## <u>201707</u> ODVSSDV avrilinghon, val



**Aaron Snyder** Structural Option Advisor: M. Kevin Parfitt, PE

## Structural Technical Report IIII November 21, 2006 Lateral System Analysis and Confirmation Design

## **Executive Summary:**

The Odyssey is a 475,650 SF luxury residential complex located in Arlington, Virginia. The site features 2- 3 story townhouses adjacent to 3 levels of underground parking with adjoining skewed towers rising from the lower parking levels clad with glass curtain walls and brick facade. There are 16 stories of apartments with suites located on the top floors and retail space on the ground floors. The Odyssey is a perfect example of the latest designs for the rising market of luxury apartment and condominium construction with a structural system almost entirely composed of concrete. The floor systems are 2-way flat slabs and the lateral systems are shear walls located throughout the plan of the Odyssey and concrete slab frames.

The lateral system analysis and confirmation design report is a look into the design and interaction of lateral design elements. Lateral load cases analyzed in the Structural Concepts and Existing Structural Conditions report are distributed throughout the lateral elements by logical loading paths through stiffness. Lateral elements are then checked by strength, drift, and overturning effects from the resolved lateral load distribution.

The Odyssey consists of two lateral resisting systems integrated into the building design. An assumption that shear walls controlled the lateral design was made to check if in fact the two systems worked as dual system or were redundant. The analyses and checks provided a better understanding of individual contributions of each system. The design shear reinforcement for shear walls was inadequate to resist the full distribution of the direct and eccentric loading. The nominal strength of the shear wall would only contribute to a third of the distributed load. An overturning check revealed the requirement of the slab frame contribution to distribute moment throughout the foundation with a resulting uplift by the shear wall lateral reaction. A further analysis into the combined deflections of the dual system must be addressed to determine the interaction of each system upon one another, thereby reducing overall drift.

A general conclusion can be made that the lateral system design of the Odyssey is two systems working together to distribute lateral loading. The interaction and economical implications of a dual system may be the basis of a proposal to study and redesign the system.

#### Introduction:

The Odyssey is located in Arlington, Virginia adjacent to the Court district and several blocks from the commercial center of downtown Arlington. The primary use of the building is residential apartments and luxury condominiums located throughout the 1<sup>st</sup>-15<sup>th</sup> levels of the tower structure. Retail spaces are designed into the upper garage and 1<sup>st</sup> levels running along the 16<sup>th</sup> street which leads directly out of downtown Arlington.

The site for the Odyssey was chosen for its ideal location within the Arlington and proximity to the metro train with access into Washington D.C. within minutes. It is zoned under the "Special Affordable Housing Protection District" ("SAHPD") designation and requires the replacement of existing affordable residential units demolished on site to build the Odyssey. A row of multistory townhouses is incorporated into the design of the overall structure of the building on account of this zoning ordinance.

Townhouses are built adjacent to the 3 sub-grade garage levels with a one-way flat slab concrete structural system. The lower garage level is is composed of 4" concrete slab (f'c=5ksi) on grade and reinforced with  $6x6 - w1.4 \ge 0.4 \le 0.4$  wire mesh. Foundation structures include two 54" mat foundations; however the typical foundations are concrete footings of various rectangular sizes, depths, and reinforcement. The remaining lower garage levels through the first floor are primarily 8.5" conventionally reinforced 2-way concrete flat slabs with drop panels typically extending 4-1/2" below the floor slab. The tower structure of the Odyssey makes up the majority of the 1<sup>st</sup>-16<sup>th</sup> levels with custom residential units ranging from studios to luxury condominiums. The overall height of the towers from grade is 167' with a pool terrace on the 15<sup>th</sup> level extending over the roof of the east tower. The floor system of the towers is primarily an 8" 2-way post tensioned flat concrete slab (f'c=5ksi) with continuous bottom reinforcement of #4 bars @ 24" o.c in each direction.

The lateral systems of the Odyssey are concrete shear walls with groupings throughout the building and integrated concrete slab frames. A set of walls surround elevator shafts at the central core of the Odyssey with another set located a stair well in the west wing of the building. The third and final shear wall is located in the east wing oriented at the askew angle of the adjoined towers.



#### Lateral System:

The lateral system of the Odyssey is a dual system of concrete shear walls and slab frames. All of the wall ends are integrated with columns, typically 18"x26" and 14"x28" with varying strengths of 8000psi on lower levels and 5000psi throughout the remaining residential levels. A set of C- channel walls each surround 2 elevator shafts at the core of the adjoining towers. These shear walls extend from the foundation 3 levels below grade to the 4<sup>th</sup> level of the Odyssey and have thicknesses of 10" and 14". Labeled shear walls A & B, the distribution of shear to these walls is minimal with approximately half of their gross height below grade. With the central shear walls dropping off at the 4<sup>th</sup> level, the interaction of the slab frame will begin to contribute more lateral resistance in combination with the remaining shear walls. Slab frames are composed of columns and the column strip slab between adjacent columns. The relative joint stiffness resists lateral loading to the frame and is achieved by added reinforcement. The Odyssey has 8" slabs with added #4 bar reinforcement.

Shear walls C & C1, are located at the extent of the west tower wing. They rise on adjacent sides of a stair-well with wall C extending from the 1<sup>st</sup> level to the roof, while wall C1 terminates on the 10<sup>th</sup> level. These walls receive a larger distribution of lateral and torsional shear than the core walls on account of there eccentric orientation to the concentration of lateral story load at the center of mass. On the opposite extent of the Odyssey in the north wing of the east tower is shear wall E with a 10" thickness and overall length of 30' rising from the 1<sup>st</sup> to 14<sup>th</sup> levels. The wall is oriented with the shorter dimension of the east tower and as a result is askew to primary lateral loading directions. On the 15<sup>th</sup> level is the roof top pool terrace with wall E located directly under the pool acting in both gravity and lateral capacities. An intricate distribution is associated to shear wall E considering the configuration to resisting both lateral load directions. A plan summary of individual shear walls is located in for further reference and their distribution throughout the building plan is depicted below.



#### Gravity loads:

The gravity loads for the lateral analysis were determined in accordance with ASCE7-02. General assumptions for several dead loads were made with interpretation of details and structural component averages. A list of relevant gravity loads follow:

Gravity: (psf)		
Floor Live:		
Resi	dential Units & Corridors	40
Publ	ic Areas	100
Mec	h. Room	150
Pool	Terrace	100
Park	ing Garage	50
Stair	rs and Exits	100
Roof Live:		
Min	. Roof Live Load	30
Roof Snow:		
Root	f Snow Load	21
Floor Dead:		
Cone	crete Slab	100 –150 (varied thickness 8"-12")
Parti	itions	8
Floo	ring	4
Ceili	ing	5
Mec	hanical	10
Bear	ns/Columns	(* varies)

#### Load Combinations:

Seismic loading was found to control the lateral design of the Odyssey and is further detailed in the following section. The strength design of the building components, structures, and foundations is determined from load combinations specified in accordance with ASCE7-02 section 2.3. A list of the combinations found in accordance with section 2.3 is listed below. A simplified check of each case is summarized in Appendix C with load combination II controlling. This takes into account of gravity loading design, however relevant seismic contributions are relevant in lateral design.

