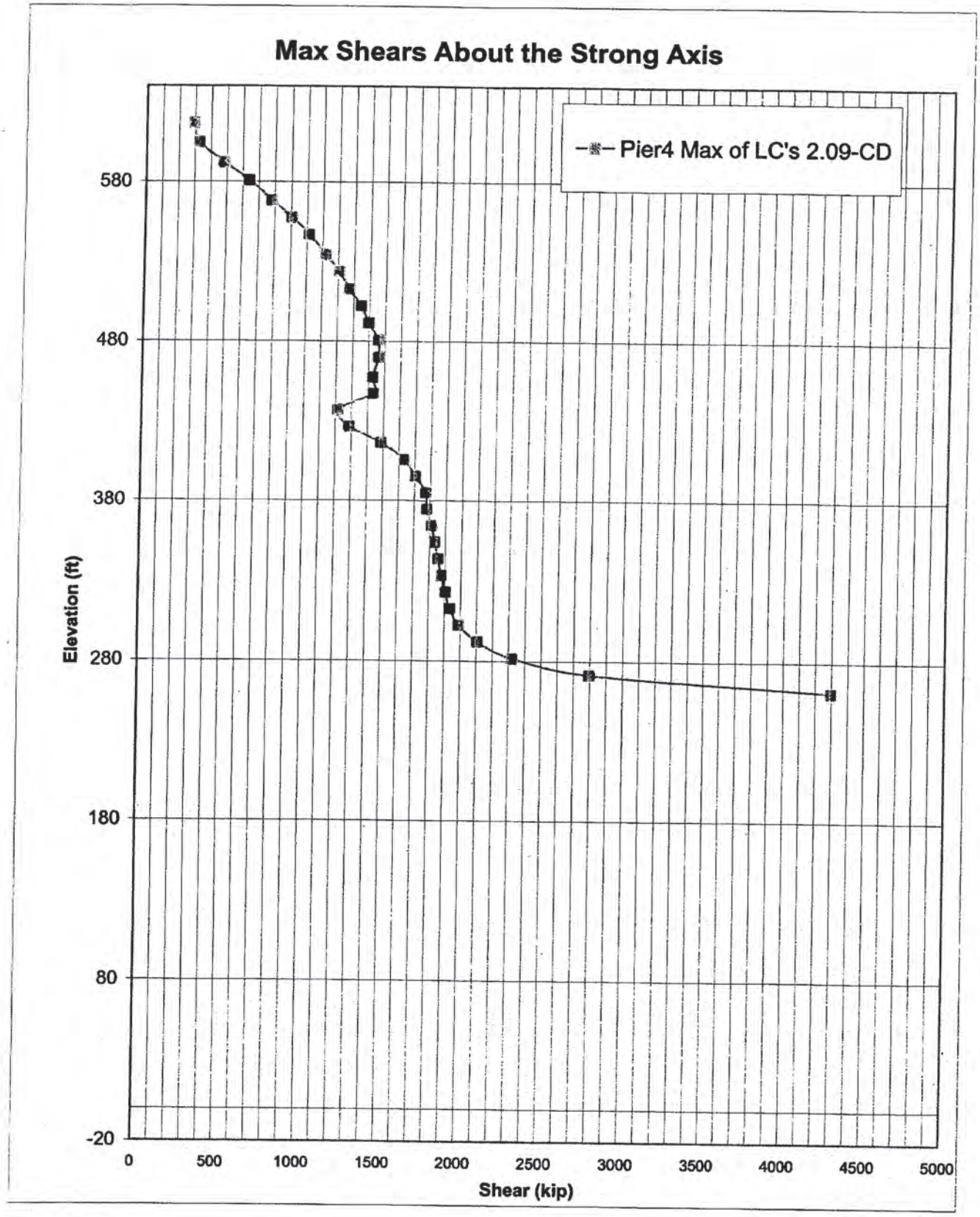

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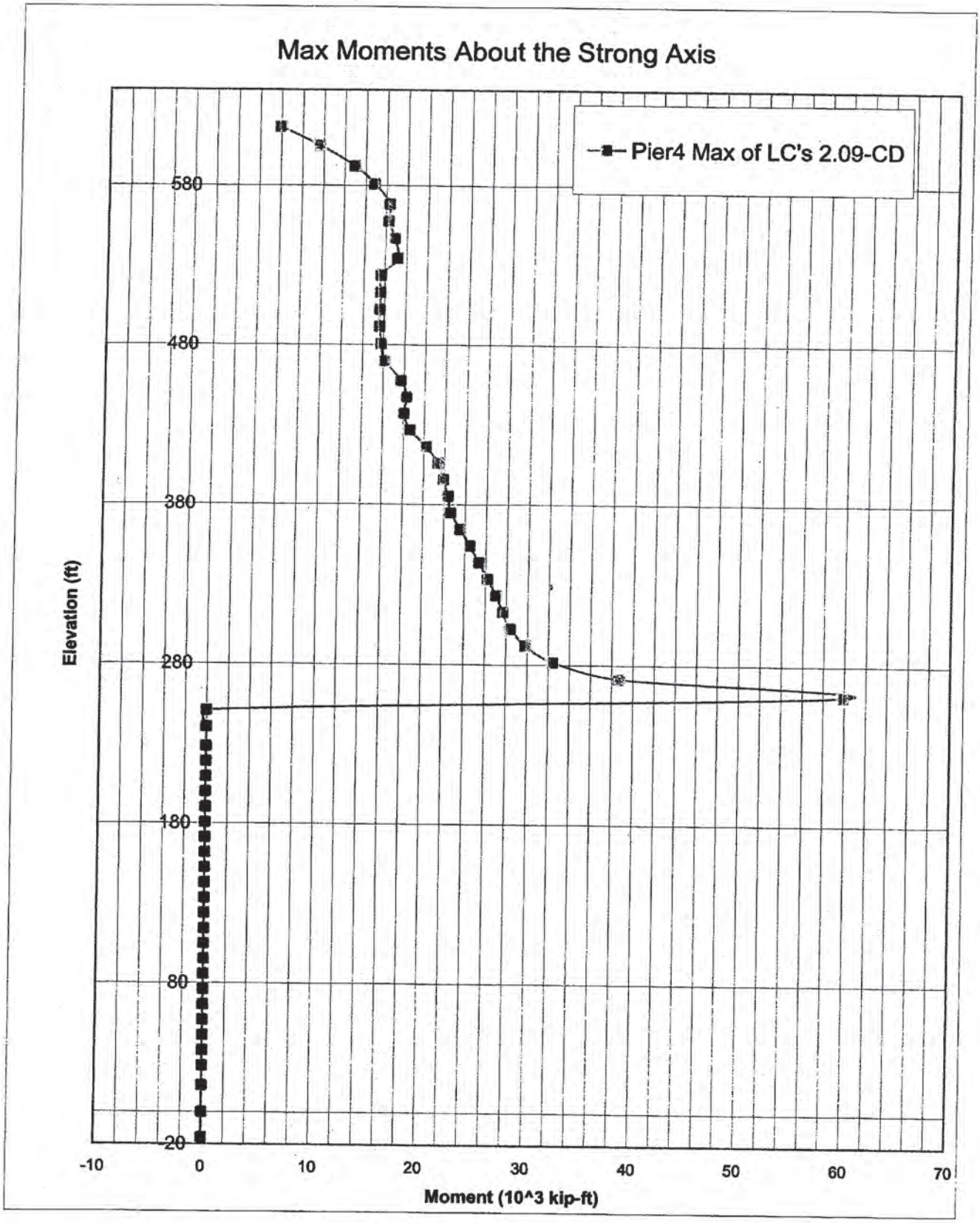

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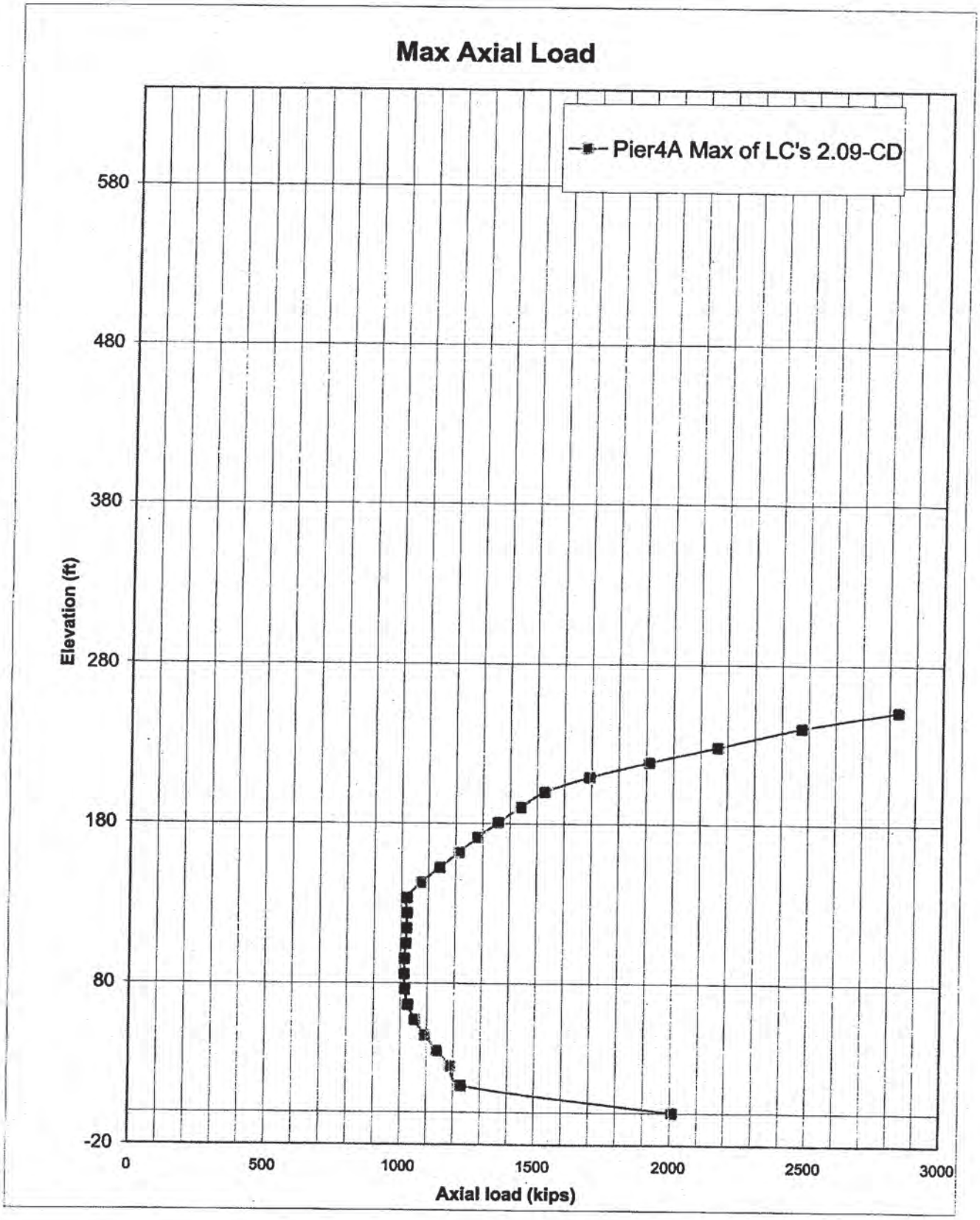

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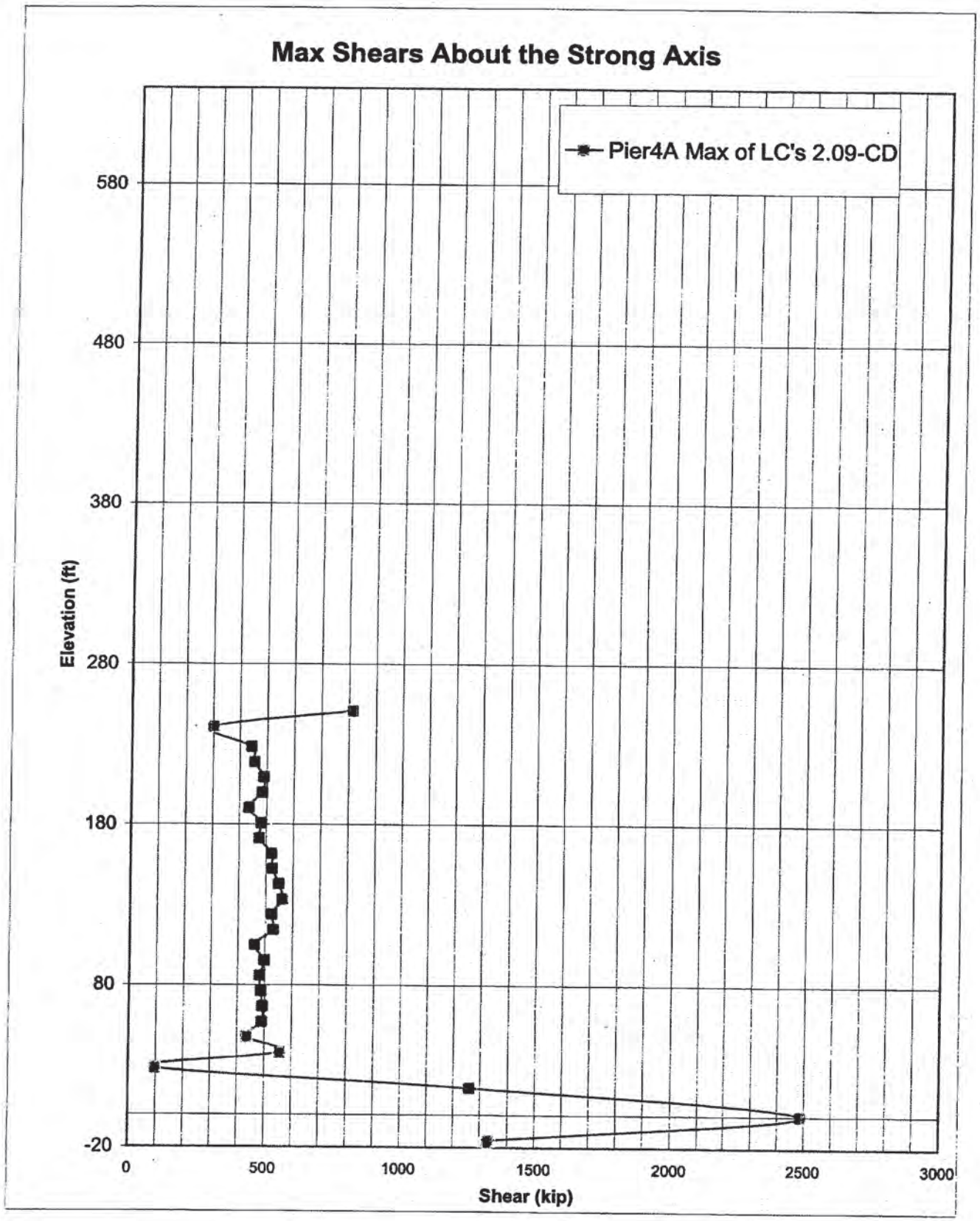

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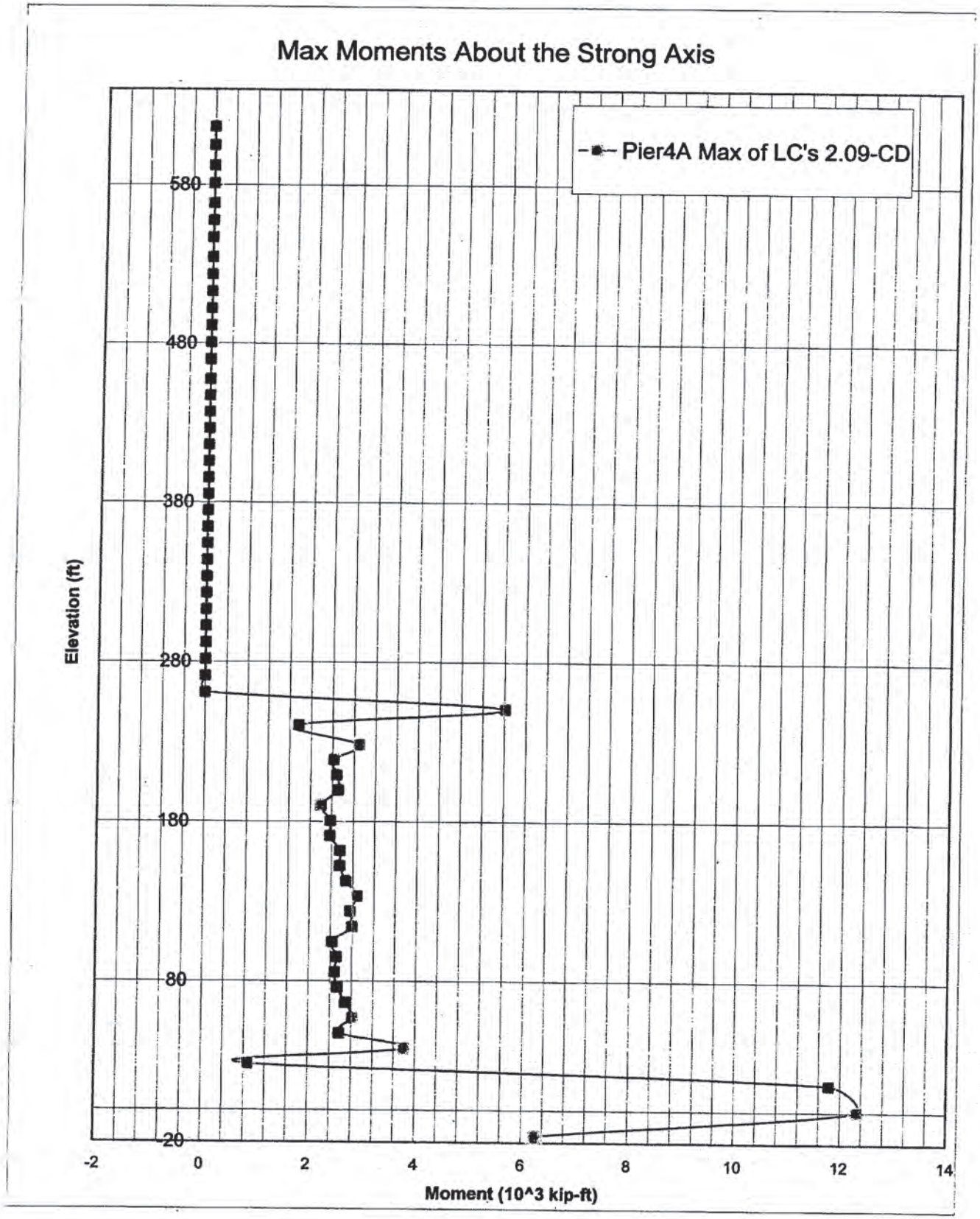

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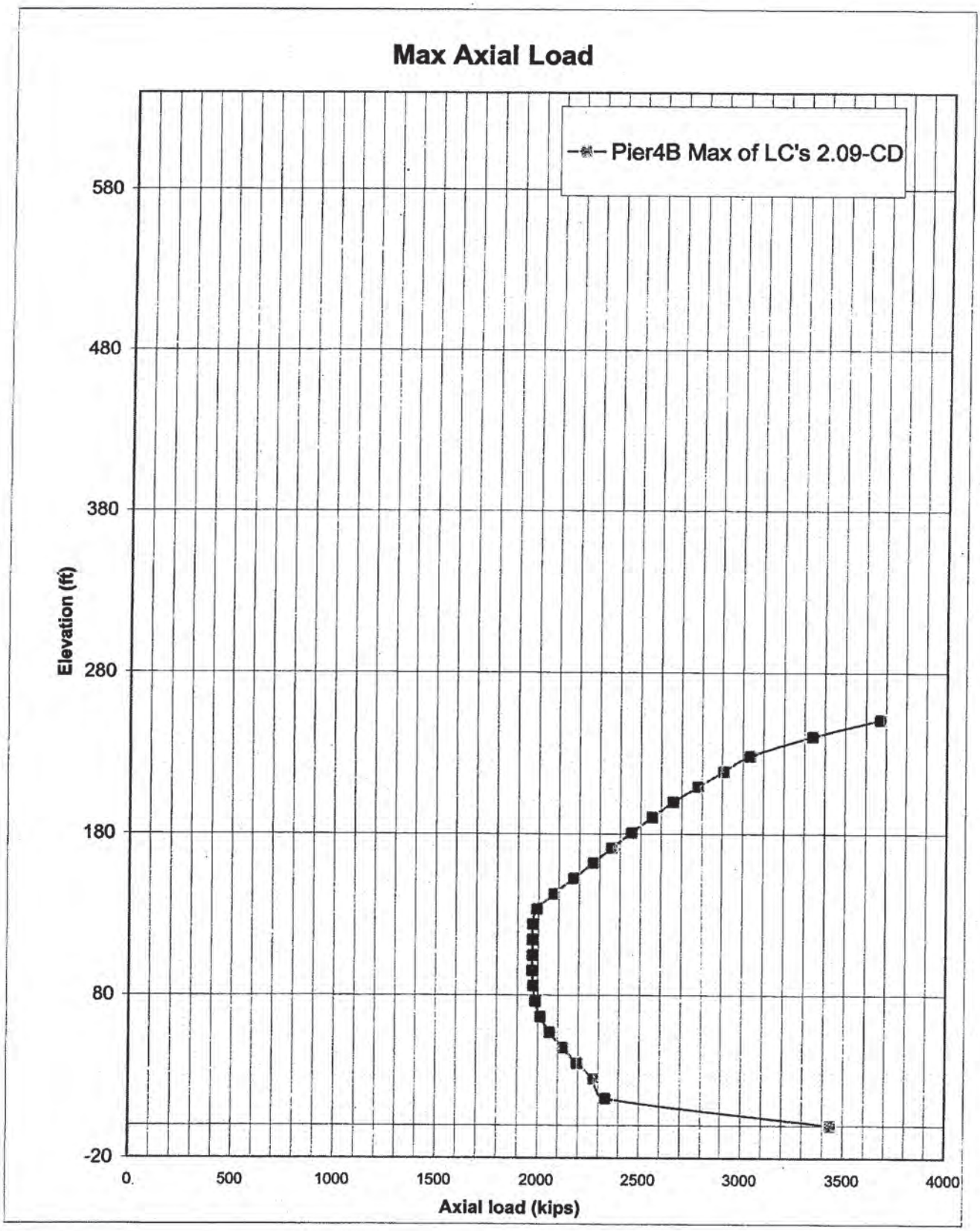

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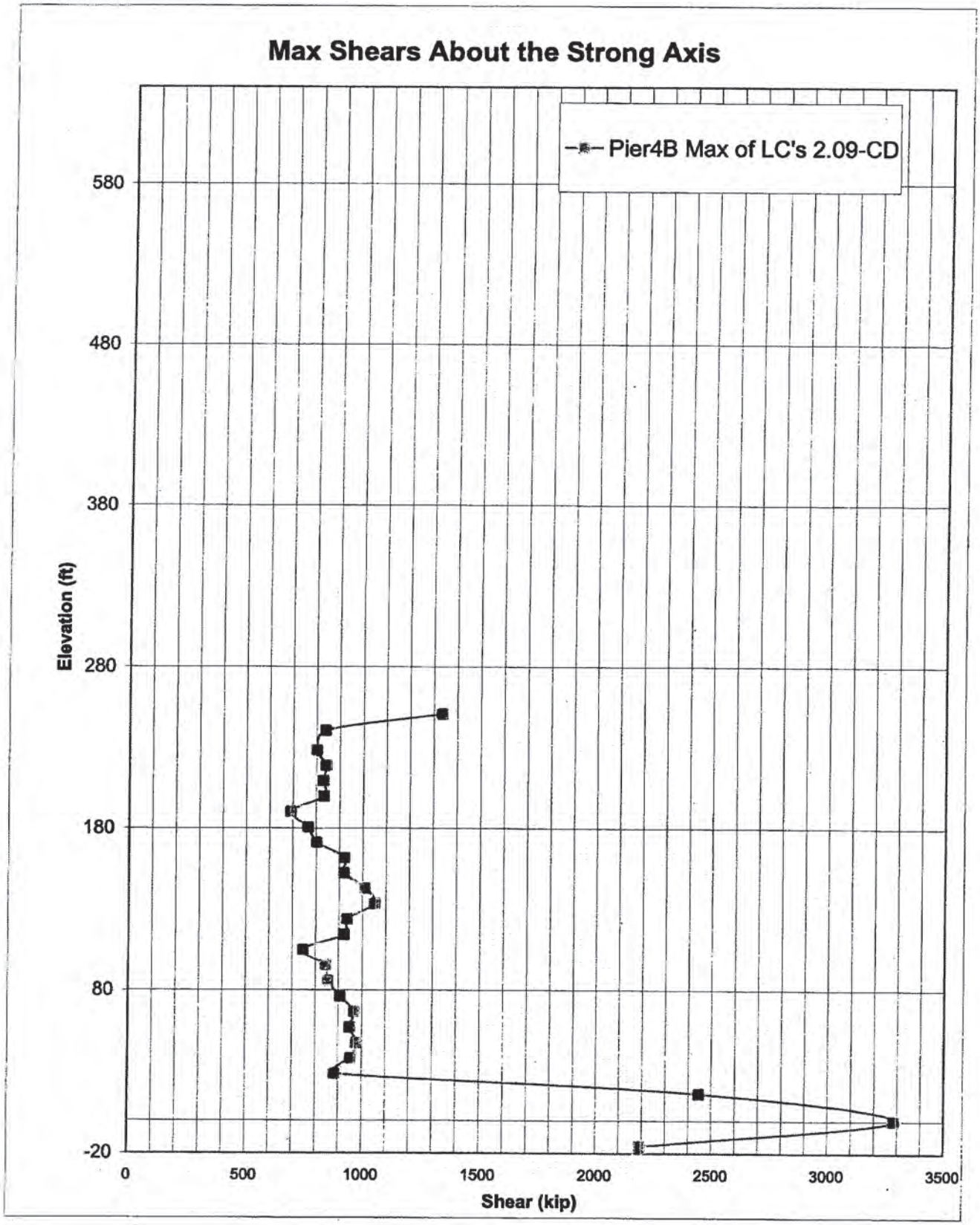

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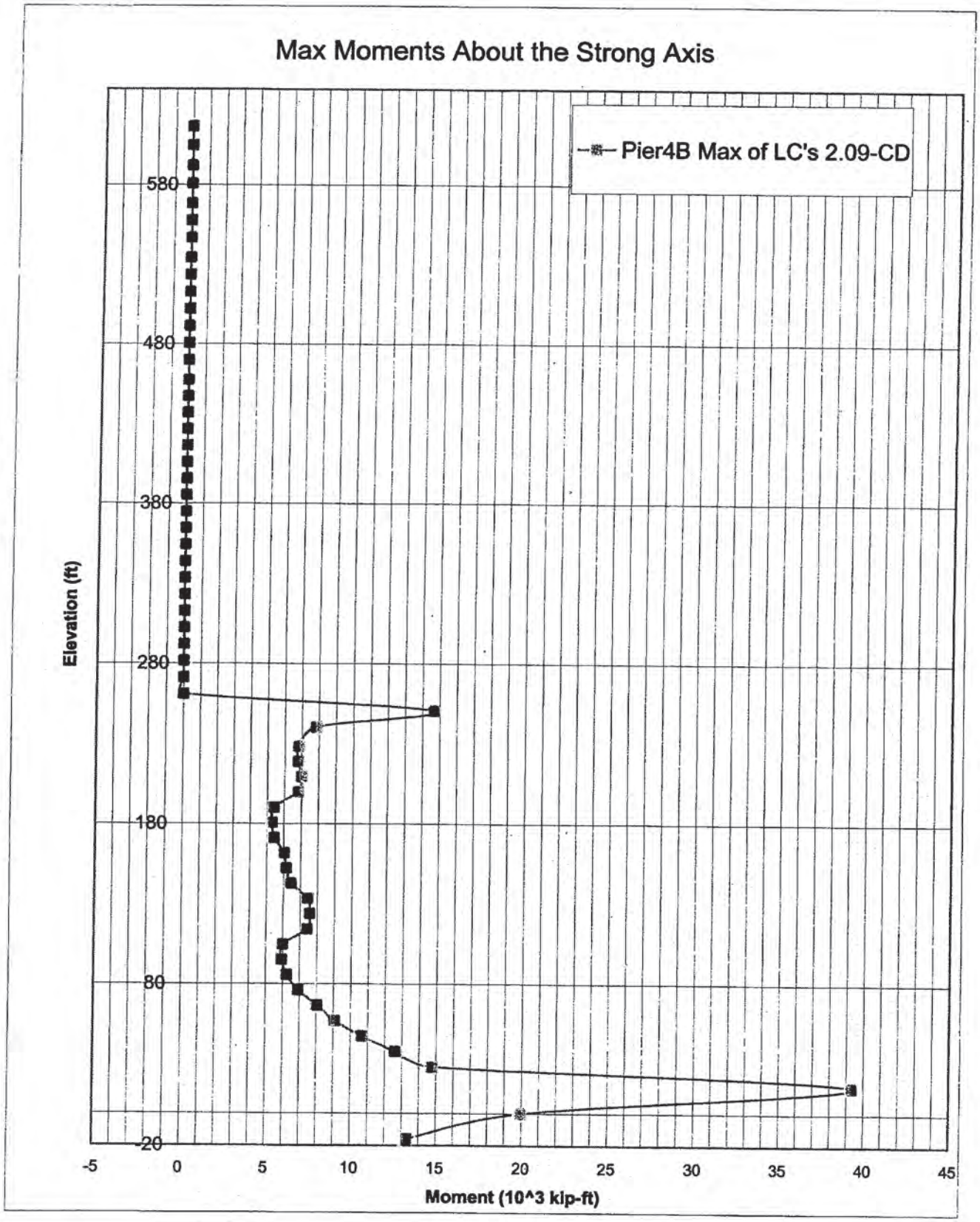


8.1.1-55

Unit Wt.	0.150	kcf	
Min trib area from group	1090	ft^2	(For Tension)
Max trib area from group	1100	ft^2	(For Compression)
Live Load (40% corridor, 60% units)	64	psf	

dlf	dlf	dlf
1.0	1.0	1.0

Pier4 (4A & 4B)

Floor	Usage	Flr. Ht. ft	Elevation ft	Width in	Length in	Min: Trib A. sq. ft	Min: Cum Trib A. sq. ft	Max: Trib A. sq. ft	Max: Cum Trib A. sq. ft	Floor DL psf	Red. LL psf	Total Steel Link Beams Trib Length incl. Embed ft	Wt. klf	Beam DL kips	Outrigger Length ft	Outrigger Weight klf	Outrigger DL kips	Misc. LL kips	Self Wt kips	Min: Total DL kips	Min: Cum DL kips	Max: Total DL kips	Max: Cum DL kips	Cum Reducible LL kips	LL % multiplier	Cum Red. LL kips	Min: Cum Service kips	Max: Cum Service kips	1.42(dlf)D+0.5L Design kips	0.9*D Design kips	1.4(dlf)D+1.7L Design kips
61	Cap	11.0	627.7	30	404	286	286	290	290	248	20				0	0	0		139	210	210	211	211	6	1.00	6	216	216	302	189	305
60	Mech	11.8	616.7	30	404	286	573	290	580	171	20	12.6	0.654	8	0	0	0		148	206	415	206	417	11	0.88	10	426	427	597	374	601
59	Roof	12.8	605.0	30	404	1006	1579	1016	1596	205	20	12.6	0.654	8	0	0	0		161	375	791	377	794	32	0.63	20	811	814	1138	712	1146
58	Typ	11.3	592.2	30	404	1006	2585	1016	2611	128	64	12.6	0.654	8	0	0	0		142	279	1070	280	1075	96	0.55	52	1122	1127	1552	963	1593
57	Typ	12.5	581.0	30	404	1006	3590	1016	3627	128	64	12.6	0.654	8	0	0	0		158	295	1365	296	1371	160	0.50	80	1445	1451	1987	1228	2055
56	Typ	10.8	568.5	30	404	1006	3590	1016	3627	128	64	12.6	0.654	8	0	0	0		136	273	1343	274	1349	160	0.50	80	1423	1429	1955	1208	2024
55	Typ	10.8	557.7	30	404	1006	4596	1016	4643	128	64	12.6	0.654	8	0	0	0		136	273	1615	274	1623	225	0.47	106	1721	1729	2357	1454	2452
54	Typ	12.5	547.0	30	404	1006	5602	1016	5659	128	64	12.6	0.654	8	0	0	0		158	295	1910	296	1919	289	0.45	130	2040	2049	2790	1719	2908
53	Typ	10.8	534.5	30	404	1006	6608	1016	6675	128	64	12.6	0.654	8	0	0	0		136	273	2183	274	2193	353	0.43	154	2336	2346	3190	1965	3331
52	Typ	10.8	523.7	30	404	1006	7614	1016	7691	128	64	12.6	0.654	8	0	0	0		136	273	2456	274	2467	418	0.42	176	2632	2643	3591	2210	3753
51	Typ	10.8	513.0	30	404	1006	8620	1016	8706	128	64	12.6	0.654	8	0	0	0		136	273	2728	274	2741	482	0.41	198	2927	2939	3991	2453	4174
50	Typ	10.8	502.2	30	404	1006	9625	1016	9722	128	64	12.6	0.654	8	0	0	0		136	273	3001	274	3015	547	0.40	220	3221	3235	4391	2701	4595
49	Typ	10.8	491.5	30	404	1006	10631	1016	10738	128	64	12.6	0.654	8	0	0	0		136	273	3274	274	3289	611	0.40	244	3518	3533	4792	2946	5020
48	Typ	10.8	480.7	30	404	1006	11637	1016	11754	128	64	12.6	0.654	8	0	0	0		136	273	3546	274	3563	675	0.40	270	3816	3833	5194	3192	5447
47	Mech	12.5	470.0	30	404	1006	12643	1016	12770	146.5	100	12.6	0.654	8	0	0	0		158	313	3860	315	3877	776	0.40	310	4170	4188	5661	3474	5956
46	Typ	10.3	457.5	30	404	1006	13649	1016	13786	128	64	12.6	0.654	8	0	0	0		130	267	4127	269	4146	840	0.40	336	4463	4482	6056	3714	6376
45	Typ	10.3	447.2	30	404	1006	14655	1016	14801	128	64	12.6	0.654	8	0	0	0		130	267	4395	269	4415	905	0.40	362	4736	4777	6450	3955	6794
44	Typ	10.3	436.8	30	404	1006	15660	1016	15817	128	64	12.6	0.654	8	0	0	0		130	267	4662	269	4684	969	0.40	388	5050	5071	6845	4196	7216
43	Typ	10.3	426.5	30	404	1006	16666	1016	16833	128	64	12.6	0.654	8	0	0	0		130	267	4930	269	4952	1033	0.40	413	5343	5366	7239	4437	7636
42	Typ	10.3	416.2	30	404	1006	17672	1016	17849	128	64	12.6	0.654	8	0	0	0		130	267	5197	269	5221	1098	0.40	439	5636	5660	7634	4677	8056
41	Typ	10.3	405.8	30	404	1006	18678	1016	18865	128	64	12.6	0.654	8	0	0	0		130	267	5464	269	5490	1162	0.40	465	5929	5955	8028	4918	8476
40	Typ	10.3	395.5	30	404	1006	19684	1016	19881	128	64	12.6	0.654	8	0	0	0		130	267	5732	269	5759	1227	0.40	491	6222	6249	8422	5159	8896
39	Typ	10.3	385.2	30	404	1006	20690	1016	20896	128	64	12.6	0.654	8	0	0	0		130	267	5999	269	6027	1291	0.40	516	6516	6544	8817	5399	9316
38	Typ	10.3	374.8	30	404	1006	21695	1016	21912	128	54	12.6	0.654	8	0	0	0		130	267	6267	269	6296	1355	0.40	542	6809	6838	9211	5640	9736
37	Typ	10.3	364.5	30	404	1006	22701	1016	22928	128	64	12.6	0.654	8	0	0	0		130	267	6534	269	6565	1420	0.40	568	7102	7133	9606	5881	10156
36	Typ	10.3	354.2	30	404	1006	23707	1016	23944	128	64	12.6	0.654	8	0	0	0		130	267	6802	269	6833	1484	0.40	594	7395	7427	10000	6121	10576
35	Typ	10.3	343.8	30	404	1006	24713	1016	24960	128	64	12.6	0.654	8	0	0	0		130	267	7069	269	7102	1548	0.40	619	7688	7722	10395	6362	10996
34	Typ	10.3	333.5	30	404	1006	25719	1016	25976	128	64	12.6	0.654	8	0	0	0		130	267	7337	269	7371	1613	0.40	645	7982	8016	10789	6603	11416
33	Typ	10.3	323.2	30	404	1006	26725	1016	26991	128	64	12.6	0.654	8	0	0	0		130	267	7604	269	7640	1677	0.40	671	8275	8310	11184	6844	11836
32	Typ	10.3	312.8	30	404	1006	27730	1016	28007	128	64	12.6	0.654	8	0	0	0		130	267	7871	269	7908	1741	0.40	697	8568	8605	11578	7084	12256
31	Typ	10.3	302.5	30	404	1006	28736	1016	29023	128	64	12.6	0.654	8	0	0	0		130	267	8139	269	8177	1806	0.40	722	8861	8899	11973	7325	12676
30	Typ	10.3	292.2	30	404	1006	29742	1016	30039	128	64	12.6	0.654	8	0	0	0		130	267	8406	269	8446	1870	0.40	748	9154	9194	12367	7566	13096
29	Typ	10.3	281.8	30	404	1006	30748	1016	31055	128	64	12.6	0.654	8	0	0	0		130	267	8674	269	8715	1935	0.40	774	9448	9488	12762	7806	13516
28	Typ	10.3	271.5	30	404	1006	31754	1016	32071	128	64	12.6	0.654	8	0	0	0		130	267	8941	269	8983	1999	0.40	800	9741	9783	13156	8047	13936
27	Typ	10.3	261.2	30	303	1027	32781	1037	33107	128	64	12.6	0.654	8	0	0	0		98	238	9179	239	9222	2065	0.40	826	10005	10048	13508	8261	14315
26	Typ	10.3	250.8	30	303	1027	33807	1037	34144	128	64	12.6	0.591	7	0	0	0		98	237	9415	238	9460	2130	0.40	852	10268	10312	13859	8474	14693
25	Typ	12.3	240.5	30	303	1027	34834	1037	35181	128	64	12.6	0.591	7	0	0	0		116	255	9670	256	9716	2196	0.40	878	10549	10595	14236	8703	15096
24	Mech	9.5	228.3	30	303	1027	35861	1037	36218	146.5	100	12.6	0.591	7	0	0	0		90	248	9918	249	9966	2299	0.40	920	10838	10885	14611	8926	15515
23	Typ	9.5	218.8	30	303	1027	36888	1037	37255	128	64	12.6	0.591	7	0	0	0		90	229	10147	230	10196	2365	0.40	946	11093	11141	14951	9132	15882
22	Typ	9.5	209.3	30	303	1027	37915	1037	38292	128	64	12.6	0.591	7	0	0	0		90	229	10376	230	10426	2430	0.40	972	11348	11398	15291	9338	16249
21	Typ	9.5	199.8	30	303	1027	38942	1037	39329	128	64	12.6	0.591	7	0	0	0		90	229	10605	230	10656	2496	0.40	998	11603	11654	15631	9544	16616
20	Typ	9.5	190.3	30	303	1027	39969	1037	40366	128	64	12.6	0.591	7	0	0	0		90	229	10834	230	10886	2562	0.40	1025	11858	11911	15970	9750	16982
19	Typ	9.5	180.8	30	303	1027	40996	1037	41402	128	64	12.6	0.591	7	0	0	0		90	229	11062	230	11116	2627	0.40	1051	12113	12167	16310	9956	17349
18	Typ	9.5	171.3	30	303	1027	42022	1037	42439	128	64	12.6	0.591	7	0	0	0		90	229	11291	230	11346	2693	0.40	1077	12368	12424	16650	10162	17716
17	Typ	9.5	161.8	30	303	1027	43049	1037	43476	128	64	12.6	0.591	7	0	0	0		90	229	11520	230	11576	2759	0.40	1104	12624	12680	16990	10368	18083
16	Typ	9.5	152.3	30	303	1027	44076	1037	44513	128	64	12.6	0.591	7	0	0	0		90	229	11749	230	11806	2825	0.40	1130	12879	12936	17330	10574	18450
15	Typ	9.5	142.8	30	303	1027	45103	1037	45550	128	64	12.6	0.591	7	0	0	0		90	229	11978	230	12037	2890	0.40	1156	13134	13193	17670	10780	18817
14	Typ	9.5	133.3	30	303	1027	46130	1037	46587	128	64	12.6	0.591	7	0	0	0		90	229	12207	230	12267	2956	0.40	1182	13389	13449	18010	10986	19184
13	Typ	9.5	123.8	30	303	1027	47157	1037	47624	128	64	12.6	0.591	7	0	0	0		90	229	12435	230	12497	3022	0.40	1209	13644	13706	18350	11192	19550
12	Typ	9.5	114.3	30	303	1027	48184	1037	48661	128	64	12.6	0.591	7	0	0	0		90	229	12664	230	12727	3087	0.40	1235	13899	13962	18690	11398	19917
11	Typ	9.5	104.8	30	303	1027	49211	1037	49697	128	64	12.6	0.591	7	0	0	0		90	229	12893	230	12957	3153	0.40	1261	14154	14218	19030	11604	20284
10	Typ	9.5	95.3	30	303	1027	50237	1037	50734	128	64	12.6	0.591	7	0	0	0		90	229	13122	230	13187	3219	0.40	1288	14409	14475	19370	11810	20651
9	Typ	9.5	85.8	30	303	1027	51264	1037	51771	128	64	12.6	0.591	7	0	0	0		90	229	13351	230	13417	3285	0.40	1314	14665	14731	19710	12016	21018
8	Typ	9.5	76.3	30	303	1027	52291	1037	52808	128	64	12.6	0.591	7	0	0	0		90	229	13580	230	13647	3350	0.40	1340	14920	14988	20049	12222	21385
7	Typ	9.5	66.8	30	303	1027	53318	1037	53845	128	64	12.6	0.591	7	0	0	0		90	229	13808	230	13878	3416	0.40	1366	15175	15244	20389	12428	21752
6	Typ	9.5	57.3	30	303	1027	54345	1037	54882	128	64	12.6	0.591	7	0	0	0		90	229	14037	230	14108	3482	0.40	1393	15430	15500	20729	12634	22118
5	Typ	9.5	47.8	30	303	1027	55372	1037	55919	128	64	12.6	0.591	7	0	0	0		90	229	14266	230	14338	3548	0.40	1419	15685	15757	21069	12840	22485
4	Typ	9.5	38.3	30	303	1027	56399	1037	56956	128	64	12.6	0.591	7	0	0	0		90	229	14495	230	14568	3613	0.40	1445	15940	16013	21409	13045	22852
3	Typ	12.2	28.8	30	303	1027	57426	1037	57992	128	64	12.6	0.591	7	0	0	0		115	254	14749	255	14823	3679	0.40	1472	16221	16295	21785	13274	23254
2	Mech	16.6	16.6	30	303	1027	58452	1037	59029	146.5	100	12.6	0.591	7	0	0	0		157	315	15064	316	15140	3782	0.40	1513	16577	16652	22255	13558	23767
Ground	Public	15.8	0	30	303	1027	59479	1037	60066	187.5	100	12.6	0.591	7	0	0	0		149	349	15413	351	15491	3884	0.40	1554	16967	17044	22774	13872	24328
B1		0.0	-15.8																												
														474			0		7250												

8.1.1-56

8.1.2 Coupling Beams

Steel Coupling Beams – Design forces were obtained by considering the seismic RSA analysis forces from ETABS combined with the gravity loads imposed by tributary area/PT reaction.

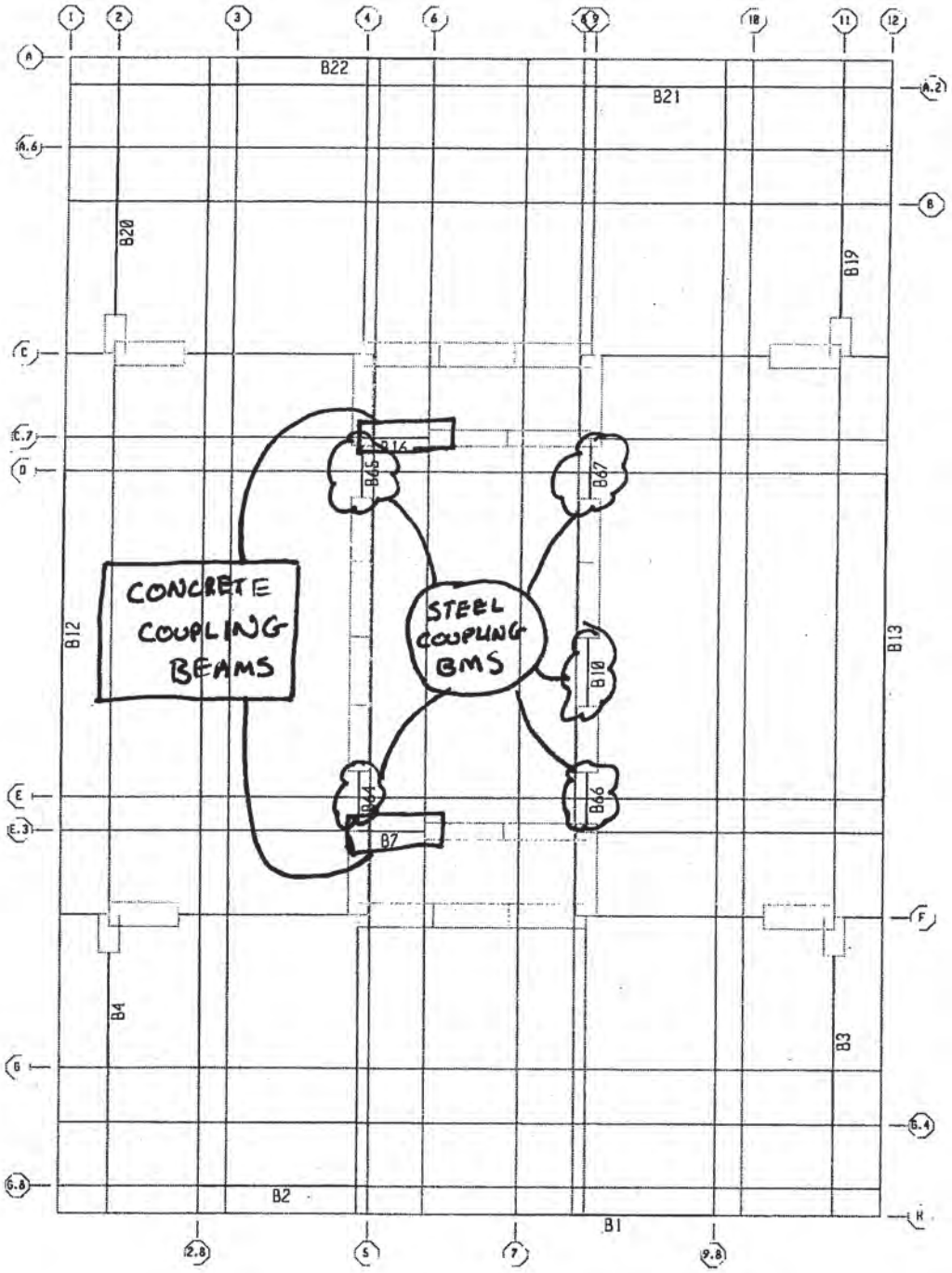
The 2002 AISC Seismic Provisions Part II, Section 16 contains requirements for Special Reinforced Concrete Shear Walls Composite with Structural Steel Elements (C-SRCW.) The steel coupling beams must meet requirements similar to that of the link portion of an Eccentrically Braced Frame (EBF.)

The AISC commentary cites research done by Harries, Shahrooz, et al. In EERI Earthquake Spectra, Volume 16, Number 4, November 2000, Harries, Gong, and Shahrooz provide guidance for the design of the embedded region and the mechanism of load transfer.

Requirements and provisions set forth in the above references were used in the design.

Concrete Coupling Beams – Beams on line E.3 and C.7 are designed as a SMRF conventionally reinforced beam. Some special conditions for openings occur in the core, and will be addressed at the building permit submittal.

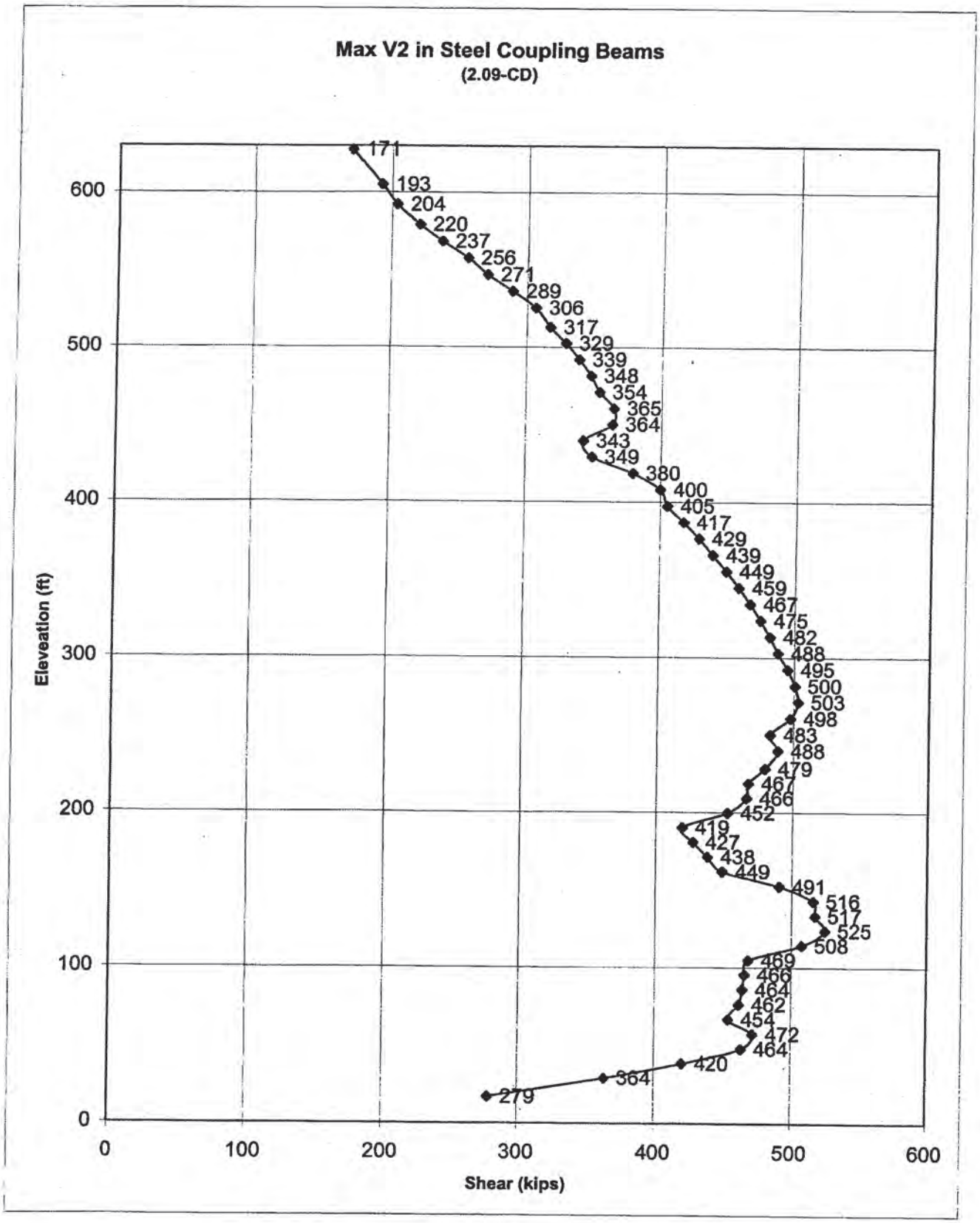
ETABS



ETABS v8.5.0 - File: 4069-20050509-2.09-CD - May 16,2005 19:16
Plan View - 24 - Elevation 228.25 - Kip-ft Units

8.1.2-2

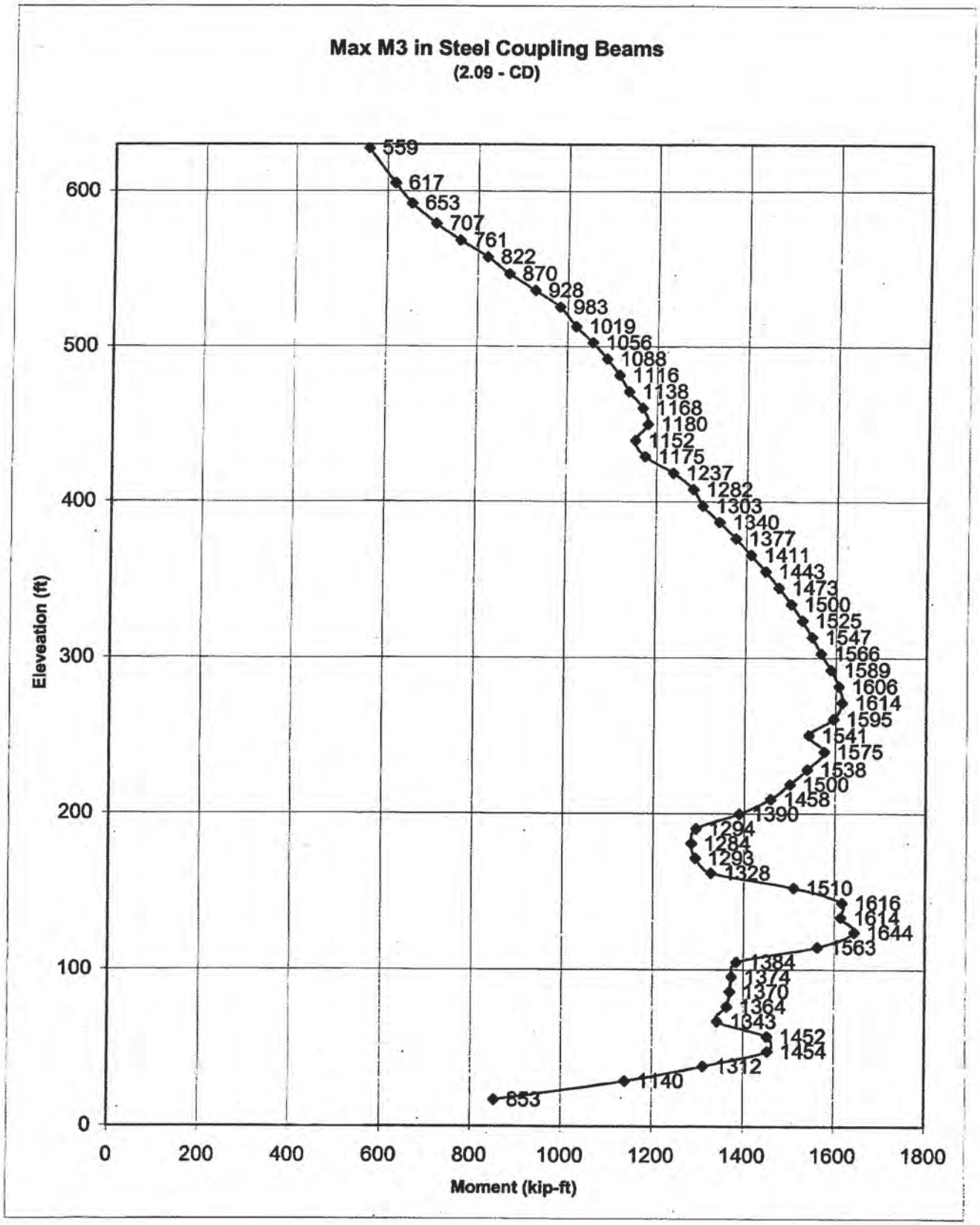
Print Date 5/16/2005



V2 plot Chart 1

8.1.2-3

Print Date 5/16/2005



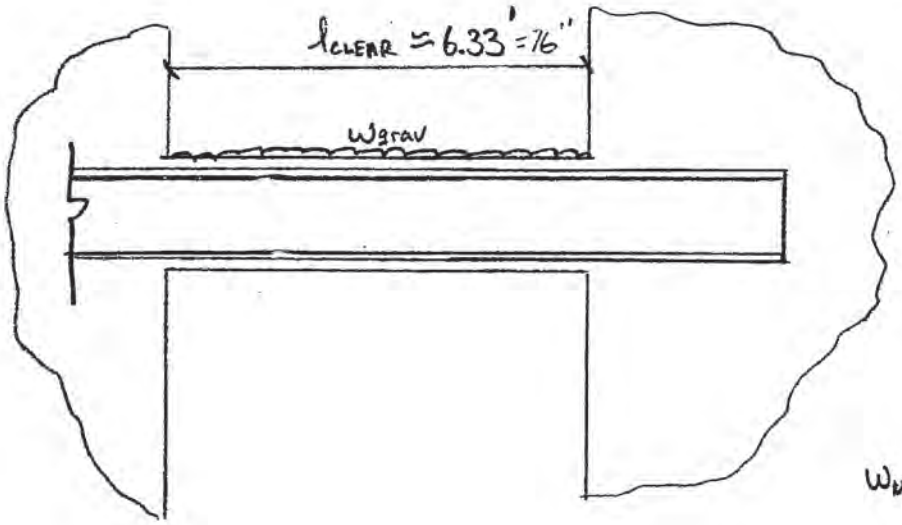
M3 Plot Chart 1

8.1.2-4

DESIMONE

Project 301 MISSION
Project No.
Item STEEL LINK BEAMS

Page ____ Of ____
Date 1/27/05
By NJR Ch'kd ____



CURRENT BEAM ASSUMPTION = W14X311

GRAVITY PT LOAD

DL = 133 PSF
LL = {60% 40 PSF; 40% 100 PSF} ≈ 64 PSF
TRIB AREA MAX = 545 ft²

$W_{grav\,MAX} = \left[.42(133\,PSF) + 0.5(64\,PSF)\right]\left(\frac{545\,ft^2}{6.33\,ft}\right)$

$= 19.01\ k/ft$

$V_{SEISMIC\,MAX} = 502\,k$

$V_{u\,MAX} = \frac{WL}{2} = \frac{(19.01\,k/ft)(6.33')}{2}$

$= 60.2\,k$

$V_u = 1.4D + 0.5L + E$

$= 60.2k + 502k$

$V_u = 562k$

$\phi V_n = (0.90)(0.6)(50ksi)(A_w) = V_u = 562k$

$\therefore A_{w\,req} = 20.8\ in^2$ where $A_w = d \cdot t_w$

W12X252 d = 15.4 t_w = 1.4 A_w = 21.5 in
W14X283 d = 16.7 t_w = 1.29 A_w = 21.5 in

CHECK MOMENT: Try W14X283 $Z_x = 542\ in^3$

$M_u = \frac{(19.01\,k/ft)(6.33)^2}{2} + 1661\,k\text{-}ft$

$= 2042\,k\text{-}ft$

$\phi M_n = (0.9)(50ksi)(542\,in^3)$

$= 2032\,k\text{-}ft$

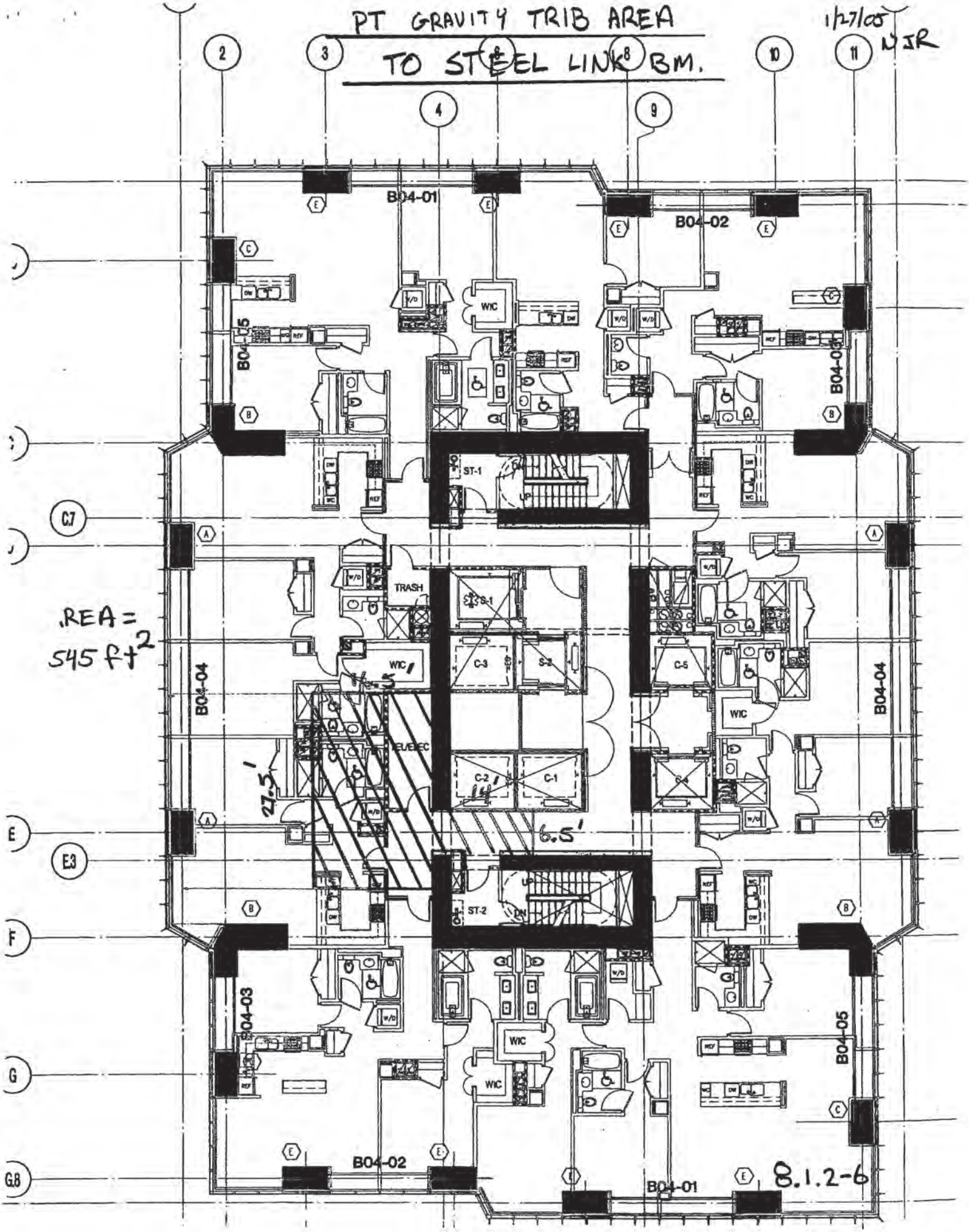
NG

USE W14X311

8.1.2-5

PT GRAVITY TRIB AREA
TO STEEL LINK BM.

