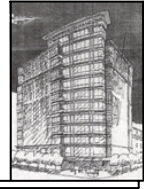


EXECUTIVE TOWER
NW WASHINGTON, DC



SEAN HOWARD
STRUCTURAL

APPENDIX E

Punching Shear Check

EXECUTIVE TOWER NW WASHINGTON, DC



SEAN HOWARD
STRUCTURAL

$\alpha_s =$ 20 corner column
30 edge column
40 interior column

$\beta_p = (\alpha_s d / b_o + 1.5) \longrightarrow$ (Lesser of two)
3.5

$V_c = (\beta_p (f_c)^{1/2} + 0.3 f_{pc}) * b_o * d + V_p$
 $2 * (f_c)^{1/2} * b_o * d$

$V_s = A_v * f_y * d / s$

	Size (in x in)	d (in)	b _o (in)	f _{pc} (psi)	f _c (psi)	α _s	β _p	V _c (lb)	ØV _c (lb)	V _u (lb)	check?	V _s w/ #4@6'	new ØV _c (lb)	check?
1	22'Ø	14	74	260	4000	20	3.5	131045	98284	86300	OK			
	20x20	14	58	260	4000	20	3.5	102711	77033	86300	no good	24000	95033.1	OK
2	24x18	14	88	190	4000	30	3.5	155837	116878	114000	OK			
3	24x16	14	84	150	4000	30	3.5	148754	111565	86900	OK			
4	24x16	14	84	150	4000	30	3.5	148754	111565	101000	OK			
5	22'Ø	14	74	300	4000	20	3.5	131045	98284	69900	OK			
	20x20	14	64	300	4000	20	3.5	113336	85002	69900	OK			
6	30x16	14	148	220	4000	40	3.5	262090	196567	183000	OK			
7	18x18	14	128	180	4000	40	3.5	226672	170004	110000	OK			
8	20x20	14	136	225	4000	40	3.5	240839	180629	181000	no good	24000	198629.3	OK
9	24x16	14	84	360	4000	30	3.5	148754	111565	73200	OK			
10														
11														
12	24x16	14	84	270	4000	30	3.5	148754	111565	79900	OK			
13	24x24	14	152	270	4000	40	3.5	269173	201880	191000	OK			
14														
15														
16	20x20	14	136	200	4000	40	3.5	240839	180629	142000	OK			
17	24x12	14	128	125	4000	40	3.5	226672	170004	111000	OK			
18														
19														
20	24x12	14	128	250	4000	40	3.5	226672	170004	81100	OK			
21														
22														
23	20x20	14	136	150	4000	40	3.5	240839	180629	174000	OK			
24	24x24	14	152	200	4000	40	3.5	269173	201880	207000	no good	24000	219879.8	OK
25	24x16	14	84	350	4000	30	3.5	148754	111565	64500	OK			
26	24x16	14	84	300	4000	30	3.5	148754	111565	90400	OK			
27	20x20	14	136	200	4000	40	3.5	240839	180629	151000	OK			
28	20x20	14	136	200	4000	40	3.5	240839	180629	155000	OK			
29	20x20	14	136	200	4000	40	3.5	240839	180629	174000	OK			
30	20x20	14	136	225	4000	40	3.5	240839	180629	165000	OK			
31	20x20	14	136	175	4000	40	3.5	240839	180629	137000	OK			
32	20x20	14	136	200	4000	40	3.5	240839	180629	124000	OK			
33	22'Ø	14	74	225	4000	20	3.5	131045	98284	78100	OK			
	20x20	14	62	225	4000	20	3.5	109794	82346	78100	OK			
34	24x16	14	84	190	4000	30	3.5	148754	111565	82100	OK			
35	24x16	14	84	160	4000	30	3.5	148754	111565	79600	OK			
36	22x22	14	144	150	4000	30	3.5	255006	191255	89200	OK			
37	22x22	14	144	170	4000	30	3.5	255006	191255	72100	OK			
38	22x22	14	144	180	4000	30	3.5	255006	191255	81000	OK			