I.	1.4D	V.	1.2D + 1.0E + L + 0.2S
II.	1.2D + 1.6L + 0.5(Lr or S)	VI.	0.9D + 1.6W
III.	1.2D + 1.6L + (Lr or 0.8W)	VII.	0.9D + 1.0E
IV.	1.2D + 1.6L + L + .5(Lr or S)		

#### Lateral Design

The lateral loads on the Odyssey were determined in accordance with design procedures specified in ASCE7-02. Detailed analyses are found in the Structural Concepts and Existing Structural Conditions report. The lateral load analyses only considered the exposed levels above grade which receive loading upon the building diaphragm. Wind loads were calculated by the analytical procedure with loading summaries located in the Appendix D sections. Seismic loads were determined through the equivalent lateral force procedure outlined in Section 9 of ASCE7-02. A summary of resolved seismic and wind loads are listed below. The seismic loads were found to control the majority of loading in both primary lateral directions. Wind was found to control on the lower levels but was overtaken by seismic for the remaining levels. An ETABS model of the shear wall system was constructed for an analysis and comparison of alternative loading combinations which ultimately did not control. Wind loading at 45° to the primary lateral directions was considered based on possible implications of the irregular building shape. Design wind load case III specified in section 6 of ASCE7-02 as 75% of both primary lateral directions was also considered. The distributions of seismic story forces throughout the building are shown in subsequent diagrams on the next page. These forces cumulate into shear story forces that will be distributed throughout the various shear walls within the structure for the lateral analysis.

Vertical Di	istribution	of Seismic	Forces
	heol	Shear	Moment
N-S	Fv	W	My
	(kine)	(kine)	(ft-kine)
 Deef, X	(NIPS) 100	(Kips)	(IFRIPS) 22,720
 16	139	120	22,730
 10	201	240	29,009
 10	242	540	32,804
 14	200	702	20,000
 10	107	702	23,990
 12	107	909	18,913
 10	140	1242	12,200
 10	140	1343	10146
 3	123	1431	7 670
 7	02	1721	6.672
 ، ۵	33	1004	2,073
 6	70	1024	2,030
 	10	1055	2,440
 4	43	2001	1,303
 3 2	20	2001	100
 	10	2030	199
	-	2043	- 7
			215347
	Load	Shear	Moment
 E-W	Fx	Vx	Mx
 Level, x	(kips)	(kips)	(ft-kips)
Roof	139	0	22,730
16	201	139	29,559
15	242	340	32,904
14	200	582	25,085
13	207	782	23,996
12	187	989	19,913
 11	167	1176	16,258
10	148	1343	13,015
 9	129	1491	10,146
 8	111	1620	7,670
 7	93	1731	5,573
6	76	1824	3,830
 5	59	1899	2,440
 4	43	1958	1,385
 3	28	2001	645
 2	15	2030	199
 1	-	2045	-
			Σ =

Vertical D	)istribution (	of Wind F	orces
	Wind Load	Shear	Moment
N-8	FX	Vx	Mx
Level x	(6)	(6)	(ft - k)
Roof	27	27	(n - iy
16	41	70	600
10	32	110	1445
1.1	36	1/6	2617
13	32	178	3977
12	32	211	5639
11	32	243	7604
10	32	275	9869
9	31	306	12430
8	31	336	15282
7	30	366	18418
6	29	395	21832
5	28	423	25516
4	27	450	29466
3	26	477	33669
2	30	506	38116
1	-	-	44865
			Σ=
			271333.8
E-M	Wind Load	Shear	Moment
	FA (IA	44	74 LA
Level, X	(K)	(K)	(п-к)
ROOT	12	12	- 400
10	14	20	190
10	25	72	402
19	22	102	1542
12	31	135	2508
11	31	166	3767
10	31	197	5318
9	30	228	7157
8	30	257	9280
7	29	286	11680
6	28	315	14350
5	28	342	17284
	27	369	20476
4	<u></u> <u></u> <u></u> <u></u> <u></u>		
4 3	25	394	23915
4 3 2	25 29	394 423	23915
4 3 2 1	25 29 -	394 423 -	23915 27592 33227
3 3 2 1	25 29 -	394 423 -	23915 27592 33227 Σ=

	roof			/	_ 139 K
	level 16	5		1	_ 201 К
			level 15	1	242 k
			level 14		200 k
			level 13		207 k
			level 12		187 K
			level 11	/	167 K
			level 10	/	 148 k
			level 9	/	– 129 k
			level 8	/	_ 111 K
			level 7	/	_ 93 K
			level 6	/	76 K
			level 5	/	_ 59 K
			level 4	/	43 K
			level 3	/	28 K
			level 2	/	_ 29 K
			level 1		2074







The distribution of seismic shear forces to the shear walls was carried out by a simplified analysis by proportion of individual wall rigidities on each floor. This distribution assumes a design scenario in which the shear walls will control the lateral system and receive full lateral and torsional shears. The intent of this analysis is to determine the degree to which the slab frame contributes to the lateral system and weather the shear walls control the design. Rigidity of each wall accounts for thickness, modulus of elasticity, and the individual wall height to length ratio. The modulus of each wall is constant with concrete strengths of each wall identical throughout the height of the building.

Ec = 57000(f<sup>\*</sup>c)<sup>.5</sup> f<sup>\*</sup>c = 4000psi Rigidity:  $R = Et(4(h/L)^3+3(h/L))^{-1}$  Distribution of shear to wall E, the skewed wall in the North wing of the East tower, will be proportionate to the rotation from the primary loading direction.

Shear wall E: 
$$R_{E-W}=R\cos(\theta)$$
  $R_{N-S}=R\sin(\theta)$ 

The direct lateral load distribution developed reasonable story loads upon each shear wall proportionate to the overall wall lengths. The walls located on the wings of the building experienced a shear increase on the  $4^{th}$  level resulting from a redistribution of force from the loss of core walls. This shear redistribution would only reason to increase the reinforcement at this level where the design remains constant then decreases from #6 to #5 bars. This suggests that shear might be redistributed to an alternative system, thereby justifying this design of the shear reinforcement. This design limit of reinforcement is further addressed in the design check section of the report

The eccentric placement of the shear walls throughout the building suggests a large contribution of shear as a result of torsional effects. The distribution of torsional shear in the N-S shear walls was determined from the effects of loading and rotation from the center of rigidity to an eccentric shear wall. The concentration of lateral load was assumed at the center of mass determined by the ETABS model shown below. The distribution of torsional was approximated by a typical percentage of the shears distributed on floors with similar centers of rigidity. Torsional shear distributions upon the eccentric walls ranged from 40% to >100% of the direct shear. The distribution and calculations of story shears are located in Appendix E.