1/27/05 NJR



REA = 545 ft²

8.1.2-6

DeSIMONE CONSULTING ENGINEERS, P.L.L.C.

PROJECT _____ PAGE _____ OF _____

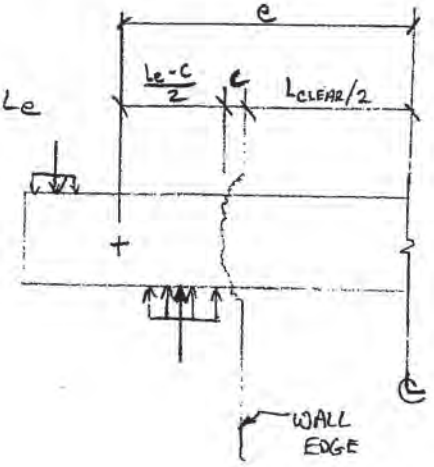
DATE 6/28/04

DCE JOB # 4069B

ITEM STEEL COUPLING BM CONT. BY NJR CH'KD _____

DETERMINE EMBEDMENT REQ.

MARCAKIS AND MITCHELL (1980) PROPOSES THE FOLLOWING BASED ON RIGID BODY MOTION OF THE EMBEDMENT LENGTH Le



(1) $$V_u = \frac{0.85\,\phi_c\,f'_c\,b'\,(Le - c)}{1 + \frac{3.6e}{(Le-c)}}$$

(2) $$e = \frac{L_{CLEAR}}{2} + c + \frac{Le-c}{2}$$

$$= \frac{74''}{2} + 1.5'' + \frac{Le - 1.5''}{2}$$

$$e = \tfrac{1}{2}Le + 37.75''$$

(3) $V_u = 1.25\,R_y V_n$ (per 2002 AISC SEISMIC PROVISIONS SEC 15.6) (1.25 IS FOR STRAIN HARDENING)

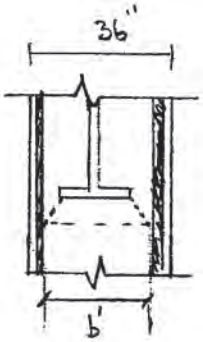
$R_y = 1.1$ (FOR A992 STEEL)

$V_n = V_{sp}$ "SHEAR" CRITICAL

$V_u = 1.25\,(1.1)\,(669\text{ kips})$

$= (1.375)(669\text{ kips})$

$V_u = 920$ kips



(4) b' = BEARING WIDTH = lesser of { CORE WIDTH, 2.5 b_f }

$= 36'' - 2c - 2\phi_{STIRUP} - 2(\tfrac{1}{2}\phi_{\#14\,BAR})$

$= 36'' - 2(1.5) - 2(0.625) - 2(\tfrac{1}{2}(1.693))$

$= 30.06'' < 2.5\,(16.6) = 41.5$

$b' = 30.1''$

PLUGGING (2), (3), AND (4) into (1) AND SOLVING FOR Le YIELDS:

$$920\text{ kips} = \frac{0.85\,(0.70)(12\text{ ksi})(30.1'')(Le - 1.5'')}{1 + \frac{3.6(\frac{1}{2}Le + 37.75'')}{(Le - 1.5'')}} \quad \therefore \quad \boxed{Le = 32.6''}$$

8.1.2-7

DeSIMONE CONSULTING ENGINEERS, P.L.L.C.

PROJECT 301 MISSION — PAGE ____ OF ____

DATE 6/28/04

DCE JOB # 4069B

ITEM STEEL COUPLING BM IN E-W DIR — BY NJR CH'KD ____

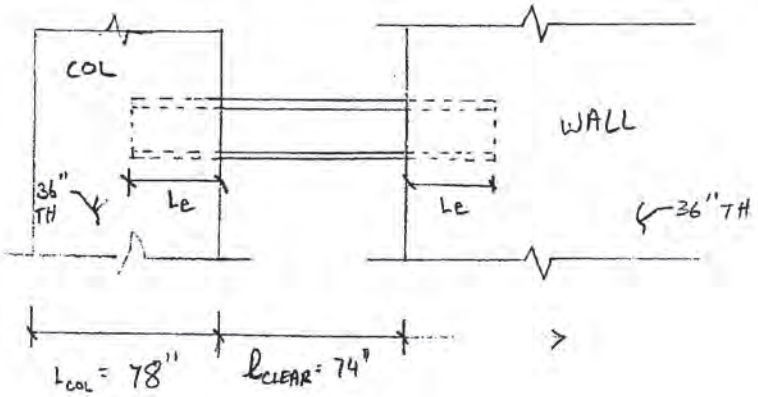
TYP BM W14X398

$Z = 801\ in^3$ $A = 117\ in^2$

$t_f = 2.85\ in$ $F_y = 50\ ksi$

$t_w = 1.77\ in$ $T = 10''$

$d = 18.3\ in$ $b_p = 16.6''$



CONCRETE DATA

(c) CLEAR COVER = 1.5" FOR WALL AND COL

#5 STIRUPS $\phi_{STIRUP} = 0.625''$ $\phi_c = 0.70$

$\phi_{\#14\ BAR} = 1.693''$; $f'_c = 12\ ksi$

effective link length (e)

$L = l_{CLEAR} + 2(c)$

$= 74'' + 2(1.5'')$

$L = 77\ in$

PLASTIC MOMENT (M_p) AND WEB PLASTIC SHEAR STRENGTH (V_{sp})

$M_p = Z F_y$

$= (801\ in^3)(50\ ksi)$

$= 40,050\ k\text{-}in$

$V_{SP} = 0.6 F_y t_w (d - 2t_f)$

$= 0.6(50\ ksi)(1.77\ in)(18.3 - 2(2.85))$

$= 669\ kips$

DETERMINE IF "SHEAR" OR "flexure" CRITICAL

$$\frac{M_p}{V_{sp}} = \frac{40,050\ k\text{-}in}{669\ k} = 59.86\ in$$

$$L = \frac{1.28 M_p}{V_{SP}}$$

Since $L \leq 1.6 \frac{M_p}{V_{SP}}$ LINK IS "SHEAR" CRITICAL

8.1.2-8

LINK BM MARK LB2

Seismic (Y/N)	y				
Mu =	500	k-ft	Mu =	6,000	k-in
Width, b =	24	in			
Total depth, h =	21	in			
Clear Cover =	1.5	in			
Stirrup size # =	5		Stirrup ϕ =	0.625	in
f'_c =	10	ksi	β_1 =	0.65	
f_y =	75	ksi	ρ_{max} =	2.5%	§1921.3.2
ϕ =	0.90		ρ_{min} =	0.4%	§1921.3.2

	§1921.5.1	Required for 1 layer steel				Required for 2 layer steel			
Bar	MIN COL h (in)	No.	As	Clear Spacing for 1 row	ρ limits check	No.	As	Clear Spacing for 2 rows	ρ limits check
3	9.4	45.5	5.00	> smin NG	OK	47.42	5.22	> smin NG	OK
4	12.5	25.1	5.02	> smin NG	OK	26.29	5.26	1.09	OK
5	15.6	16.3	5.04	> smin NG	OK	17.09	5.30	1.91	OK
6	18.8	11.5	5.06	1.06	OK	12.14	5.34	3.00	OK
7	21.9	8.5	5.08	1.65	OK	8.97	5.38	4.54	OK
8	25.0	6.5	5.10	2.44	OK	6.87	5.43	6.70	OK
9	28.2	5.1	5.12	3.39	OK	5.47	5.47	9.60	OK
10	31.8	4.0	5.14	4.80	OK	4.35	5.52	14.46	OK
11	35.3	3.3	5.16	6.53	OK	3.57	5.58	21.88	OK
14	42.3	2.3	5.21	12.05	OK	2.53	5.68	66.91	OK
18	56.4	1.3	5.30	51.58	OK	1.48	5.91	error	OK

Check above beam with specific reinforcing

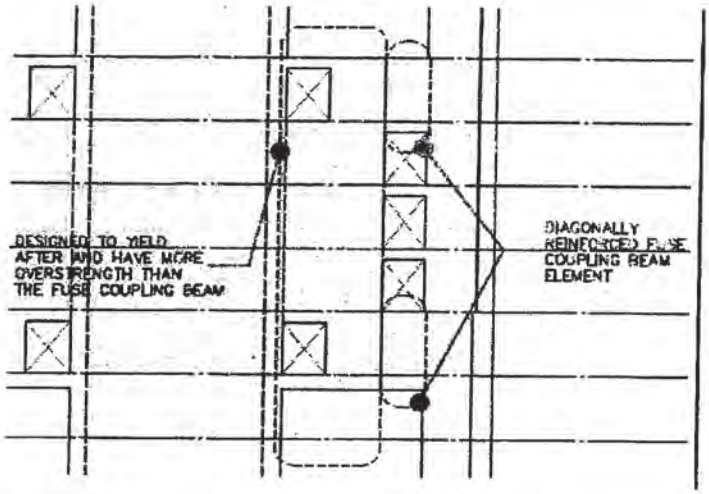
Bar size # =	10	d =	17.11	
No. of bars =	6.00	a =	2.80	
No. of rows =	2	ϕ Mn =	8077	k-in
Diameter =	1.270		673	k-ft
As total =	7.62			
ρ	1.86%	Mu/ϕ Mn =	0.74	should be less than 1.0 to be OK
		Clear Spacing	7.97	in
		ρ limits check	OK	

fy for overstrength =	1.25	
a =	3.50	
Mpr=	10969	k-in
	914	k-ft

8.1.2-9

8.1.3 Outrigger and Outrigger Column

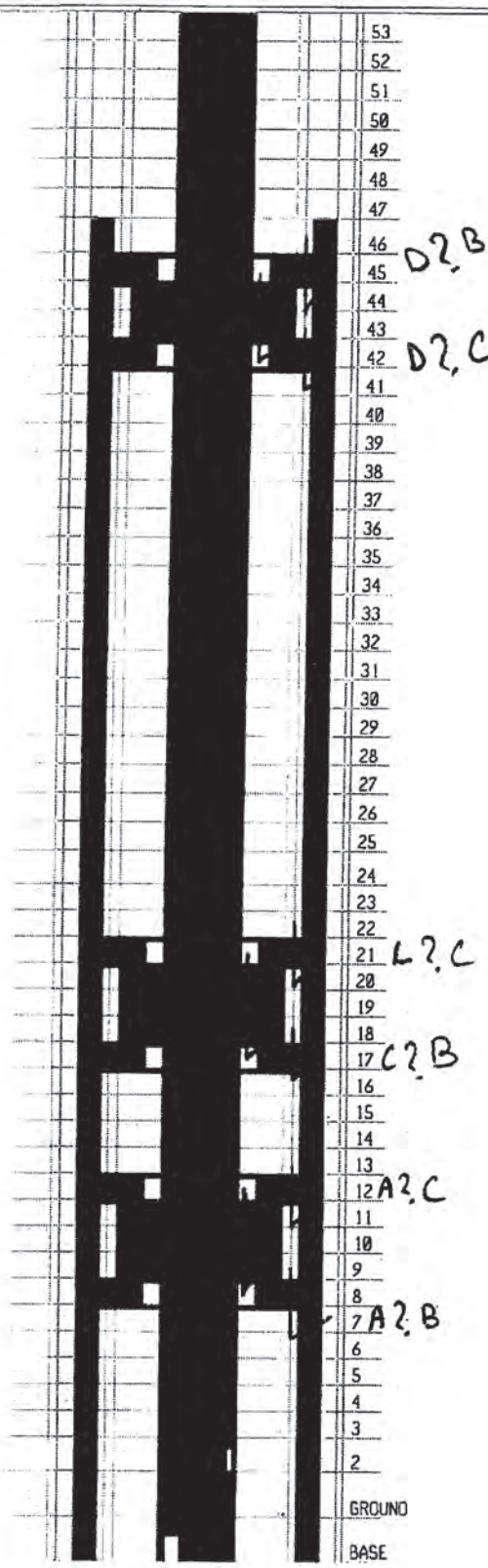
The outrigger shape has two distinct parts. The portion directly attached to the shear wall core (left side on the below picture) and the floor high sections attached to the outrigger column (on the right.) The part of the shear wall attached to the column is designed as a diagonally reinforced fuse coupling beam element. The outrigger is geometrically proportioned to yield first in this element. The other portion, attached to the core is designed to resist the capacity of the fuse coupling beams.



The outrigger column is designed for the capacity of the system. Outrigger column axial force from the code based design earthquake (with orthogonal effects, i.e. 100%+30%, and with torsion) is only 35% of that produced by the outrigger system. Since this outrigger column is part of the dual system as well as the primary system, it was designed for the conservative load case of 2.8*P_E instead of the less conservative required code level force. Torsion on the L-shape column was also checked, at the request of the peer reviewer Middlebrook + Louie of San Francisco.

Design force Method	Axial (kips)
Code Design Force (P_E) from ETABS =	9,200
Over-strength/System Capacity (Use Smaller of) =	
1) 2.8 * P_E =	2.8*(9,200) = 25,800
2) V_{pr} of Outrigger Beams * 6 Locations=	6*(6,000) =36,000

ETABS



ETABS v8.5.0 - File: 4069-20050509-2.09-CD - May 20,2005 17:49
Elevation View - C - Kip-in Units

8.1.3-2

Print Date: 5/20/2005

	Story	Spandrel	Load	Loc	P	V2	V3	T	M2	M3
A?A	12	A1A	E100X530Y MAX	Left	630	5574	13	503	22	10815
A?B	9	A1B	E100X530Y MAX	Left	2167	3843	10	179	57	12966
A?C	13	A3C	E100X530Y MAX	Left	794	1910	21	202	82	8036
C?A	21	C3A	E100X530Y MAX	Left	573	5008	16	563	31	8744
C?B	18	C3B	E30X100Y5 MAX	Left	1577	2956	10	253	68	9654
C?C	22	C1C	E100X530Y MAX	Left	971	2051	17	199	72	8736
D?A	45	D3A	E100X530Y MAX	Left	273	4318	9	443	25	7708
D?B	43	D3B	E100X530Y MAX	Left	1355	2552	6	193	61	9134
D?C	46	D3C	E100X530Y MAX	Left	811	1803	9	119	44	8028

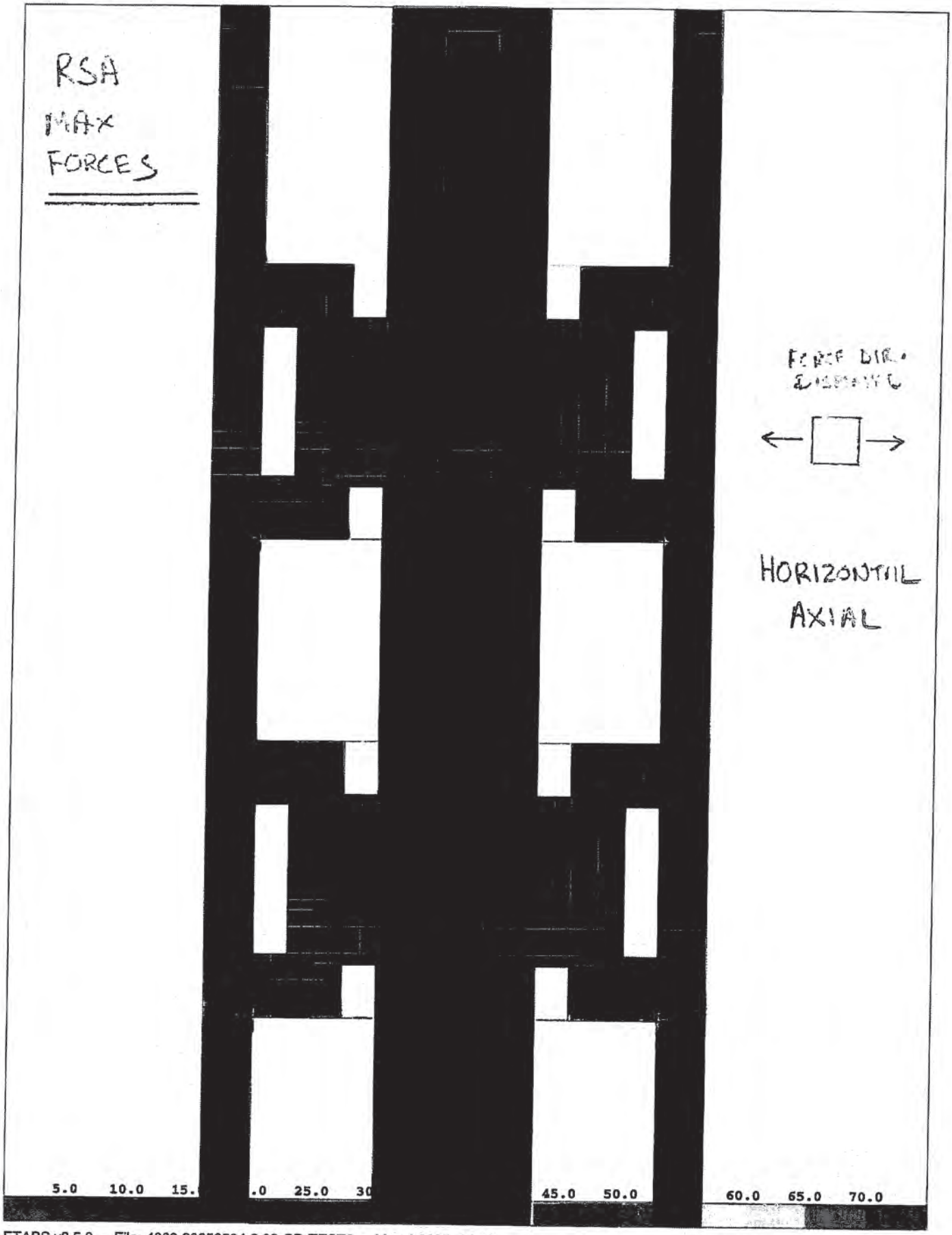
← GOVERNS FUSE DESIGN

Etabs Model: 2.09-CD

4069-outrigger design force

8.1.3-3

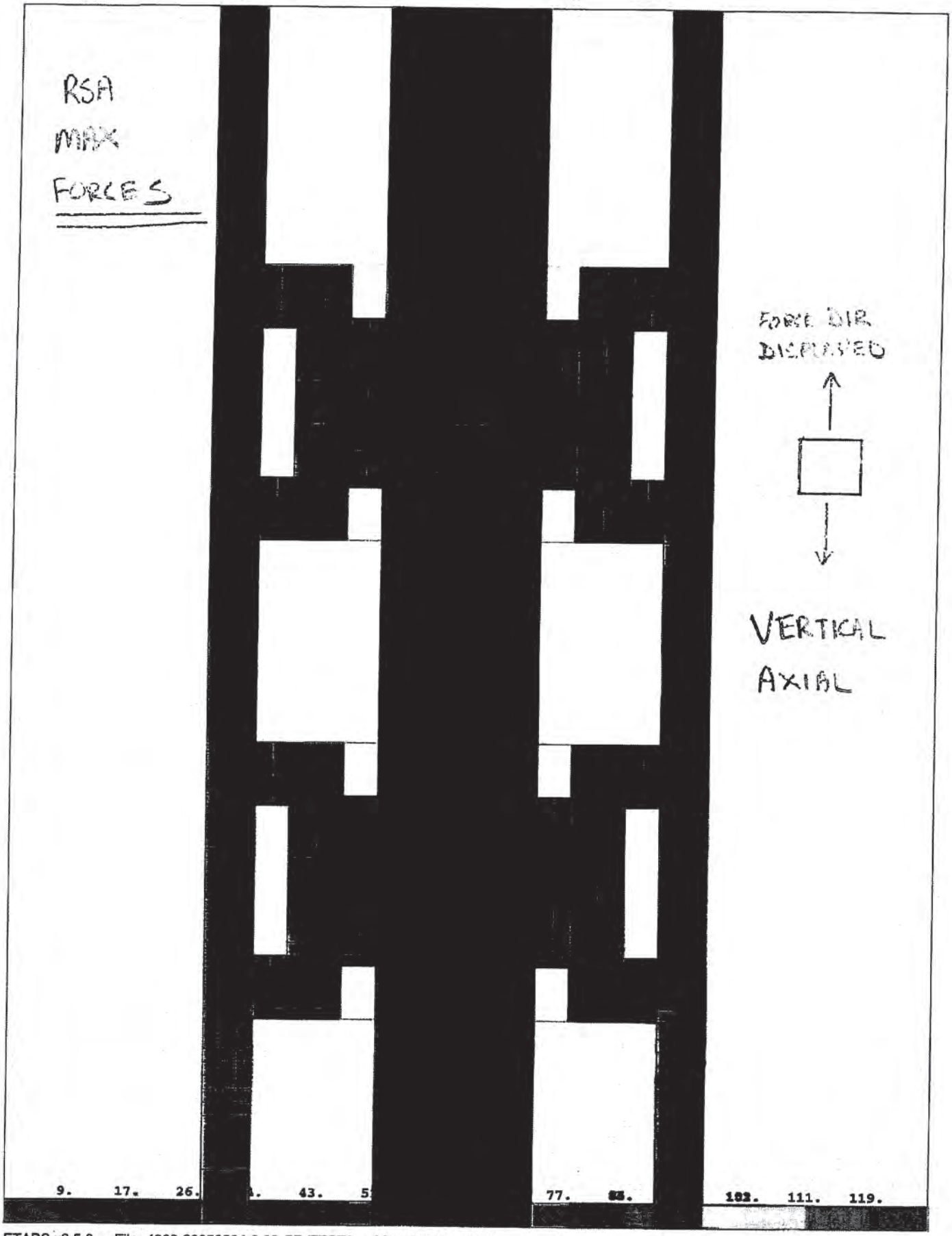
ETABS



ETABS v8.5.0 - File: 4069-20050504-2.09-CD-TEST2 - May 4,2005 14:54
Elevation View - C Resultant F11 Diagram (E100X530Y) - Kip-in Units

8.1.3-4

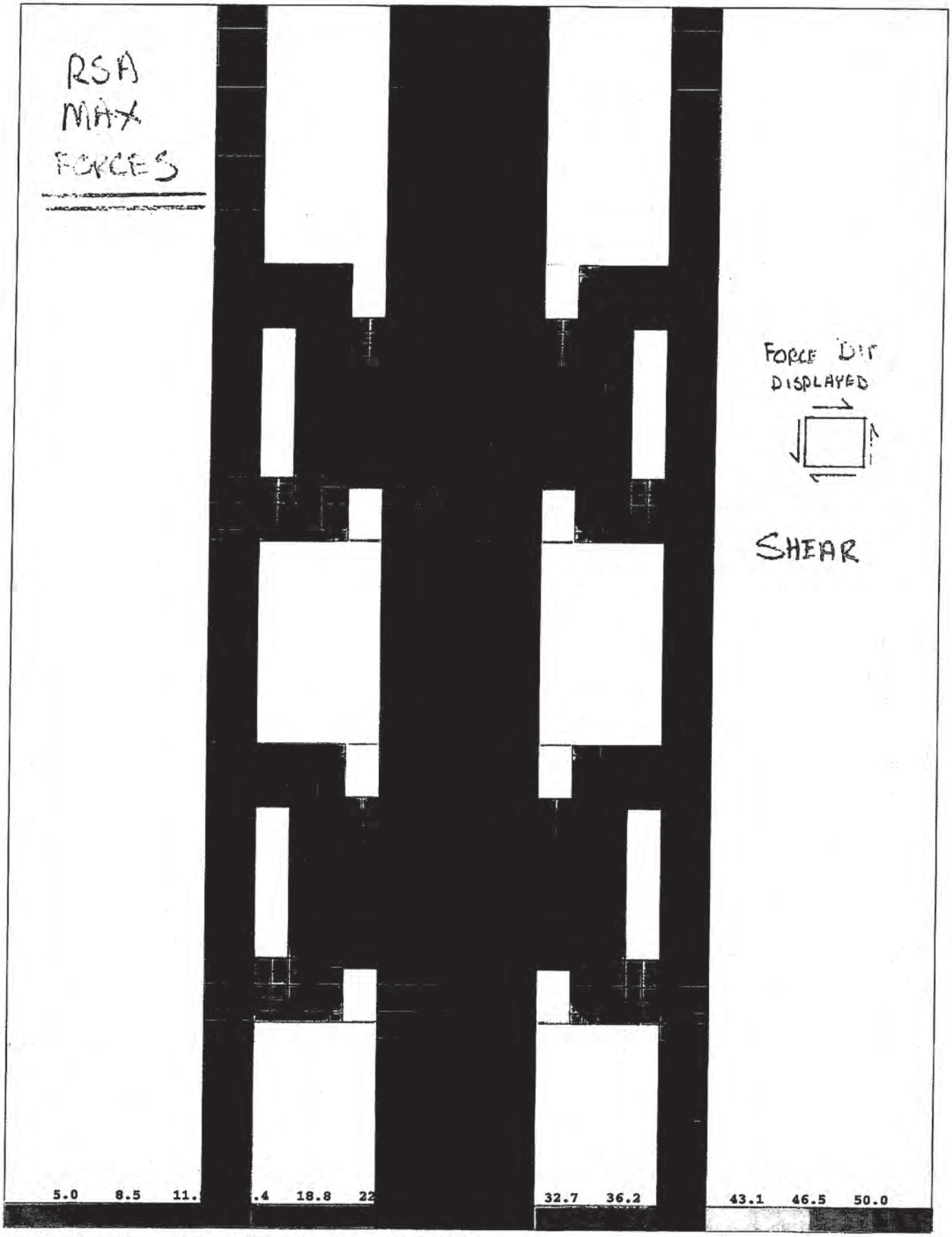
ETABS



ETABS v8.5.0 - File: 4069-20050504-2.09-CD-TEST2 - May 4,2005 14:55
Elevation View - C Resultant F22 Diagram (E100X530Y) - Kip-in Units

8.1.3-5

ETABS



ETABS v8.5.0 - File: 4069-20050504-2.09-CD-TEST2 - May 4,2005 14:51
Elevation View - C Resultant F12 Diagram (E100X530Y) - Kip-in Units

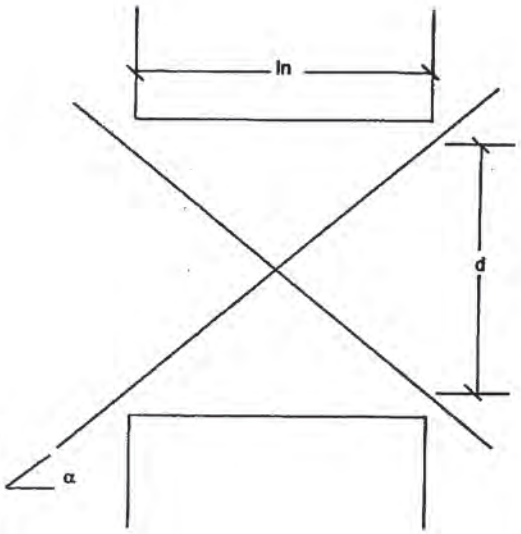
8.1.3-6

Print Date: 5/21/2005

Project	301 Mission
Job #	4069
Date	5/20/2005
Etabs Model	2.09-CD

Coupling beam design for outrigger connected to col D at L8

ln	72	in	
d	124	in	
bw	36	in	
f'c	10000	psi	
Vu	3843	kips	
Mu	12966	k-ft	
Avd	37.44	in^2	Total area of steel in one diagonal
fy	75	ksi	24#11
ln/d	0.6		
4sqrt(f'c)bw*d	1786	kips	
α	1.04	rads	
	59.9	degs	
Mn	14570	k-ft	Avd*fy*d*Cos(α)
ϕ-factor	0.9		
ϕMn	**13113**	k-ft	
Vn	4857	kips	2*Avd*fy*Sin(α)
10sqrt(f'c)bw*d	4464	kips	Upper limit (UBC equ. 21-11)
Vn	4464	kips	
ϕ-factor	0.85		(UBC 1921.6.10.2)
ϕVn	**3794**	kips	



ok

Vu/ϕVn	**1.01**	**NG**
Mu/ϕMn	**0.99**	**OK**

Check if conventional reinforcment is possible:
Requirement Vu<4sqrt(f'c)bw*d (ACI-99 21.6.7.3)

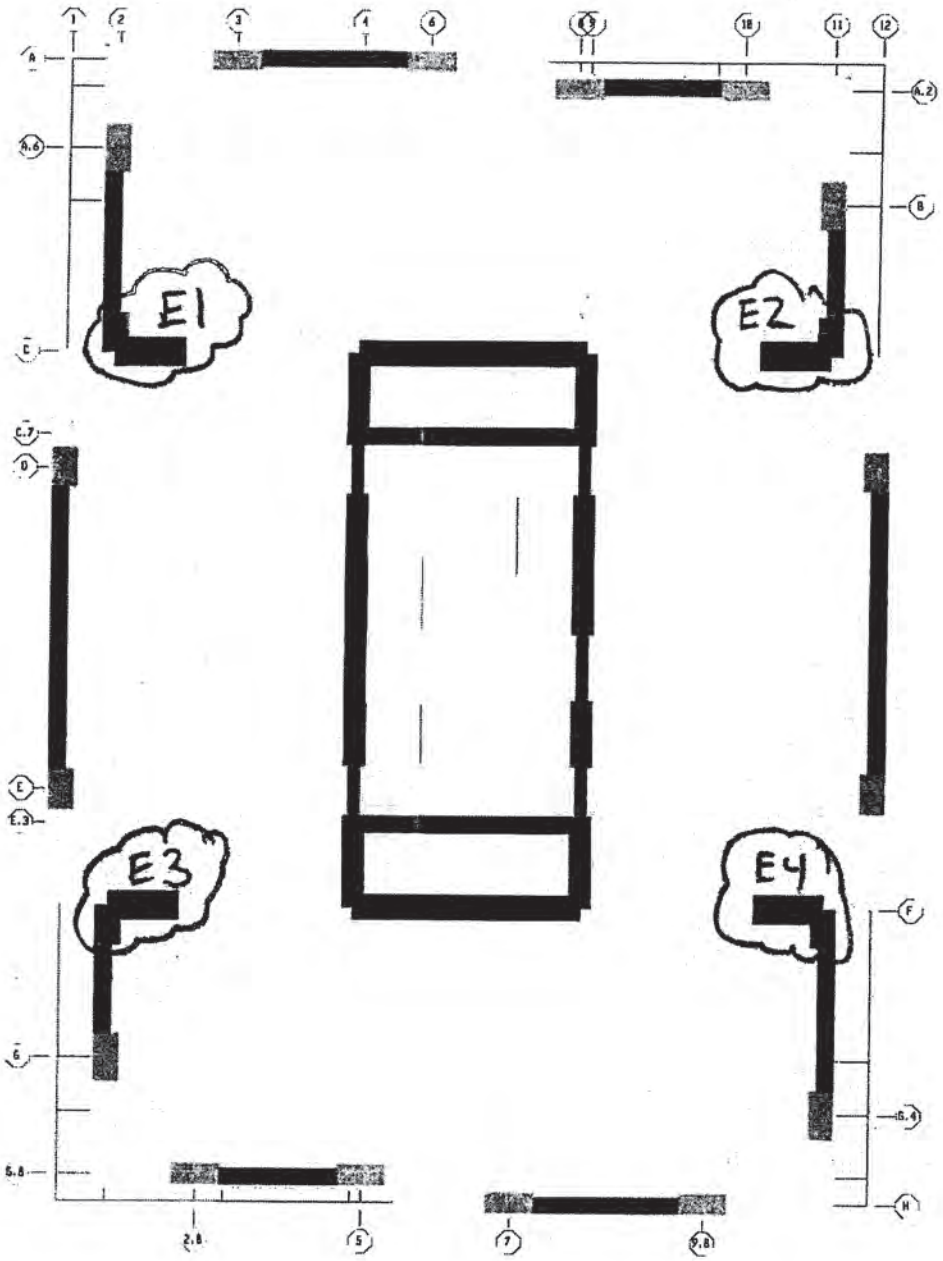
Vu/sqrt(f'c)bw*d<4	8.6	if less than 4, conventional CAN be used

What is Vp?

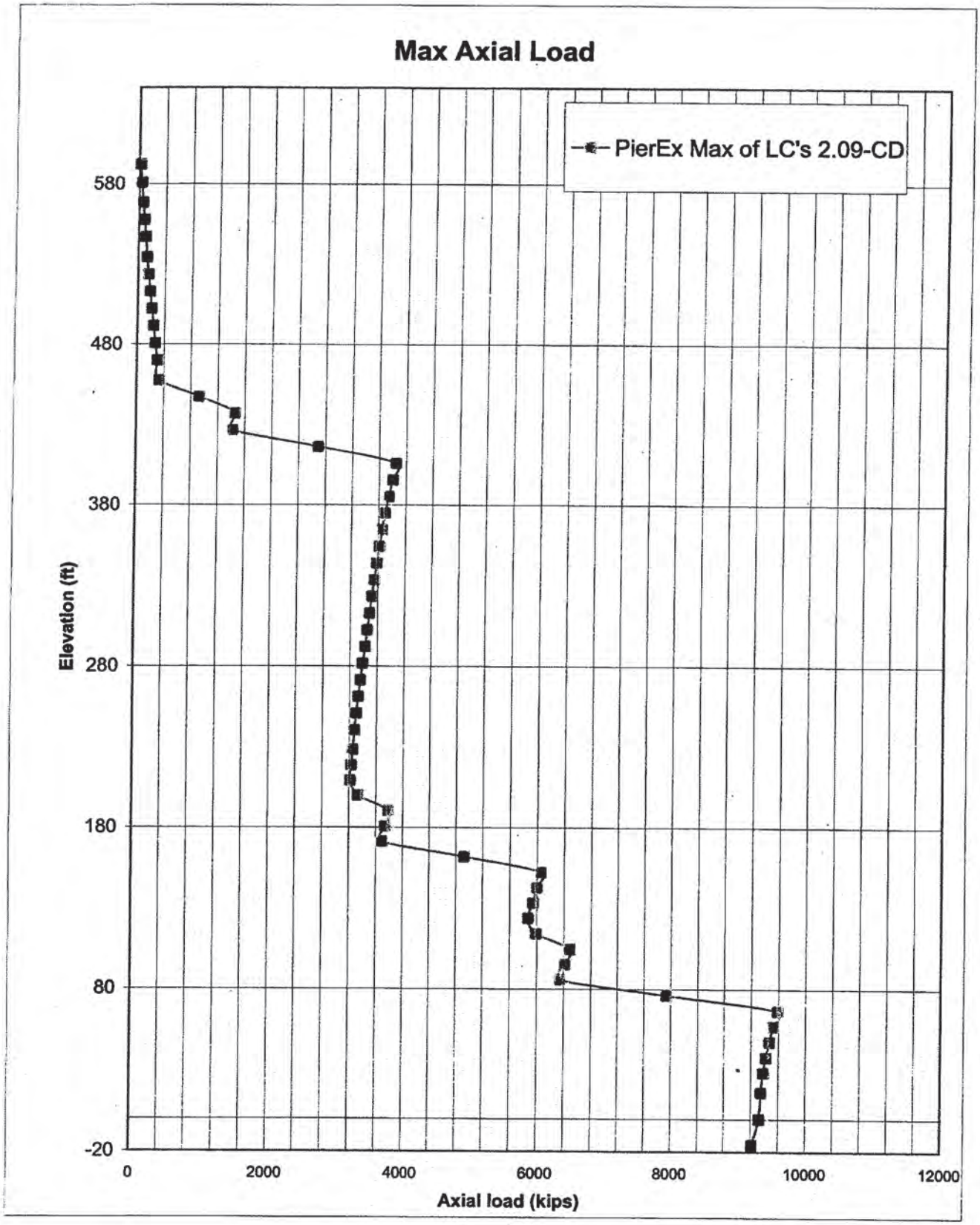
1.25fy =	93.75	ksi	
Vp	6071	kips	2*Avd*fy*Sin(α)

8.1.3-7

OUTRIGGER COLUMS

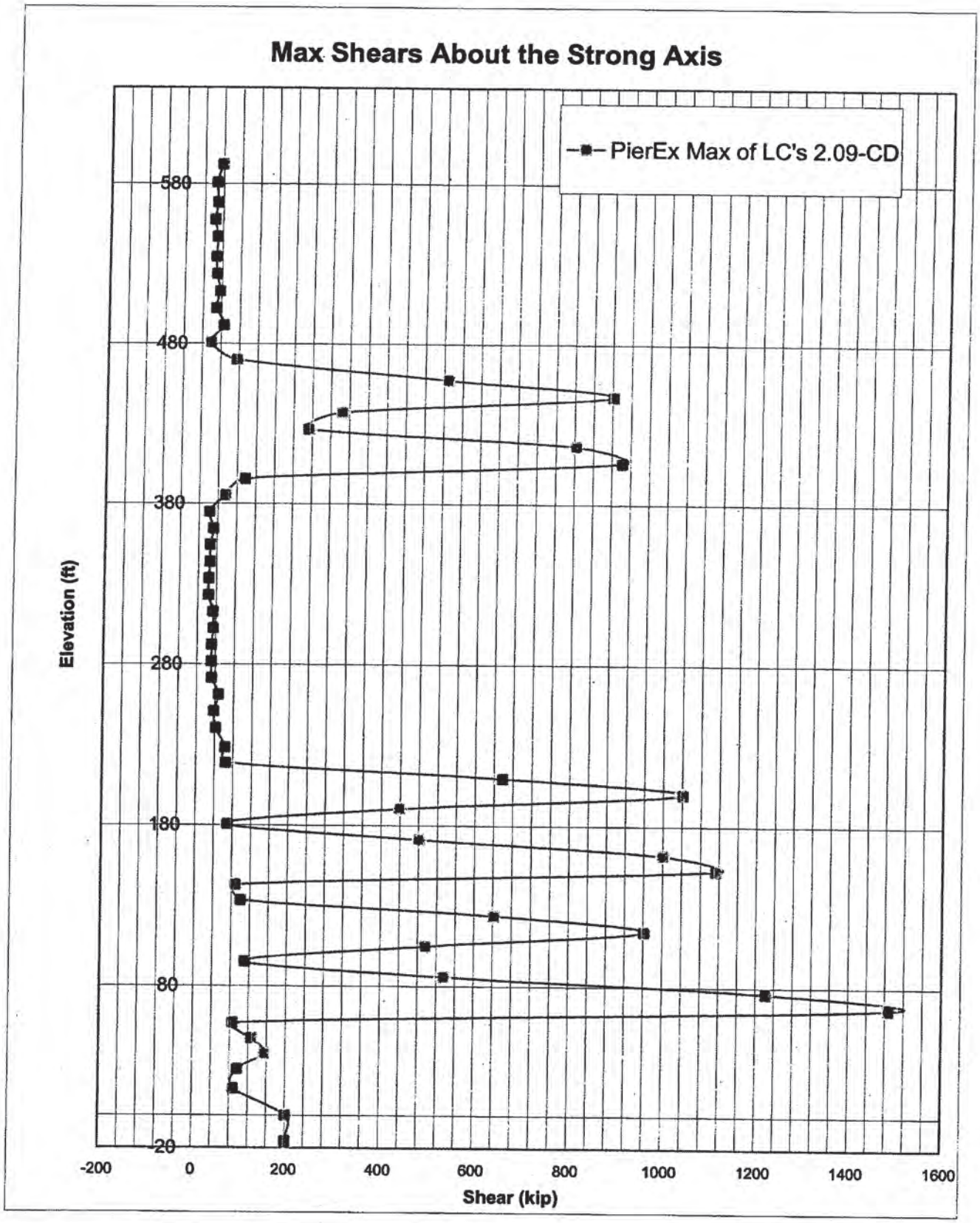


Print Date 5/9/2005



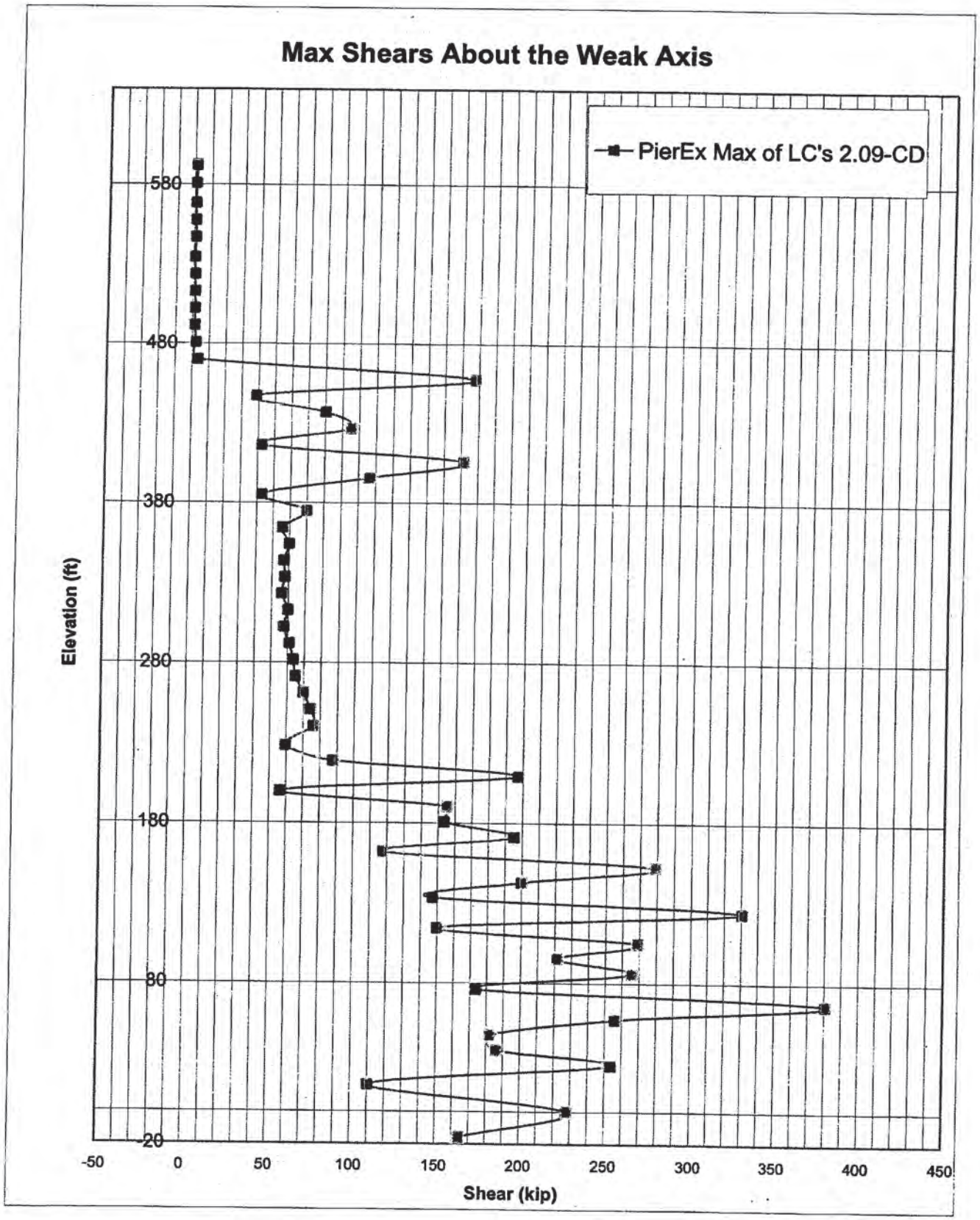
8.1.3-9

Print Date 5/9/2005



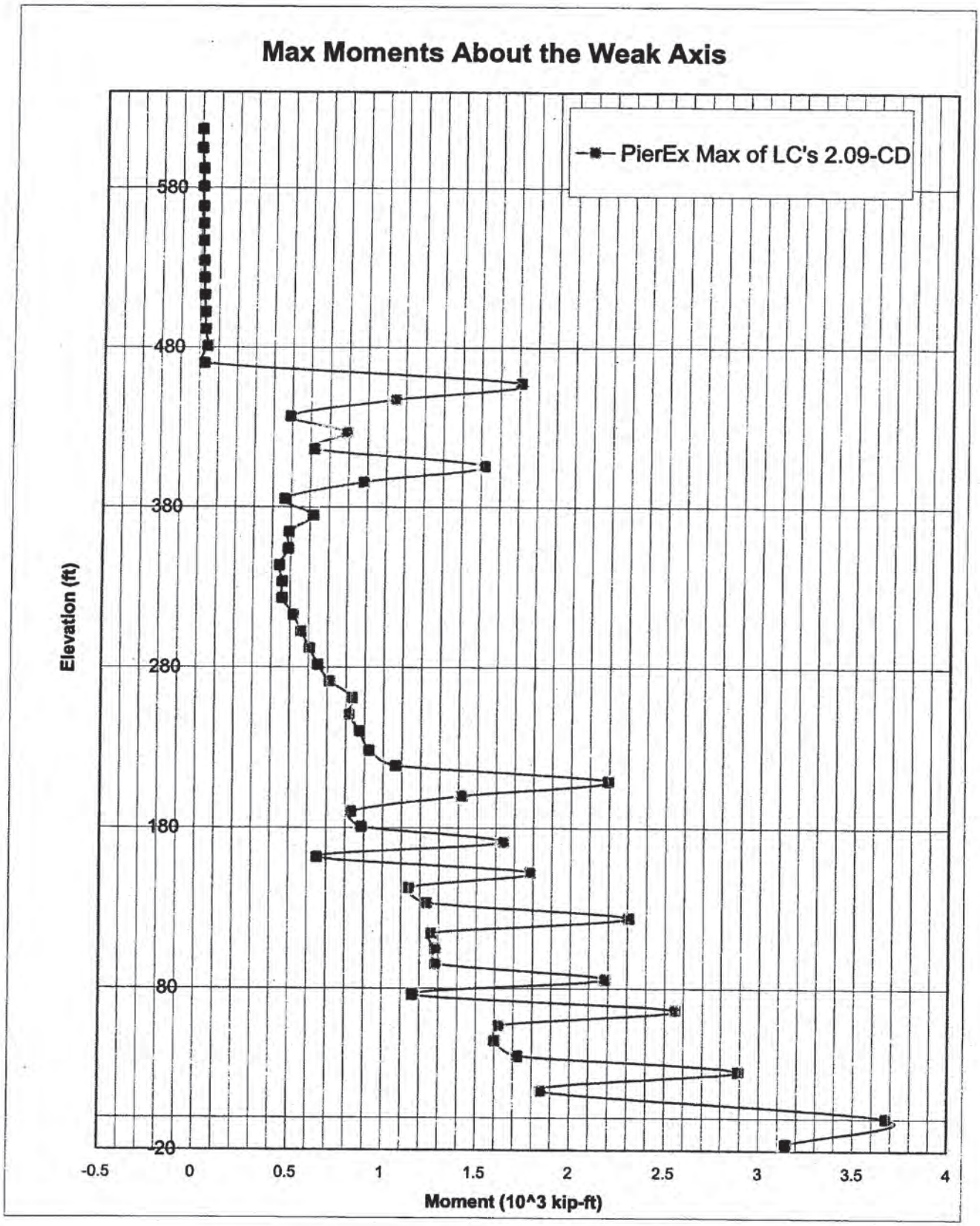
8.1.3-10

Print Date 5/9/2005



8.1.3-11

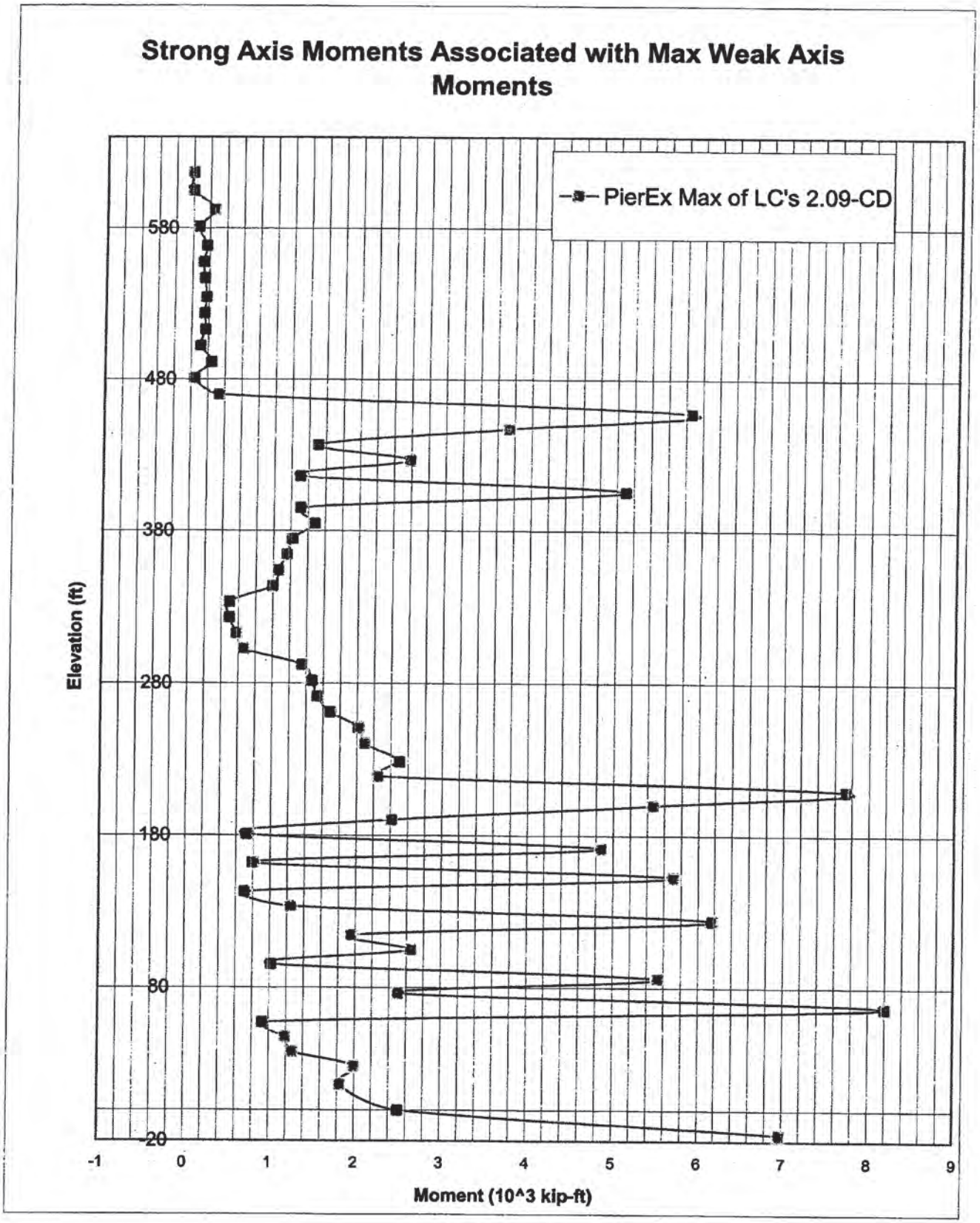
Print Date 5/9/2005



8.1.3-12

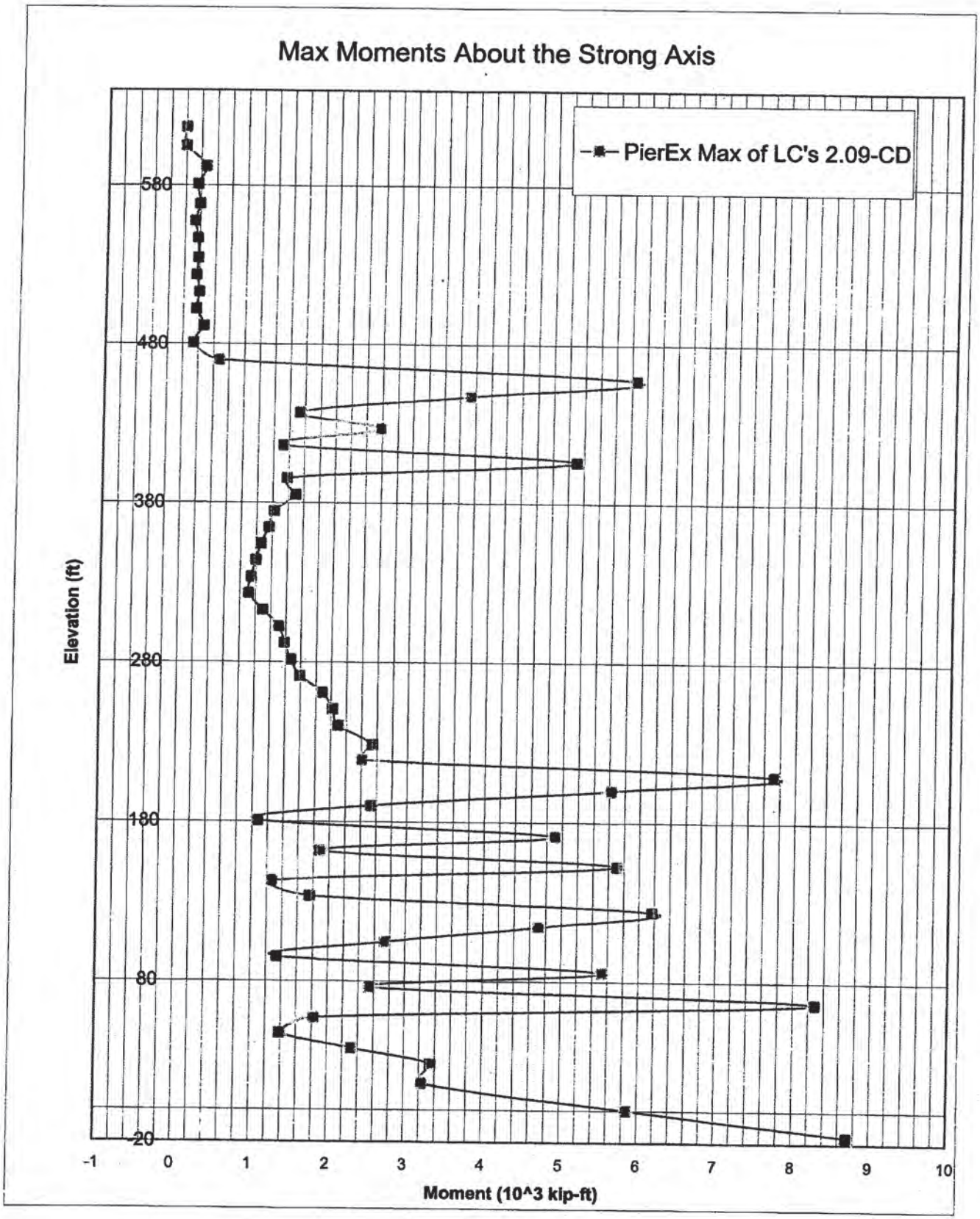
Print Date 5/9/2005

Strong Axis Moments Associated with Max Weak Axis Moments



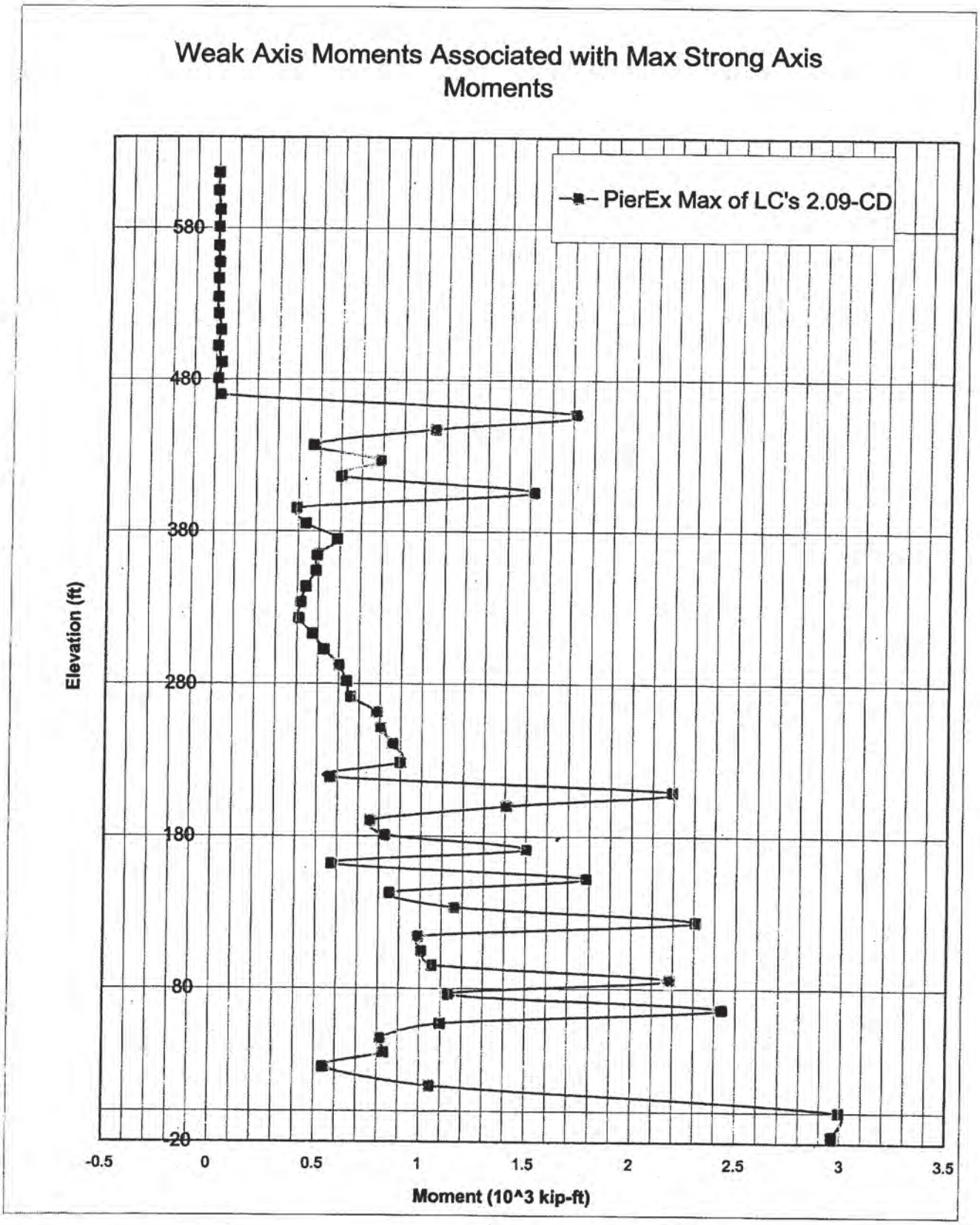
8.1.3-13

Print Date 5/9/2005



8.1.3-14

Print Date 5/9/2005



8.1.3-15

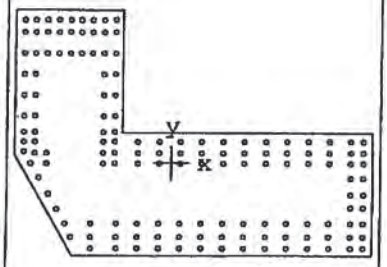
Print Date 5/16/2005

Unit Wt.	0.150	kcf
Min trib area from group	459	ft² (For Tension)
Max trib area from group	521	ft² (For Compression)
Live Load (100% units)	64	psf