### **Design Spot Checks**

#### Strength Check:

The shear wall reinforcement was checked for wall C.1 which is located in the wing of the east tower set at an eccentric location to the concentrated lateral shear. The intent of checking this particular wall is to determine weather the reinforcement of the wall will have the strength to resist the combination of direct and torsional shear without additional resistance from the slab frame.

The reinforcement design was checked in accordance with shear strength calculations specified in ACI318 section 11.10, special provisions for walls. The design limitation is based on the factored shear load such that:

$$Vu \le \Phi Vn$$
 where,  $Vn = Vc + Vs$ .

The nominal shear strength provided by concrete walls which are subjected to vertical compression is taken as:

$$Vc = 2(f'c)^{.5} hd$$
 where,  $d = .8l_w$ 

The nominal shear strength provided by the horizontal reinforcement within the wall is determined by:

$$Vs = A_v f_v d/s$$

The design check reveals that the walls are under reinforced for the direct and torsional shear distribution. Speculations earlier of interaction between the dual systems at critical levels are apparent when comparing the design strength to the distributed lateral shear. More than 2/3 of the story shear would need to be redistributed into the slab frame for the present reinforcement design of the shear walls. The design check shows that shear walls do not control the lateral system of the Odyssey and it is likely that the slab frame contributes in the distribution of lateral forces.

Design S	Strength S	Spot Chec	:k	fc =	4000	fy =	60	L=	13.875	Φ=	0.75	
	Shear Wal	l: C.1			(psi)		(ksi)		(ft)			
	h	d	#Bar	Av	S	Vc	Vs	Vn	ΦVn	Vu	Check	
Level	(in)	(in)		(in2)	(in)	(k)	(k)	(k)	(k)	(k)		
9	10	133.2	#5	0.31	12	168.5	206.5	374.9	281.2	695.7	Х	
8	10	133.2	#5	0.31	12	168.5	206.5	374.9	281.2	775.8	Х	
7	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	848.2	Х	
6	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	914.1	Х	
5	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	975.7	Х	
4	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	1036.3	Х	
3	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	600.1	Х	
2	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	614.8	Х	
1	10	133.2	#6	0.44	12	168.5	293.0	461.5	346.1	378.5	Х	

The overturning moment by the lateral effects upon eccentric shear walls was considered for this analysis. The shear walls will contribute a greater overturning moment to the structure by combined direct and torsional shears. These walls only extend from the 1<sup>st</sup> level and will distribute the overturning loads into the subsequent concrete floor system below grade. Overturning forces through a combined effect of both the shear walls and the slab frame will need to be considered to analyze full overturning effects on the mat foundation in the lower garage level. This analysis will consider the shear wall effects alone to determine the requirement, if any, of a contributing slab frame integrated with the shear walls. The dead load on account of both the shear wall itself and of accumulated tributary area floor loads was calculated as P = 3675k. The overturning moment was calculated from the resulting shear distribution to wall C.1, with M = 243980 ft –k.

 $P_{res} = M/L_w - P = 13909 k$ 

The result of this analysis does not take into account of added structural weight below grade. This includes the 54" mat slab which ties into the frame columns which are integrated into the shear above walls. The magnitude of the uplift force suggests that a significant contribution of the slab frame is required in resisting the lateral loading. A combined lateral system will distribute the overturning moment over a larger area than the shear wall alone.

#### Drift:

A drift analysis was calculated for an eccentric shear wall. Shear wall C.1 will experience deflection due to both flexure and shear cause by the distributed lateral loads acting at each level. The story drifts were calculated in Appendix E by the following deflection equations:

 $\Delta$ Flexure = Ph<sup>3</sup>/3EI  $\Delta$ Shear = 2.78Ph/A<sub>w</sub>E

The maximum story drift for the shear wall was found to be  $\Delta = 0.10^{\circ}$  which more than satisfies the BOCA 96 drift limitation of H/240. These results are counterintuitive to the before mentioned theory in which the slab frame and shear walls act as an integral lateral system. Based on the minimal deflections, the shear walls appear to act alone in resisting the lateral deflections. A further drift analysis of a combined system may provide a better understanding of these results. An analysis of combined deflected behaviors producing interaction forces between the lateral systems may show decreases in overall drift of a dual system apposed to individual systems A schematic of the interactions is show below.



### Summary/Conclusions

The Odyssey consists of two lateral resisting systems integrated into the building design. An assumption that shear walls controlled the lateral design was made to check if in fact the two systems worked as dual system or were redundant. The analyses and checks provided a better understanding of individual contributions of each system. The design shear reinforcement for shear walls was inadequate to resist the full distribution of the direct and eccentric loading. The nominal strength of the shear wall would only contribute to a third of the distributed load. An overturning check revealed the requirement of the slab frame contribution to distribute moment throughout the foundation with a resulting uplift by the shear wall lateral reaction. A further analysis into the combined deflections of the dual system must be addressed to determine the interaction of each system upon one another, thereby reducing overall drift.

A general conclusion can be made that the lateral system design of the Odyssey is two systems working together to distribute lateral loading. The interaction and economical implications of a dual system may be the basis of a proposal to study and redesign the system.

# Appendix

Appendix – A	 Floor Plan
Appendix – B	 Shear Wall Plan Summary
Appendix – C	 Load Case Summary
Appendix – D	 Lateral Load Summary
Appendix – E	 Lateral Distribution
Appendix – F	 Drift Check

**References:** 



## Appendix B – Shear Wall Plan Summary

#### Shear wall A:

Resists both lateral load directions: North-South & East-West. Location: Surrounds north-core elevator shafts Range: B3 - 4<sup>th</sup> level Size: North-South walls - 1'-2" x 10' Integrated columns - 14"x 28" Column Reinforcement - 6 #9 bars East-West wall - 10"x17'-10" Wall Reinforcement: #5 & #6 bars @ 12"

#### Shear wall B:

Resists both lateral load directions: North-South & East-West. Location: Surrounding south-core elevator shafts Range: B3 - 4<sup>th</sup> level Size: North-South walls - 1'-2" x 10'-0" Integrated into columns - 14"x 28" Column Reinforcement - 6 #9 bars East-West wall - 10"x17'-0" Wall Reinforcement: #5 & #6 bars @ 12"

Shear wall C, C1: Resists lateral load directions: North-South Location: Surrounding West stair tower. Range: 1st - 16<sup>th</sup> level C1 terminates at 10<sup>th</sup> level Size: North-South walls - 10"x 13'-10.5" Ends attached to columns – 18"x 26" and 24"x 24" Column Reinforcement – (varies) #11 bars Wall Reinforcement: #5 & #6 bars @ 12"

#### Shear wall E:

Resists lateral load directions: North West-South East Location: Column line X4 - North side of East tower Range: 1st - 14<sup>th</sup> level Size: North-South walls - 10"x 29'-5" Ends attached to columns – 18"x 26" Column Reinforcement – (varies) #11 bars Wall Reinforcement: #5 & #6 bars @ 12"



13







			⊨	1496	1631	3169	0882	3248	3228	3208	3189	3170	3152	3134	3117	3100	3085	3070	3056		
			N	1415	1554	3103	2913	3326	3378	3430	3481	3530	3579	3627	E29E	3719	3762	3804	3851		
		N 2-3	>	1970	3413	5188	4552	5186	5166	5147	5127	5109	5090	5072	5055	5039	5023	5008	4994		
	AD CASES	2 SECTIO	≥	1947	3336	5230	4585	5265	5316	5368	5419	5469	5517	9999	5611	2995	2700	5742	5790		
	TO/	ASCE7-0		2094	3212	5384	4352	4979	4979	4979	4979	4979	4979	4979	4979	4979	4979	4979	4979		
			=	1888	3995	5654	4819	5534	5534	5534	5534	5534	5534	5534	5534	5534	5534	5534	5534		
			_	2110	2224	4554	4169	4731	4731	4731	4731	4731	4731	4731	4731	4731	4731	4731	4731		
	×	Wind	(K)	37	78	110	146	178	211	243	275	306	336	366	395	423	450	477	506		
	ш	Earthquake	(K)	139	201	242	200	207	187	167	148	129	111	63	76	59	43	28	15		
	s	Snow	(K)	112		210														-	
	L	Live Roof	(K)	160		300															
	Ц	Live Load	(K)		1305	1001	778	924	924	924	924	924	924	924	924	924	924	924	924		
(psf) 40 150 100 30 30 21 21 21 21 21 21 30 30 30 30 30 30 30 30 30 30 30 30 30	DL	Dead Load	(K)	1507	1589	3253	2978	3379	3379	3379	3379	3379	3379	3379	3379	3379	3379	3379	3379		
Combon	A	Gross Area	(ft <sup>2</sup> )	5332	9711	19453	19453	23111	23111	23111	23111	23111	23111	23111	23111	23111	23111	23111	23111		
Live Load: Res./Corr. Public Pool Snow Load (			Level	ROOF	16	15	14	13	12	11	10	<del>م</del>	ω	7	ى	ъ	4	m	2	Ļ	

# Appendix C – Load Case Summary

# Appendix D – Lateral Load Summary

					Load	Shear	Moment
N-S	w.	h.	w.h."	С.,	F.	٧.	М,
Level, x	(kips)	(8)			(kips)	(kips)	(ft-kips)
Roof	1507	163 🗥	732.728	0.068	139		22.73
16	2460	147.1	1.055.881	0.098	201	139	29.55
15	3253	136.1	1.270.351	0.118	242	340	32.9
14	2978	125.3	1,051,948	0.098	200	582	25,0
13	3379	116	1,086,958	0.101	207	782	23,9
12	3379	106.63	981,264	0.091	187	989	19,9
11	3379	97.3	877,986	0.082	167	1,176	16,2
10	3379	88	777,134	0.072	148	1,343	13,0
9	3379	78.64	677,920	0.063	129	1,491	10,1
8	3379	69.31	581,518	0.054	111	1,620	7,6
7	3379	60	488,065	0.045	93	1,731	5,5
6	3379	50.65	397,302	0.037	76	1,824	3,8
5	3379	41.32	310,263	0.029	59	1,899	2,4
4	3379	32	227,459	0.021	43	1,958	1,3
3	3379	22.66	149,573	0.014	28	2,001	6
2	3379	13.33	78,520	0.007	15	2,030	1
1						2,045	
	Σ -		Σ -	Σ -	Σ -		Σ -
	50748		10744870	1.000	2045		215:
					Load	Shear	Moment
E-W	w.	h.	w.h.*	с.	F.	٧.	м.
Level, x	(kips)	(ft)			(kips)	(kips)	(ft-kips)
Roof	1507	163	732,728	0.068	139		22.7
16	2460	147.1	1,055,881	0.098	201	139	29,5
15	3253	136.1	1,270,351	0.118	242	340	32,9
14	2978	125.3	1,051,948	0.098	200	582	25,0
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11	3379	97.3	877,986	0.082	167	1,176	16,2
10	3379	88	777,134	0.072	148	1,343	13,4
	3379	78.64	677,920	0.063	129	1,491	10,1
9			581,518	0.054	111	1,620	7,6
<u>9</u> 8	3379	69.31			93	1,731	5,5
9 8 7	3379	69.31	488,065	0.045	001		
9 8 7 6	3379 3379 3379	69.31 60 50.65	488,065 397,302	0.045	76	1,824	3,8
9 8 7 6 5	3379 3379 3379 3379 3379	69.31 60 50.65 41.32	488,065 397,302 310,263	0.045 0.037 0.029	76 76 59	1,824 1,899	3,8
9 8 7 6 5 4	3379 3379 3379 3379 3379 3379 3379	69.31 60 50.65 41.32 32	488,065 397,302 310,263 227,459	0.045 0.037 0.029 0.021	76 79 43	1,824 1,899 1,958	3,8 2,4 1,3
9 8 7 6 5 4 3	3379 3379 3379 3379 3379 3379 3379 3379	69.31 60 50.65 41.32 32 22.66	488,065 397,302 310,263 227,459 149,573	0.045 0.037 0.029 0.021 0.014	76 76 59 43 28	1,824 1,899 1,958 2,001	3,8 2,4 1,3 6
9 8 7 6 5 4 3 2	3379 3379 3379 3379 3379 3379 3379 3379	69.31 60 50.65 41.32 32 22.66 13.33	488,065 397,302 310,263 227,459 149,573 78,520	0.045 0.037 0.029 0.021 0.014 0.007	76 59 43 28 15	1,824 1,839 1,958 2,001 2,030	3,8 2,4 1,3 6
9 8 7 6 5 4 3 2 1	3379 3379 3379 3379 3379 3379 3379 3379	69.31 60 50.65 41.32 32 22.66 13.33	488,065 397,302 310,263 227,459 149,573 78,520	0.045 0.037 0.029 0.021 0.014 0.007	76 59 43 28 15	1,824 1,899 1,958 2,001 2,030 2,045	3,8 2,4 1,3 6 1
9 8 7 6 5 4 3 2 1	3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379           3379	69.31 60 50.65 41.32 32 22.66 13.33	488,065 397,302 310,263 227,459 149,573 78,520 Σ -	0.045 0.037 0.029 0.021 0.014 0.007 Σ =	76           59           43           28           15	1,824 1,899 1,958 2,001 2,030 2,045	3,8 2,4 1,3 6 1 Σ –