Ex (Outrigger Columns)

Floor	Usage	Flr. Ht. ft	Elevation ft	Width in	Length in	Trib A. sq. ft	Cum Trib A. sq. ft	Trib A. sq. ft	Cum Trib A. sq. ft	Floor DL psf	Red. LL psf	SMRF Beam Trib Length ft	SMRF Beam Wt. klf	Beam DL kips	Exterior Wall DL kips	Outrigger Length ft	Outrigger Weight klf	Outrigger DL kips	Misc. LL kips	Self Wt kips	Min Total DL kips	Min Cum DL kips	Max Total DL kips	Max Cum DL kips	Cum Reducible LL kips	LL ⅝ multiplier	Cum Red. LL kips	Cum Service kips	Cum Service kips	1.42(dl)D+0.5L Design kips	0.9*D Design kips	1.4(dl)D+1.7L Design kips
																					Min		Max						dlf 1.0	dlf 1.0	dlf 1.0
61	Cap	11.0	627.7	51.4	51.4	138	138	159	159	248	20					0	0	0		30	64	64	70	70	3	1.00	3	67	72	100	58	102
60	Mech	11.8	616.7	51.4	51.4	138	275	159	318	171	20	9	0.900	8	2.6	0	0	0		32	67	131	70	140	6	1.15	6	137	146	202	118	207
59	Roof	12.8	605.0	51.4	51.4	441	716	503	820	205	20	9	0.900	8	2.9	0	0	0		35	136	268	149	289	14	0.81	12	279	301	416	241	424
58	Typ	11.3	592.2	51.4	51.4	441	1157	503	1323	128	40	9	0.900	8	2.5	0	0	0		31	98	366	106	395	32	0.69	22	388	417	572	329	591
57	Typ	12.5	581.0	51.4	51.4	441	1597	503	1825	128	40	9	0.900	8	2.8	0	0	0		34	102	467	110	505	50	0.63	31	498	536	732	421	759
56	Typ	10.8	568.5	51.4	51.4	441	1597	503	1825	128	40	9	0.900	8	2.4	0	0	0		30	97	462	104	520	50	0.63	31	493	531	725	416	752
55	Typ	10.8	557.7	51.4	51.4	441	2038	503	2328	128	40	9	0.900	8	2.4	0	0	0		30	97	559	104	604	67	0.58	39	598	643	877	503	912
54	Typ	12.5	547.0	51.4	51.4	441	2479	503	2831	128	40	9	0.900	8	2.8	0	1	0		34	102	660	110	714	85	0.55	47	707	760	1037	594	1079
53	Typ	10.8	534.5	51.4	51.4	441	2919	503	3333	128	40	9	0.900	8	2.4	0	2	0		30	97	757	104	818	102	0.53	54	811	872	1189	681	1237
52	Typ	10.8	523.7	51.4	51.4	441	3360	503	3836	128	40	9	0.900	8	2.4	0	3	0		30	97	853	104	923	120	0.51	61	915	984	1341	768	1396
51	Typ	10.8	513.0	51.4	51.4	441	3800	503	4339	128	40	9	0.900	8	2.4	0	4	0		30	97	950	104	1027	138	0.49	68	1018	1095	1492	855	1553
50	Typ	10.8	502.2	51.4	51.4	441	4241	503	4841	128	40	9	0.900	8	2.4	0	5	0		30	97	1047	104	1132	155	0.48	75	1121	1206	1644	942	1711
49	Typ	10.8	491.5	51.4	51.4	441	4682	503	5344	128	40	9	0.900	8	2.4	0	6	0		30	97	1143	104	1236	173	0.47	81	1224	1317	1796	1029	1868
48	Typ	10.8	480.7	51.4	51.4	441	5122	503	5846	128	40	9	0.900	8	2.4	0	7	0		30	97	1240	104	1341	191	0.46	88	1327	1428	1947	1116	2026
47	Mech	12.5	470.0	75.3	75.3	420	5542	482	6328	146.5	100	9	0.900	8	2.8	0	0	0		74	146	1386	155	1496	233	0.45	105	1491	1601	2177	1247	2273
46	Typ	10.3	457.5	75.3	75.3	420	5962	482	6810	128	40	9	0.900	8	2.3	5.7	2.936	17		61	142	1528	150	1646	249	0.44	111	1639	1756	2392	1375	2492
45	Typ	10.3	447.2	75.3	75.3	420	6381	482	7291	128	40	9	0.900	8	2.3	5.7	3.643	21		61	146	1674	154	1800	265	0.44	116	1790	1916	2614	1506	2717
44	Typ	10.3	436.8	75.3	75.3	420	6801	482	7773	128	40	9	0.900	8	2.3	5.7	3.643	21		61	146	1820	154	1953	283	0.43	122	1942	2076	2835	1638	2942
43	Typ	10.3	426.5	75.3	75.3	420	7220	482	8255	128	40	9	0.900	8	2.3	5.7	2.936	17		61	142	1962	150	2103	300	0.43	128	2089	2231	3051	1765	3162
42	Typ	10.3	416.2	75.3	75.3	420	7640	482	8736	128	40	9	0.900	8	2.3	0	0	0		61	125	2087	133	2236	316	0.42	133	2220	2370	3242	1878	3358
41	Typ	10.3	405.8	75.3	75.3	420	8060	482	9218	128	40	9	0.900	8	2.3	0	0	0		61	125	2212	133	2369	333	0.42	139	2351	2508	3434	1991	3554
40	Typ	10.3	395.5	75.3	75.3	420	8479	482	9699	128	40	9	0.900	8	2.3	0	0	0		61	125	2337	133	2503	350	0.41	145	2482	2647	3626	2103	3749
39	Typ	10.3	385.2	75.3	75.3	420	8899	482	10181	128	40	9	0.900	8	2.3	0	0	0		61	125	2462	133	2636	367	0.41	150	2612	2786	3818	2216	3945
38	Typ	10.3	374.8	75.3	75.3	420	9319	482	10663	128	40	9	1.125	10	2.3	0	0	0		61	127	2589	135	2771	384	0.41	156	2745	2925	4012	2330	4143
37	Typ	10.3	364.5	75.3	75.3	420	9738	482	11144	128	40	9	1.125	10	2.3	0	0	0		61	127	2717	135	2906	400	0.40	161	2878	3067	4207	2445	4342
36	Typ	10.3	354.2	75.3	75.3	420	10158	482	11626	128	40	9	1.125	10	2.3	0	0	0		61	127	2844	135	3041	417	0.40	167	3011	3208	4402	2559	4541
35	Typ	10.3	343.8	75.3	75.3	420	10577	482	12108	128	40	9	1.125	10	2.3	0	0	0		61	127	2971	135	3176	434	0.40	174	3145	3350	4597	2674	4742
34	Typ	10.3	333.5	75.3	75.3	420	10997	482	12589	128	40	9	1.125	10	2.3	0	0	0		61	127	3098	135	3311	451	0.40	180	3278	3492	4792	2788	4942
33	Typ	10.3	323.2	75.3	75.3	420	11417	482	13071	128	40	9	1.125	10	2.3	0	0	0		61	127	3225	135	3446	468	0.40	187	3412	3633	4987	2903	5143
32	Typ	10.3	312.8	75.3	75.3	420	11836	482	13552	128	40	9	1.125	10	2.3	0	0	0		61	127	3353	135	3582	484	0.40	194	3546	3775	5183	3017	5344
31	Typ	10.3	302.5	75.3	75.3	420	12256	482	14034	128	40	9	1.125	10	2.3	0	0	0		61	127	3480	135	3717	501	0.40	200	3680	3917	5378	3132	5544
30	Typ	10.3	292.2	75.3	75.3	420	12676	482	14516	128	40	9	1.125	10	2.3	0	0	0		61	127	3607	135	3852	518	0.40	207	3814	4059	5573	3246	5745
29	Typ	10.3	281.8	75.3	75.3	420	13095	482	14997	128	40	9	1.125	10	2.3	0	0	0		61	127	3734	135	3987	535	0.40	214	3948	4201	5768	3361	5945
28	Typ	10.3	271.5	75.3	75.3	420	13515	482	15479	128	40	9	1.125	10	2.3	0	0	0		61	127	3861	135	4122	551	0.40	221	4082	4343	5964	3475	6146
27	Typ	10.3	261.2	75.3	75.3	420	13934	482	15961	128	40	9	1.125	10	2.3	0	0	0		61	127	3989	135	4257	568	0.40	227	4216	4485	6159	3590	6347
26	Typ	10.3	250.8	75.3	75.3	420	14354	482	16442	128	40	9	1.125	10	2.3	0	0	0		61	127	4116	135	4392	585	0.40	234	4350	4626	6354	3704	6547
25	Typ	12.3	240.5	75.3	75.3	420	14774	482	16924	128	40	9	1.125	10	2.8	0	0	0		72	139	4255	147	4539	602	0.40	241	4495	4780	6566	3829	6764
24	Mech	9.5	228.3	75.3	75.3	420	15193	482	17405	146.5	100	9	1.125	10	2.1	0	0	0		56	130	4385	139	4678	644	0.40	258	4642	4936	6772	3946	6987
23	Typ	9.5	218.8	75.3	75.3	420	15613	482	17887	128	40	9	1.125	10	2.1	0	0	0		56	122	4507	130	4808	661	0.40	264	4771	5072	6960	4056	7181
22	Typ	9.5	209.3	75.3	75.3	420	16033	482	18369	128	40	9	1.125	10	2.1	5.7	2.936	17		56	139	4645	147	4955	677	0.40	271	4916	5226	7172	4181	7398
21	Typ	9.5	199.8	75.3	75.3	420	16452	482	18850	128	40	9	1.125	10	2.1	5.7	3.643	21		56	143	4788	151	5106	694	0.40	278	5066	5383	7389	4309	7620
20	Typ	9.5	190.3	75.3	75.3	420	16872	482	19332	128	40	9	1.125	10	2.1	5.7	3.643	21		56	143	4931	151	5257	711	0.40	284	5215	5541	7606	4438	7843
19	Typ	9.5	180.8	75.3	75.3	420	17291	482	19814	128	40	9	1.125	10	2.1	5.7	3.643	21		56	143	5074	151	5407	728	0.40	291	5365	5698	7824	4567	8065
18	Typ	9.5	171.3	75.3	75.3	420	17711	482	20295	128	40	9	1.125	10	2.1	5.7	2.936	17		56	139	5213	147	5554	744	0.40	298	5511	5852	8036	4692	8282
17	Typ	9.5	161.8	75.3	75.3	420	18131	482	20777	128	40	9	1.125	10	2.1	0	0	0		56	122	5335	130	5684	761	0.40	305	5639	5989	8224	4801	8475
16	Typ	9.5	152.3	75.3	75.3	420	18550	482	21258	128	40	9	1.125	10	2.1	0	0	0		56	122	5457	130	5814	778	0.40	311	5768	6125	8412	4911	8669
15	Typ	9.5	142.8	75.3	75.3	420	18970	482	21740	128	40	9	1.125	10	2.1	0	0	0		56	122	5579	130	5944	795	0.40	318	5897	6262	8600	5021	8862
14	Typ	9.5	133.3	75.3	75.3	420	19390	482	22222	128	40	9	1.125	10	2.1	0	0	0		56	122	5701	130	6074	812	0.40	325	6026	6399	8788	5131	9056
13	Typ	9.5	123.8	75.3	75.3	420	19809	482	22703	128	40	9	1.125	10	2.1	5.7	2.936	17		56	139	5840	147	6221	828	0.40	331	6171	6552	8959	5256	9273
12	Typ	9.5	114.3	75.3	75.3	420	20229	482	23185	128	40	9	1.406	13	2.1	5.7	3.643	21		56	145	5985	153	6374	845	0.40	338	6323	6712	9220	5387	9499
11	Typ	9.5	104.8	75.3	75.3	420	20648	482	23667	128	40	9	1.406	13	2.1	5.7	3.643	21		56	145	6131	153	6528	862	0.40	345	6476	6872	9442	5518	9725
10	Typ	9.5	95.3	75.3	75.3	420	21068	482	24148	128	40	9	1.406	13	2.1	5.7	3.643	21		56	145	6276	153	6681	879	0.40	352	6628	7032	9663	5648	9951
9	Typ	9.5	85.8	75.3	75.3	420	21488	482	24630	128	40	9	1.406	13	2.1	5.7	2.936	17		56	141	6417	149	6830	896	0.40	358	6776	7188	9878	5776	10171
8	Typ	9.5	76.3	75.3	75.3	420	21907	482	25111	128	40	9	1.406	13	2.1	0	0	0		56	125	6542	133	6963	912	0.40	365	6907	7328	10069	5888	10368
7	Typ	9.5	66.8	75.3	75.3	420	22327	482	25593	128	40	9	1.406	13	2.1	0	0	0		56	125	6667	133	7095	929	0.40	372	7038	7467	10261	6000	10565
6	Typ	9.5	57.3	75.3	75.3	420	22747	482	26075	128	40	9	1.406	13	2.1	0	0	0		56	125	6791	133	7228	946	0.40	378	7170	7606	10453	6112	10762
5	Typ	9.5	47.8	75.3	75.3	420	23166	482	26556	128	40	9	1.406	13	2.1	0	0	0		56	125	6916	133	7360	963	0.40	385	7301	7745	10644	6224	10959
4	Typ	9.5	38.3	78.6	78.6	416	23582	478	27034	128	40	9	1.406	13	2.1	0	0	0		61	129	7045	137	7497	979	0.40	392	7437	7889	10842	6341	11162
3	Typ	12.2	26.8	78.6	78.6	416	23998	478	27513	128	40	9	1.406	13	2.7	0	0	0		78	147	7192	155	7652	996	0.40	398	7593	8051	11066	6473	11391
2	Mech	16.6	16.6	78.6	78.6	416	24414	478	27991	146.5	100	9	1.406	13	3.7	0	0	0		107	184	7376	193	7845	1038	0.40	415	7791	8261	11348	6638	11689
Ground	Public	15.8	0	78.6	78.6	416	24831	478	28469	187.5	100	9	1.406	13	3.5	0	0	0		101	196	7572	207	8053	1079	0.40	432	8003	8484	11651	6815	12008
B1		0.0	-15.8																													
														593	142			267	3332													

8.1.3-16



120 x 84 in

Code: ACI 318-95

Units: English

Run axis: Biaxial

Run option: Investigation

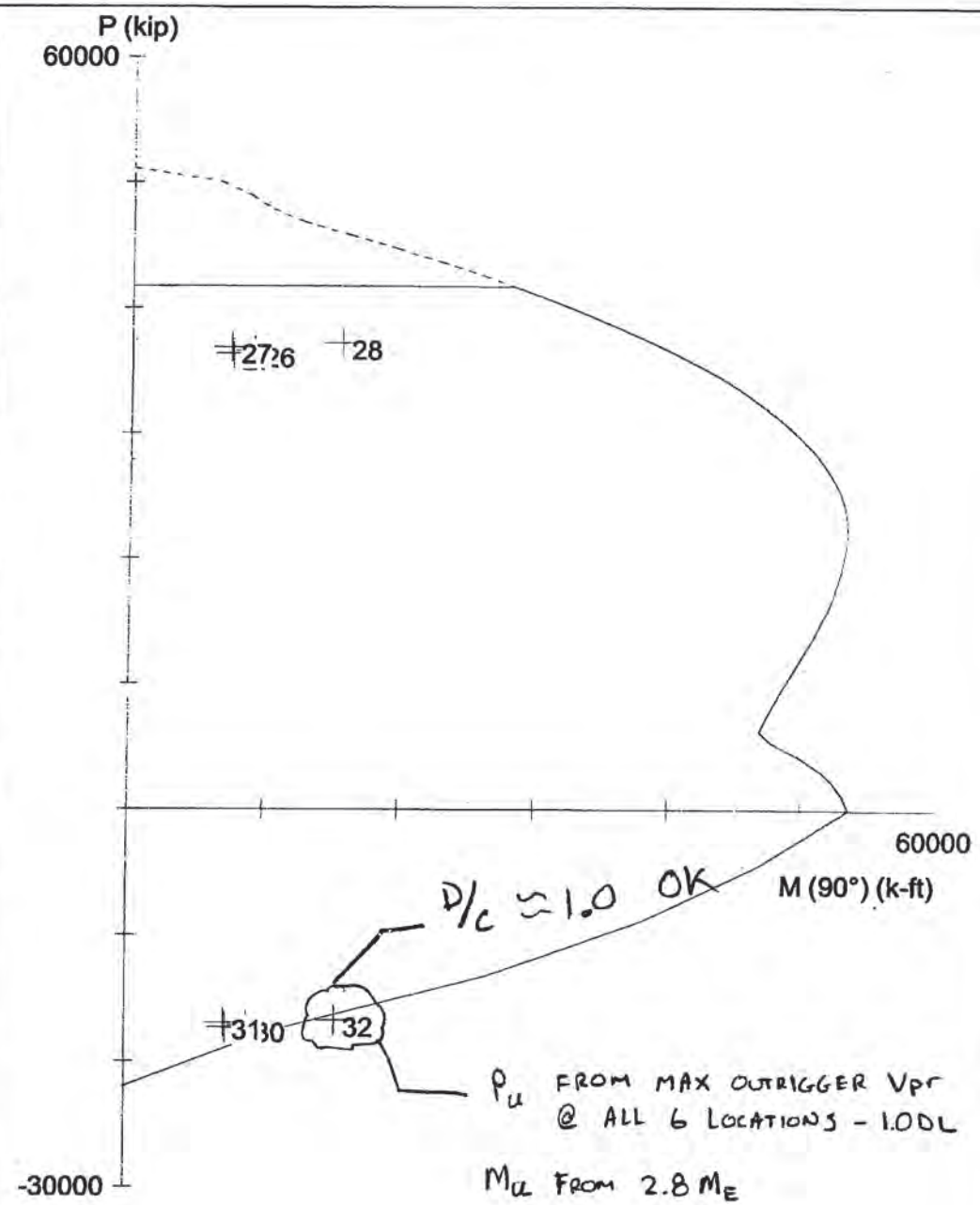
Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/16/05

Time: 15:21:17



PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

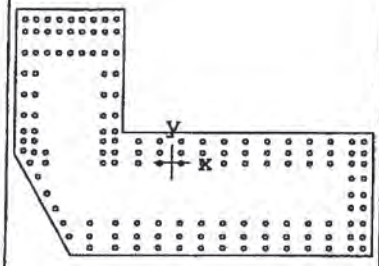
File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\3-OUTR~1\LB1.COL

Project:

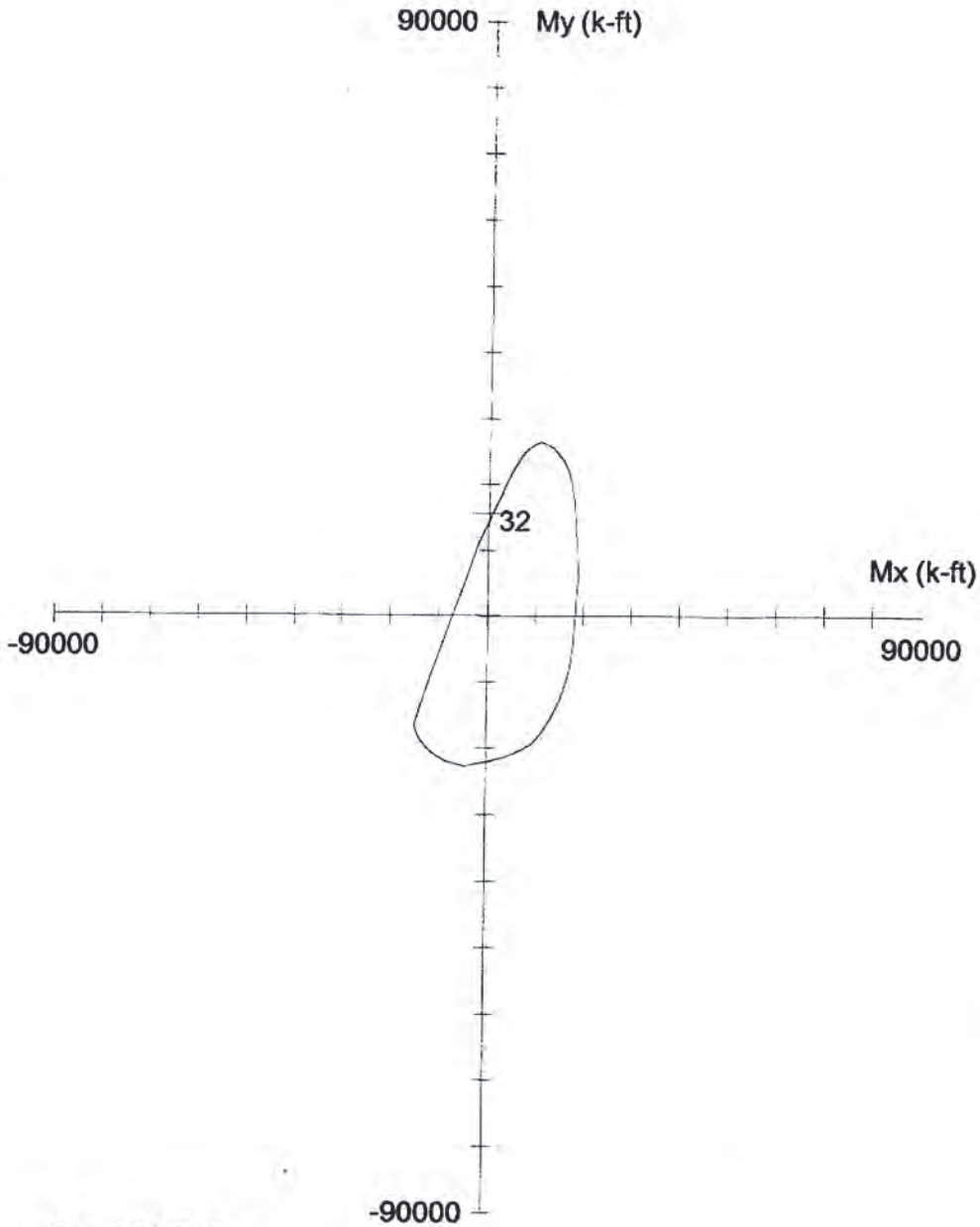
Column:		Engineer:	
f'c = 10 ksi	fy = 75 ksi	Ag = 6216.51 in^2	145 #14 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 326.25 in^2	Rho = 5.25%
fc = 8.5 ksi	e_rup = Infinity	Xo = -0.00 in	Ix = 2.86252e+006 in^4
e_u = 0.003 in/in		Yo = -0.00 in	Iy = 7.57655e+006 in^4
Beta1 = 0.65		Clear spacing = 1.61 in	Clear cover = N/A

8.1.3-17

Confinement: Tied phi(a) = 0.8 phi(b) = 0.9 phi(c) = 0.7



120 x 84 in



P = -16716 kip

Code: ACI 318-95

Units: English

Run axis: Biaxial

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/16/05

Time: 15:21:45

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\3-OUTR~1\LB1.COL

Project:

Column:

Engineer:

f'c = 10 ksi	fy = 75 ksi	Ag = 6216.51 in^2	145 #14 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 326.25 in^2	Rho = 5.25%
fc = 8.5 ksi	e_rup = Infinity	Xo = -0.00 in	Ix = 2.86252e+006 in^4
e_u = 0.003 in/in		Yo = -0.00 in	Iy = 7.57655e+006 in^4
Beta1 = 0.65		Clear spacing = 1.61 in	Clear cover = N/A

8.1.3-18

Confinement: Tied phi(a) = 0.8 phi(b) = 0.9 phi(c) = 0.7

General Information:
==========

File Name: F:\PROJECTS\4069\PCA\TOWER\CURRENT\3-OUTR~1\LB1.COL
Project:
Column:
Code: ACI 318-95
Engineer:
Units: English

Run Option: Investigation
Run Axis: Biaxial
Slenderness: Not considered
Column Type: Structural

Material Properties:
==========

f'c = 10 ksi
Ec = 5000 ksi
fc = 8.5 ksi
Ultimate strain = 0.003 in/in
Betal = 0.65
fy = 75 ksi
Es = 29000 ksi
Rupture strain = Infinity

Section:
==========

Exterior Points

No.	X (in)	Y (in)	No.	X (in)	Y (in)	No.	X (in)	Y (in)
1	-33.3	-31.7	2	67.3	-31.7	3	67.3	10.3
4	-16.7	10.3	5	-16.7	52.3	6	-52.7	52.3
7	-52.7	2.8						

Gross section area, Ag = 6216.51 in^2
Ix = 2.86252e+006 in^4
Xo = -0.000736446 in
Iy = 7.57655e+006 in^4
Yo = -0.000717949 in

Reinforcement:
==========

Rebar Database: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.7

Pattern: Irregular

Total steel area, As = 326.25 in^2 at 5.25%

Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)	Area in^2	X (in)	Y (in)
2.25	60.1	-11.0	2.25	60.1	-15.4	2.25	64.4	-15.4
2.25	60.1	-5.3	2.25	64.4	-5.3	2.25	-44.6	-5.1
2.25	-45.9	3.4	2.25	-45.9	7.2	2.25	-41.5	-10.7
2.25	64.4	-11.0	2.25	-33.8	-25.4	2.25	-35.9	-20.8
2.25	-47.3	-0.3	2.25	-49.7	7.2	2.25	-42.0	-0.3
2.25	-23.0	-0.3	2.25	-23.0	3.4	2.25	-27.0	-20.8
2.25	-27.0	-25.4	2.25	-23.0	10.5	2.25	-45.9	10.6
2.25	-19.2	10.6	2.25	-49.7	10.6	2.25	-42.0	3.4
2.25	-38.6	-15.8	2.25	2.9	-20.8	2.25	-4.2	-20.8
2.25	-11.4	-20.8	2.25	-18.5	-20.8	2.25	52.9	-20.8
2.25	45.8	-20.8	2.25	38.6	-20.8	2.25	31.5	-20.8
2.25	24.3	-20.8	2.25	17.2	-20.8	2.25	10.1	-20.8
2.25	-19.2	-0.2	2.25	3.0	-0.3	2.25	-4.1	-0.3
2.25	-11.3	-0.3	2.25	53.0	-0.3	2.25	45.9	-0.3
2.25	38.7	-0.3	2.25	31.6	-0.3	2.25	24.4	-0.3

8.1.3-19

2.25	17.3	-0.3	2.25	10.2	-0.3	2.25	-30.6	37.3
2.25	-34.4	37.4	2.25	-38.2	37.3	2.25	-42.0	37.3
2.25	-26.8	37.3	2.25	-19.2	3.5	2.25	2.9	-25.4
2.25	-4.2	-25.4	2.25	-11.4	-25.4	2.25	-18.5	-25.4
2.25	3.0	3.4	2.25	-4.1	3.4	2.25	-11.3	3.4
2.25	3.0	-29.2	2.25	-4.1	-29.2	2.25	-11.3	-29.2
2.25	-18.4	-29.2	2.25	3.0	7.2	2.25	-4.1	7.2
2.25	-11.3	7.2	2.25	-23.0	37.3	2.25	-23.0	30.2
2.25	-45.9	37.4	2.25	-45.9	30.3	2.25	-19.2	37.4
2.25	-19.2	30.3	2.25	-49.7	37.4	2.25	-49.7	30.3
2.25	-23.0	23.0	2.25	-45.9	23.1	2.25	-19.2	23.1
2.25	-49.7	23.1	2.25	-23.0	15.9	2.25	-23.0	7.2
2.25	-45.9	16.0	2.25	-30.6	44.6	2.25	-34.4	44.7
2.25	-38.2	44.6	2.25	-45.9	44.6	2.25	-45.9	48.8
2.25	-42.0	44.6	2.25	-42.0	48.8	2.25	-38.2	48.8
2.25	-19.2	16.0	2.25	-19.2	7.3	2.25	-49.7	16.0
2.25	-49.7	3.9	2.25	-23.0	44.6	2.25	-23.0	48.8
2.25	-26.8	44.6	2.25	-26.8	48.8	2.25	-30.6	48.8
2.25	-34.2	48.8	2.25	-19.2	44.7	2.25	-49.7	44.6
2.25	-19.2	48.9	2.25	-49.7	48.8	2.25	60.1	-0.3
2.25	64.4	-0.3	2.25	52.9	-25.4	2.25	45.8	-25.4
2.25	53.0	3.4	2.25	45.9	3.4	2.25	53.0	-29.2
2.25	45.9	-29.2	2.25	53.0	7.2	2.25	45.9	7.2
2.25	38.6	-25.4	2.25	38.7	3.4	2.25	38.7	-29.2
2.25	38.7	7.2	2.25	31.5	-25.4	2.25	24.3	-25.4
2.25	17.2	-25.4	2.25	10.1	-25.4	2.25	31.6	3.4
2.25	24.4	3.4	2.25	17.3	3.4	2.25	10.2	3.4
2.25	60.1	-20.8	2.25	60.1	3.4	2.25	64.4	3.4
2.25	31.6	-29.2	2.25	24.4	-29.2	2.25	17.3	-29.2
2.25	10.2	-29.2	2.25	31.6	7.2	2.25	24.4	7.2
2.25	17.3	7.2	2.25	10.2	7.2	2.25	60.1	-25.4
2.25	64.4	-25.4	2.25	64.4	-20.8	2.25	60.2	-29.2
2.25	60.1	7.2	2.25	64.5	-29.2	2.25	64.4	7.2
2.25	-26.9	-29.2						

Factored Loads and Moments with Corresponding Capacities: (see user's manual for notation)

No.	Pu kip	Mux k-ft	Muy k-ft	fMnx k-ft	fMny k-ft	fMn/Mu
1	20226.0	766.0	2669.0	19607.6	68168.1	25.545
2	20418.0	1050.0	3229.0	22380.7	68729.0	21.288
3	20675.0	377.0	2621.0	8641.3	60235.7	22.981
4	20871.0	1069.0	5553.0	12090.4	62491.9	11.256
5	17217.0	2894.0	1996.0	46486.3	32006.5	16.054
6	17391.0	1850.0	1827.0	45531.0	45092.0	24.646
7	17633.0	3678.0	2510.0	46209.4	31463.0	12.555
8	20174.0	3147.0	6975.0	30084.3	66718.3	9.564
9	19593.0	546.0	3345.0	9917.9	61177.7	18.286
10	20418.0	1050.0	3229.0	22380.7	68729.0	21.288
11	20675.0	2995.0	5857.0	33077.9	64568.6	11.028
12	20871.0	2961.0	8714.0	23229.2	68434.5	7.853
13	-3043.0	766.0	2669.0	22741.4	79307.7	29.712
14	-2879.0	1050.0	3229.0	25336.3	77493.8	24.012
15	-2688.0	377.0	2621.0	8918.7	62771.4	23.944
16	-2406.0	1069.0	5553.0	13159.0	68846.2	12.395
17	-34.0	2894.0	1996.0	49578.6	34144.2	17.123
18	148.0	1850.0	1827.0	45791.5	45124.0	24.726
19	354.0	3678.0	2510.0	49571.8	33895.0	13.486
20	-1708.0	3147.0	6975.0	31859.0	70890.4	10.157
21	-2410.0	546.0	3345.0	10699.3	65584.0	19.606
22	-2879.0	1050.0	3229.0	25336.3	77493.8	24.012
23	-2688.0	2995.0	5857.0	32951.7	64399.3	10.997
24	-2406.0	2961.0	8714.0	26372.0	77803.0	8.926
25	36362.4	0.0	7473.7	-21.2	40456.1	5.413

26	36590.5	0.0	9039.8	16.7	40047.7	4.430
27	36889.2	0.0	7339.0	38.7	39485.2	5.380
28	37207.6	0.0	15549.5	-20.7	38821.2	2.497
29	-17310.8	0.0	7473.7	19.2	12125.9	1.622
30	-17149.3	0.0	9039.8	-9.3	12754.4	1.411
31	-16939.5	0.0	7339.0	2.0	13651.1	1.860
32	-16715.6	0.0	15549.5	2.6	14585.9	0.938

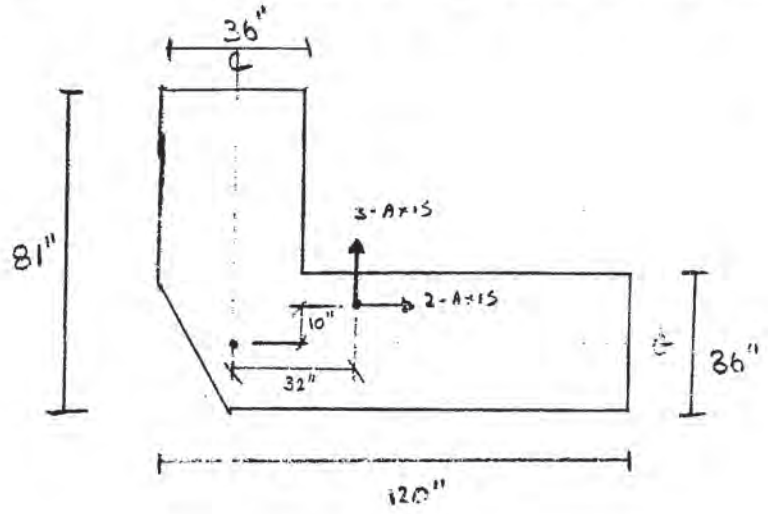
*** Program completed as requested! ***

DESIMONE

Project 301 MISSION — Page 1 of 6

Project No. 4069 B — Date 4/15/05

Item TORSION ON L-SHAPE COL — By NJR Ch'kd



LOAD	EQ RSA
LEVEL 9 E30X100YS	P_E = 7048k (PIER E3)
(LEVEL 9 IS ALSO LOCATION OF MAX SHEAR)	V_2 = 1356 k
	V_3 = 307 k
	T = 1790 k-ft
	M_2 = 1501 k-ft
	M_3 = 3350 k-ft

REINFORCING

136 #14 VERT

A_{cp} = 5660 in^2 (AREA)

P_{cp} = 389 in (Perimeter)

ϕ = 0.85 (ACI 318-99)

f'_c = 10

ACI 318 11.6.1 (CHECK TO SEE IF TORSION CAN BE NEGLECTED)

If $T_u < \phi \sqrt{f'_c}\left(\frac{A_{cp}^2}{P_{cp}}\right) \Rightarrow$ NEGLECT TORSION

$$1790\text{k-ft} < .85\sqrt{10{,}000}\left(\frac{(5660\ in^2)^2}{389}\right)\left(\frac{1\ k}{1000\ lb}\right)\left(\frac{1\ ft}{12\ in}\right) ?$$

1790 k-ft $\not<$ 583 k-ft

∴ TORSION CAN NOT BE NEGLECTED

8.1.3-22

ACI 318-99 SEC 11.6.3 IS SECTION ADEQUATE

$$\sqrt{\left(\frac{V_u}{b_w d}\right)^2 + \left(\frac{T_u P_h}{1.7 A_{oh}^2}\right)^2} \leq \phi\left(\frac{V_c}{b_w d} + 8\sqrt{f'_c}\right)$$

$$\sqrt{369.3^2 + 186.2^2} \leq \phi(0 + 8\sqrt{10{,}000})$$

$$413 \leq 680$$

$\phi = 0.85$

$A_{oh} = 5024\ in^2$

$P_h = 372\ in$

$d = 102\ in$

$b_w = 36"$

$V_u = 1356$

$T_u = 1790\ k\text{-}ft$
$= 21{,}480{,}000\ lb\text{-}in$

$f'_c = 10{,}000\ psi$

ASSUME $V_c = 0$

$\therefore$ SEC IS ADEQUATE

8.1.3-23

ACI 318-99 SEC 11.6.3 DETERMINE AMOUNT OF TORSION REIN.

11.6.3.6 TRANSVERSE

$$\phi T_n \geq T_u$$

$$\frac{T_u}{\phi} \leq T_n = \frac{2 A_o A_t f_{yv}}{s} \cot\theta$$

$$\therefore A_{t_{min}} = \frac{T_u s}{\phi 2 A_o f_{yv} \cot\theta}$$

$$A_{t_{min}} = \frac{(21{,}480{,}000)(4\text{ in})}{(0.85)(2)(4270\text{ in}^2)(f_{yv})\cot(45^\circ)}$$

60ksi ⇒ $A_{tmin} = 0.197\text{in}^2$

75ksi ⇒ $A_{tmin} = 0.157\text{in}^2$

$\phi = 0.85$

$\theta = 45^\circ$

$A_o = (.85)(A_{oh}) = 4270\text{ in}^2$

s = VERT SPACING (TRY 4")

A_t = AREA OF 1 leg of stirup

$T_u = 21{,}480{,}000\text{ lb-in}$

$f_{yv} = \begin{cases} 60\text{ksi} \\ 75\text{ksi} \leftarrow \text{USING THIS FOR TIES} \end{cases}$

∴ ADD 0.157 in^2 to leg of shear STIRUP

11.6.3.7 LONGITUDINAL

$$A_l = \frac{A_t}{s} P_h \left(\frac{f_{yv}}{f_{yl}}\right) \cot^2(45)$$

(60ksi) $A_l = 11.7\text{ in}^2$

(75ksi) $A_l = 14.6\text{ in}^2$

$A_t = 0.157\text{ in}^2$

$P_h = 372\text{ in}$

$f_{yl} = 75\text{ksi}$

∴ ADD 18.3 in^2 to VERT BARS

DESIMONE CONSULTING ENGINEERS, PLLC 18 WEST 18TH STREET 10TH FLOOR NEW YORK, NEW YORK 10011 P. 212.532.2211 F. 212.481.6108

CHECK MIN TORSION REINFORCMENT (ACI 99 11.6.5)

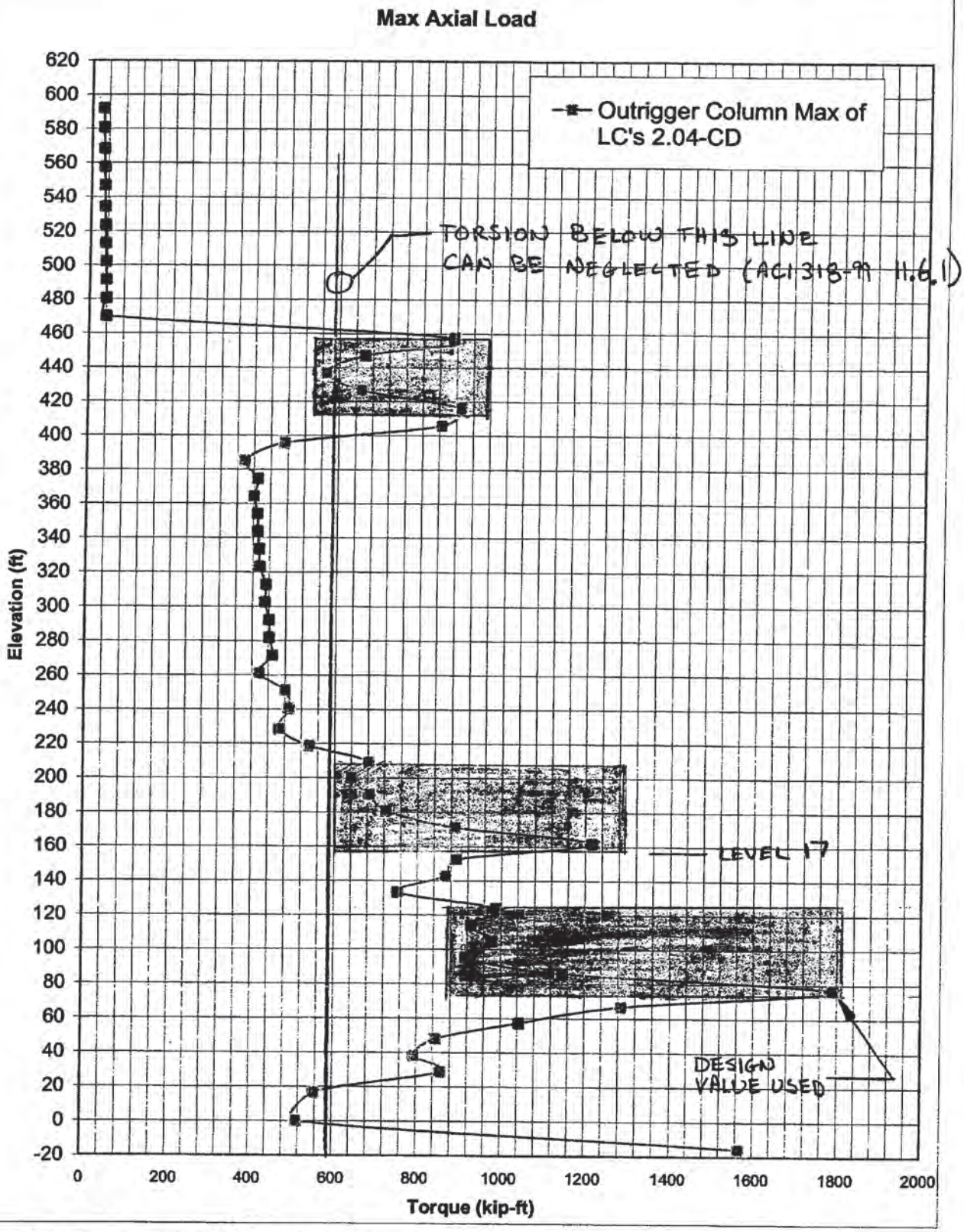
EQU 11-23 WILL BE CHECKED AND SATISFIED WHEN SHEAR REINFORCEMENT IS CHECKED.

$$A_{l\,min} = \frac{5\sqrt{f'c}\,A_{cp}}{f_{yl}} - \left(\frac{A_t}{s}\right) P_h \frac{f_{yv}}{f_{yl}}$$

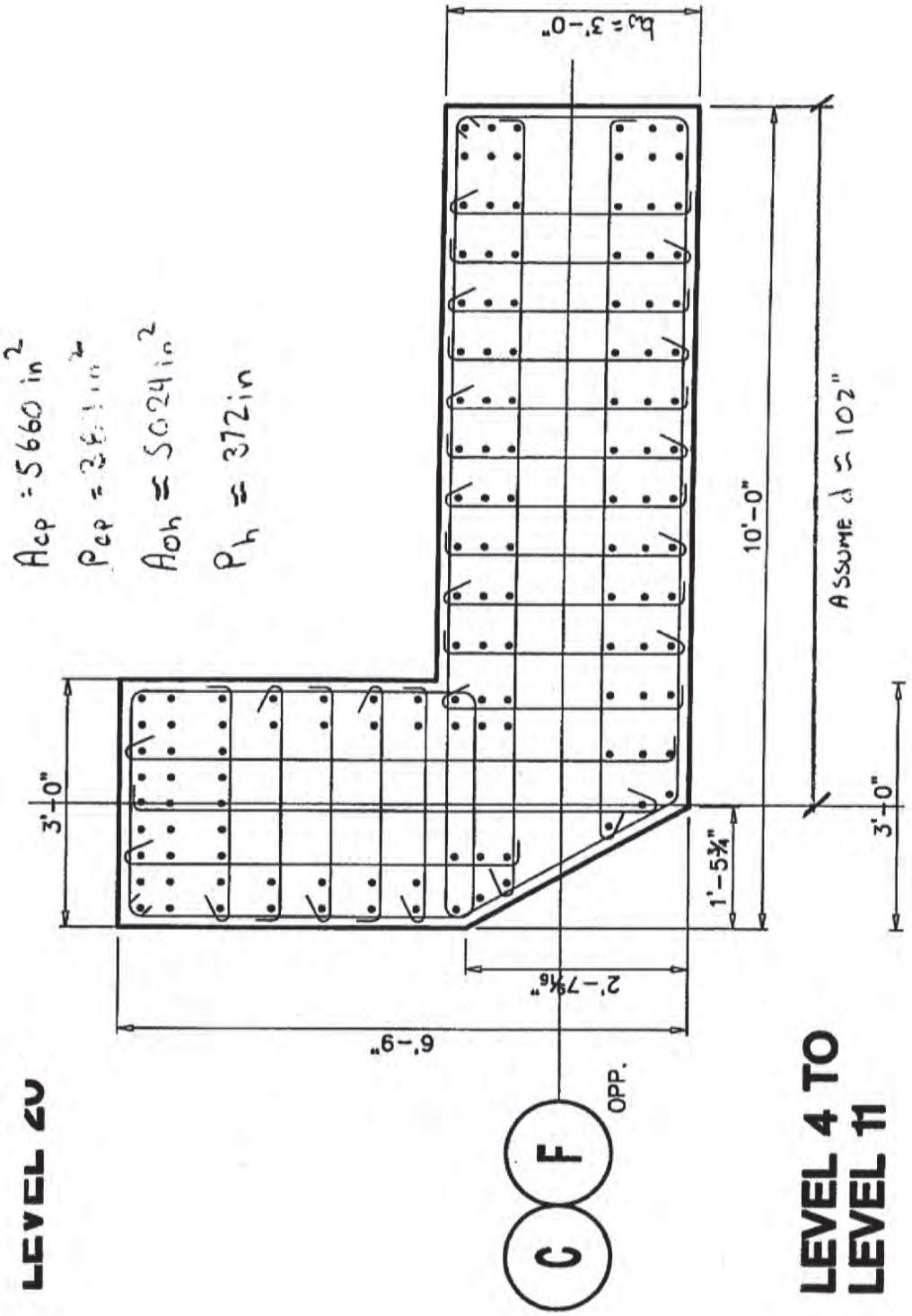
$$= 23.1\ in^2 \longleftarrow \text{GOVERNS}$$

Add 23.1 in^2 long. Steel

DESIMONE CONSULTING ENGINEERS, PLLC 18 WEST 18TH STREET 10TH FLOOR NEW YORK, NEW YORK 10011 P. 212.532.2211 F. 212.481.6108



SHADED AREAS REPRESENT OUTRIGGER LOCATIONS


$A_{cp} = 5660\ in^2$
$P_{cp} = 324\ in$
$A_{oh} = 5024\ in^2$
$P_h = 372\ in$
$b_w = 3'-0"$
10'-0"
Assume $d \leq 102"$
3'-0"
1'-5¾"
3'-0"
2'-7⅝"
6'-9"
C
F
OPP.
LEVEL 2U
LEVEL 4 TO
LEVEL 11

8.1.3-27

8.2 Secondary Special Moment Frame System

8.2.1 Beams and Columns

The Special Moment Resisting Frames' (SMRF) are designed according to all the requirements of UBC 1921. Beam shear is checked against the probable moment strength of the beams. Since plastic hinge column ties are being used over the full height of the frame columns, strong column weak beam criteria will not be checked per UBC 1921.4.2.3.