Vertical Distribution of Wind Forces Wind Loading (N-8)         Norment (t)         Wind Load         Wind Load         Wind Load         Shear         Morment (t)           Level         (t)         (t)         (t)         Height (t)         Wind that         Area (ti)         (pst)         (k)         (k)         (t)         (t)-(s)           16         116         146.95         1.35         183         1982         18.3         32         110         144.4           10.66         125.29         9.995         224         2290         15.5         32         178         3976.1           12         9.33         115.96         9.33         224         2090         15.5         32         211         5639.2           11         9.33         77.86.4         9.33         224         2090         14.6         31         306         12241         5639.2           9         9.33         76.84         9.33         224         2090         14.2         30         306         12281.1           6         9.33         50.65         9.33         224         2090         13.2         246         2409         246         2402         246         246         2461	Vertical Distribution of Wind Forces Mind Loading (N-S)         Tributary         Tributary         Tributary         Wind Load         Wind Load         Shear         Moment (k)         Moment (k)										
Wind Loading (N-E)         Tributary         Tributary         Tributary         Wind Load         Wind Load         Moment           Level         (ft,)         (ft,)         (ft,)         Height (ft,)         Width (ft,)         Area (ft,)         (gs)         (g	Mind Loading (N+S)         rub         rub         rub         rub         rub         rub         rub         rub         rub         mail         rub	Vertical Di	istribution of V	Vind Forces							
Story Height         Elevation         Tributary         Tributary         Wind Load         Wind Load         Shear         Momen           Level         (ft.)         (ft.)         Height (ft.)         Wind (ft.)         Area (ft.)         (psf.)         (k)         (k)         (ft.)         (ft.) <th>Story Height         Elevation         Tributary         Tributary         Tributary         Wind Load         Wind Load         Shear         Momen           Level         (ft.)         (ft.)         Height (ft.)         Wind (ft.)         Area (ft.)         (gs.)         (gb.)         (</th> <th>Wind Load</th> <th>ling (N-S)</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	Story Height         Elevation         Tributary         Tributary         Tributary         Wind Load         Wind Load         Shear         Momen           Level         (ft.)         (ft.)         Height (ft.)         Wind (ft.)         Area (ft.)         (gs.)         (gb.)         (	Wind Load	ling (N-S)								
Level         (t)         (t)         Height (t)         Width (t)         Area (t <sup>+</sup> )         (ps)         (k)         (k)         (k)         (t)         (t)           Roof         4         162.95         12         183         2196         16.8         37         37         -           16         114.0.95         13.5         183         1982         16.3         32         110         144           14         10.66         125.29         9.995         224         2239         16         36         146         2616.           13         9.33         116.63         9.33         224         2090         15.5         32         2111         533.           10         9.33         69.91         9.33         78.64         9.33         224         2090         15.4         322         273         968.           9         9.33         78.64         9.33         224         2090         14.8         31         306         12430.           8         9.33         69.91         9.33         224         2090         13.9         28         28465.           16         9.33         51.06         9.33         <	Level         (t)         (t)         Height (t)         Width (t)         Area (t <sup>+</sup> )         (ps)         (k)         (k)         (t)         (t)           Roof         4         162.95         12         183         2196         16.8         37         37         -           16         114.0.95         13.5         1183         2471         16.5         44         78         590.           15         11         135.95         10.83         183         1982         16.3         32         110         144           14         10.66         125.22         9.995         224         2090         15.5         32         178         3976           12         9.33         106.63         9.33         224         2090         15.4         32         243         7603           10         9.33         67.97         9.33         224         2090         14.6         31         336         12488           8         9.33         69.81         9.33         224         2090         13.9         28         322         1431           5         9.33         11.33         224         2090         13.9         28 </th <th></th> <th>Story Height</th> <th>Elevation</th> <th>Tributary</th> <th>Tributary</th> <th>Tributary</th> <th>Wind Load</th> <th>Wind Load</th> <th>Shear</th> <th>Momen</th>		Story Height	Elevation	Tributary	Tributary	Tributary	Wind Load	Wind Load	Shear	Momen
Roof         4         162.95         12         183         2196         16.8         37         37         5           16         16         146.95         1.3.5         183         2471         16.5         41         78         590.           15         11         135.95         10.83         183         2471         16.5         32         110         1444           14         10.66         125.29         9.995         224         2239         16         36         146         2616.           13         9.33         115.96         9.33         224         2090         15.5         32         211         5639.           10         9.33         97.30         9.33         224         2090         14.9         31         306         12437.69.98.           8         9.33         78.64         9.33         224         2090         14.2         30         366         18418.           6         9.33         69.31         9.33         224         2090         13.2         27         450         29465.           3         9.33         22.46         9.33         224         2090         13	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Level	(ft.)	(ft.)	Height (ft.)	Width (ft.)	Area (ft <sup>2</sup> )	(psf)	(K)	(K)	(ft - k)
16         16         146.95         13.5         183         2471         16.5         41         78         500           15         11         135.95         10.83         183         1982         16.3         32         110         1444           14         10.66         125.29         9.995         224         2239         16         36         146         2616         214         233         10         6.36         146         2016         32         211         5639         33         224         2090         15.5         32         211         5639         33         224         2090         15.4         32         243         7603         100         9.33         78.64         9.33         224         2090         14.6         31         336         15281         1336         15281           7         9.33         78.64         9.33         224         2090         14.6         31         336         15281         136         1362         18418         1459         136         1430         14230         136         12430         136         12423         25616         13         1333         11333         124         2090 <td>16         146         146.95         13.5         193         2471         16.5         41         78         590           15         11         135.95         10.83         183         1982         16.3         32         110         1444           14         10.66         19.995         224         2239         16         36         146         2616         212         9.33         106.63         9.33         224         2090         15.5         32         211         5639           11         9.33         97.30         9.33         224         2090         15.4         32         243         7603.           9         9.33         78.64         9.33         224         2090         14.9         31         306         12430.           8         9.33         69.98         9.33         224         2090         14.2         30         66         18418.           6         9.33         50.65         9.33         224         2090         13.2         7         450         2423         2551.           4         9.33         11.33         224         2090         13.2         7         450         <td< td=""><td>Roof</td><td>4</td><td>162.95</td><td>12</td><td>183</td><td>2196</td><td>16.8</td><td>37</td><td>37</td><td>-</td></td<></td>	16         146         146.95         13.5         193         2471         16.5         41         78         590           15         11         135.95         10.83         183         1982         16.3         32         110         1444           14         10.66         19.995         224         2239         16         36         146         2616         212         9.33         106.63         9.33         224         2090         15.5         32         211         5639           11         9.33         97.30         9.33         224         2090         15.4         32         243         7603.           9         9.33         78.64         9.33         224         2090         14.9         31         306         12430.           8         9.33         69.98         9.33         224         2090         14.2         30         66         18418.           6         9.33         50.65         9.33         224         2090         13.2         7         450         2423         2551.           4         9.33         11.33         224         2090         13.2         7         450 <td< td=""><td>Roof</td><td>4</td><td>162.95</td><td>12</td><td>183</td><td>2196</td><td>16.8</td><td>37</td><td>37</td><td>-</td></td<>	Roof	4	162.95	12	183	2196	16.8	37	37	-