SUMMARY OF EQ LOADS

12/9/2004

COLUMN A

Group A

	Story	Column	Load	P	M2	M3
+P	2	C109	SCMFLONG	2170	33	2341
-P	2	C109	SCMFLONG	-2170	-33	-2341
+M2	2	C110	SCMFLONG	2170	41	2341
-M2	2	C110	SCMFLONG	-2170	-41	-2341
+M3	2	C97	SCMFLONG	2161	41	2851
-M3	2	C97	SCMFLONG	-2161	-41	-2851

	Story	Column	Load	P	M2	M3
+P	5	C109	SCMFLONG	2009	9	1612
-P	5	C109	SCMFLONG	-2009	-9	-1612
+M2	5	C110	SCMFLONG	2009	10	1612
-M2	5	C110	SCMFLONG	-2009	-10	-1612
+M3	5	C110	SCMFLONG	2009	10	1612
-M3	5	C110	SCMFLONG	-2009	-10	-1612

	Story	Column	Load	P	M2	M3
+P	15	C109	SCMFLONG	1273	3	457
-P	15	C109	SCMFLONG	-1273	-3	-457
+M2	17	C109	SCMFLONG	1188	8	544
-M2	17	C109	SCMFLONG	-1188	-8	-544
+M3	15	C110	SCMFLONG	1273	5	754
-M3	15	C110	SCMFLONG	-1273	-5	-754

	Story	Column	Load	P	M2	M3
+P	21	C109	SCMFLONG	1033	9	627
-P	21	C109	SCMFLONG	-1033	-9	-627
+M2	21	C109	SCMFLONG	1033	9	627
-M2	21	C109	SCMFLONG	-1033	-9	-627
+M3	21	C96	SCMFLONG	1025	9	654
-M3	21	C96	SCMFLONG	-1025	-9	-654

	Story	Column	Load	P	M2	M3
+P	31	C109	SCMFLONG	688	2	460
-P	31	C109	SCMFLONG	-688	-2	-460
+M2	33	C109	SCMFLONG	620	6	504
-M2	33	C109	SCMFLONG	-620	-6	-504
+M3	33	C96	SCMFLONG	612	6	530
-M3	33	C96	SCMFLONG	-612	-6	-530

	Story	Column	Load	P	M2	M3
+P	41	C109	SCMFLONG	329	3	431
-P	41	C109	SCMFLONG	-329	-3	-431
+M2	41	C110	SCMFLONG	329	4	431
-M2	41	C110	SCMFLONG	-329	-4	-431
+M3	41	C110	SCMFLONG	329	4	431
-M3	41	C110	SCMFLONG	-329	-4	-431

	Story	Column	Load	P	M2	M3
+P	51	C109	SCMFLONG	138	1	160
-P	51	C109	SCMFLONG	-138	-1	-160
+M2	53	C109	SCMFLONG	103	6	161
-M2	53	C109	SCMFLONG	-103	-6	-161
+M3	52	C97	SCMFLONG	116	5	218
-M3	52	C97	SCMFLONG	-116	-5	-218

2.09-CD UPDATE 5/21/05

(GROUP A - LC MFSS425)

MAX P_{GROUND} = 1400kips

MAX $M3_{AV}$ = 1600 k-ft

∴ GROUP A PREVIOUS DESIGN IS OK

COLUMN C

2.09-CD UPDATE 5/21/05
(GROUP C - LC MFSSX25)
MAX P = 8700 kips
MAX M3 = 2,800 kip - ft

∴ GROUP C DESIGN WILL BE UPDATED @ GROUND FOR
P_E = 8,700 kips

Group C

Story	Column	Load	P	M2	M3
2	C158	SCMFLONG	6828	100	3040
2	C158	SCMFLONG	-6828	-100	-3040
2	C107	SCMFLONG	6184	111	2504
2	C107	SCMFLONG	-6184	-111	-2504
2	C158	SCMFLONG	6828	100	3040
2	C158	SCMFLONG	-6828	-100	-3040

Story	Column	Load	P	M2	M3
5	C158	SCMFLONG	5962	18	2114
5	C158	SCMFLONG	-5962	-18	-2114
5	C107	SCMFLONG	5669	20	2098
5	C107	SCMFLONG	-5669	-20	-2098
5	C157	SCMFLONG	5870	17	2171
5	C157	SCMFLONG	-5870	-17	-2171

Story	Column	Load	P	M2	M3
15	C107	SCMFLONG	3563	10	736
15	C107	SCMFLONG	-3563	-10	-736
17	C99	SCMFLONG	3281	20	770
17	C99	SCMFLONG	-3281	-20	-770
20	C107	SCMFLONG	2997	5	857
20	C107	SCMFLONG	-2997	-5	-857

Story	Column	Load	P	M2	M3
21	C107	SCMFLONG	2894	20	851
21	C107	SCMFLONG	-2894	-20	-851
21	C99	SCMFLONG	2859	21	860
21	C99	SCMFLONG	-2859	-21	-860
21	C99	SCMFLONG	2859	21	860
21	C99	SCMFLONG	-2859	-21	-860

Story	Column	Load	P	M2	M3
31	C107	SCMFLONG	1966	3	646
31	C107	SCMFLONG	-1966	-3	-646
33	C99	SCMFLONG	1759	14	695
33	C99	SCMFLONG	-1759	-14	-695
33	C99	SCMFLONG	1759	14	695
33	C99	SCMFLONG	-1759	-14	-695

Story	Column	Load	P	M2	M3
41	C158	SCMFLONG	1045	8	504
41	C158	SCMFLONG	-1045	-8	-504
41	C107	SCMFLONG	1001	10	620
41	C107	SCMFLONG	-1001	-10	-620
41	C107	SCMFLONG	1001	10	620
41	C107	SCMFLONG	-1001	-10	-620

Story	Column	Load	P	M2	M3
51	C107	SCMFLONG	396	4	270
51	C107	SCMFLONG	-396	-4	-270
53	C107	SCMFLONG	286	14	265
53	C107	SCMFLONG	-286	-14	-265
52	C107	SCMFLONG	339	2	282
52	C107	SCMFLONG	-339	-2	-282

COLUMN D

Group

Story	Column	Load	P	M2	M3
P	GROUND	C161	SCMFSHORT	6731	12	1674
P	GROUND	C161	SCMFSHORT	-6731	-12	-1674
M2	2	C165	E100X100Y5 MAX	1554	558	1947
M2	2	C165	E100X100Y5 MAX	-1554	-558	-1947
M3	2	C170	SCMFSHORT	6630	55	6975
M3	2	C170	SCMFSHORT	-6630	-55	-6975

Story	Column	Load	P	M2	M3
P	4	C161	SCMFSHORT	5956	17	5074
P	4	C161	SCMFSHORT	-5956	-17	-5074
M2	4	C170	E100X100Y5 MAX	1395	127	1051
M2	4	C170	E100X100Y5 MAX	-1395	-127	-1051
M3	4	C161	SCMFSHORT	5956	17	5074
M3	4	C161	SCMFSHORT	-5956	-17	-5074

Story	Column	Load	P	M2	M3
P	15	C164	SCMFSHORT	2491	6	860
P	15	C164	SCMFSHORT	-2491	-6	-860
M2	17	C165	E100X100Y5 MAX	431	62	645
M2	17	C165	E100X100Y5 MAX	-431	-62	-645
M3	17	C170	SCMFSHORT	2207	5	3447
M3	17	C170	SCMFSHORT	-2207	-5	-3447

Story	Column	Load	P	M2	M3
P	21	C164	SCMFSHORT	2155	7	2715
P	21	C164	SCMFSHORT	-2155	-7	-2715
M2	21	C165	E100X100Y5 MAX	387	66	574
M2	21	C165	E100X100Y5 MAX	-387	-66	-574
M3	21	C171	SCMFSHORT	2155	4	2727
M3	21	C171	SCMFSHORT	-2155	-4	-2727

Story	Column	Load	P	M2	M3
P	31	C164	SCMFSHORT	1549	3	351
P	31	C164	SCMFSHORT	-1549	-3	-351
M2	33	C165	E100X100Y5 MAX	243	27	203
M2	33	C165	E100X100Y5 MAX	-243	-27	-203
M3	33	C171	SCMFSHORT	1448	2	1140
M3	33	C171	SCMFSHORT	-1448	-2	-1140

Story	Column	Load	P	M2	M3
P	41	C164	SCMFSHORT	832	1	280
P	41	C164	SCMFSHORT	-832	-1	-280
M2	41	C161	E100X100Y5 MAX	141	11	63
M2	41	C161	E100X100Y5 MAX	-141	-11	-63
M3	44	C159	SCMFSHORT	724	1	761
M3	44	C159	SCMFSHORT	-724	-1	-761

Story	Column	Load	P	M2	M3
P	53	C164	SCMFSHORT	330	1	477
P	53	C164	SCMFSHORT	-330	-1	-477
M2	53	C161	E100X100Y5 MAX	66	6	79
M2	53	C161	E100X100Y5 MAX	-66	-6	-79
M3	53	C164	SCMFSHORT	330	1	477
M3	53	C164	SCMFSHORT	-330	-1	-477

2.09-CD UPDATE

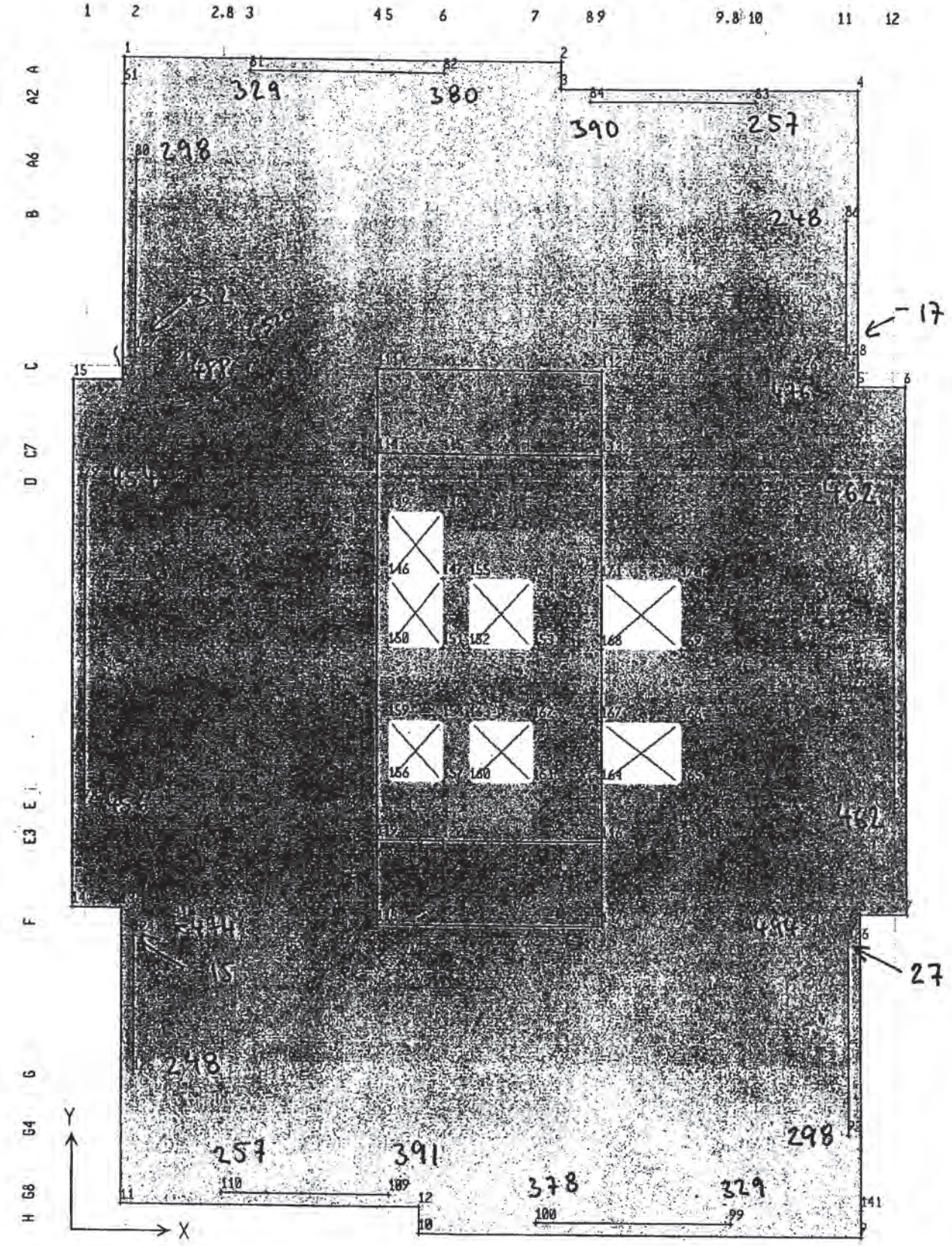
(GROUP D - LC MF55X25)

MAX P_{GROUND} = 4000 k

MAX $M3_{GROUND}$ = 6,400 k-ft

∴ GROUP D PREVIOUS DESIGN IS OK FOR VERTICAL BARS @ GROUND

Reactions [lbs]



$\Sigma = 13,164$

Unit Wt.	0.150	kcf
Min trib area from group	454	ft² (For Header)
Max trib area from group	462	ft² (For Overpressure)

dll	dll	dll
1.0	1.0	1.0

Col A						Min		Max											Min		Max						Min	Max			
Floor	Desgn	Flr. No. ft.	Elevation ft.	Width in.	Length ft.	Trib A. sq. ft	Cum Trib A. sq. ft	Trib A. sq. ft	Cum Trib A. sq. ft	Floor DL psf	Red. LL psf	1st Beam Trib Length ft	Wt. klf	2nd Beam Trib Length ft	Wt. klf	Beam DL klps	Exterior Wall DL klps	Outrigger Length ft	Outrigger Weight klf	Outrigger DL klps	Min. LL klps	Self Wt klps	Total DL klps	Cum DL klps	Total DL klps	Cum DL klps	Cum Non-Reduc. LL klps	Cum Reducible LL klps	LL % multiplier	Cum Red. LL klps	Cum Service klps	Cum Service klps	1.4(SIGD+0.5L Design klps	0.9*D Design klps	1.4(SIGD+1.7L Design klps
60	Typ	22.5	627.5	30	72	252	252	258	258	301	20						0	0	0	0	0	35	93	93	94	94	0	4	1.00	4	97	99	136	84	139
59	Typ	13	605	30	72	439	691	447	705	301	20						0	0	0	0	0	28	133	226	134	228	8	13	0.84	11	237	239	330	205	336
58	Typ	13	592	30	72	439	1090	447	1110	133	40	17	0.900	0	0	15	0	0	0	0	0	29	103	329	104	333	0	31	0.70	22	351	354	483	296	500
57	Typ	10.75	579	30	72	439	1529	447	1557	133	40	17	0.900	9	0	15	0	0	0	0	0	26	98	427	99	431	0	48	0.63	31	457	462	638	384	650
56	Typ	10.75	568.25	30	72	439	1968	447	2004	133	40	17	0.900	9	0	15	0	0	0	0	0	24	98	525	99	530	0	64	0.59	39	563	569	772	472	788
55	Typ	10.75	557.5	30	72	439	2407	447	2451	133	40	17	0.900	0	0	15	0	0	0	0	0	24	98	623	99	629	0	83	0.56	46	669	676	917	560	940
54	Typ	10.75	546.75	30	72	439	2846	447	2898	133	40	17	0.900	0	0	15	0	0	0	0	0	24	98	720	99	728	0	101	0.53	54	774	782	1061	648	1088
53	Typ	10.5	535.5	30	72	439	3285	447	3345	133	40	17	0.900	0	0	15	0	0	0	0	0	24	98	818	99	827	0	118	0.51	61	888	897	1209	737	1241
52	Typ	10.5	524.75	30	72	439	3724	447	3792	133	40	17	0.900	0	0	15	0	0	0	0	0	25	102	920	102	930	0	136	0.50	67	998	997	1354	826	1415
51	Typ	10.5	514	30	72	439	4163	447	4239	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1017	98	1028	0	154	0.48	74	1092	1102	1497	916	1566
50	Typ	10.5	503.25	30	72	439	4602	447	4686	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1115	98	1127	0	171	0.47	81	1195	1207	1640	1010	1716
49	Typ	10.5	491.25	30	72	439	5040	447	5133	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1212	98	1225	0	189	0.46	87	1299	1312	1783	1093	1865
47	Typ	10.5	470.75	30	72	439	5480	447	5580	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1309	98	1324	0	206	0.45	93	1403	1417	1926	1178	2015
46	Typ	10.5	460.25	30	72	439	5918	447	6027	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1407	98	1422	0	224	0.44	100	1506	1521	2069	1264	2164
45	Typ	10.5	449.75	30	72	439	6357	447	6474	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1504	98	1520	0	241	0.44	106	1610	1626	2212	1354	2314
44	Typ	10.5	439.25	30	72	439	6796	447	6921	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1602	98	1618	0	259	0.43	112	1723	1740	2354	1441	2463
43	Typ	10.5	428.75	30	72	439	7235	447	7368	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1699	98	1717	0	276	0.43	118	1841	1858	2497	1529	2612
42	Typ	10.5	418.25	30	72	439	7674	447	7815	133	40	17	0.900	9	0	15	0	0	0	0	0	24	97	1796	98	1815	0	294	0.42	124	1939	1959	2640	1616	2762
41	Typ	10.5	407.75	30	72	439	8113	447	8262	133	40	17	0.900	0	0	15	0	0	0	0	0	24	97	1893	98	1913	0	312	0.42	130	2043	2064	2782	1704	2911
40	Typ	10.5	397.25	30	72	439	8552	447	8709	133	40	17	0.900	9	0	15	0	0	0	0	0	24	97	1991	98	2012	0	329	0.41	136	2148	2169	2925	1792	3060
39	Typ	10.5	386.75	30	72	439	9431	447	9603	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2092	102	2114	0	347	0.41	142	2255	2276	3073	1883	3211
38	Typ	10.5	376.25	30	72	439	9870	447	10050	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2193	102	2217	0	364	0.40	147	2360	2384	3221	1974	3364
37	Typ	10.5	365.75	30	72	439	10309	447	10497	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2294	102	2319	0	383	0.40	153	2467	2492	3369	2065	3518
36	Typ	10.5	355.25	30	72	439	10748	447	10944	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2395	102	2421	0	399	0.40	159	2575	2601	3518	2156	3673
35	Typ	10.5	344.75	30	72	439	11187	447	11391	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2496	102	2523	0	417	0.40	167	2683	2709	3668	2247	3829
34	Typ	10.5	334.25	30	72	439	11626	447	11838	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2597	102	2625	0	434	0.40	174	2791	2817	3815	2338	3985
33	Typ	10.5	323.75	30	72	439	12065	447	12285	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2698	102	2728	0	452	0.40	181	2879	2909	3964	2429	4142
32	Typ	10.5	313.25	30	72	439	12504	447	12732	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2800	102	2830	0	470	0.40	188	2988	3018	4112	2520	4297
31	Typ	10.5	302.75	30	72	439	12943	447	13179	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	2901	102	2932	0	487	0.40	195	3096	3127	4261	2611	4453
30	Typ	10.5	292.25	30	72	439	13383	447	13628	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	3002	102	3034	0	505	0.40	202	3204	3236	4409	2702	4609
29	Typ	10.5	281.75	30	72	439	13821	447	14073	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	3103	102	3136	0	522	0.40	209	3312	3345	4558	2793	4765
28	Typ	10.5	271.25	30	72	439	14260	447	14520	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	3204	102	3238	0	540	0.40	216	3420	3454	4707	2884	4922
27	Typ	10.5	260.75	30	72	439	14699	447	14967	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	3305	102	3341	0	557	0.40	223	3528	3564	4855	2975	5078
26	Typ	10.5	250.25	30	72	439	15138	447	15414	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	3406	102	3443	0	575	0.40	230	3636	3673	5004	3066	5235
25	Typ	11.5	238.75	30	72	439	15577	447	15861	133	40	17	1.125	0	0	19	0	0	0	0	0	24	101	3508	102	3545	0	593	0.40	237	3745	3782	5153	3157	5392
24	Typ	9.5	228.25	30	72	439	16016	447	16308	133	40	17	1.125	0	0	19	0	0	0	0	0	26	105	3611	104	3650	0	610	0.40	244	3855	3894	5304	3250	5549
23	Typ	9.5	218.75	30	72	439	16455	447	16755	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	3710	100	3750	0	628	0.40	251	3961	4001	5450	3339	5676
22	Typ	9.5	209.25	30	72	439	16894	447	17202	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	3809	100	3850	0	645	0.40	258	4067	4108	5595	3428	5826
21	Typ	9.5	199.75	30	72	439	17333	447	17649	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	3908	100	3949	0	663	0.40	265	4173	4215	5741	3517	5975
20	Typ	9.5	190.25	30	72	439	17772	447	18096	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	4007	100	4049	0	680	0.40	272	4279	4322	5886	3606	6123
19	Typ	9.5	180.75	30	72	439	18211	447	18543	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	4106	100	4149	0	698	0.40	279	4385	4429	6032	3695	6274
18	Typ	9.5	171.25	30	72	439	18650	447	18990	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	4204	100	4249	0	715	0.40	286	4491	4535	6177	3784	6426
17	Typ	9.5	161.75	30	72	439	19089	447	19437	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	4303	100	4349	0	733	0.40	293	4596	4642	6323	3873	6577
16	Typ	9.5	152.25	30	72	439	19528	447	19884	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	4402	100	4449	0	751	0.40	300	4702	4749	6468	3962	6729
15	Typ	9.5	142.75	30	72	439	19967	447	20331	133	40	17	1.125	0	0	19	0	0	0	0	0	21	99	4501	100	4549	0	768	0.40	307	4808	4856	6613	4051	6881
14	Typ	9.5	133.25	36	72	436	20403	444	20775	133	40	17	1.406	0	0	24	0	0	0	0	0	21	99	4600	100	4649	0	786	0.40	314	4914	4963	6759	4140	7033
13	Typ	9.5	122.75	36	72	436	20839	444	21219	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	4707	100	4750	0	803	0.40	321	5020	5070	6917	4237	7205
12	Typ	9.5	112.25	36	72	436	21275	444	21663	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	4808	100	4851	0	821	0.40	328	5143	5195	7079	4333	7377
11	Typ	9.5	104.75	36	72	436	21711	444	22107	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	4909	100	4952	0	838	0.40	335	5251	5303	7242	4430	7550
10	Typ	9.5	95.25	36	72	436	22147	444	22551	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5010	100	5054	0	855	0.40	342	5372	5426	7390	4527	7709
9	Typ	9.5	85.75	36	72	436	22583	444	22995	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5110	100	5155	0	873	0.40	349	5480	5535	7547	4624	7868
8	Typ	9.5	76.25	36	72	436	23019	444	23439	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5211	100	5256	0	890	0.40	356	5589	5645	7705	4721	8027
7	Typ	9.5	66.75	36	72	436	23455	444	23883	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5313	100	5358	0	908	0.40	363	5701	5757	7863	4817	8187
6	Typ	9.5	57.25	36	72	436	23891	444	24327	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5414	100	5459	0	925	0.40	370	5810	5868	8021	4914	8354
5	Typ	9.5	47.75	36	72	436	24327	444	24771	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5515	100	5560	0	943	0.40	377	5919	5978	8178	5011	8520
4	Typ	9.5	38.25	36	72	436	24763	444	25215	133	40	17	1.406	0	0	24	0	0	0	0	0	21	101	5615	100	5661	0	960	0.40	384	6029	6089	8336	5108	8687
3	Typ	12.167	28.75	36	72	436	25199	444	25659	133	40	17	1.406	0	0	24	0	0	0	0	0	26	108	5723	109	5769	0	978	0.40	391	6139	6235	8494	5202	8854
2	Mech	16.583	16.5833	36	72	436	25635	444	26103	146.5	100	17	1.406	0	0	24	0	0	0	0	0	33	115	5838	134	5903	0	995	0.40	398	6256	6338	8662	5308	9030
BASE		0	0														0	0	0	0	0	43	133	5970	134	6037	0	1038	0.40	415	6446	6529	8866	5417	9247
																0859	0			0	1472													

8.2.1-6

Unit Wt.	0.150	kcf
Min trib area from group	248	ft² (For Tributary)
Max trib area from group	298	ft² (For Cantilever)

df	sl	sr
1.0	1.0	1.0

Col C

	Floor	Usage	Flr. Ht. ft.	Elevation ft.	Width in.	Length in.	Trib A. sq. ft	Cum Trib A. sq. ft	Cum Trib A. sq. ft*	Floor DL psf	Roof LL psf	1st Beam Trib Length ft	Wt. k/f	2nd Beam Trib Length ft	Wt. k/f	Beam DL kips	Exterior Wall DL kips	Outrigger Length ft	Outrigger Weight k/f	Outrigger DL kips	Misc. LL kips	Self Wt kips	Min. Total DL kips	Min. Cum DL kips	Max. Total DL kips	Max. Cum DL kips	Core Non-Reduc. LL kips	Cum. Reducible LL kips	LL % multiplier	Cum Red. LL kips	Cum Service kips	1.4(1.6(D)+0.5L Design kips	0.9*D Design kips	1.4(0.9D)+1.7L Design kips
	60	Typ	22.5	627.50	30	72	109	109	134	134	201	20				0	0	0	0	0	0	51	73	73	78	78	0	2	1.00	2	75	80	111	65	112
	59	Typ	13	605.00	30	72	233	342	283	417	201	20	9	0.900	0	0	9	0	0	0	29	84	157	94	172	0	7	1.00	7	166	179	247	141	257
	57	Typ	10.75	579.00	30	72	233	806	283	983	133	40	9	0.900	0	0	9	0	0	0	29	68	225	75	247	0	16	0.88	14	239	264	328	203	370
	56	Typ	10.75	568.25	30	72	233	1041	283	1266	133	40	9	0.900	0	0	9	0	0	0	24	63	288	70	317	0	25	0.78	20	308	337	460	259	477
	55	Typ	10.75	557.50	30	72	233	1274	283	1549	133	40	9	0.900	0	0	9	0	0	0	24	63	352	70	387	0	33	0.72	25	376	412	564	316	584
	54	Typ	10.75	546.75	30	72	233	1507	283	1832	133	40	9	0.900	0	0	9	0	0	0	24	63	415	70	457	0	44	0.67	30	446	486	663	373	689
	53	Typ	10.75	536.00	30	72	233	1740	283	2115	133	40	9	0.900	0	0	9	0	0	0	24	63	478	70	526	0	53	0.64	34	512	560	763	430	793
	52	Typ	12.5	525.25	30	72	233	1973	283	2398	133	40	9	0.900	0	0	9	0	0	0	24	63	541	70	596	0	63	0.61	38	580	633	866	487	900
	51	Typ	10.5	512.75	30	72	233	2206	283	2681	133	40	9	0.900	0	0	9	0	0	0	28	67	609	74	670	0	72	0.59	42	651	713	973	548	1019
	50	Typ	10.5	502.25	30	72	233	2439	283	2964	133	40	9	0.900	0	0	9	0	0	0	24	63	671	69	740	0	81	0.57	46	718	786	1079	604	1114
	49	Typ	10.5	491.75	30	72	233	2672	283	3247	133	40	9	0.900	0	0	9	0	0	0	24	63	734	69	809	0	91	0.55	50	784	859	1174	661	1213
	48	Typ	10.5	481.25	30	72	233	2905	283	3530	133	40	9	0.900	0	0	9	0	0	0	24	63	797	69	878	0	100	0.54	54	851	932	1254	717	1322
	47	Typ	10.5	470.75	30	72	233	3138	283	3813	133	40	9	0.900	0	0	9	0	0	0	24	63	860	69	948	0	109	0.53	58	917	1006	1375	774	1425
	46	Typ	10.5	460.25	30	72	233	3371	283	4096	133	40	9	0.900	0	0	9	0	0	0	24	63	922	69	1017	0	119	0.52	63	984	1079	1475	830	1528
	45	Typ	10.5	449.75	30	72	233	3604	283	4379	133	40	9	0.900	0	0	9	0	0	0	24	63	985	69	1086	0	128	0.51	65	1050	1152	1575	886	1632
	44	Typ	10.5	439.25	30	72	233	3837	283	4662	133	40	9	0.900	0	0	9	0	0	0	24	63	1048	69	1156	0	137	0.50	69	1116	1224	1676	943	1737
	43	Typ	10.5	428.75	30	72	233	4070	283	4945	133	40	9	0.900	0	0	9	0	0	0	24	63	1110	69	1225	0	147	0.49	72	1183	1297	1778	999	1838
	42	Typ	10.5	418.25	30	72	233	4303	283	5229	133	40	9	0.900	0	0	9	0	0	0	24	63	1173	69	1293	0	156	0.49	76	1249	1370	1879	1056	1943
	41	Typ	10.5	407.75	30	72	233	4536	283	5511	133	40	9	0.900	0	0	9	0	0	0	24	63	1236	69	1364	0	165	0.48	79	1315	1442	1976	1112	2044
	40	Typ	10.5	397.25	30	72	233	4769	283	5794	133	40	9	0.900	0	0	9	0	0	0	24	63	1299	69	1433	0	175	0.47	83	1381	1514	2077	1169	2147
	39	Typ	10.5	386.75	30	72	233	5002	283	6077	133	40	9	0.900	0	0	9	0	0	0	24	63	1361	69	1503	0	184	0.47	86	1447	1589	2177	1225	2250
	38	Typ	10.5	376.25	30	72	233	5235	283	6360	133	40	9	0.900	0	0	9	0	0	0	24	63	1424	69	1573	0	193	0.46	89	1513	1661	2277	1282	2353
	37	Typ	10.5	365.75	30	72	233	5468	283	6643	133	40	9	1.125	0	0	10	0	0	0	24	65	1489	71	1643	0	203	0.46	93	1581	1736	2380	1340	2460
	36	Typ	10.5	355.25	30	72	233	5701	283	6927	133	40	9	1.125	0	0	10	0	0	0	24	65	1553	71	1713	0	212	0.45	96	1649	1811	2483	1398	2566
	35	Typ	10.5	344.75	30	72	233	5934	283	7209	133	40	9	1.125	0	0	10	0	0	0	24	65	1618	71	1786	0	221	0.45	99	1717	1885	2586	1456	2669
	34	Typ	10.5	334.25	30	72	233	6167	283	7492	133	40	9	1.125	0	0	10	0	0	0	24	65	1683	71	1858	0	231	0.44	103	1785	1960	2689	1515	2775
	33	Typ	10.5	323.75	30	72	233	6400	283	7775	133	40	9	1.125	0	0	10	0	0	0	24	65	1748	71	1929	0	240	0.44	106	1853	2035	2792	1573	2880
	32	Typ	10.5	313.25	30	72	233	6633	283	8058	133	40	9	1.125	0	0	10	0	0	0	24	65	1812	71	2000	0	249	0.44	109	1921	2109	2895	1631	2986
	31	Typ	10.5	302.75	30	72	233	6866	283	8341	133	40	9	1.125	0	0	10	0	0	0	24	65	1877	71	2072	0	258	0.43	112	1989	2184	2998	1689	3091
	30	Typ	10.5	292.25	30	72	233	7099	283	8624	133	40	9	1.125	0	0	10	0	0	0	24	65	1942	71	2143	0	268	0.43	115	2057	2259	3101	1748	3197
	29	Typ	10.5	281.75	30	72	233	7332	283	8907	133	40	9	1.125	0	0	10	0	0	0	24	65	2007	71	2215	0	277	0.43	119	2125	2333	3204	1806	3303
	28	Typ	10.5	271.25	30	72	233	7565	283	9190	133	40	9	1.125	0	0	10	0	0	0	24	65	2071	71	2286	0	286	0.43	122	2193	2408	3307	1864	3407
	27	Typ	10.5	260.75	30	72	233	7798	283	9473	133	40	9	1.125	0	0	10	0	0	0	24	65	2136	71	2357	0	296	0.42	125	2261	2482	3410	1922	3513
	28	Typ	10.5	250.25	30	72	233	8031	283	9756	133	40	9	1.125	0	0	10	0	0	0	24	65	2201	71	2429	0	305	0.42	128	2329	2557	3513	1981	3618
	25	Typ	11.5	238.75	30	72	233	8264	283	10039	133	40	9	1.125	0	0	10	0	0	0	24	65	2264	71	2500	0	314	0.42	131	2397	2631	3616	2039	3722
	24	Typ	9.5	227.25	30	72	233	8497	283	10322	133	40	9	1.125	0	0	10	0	0	0	24	65	2328	71	2572	0	324	0.42	134	2467	2705	3722	2096	3827
	23	Typ	9.5	217.75	30	72	233	8730	283	10605	133	40	9	1.125	0	0	10	0	0	0	21	62	2395	69	2643	0	333	0.41	137	2532	2780	3822	2156	3930
	22	Typ	9.5	208.25	30	72	233	8963	283	10888	133	40	9	1.125	0	0	10	0	0	0	21	62	2458	69	2713	0	342	0.41	141	2599	2853	3921	2212	4030
	21	Typ	9.5	198.75	30	72	233	9196	283	11171	133	40	9	1.125	0	0	10	0	0	0	21	62	2520	69	2781	0	352	0.41	144	2664	2925	4021	2268	4130
	20	Typ	9.5	189.25	30	72	233	9429	283	11454	133	40	9	1.125	0	0	10	0	0	0	21	62	2582	69	2850	0	361	0.41	147	2729	2997	4121	2324	4240
	19	Typ	9.5	179.75	30	72	233	9662	283	11737	133	40	9	1.125	0	0	10	0	0	0	21	62	2645	69	2919	0	370	0.40	150	2795	3069	4220	2380	4343
	18	Typ	9.5	170.25	30	72	233	9895	283	12020	133	40	9	1.125	0	0	10	0	0	0	21	62	2707	69	2988	0	380	0.40	153	2860	3141	4320	2437	4446
	17	Typ	9.5	160.75	30	72	233	10128	283	12303	133	40	9	1.125	0	0	10	0	0	0	21	62	2770	69	3058	0	389	0.40	156	2926	3214	4420	2493	4549
	16	Typ	9.5	151.25	30	72	233	10361	283	12586	133	40	9	1.125	0	0	10	0	0	0	21	62	2832	69	3127	0	398	0.40	159	2992	3286	4520	2549	4652
	15	Typ	9.5	141.75	30	72	233	10594	283	12868	133	40	9	1.125	0	0	10	0	0	0	21	62	2895	69	3196	0	408	0.40	163	3058	3359	4620	2605	4755
	14	Typ	9.5	132.25	36	72	250	10834	293	13149	133	40	9	1.125	0	0	10	0	0	0	21	62	2957	69	3265	0	417	0.40	167	3124	3432	4720	2662	4855
	13	Typ	9.5	122.75	36	72	250	11074	293	13429	133	40	9	1.125	0	0	10	0	0	0	26	66	3024	73	3338	0	426	0.40	170	3194	3509	4825	2721	4963
	12	Typ	9.5	114.25	36	72	250	11314	293	13709	133	40	9	1.406	0	0	13	0	0	0	26	68	3090	73	3411	0	435	0.40	174	3264	3585	4931	2781	5072
	11	Typ	9.5	104.75	36	72	250	11554	293	13989	133	40	9	1.406	0	0	13	0	0	0	26	69	3159	76	3487	0	445	0.40	178	3337	3664	5040	2843	5184
	10	Typ	9.5	95.25	36	72	250	11794	293	14269	133	40	9	1.406	0	0	13	0	0	0	26	69	3228	76	3562	0	454	0.40	181	3405	3744	5149	2905	5296
	9	Typ	9.5	85.75	36	72	250	12034	293	14549	133	40	9	1.406	0	0	13	0	0	0	26	69	3297	76	3638	0	463	0.40	185	3482	3823	5258	2967	5408
	8	Typ	9.5	76.25	36	72	250	12274	293	14829	133	40	9	1.406	0	0	13	0	0	0	26	69	3366	76	3713	0	472	0.40	189	3555	3902	5367	3029	5520
	7	Typ	9.5	66.75	36	72	250	12514	293	15109	133	40	9	1.406	0	0	13	0	0	0	26	69	3435	76	3789	0	481	0.40	193	3627	3981	5476	3091	5632
	6	Typ	9.5	57.25	36	72	250	12864	293	15389	133	40	9	1.406	0	0	13	0	0	0	26	69	3504	76	3864	0	491	0.40	196	3700	4061	5586	3153	5744
	5	Typ	9.5	47.75	36	72	250	12894	293	15669	133	40	9	1.406	0	0	13	0	0	0	26	69	3572	76	3940	0	500	0.40	200	3772	4140	5695	3215	5856
	4	Typ	9.5	38.25	36	72	250	13124	293	15949	133	40	9	1.406	0	0	13	0	0	0	26	69	3641	76	4015	0	509	0.40	204	3845	4219	5804	3277	5968
	3	Typ	12.167	28.75	36	72	250	13354	293	16229	133	40	9	1.406	0	0	13	0	0	0	26	69	3710	76	4091	0	518	0.40	207	3917	4298	5913	3339	6080
	2	Mech	16.583	16.58	36	72	250	13584	293	16509	133	40	9	1.406	0	0	13	0	0	0	33	76	3786	83	4176	0	527	0.40	211	3997	4387	6022	3400	6192
BASE			0	0.00																	43	88	3874	95	4268	0	537	0.40	215	4089	4483	6168	3487	6349
																373	9			0	1472													

8.2.1-7

DODSONNOC00000495

Unit Wt.	0.150	kcf
Min trib area from group	257	ft^2 (For Tension)
Max trib area from group	391	ft^2 (For Compression)

dif	dif	dif
1.0	1.0	1.0

Col# D

Floor	Usage	Flr. Elt. ft.	Elevation ft.	Width in	Length in	Min Trib A. sq. ft	Min Cum Trib A. sq. ft	Max Trib A. sq. ft	Max Cum Trib A. sq. ft	Floor DL psf	Red. LL psf	1st Beam Trib Length ft	Wt. klf	Beam DL kips	Self Wt kips	Min Total DL kips	Min Cum DL kips	Max Total DL kips	Max Cum DL kips	Cum Reducible LL kips	LL % multiplier	Cum Red. LL kips	Min Cum Service kips	Max Cum Service kips	1.4(dl)D+0.5L Design kips	0.9*D Design kips	1.4(dl)D+1.7L Design kips
60	Window Wash	22.5	627.50	24	36	122.5	123	190	190	201	20			0	20	45	45	58	58	2	1.00	2	67	61	84	40	86
59	Roof	13	605.00	24	36	251	374	385	575	201	20	9	0.475	4	12	66	111	93	152	7	1.00	7	119	159	219	100	225
58	Mech	13	592.00	24	36	251	625	385	960	146.5	100	9	0.475	4	12	53	164	72	224	33	0.85	28	192	252	332	148	361
57	Mech	10.75	579.00	24	36	251	876	385	1345	146.5	100	9	0.475	4	10	51	215	70	294	58	0.76	44	258	338	440	193	486
56	Typ	10.75	568.25	24	36	251	1127	385	1730	133	40	9	0.475	4	10	47	262	65	360	68	0.70	47	309	407	534	236	584
55	Typ	10.75	557.50	24	36	251	1378	385	2115	133	40	9	0.475	4	10	47	309	65	425	78	0.65	51	360	476	629	278	681
54	Typ	10.75	546.75	24	36	251	1629	385	2500	133	40	9	0.475	4	10	47	357	65	490	88	0.62	55	411	544	723	321	779
53	Typ	10.75	536.00	24	36	251	1880	385	2885	133	40	9	0.475	4	10	47	404	65	555	98	0.60	58	462	613	817	364	876
52	Typ	12.5	525.25	24	48	249	2129	383	3268	133	40	9	0.475	4	15	52	456	70	625	108	0.58	62	518	687	919	411	981
51	Mech	10.5	512.75	24	48	249	2378	383	3651	146.5	100	9	0.475	4	13	53	510	73	698	133	0.56	74	584	772	1029	459	1103
50	Typ	10.5	502.25	24	48	249	2627	383	4034	133	40	9	0.475	4	13	50	560	68	766	143	0.54	77	637	843	1127	504	1204
49	Typ	10.5	491.75	24	48	249	2876	383	4417	133	40	9	0.475	4	13	50	610	68	834	153	0.53	81	691	915	1225	549	1305
48	Typ	10.5	481.25	24	48	249	3125	383	4800	133	40	9	0.475	4	13	50	660	68	902	163	0.52	84	744	986	1323	594	1406
47	Typ	10.5	470.75	24	48	249	3374	383	5183	133	40	9	0.475	4	13	50	710	68	970	173	0.51	88	798	1057	1421	639	1506
46	Typ	10.5	460.25	24	48	249	3623	383	5566	133	40	9	0.475	4	13	50	760	68	1037	182	0.50	91	851	1128	1519	684	1607
45	Typ	10.5	449.75	24	48	249	3872	383	5949	133	40	9	0.475	4	13	50	810	68	1105	192	0.49	95	904	1200	1617	729	1708
44	Typ	10.5	439.25	24	48	249	4121	383	6332	133	40	9	0.475	4	13	50	860	68	1173	202	0.48	98	958	1273	1715	774	1809
43	Typ	10.5	428.75	24	48	249	4370	383	6715	133	40	9	0.475	4	13	50	910	68	1241	212	0.48	101	1011	1342	1813	819	1909
42	Mech	10.5	418.25	24	48	249	4619	383	7098	146.5	100	9	0.475	4	13	53	963	73	1314	237	0.47	112	1075	1425	1921	867	2029
41	Typ	10.5	407.75	24	48	249	4868	383	7481	133	40	9	0.475	4	13	50	1013	68	1382	247	0.46	115	1128	1497	2039	912	2130
40	Typ	10.5	397.25	24	48	249	5117	383	7864	133	40	9	0.525	5	13	50	1064	68	1450	257	0.46	118	1182	1568	2138	957	2231
39	Typ	10.5	386.75	30	48	247	5364	381	8245	133	40	9	0.525	5	16	53	1117	71	1521	267	0.45	121	1238	1642	2221	1005	2336
38	Typ	10.5	376.25	30	48	247	5611	381	8626	133	40	9	0.525	5	16	53	1170	71	1592	277	0.45	125	1295	1717	2323	1053	2441
37	Typ	10.5	365.75	30	48	247	5858	381	9007	133	40	9	0.525	5	16	53	1224	71	1663	287	0.45	128	1351	1791	2426	1101	2546
36	Typ	10.5	355.25	30	48	247	6105	381	9388	133	40	9	0.525	5	16	53	1277	71	1734	297	0.44	131	1408	1866	2528	1149	2651
35	Typ	10.5	344.75	30	48	247	6352	381	9769	133	40	9	0.525	5	16	53	1330	71	1806	307	0.44	134	1465	1940	2631	1197	2756
34	Typ	10.5	334.25	30	48	247	6599	381	10150	133	40	9	0.525	5	16	53	1384	71	1877	316	0.43	138	1521	2014	2734	1245	2861
33	Typ	10.5	323.75	30	48	247	6846	381	10531	133	40	9	0.525	5	16	53	1437	71	1948	326	0.43	141	1578	2089	2836	1293	2966
32	Typ	10.5	313.25	30	48	247	7093	381	10912	133	40	9	0.525	5	16	53	1490	71	2019	336	0.43	144	1634	2163	2939	1341	3071
31	Typ	10.5	302.75	30	48	247	7340	381	11293	133	40	9	0.525	5	16	53	1544	71	2090	346	0.43	147	1691	2237	3042	1389	3176
30	Typ	10.5	292.25	30	48	247	7587	381	11674	133	40	9	0.525	5	16	53	1597	71	2161	356	0.42	150	1747	2312	3144	1437	3281
29	Typ	10.5	281.75	30	60	244.5	7831	379	12052	133	40	9	0.525	5	20	57	1654	75	2236	366	0.42	153	1807	2389	3252	1488	3391
28	Typ	10.5	271.25	30	60	244.5	8076	379	12431	133	40	9	0.525	5	20	57	1711	75	2311	376	0.42	157	1867	2467	3360	1540	3501
27	Typ	10.5	260.75	30	60	244.5	8320	379	12809	133	40	9	0.525	5	20	57	1768	75	2386	385	0.41	160	1927	2545	3467	1591	3611
26	Mech	10.5	250.25	30	60	244.5	8565	379	13188	146.5	100	9	0.525	5	20	60	1828	80	2465	410	0.41	169	1997	2634	3585	1645	3739
25	Mech	11.5	239.75	30	60	244.5	8809	379	13566	146.5	100	9	0.525	5	22	62	1890	82	2547	434	0.41	178	2068	2725	3706	1701	3869
24	Mech	9.5	228.25	30	60	244.5	9054	379	13945	146.5	100	9	0.525	5	18	58	1948	78	2625	459	0.41	187	2135	2812	3821	1753	3993
23	Typ	9.5	218.75	30	60	244.5	9298	379	14323	133	40	9	0.525	5	18	55	2003	73	2698	468	0.41	190	2193	2888	3926	1803	4100
22	Typ	9.5	209.25	30	60	244.5	9543	379	14702	133	40	9	0.525	5	18	55	2058	73	2771	478	0.40	193	2251	2964	4031	1853	4207
21	Typ	9.5	199.75	30	60	244.5	9787	379	15080	133	40	9	0.525	5	18	55	2113	73	2844	488	0.40	196	2309	3040	4136	1902	4314
20	Typ	9.5	190.25	30	60	244.5	10032	379	15459	133	40	9	0.625	6	18	56	2169	74	2918	498	0.40	199	2369	3117	4242	1952	4423
19	Typ	9.5	180.75	30	60	244.5	10276	379	15837	133	40	9	0.625	6	18	56	2225	74	2991	508	0.40	203	2428	3194	4349	2003	4533
18	Typ	9.5	171.25	30	60	244.5	10521	379	16216	133	40	9	0.625	6	18	56	2281	74	3065	517	0.40	207	2488	3272	4456	2053	4643
17	Typ	9.5	161.75	30	60	244.5	10765	379	16594	133	40	9	0.625	6	18	56	2337	74	3139	527	0.40	211	2548	3350	4563	2104	4753
16	Typ	9.5	152.25	30	60	244.5	11010	379	16973	133	40	9	0.625	6	18	56	2393	74	3213	537	0.40	215	2608	3427	4669	2154	4863
15	Typ	9.5	142.75	30	60	244.5	11254	379	17351	133	40	9	0.625	6	18	56	2449	74	3286	547	0.40	219	2668	3505	4776	2204	4973
14	Typ	9.5	133.25	36	72	239	11493	373	17724	133	40	9	0.725	7	26	64	2513	82	3368	556	0.40	223	2736	3591	4894	2262	5094
13	Typ	9.5	123.75	36	72	239	11732	373	18097	133	40	9	0.725	7	26	64	2577	82	3450	566	0.40	226	2803	3676	5012	2319	5215
12	Typ	9.5	114.25	36	72	239	11971	373	18470	133	40	9	0.725	7	26	64	2641	82	3532	575	0.40	230	2871	3762	5130	2377	5336
11	Typ	9.5	104.75	36	72	239	12210	373	18843	133	40	9	0.725	7	26	64	2705	82	3614	585	0.40	234	2939	3848	5248	2435	5457
10	Typ	9.5	95.25	36	72	239	12449	373	19216	133	40	9	0.725	7	26	64	2769	82	3695	594	0.40	238	3007	3933	5366	2492	5578
9	Typ	9.5	85.75	36	72	239	12688	373	19589	133	40	9	0.725	7	26	64	2833	82	3777	604	0.40	242	3075	4019	5484	2550	5699
8	Typ	9.5	76.25	36	72	239	12927	373	19962	133	40	9	0.725	7	26	64	2897	82	3859	614	0.40	245	3142	4104	5602	2607	5820
7	Typ	9.5	66.75	36	72	239	13166	373	20335	133	40	9	0.725	7	26	64	2961	82	3941	623	0.40	249	3210	4190	5720	2665	5941
6	Typ	9.5	57.25	36	72	239	13405	373	20708	133	40	9	0.725	7	26	64	3025	82	4023	633	0.40	253	3278	4276	5839	2722	6062
5	Typ	9.5	47.75	36	72	239	13644	373	21081	133	40	9	0.725	7	26	64	3089	82	4104	642	0.40	257	3346	4361	5957	2780	6183
4	Typ	9.5	38.25	36	72	239	13883	373	21454	133	40	9	0.725	7	26	64	3153	82	4186	652	0.40	261	3414	4447	6075	2838	6304
3	Typ	12.1667	28.75	36	72	239	14122	373	21827	133	40	9	0.725	7	33	71	3224	89	4275	661	0.40	265	3489	4540	6203	2902	6435
2	Mech	16.5833	16.58	36	72	239	14361	373	22200	146.5	100	9	0.725	7	45	86	3310	106	4381	685	0.40	274	3584	4655	6338	2979	6599
Ground	Ground/Public	15.75	0.00	36	72	239	14600	373	22573	187.5	100	9	1.31	12	43	99	3409	124	4505	709	0.40	284	3693	4789	6539	3068	6790
BASE			-15.75																								

306 7096

8.2.1-8

ADD 1000 k-ft for GRAV MOMENT.

Group A

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	2	C109	SCMFLONG	2170	33	2341	8860	5427	9237	11030	3257
-P	2	C109	SCMFLONG	-2170	-33	-2341	8860	5427	9237	11030	3257
+M2	2	C110	SCMFLONG	2170	41	2341	8860	5427	9237	11030	3257
-M2	2	C110	SCMFLONG	-2170	-41	-2341	8860	5427	9237	11030	3257
+M3	2	C97	SCMFLONG	2161	41	2851	8860	5427	9237	11021	3266
-M3	2	C97	SCMFLONG	-2161	-41	-2851	8860	5427	9237	11021	3266

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	5	C109	SCMFLONG	2009	9	1612	8336	5108	8682	10345	3099
-P	5	C109	SCMFLONG	-2009	-9	-1612	8336	5108	8682	10345	3099
+M2	5	C110	SCMFLONG	2009	10	1612	8336	5108	8682	10345	3099
-M2	5	C110	SCMFLONG	-2009	-10	-1612	8336	5108	8682	10345	3099
+M3	5	C110	SCMFLONG	2009	10	1612	8336	5108	8682	10345	3099
-M3	5	C110	SCMFLONG	-2009	-10	-1612	8336	5108	8682	10345	3099

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	15	C109	SCMFLONG	1273	3	457	6759	4140	7043	8032	2867
-P	15	C109	SCMFLONG	-1273	-3	-457	6759	4140	7043	8032	2867
+M2	17	C109	SCMFLONG	1188	8	544	6759	4140	7043	7947	2952
-M2	17	C109	SCMFLONG	-1188	-8	-544	6759	4140	7043	7947	2952
+M3	15	C110	SCMFLONG	1273	5	754	6759	4140	7043	8032	2867
-M3	15	C110	SCMFLONG	-1273	-5	-754	6759	4140	7043	8032	2867

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	21	C109	SCMFLONG	1033	9	627	6032	3695	6284	7065	2662
-P	21	C109	SCMFLONG	-1033	-9	-627	6032	3695	6284	7065	2662
+M2	21	C109	SCMFLONG	1033	9	627	6032	3695	6284	7065	2662
-M2	21	C109	SCMFLONG	-1033	-9	-627	6032	3695	6284	7065	2662
+M3	21	C96	SCMFLONG	1025	9	654	6032	3695	6284	7057	2670
-M3	21	C96	SCMFLONG	-1025	-9	-654	6032	3695	6284	7057	2670

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	31	C109	SCMFLONG	688	2	460	4558	2793	4746	5246	2105
-P	31	C109	SCMFLONG	-688	-2	-460	4558	2793	4746	5246	2105
+M2	33	C109	SCMFLONG	620	6	504	4558	2793	4746	5178	2173
-M2	33	C109	SCMFLONG	-620	-6	-504	4558	2793	4746	5178	2173
+M3	33	C96	SCMFLONG	612	6	530	4558	2793	4746	5170	2181
-M3	33	C96	SCMFLONG	-612	-6	-530	4558	2793	4746	5170	2181

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	41	C109	SCMFLONG	329	3	431	3073	1883	3201	3402	1554
-P	41	C109	SCMFLONG	-329	-3	-431	3073	1883	3201	3402	1554
+M2	41	C110	SCMFLONG	329	4	431	3073	1883	3201	3402	1554
-M2	41	C110	SCMFLONG	-329	-4	-431	3073	1883	3201	3402	1554
+M3	41	C110	SCMFLONG	329	4	431	3073	1883	3201	3402	1554
-M3	41	C110	SCMFLONG	-329	-4	-431	3073	1883	3201	3402	1554

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	51	C109	SCMFLONG	138	1	160	1640	1003	1714	1778	865
-P	51	C109	SCMFLONG	-138	-1	-160	1640	1003	1714	1778	865
+M2	53	C109	SCMFLONG	103	6	161	1640	1003	1714	1743	900
-M2	53	C109	SCMFLONG	-103	-6	-161	1640	1003	1714	1743	900
+M3	52	C97	SCMFLONG	116	5	218	1640	1003	1714	1756	887
-M3	52	C97	SCMFLONG	-116	-5	-218	1640	1003	1714	1756	887

dlf = dead load factor (see gravity load take down)

NOTE: MOE f'c 10 ksi → 5000 ksi, 4577 ksi, 4346 ksi

2.09-CD UPDATE 5/21/05

P_E = 8,700 kips

14,868 kips

-5213 kips

Group C

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	2	C158	SCMFLONG	6828	100	3040	6168	3487	6341	12996	-3341
-P	2	C158	SCMFLONG	-6828	-100	-3040	6168	3487	6341	12996	-3341
+M2	2	C107	SCMFLONG	6184	111	2504	6168	3487	6341	12352	-2697
-M2	2	C107	SCMFLONG	-6184	-111	-2504	6168	3487	6341	12352	-2697
+M3	2	C158	SCMFLONG	6828	100	3040	6168	3487	6341	12996	-3341
-M3	2	C158	SCMFLONG	-6828	-100	-3040	6168	3487	6341	12996	-3341

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	5	C158	SCMFLONG	5962	18	2114	5804	3277	5968	11766	-2685
-P	5	C158	SCMFLONG	-5962	-18	-2114	5804	3277	5968	11766	-2685
+M2	5	C107	SCMFLONG	5669	20	2098	5804	3277	5968	11473	-2392
-M2	5	C107	SCMFLONG	-5669	-20	-2098	5804	3277	5968	11473	-2392
+M3	5	C157	SCMFLONG	5870	17	2171	5804	3277	5968	11674	-2593
-M3	5	C157	SCMFLONG	-5870	-17	-2171	5804	3277	5968	11674	-2593

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	15	C107	SCMFLONG	3563	10	736	4720	2662	5072	8283	-901
-P	15	C107	SCMFLONG	-3563	-10	-736	4720	2662	5072	8283	-901
+M2	17	C99	SCMFLONG	3281	20	770	4520	2549	4855	7801	-732
-M2	17	C99	SCMFLONG	-3281	-20	-770	4520	2549	4855	7801	-732
+M3	20	C107	SCMFLONG	2997	5	857	4220	2380	5184	7217	-617
-M3	20	C107	SCMFLONG	-2997	-5	-857	4220	2380	5184	7217	-617

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	21	C107	SCMFLONG	2894	20	851	4121	2324	4240	7015	-570
-P	21	C107	SCMFLONG	-2894	-20	-851	4121	2324	4240	7015	-570
+M2	21	C99	SCMFLONG	2859	21	860	4121	2324	4240	6980	-535
-M2	21	C99	SCMFLONG	-2859	-21	-860	4121	2324	4240	6980	-535
+M3	21	C99	SCMFLONG	2859	21	860	4121	2324	4240	6980	-535
-M3	21	C99	SCMFLONG	-2859	-21	-860	4121	2324	4240	6980	-535

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	31	C107	SCMFLONG	1966	3	646	3101	1748	3197	5067	-218
-P	31	C107	SCMFLONG	-1966	-3	-646	3101	1748	3197	5067	-218
+M2	33	C99	SCMFLONG	1759	14	695	3101	1748	3197	4860	-11
-M2	33	C99	SCMFLONG	-1759	-14	-695	3101	1748	3197	4860	-11
+M3	33	C99	SCMFLONG	1759	14	695	3101	1748	3197	4860	-11
-M3	33	C99	SCMFLONG	-1759	-14	-695	3101	1748	3197	4860	-11

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	41	C158	SCMFLONG	1045	8	504	2077	1169	2147	3122	124
-P	41	C158	SCMFLONG	-1045	-8	-504	2077	1169	2147	3122	124
+M2	41	C107	SCMFLONG	1001	10	620	2077	1169	2147	3078	168
-M2	41	C107	SCMFLONG	-1001	-10	-620	2077	1169	2147	3078	168
+M3	41	C107	SCMFLONG	1001	10	620	2077	1169	2147	3078	168
-M3	41	C107	SCMFLONG	-1001	-10	-620	2077	1169	2147	3078	168

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	51	C107	SCMFLONG	396	4	270	1073	604	1114	1469	208
-P	51	C107	SCMFLONG	-396	-4	-270	1073	604	1114	1469	208
+M2	53	C107	SCMFLONG	286	14	265	1073	604	1114	1359	318
-M2	53	C107	SCMFLONG	-286	-14	-265	1073	604	1114	1359	318
+M3	52	C107	SCMFLONG	339	2	282	1073	604	1114	1412	265
-M3	52	C107	SCMFLONG	-339	-2	-282	1073	604	1114	1412	265

dlf = dead load factor (see load take down)

Group # D

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	GROUND	C161	SCMFSHORT	6731	12	1674	6539	3068	6790	13270	-3663
-P	GROUND	C161	SCMFSHORT	-6731	-12	-1674	6539	3068	6790	13270	-3663
+M2	2	C165	E100X100Y5 MAX	1554	558	1947	6358	2979	6599	7912	1425
-M2	2	C165	E100X100Y5 MAX	-1554	-558	-1947	6358	2979	6599	7912	1425
+M3	2	C170	SCMFSHORT	6630	55	6975	6358	2979	6599	12988	-3651
-M3	2	C170	SCMFSHORT	-6630	-55	-6975	6358	2979	6599	12988	-3651

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	4	C161	SCMFSHORT	5956	17	5074	6075	2838	6304	12031	-3118
-P	4	C161	SCMFSHORT	-5956	-17	-5074	6075	2838	6304	12031	-3118
+M2	4	C170	E100X100Y5 MAX	1395	127	1051	6075	2838	6304	7470	1443
-M2	4	C170	E100X100Y5 MAX	-1395	-127	-1051	6075	2838	6304	7470	1443
+M3	4	C161	SCMFSHORT	5956	17	5074	6075	2838	6304	12031	-3118
-M3	4	C161	SCMFSHORT	-5956	-17	-5074	6075	2838	6304	12031	-3118

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	15	C164	SCMFSHORT	2491	6	860	4776	2204	4973	7267	-287
-P	15	C164	SCMFSHORT	-2491	-6	-860	4776	2204	4973	7267	-287
+M2	17	C165	E100X100Y5 MAX	431	62	645	4563	2104	4753	4994	1673
-M2	17	C165	E100X100Y5 MAX	-431	-62	-645	4563	2104	4753	4994	1673
+M3	17	C170	SCMFSHORT	2207	5	3447	4563	2104	4753	6770	-103
-M3	17	C170	SCMFSHORT	-2207	-5	-3447	4563	2104	4753	6770	-103

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	21	C164	SCMFSHORT	2155	7	2715	4136	1902	4314	6291	-253
-P	21	C164	SCMFSHORT	-2155	-7	-2715	4136	1902	4314	6291	-253
+M2	21	C165	E100X100Y5 MAX	387	66	574	4136	1902	4314	4523	1515
-M2	21	C165	E100X100Y5 MAX	-387	-66	-574	4136	1902	4314	4523	1515
+M3	21	C171	SCMFSHORT	2155	4	2727	4136	1902	4314	6291	-253
-M3	21	C171	SCMFSHORT	-2155	-4	-2727	4136	1902	4314	6291	-253

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	31	C164	SCMFSHORT	1549	3	351	3042	1389	3176	4591	-160
-P	31	C164	SCMFSHORT	-1549	-3	-351	3042	1389	3176	4591	-160
+M2	33	C165	E100X100Y5 MAX	243	27	203	2836	1293	2966	3079	1050
-M2	33	C165	E100X100Y5 MAX	-243	-27	-203	2836	1293	2966	3079	1050
+M3	33	C171	SCMFSHORT	1448	2	1140	2836	1293	2966	4284	-155
-M3	33	C171	SCMFSHORT	-1448	-2	-1140	2836	1293	2966	4284	-155

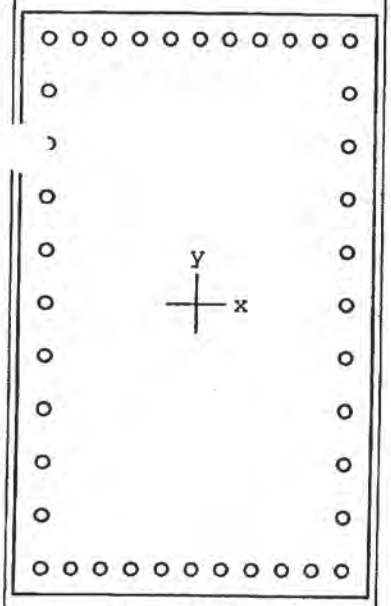
	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	41	C164	SCMFSHORT	832	1	280	2077	1169	2147	2909	337
-P	41	C164	SCMFSHORT	-832	-1	-280	2077	1169	2147	2909	337
+M2	41	C161	E100X100Y5 MAX	141	11	63	2077	1169	2147	2218	1028
-M2	41	C161	E100X100Y5 MAX	-141	-11	-63	2077	1169	2147	2218	1028
+M3	44	C159	SCMFSHORT	724	1	761	2077	1169	2147	2801	445
-M3	44	C159	SCMFSHORT	-724	-1	-761	2077	1169	2147	2801	445

	Story	Column	Load	P	M2	M3	1.42(dlf)D+0.5L	0.9*(dlf)D	1.4(dlf)D+1.7L	P_{comp}	P_{tens}
+P	53	C164	SCMFSHORT	330	1	477	817	364	876	1147	34
-P	53	C164	SCMFSHORT	-330	-1	-477	817	364	876	1147	34
+M2	53	C161	E100X100Y5 MAX	66	6	79	817	364	876	883	298
-M2	53	C161	E100X100Y5 MAX	-66	-6	-79	817	364	876	883	298
+M3	53	C164	SCMFSHORT	330	1	477	817	364	876	1147	34
-M3	53	C164	SCMFSHORT	-330	-1	-477	817	364	876	1147	34

dlf = dead load factor (see load take down)

D #

8.2.1-11



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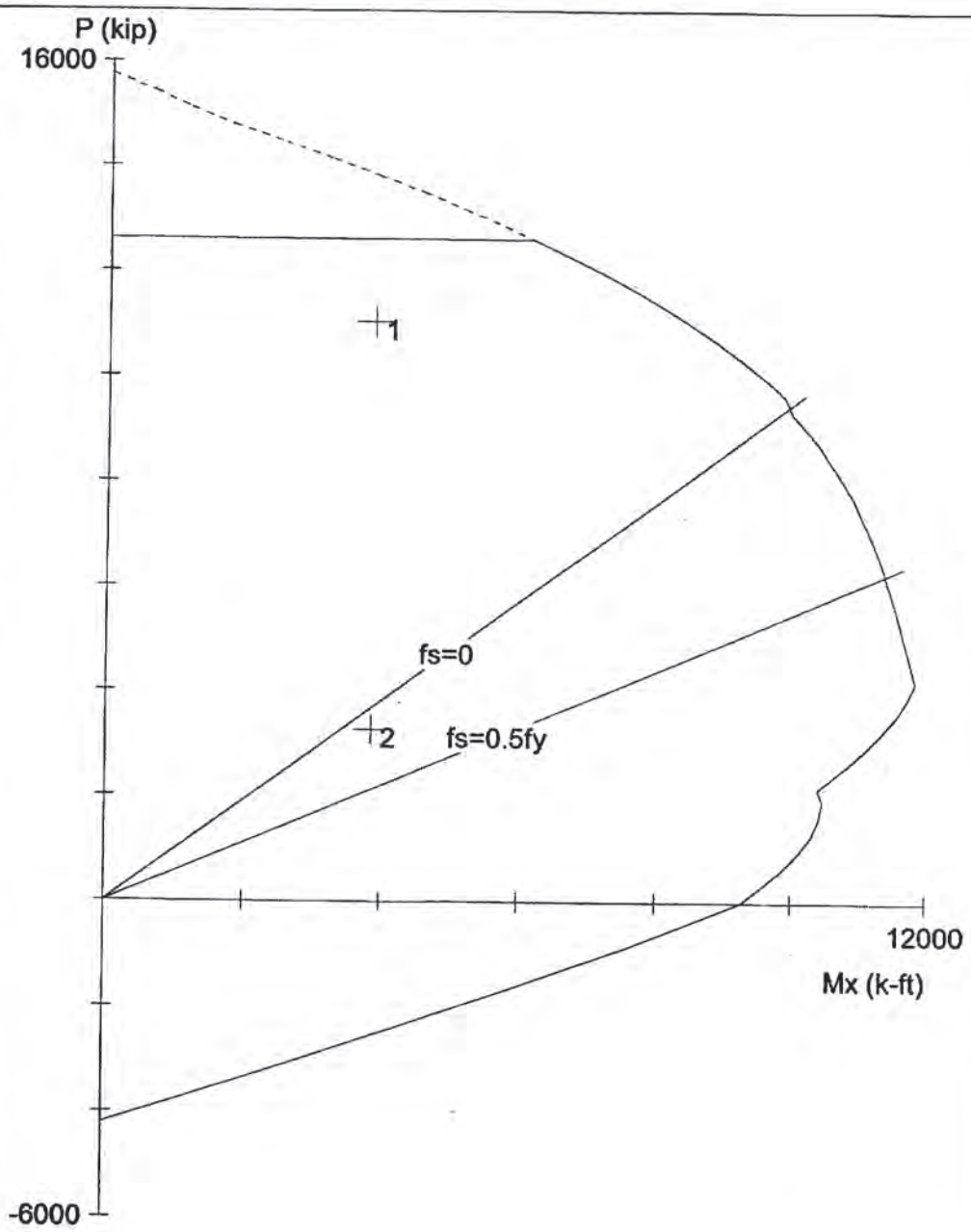


Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

'enderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 12/14/04

Time: 10:21:54

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\4069-T~1\4069-C~1\LONG_D~1\A-2-3.COL

GROUP A

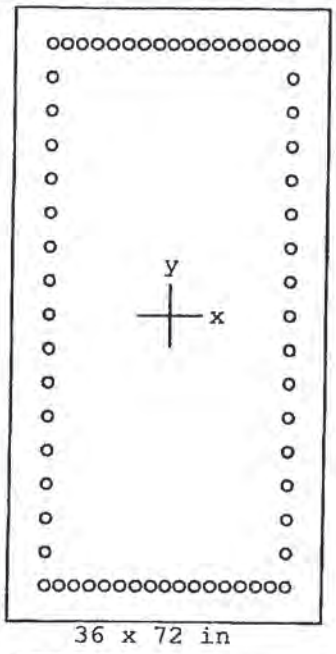
Project:

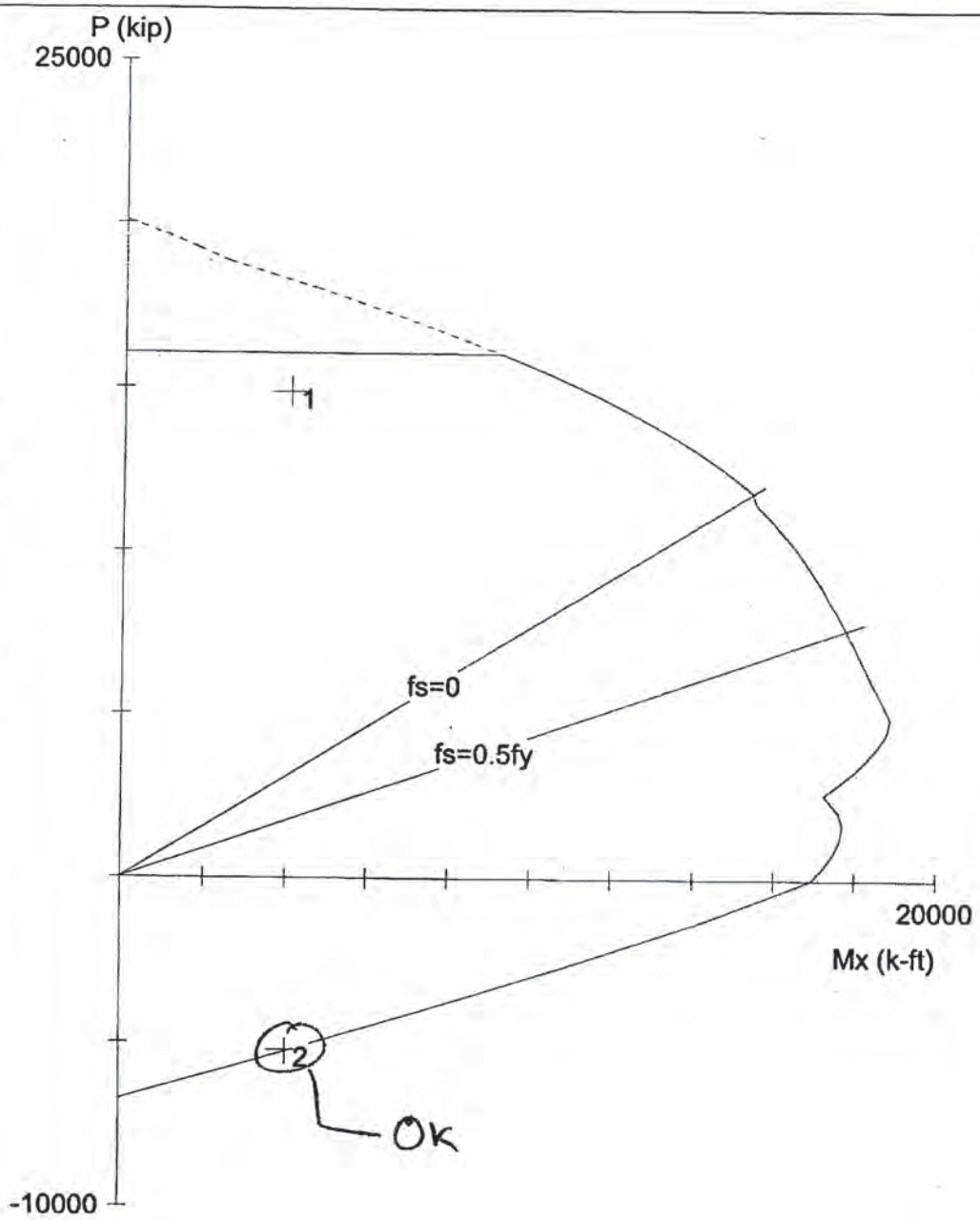
Column:

Engineer:

f'c = 10 ksi	fy = 75 ksi	Ag = 2160 in^2	40 #11 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 62.40 in^2	Rho = 2.89%
fc = 8.5 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 648000 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 233280 in^4
Beta1 = 0.65		Clear spacing = 1.65 in	Clear cover = 2.00 in

8.2.1-12





Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/21/05

Time: 17:05:50

ETABS: 2.09-CD

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\LONGDI~1\C-2-3.COL

GROUP B

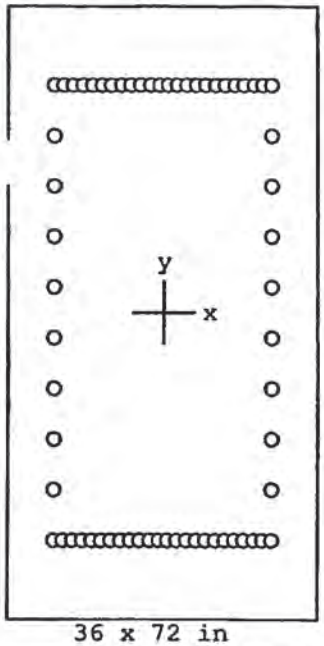
Project:

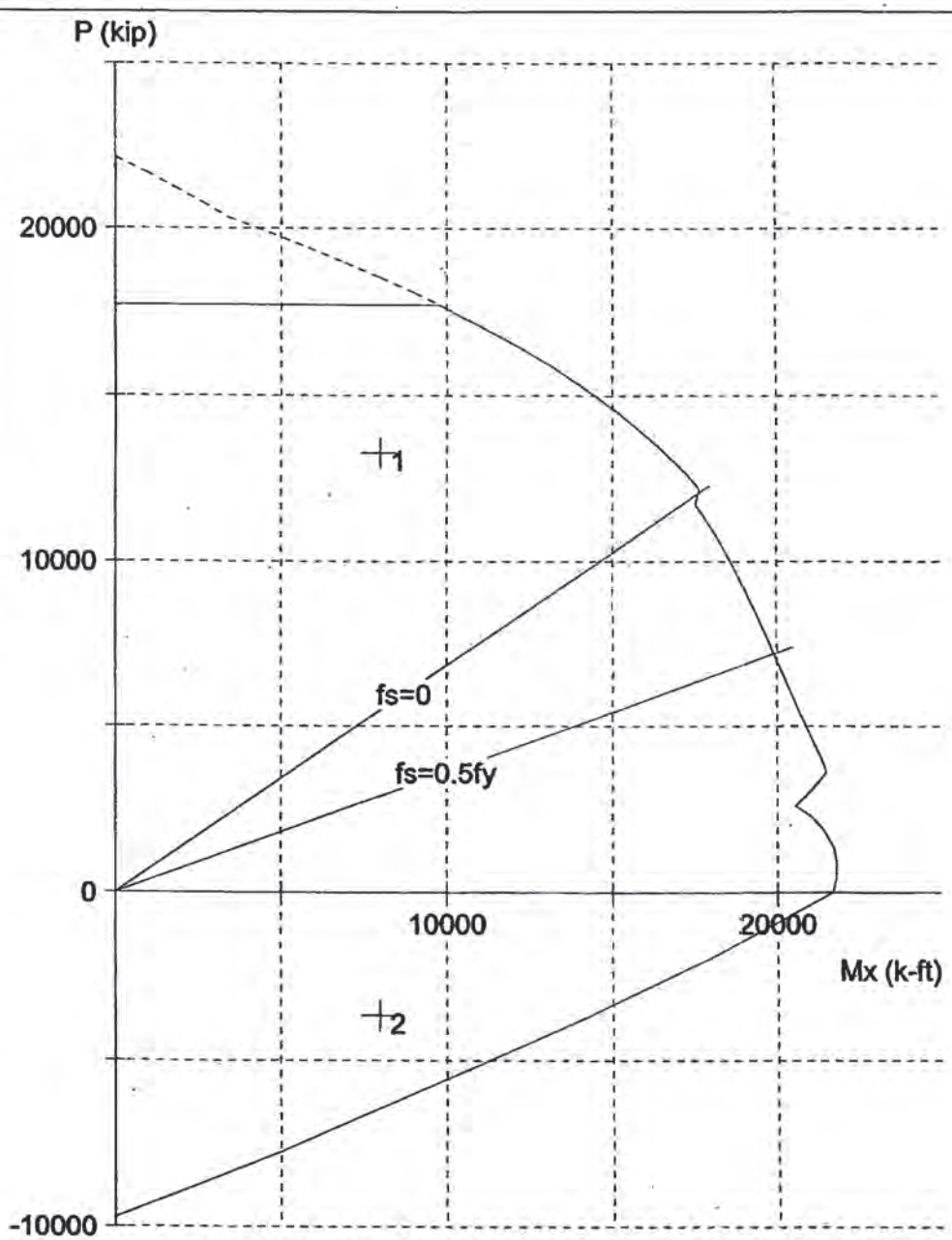
Column:

Engineer:

f'c = 10 ksi	fy = 75 ksi	Ag = 2592 in^2	64 #11 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 99.84 in^2	Rho = 3.85%
fc = 8.5 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 1.11974e+006 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 279936 in^4
Beta1 = 0.65		Clear spacing = 0.31 in	Clear cover = 3.50 in 8.2.1-13

Confinement: Tied





Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

'enderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 01/03/05

Time: 11:35:51

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

GROUP D

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\SHORT_~2\E-B-4.COL

LEVEL B → LO4

Project:

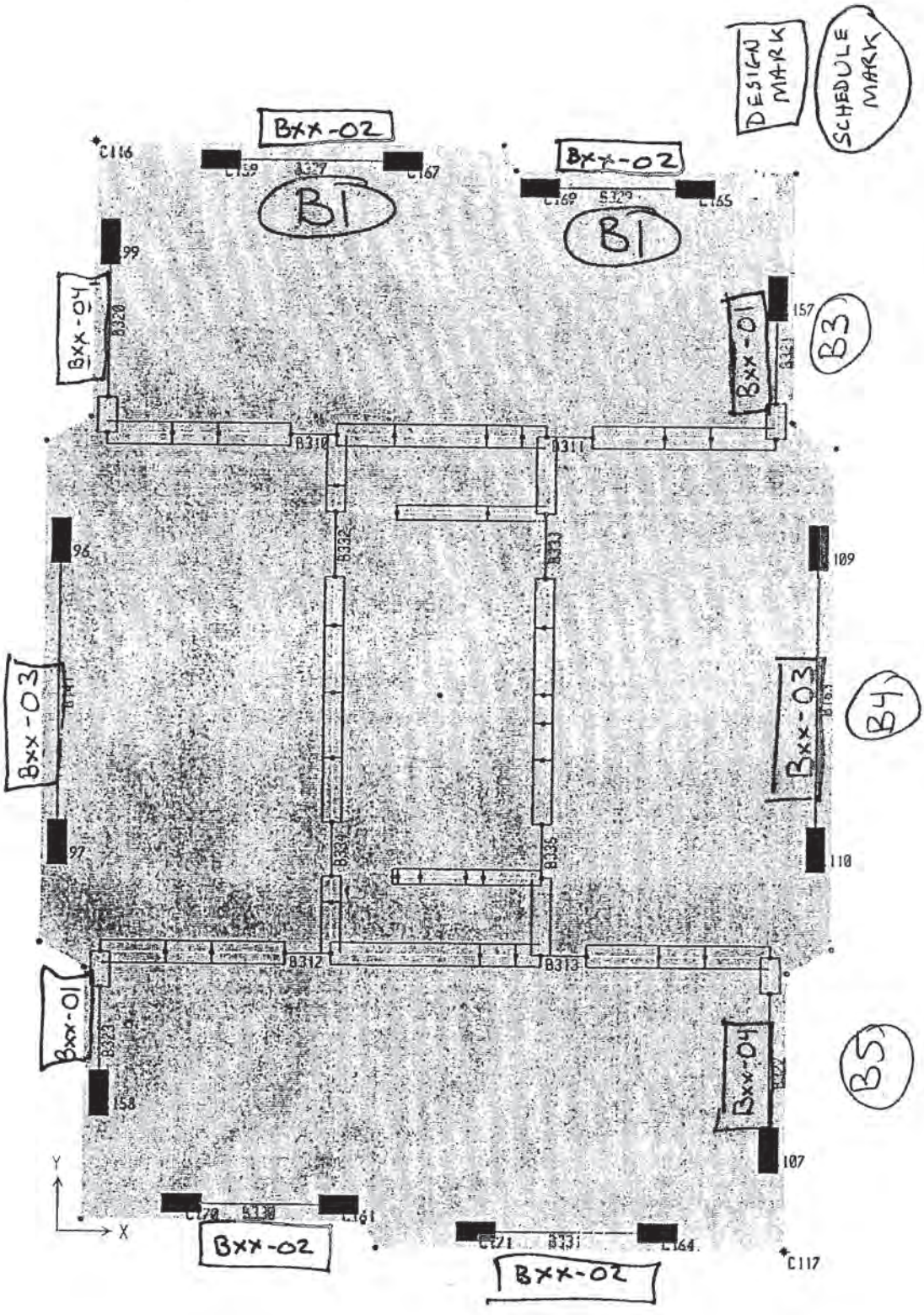
Column:

Engineer:

f'c = 10 ksi	fy = 75 ksi	Ag = 2592 in^2	64 #14 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 144.00 in^2	Rho = 5.56%
fc = 8.5 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 1.11974e+006 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 279936 in^4
Beta1 = 0.65		Clear spacing = -0.59 in	Clear cover = 4.50 in

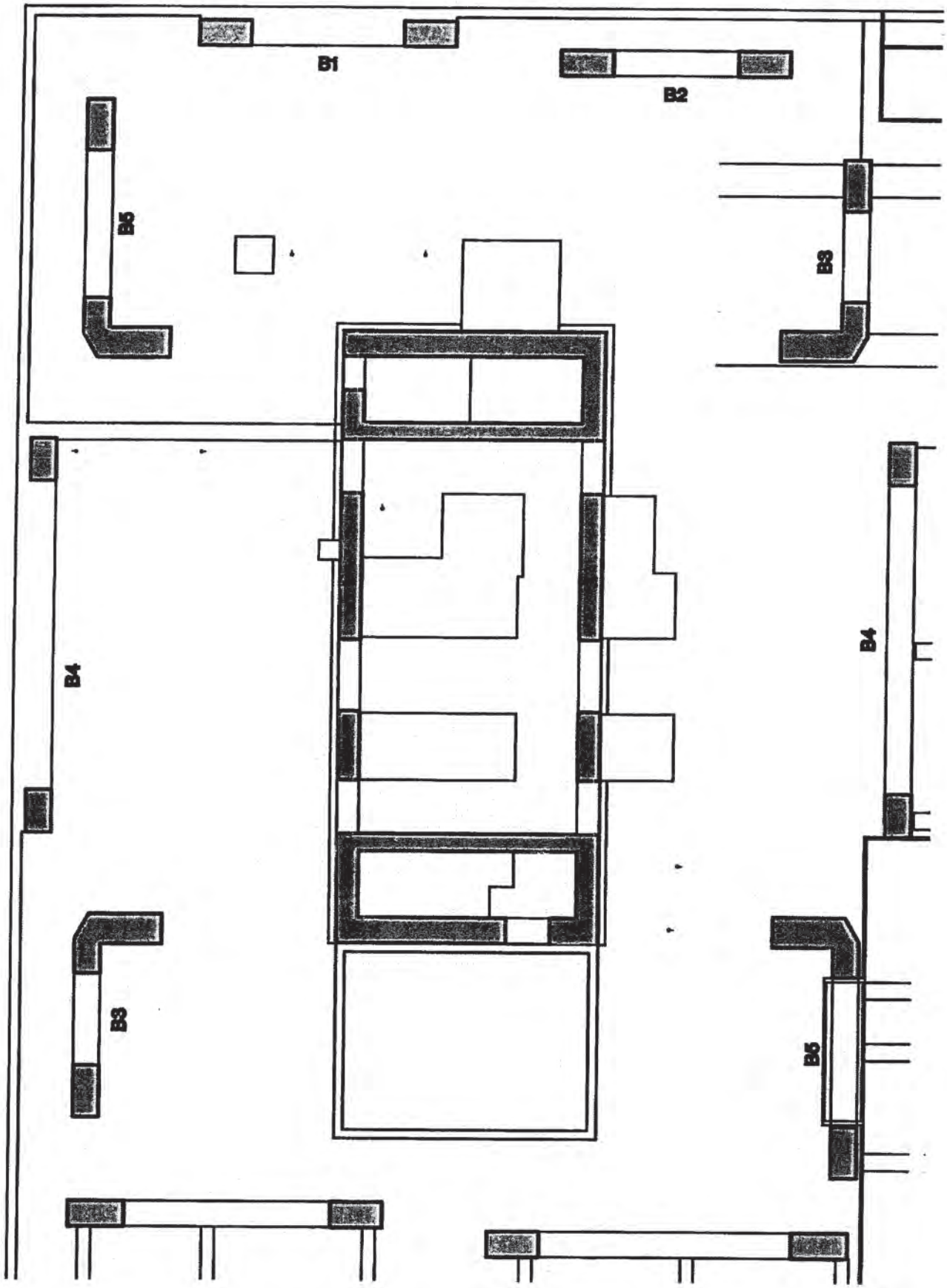
8.2.1-14

ETABS



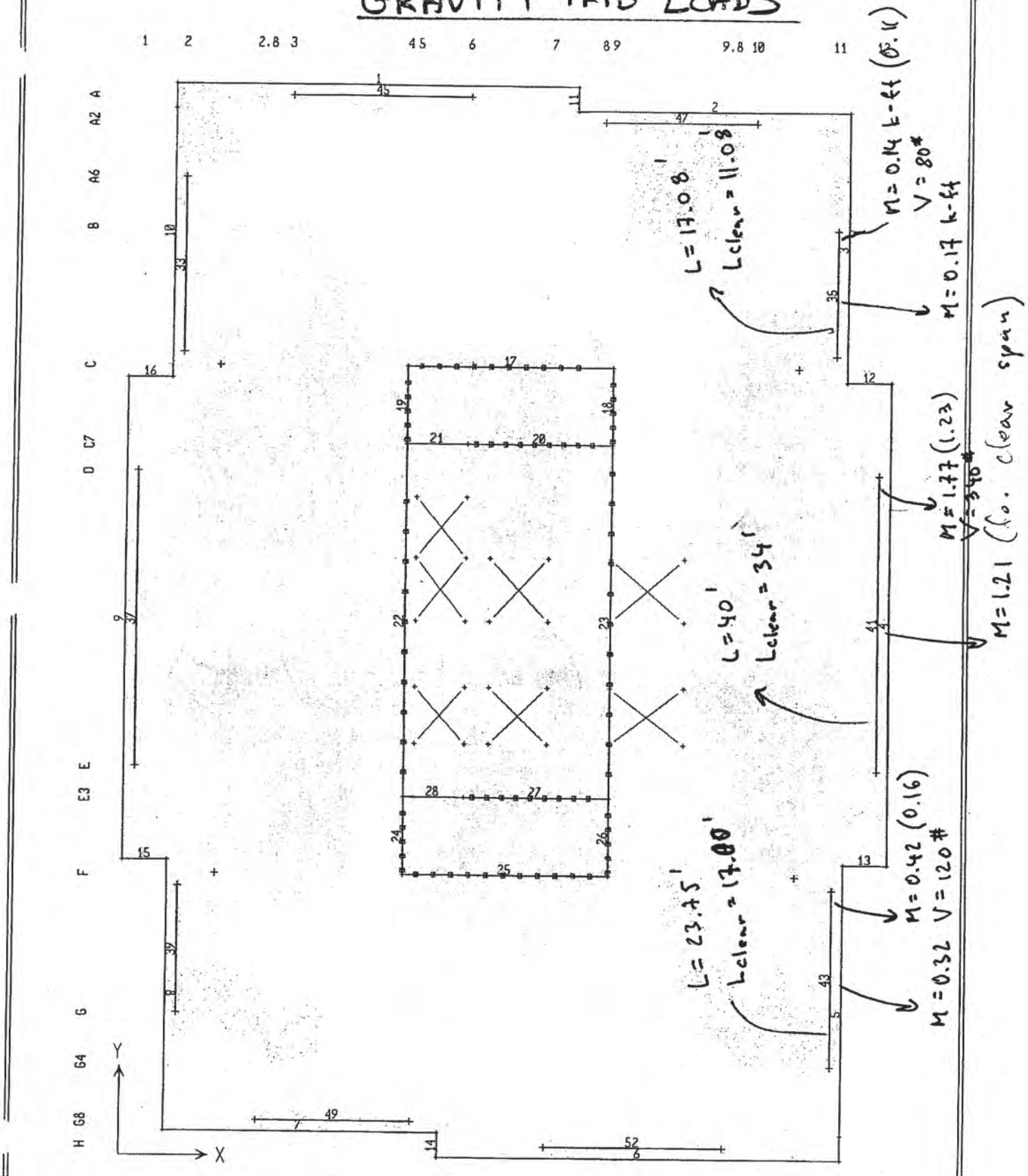
ETABS v8.4.7 - File: 4069-20041206-PeriMF 2.03 - 25MF - December 10,2004 9:21
Plan View - 20 - Elevation 190.25 - Kip-ft Units

8.2.1-15



8.2.1-16

GRAVITY TRIB LOADS



Beam Unit Wt.	0.150	kcf
slab depth	9	in
parapet ht above roof	23.5	ft
Exterior Cladding DL	15	psf vertically

Brx-41									SAPE ANALYSIS 1PSF		SDL		DL Self wt (excludes slab)		DL exterior cladding		Total DL		LL		$M_{gravend,neg}$	$M_{gravend,min}$	Mu_{end}	Mu_{center}
Floor	Usage	Flr. Ht. ft.	Elevation ft	Width in	Depth in	Clear Length ft	Floor DL psf	Floor LL psf	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	$wt^2/9$ kip-ft	$wt^2/14$ Center Moment kip-ft	$wt^2/9$ End Moment kip-ft	$wt^2/14$ Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	1.412D+0.5L Design kip-ft	0.9*D Design kip-ft	1.4D+1.7L Design kip-ft	1.4D+1.7L Design kip-ft
60	Roof	22.5	627.5				196	20																
59	Roof	13	605	24	36	16.83	196	20	0.338	0.411	66	80	21	14	14	9	102	103	7	8	-148	-92	-154	158
58	Typ	13	592	24	36	16.83	128	40	0.338	0.411	43	53	21	14	6	4	71	70	14	16	-107	-64	-122	126
57	Typ	10.75	579	24	36	16.83	128	40	0.338	0.411	43	53	21	14	6	4	70	70	14	16	-106	-63	-121	126
56	Typ	10.75	568.25	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
55	Typ	10.75	557.5	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
54	Typ	10.75	546.75	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
53	Typ	10.75	536	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
52	Mech	12.5	525.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	3	54	54	11	13	-82	-49	-94	97
51	Typ	10.5	512.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	3	54	54	11	13	-82	-49	-94	97
50	Typ	10.5	502.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	3	54	54	11	13	-82	-49	-94	97
49	Typ	10.5	491.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
48	Typ	10.5	481.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
47	Typ	10.5	470.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
46	Typ	10.5	460.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
45	Typ	10.5	449.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
44	Typ	10.5	439.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
43	Typ	10.5	428.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
42	Typ	10.5	418.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
41	Typ	10.5	407.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
40	Typ	10.5	397.25	24	45	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
39	Typ	10.5	386.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
38	Typ	10.5	376.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
37	Typ	10.5	365.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
36	Typ	10.5	355.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
35	Typ	10.5	344.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
34	Typ	10.5	334.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
33	Typ	10.5	323.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
32	Typ	10.5	313.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
31	Typ	10.5	302.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
30	Typ	10.5	292.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
29	Typ	10.5	281.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
28	Typ	10.5	271.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
27	Typ	10.5	260.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
26	Typ	10.5	250.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
25	Mech	11.5	239.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
24	Typ	9.5	228.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	73
23	Typ	9.5	218.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
22	Typ	9.5	209.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
21	Typ	9.5	199.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
20	Typ	9.5	190.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
19	Typ	9.5	180.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
18	Typ	9.5	171.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
17	Typ	9.5	161.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
16	Typ	9.5	152.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-72	72
15	Typ	9.5	142.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
14	Typ	9.5	133.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
13	Typ	9.5	123.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
12	Typ	9.5	114.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
11	Typ	9.5	104.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
10	Typ	9.5	95.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
9	Typ	9.5	85.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
8	Typ	9.5	76.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
7	Typ	9.5	66.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
6	Typ	9.5	57.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
5	Typ	9.5	47.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
4	Typ	9.5	38.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
3	Typ	12.1667	28.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
2	Mech	16.5833	16.5833	30	45	10.83	141.5	100	0.140	0.170	20	24	15	9	3	2	37	35	6	7	-52	-31	-58	57
Ground		0	0																		-60	-34	-76	78

8.2.1-18

Beam Unit Wt.	0.150	kcf
slab depth	9	in
parapet ht above roof	23.5	ft
Exterior Cladding DL	15	psf vertically

Rxx-03									SAFE ANALYSIS 1PSF		SDL		DL Self wt (excludes slab)		DL exterior cladding		Total DL		LL		$M_{grav\ end\ max}$	$M_{grav\ end\ min}$	Mu_{end}	Mu_{center}
Floor	Usage	Flr. Ht. ft.	Elevation ft.	Width in	Depth in	Clear Length ft	Floor DL psf	Floor LL psf	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	$wt^2/9$ End Moment kip-ft	$wt^2/14$ Center Moment kip-ft	$wt^2/9$ End Moment kip-ft	$wt^2/14$ Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	1.42D+0.5L Design kip-ft	0.9*D Design kip-ft	1.4D+1.7L Design kip-ft	1.4D+1.7L Design kip-ft
60	Roof	22.5	627.5				196	20																
59	Roof	13	805	24	36	40.00	196	20	2.450	1.675	480	328	120	77	80	51	680	457	49	33	-990	-612	-1036	696
58	Typ	13	592	24	36	40.00	128	40	2.450	1.675	314	214	120	77	35	22	468	314	98	67	-714	-421	-822	553
57	Typ	10.75	579	24	36	40.00	128	40	2.450	1.675	314	214	120	77	32	20	465	312	98	67	-710	-419	-818	550
56	Typ	10.75	568.25	24	36	40.00	128	40	2.450	1.675	314	214	120	77	29	18	462	310	98	67	-705	-416	-814	548
55	Typ	10.75	557.5	24	36	40.00	128	40	2.450	1.675	314	214	120	77	29	18	462	310	98	67	-705	-416	-814	548
54	Typ	10.75	546.75	24	36	40.00	128	40	2.450	1.675	314	214	120	77	29	18	462	310	98	67	-705	-416	-814	548
53	Typ	10.75	536	24	36	40.00	128	40	2.450	1.675	314	214	120	77	29	18	462	310	98	67	-705	-416	-814	548
52	Mech	12.5	525.25	24	36	38.00	128	40	2.211	1.511	283	193	108	70	28	18	419	281	88	60	-640	-377	-737	496
51	Typ	10.5	512.75	24	36	38.00	128	40	2.211	1.511	283	193	108	70	28	18	419	281	88	60	-639	-377	-737	496
50	Typ	10.5	502.25	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
49	Typ	10.5	491.75	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
48	Typ	10.5	481.25	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
47	Typ	10.5	470.75	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
46	Typ	10.5	460.25	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
45	Typ	10.5	449.75	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
44	Typ	10.5	439.25	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
43	Typ	10.5	428.75	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
42	Typ	10.5	418.25	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
41	Typ	10.5	407.75	24	36	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
40	Typ	10.5	397.25	24	45	38.00	128	40	2.211	1.511	283	193	108	70	25	16	417	279	88	60	-636	-375	-734	494
39	Typ	10.5	386.75	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
38	Typ	10.5	376.25	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
37	Typ	10.5	365.75	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
36	Typ	10.5	355.25	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
35	Typ	10.5	344.75	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
34	Typ	10.5	334.25	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
33	Typ	10.5	323.75	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
32	Typ	10.5	313.25	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
31	Typ	10.5	302.75	24	45	38.00	128	40	2.211	1.511	283	193	144	93	25	16	453	303	88	60	-687	-407	-784	526
30	Typ	10.5	292.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	22	14	399	267	78	53	-605	-359	-691	464
29	Typ	10.5	281.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	22	14	399	267	78	53	-605	-359	-691	464
28	Typ	10.5	271.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	22	14	399	267	78	53	-605	-359	-691	464
27	Typ	10.5	260.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	22	14	399	267	78	53	-605	-359	-691	464
26	Typ	10.5	250.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	22	14	399	267	78	53	-605	-359	-691	464
25	Mech	11.5	239.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	23	15	400	267	78	53	-607	-360	-692	465
24	Typ	9.5	228.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	22	14	399	267	78	53	-605	-359	-691	464
23	Typ	9.5	218.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
22	Typ	9.5	209.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
21	Typ	9.5	199.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
20	Typ	9.5	190.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
19	Typ	9.5	180.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
18	Typ	9.5	171.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
17	Typ	9.5	161.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
16	Typ	9.5	152.25	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
15	Typ	9.5	142.75	24	45	35.67	128	40	1.948	1.332	249	170	127	82	20	13	397	265	78	53	-602	-357	-688	462
14	Typ	9.5	133.25	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
13	Typ	9.5	123.75	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
12	Typ	9.5	114.25	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
11	Typ	9.5	104.75	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
10	Typ	9.5	95.25	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
9	Typ	9.5	85.75	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
8	Typ	9.5	76.25	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
7	Typ	9.5	66.75	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
6	Typ	9.5	57.25	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
5	Typ	9.5	47.75	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
4	Typ	9.5	38.25	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
3	Typ	12.1667	28.75	30	45	34.00	128	40	1.770	1.210	227	155	145	93	18	12	389	260	71	48	-588	-350	-665	446
2	Mech	16.5833	16.5833	30	45	34.00	141.5	100	1.770	1.210	250	171	145	93	28	18	423	282	177	121	-689	-380	-893	600
Ground		0	0																					

8.2.1-19

Beam Unit Wt.	0.150	kcf
slab depth	sl	in
parapet ht above roof	23.5	ft
Exterior Cladding DL	15	psf vertically

Bxx-44									SAFE ANALYSIS 1PSF		SDL		DL Self wt (excludes slab)		DL exterior cladding		Total DL		LL		$M_{gravend\,min}$	$M_{gravend\,min}$	Mu_{end}	Mu_{center}
Floor	Usage	Flr. Ht. ft.	Elevation ft.	Width in	Depth in	Clear Length ft	Floor DL psf	Floor LL psf	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	$wt^2/9$ kip-ft	$wt^2/14$ kip-ft	$wt^2/9$ kip-ft	$wt^2/14$ kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	Maximum End Moment kip-ft	Maximum Center Moment kip-ft	1.42D+0.5L Design kip-ft	0.9*D Design kip-ft	1.4D+1.7L Design kip-ft	1.4D+1.7L Design kip-ft
60	Roof	22.5	627.5				196	20																
59	Roof	13	605	24	36	23.50	196	20	0.552	0.421	108	82	41	27	28	18	177	127	11	8	-257	-159	-367	192
58	Typ	13	592	24	36	23.50	128	40	0.552	0.421	71	54	41	27	12	8	124	88	22	17	-187	-112	-211	152
57	Typ	10.75	579	24	36	23.50	128	40	0.552	0.421	71	54	41	27	11	7	123	87	22	17	-186	-111	-210	151
56	Typ	10.75	568.25	24	36	23.50	128	40	0.552	0.421	71	54	41	27	10	6	122	87	22	17	-184	-110	-208	150
55	Typ	10.75	557.5	24	36	23.50	128	40	0.552	0.421	71	54	41	27	10	6	122	87	22	17	-184	-110	-208	150
54	Typ	10.75	546.75	24	36	23.50	128	40	0.552	0.421	71	54	41	27	10	6	122	87	22	17	-184	-110	-208	150
53	Typ	10.75	536	24	36	23.50	128	40	0.552	0.421	71	54	41	27	10	6	122	87	22	17	-184	-110	-208	150
52	Mech	12.5	525.25	24	36	22.50	128	40	0.506	0.385	65	49	38	24	10	6	122	87	22	17	-184	-110	-208	150
51	Typ	10.5	512.75	24	36	22.50	128	40	0.506	0.385	65	49	38	24	10	6	113	80	20	15	-170	-101	-192	138
50	Typ	10.5	502.25	24	36	22.50	128	40	0.506	0.385	65	49	38	24	10	6	112	80	20	15	-170	-101	-192	138
49	Typ	10.5	491.75	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
48	Typ	10.5	481.25	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
47	Typ	10.5	470.75	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
46	Typ	10.5	460.25	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
45	Typ	10.5	449.75	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
44	Typ	10.5	439.25	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
43	Typ	10.5	428.75	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
42	Typ	10.5	418.25	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
41	Typ	10.5	407.75	24	36	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
40	Typ	10.5	397.25	24	45	22.50	128	40	0.506	0.385	65	49	38	24	9	6	112	79	20	15	-169	-100	-191	137
39	Typ	10.5	386.75	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
38	Typ	10.5	376.25	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
37	Typ	10.5	365.75	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
36	Typ	10.5	355.25	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
35	Typ	10.5	344.75	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
34	Typ	10.5	334.25	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
33	Typ	10.5	323.75	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
32	Typ	10.5	313.25	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
31	Typ	10.5	302.75	24	45	22.50	128	40	0.506	0.385	65	49	51	33	9	6	124	88	20	15	-187	-112	-208	149
30	Typ	10.5	292.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
29	Typ	10.5	281.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
28	Typ	10.5	271.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
27	Typ	10.5	260.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
26	Typ	10.5	250.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
25	Mech	11.5	239.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
24	Typ	9.5	228.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-188	134
23	Typ	9.5	218.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	8	5	112	79	18	14	-168	-101	-187	134
22	Typ	9.5	209.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
21	Typ	9.5	199.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
20	Typ	9.5	190.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
19	Typ	9.5	180.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
18	Typ	9.5	171.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
17	Typ	9.5	161.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
16	Typ	9.5	152.25	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
15	Typ	9.5	142.75	24	45	21.33	128	40	0.455	0.347	58	44	46	29	7	5	111	78	18	14	-167	-100	-186	133
14	Typ	9.5	133.25	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	5	111	78	18	14	-167	-100	-186	133
13	Typ	9.5	123.75	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
12	Typ	9.5	114.25	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
11	Typ	9.5	104.75	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
10	Typ	9.5	95.25	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
9	Typ	9.5	85.75	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
8	Typ	9.5	76.25	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
7	Typ	9.5	66.75	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
6	Typ	9.5	57.25	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
5	Typ	9.5	47.75	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
4	Typ	9.5	38.25	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
3	Typ	12.1667	28.75	30	45	20.50	128	40	0.420	0.320	54	41	53	34	7	4	113	79	17	13	-169	-102	-187	132
2	Mech	16.5833	16.5833	30	45	20.50	141.5	100	0.420	0.320	59	45	53	34	8	5	114	80	17	13	-170	-102	-188	133
Ground		0	0												10	6	122	86	42	32	-194	-110	-242	174

8.2.1-20

Beam Unit Wt.	0.150	kcf
slab depth	9	in
parapet ht above roof	23.6	ft
Exterior Cladding DL	15	psf vertically

								SAFE ANALYSIS															
								1PSF		SDL		DL Self wt (excludes slab)		DL exterior cladding		Total DL		LL		$M_{grav\ and\ max}$	$M_{grav\ and\ min}$	Mu_{end}	Mu_{center}
Brx-92							Clear	Floor	Floor	Maximum	Maximum	Maximum	Maximum	$wt^2/9$	$wt^2/14$	$wt^2/9$	$wt^2/14$	Maximum	Maximum	Maximum	Maximum	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L
	Floor	Usage	Flr. Ht. ft.	Elevation ft.	Width in	Depth in	Length ft	DL psf	LL psf	End Moment kip-ft	Center Moment kip-ft	End Moment kip-ft	Center Moment kip-ft	End Moment kip-ft	Center Moment kip-ft	End Moment kip-ft	Center Moment kip-ft	End Moment kip-ft	Center Moment kip-ft	End Moment kip-ft	Center Moment kip-ft	Design kip-ft	Design kip-ft	Design kip-ft	Design kip-ft
	60	Roof	22.5	627.5				196	20																
	59	Roof	13	605	24	36	16.83	196	20	0.338	0.411	66	80	21	14	14	9	102	103	7	8	-148	-92	-154	158
	58	Typ	13	592	24	36	16.83	128	40	0.338	0.411	43	53	21	14	6	4	71	70	14	16	-107	-64	-122	126
	57	Typ	10.75	579	24	36	16.83	128	60	0.338	0.411	43	53	21	14	6	4	70	70	14	16	-106	-63	-121	126
	56	Typ	10.75	568.25	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
	55	Typ	10.75	557.5	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
	54	Typ	10.75	546.75	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
	53	Typ	10.75	536	24	36	16.83	128	40	0.338	0.411	43	53	21	14	5	3	70	69	14	16	-106	-63	-120	125
	52	Mech	12.5	525.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	3	54	54	11	13	-82	-49	-94	97
	51	Typ	10.5	512.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	3	54	54	11	13	-82	-49	-94	97
	50	Typ	10.5	502.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	49	Typ	10.5	491.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	48	Typ	10.5	481.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	47	Typ	10.5	470.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	46	Typ	10.5	460.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	45	Typ	10.5	449.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	44	Typ	10.5	439.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	43	Typ	10.5	428.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	42	Typ	10.5	418.25	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	41	Typ	10.5	407.75	24	36	14.83	128	40	0.263	0.319	34	41	16	11	4	2	54	54	11	13	-82	-49	-93	97
	40	Typ	10.5	397.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	39	Typ	10.5	386.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	38	Typ	10.5	376.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	37	Typ	10.5	365.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	36	Typ	10.5	355.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	35	Typ	10.5	344.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	34	Typ	10.5	334.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	33	Typ	10.5	323.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	32	Typ	10.5	313.25	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	31	Typ	10.5	302.75	24	45	14.83	128	40	0.263	0.319	34	41	22	14	4	2	59	57	11	13	-90	-53	-101	102
	30	Typ	10.5	292.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
	29	Typ	10.5	281.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
	28	Typ	10.5	271.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
	27	Typ	10.5	260.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
	26	Typ	10.5	250.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
	25	Mech	11.5	239.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	73
	24	Typ	9.5	228.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	3	2	42	41	7	9	-64	-38	-72	72
	23	Typ	9.5	218.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	22	Typ	9.5	209.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	21	Typ	9.5	199.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	20	Typ	9.5	190.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	19	Typ	9.5	180.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	18	Typ	9.5	171.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	17	Typ	9.5	161.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	16	Typ	9.5	152.25	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	15	Typ	9.5	142.75	24	45	12.50	128	40	0.186	0.226	24	29	16	10	2	2	42	41	7	9	-63	-38	-71	72
	14	Typ	9.5	133.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	13	Typ	9.5	123.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	12	Typ	9.5	114.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	11	Typ	9.5	104.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	10	Typ	9.5	95.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	9	Typ	9.5	85.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	8	Typ	9.5	76.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	7	Typ	9.5	66.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	6	Typ	9.5	57.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	5	Typ	9.5	47.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	4	Typ	9.5	38.25	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	34	32	6	7	-52	-31	-58	57
	3	Typ	12.1667	28.75	30	45	10.83	128	40	0.140	0.170	18	22	15	9	2	1	35	33	6	7	-52	-31	-58	57
	2	Mech	16.5833	16.5833	30	45	10.83	141.5	100	0.140	0.170	20	24	15	9	3	2	37	35	14	17	-60	-34	-76	78
Ground			0	0																					

8.2.1-21

Bxx-01

	Story	Beam	Load	Loc	V2	T	M3
+M3	3	B323	SCMFLONG	0	361	6	2257
+V2	3	B323	SCMFLONG	0	361	6	2257
+T	3	B321	E100X5100Y MAX	14.0834	233	27	1460

2.09 UPDATE: 5/21/05

ALL M3 ARE ± 5% OF PREVIOUS DESIGN.

	Story	Beam	Load	Loc	V2	T	M3
+M3	6	B321	SCMFLONG	14.0834	411	7	2555
+V2	6	B321	SCMFLONG	14.0834	411	7	2555
+T	11	B321	E100X5100Y MAX	14.0834	235	39	1454

	Story	Beam	Load	Loc	V2	T	M3
+M3	16	B323	SCMFLONG	0	169	9	1051
+V2	16	B323	SCMFLONG	0	169	9	1051
+T	20	B321	E100X5100Y MAX	14.0834	127	20	784

	Story	Beam	Load	Loc	V2	T	M3
+M3	21	B323	SCMFLONG	0	142	5	878
+V2	21	B323	SCMFLONG	0	142	5	878
+T	25	B321	E100X5100Y MAX	14.0834	100	20	623

	Story	Beam	Load	Loc	V2	T	M3
+M3	45	B323	SCMFLONG	0	84	3	524
+V2	45	B323	SCMFLONG	0	84	3	524
+T	52	B323	E100X5100Y MAX	0	52	12	319

Bxx-03

	Story	Beam	Load	Loc	V2	T	M3
+M3	3	B141	SCMFLONG	3	70	6	1189
+V2	3	B141	SCMFLONG	3	70	6	1189
+T	3	B141	E100X5100Y MAX	3	46	27	775

	Story	Beam	Load	Loc	V2	T	M3
+M3	9	B163	SCMFLONG	3	101	9	1721
+V2	9	B163	SCMFLONG	3	101	9	1721
+T	10	B163	E100X5100Y MAX	3	64	41	1090

	Story	Beam	Load	Loc	V2	T	M3
+M3	16	B141	SCMFLONG	3	59	5	996
+V2	16	B141	SCMFLONG	3	59	5	996
+T	16	B141	E100X5100Y MAX	3	36	19	619

	Story	Beam	Load	Loc	V2	T	M3
+M3	21	B141	SCMFLONG	3	50	5	849
+V2	21	B141	SCMFLONG	3	50	5	849
+T	22	B141	E100X5100Y MAX	3	32	21	539

	Story	Beam	Load	Loc	V2	T	M3
+M3	44	B141	SCMFLONG	3	21	3	360
+V2	44	B141	SCMFLONG	3	21	3	360
+T	44	B141	E100X5100Y MAX	3	12	11	208

Bxx-04

	Story	Beam	Load	Loc	V2	T	M3
+M3	3	B320	SCMFLONG	0	224	6	2148
+V2	3	B320	SCMFLONG	0	224	6	2148
+T	3	B320	E100X5100Y MAX	0	145	27	1390

	Story	Beam	Load	Loc	V2	T	M3
+M3	8	B322	SCMFLONG	20.7467	298	8	2842
+V2	8	B322	SCMFLONG	20.7467	298	8	2842
+T	9	B320	E100X5100Y MAX	0	189	39	1808

	Story	Beam	Load	Loc	V2	T	M3
+M3	8	B322	SCMFLONG	20.7467	298	8	2842
+V2	8	B322	SCMFLONG	20.7467	298	8	2842
+T	9	B320	E100X5100Y MAX	0	189	39	1808

	Story	Beam	Load	Loc	V2	T	M3
+M3	16	B320	SCMFLONG	0	164	7	1564
+V2	16	B320	SCMFLONG	0	164	7	1564
+T	20	B320	E100X5100Y MAX	0	107	20	1023

	Story	Beam	Load	Loc	V2	T	M3
+M3	21	B322	SCMFLONG	20.7467	140	5	1331
+V2	21	B322	SCMFLONG	20.7467	140	5	1331
+T	27	B292*	E100XM30YM	11	131	33	684

	Story	Beam	Load	Loc	V2	T	M3
+M3	50	B291*	E30X100Y	6	71	-5	684
+V2	43	B291*	E100X30Y	10	116	-3	684
+T	45	B320	E100X5100Y MAX	0	52	11	504

Bxx-02

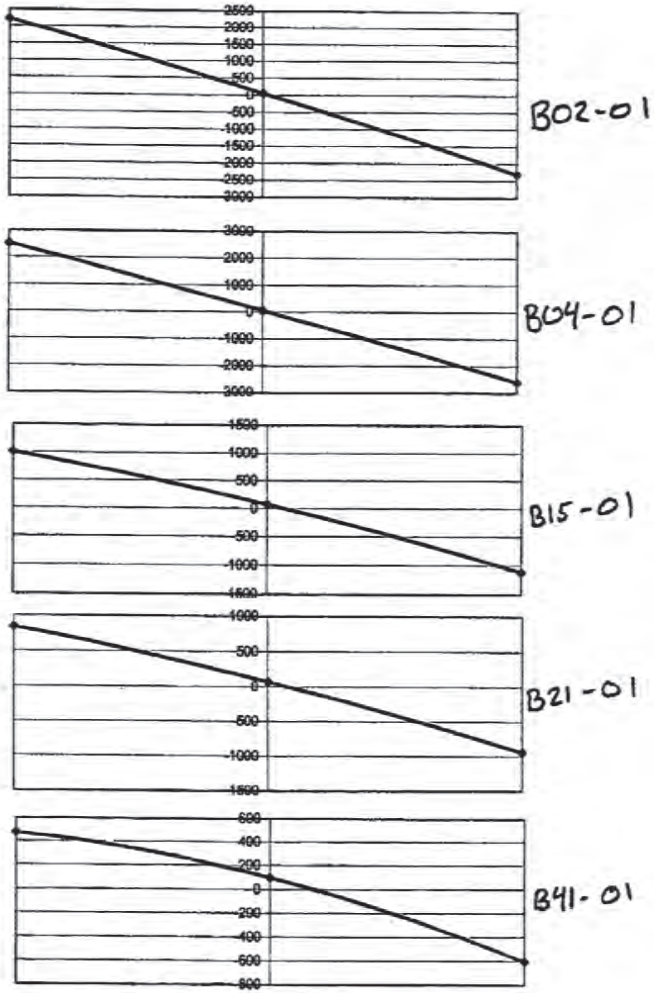
	Story	Beam	Load	Loc	V2	T	M3
+M3	2	B22	MFSSX25	3	497	39	4388
+V2	2	B21	MFSSX25	17.3333	606	39	4344
+T	2	B21	MFSSX25	17.3333	606	39	4344

	Story	Beam	Load	Loc	V2	T	M3
+M3	7	B1	MFSSX25	3	155	3	1369
+V2	7	B2	MFSSX25	17.3333	186	3	1333
+T	14	B1	E30X100Y5 MAX	3	37	11	327

COMBINED DESIGN LOAD CASES

Bxx-01

	Story	Beam	Load	Loc	V2	T	M3	$M_{grav\ end\ max}$ 1.42D+0.5L	$M_{grav\ end\ min}$ 0.9*D	Mu_{end} 1.4D+1.7L	Mu_{center} 1.4D+1.7L	End Mu+	Center Mu+	End Mu-
+M3	3	B323	SCMFLONG		361	6	2257	-52	-31	-58	57	2226	57	-2309
+V2	3	B323	SCMFLONG		361	6	2257							
+T	3	B321	E100X5100Y MAX	14.0834	233	27	1460							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	6	B321	SCMFLONG	14.0834	411	7	2555	-52	-31	-58	57	2524	57	-2607
+V2	6	B321	SCMFLONG	14.0834	411	7	2555							
+T	11	B321	E100X5100Y MAX	14.0834	235	39	1454							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	16	B323	SCMFLONG		169	9	1051	-63	-38	-71	72	1013	72	-1114
+V2	16	B323	SCMFLONG		169	9	1051							
+T	20	B321	E100X5100Y MAX	14.0834	127	20	784							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	21	B323	SCMFLONG		142	5	878	-63	-38	-71	72	840	72	-941
+V2	21	B323	SCMFLONG		142	5	878							
+T	25	B321	E100X5100Y MAX	14.0834	100	20	623							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	45	B323	SCMFLONG		84	3	524	-82	-49	-93	97	475	97	-606
+V2	45	B323	SCMFLONG		84	3	524							
+T	52	B323	E100X5100Y MAX		52	12	319							



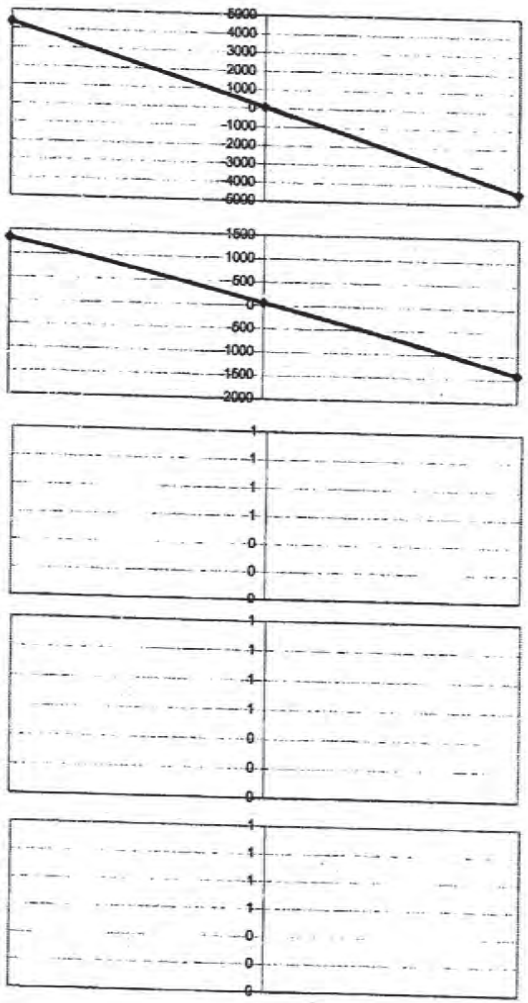
↑
NON-REVERSING PH
CHECK

8.2.1-25

Bxx-02

	Story	Beam	Load	Loc	V2	T	M3	$M_{grav\ and\ max}$	$M_{grav\ and\ min}$	Mu_{end}	Mu_{center}	End Mu+	Center Mu+	End Mu-
								1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L			
+M3	2	B22	MFSSX25	3	496.7	38.76	4388							
+V2	2	B21	MFSSX25	17.3333	606	38.76	4344	-52	-31	-58	57	4357	57	-4440
+T	2	B21	MFSSX25	17.3333	606	38.76	4344							

	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	7	B1	MFSSX25	3	154.9	2.52	1369							
+V2	7	B2	MFSSX25	17.3333	185.9	2.64	1333	-52	-31	-58	57	1338	57	-1420
+T	14	B1	E30X100Y5 MAX	3	37.05	10.68	327							

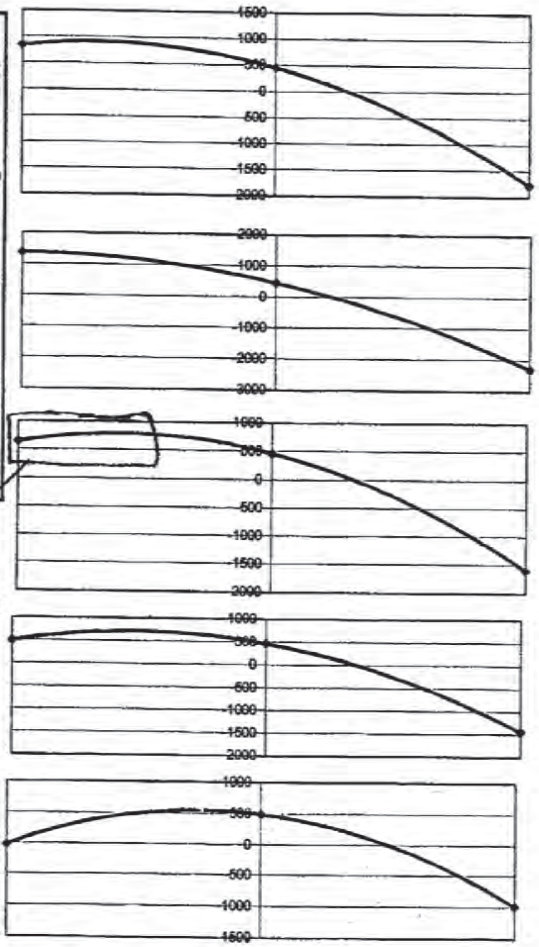


8.2.1-26

Bxx-03

	Story	Beam	Load	Loc	V2	T	M3	$M_{grav\ end\ max}$ 1.42D+0.5L	$M_{grav\ end\ min}$ 0.9*D	Mu_{end} 1.4D+1.7L	$Mu_{beamter}$ 1.4D+1.7L	End Mu+	Center Mu+	End Mu-
+M3	3	B141	SCMFLONG	3	70	6	1189	-592	-353	-669	448	836	448	-1781
+V2	3	B141	SCMFLONG	3	70	6	1189							
+T	3	B141	E100X5100Y MAX	3	46	27	775							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	9	B163	SCMFLONG	3	101	9	1721	-588	-350	-665	446	1371	446	-2309
+V2	9	B163	SCMFLONG	3	101	9	1721							
+T	10	B163	E100X5100Y MAX	3	64	41	1090							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	16	B141	SCMFLONG	3	59	5	996	-602	-357	-688	462	639	462	-1598
+V2	16	B141	SCMFLONG	3	59	5	996							
+T	16	B141	E100X5100Y MAX	3	36	19	619							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	21	B141	SCMFLONG	3	50	5	849	-602	-357	-688	462	492	462	-1451
+V2	21	B141	SCMFLONG	3	50	5	849							
+T	22	B141	E100X5100Y MAX	3	32	21	539							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	44	B141	SCMFLONG	3	21	3	360	-636	-375	-734	494	-15	494	-996
+V2	44	B141	SCMFLONG	3	21	3	360							
+T	44	B141	E100X5100Y MAX	3	12	11	208							

NON-REVERSING PH. ADD EXTRA SHEAR HOOPS.