15       11       135.95       10.83       183       1982       16.3       32       110       1444         14       10.86       125.29       9.996       224       2239       16       36       146       2616.         13       9.33       116.96       9.33       224       2090       15.5       32       2718       6339.         11       9.33       97.30       9.33       224       2090       15.2       32       276       9868.         9       9.33       67.97       9.33       224       2090       15.2       32       275       9868.         9       9.33       69.31       9.33       224       2090       14.9       31       306       12430.         7       9.33       59.96       9.33       224       2090       14.2       30       366       18418.         6       9.33       50.65       9.33       224       2090       13.6       28       423       2935       21831.         15       9.33       13.33       11.33       224       2090       12.5       26       477       3368.         2       9.33       13.33	15       11       135.95       10.83       183       1982       16.3       32       110       1444         14       10.66       125.29       9.995       224       2239       16       36       146       2616         13       9.33       116.96       9.33       224       2090       15.5       32       271       6339         11       9.33       97.30       9.33       224       2090       15.2       32       275       9868         9       9.33       87.97       9.33       224       2090       15.2       32       275       9868         9       9.33       69.31       9.33       224       2090       14.9       31       306       12430         7       9.33       59.98       9.33       224       2090       14.2       30       306       12431         6       9.33       50.65       9.33       224       2090       13.6       28       423       25616         3       9.33       224       2090       13.6       28       423       25616         4       9.33       1.33       11.33       224       2090       13.6	16	16	146.95	13.5	183	2471	16.5	41	78	590.
14         10.66         125.23         9.995         224         2239         16         36         146         2816           13         9.33         116.96         9.33         224         2090         15.5         32         178         3976           11         9.33         97.30         9.33         224         2090         15.4         32         241         663           9         9.33         78.64         9.33         224         2090         14.9         31         306         1228           9         9.33         78.64         9.33         224         2090         14.4         31         336         1228           7         9.33         50.95         9.33         224         2090         14.2         30         366         18418           6         9.33         74.32         9.33         224         2090         13         27         450         29465           3         9.33         22.66         9.33         224         2090         12.5         266         477         3368           2         9.33         13.33         11.33         224         2538         11.7         3	14       10.66       125.29       9.995       224       2239       16       36       146       2816         13       9.33       115.96       9.33       224       2090       15.5       32       178       3976.         12       9.33       106.63       9.33       224       2090       15.4       32       243       7603.         10       9.33       87.97       9.33       224       2090       15.4       32       275       9668.         9       9.33       78.64       9.33       224       2090       14.9       31       306       12430.         8       9.33       69.31       9.33       224       2090       14.6       31       336       15281.         7       9.33       50.65       9.33       224       2090       13.8       29       395       21831.         5       9.33       13.33       11.33       224       2090       13       27       450       29465.         3       9.33       22.4       2090       13       27       450       29465.         1       13.33       11.33       11.33       11.33       11.33 <td< td=""><td>15</td><td>11</td><td>135.95</td><td>10.83</td><td>183</td><td>1982</td><td>16.3</td><td>32</td><td>110</td><td>1444.</td></td<>	15	11	135.95	10.83	183	1982	16.3	32	110	1444.
13       9.33       115.96       9.33       224       2090       15.5       32       178       3976.         12       9.33       106.63       9.33       224       2090       15.5       32       211       5639.         10       9.33       67.97       9.33       224       2090       15.2       32       275       9668.         9       9.33       78.64       9.33       224       2090       14.8       31       336       12430.         8       9.33       569.81       9.33       224       2090       14.6       31       336       15281.         7       9.33       50.65       9.33       224       2090       13.8       28       423       25616.         4       9.33       50.65       9.33       224       2090       13.6       28       423       25616.         4       9.33       13.33       11.33       224       2090       12.5       26       477       33668.         2       9.33       13.33       11.33       224       258       11.7       30       506       3814.5       12       -       -       44864.         1<	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	14	10.66	125.29	9.995	224	2239	16	36	146	2616.
12         9.33         106.63         9.33         224         2090         15.5         32         211         5639           11         9.33         97.30         9.33         224         2090         15.4         32         243         7603           9         9.33         78.64         9.33         224         2090         14.6         31         306         12430           8         9.33         69.31         9.33         224         2090         14.6         31         336         15281           7         9.33         50.65         9.33         224         2090         13.9         29         395         21831           5         9.33         41.32         9.33         224         2090         13.6         28         423         25616           4         9.33         13.33         11.33         224         2090         13.6         28         463         3868.           2         9.33         13.33         11.33         224         2090         12.7         26         477         3868.           2         9.33         13.33         11.33         224         45516         1 <t< td=""><td><math display="block">\begin{array}{c c c c c c c c c c c c c c c c c c c </math></td><td>13</td><td>9.33</td><td>115.96</td><td>9.33</td><td>224</td><td>2090</td><td>15.5</td><td>32</td><td>178</td><td>3976.</td></t<>	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	13	9.33	115.96	9.33	224	2090	15.5	32	178	3976.
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11       9.33       97.30       9.33       224       2090       15.4       32       243       7603         10       9.33       78.64       9.33       224       2090       14.9       31       306       1243         8       9.33       76.84       9.33       224       2090       14.6       31       336       1281         7       9.33       59.98       9.33       224       2090       14.6       31       306       18418.         6       9.33       50.65       9.33       224       2090       13.9       29       395       1818.         5       9.33       11.32       9.33       224       2090       13.6       28       423       25516.         4       9.33       11.99       9.33       224       2090       12.5       26       477       3368         2       9.33       13.33       11.33       224       2090       12.5       26       477       3686         2       9.33       13.33       11.33       224       2538       11.7       30       506       38115.         1       13.33       0.00       6.665       224	12	9.33	106.63	9.33	224	2090	15.5	32	211	5639.
10       9.33       87.97       9.33       224       2090       15.2       32       275       9968.         9       9.33       78.64       9.33       224       2090       14.9       31       306       1243.0         7       9.33       59.98       9.33       224       2090       14.2       30       366       18418.         6       9.33       50.65       9.33       224       2090       13.9       29       396       21831.         5       9.33       41.32       9.33       224       2090       13.6       28       423       25516.         4       9.33       13.33       11.33       224       2090       13       27       450       29465.         3       9.33       13.33       11.33       224       2053       11.7       30       506       8115.         1       13.33       0.00       6.665       224       1493       -       -       44864.         1       13.33       0.00       6.665       224       1493       -       -       44864.         1       13.33       0.00       6.665       224       1493       -	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11	9.33	97.30	9.33	224	2090	15.4	32	243	7603.