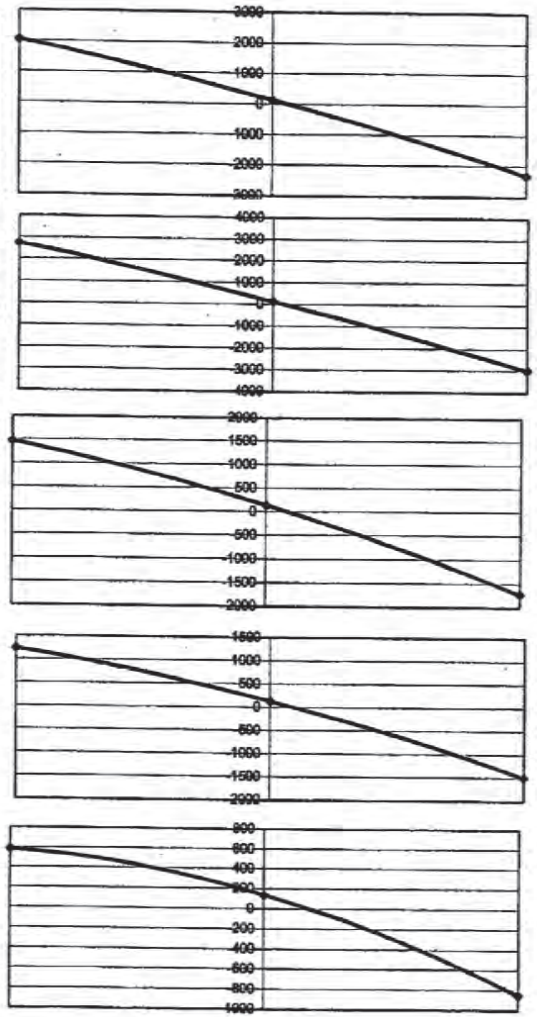


8.2.1-27

DODSONNOC0000515

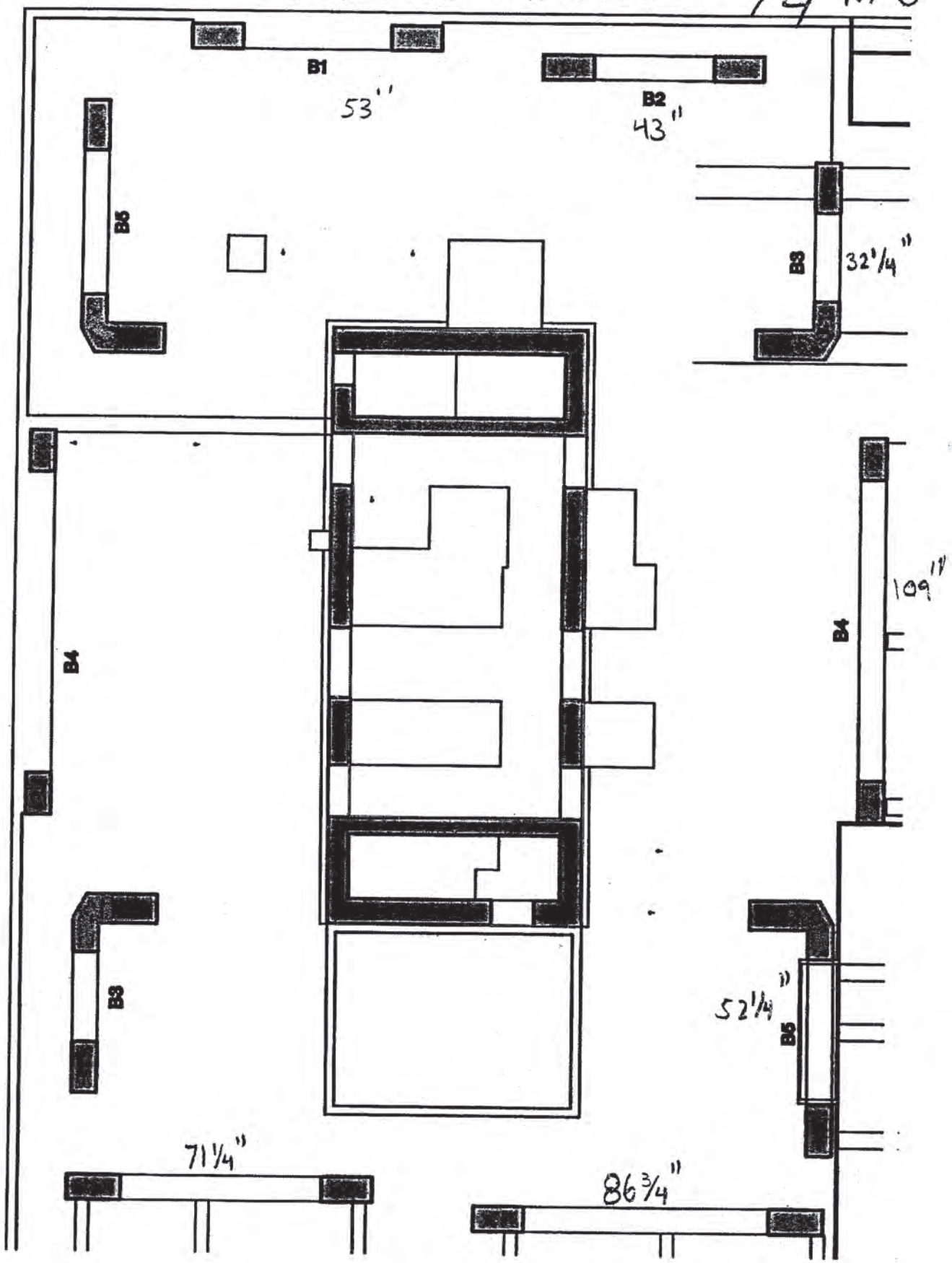
Bxx-04

	Story	Beam	Load	Loc	V2	T	M3	$M_{grav\ end\ max}$ 1.42D+0.5L	$M_{grav\ end\ min}$ 0.9*D	Mu_{end} 1.4D+1.7L	Mu_{center} 1.4D+1.7L	End Mu+	Center Mu+	End Mu-
+M3	3	B320	SCMFLONG		224	6	2148	-170	-102	-188	133	2046	133	-2318
+V2	3	B320	SCMFLONG		224	6	2148							
+T	3	B320	E100X5100Y MAX		145	27	1390							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	8	B322	SCMFLONG	20.7467	298	8	2842	-169	-102	-187	132	2740	132	-3011
+V2	8	B322	SCMFLONG	20.7467	298	8	2842							
+T	9	B320	E100X5100Y MAX		189	39	1808							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	16	B320	SCMFLONG		164	7	1564	-167	-100	-186	133	1464	133	-1731
+V2	16	B320	SCMFLONG		164	7	1564							
+T	20	B320	E100X5100Y MAX		107	20	1023							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	21	B322	SCMFLONG	20.7467	140	5	1331	-167	-100	-186	133	1231	133	-1498
+V2	21	B322	SCMFLONG	20.7467	140	5	1331							
+T	27	B292*	E100XM30YM	11	131	33	684							
	Story	Beam	Load	Loc	V2	T	M3	1.42D+0.5L	0.9*D	1.4D+1.7L	1.4D+1.7L	Mu+		Mu-
+M3	50	B291*	E30X100Y	6	71	-5	684	-169	-100	-191	137	584	137	-853
+V2	43	B291*	E100X30Y	10	116	-3	684							
+T	45	B320	E100X5100Y MAX		52	11	504							



8.2.1-28

MAX DEPTH BASID ON L_{CLEAR}/4 AT G



8.2.1-29

B02-01

Seismic (Y/N)	y				
Mu =	2,309	k-ft	Mu =	27,708	k-in
Width, b =	24	in			
Total depth, h =	38	in			
Clear Cover =	1.5	in			
Stirrup size # =	5		Stirrup ϕ =	0.625	in
f'_c =	10	ksi	β_1 =	0.65	
f_y =	75	ksi	ρ_{max} =	2.5%	§1921.3.2
ϕ =	0.90		ρ_{min} =	0.4%	§1921.3.2

	§1921.5.1	Required for 1 layer steel				Required for 2 layer steel			
Bar	MIN COL h (in)	No.	As	Clear Spacing for 1 row	ρ limits check	No.	As	Clear Spacing for 2 rows	ρ limits check
3	9.4	111.6	12.28	> smin NG	OK	114.15	12.56	> smin NG	OK
4	12.5	61.5	12.30	> smin NG	OK	63.04	12.61	> smin NG	OK
5	15.6	39.8	12.33	> smin NG	OK	40.84	12.66	> smin NG	OK
6	18.8	28.1	12.35	> smin NG	OK	28.89	12.71	> smin NG	OK
7	21.9	20.6	12.38	> smin NG	OK	21.28	12.77	1.08	OK
8	25.0	15.7	12.40	> smin NG	OK	16.23	12.82	1.64	OK
9	28.2	12.4	12.43	> smin NG	OK	12.88	12.88	2.30	OK
10	31.8	9.8	12.46	> smin NG	OK	10.19	12.94	3.24	OK
11	35.3	8.0	12.49	> smin NG	OK	8.33	13.00	4.38	OK
14	42.3	5.6	12.54	2.25	OK	5.83	13.13	7.73	OK
18	56.4	3.2	12.66	5.82	OK	3.35	13.39	23.71	OK

Check above beam with specific reinforcing

Bar size # =	10	d =	34.11	
No. of bars =	12.00	a =	5.60	
No. of rows =	2	ϕ Mn =	32202	k-in
Diameter =	1.270		2683	k-ft
As total =	15.24			
ρ	1.86%	Mu/ϕ Mn =	0.86	should be less than 1.0 to be OK
		Clear Spacing	2.43	in
		ρ limits check	OK	

fy for overstrength =	1.25	
a =	7.00	
Mpr=	43724	k-in
	3644	k-ft

Singly Reinforced

8.2.1-30

B02-02

Seismic (Y/N)	y				
Mu =	**4,400**	k-ft	Mu =	52,800	k-in
Width, b =	**36**	in			
Total depth, h =	**42**	in			
Clear Cover =	**1.5**	in			
Stirrup size # =	**5**		Stirrup ϕ =	0.625	in
f'_c =	**10**	ksi	β_1 =	0.65	
f_y =	**75**	ksi	ρ_{max} =	2.5%	§1921.3.2
ϕ =	**0.90**		ρ_{min} =	0.4%	§1921.3.2

	§1921.5.1	Required for 1 layer steel				Required for 2 layer steel			
Bar	MIN COL h (in)	No.	As	Clear Spacing for 1 row	ρ limits check	No.	As	Clear Spacing for 2 rows	ρ limits check
3	9.4	**191.7**	21.08	> smin NG	**OK**	195.55	21.51	> smin NG	**OK**
4	12.5	**105.6**	21.12	> smin NG	**OK**	107.96	21.59	> smin NG	**OK**
5	15.6	**68.3**	21.16	> smin NG	**OK**	69.91	21.67	> smin NG	**OK**
6	18.8	**48.2**	21.20	> smin NG	**OK**	49.44	21.75	> smin NG	**OK**
7	21.9	**35.4**	21.24	> smin NG	**OK**	36.39	21.84	> smin NG	**OK**
8	25.0	**26.9**	21.27	> smin NG	**OK**	27.74	21.92	1.39	**OK**
9	28.2	**21.3**	21.31	> smin NG	**OK**	22.00	22.00	1.93	**OK**
10	31.8	**16.8**	21.36	> smin NG	**OK**	17.40	22.10	2.69	**OK**
11	35.3	**13.7**	21.40	> smin NG	**OK**	14.23	22.19	3.55	**OK**
14	42.3	**9.6**	21.49	1.82	**OK**	9.95	22.39	5.87	**OK**
18	56.4	**5.4**	21.67	4.42	**OK**	5.70	22.79	13.70	**OK**

Check above beam with specific reinforcing

Bar size # =	**11**	d =	37.97	
No. of bars =	**16.00**	a =	6.12	
No. of rows =	**2**	ϕ Mn =	58810	k-in
Diameter =	1.410		4901	k-ft
As total =	24.96			
ρ	1.83%	Mu/ϕ Mn =	**0.90**	should be less than 1.0 to be OK
		Clear Spacing	**2.92**	in
		ρ limits check	**OK**	

fy for overstrength =	1.25	
a =	7.65	
Mpr=	79891	k-in
	6658	k-ft

Singly Reinforced

8.2.1-31

B02-03

Seismic (Y/N)	y				
Mu =	1,781	k-ft	Mu =	21,372	k-in
Width, b =	24	in			
Total depth, h =	38	in			
Clear Cover =	1.5	in			
Stirrup size # =	5		Stirrup ϕ =	0.625	in
f'_c =	10	ksi	β_1 =	0.65	
f_y =	75	ksi	ρ_{max} =	2.5%	§1921.3.2
ϕ =	0.90		ρ_{min} =	0.4%	§1921.3.2

	§1921.5.1	Required for 1 layer steel				Required for 2 layer steel			
Bar	MIN COL h (in)	No.	As	Clear Spacing for 1 row	ρ limits check	No.	As	Clear Spacing for 2 rows	ρ limits check
3	9.4	84.7	9.32	> smin NG	OK	86.57	9.52	> smin NG	OK
4	12.5	46.7	9.34	> smin NG	OK	47.80	9.56	> smin NG	OK
5	15.6	30.2	9.36	> smin NG	OK	30.96	9.60	> smin NG	OK
6	18.8	21.3	9.37	> smin NG	OK	21.90	9.64	1.16	OK
7	21.9	15.7	9.39	> smin NG	OK	16.13	9.68	1.80	OK
8	25.0	11.9	9.41	> smin NG	OK	12.30	9.72	2.64	OK
9	28.2	9.4	9.43	> smin NG	OK	9.76	9.76	3.67	OK
10	31.8	7.4	9.45	1.60	OK	7.72	9.80	5.19	OK
11	35.3	6.1	9.47	2.21	OK	6.31	9.85	7.10	OK
14	42.3	4.2	9.51	3.90	OK	4.42	9.94	13.25	OK
18	56.4	2.4	9.60	10.24	OK	2.53	10.13	63.44	OK

Check above beam with specific reinforcing

Bar size # =	10	d =	34.11	
No. of bars =	12.00	a =	5.60	
No. of rows =	2	ϕ Mn =	32202	k-in
Diameter =	1.270		2683	k-ft
As total =	15.24			
ρ	1.86%	Mu/ϕ Mn =	0.66	should be less than 1.0 to be OK
		Clear Spacing	2.43	in
		ρ limits check	OK	

fy for overstrength =	1.25	
a =	7.00	
Mpr=	43724	k-in
	3644	k-ft

Singly Reinforced

8.2.1-32

B02-04

Seismic (Y/N)	y				
Mu =	2,318	k-ft	Mu =	27,816	k-in
Width, b =	24	in			
Total depth, h =	38	in			
Clear Cover =	1.5	in			
Stirrup size # =	5		Stirrup ϕ =	0.625	in
f'_c =	10	ksi	β_1 =	0.65	
f_y =	75	ksi	ρ_{max} =	2.5%	§1921.3.2
ϕ =	0.90		ρ_{min} =	0.4%	§1921.3.2

	§1921.5.1	Required for 1 layer steel				Required for 2 layer steel			
Bar	MIN COL h (in)	No.	As	Clear Spacing for 1 row	ρ limits check	No.	As	Clear Spacing for 2 rows	ρ limits check
3	9.4	112.1	12.33	> smin NG	OK	114.63	12.61	> smin NG	OK
4	12.5	61.8	12.36	> smin NG	OK	63.31	12.66	> smin NG	OK
5	15.6	39.9	12.38	> smin NG	OK	41.01	12.71	> smin NG	OK
6	18.8	28.2	12.40	> smin NG	OK	29.02	12.77	> smin NG	OK
7	21.9	20.7	12.43	> smin NG	OK	21.37	12.82	1.07	OK
8	25.0	15.8	12.46	> smin NG	OK	16.30	12.87	1.62	OK
9	28.2	12.5	12.48	> smin NG	OK	12.93	12.93	2.28	OK
10	31.8	9.9	12.51	> smin NG	OK	10.23	12.99	3.22	OK
11	35.3	8.0	12.54	> smin NG	OK	8.37	13.06	4.35	OK
14	42.3	5.6	12.60	2.23	OK	5.86	13.18	7.66	OK
18	56.4	3.2	12.72	5.77	OK	3.36	13.45	23.44	OK

Check above beam with specific reinforcing

Bar size # =	10	d =	34.11	
No. of bars =	16.00	a =	7.47	
No. of rows =	2	ϕ Mn =	41655	k-in
Diameter =	1.270		3471	k-ft
As total =	20.32			
ρ	2.48%	Mu/ϕ Mn =	0.67	should be less than 1.0 to be OK
		Clear Spacing	1.37	in
		ρ limits check	OK	

fy for overstrength =	1.25	
a =	9.34	
Mpr=	56075	k-in
	4673	k-ft

Singly Reinforced

8.2.1-33

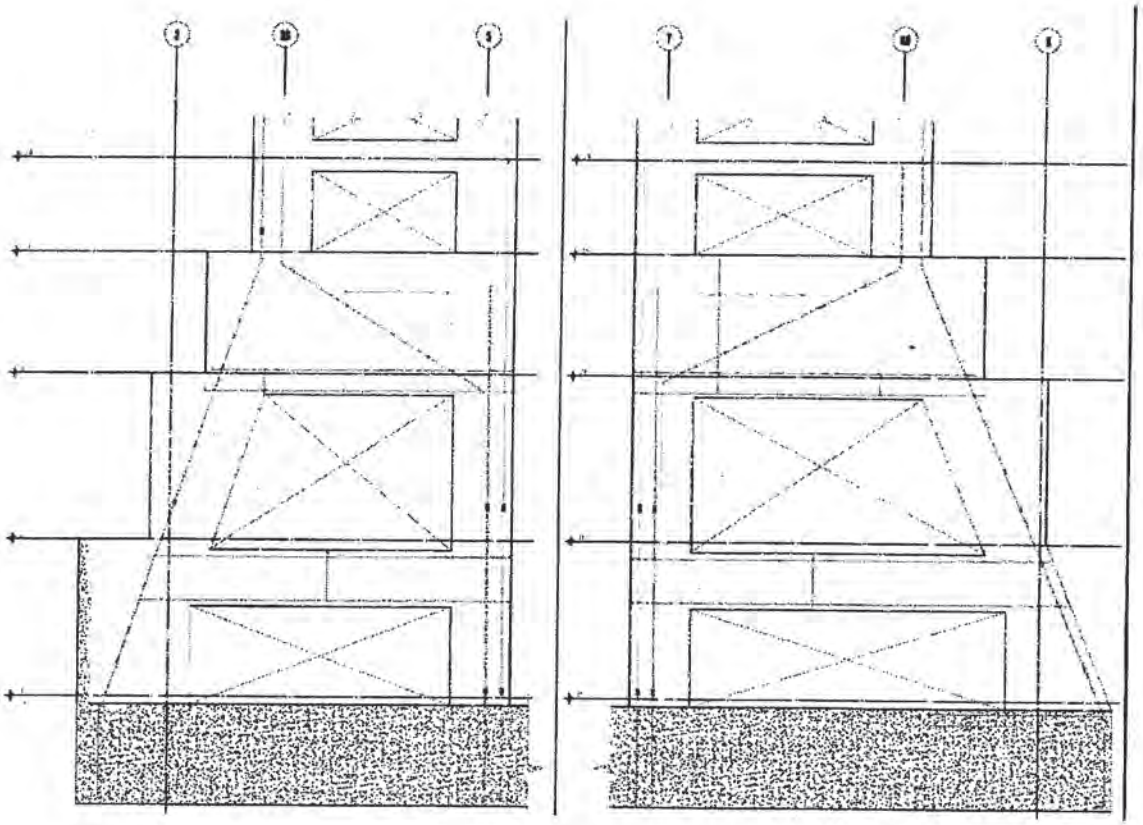
	Level	ϕMn	b_w	d	f'c	M_{pr}	Min L in group	Ve (2Mpr/L)	Ve (analysis)	Worse Case $1.2*V_{DL}+0.5*V_{LL}$	Vu	Max spacing in PH	s_{actual}	Bar Size	As req	legs	ϕVn	inside PH INT
		k-ft	in	in	ksi	k-ft	ft	kips	kips	kips		in	in	in^2	in^2		kips	
Bxx-01	L2-L3		24	34.11	10	3644	10.83	673	361	15	688	8.5	4	0.31	1.315	6	809	0.85
	L4-L14		24	34.11	10	3644	10.83	673	411	15	688	8.5	4	0.31	1.315	6	809	0.85
	L15-L20		24	30.38	10	1696	12.5	271	169	15	286	7.6	6	0.31	0.893	4	320	0.89
	L21-L40		24	26.38	8	1434	12.5	229	142	15	244	6.6	6	0.31	0.870	4	278	0.88
	L41-Roof		24	25.38	7	937	14.83	126	84	15	141	6.3	6	0.20	0.498	4	173	0.82
Bxx-03	L2-L3		24	34.11	10	3644	34	214	70	62	276	8.5	6	0.31	0.628	4	360	0.77
	L4-L14		24	34.11	10	3644	34	214	101	62	276	8.5	6	0.31	0.628	4	360	0.77
	L15-L20		24	30.25	10	2577	35.67	144	59	62	206	7.6	6	0.31	0.478	4	319	0.65
	L21-L40		24	26.25	8	2138	35.67	120	50	62	182	6.6	6	0.31	0.457	4	277	0.66
	L41-Roof		24	24.38	7	1484	38	78	21	62	140	6.1	6	0.20	0.320	4	166	0.85
Bxx-04	L2-L3		24	34.11	10	4673	20.5	456	224	22	478	8.5	6	0.31	1.337	6	539	0.89
	L4-L14		24	34.11	10	4673	20.5	456	298	22	478	8.5	6	0.31	1.337	6	539	0.89
	L15-L20		24	30.25	10	2577	21.3	242	164	22	264	7.6	6	0.31	0.800	4	319	0.83
	L21-L40		24	26.25	8	2138	21.3	201	140	22	223	6.6	6	0.31	0.765	4	277	0.81
	L41-Roof		24	24.38	7	1297	22.5	115	116	22	138	6.1	6	0.20	0.473	4	166	0.83

	Level	ϕMn	b_w	d	f'c	M_{pr}	Min L in group	Ve (2Mpr/L)	Ve (analysis)	Worse Case $1.2*V_{DL}+0.5*V_{LL}$	Vu	Max spacing in PH	s_{actual}	Bar Size	As req	legs	ϕVn	inside PH INT
		k-ft	in	in	ksi	k-ft	ft	kips	kips	kips		in	in	in^2	in^2		kips	
Bxx-02	L2-L3		36	37.97	10	6658	14	951	606	15	966	9.5	3.5	0.31	1.461	6	1029	0.94
	L4-L14		24	29.97	10	6658	14	951	186	15	966	7.5	3.5	0.31	1.851	8	1083	0.89

8.2.1-35

8.2.2 Slope Column Design

There are two SMRF columns on the south side of the tower that slope starting at level 3 as shown below. Each frame is in different physical planes (see plan.) This slope was required in order to provide for the code required Porte Cochere vehicle clearances. The columns make angles of 18 and 22 degrees with the vertical. A direct load path to the ground is provided for the axial force by uninterrupted vertical rebar. A strut and tie load path is provided for the horizontal load that will be induced at level 3 where the column starts to slope. Each frame is designed to resolve their own forces in their respective planes without any force transfer to the diaphragms. The columns starting at level 2 have been designed to resist the additional moments that will be induced. Design loads are based on the capacities of the columns directly above level 3.



DESIMONE

Project _____ Page _____ Of _____

Project No. _____ Date 5/21/05

Item MF SLOPING COLUMN By NJR. Ch'kd _____

THE CAPACITY OF COL D = { ① $P_E = 2500k(C) \frac{1.25 M_n}{\phi} = 30,500\ k\text{-}ft$; ② $P_E = -10,000k\ (T)$ $M = 0$

USING THE BEHAVIOR SCALE FACTORS, I CAN DETERMINE THE DESIGN FORCES.

① SLOPE COL MOMENT:

$M_u = (1.2\ k\text{-}ft)(2500\ \text{SCALED}) + (1.2\ k\text{-}ft)\left(\frac{30,500\ \text{SCALED}}{12}\right)$

$= 3000\ k\ ft + 3050$

$= 6050\ k\text{-}ft$

$P_E = (0.6k)(2500) + (0.6k)\left(\frac{30,500}{12}\right)$

$= 3025\ kips$

② $M_U = (1.2)(10,000)$

$= 12,000\ k\text{-}ft$

$P_E = (0.6k)(10,000)$

$= 6000k$

} ← GOVERNS

GRAV @ LEVEL 2

$1.42\ DL + 0.5L = 6203\ k$

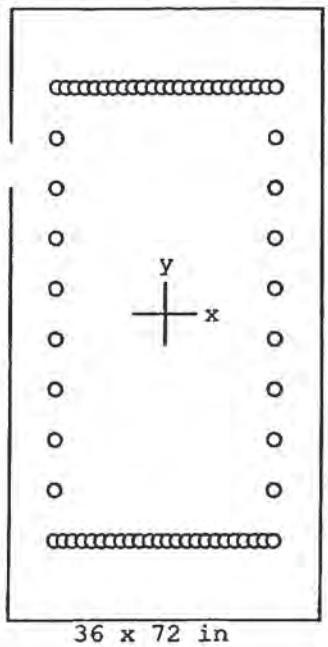
$0.9\ DL = 2902\ k$

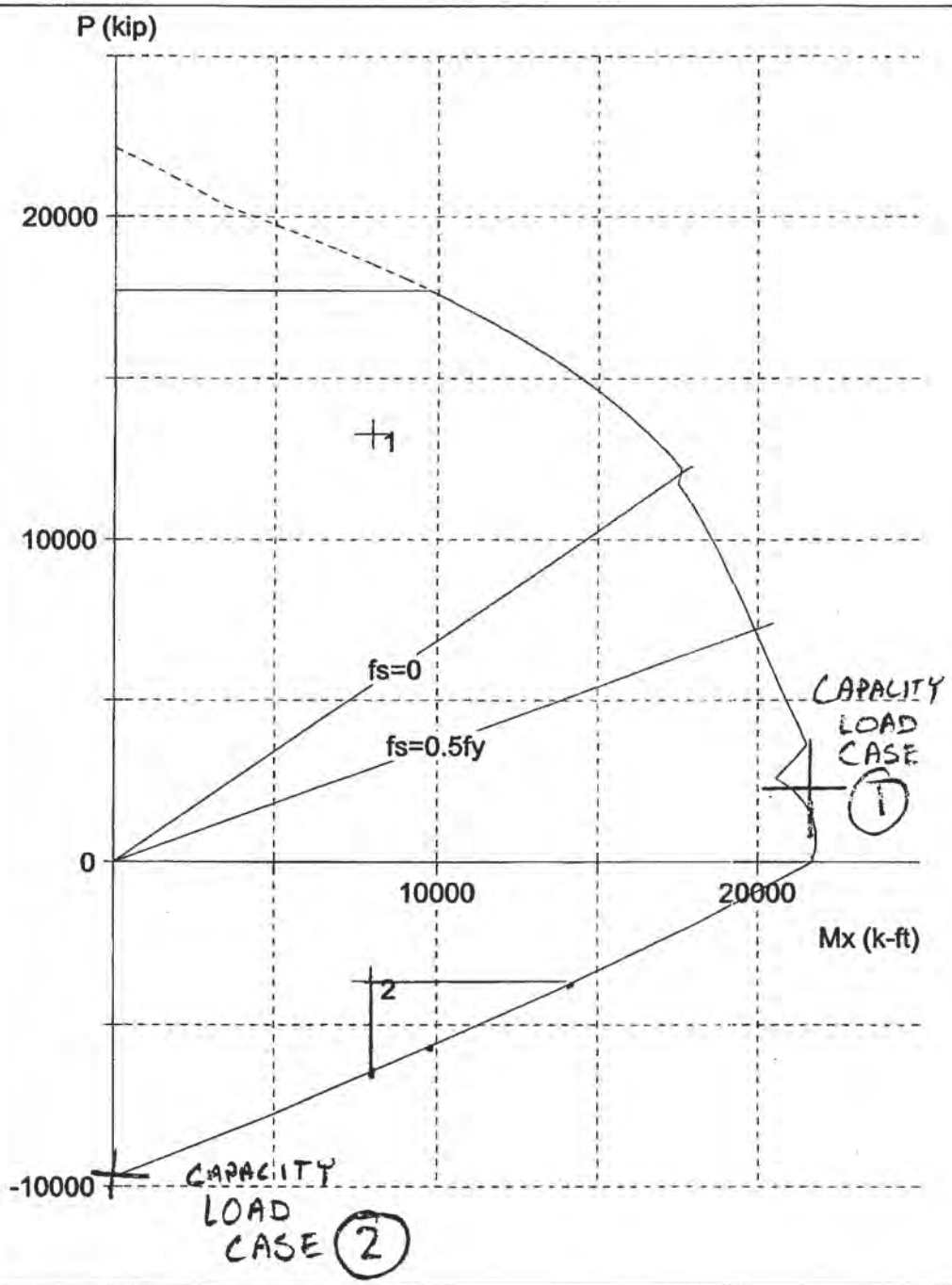
MAX LOADS FROM ETABS ANALYSIS

	Story	Brace	Load	Loc	P	V2	M3
Max P	GROUND	D102	MFSSX25	0	4244	195	1715
Max V2	3	D106	MFSSX25	13	3520	479	5931
Max M3	3	D106	MFSSX25	13	3520	479	5931

Units in Kips and ft 209-CD

8.2.2-2





Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

'enderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 01/03/05

Time: 11:35:51

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\SHORT_~2\GROUP D E-B-4.COL

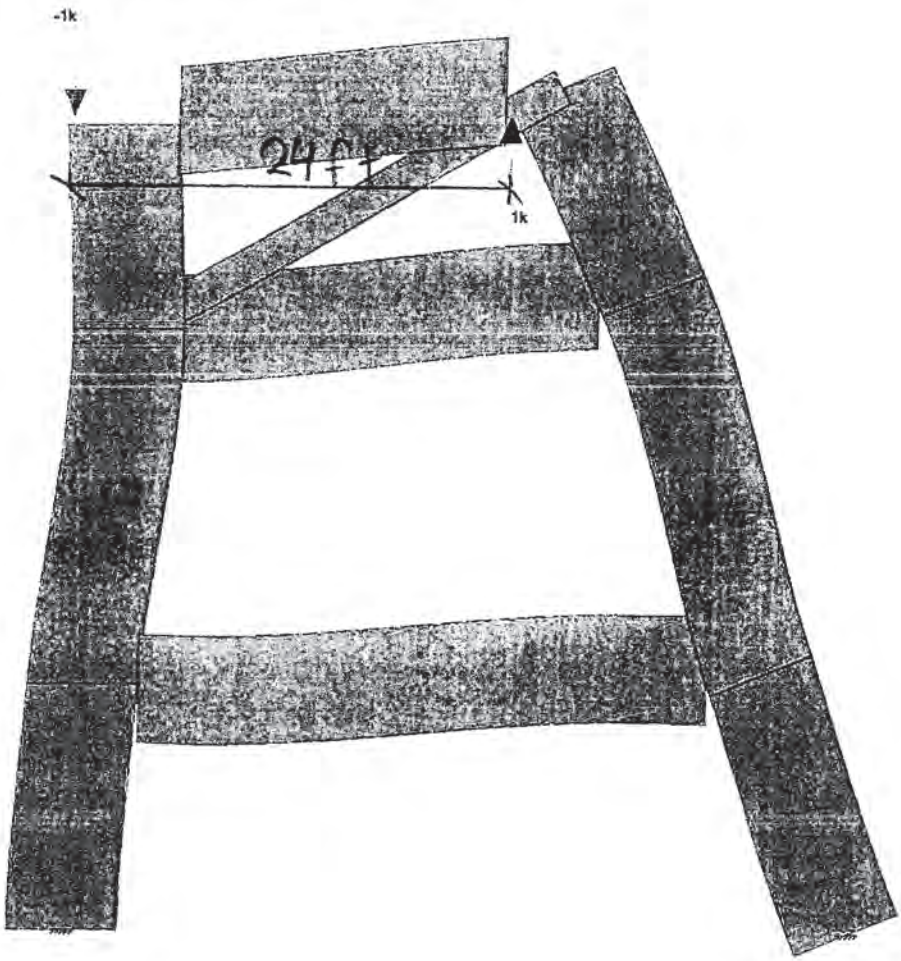
LEVEL B → LO4

Project:

Column:		Engineer:	
f'c = 10 ksi	fy = 75 ksi	Ag = 2592 in^2	64 #14 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 144.00 in^2	Rho = 5.56%
fc = 8.5 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 1.11974e+006 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 279936 in^4
Beta1 = 0.65		Clear spacing = -0.59 in	Clear cover = 4.50 in 8.2.2-3

BEHAVIOR STUDY FOR UNIT

COUPLE LOAD



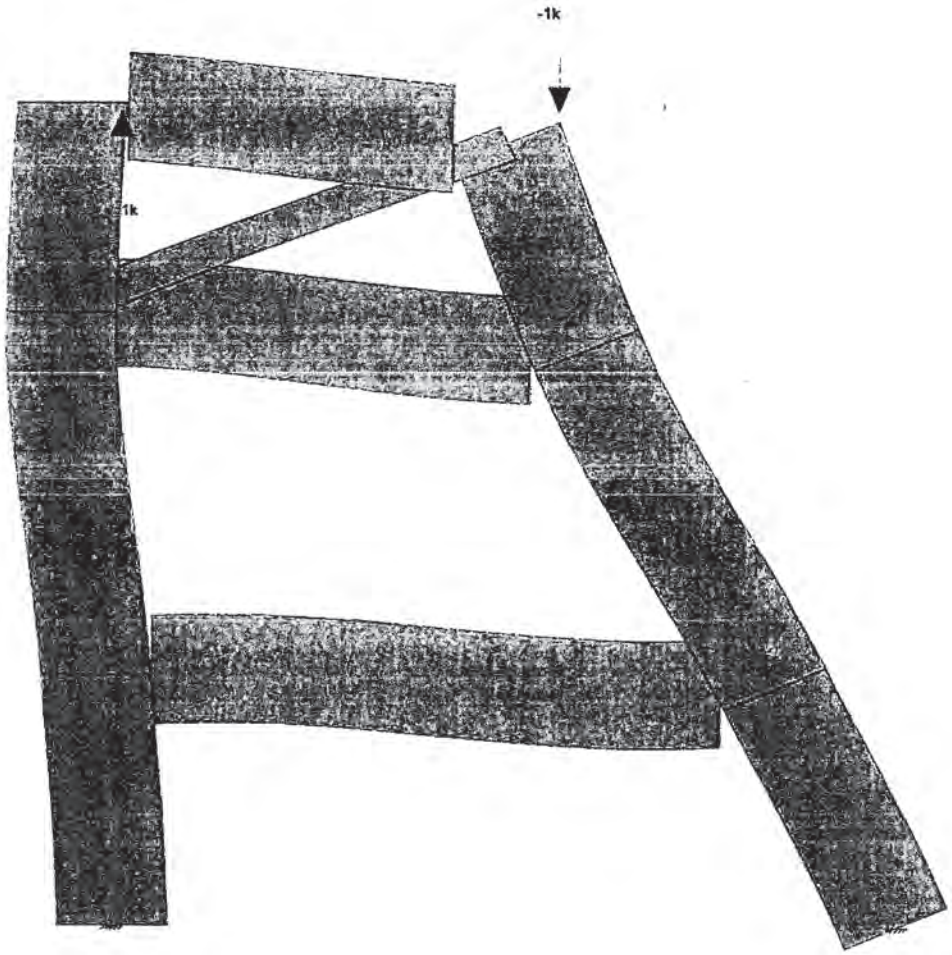
24 k-ft

Loads: BLC 1, test
Results for LC 1, test

DeSimone Consulting Eng...

May 21, 2005 at 8:27 PM
20050504.R3D

8.2.2-4

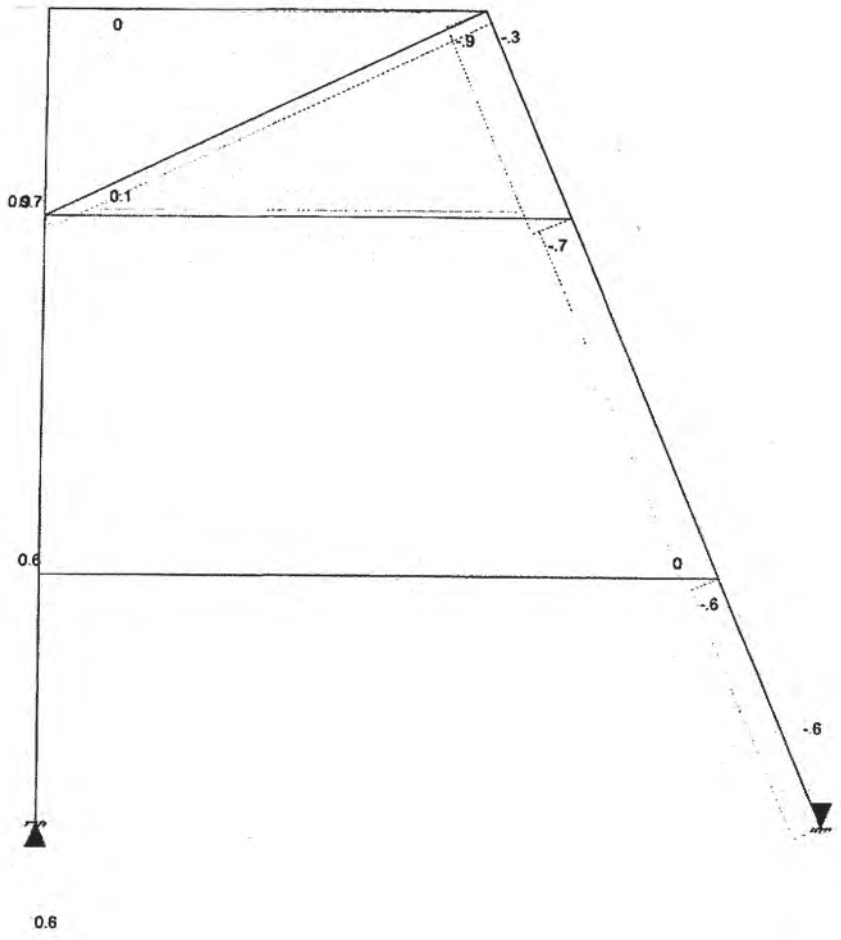


Loads: LC 1, test
Results for LC 1, test

DeSimone Consulting Eng...

May 21, 2005 at 8:28 PM
20050504.R3D

8.2.2-5



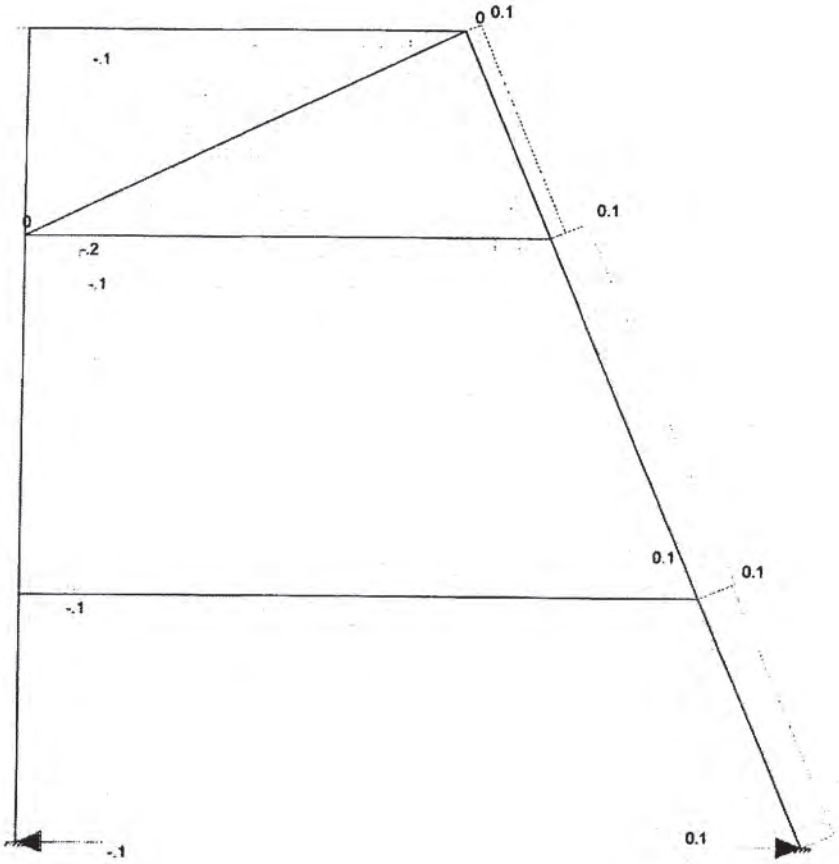
Results for LC 1, test
Member Axial Forces (k)
Reaction units are k and k-ft

DeSimone Consulting Eng...

May 21, 2005 at 8:27 PM

20050504.R3D

8.2.2-6



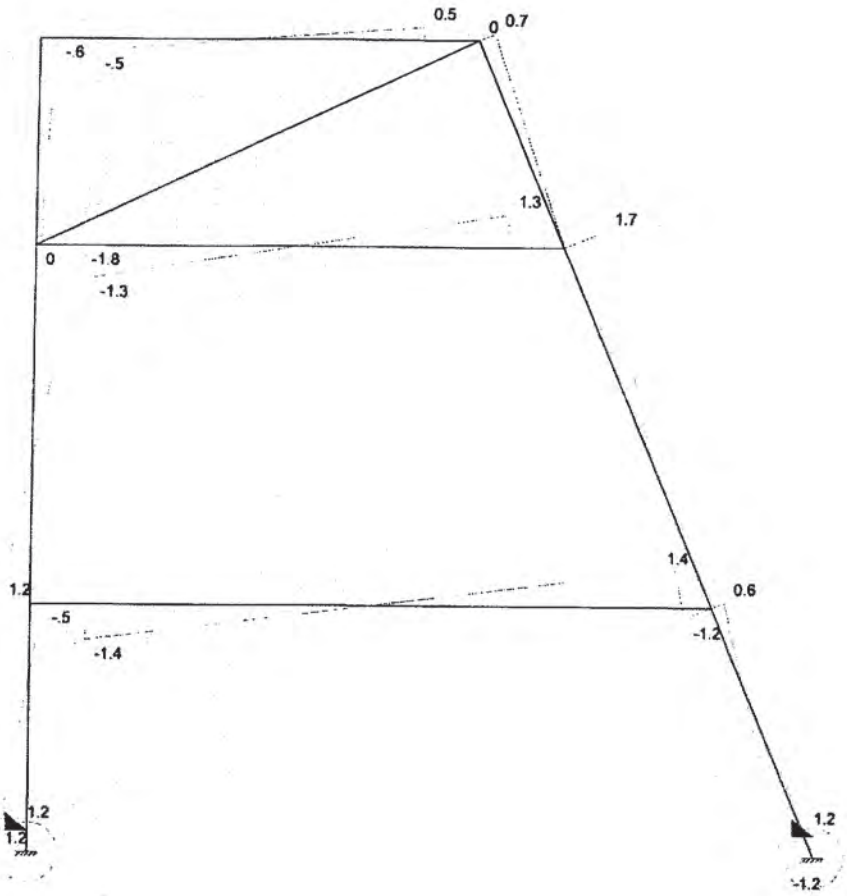
Results for LC 1, test
Member y Shear Forces (k)
Reaction units are k and k-ft

DeSimone Consulting Eng...

May 21, 2005 at 8:26 PM

20050504.R3D

8.2.2-7

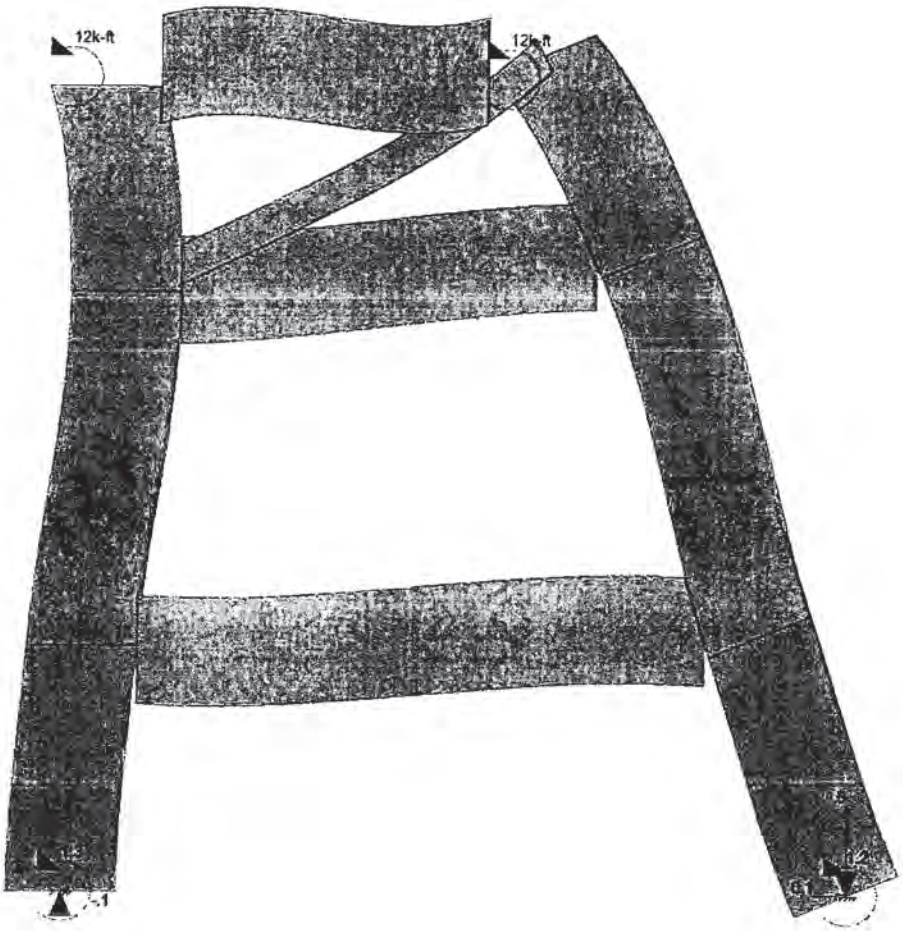


Results for LC 1, test
Member z Bending Moments (k-ft)
Reaction units are k and k-ft

DeSimone Consulting Eng...

May 21, 2005 at 8:26 PM
20050504.R3D

8.2.2-8



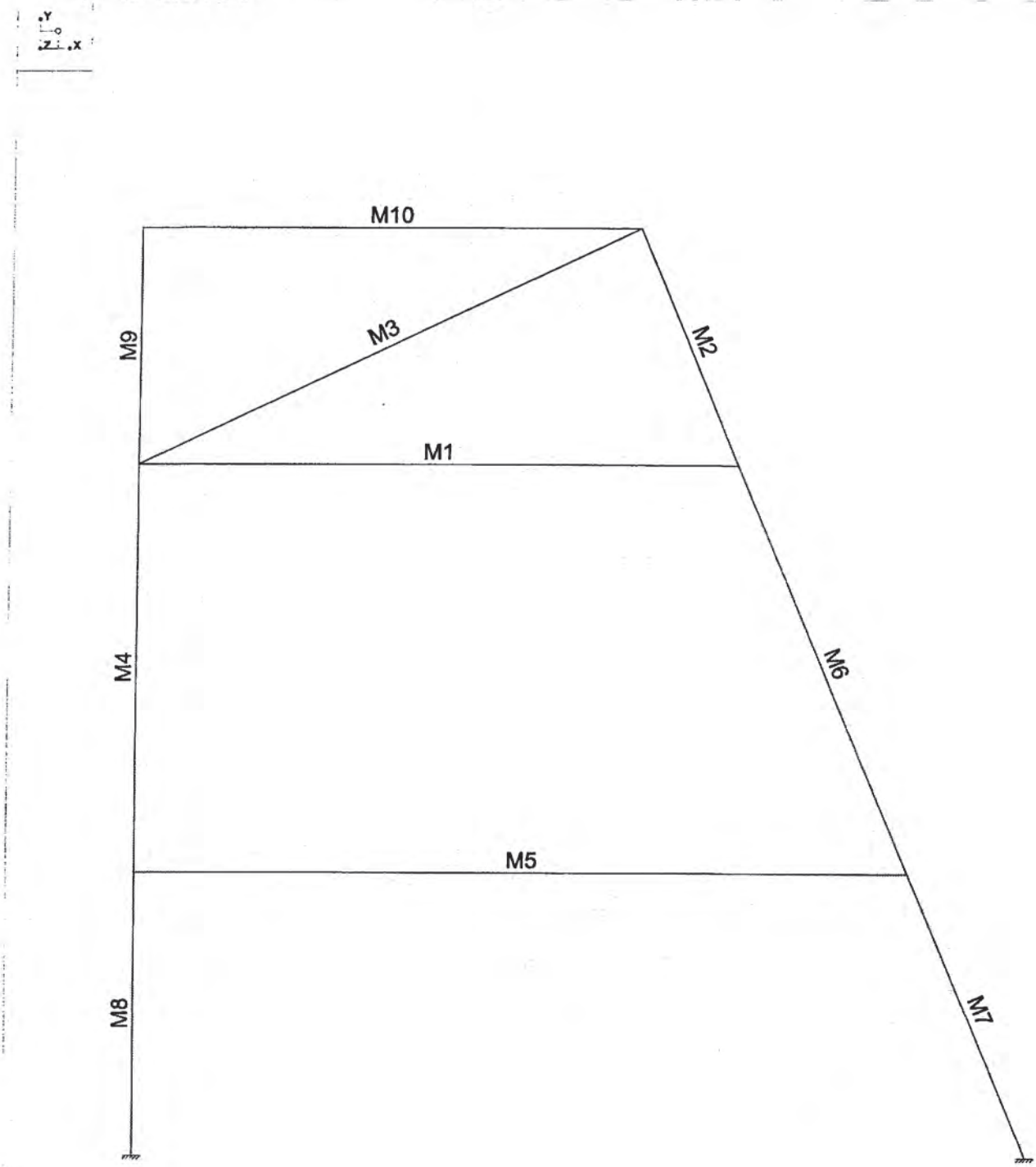
Loads: LC 2, Unit Moment
Results for LC 2, Unit Moment
Reaction units are k and k-ft

DeSimone Consulting Eng...

May 21, 2005 at 8:46 PM

20050504.R3D

8.2.2-9



Results for LC 4, 0.9DL-LC2

DeSimone Consulting Eng...