9         9.33         78.64         9.33         224         2090         14.9         31         306         12430.           8         9.33         69.31         9.33         224         2090         14.6         31         336         15281.           7         9.33         50.65         9.33         224         2090         13.9         29         395         21831.           5         9.33         41.32         9.33         224         2090         13.8         28         423         26516.           4         9.33         31.99         9.33         224         2090         13.27         450         29465.           3         9.33         13.33         11.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2090         12.5         26         477         33668.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.    <	9       9.33       78.64       9.33       224       2090       14.9       31       306       12430.         8       9.33       59.98       9.33       224       2090       14.6       31       336       15281.         7       9.33       50.965       9.33       224       2090       13.9       29       395       21831.         5       9.33       41.32       9.33       224       2090       13.8       28       423       25616.         3       9.33       14.32       9.33       224       2090       12.5       26       477       33668.         2       9.33       13.33       11.33       224       2638       11.7       30       506       38115.         1       13.33       0.00       6.665       224       1493       -       -       44864.         1       13.33       0.00       6.665       224       1493       -       -       44864.         1       13.33       0.00       6.665       224       1493       -       -       44864.         1       13.33       11.33       6.2       671       16.1       11       37.4	10	9.33	87.97	9.33	224	2090	15.2	32	275	9868.
8         9.33         69.91         9.33         224         2090         14.6         31         336         15281           7         9.33         50.65         9.33         224         2090         14.2         30         366         18418.           6         9.33         41.32         9.33         224         2090         13.6         28         423         25516.           4         9.33         31.99         9.33         224         2090         13.6         28         423         25516.           3         9.33         13.33         11.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2536         11.7         30         5066         38115.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           Vind Loading (E-W)         File         Wind With (t)         Area (th)         (ps)         (k)         (k)         (t)         (t)         (t)         (t)         (t)         -         -         -         44864.	8         9.33         69.31         9.33         224         2090         14.6         31         336         15281           7         9.33         59.98         9.33         224         2090         14.2         30         366         18418.           6         9.33         50.65         9.33         224         2090         13.9         29         395         21831.           5         9.33         41.32         9.33         224         2090         13.6         28         423         25516.           3         9.33         22.66         9.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         5066         38115.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         11.33         62         837         16.3         14         20         16.	9	9.33	78.64	9.33	224	2090	14.9	31	306	12430.
7         9.33         59.98         9.33         224         2090         14.2         30         366         18418.           6         9.33         50.65         9.33         224         2090         13.9         29         395         21831.           5         9.33         31.99         9.33         224         2090         13         27         450         29465.           3         9.33         13.33         11.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         15.5         17         Kith         Area (ft)         (psf)         (k)         (ft)         (ft)         (ft)	7         9.33         59.86         9.33         224         2090         14.2         30         366         18418.           6         9.33         50.65         9.33         224         2090         13.9         29         395         21831.           5         9.33         41.32         9.33         224         2090         13.6         28         423         25516.           4         9.33         22.66         9.33         224         2090         13.         27         450         29465.           3         9.33         12.3         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         4864.           Wind Loading (E-W)         Tributary         Tributary         Wind Load         Wind Load         Shear         Momen           Level         (ft)         (ft)         Height (ft)         Widt (ft)         Area (ft)         (ps)         (k)         (k)         2 </td <td>8</td> <td>9.33</td> <td>69.31</td> <td>9.33</td> <td>224</td> <td>2090</td> <td>14.6</td> <td>31</td> <td>336</td> <td>15281.</td>	8	9.33	69.31	9.33	224	2090	14.6	31	336	15281.
6         9.33         50.65         9.33         224         2090         13.9         29         395         21831.           5         9.33         41.32         9.33         224         2090         13.6         28         423         25516.           3         9.33         22.66         9.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         4864.           1         13.33         0.00         6.665         224         1493         -         -         4864.           1         13.33         0.00         6.665         224         1493         -         -         4864.           1         13.33         0.00         6.665         224         1493         -         -         4864.           1         13.33         0.00         6.665         224         1493         -         -         4864.           1         15.5	6         9.33         50.65         9.33         224         2090         13.9         29         395         21831.           5         9.33         41.32         9.33         224         2090         13.6         28         423         25616.           3         9.33         22.66         9.33         224         2090         12.5         26         477         33688.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         15.33         0.00         6.665         224         1493         -         -         44864.           1         16.25 <td>7</td> <td>9.33</td> <td>59.98</td> <td>9.33</td> <td>224</td> <td>2090</td> <td>14.2</td> <td>30</td> <td>366</td> <td>18418.</td>	7	9.33	59.98	9.33	224	2090	14.2	30	366	18418.
5         9.33         41.32         9.33         224         2090         13.6         28         423         25516.           4         9.33         22.66         9.33         224         2090         13         27         450         29465.           2         9.33         13.33         11.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           10         11         13.59         10         Area (ft)         Wind Load         Wind Load         Momen           Level         (ft)         (ft)         Height (ft)         Widt (ft)         Area (ft)         (pst)         (k)         (k)         (k)	5         9.33         41.32         9.33         224         2090         13.6         28         423         25516.           4         9.33         22.66         9.33         224         2090         12.5         26         477         3368.           2         9.33         13.33         11.33         224         2090         12.5         26         477         3368.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           10         Story Height         Elevation         Tributary         Tributary         Wind Load         Wind Load         Shear         Momen           Level         (ft)         Height (ft)         Width (ft)         Area (ft)         (gs)         (k)         (k)         (k)         (k)           11         135.95         10.83         62         837         16.3	6	9.33	50.65	9.33	224	2090	13.9	29	395	21831.
4       9.33       31.99       9.33       224       2090       13       27       450       29465.         3       9.33       22.66       9.33       224       2090       12.5       26       477       33688.         2       9.33       13.33       11.33       224       2538       11.7       30       506       38115.         1       13.33       0.00       6.665       224       1493       -       -       -       44864.         Mind Loading (E-W)        6.665       224       1493       -       -       -       44864.         Mind Loading (E-W)             -       -       44864.         Evel       (ft.)       (ft.)       Height (ft.)       Width (ft.)       Area (ft.)       Wind Load       Shear       Moren       (ftk)         Roof       4       162.95       12       62       744       16.5       12       12       -	4         9.33         31.99         9.33         224         2090         13         27         450         29465.           3         9.33         13.33         11.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         44864.           Wind Loading (E-W)                    44864.           Wind Loading (E-W) </td <td>5</td> <td>9.33</td> <td>41.32</td> <td>9.33</td> <td>224</td> <td>2090</td> <td>13.6</td> <td>28</td> <td>423</td> <td>25516.</td>	5	9.33	41.32	9.33	224	2090	13.6	28	423	25516.
3         9.33         22.66         9.33         224         2090         12.5         26         477         33668           2         9.33         13.33         11.33         224         2638         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         Tributary         Tributary         Wind Load         Stear         Momen           Level         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (ft.)           16         16         146.95         13.5         62         837         16.3         14         26	3         9.33         22.66         9.33         224         2090         12.5         26         477         33668.           2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         44864.           1         16.1         11.7         30.66         20.7         16.7         (k)         Moren           1         61         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83	4	9.33	31.99	9.33	224	2090	13	27	450	29465.