May 22, 2005 at 9:40 AM

20050504.R3D

8.2.2-10

Member Section Forces (By Combination)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[...	z-z Moment[...
1	1	M2	1	1363.335	511.937	0	0	0	8375.353
2			2	1363.335	511.937	0	0	0	6774.072
3			3	1363.335	511.937	0	0	0	5172.791
4			4	1363.335	511.937	0	0	0	3571.51
5			5	1363.335	511.937	0	0	0	1970.229
6	1	M4	1	11558.161	195.781	0	0	0	1494.762
7			2	11558.161	195.781	0	0	0	522.219
8			3	11558.161	195.781	0	0	0	-450.325
9			4	11558.161	195.781	0	0	0	-1422.868
10			5	11558.161	195.781	0	0	0	-2395.411
11	1	M6	1	857.854	-145.769	0	0	0	-1094.441
12			2	857.854	-145.769	0	0	0	-309.838
13			3	857.854	-145.769	0	0	0	474.766
14			4	857.854	-145.769	0	0	0	1259.369
15			5	857.854	-145.769	0	0	0	2043.973
16	1	M7	1	743.52	-155.507	0	0	0	181.65
17			2	743.52	-155.507	0	0	0	761.632
18			3	743.52	-155.507	0	0	0	1341.615
19			4	743.52	-155.507	0	0	0	1921.597
20			5	743.52	-155.507	0	0	0	2501.58
21	1	M8	1	11659.886	142.539	0	0	0	-514.254
22			2	11659.886	142.539	0	0	0	-1004.946
23			3	11659.886	142.539	0	0	0	-1495.637
24			4	11659.886	142.539	0	0	0	-1986.329
25			5	11659.886	142.539	0	0	0	-2477.02
26	1	M9	1	10523.647	620.813	0	0	0	-1834.488
27			2	10523.647	620.813	0	0	0	-3627.084
28			3	10523.647	620.813	0	0	0	-5419.681
29			4	10523.647	620.813	0	0	0	-7212.277
30			5	10523.647	620.813	0	0	0	-9004.873
31	2	M2	1	-3178.789	276.904	0	0	0	4646.271
32			2	-3178.789	276.904	0	0	0	3780.145
33			3	-3178.789	276.904	0	0	0	2914.02
34			4	-3178.789	276.904	0	0	0	2047.895
35			5	-3178.789	276.904	0	0	0	1181.769
36	2	M4	1	15027.661	-571.363	0	0	0	-8010.231
37			2	15027.661	-571.363	0	0	0	-5171.985
38			3	15027.661	-571.363	0	0	0	-2333.738
39			4	15027.661	-571.363	0	0	0	504.508
40			5	15027.661	-571.363	0	0	0	3342.754
41	2	M6	1	-2639.526	482.145	0	0	0	7235.118
42			2	-2639.526	482.145	0	0	0	4639.972
43			3	-2639.526	482.145	0	0	0	2044.826
44			4	-2639.526	482.145	0	0	0	-550.32
45			5	-2639.526	482.145	0	0	0	-3145.465
46	2	M7	1	-2345.038	463.514	0	0	0	2002.392
47			2	-2345.038	463.514	0	0	0	273.665
48			3	-2345.038	463.514	0	0	0	-1455.062
49			4	-2345.038	463.514	0	0	0	-3183.789
50			5	-2345.038	463.514	0	0	0	-4912.517
51	2	M8	1	14748.851	-474.441	0	0	0	-1769.576
52			2	14748.851	-474.441	0	0	0	-136.312
53			3	14748.851	-474.441	0	0	0	1496.953
54			4	14748.851	-474.441	0	0	0	3130.218
55			5	14748.851	-474.441	0	0	0	4763.482
56	2	M9	1	15825.129	209.942	0	0	0	-1952.91

MAX AXIAL

8.2.2-11

Member Section Forces (By Combination) (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[...	z-z Moment[...
57			2	15825.129	209.942	0	0	0	-2559.118
58			3	15825.129	209.942	0	0	0	-3165.325
59			4	15825.129	209.942	0	0	0	-3771.533
60			5	15825.129	209.942	0	0	0	-4377.741
61	3	M2	1	9572.159	-1259.706	0	0	0	-19753.372
62			2	9572.159	-1259.706	0	0	0	-15813.156
63			3	9572.159	-1259.706	0	0	0	-11872.94
64			4	9572.159	-1259.706	0	0	0	-7932.724
65			5	9572.159	-1259.706	0	0	0	-3992.508
66	3	M4	1	4206.331	1778.995	0	0	0	22266.506
67			2	4206.331	1778.995	0	0	0	13429.346
68			3	4206.331	1778.995	0	0	0	4592.186
69			4	4206.331	1778.995	0	0	0	-4244.974
70			5	4206.331	1778.995	0	0	0	-13082.134
71	3	M6	1	8252.452	-1515.402	0	0	0	-20222.019
72			2	8252.452	-1515.402	0	0	0	-12065.364
73			3	8252.452	-1515.402	0	0	0	-3908.71
74			4	8252.452	-1515.402	0	0	0	4247.945
75			5	8252.452	-1515.402	0	0	0	12404.6
76	3	M7	1	7337.084	-1444.222	0	0	0	-3701.259
77			2	7337.084	-1444.222	0	0	0	1685.135
78			3	7337.084	-1444.222	0	0	0	7071.528
79			4	7337.084	-1444.222	0	0	0	12457.922
80			5	7337.084	-1444.222	0	0	0	17844.315
81	3	M8	1	5078.067	1489.961	0	0	0	2891.907
82			2	5078.067	1489.961	0	0	0	-2237.283
83			3	5078.067	1489.961	0	0	0	-7366.473
84			4	5078.067	1489.961	0	0	0	-12495.664
85			5	5078.067	1489.961	0	0	0	-17624.854
86	3	M9	1	2399.074	-1128.006	0	0	0	6239.946
87			2	2399.074	-1128.006	0	0	0	9497.064
88			3	2399.074	-1128.006	0	0	0	12754.181
89			4	2399.074	-1128.006	0	0	0	16011.298
90			5	2399.074	-1128.006	0	0	0	19268.415
91	4	M2	1	13842.671	-923.576	0	0	0	-14419.243
92			2	13842.671	-923.576	0	0	0	-11530.403
93			3	13842.671	-923.576	0	0	0	-8641.562
94			4	13842.671	-923.576	0	0	0	-5752.721
95			5	13842.671	-923.576	0	0	0	-2863.88
96	4	M4	1	1001.002	2489.949	0	0	0	31014.708
97			2	1001.002	2489.949	0	0	0	18645.886
98			3	1001.002	2489.949	0	0	0	6277.063
99			4	1001.002	2489.949	0	0	0	-6091.76
100			5	1001.002	2489.949	0	0	0	-18460.582
101	4	M6	1	11484.392	-2093.457	0	0	0	-27839.903
102			2	11484.392	-2093.457	0	0	0	-16571.868
103			3	11484.392	-2093.457	0	0	0	-5303.833
104			4	11484.392	-2093.457	0	0	0	5964.203
105			5	11484.392	-2093.457	0	0	0	17232.238
106	4	M7	1	10187.909	-2017.315	0	0	0	-5382.069
107			2	10187.909	-2017.315	0	0	0	2141.741
108			3	10187.909	-2017.315	0	0	0	9665.55
109			4	10187.909	-2017.315	0	0	0	17189.359
110			5	10187.909	-2017.315	0	0	0	24713.169
111	4	M8	1	2226.204	2057.864	0	0	0	4012.529
112			2	2226.204	2057.864	0	0	0	-3071.669
113			3	2226.204	2057.864	0	0	0	-10155.867

MAX MOMENT

8.2.2-12

Member Section Forces (By Combination) (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[...	z-z Moment[...
114			4	2226.204	2057.864	0	0	0	-17240.066
115			5	2226.204	2057.864	0	0	0	-24324.264
116	4	M9	1	-2661.753	-611.089	0	0	0	5939.187
117			2	-2661.753	-611.089	0	0	0	7703.708
118			3	-2661.753	-611.089	0	0	0	9468.228
119			4	-2661.753	-611.089	0	0	0	11232.749
120			5	-2661.753	-611.089	0	0	0	12997.269

Member Section Forces (By Combination)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[...	z-z Moment[k-ft]
1	1	M1	1	-800.94	213.908	0	0	0	2392.13
2			2	-800.94	213.908	0	0	0	1188.361
3			3	-800.94	213.908	0	0	0	-15.408
4			4	-800.94	213.908	0	0	0	-1219.177
5			5	-800.94	213.908	0	0	0	-2422.946
6	1	M5	1	-53.242	-101.725	0	0	0	-1557.148
7			2	-53.242	-101.725	0	0	0	-773.865
8			3	-53.242	-101.725	0	0	0	9.417
9			4	-53.242	-101.725	0	0	0	792.7
10			5	-53.242	-101.725	0	0	0	1575.982
11	1	M10	1	-620.813	1820.647	0	0	0	16033.184
12			2	-620.813	1820.647	0	0	0	7976.819
13			3	-620.813	1820.647	0	0	0	-79.546
14			4	-620.813	1820.647	0	0	0	-8135.911
15			5	-620.813	1820.647	0	0	0	-16192.276
16	2	M1	1	395.083	-419.286	0	0	0	-4642.646
17			2	395.083	-419.286	0	0	0	-2283.112
18			3	395.083	-419.286	0	0	0	76.422
19			4	395.083	-419.286	0	0	0	2435.956
20			5	395.083	-419.286	0	0	0	4795.49
21	2	M5	1	96.922	278.809	0	0	0	4311.429
22			2	96.922	278.809	0	0	0	2164.597
23			3	96.922	278.809	0	0	0	17.764
24			4	96.922	278.809	0	0	0	-2129.069
25			5	96.922	278.809	0	0	0	-4275.902
26	2	M10	1	-209.942	-377.871	0	0	0	-3244.128
27			2	-209.942	-377.871	0	0	0	-1572.048
28			3	-209.942	-377.871	0	0	0	100.032
29			4	-209.942	-377.871	0	0	0	1772.112
30			5	-209.942	-377.871	0	0	0	3444.192
31	3	M1	1	-738.079	1121.136	0	0	0	12370.671
32			2	-738.079	1121.136	0	0	0	6061.478
33			3	-738.079	1121.136	0	0	0	-247.716
34			4	-738.079	1121.136	0	0	0	-6556.909
35			5	-738.079	1121.136	0	0	0	-12866.103
36	3	M5	1	-289.035	-871.736	0	0	0	-13490.65
37			2	-289.035	-871.736	0	0	0	-6778.279
38			3	-289.035	-871.736	0	0	0	-65.909
39			4	-289.035	-871.736	0	0	0	6646.462
40			5	-289.035	-871.736	0	0	0	13358.832
41	3	M10	1	1128.006	-1303.926	0	0	0	-11819.807
42			2	1128.006	-1303.926	0	0	0	-6049.935
43			3	1128.006	-1303.926	0	0	0	-280.062
44			4	1128.006	-1303.926	0	0	0	5489.81
45			5	1128.006	-1303.926	0	0	0	11259.683
46	4	M1	1	-1979.2	1728.898	0	0	0	19128.176
47			2	-1979.2	1728.898	0	0	0	9398.8
48			3	-1979.2	1728.898	0	0	0	-330.576
49			4	-1979.2	1728.898	0	0	0	-10059.952
50			5	-1979.2	1728.898	0	0	0	-19789.328
51	4	M5	1	-432.085	-1225.202	0	0	0	-18938.702
52			2	-432.085	-1225.202	0	0	0	-9504.65
53			3	-432.085	-1225.202	0	0	0	-70.598
54			4	-432.085	-1225.202	0	0	0	9363.454
55			5	-432.085	-1225.202	0	0	0	18797.506
56	4	M10	1	611.089	1135.247	0	0	0	9591.529

8.2.2-14

Member Section Forces (By Combination) (Continued)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[...	z-z Moment[k-ft]
57			2	611.089	1135.247	0	0	0	4568.063
58			3	611.089	1135.247	0	0	0	-455.404
59			4	611.089	1135.247	0	0	0	-5478.871
60			5	611.089	1135.247	0	0	0	-10502.337

Member Section Forces (By Combination)

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-ft]	y-y Moment[...	z-z Moment[k-ft]
1	1	M3	1	1813.55	-29.047	0	0	0	-470.429
2			2	1813.55	-29.047	0	0	0	-278.973
3			3	1813.55	-29.047	0	0	0	-87.517
4			4	1813.55	-29.047	0	0	0	103.939
5			5	1813.55	-29.047	0	0	0	295.395
6	2	M3	1	-845.723	8.545	0	0	0	68.465
7			2	-845.723	8.545	0	0	0	12.145
8			3	-845.723	8.545	0	0	0	-44.175
9			4	-845.723	8.545	0	0	0	-100.496
10			5	-845.723	8.545	0	0	0	-156.816
11	3	M3	1	1549.259	-8.243	0	0	0	75.167
12			2	1549.259	-8.243	0	0	0	129.496
13			3	1549.259	-8.243	0	0	0	183.824
14			4	1549.259	-8.243	0	0	0	238.152
15			5	1549.259	-8.243	0	0	0	292.48
16	4	M3	1	4315.334	-48.239	0	0	0	-511.166
17			2	4315.334	-48.239	0	0	0	-193.212
18			3	4315.334	-48.239	0	0	0	124.742
19			4	4315.334	-48.239	0	0	0	442.696
20			5	4315.334	-48.239	0	0	0	760.65

Envelope Joint Reactions

	Joint		X [k]	lc	Y [k]	lc	Z [k]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
1	N6	max	2058	4	14749	2	0	1	0	1	0	1	4763	2
2		min	-474	2	2226	4	0	1	0	1	0	1	-24324	4
3	N4	max	474	2	10180	4	0	1	0	1	0	1	4913	2
4		min	-2058	4	-2343	2	0	1	0	1	0	1	-24713	4
5	Totals:	max	0	4	12406	3	0	1						
6		min	0	2	12406	1	0	1						

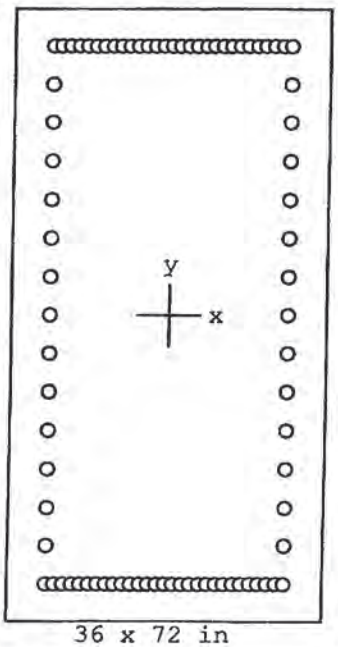
$\phi F_y A_s = 2058 \text{ kips}$

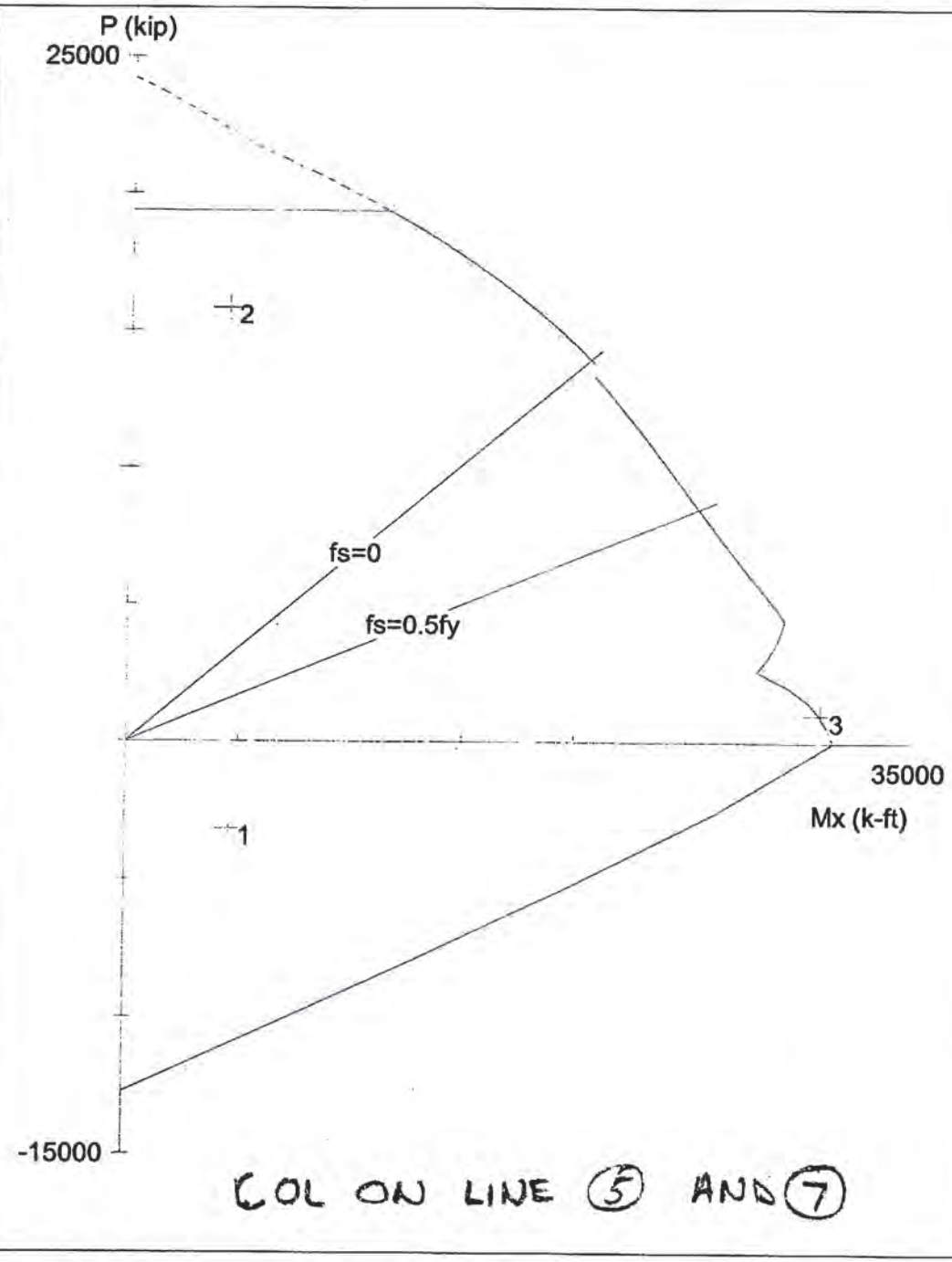
$A_{s_{REQ}} = \frac{2058}{(0.75)\ 75 \text{ ksi}}$

(STEEL TIE)

$A_{SREQ} = 36.6 \text{ in}^2$ OR 16.2-#14

PROVIDE 20-#14





COL ON LINE (5) AND (7)

Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

Slenderness: Not considered

Column type: Structural

Bars: ASTM A615

Date: 05/22/05

Time: 09:57:27

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\CURRENT\SHORTD~1\SLOPEE.COL

64 #14 TYP COL E

20 #14 BARS ADD

Project:

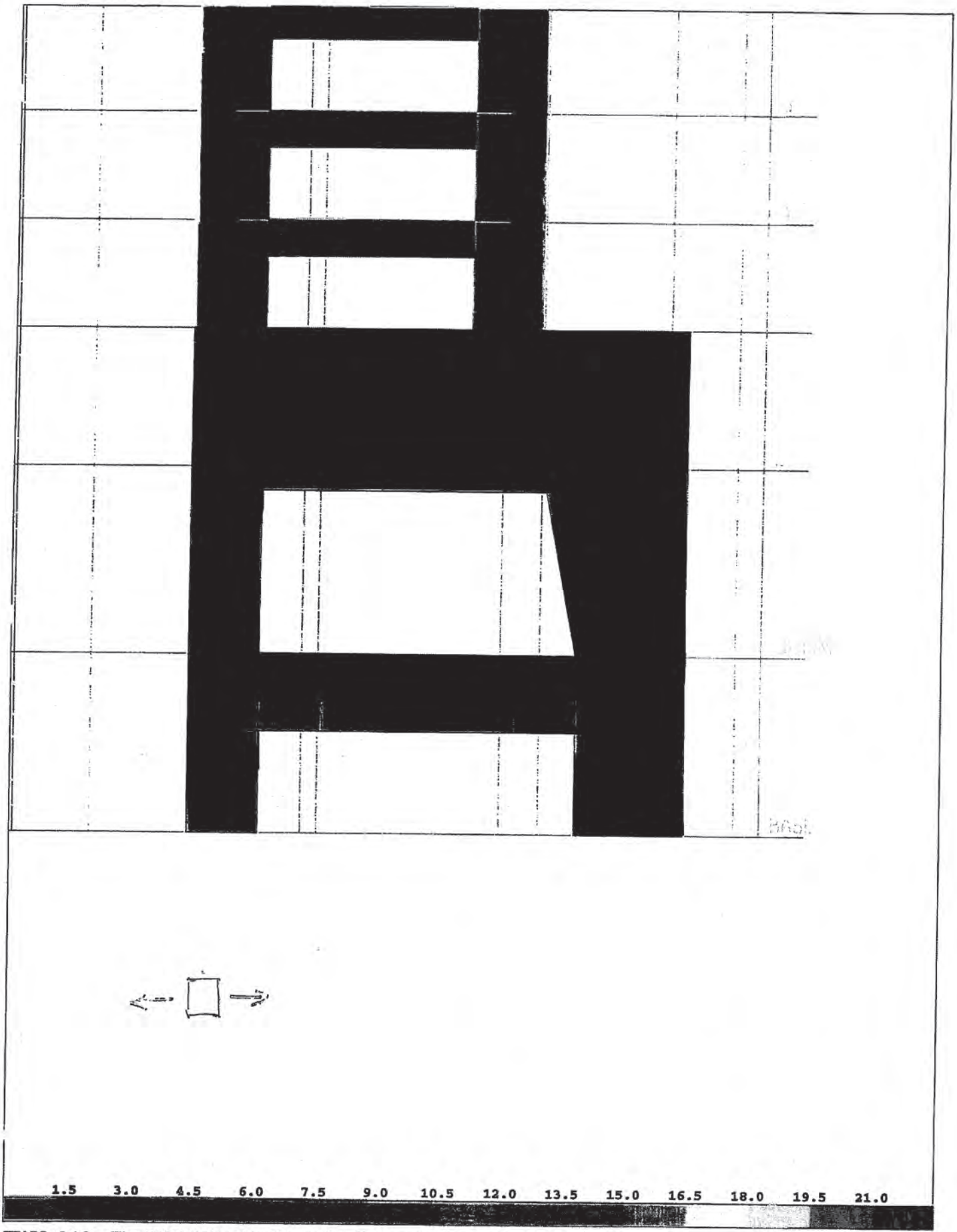
Column:

Engineer:

f'c = 10 ksi	fy = 75 ksi	Ag = 2592 in^2	84 #14 bars
Ec = 5000 ksi	Es = 29000 ksi	As = 189.00 in^2	Rho = 7.29%
fc = 8.5 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 1.11974e+006 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 279936 in^4
Beta1 = 0.65		Clear spacing = -0.72 in	Clear cover = 3.50 in 8.2.2-18

Confinement: Tied phi(a) = 0.8 phi(b) = 0.9 phi(c) = 0.7

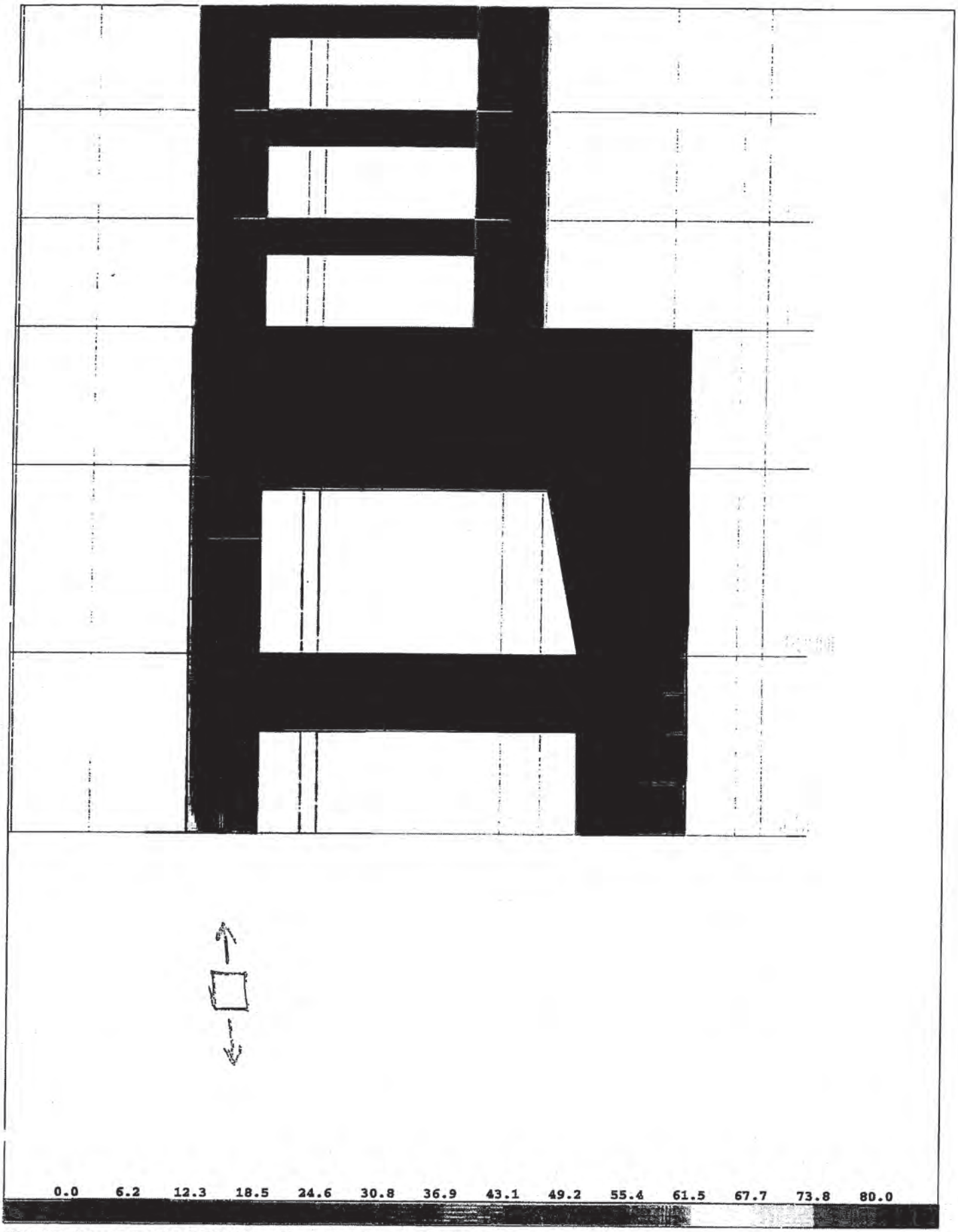
ETABS



ETABS v8.4.9 - File: 4089-20050210-New Rigs 1.28 - February 10,2005 15:42
Elevation View - H Resultant F11 Diagram (E100X5100Y) - Kip-in Units

8117-19

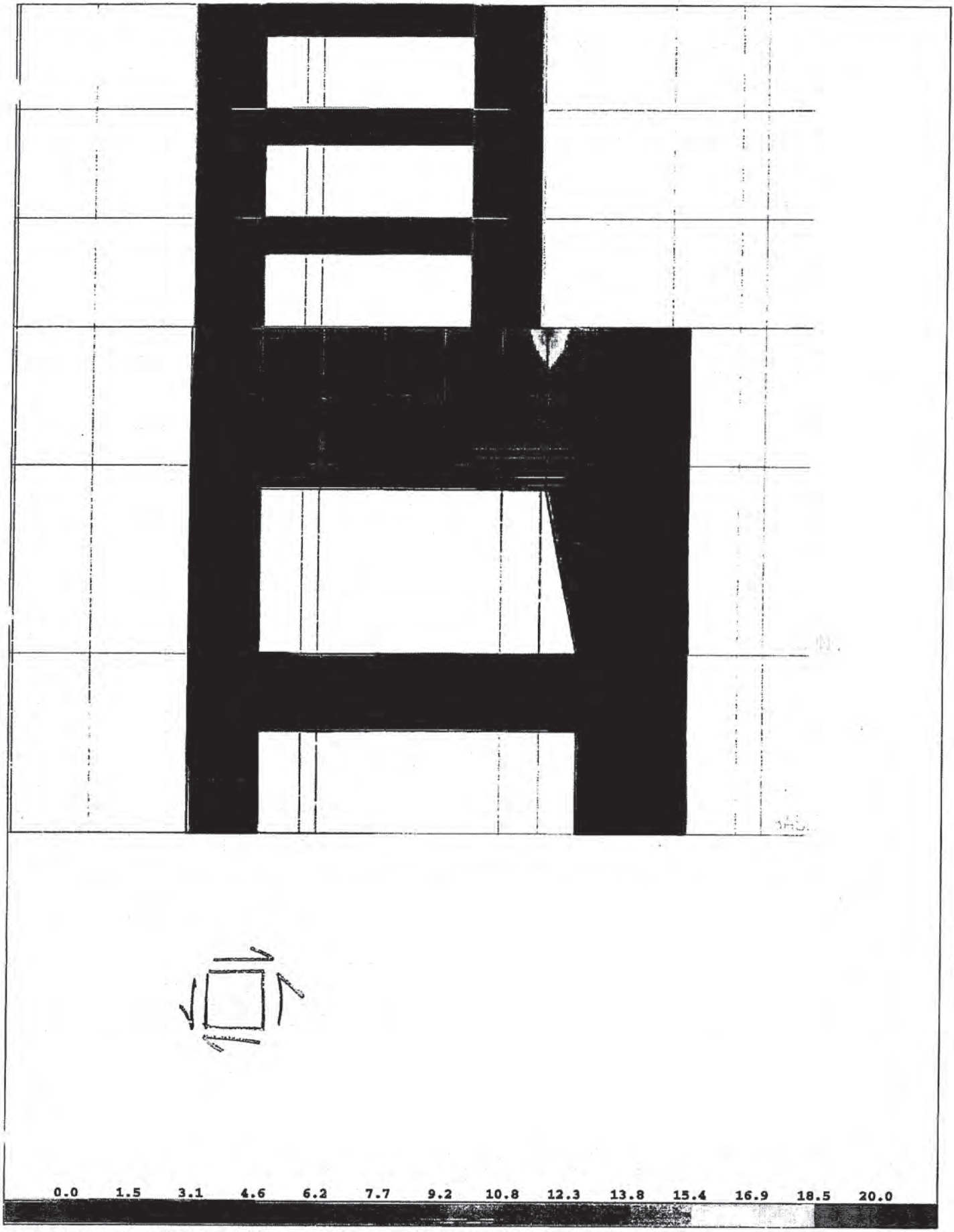
ETABS



ETABS v8.4.9 - File: 4069-20050210-New Rigs 1.28 - February 10,2005 14:59
Elevation View - H Resultant F22 Diagram (E100X5100Y) - Kip-in Units

R77-70

ETABS



ETABS v8.4.9 - File: 4069-20050210-New Rigs 1.28 - February 10,2005 14:58
Elevation View - H Resultant F12 Diagram (E100X5100Y) - Kip-in Units

8.2.2-21

8.3 Gravity System

8.3 Gravity System

The 12 inch thick level 1 slab has been modeled in SAFE. The slab is seismically separated from the elevator core and is therefore simply supported.

The gravity beams at the southern side of the tower have been designed using SAFE.

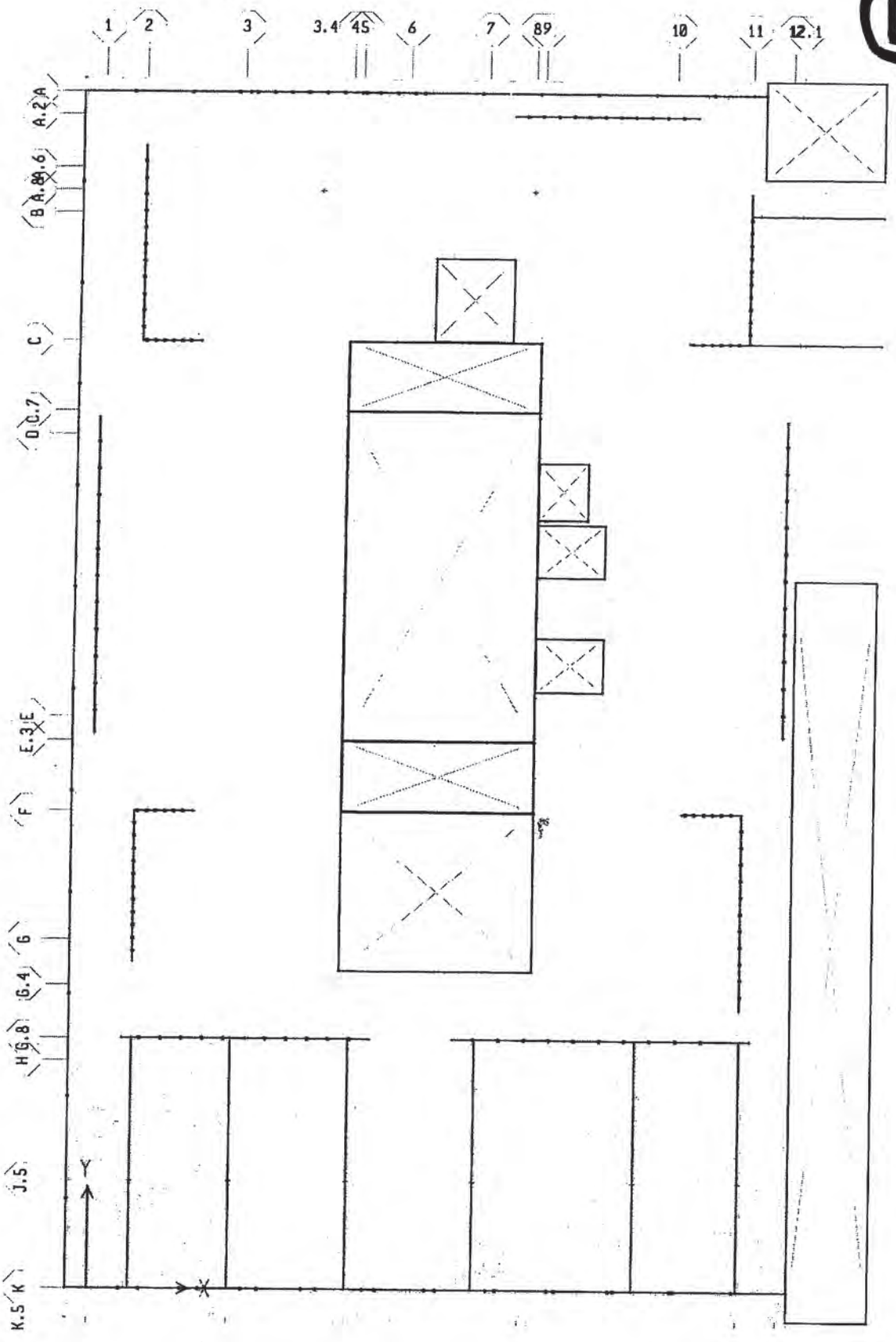
Loads for the gravity columns have been taken from SAFE slab analysis including beam transfers at levels 1 to level 3. The gravity columns have been design using PCA column. Slenderness effects have been accounted for in the design.

SAFE

SLAB DESIGN

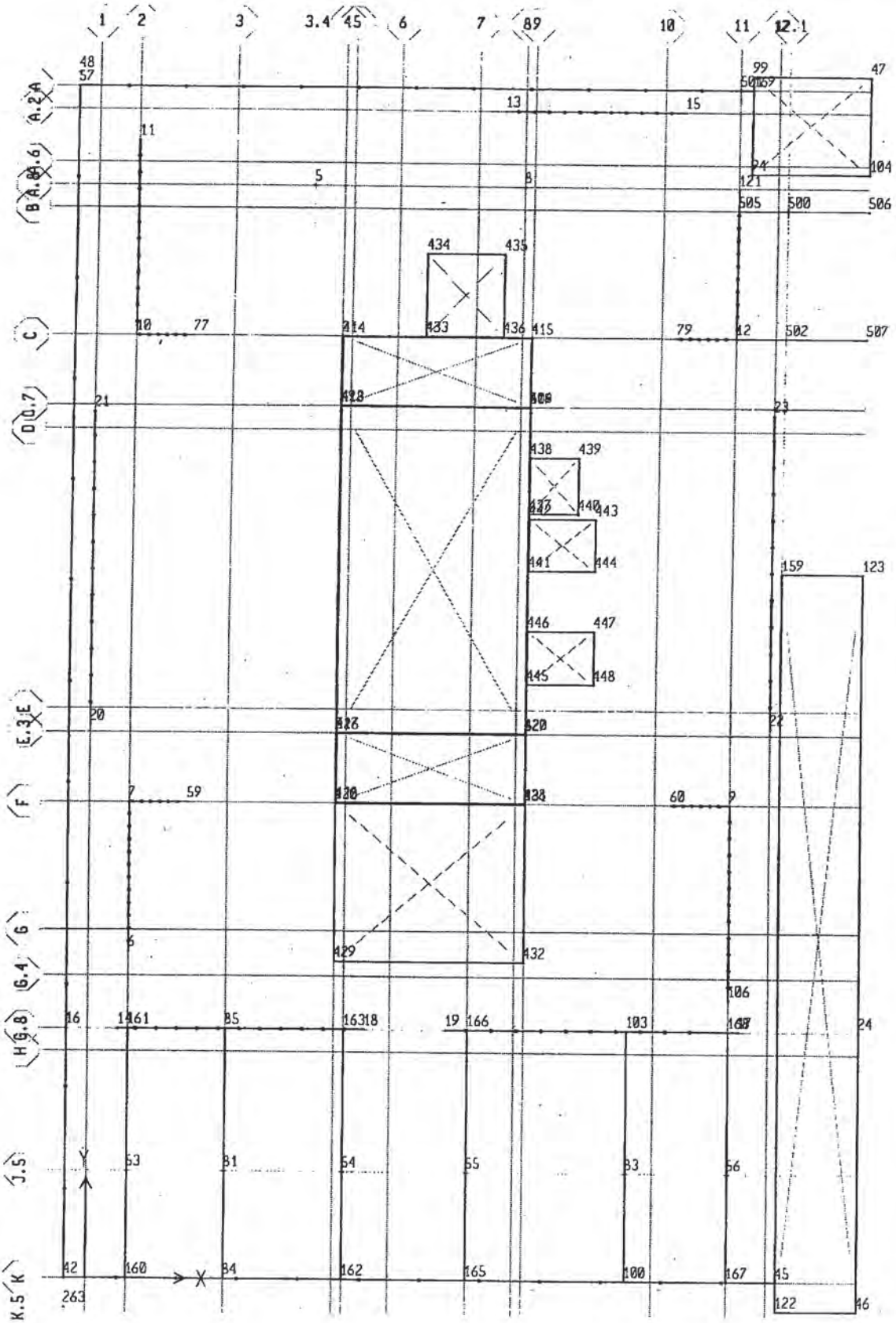
L1

Tower



8.3-2

SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 18,2005 12:31 - Scale: Fit to Page
Structural Layer Plan View - Kip-in Units


1
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3.4
4.5
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8.9
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12.1
A.2
A
B
A.8
A.6
C
D
D.7
E.3
E
F
G
G.4
H
G.8
J.5
K
K.5
48
57
99
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169
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13
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121
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106
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1461
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16318
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166
103
167
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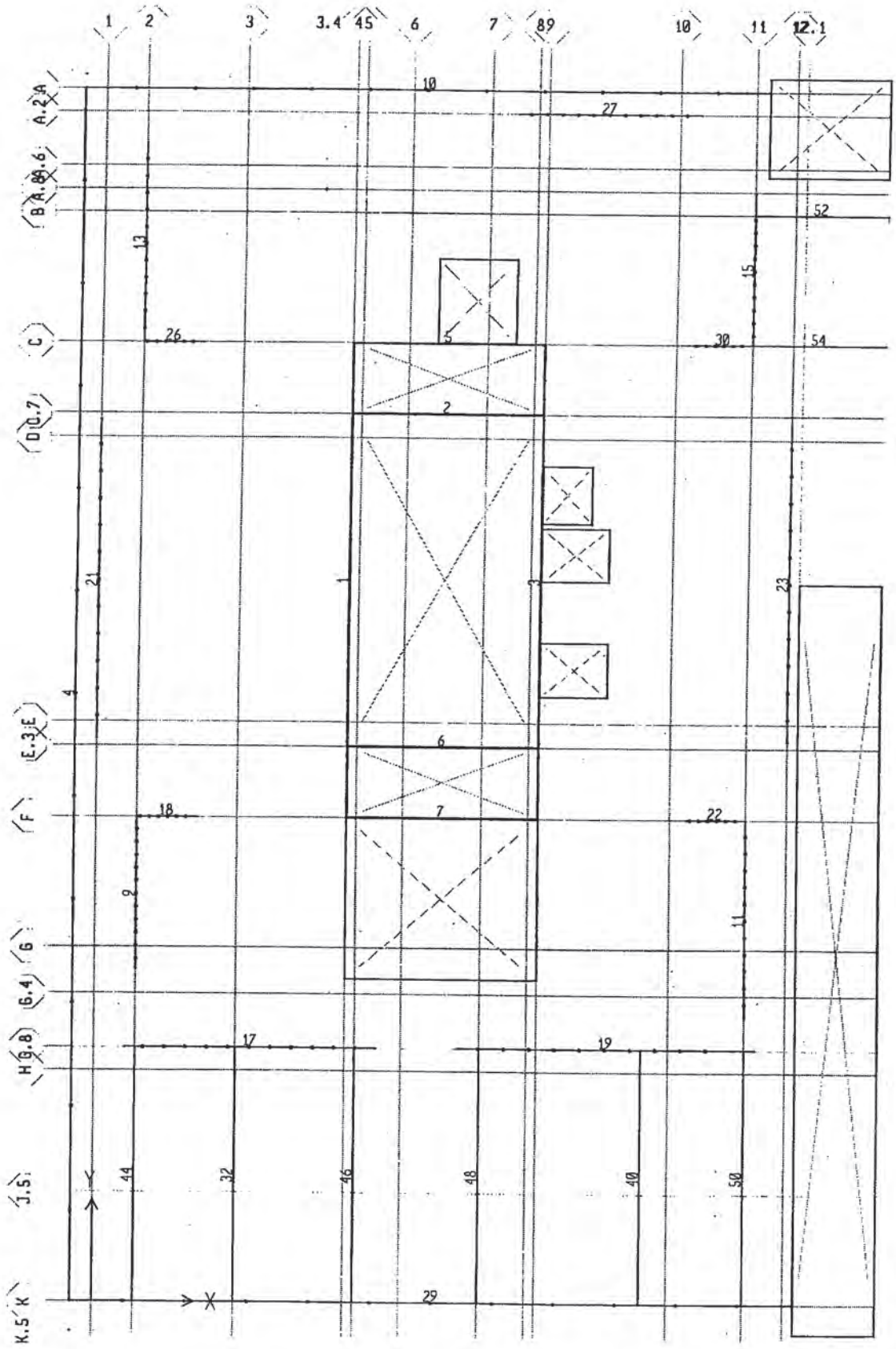
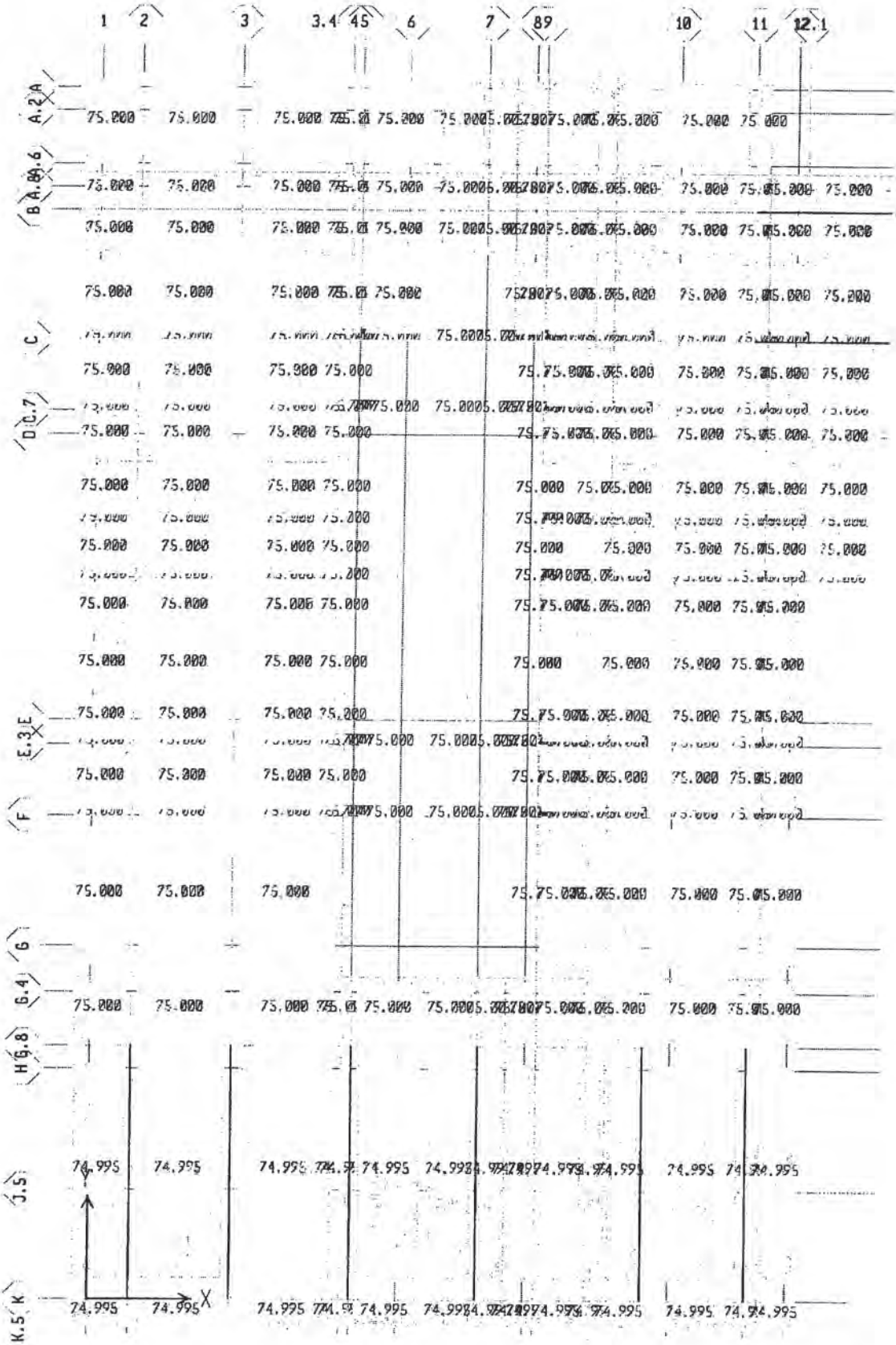
122
46

8.3-3



8.3-4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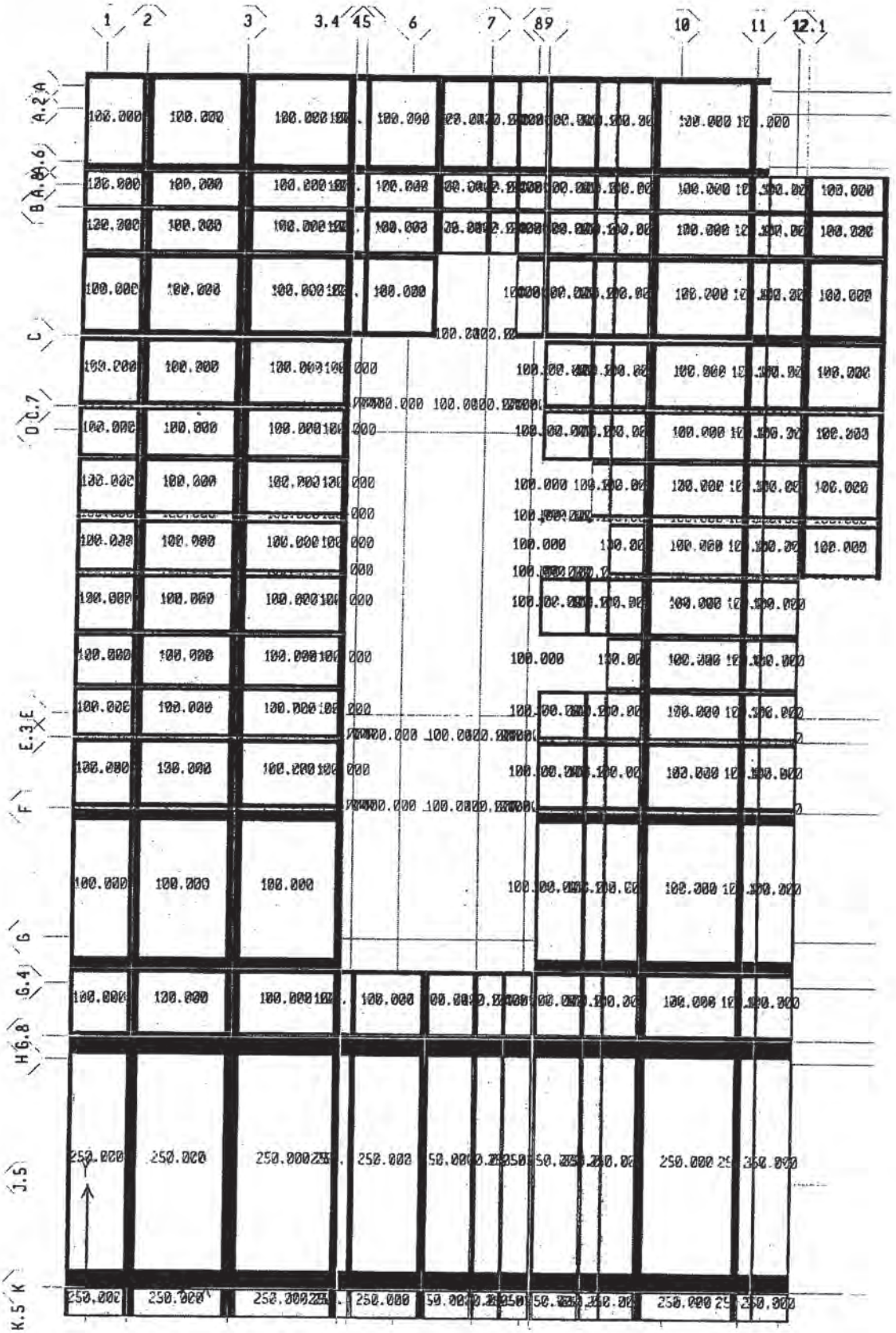
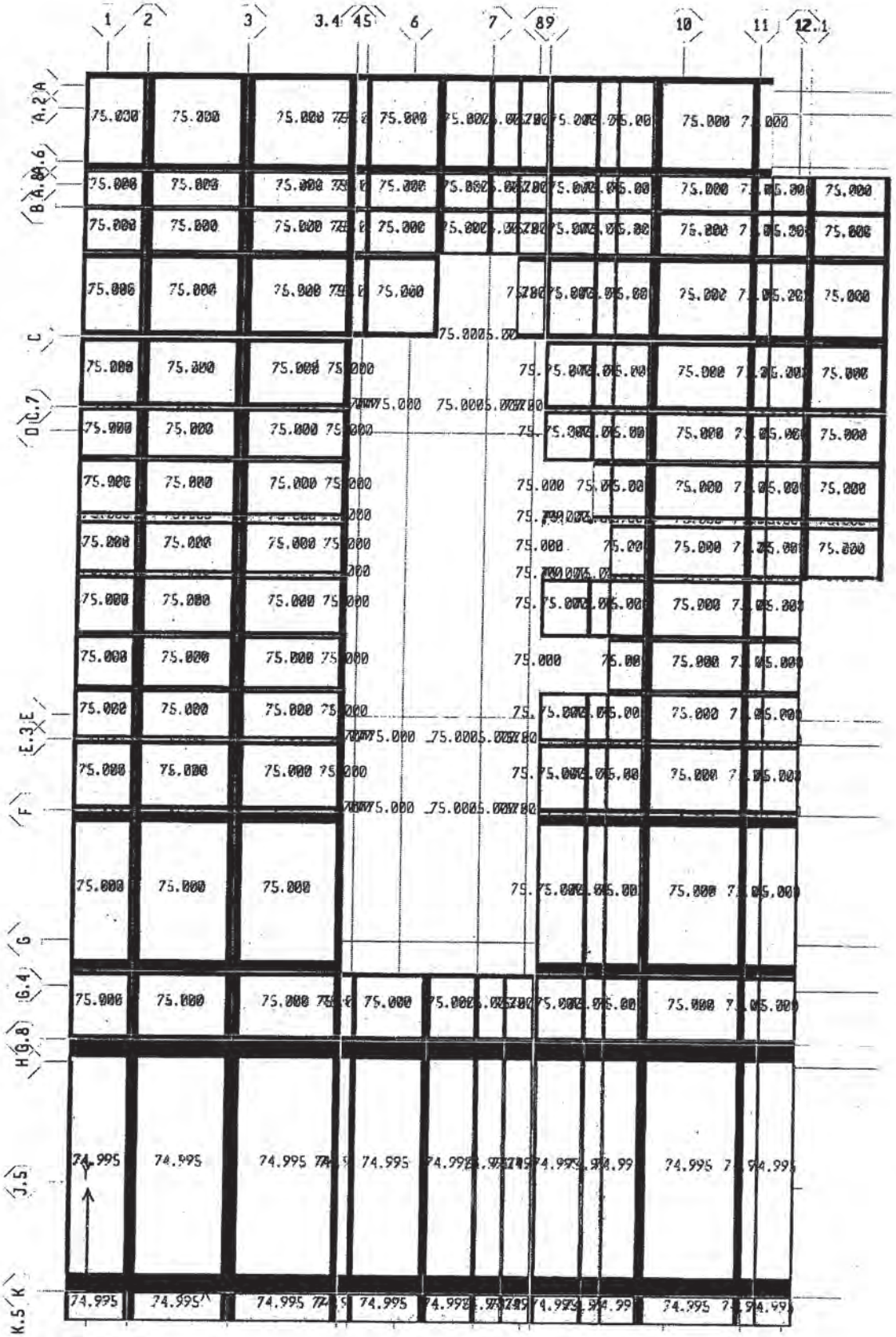
12.1
A.2
A
B
A.8
9.6
C
D
C.7
E.3
E
F
G
G.4
H
G.8
J.5
K
K.5
75.000
74.995
X

8.3-5



SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 8:42 - Scale: Fit to Page
Surface Loading (L) - lb-ft Units

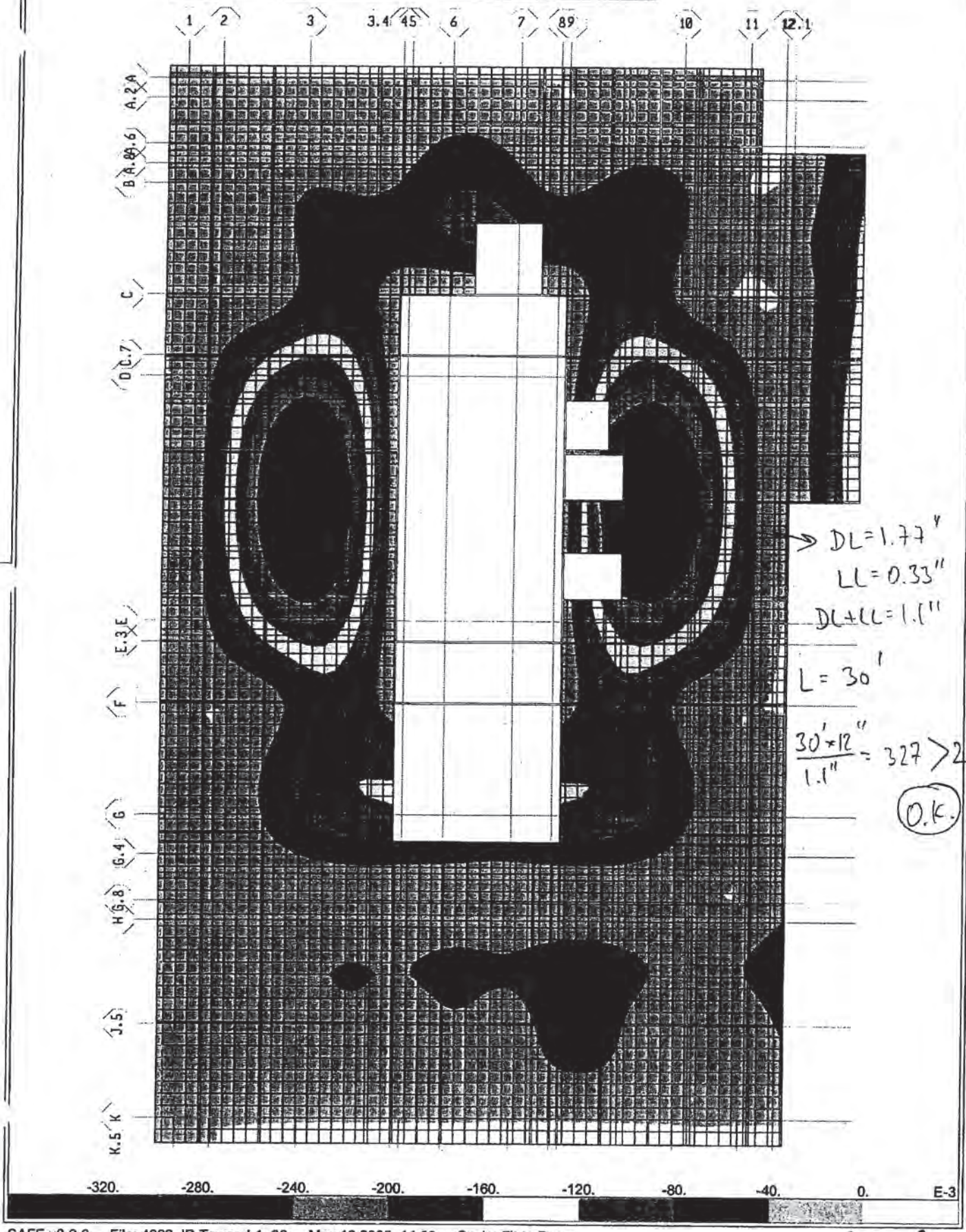
8.3-6



SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:18 - Scale: Fit to Page
Surface Loading (SDL) - lb-ft Units

8.3-7

CRACKED DEFLECTION LL



DL = 1.77"

LL = 0.33"

DL+LL = 1.1"

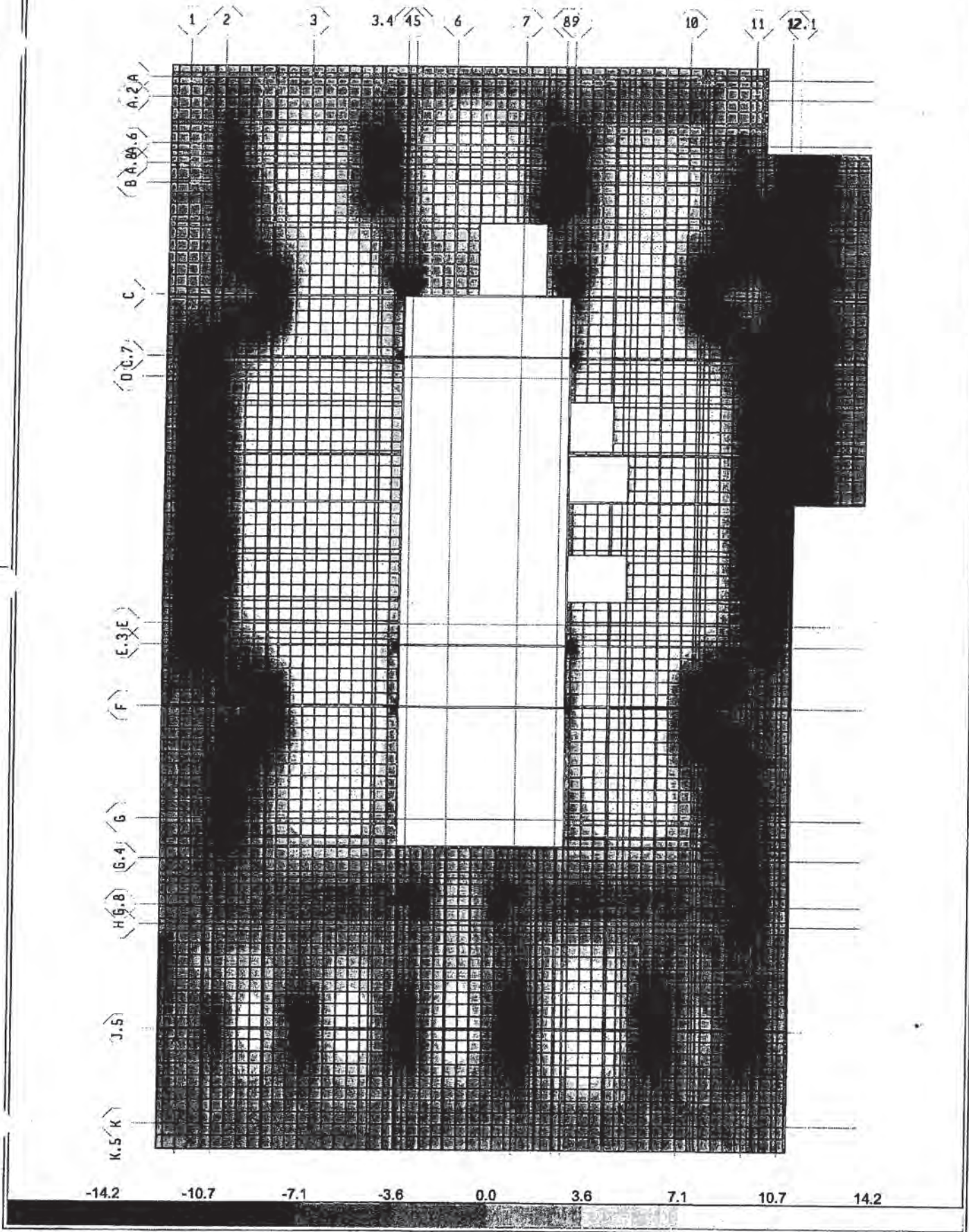
L = 30'

$\frac{30' \times 12''}{1.1''} = 327 > 240$

O.K.

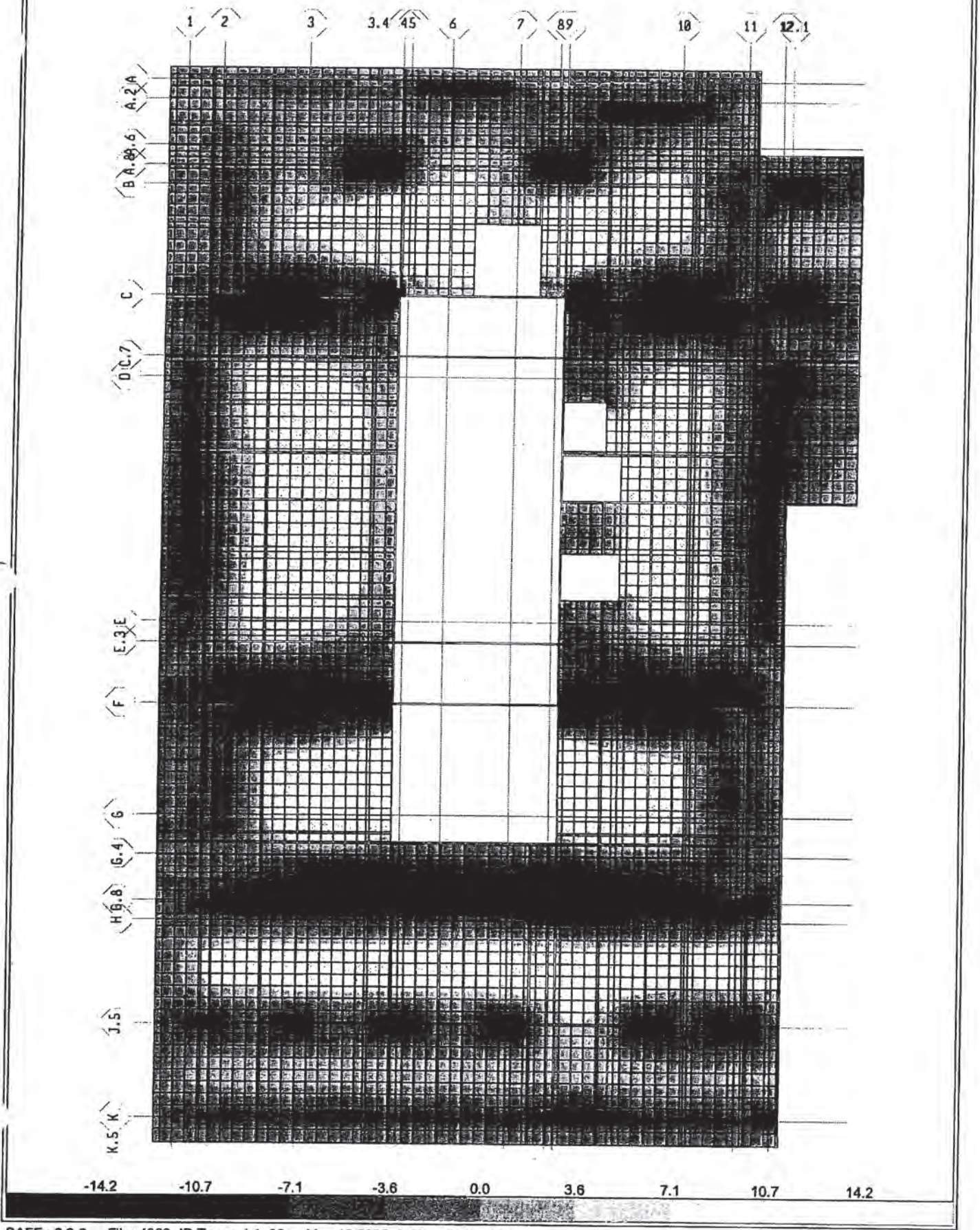
SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 14:03 - Scale: Fit to Page
Cracked Deformed Shape (L) - Kip-in Units

8.3-8



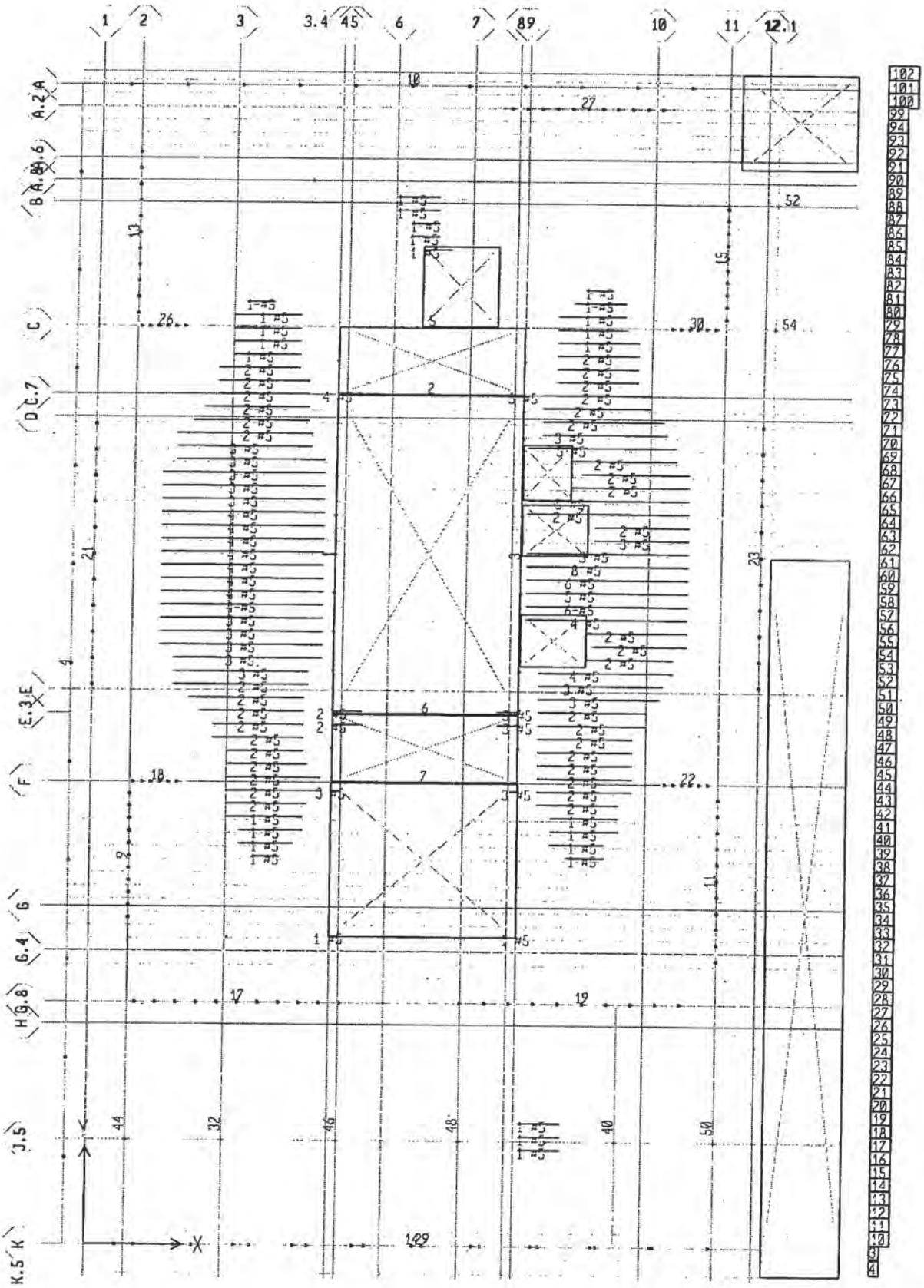
SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:02 - Scale: Fit to Page
Slab Resultant Mxx Diagram - (14D17L) - Kip-in Units

8.3-9



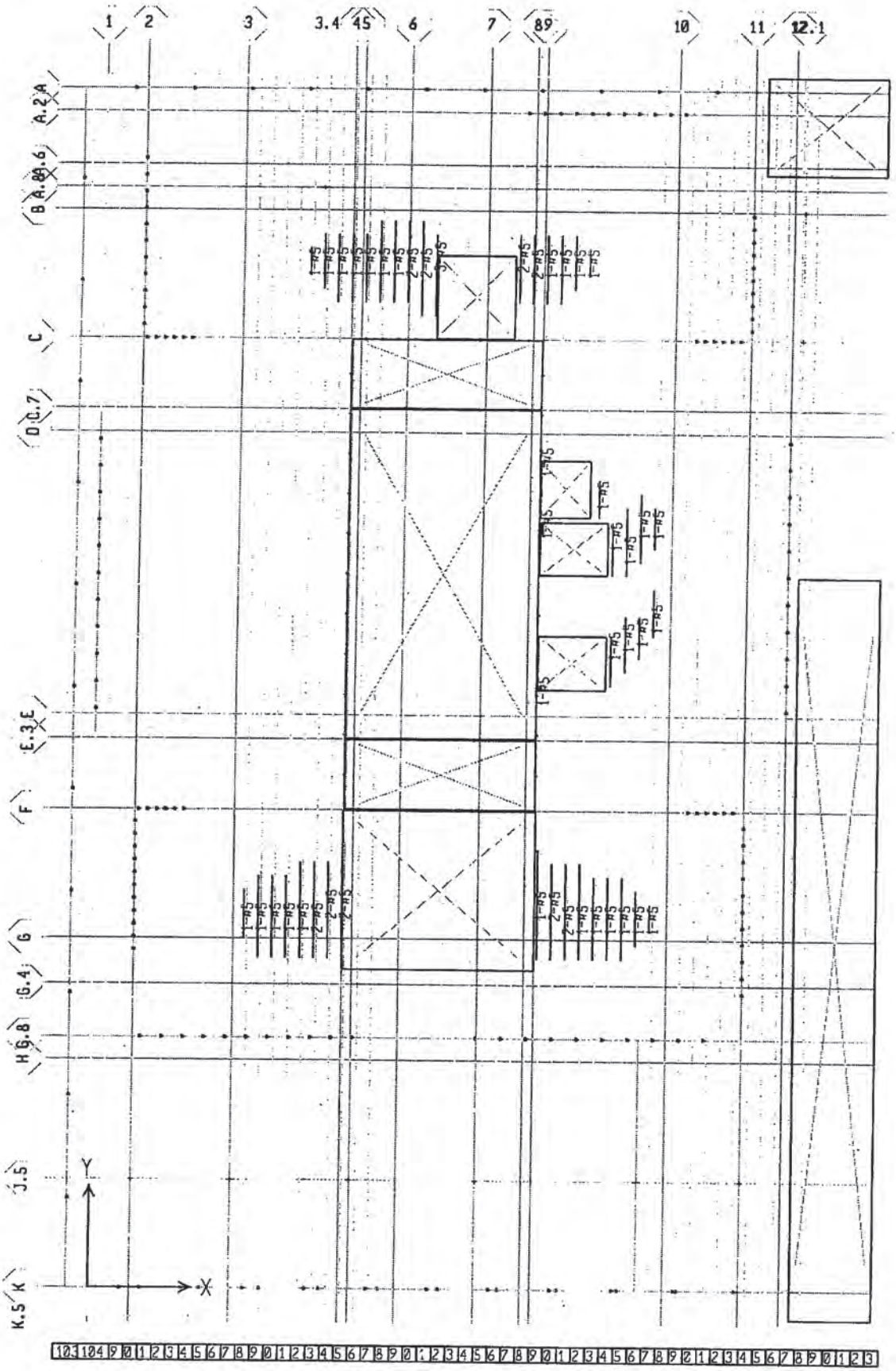
SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:03 - Scale: Fit to Page
Slab Resultant Myy Diagram - (14D17L) - Kip-in Units

8.3-10



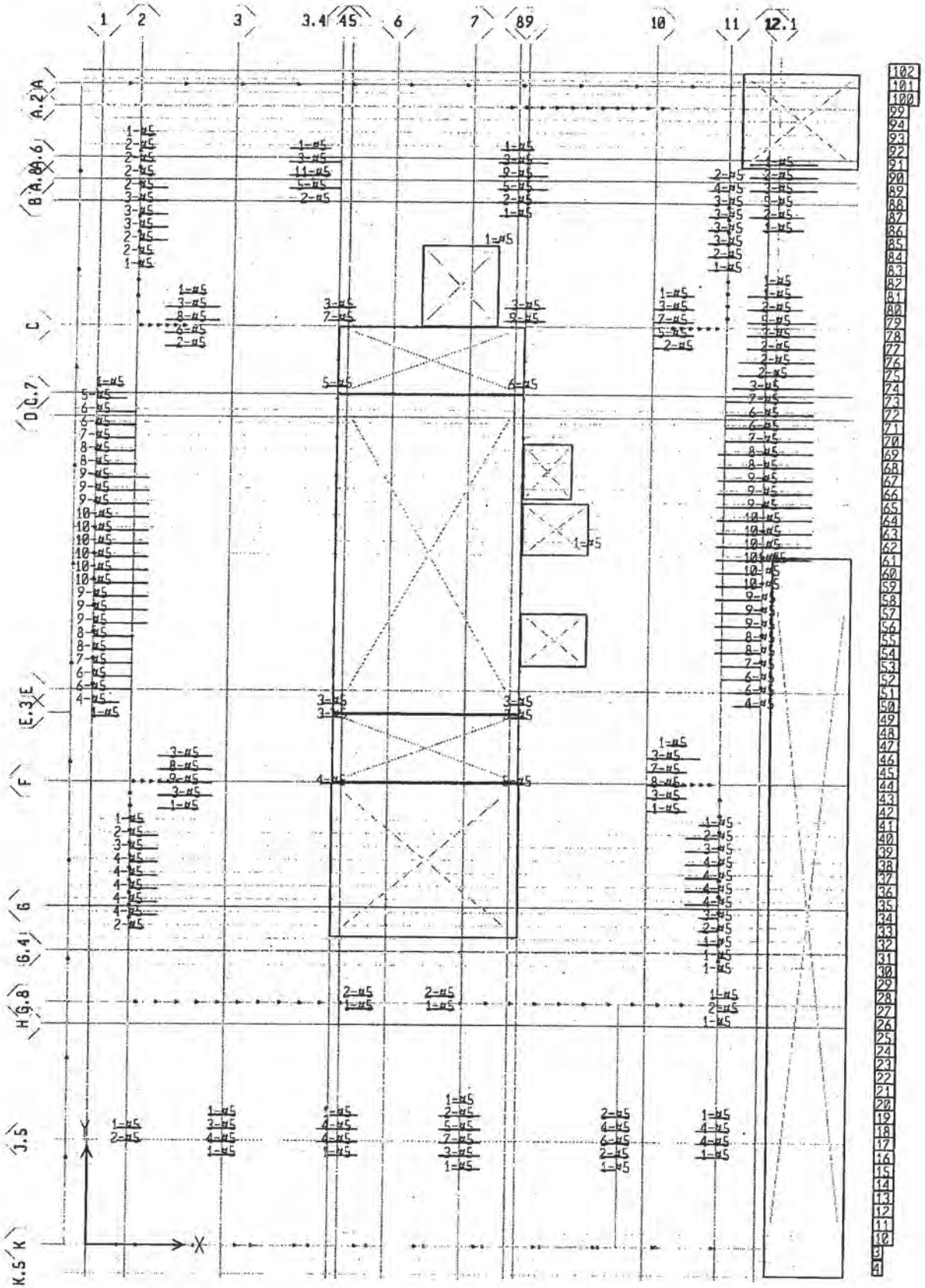
SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:11 - Scale: Fit to Page
Bottom X-Strip Reinforcement (Sq-in) in addition to #5 @ 12.000 (Bot) - Kip-in Units

8.3-11



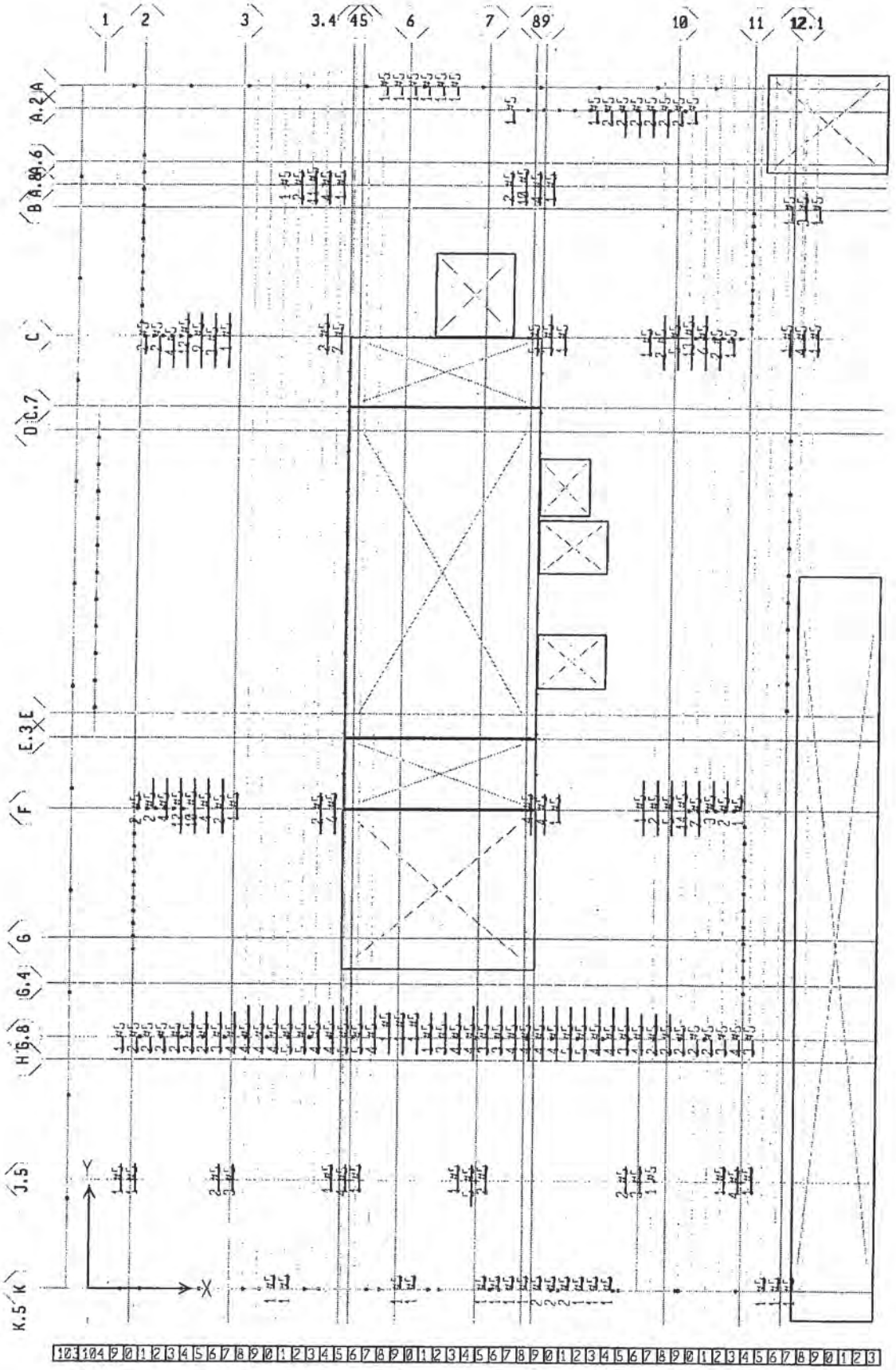
SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:11 - Scale: Fit to Page
Bottom Y-Strip Reinforcement (Sq-in) in addition to #5 @ 12.000 (Bot) - Kip-in Units

8.3-12



SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:11 - Scale: Fit to Page
Top X-Strip Reinforcement (Sq-in) in addition to #5 @ 12.000 (Top) - Kip-in Units

8.3-13



SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:11 - Scale: Fit to Page
Top Y-Strip Reinforcement (Sq-in) in addition to #5 @ 12.000 (Top) - Kip-in Units

8.3-14

DESIMONE CONSULTING ENGINEERS
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Job no. : 4069
Client : Handel Architects
Project : 301 Mission street
Engineer : Jiri Pertold
Page No. :
Revision :

HIGH RISE SIDE

LEVEL L1 Reactions DON'T include wall self weight and cladding

COLUMN SPRING REACTIONS

COLUMN	ONE LEVEL FZ DL (kips)	ONE LEVEL FZ LL (kips)	1.4DL+1.7LL (kips)
5	113	50	243
8	102	46	221
53	49	48	151
54	74	77	234
55	85	89	271
56	67	67	207
81	70	71	219
83	78	80	245
500	81	33	169
501	2	1	4
502	85	35	177

WALL REACTIONS

WALL	ONE LEVEL FZ DL (kips)	ONE LEVEL FZ LL (kips)	1.4DL+1.7LL (kips)
1	287	127	618
2	-57	-25	-123
3	233	103	502
4	93	65	240
5	74	33	160
6	-60	-27	-130
7	20	9	43
9	85	38	184
10	142	63	306
11	106	46	227
13	101	45	218
15	40	18	87
17	242	177	640
18	123	55	265
19	282	215	760
21	272	121	587
22	120	53	259
23	314	140	677
26	114	51	245
27	81	36	175
29	285	301	912
30	100	45	216

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LINE OBJECT DATA

LINE	JNT-1	JNT-2	SECTION	SUPPORT	RELEASES	LENGTH
1	1	2	WALL30CORE			828.000
2	49	50	WALL24CORE			330.000
3	3	4	WALL30CORE			828.000
4	42	57	WALL14		0	2103.000
5	2	4	WALL36CORE			330.000
6	51	52	WALL24CORE			330.000
7	1	3	WALL36CORE			330.000
9	6	7	WALL36			264.000
10	57	169	WALL14		0	1175.000
11	106	9	WALL36			344.000
13	10	11	WALL36			344.000
15	12	121	WALL36			264.000
17	14	18	WALL36			428.000
18	7	59	WALL42			102.000
19	19	17	WALL36			511.000
21	20	21	WALL36			556.000
22	60	9	WALL42			102.000
23	22	23	WALL36			556.000
26	10	77	WALL42			102.000
27	13	15	WALL36		0	316.000
29	42	45	WALL14			1241.000
30	79	12	WALL42			102.000
32	84	85	18X18			437.000
40	100	103	18X18			437.000
44	160	161	18X18			437.000
46	162	163	18X18			437.000
48	165	166	18X18			437.000
50	167	168	18X18			437.000
52	505	506	18X18			228.000
54	12	507	18X18			228.000

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POINT OBJECT DATA

POINT	GLOBAL-X	GLOBAL-Y	SUPPORTSPRING	RESTRAINT	RES DIM X	RES DIM Y
1	428.000	836.000				
2	428.000	1664.000				
3	758.000	836.000				
4	758.000	1664.000				
5	377.000	1930.000	18X18			
6	70.000	572.000				
7	70.000	836.000				
8	741.000	1930.000	18X18			
9	1116.000	836.000				
10	70.000	1664.000				
11	70.000	2008.000				
12	1116.000	1664.000				
13	705.000	2063.000				
14	53.000	437.000				
15	1021.000	2063.000				
16	-37.000	437.000				
17	1134.000	437.000				
18	481.000	437.000				
19	623.000	437.000				
20	0.000	972.000				
21	0.000	1528.000				
22	1186.000	972.000				
23	1186.000	1528.000				
24	1344.000	437.000				

8.3-16

25	-37.000	24.000	
26	1344.000	24.000	
27	1344.000	0.000	
28	1344.000	48.000	
29	-37.000	48.000	
30	1344.000	72.000	
31	-37.000	72.000	
32	1344.000	96.000	
33	-37.000	96.000	
34	1344.000	120.000	
35	-37.000	120.000	
36	1344.000	144.000	
37	-37.000	144.000	
38	1344.000	168.000	
39	-37.000	168.000	
40	1344.000	192.000	
42	-37.000	0.000	
45	1204.000	0.000	
46	1344.000	-51.000	
47	1344.000	2127.000	
48	-37.000	2127.000	
49	428.000	1540.000	
50	758.000	1540.000	
51	428.000	960.000	
52	758.000	960.000	
53	70.000	188.000	18X18
54	445.000	188.000	18X18
55	660.900	188.000	18X18
56	1116.000	188.000	18X18
57	-37.000	2103.000	
59	172.000	836.000	
60	1014.000	836.000	
61	-37.000	192.000	
62	1344.000	216.000	
63	-37.000	216.000	
64	1344.000	240.000	
65	-37.000	240.000	
66	1344.000	264.000	
67	-37.000	264.000	
68	1344.000	288.000	
69	-37.000	288.000	
70	1344.000	312.000	
71	-37.000	312.000	
72	1344.000	336.000	
73	-37.000	336.000	
74	1344.000	360.000	
75	-37.000	360.000	
76	1344.000	384.000	
77	172.000	1664.000	
78	1344.000	408.000	
79	1014.000	1664.000	
80	1344.000	432.000	
81	241.000	188.000	18X18
82	1344.000	456.000	
83	938.000	188.000	18X18
84	241.000	0.000	
85	241.000	437.000	
86	1344.000	504.000	
88	1344.000	528.000	
89	-37.000	528.000	
90	1344.000	552.000	
91	-37.000	552.000	
92	1344.000	576.000	
93	-37.000	576.000	
94	1138.000	1955.000	
95	1344.000	600.000	
96	-37.000	600.000	
97	1344.000	624.000	
98	-37.000	624.000	
99	1138.000	2127.000	

8.3-17

100	938.000	0.000
101	1344.000	648.000
102	-37.000	648.000
103	938.000	437.000
104	1344.000	1955.000
105	1344.000	-24.000
106	1116.000	492.000
107	1344.000	672.000
108	-37.000	672.000
109	1344.000	696.000
110	-37.000	696.000
111	1344.000	720.000
112	-37.000	720.000
113	1344.000	744.000
114	-37.000	744.000
115	1344.000	768.000
116	-37.000	768.000
117	1344.000	792.000
118	-37.000	792.000
119	1344.000	816.000
120	-37.000	816.000
121	1116.000	1928.000
122	1204.000	-51.000
123	1344.000	1246.000
125	1344.000	840.000
126	-37.000	840.000
127	1344.000	864.000
128	-37.000	864.000
129	1344.000	888.000
130	-37.000	888.000
131	1344.000	912.000
132	-37.000	912.000
133	1344.000	936.000
134	-37.000	936.000
135	1344.000	960.000
136	-37.000	960.000
137	1344.000	984.000
138	-37.000	984.000
139	1344.000	1008.000
140	-37.000	1008.000
141	1344.000	1032.000
142	-37.000	1032.000
143	1344.000	1056.000
144	-37.000	1056.000
145	1344.000	1080.000
146	-37.000	1080.000
147	1344.000	1104.000
148	-37.000	1104.000
149	1344.000	1128.000
150	-37.000	1128.000
151	1344.000	1152.000
152	-37.000	1152.000
153	1344.000	1176.000
154	-37.000	1176.000
155	1344.000	1200.000
156	-37.000	1200.000
157	1344.000	1224.000
158	-37.000	1224.000
159	1204.000	1246.000
160	70.000	0.000
161	70.000	437.000
162	445.000	0.000
163	445.000	437.000
164	1344.000	1248.000
165	660.900	0.000
166	660.900	437.000
167	1116.000	0.000
168	1116.000	437.000
169	1138.000	2103.000
177	-37.000	1248.000

8.3-18

178	1344.000	1272.000
179	-37.000	1272.000
180	1344.000	1296.000
181	-37.000	1296.000
182	1344.000	1320.000
183	-37.000	1320.000
184	1344.000	1344.000
185	-37.000	1344.000
186	1344.000	1368.000
187	-37.000	1368.000
188	1344.000	1392.000
189	-37.000	1392.000
190	1344.000	1416.000
191	-37.000	1416.000
192	1344.000	1440.000
193	-37.000	1440.000
194	1344.000	1464.000
195	-37.000	1464.000
196	1344.000	1488.000
197	-37.000	1488.000
198	1344.000	1512.000
199	-37.000	1512.000
200	1344.000	1536.000
201	-37.000	1536.000
202	1344.000	1560.000
203	-37.000	1560.000
204	1344.000	1584.000
205	-37.000	1584.000
206	1344.000	1608.000
207	-37.000	1608.000
208	1344.000	1632.000
209	-37.000	1632.000
210	1344.000	1656.000
211	-37.000	1656.000
212	1344.000	1680.000
213	-37.000	1680.000
214	1344.000	1704.000
215	-37.000	1704.000
216	1344.000	1728.000
217	-37.000	1728.000
218	1344.000	1752.000
219	-37.000	1752.000
220	1344.000	1776.000
221	-37.000	1776.000
222	1344.000	1800.000
223	-37.000	1800.000
224	1344.000	1824.000
225	-37.000	1824.000
226	1344.000	1848.000
227	-37.000	1848.000
228	1344.000	1872.000
229	-37.000	1872.000
230	1344.000	1896.000
231	-37.000	1896.000
232	1344.000	1920.000
233	-37.000	1920.000
234	1344.000	1944.000
235	-37.000	1944.000
236	1344.000	1968.000
237	-37.000	1968.000
238	1344.000	1992.000
239	-37.000	1992.000
240	1344.000	2016.000
241	-37.000	2016.000
242	1344.000	2040.000
243	-37.000	2040.000
245	1344.000	2139.996
246	24.000	-51.000
247	-37.000	2139.996
248	-37.000	480.000

8.3-19

249	-37.000	-60.000
251	1344.000	-60.000
252	1344.000	2064.000
253	-37.000	2064.000
254	1344.000	2088.000
255	-37.000	2088.000
256	1344.000	2112.000
257	-37.000	2112.000
258	1344.000	-51.000
259	1344.000	2127.000
260	240.000	-51.000
261	0.000	-51.000
262	0.000	2127.000
263	-37.000	-51.000
264	-24.000	-51.000
265	-24.000	2127.000
269	24.000	2127.000
270	240.000	2127.000
273	-37.000	-51.000
281	48.000	-51.000
282	48.000	2127.000
283	72.000	-51.000
284	72.000	2127.000
285	96.000	-51.000
286	96.000	2127.000
287	120.000	-51.000
288	120.000	2127.000
289	144.000	-51.000
290	144.000	2127.000
291	168.000	-51.000
292	168.000	2127.000
293	192.000	-51.000
294	192.000	2127.000
295	216.000	-51.000
296	216.000	2127.000
298	-37.000	2127.000
299	264.000	-51.000
300	264.000	2127.000
301	288.000	-51.000
302	288.000	2127.000
303	312.000	-51.000
304	312.000	2127.000
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306	336.000	2127.000
307	360.000	-51.000
308	360.000	2127.000
309	384.000	-51.000
310	384.000	2127.000
311	408.000	-51.000
312	408.000	2127.000
313	432.000	-51.000
314	432.000	2127.000
315	456.000	-51.000
316	456.000	2127.000
317	480.000	-51.000
318	480.000	2127.000
319	504.000	-51.000
320	504.000	2127.000
321	528.000	-51.000
322	528.000	2127.000
323	552.000	-51.000
324	552.000	2127.000
325	576.000	-51.000
326	576.000	2127.000
327	600.000	-51.000
328	600.000	2127.000
329	624.000	-51.000
330	624.000	2127.000
331	648.000	-51.000
332	648.000	2127.000

8.3-20

333	672.000	-51.000
334	672.000	2127.000
335	696.000	-51.000
336	696.000	2127.000
337	720.000	-51.000
338	720.000	2127.000
339	744.000	-51.000
340	744.000	2127.000
341	768.000	-51.000
342	768.000	2127.000
343	792.000	-51.000
344	792.000	2127.000
345	816.000	-51.000
346	816.000	2127.000
347	840.000	-51.000
348	840.000	2127.000
349	864.000	-51.000
350	864.000	2127.000
351	888.000	-51.000
352	888.000	2127.000
353	912.000	-51.000
354	912.000	2127.000
355	936.000	-51.000
356	936.000	2127.000
357	960.000	-51.000
358	960.000	2127.000
359	984.000	-51.000
360	984.000	2127.000
361	1008.000	-51.000
362	1008.000	2127.000
363	1032.000	-51.000
364	1032.000	2127.000
365	1056.000	-51.000
366	1056.000	2127.000
367	1080.000	-51.000
368	1080.000	2127.000
369	1104.000	-51.000
370	1104.000	2127.000
371	1128.000	-51.000
372	1128.000	2127.000
373	1152.000	-51.000
374	1152.000	2127.000
375	1176.000	-51.000
376	1176.000	2127.000
377	1200.000	-51.000
378	1200.000	2127.000
379	1224.000	-51.000
380	1224.000	2127.000
381	1248.000	-51.000
382	1248.000	2127.000
383	1272.000	-51.000
384	1272.000	2127.000
385	1296.000	-51.000
386	1296.000	2127.000
387	1320.000	-51.000
388	1320.000	2127.000
413	429.000	1541.000
414	429.000	1663.000
415	757.000	1663.000
416	757.000	1541.000
417	429.000	961.000
418	429.000	1539.000
419	757.000	1539.000
420	757.000	961.000
425	429.000	837.000
426	429.000	959.000
427	757.000	959.000
428	757.000	837.000
429	428.000	556.000
430	428.000	835.000

8.3-21

431	758.000	835.000	
432	758.000	556.000	
433	574.000	1665.000	
434	574.000	1811.000	
435	708.000	1811.000	
436	708.000	1665.000	
437	759.000	1350.000	
438	759.000	1450.000	
439	844.000	1450.000	
440	844.000	1350.000	
441	759.000	1249.000	
442	759.000	1341.000	
443	875.000	1341.000	
444	875.000	1249.000	
445	759.000	1048.000	
446	759.000	1142.000	
447	875.000	1142.000	
448	875.000	1048.000	
449	-37.000	-24.000	
453	-37.000	0.000	
470	-37.000	432.000	
486	-37.000	456.000	
490	-37.000	408.000	
492	-37.000	384.000	
500	1204.000	1890.000	18X18
501	1116.000	2103.000	18X18
502	1204.000	1664.000	18X18
505	1116.000	1890.000	
506	1344.000	1890.000	
507	1344.000	1664.000	
511	1344.000	480.000	
518	-37.000	504.000	

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COLUMN SPRING REACTIONS

COLUMN	GRID I	GRID J	LOAD	FZ	MX	MY
53	7	12	L	48.41	49.948	-91.018
53	7	12	DL	48.92	48.747	-87.914
54	29	12	L	76.58	98.084	-7.761
54	29	12	DL	74.09	86.149	-3.534
55	43	12	L	89.09	107.914	-87.308
55	43	12	DL	85.31	94.885	-81.532
56	75	12	L	66.93	103.459	-92.343
56	75	12	DL	66.64	100.865	-86.811
81	17	12	L	70.92	86.022	-29.429
81	17	12	DL	70.06	82.064	-25.587
83	64	12	L	80.02	93.284	150.146
83	64	12	DL	77.88	87.996	135.145
500	83	114	L	32.67	-48.418	-198.309
500	83	114	DL	81.24	-111.661	-488.023
501	75	130	L	0.91	-14.787	1.274
501	75	130	DL	2.05	-32.951	2.908
502	83	102	L	34.58	34.030	-213.572
502	83	102	DL	84.53	82.527	-513.973
5	23	118	L	50.12	-134.016	-49.079
5	23	118	DL	112.77	-301.546	-110.431

8.3-22

8	49	118	L	45.53	-156.876	26.176
8	49	118	DL	102.44	-352.995	58.882

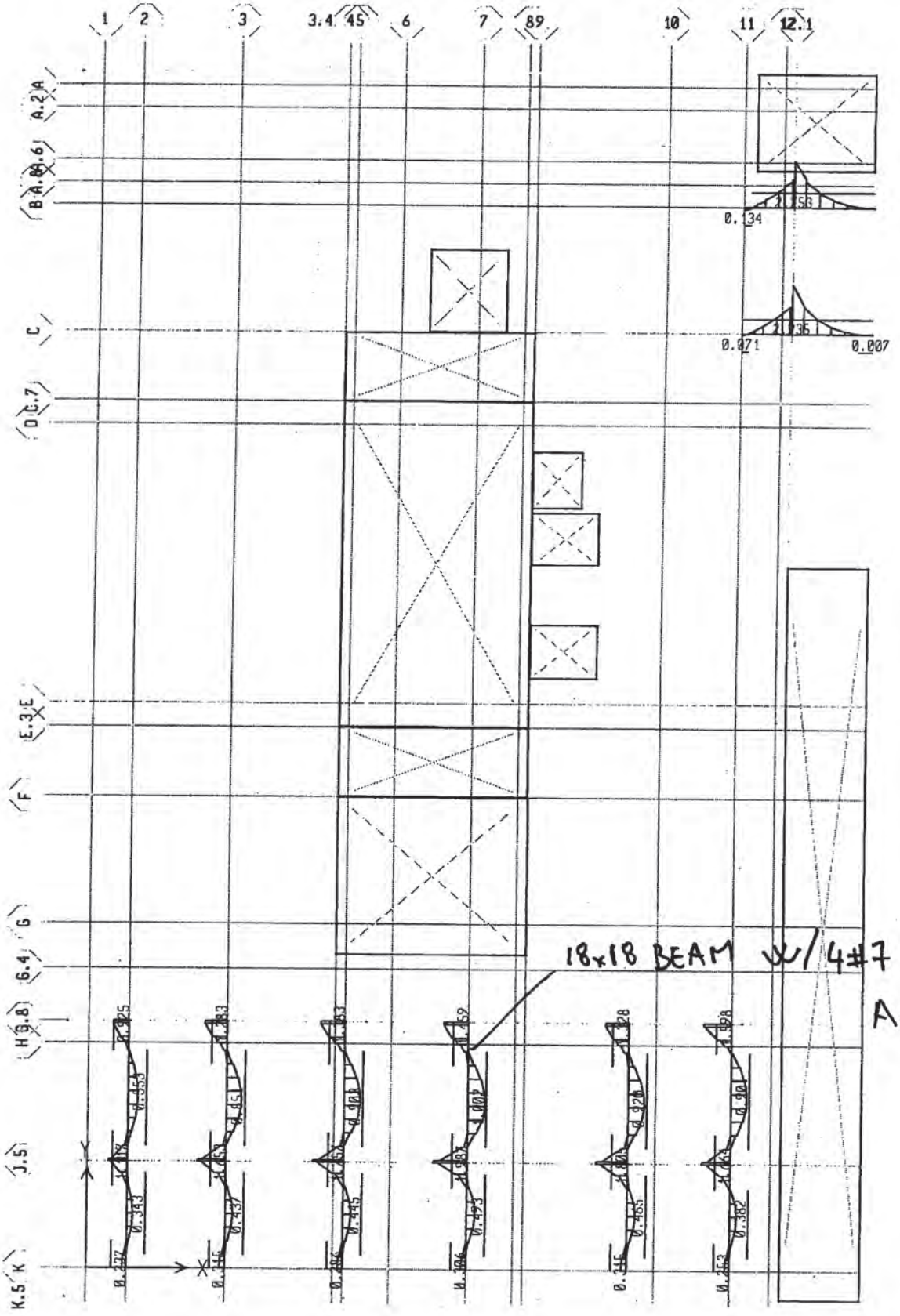
WALL REACTIONS

WALL	LOAD	FZ	MX	MY
1	L	127.46	-2563.257	0.000
1	DL	286.73	-5761.649	0.000
3	L	103.43	-1120.156	0.000
3	DL	232.68	-2515.311	0.000
5	L	33.04	0.000	448.510
5	DL	74.35	0.000	1008.804
7	L	8.73	0.000	-480.053
7	DL	20.12	0.000	-1062.738
9	L	37.74	-1964.090	-1091.776
9	DL	85.42	-4490.800	-2470.747
11	L	45.89	-960.220	601.231
11	DL	106.31	-2541.611	1508.058
13	L	44.93	1930.781	-1074.936
13	DL	101.09	4344.398	-2418.692
15	L	18.35	1504.751	998.341
15	DL	39.70	3300.195	2231.210
17	L	176.61	-2047.104	-5098.576
17	DL	242.46	1862.908	-8339.580
19	L	214.54	-3316.029	3022.471
19	DL	282.40	1210.600	6709.072
21	L	120.99	80.575	-6837.495
21	DL	272.22	185.043	-15383.453
23	L	139.57	5311.587	4445.688
23	DL	314.32	12056.091	9927.567
27	L	36.06	-1181.093	-1089.807
27	DL	81.12	-2657.445	-2450.260
29	L	301.09	2802.374	-4207.260
29	DL	285.48	2843.426	-3802.895
2	L	-25.33	0.000	-358.374
2	DL	-56.99	0.000	-806.983
6	L	-26.87	0.000	-448.143
6	DL	-60.44	0.000	-1007.424
18	L	54.54	667.111	-2719.141
18	DL	122.74	1496.171	-6123.846
22	L	53.47	650.492	2608.867
22	DL	120.35	1460.340	5873.930
26	L	50.58	-785.869	-2373.531
26	DL	113.82	-1768.255	-5340.615
30	L	44.54	-590.820	2648.230
30	DL	99.91	-1317.228	5966.472
4	L	65.00	-27670.266	-1172.941
4	DL	92.81	-18655.153	-1629.634
10	L	63.15	-1240.399	4955.941
10	DL	142.09	-2790.136	11157.921

8.3-23

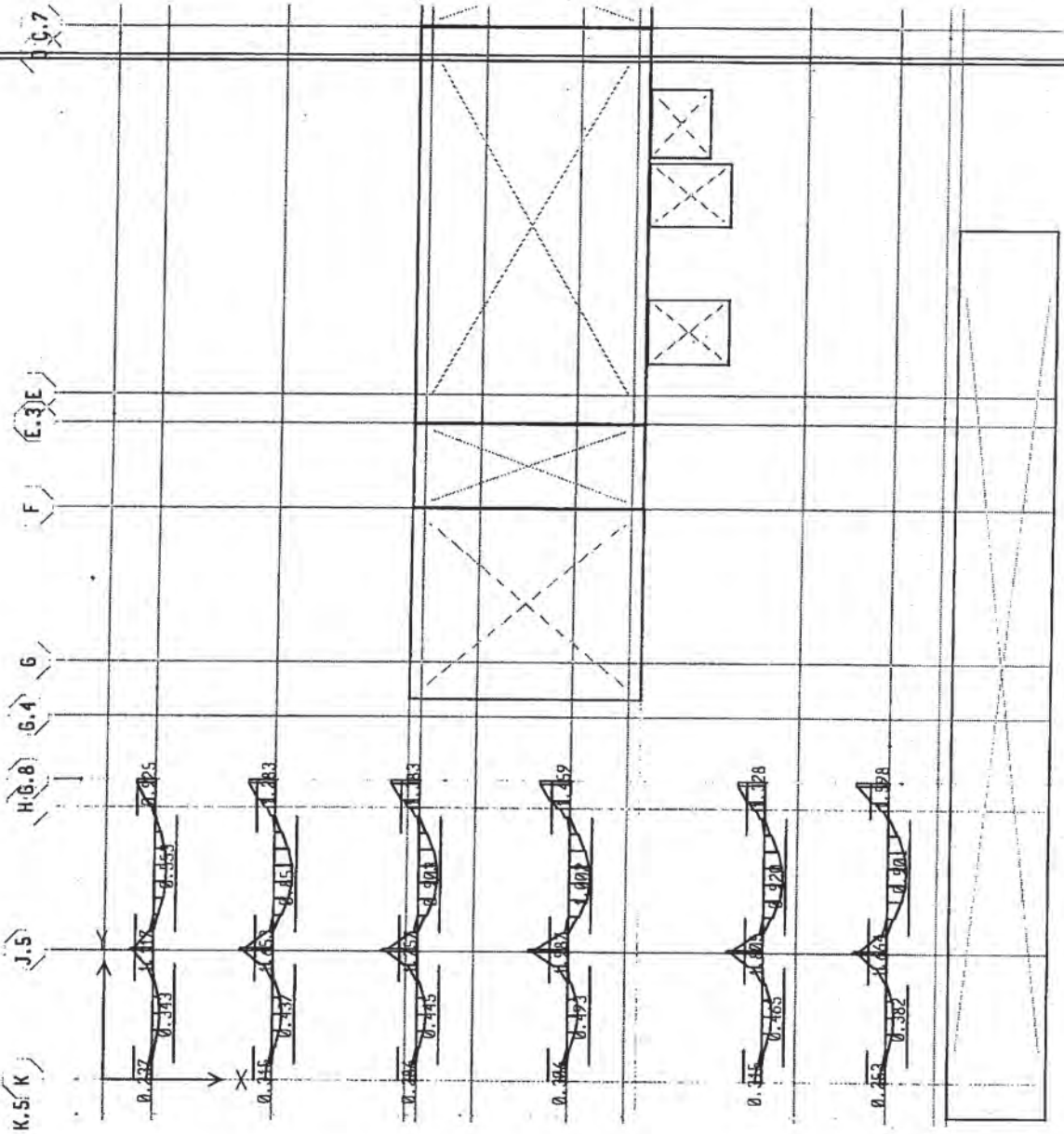
SAFE

BEAM DESIGN (L1)



SAFE v8.0.6 - File: 4069-JP-Tower_L1_06 - May 19,2005 9:18 - Scale: Fit to Page
Beam Flexural Reinforcement (Sq-in) - lb-ft Units

8.3-24


D.7
E.3 E
F
G
G.4
H 6.8
J.5
K.5 K

6.4

COLUMN DESIGN (L1) TOWER

```
OOOOOOO    OOOOO    OOOOO    OOOOO    OOOOO   OO
OO    OO   OO  OO   OO  OO   OO  OO   OO  OO  OO
OO    OO   OO  OO   OO  OO   OO  OO   OO  OO  OO
OO    OO   OO       OO  OO   OO       OO  OO  OO
OO    OO   OO       OOOOOOO  OO       OO  OO  OO
OOOOOOO    OO  OO   OO  OO   OO  OO   OO  OO  OO
OO         OO  OO   OO  OO   OO  OO   OO  OO  OO
OO          OOOOO   OO  OO    OOOO     OOOO   OOOOO  (TM)
```

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Computer program for the Strength Design of Reinforced Concrete Sections

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General Information:
==========

File Name: F:\PROJECTS\4069\PCA\TOWER\L1COL\B01-03.COL
Project: 4069
Column: B4-24x48" Engineer: JP
Code: ACI 318-95 Units: English

Run Option: Investigation Slenderness: Considered
Run Axis: X-axis Column Type: Structural

Material Properties:
==========

f'c = 7 ksi fy = 60 ksi
Ec = 3043 ksi Es = 29000 ksi
fc = 5.95 ksi Rupture strain = Infinity
Ultimate strain = 0.003 in/in
Beta1 = 0.7

Section:
==========

Rectangular: Width = 18 in Depth = 18 in

Gross section area, Ag = 324 in^2
Ix = 8748 in^4 Iy = 8748 in^4
Xo = 0 in Yo = 0 in

Reinforcement:
==========

Rebar Database: ASTM A615

Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)	Size	Diam (in)	Area (in^2)
# 3	0.38	0.11	# 4	0.50	0.20	# 5	0.63	0.31
# 6	0.75	0.44	# 7	0.88	0.60	# 8	1.00	0.79
# 9	1.13	1.00	# 10	1.27	1.27	# 11	1.41	1.56
# 14	1.69	2.25	# 18	2.26	4.00			

Confinement: Tied; #3 ties with #10 bars, #4 with larger bars.
phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.7

Layout: Rectangular
Pattern: All Sides Equal (Cover to transverse reinforcement)
Total steel area, As = 8.00 in^2 at 2.47%
8 #9 Cover = 1.5 in

Slenderness:
==========

Sway Criteria:

X-axis: Braced column.

Column	Axis	Height ft	Width in	Depth in	I in^4	f'c ksi	Ec ksi
Design	X	14.75	18	18	8748	7	3043
Above	X	(no column specified...)					
Below	X	(no column specified...)					

X-Beams Location	Length ft	Width in	Depth in	I in^4	f'c ksi	Ec ksi
Above Left	30	30	12	4320	7	1000
Above Right	30	30	12	4320	7	1000
Below Left	30	36	12	5184	7	1000
Below Right	30	36	12	5184	7	1000

8.3-27

Effective Length Factors:

Axis	Psi(top)	Psi(bot)	k(Braced)	k(Sway)	klu/r
X	11.737	9.781	1.000	(N/A)	34.06

Moment Magnification Factors:

Stiffness reduction factor, phi(K) = 0.75
Cracked-section coefficients: cI(beams) = 0.35; cI(columns) = 0.7

0.2*Ec*Ig + Es*Ise (X-axis) = 1.28e+007 kip-in^2

X-axis	Braced				Sway	
Ld/Comb	Pc(kip)	Betad	Cm	Delta	Pc(kip)	Delta
1 U1	2776	0.454	1.000	1.154	--- N/A ---	

Load Combinations:

U1 = 1.400*Dead + 1.700*Live + 0.000*Lateral

Service Loads:

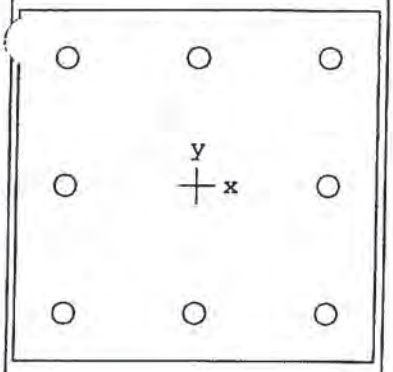
No.	Load Case	Axial Load kip	Mx @ Top k-ft	Mx @ Bot k-ft	My @ Top k-ft	My @ Bot k-ft
1	Dead	90.0	0.0	0.0	0.0	0.0
	Live	89.0	0.0	0.0	0.0	0.0
	Latl	0.0	0.0	0.0	0.0	0.0

Factored Loads and Moments with Corresponding Capacities: (see user's manual for notation)

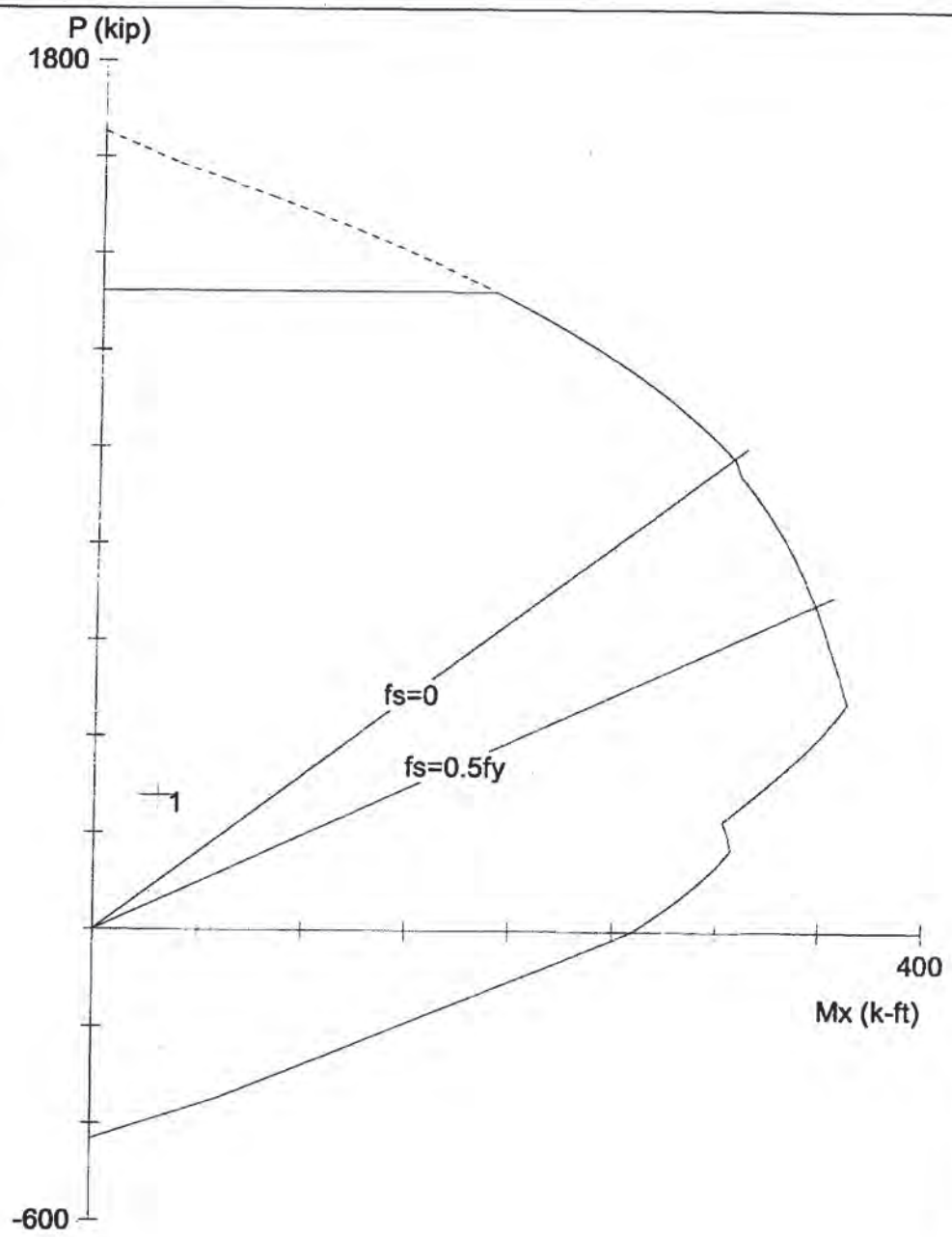
No.	Load Combo	Pu kip	Mux k-ft	fMnx k-ft	fMn/Mu
1	1 U1	277.3	30.4	317.7	10.454

*** Program completed as requested! ***

8.3-28



18 x 18 in



Code: ACI 318-95

Units: English

Run axis: About X-axis

Run option: Investigation

Slenderness: Considered

Column type: Structural

Bars: ASTM A615

Date: 05/19/05

Time: 10:00:36

PCACOL V3.00 (PCA 1999) - Licensed to: Licensee name not yet specified.

File: F:\PROJECTS\4069\PCA\TOWER\L1COL\B01-03.COL

Project: 4069

Column: B4-24x48"

Engineer: JP

f'c = 7 ksi	fy = 60 ksi	Ag = 324 in^2	8 #9 bars
Ec = 3043 ksi	Es = 29000 ksi	As = 8.00 in^2	Rho = 2.47%
fr = 5.95 ksi	e_rup = Infinity	Xo = 0.00 in	Ix = 8748 in^4
e_u = 0.003 in/in		Yo = 0.00 in	Iy = 8748 in^4
Beta1 = 0.7		Clear spacing = 5.43 in	Clear cover = 1.88 in

8.3-29

Confinement: Tied phi(a) = 0.8, phi(b) = 0.9, phi(c) = 0.7