2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         14         10.61         11         11         11         11         11         14         10.66         125.29         9.995         222         2071         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14	2         9.33         13.33         11.33         224         2538         11.7         30         506         38115.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         13.33         0.00         6.665         224         1493         -         -         -         44864.           1         14.35         1         14.35         14.33         16.3         14         26         196.         16.3         14         26         196.         196.         196.         193.         14.3         26         196.         137.1         13.3         13.3         115.96         9.33         222         2071         15.3         32         103         1542.	3	9.33	22.66	9.33	224	2090	12.5	26	477	33668.
1         13.33         0.00         6.665         224         1493         -         -         44864.           Mind Loading (E-W)	1         13.33         0.00         6.665         224         1493         -         -         -         44864.           Mind Loading (E-W)	2	9.33	13.33	11.33	224	2538	11.7	30	506	38115.
Mind Loading (E-W)         Image: Constraint of the system         Tributary         Tributary         Tributary         Mind Load         Wind Load         Shear         Moment (t, k)           Story Height         Elevation         Tributary         Tributary         Tributary         Wind Load         Wind Load         Shear         Moment (t, k)           Roof         4         162.95         12         62         744         16.5         12         12         -           16         16         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2071         15.3         32         103         1542.           12         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           14         9.33         97.30         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33<	Mind Loading (E-W)         Tributary         Tributary         Tributary         Wind Load         Wind Load         Story Height         Elevation         Tributary         Tributary         Wind Load         Wind Load         Story         K(k)         (k)         (k)         (k)         (ft.)         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (ft.)         (ft.)         (ft.)         (ft.)         Momen           Level         (ft.)         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (ft.)	1	13.33	0.00	6.665	224	1493	-	-	-	44864.
Story Height         Elevation         Tributary         Tributary         Tributary         Wind Load         Wind Load         Shear         Moment           Level         (ft.)         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (ft. k)           Roof         4         162.95         12         62         744         16.5         12         12         -           16         16         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2071         15.3         32         103         1542.           12         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           11         9.33         97.30         9.33         222         2071         15.1         31         166         3767.           10         9.33         69.31         9.33         222	Story Height         Elevation         Tributary         Tributary         Tributary         Wind Load         Wind Load         Shear         Moment           Level         (ft.)         (ft.)         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (ft. + k)           Roof         4         162.95         12         62         744         16.5         12         12         -           16         16         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33	Alind Load	ling (E-)A()								
Level         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (pst)         (k)         (k)         (ft.)         (ft.)           Roof         4         162.95         12         62         744         16.5         12         12         -           16         16         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2071         15.3         32         103         1542.           12         9.33         116.63         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         69.31         9.33         222         2071 <td< th=""><th>Level         (ft.)         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (k)         (ft.)           Roof         4         162.95         12         62         744         16.5         12         12         -           16         16         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2071         15.8         35         72         873.           13         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         69.31         9.33         222         20</th><th></th><th>Ston/Height</th><th>Elevation</th><th>Tributary</th><th>Tributary</th><th>Tributary</th><th>Wind Load</th><th>Mind Load</th><th>Shear</th><th>Momen</th></td<>	Level         (ft.)         (ft.)         Height (ft.)         Width (ft.)         Area (ft.)         (psf)         (k)         (k)         (k)         (ft.)           Roof         4         162.95         12         62         744         16.5         12         12         -           16         16         146.95         13.5         62         837         16.3         14         26         196.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2071         15.8         35         72         873.           13         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         69.31         9.33         222         20		Ston/Height	Elevation	Tributary	Tributary	Tributary	Wind Load	Mind Load	Shear	Momen
Level(ii)(iii)(iiii)(iiiii)(iiiii)(iiiii)(iiiiii)(iiiiii)(iiiiiiii)(iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	Level         (ii)         (iii)         (iii)         (iiii)         (iiii)         (iiiii)         (iiiii)         (iiiiii)         (iiiiiii)         (iiiiiiiiiiiiii)         (iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	Lovol	(ff)	(ft)	Height (ft)	VACINTE (TT)	Area (ff <sup>2</sup> )	(nef)	(10)	(10)	(ff - 1/)
Roon4102.93120274410.312121212121616146.9513.56283716.31426196.1511135.9510.836267116.11137481.1410.66125.299.995222221915.83572873.139.33115.969.33222207115.3321031542.129.33106.639.33222207115.1311352508.119.3397.309.33222207115.1311663767.109.3387.979.33222207114.9311975318.99.3378.649.33222207114.3302579280.79.3359.989.33222207114.3302579280.79.3350.659.33222207114.3302579280.69.3350.659.33222207113.72831514349.59.3341.329.33222207113.32834217284.49.3331.999.33222207112.82736920476.39.3322.669.33222207112.82736920476.	Roon         4         102.33         12         02         744         10.3         12         13         14         10.66         125.29         9.995         222         2219         15.8         35         72         873.           13         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         69.31         9.33         222         2071         14.3         3	Boof	(11)	(1.)	12	62	744	(poi) 165	12	(1)	(it - iy
10         10         140.33         10.3         02         037         10.3         14         20         133           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2219         15.8         35         72         873.           13         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         166         3767.           10         9.33         97.30         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.3         30         257         9280.           7         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           6         9.33         50.65         9.33         222         2071         13.7         2	16         16         140.33         133         62         637         16.3         14         26         133.           15         11         135.95         10.83         62         671         16.1         11         37         481.           14         10.66         125.29         9.995         222         2219         15.8         35         72         873.           13         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         135         2508.           11         9.33         97.30         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14.3	16	4	1/16/95	12	62	227	16.3	14	26	- 106
13         11         13333         10.03         02         011         10.1         11         031         1401           14         10.66         125.29         9.995         222         2219         15.8         35         72         873.           13         9.33         115.96         9.33         222         2071         15.3         32         103         1542.           12         9.33         106.63         9.33         222         2071         15.1         31         135         2508.           11         9.33         97.30         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14.3	13         11         13333         10333	10	10	135.95	10.83	62	671	16.5	14	20	/190.
13         9.33         115.96         9.33         222         2071         15.3         32         103         1542           12         9.33         106.63         9.33         222         2071         15.3         32         103         1542           12         9.33         106.63         9.33         222         2071         15.3         32         103         1542           11         9.33         97.30         9.33         222         2071         15.1         31         135         2508           10         9.33         97.30         9.33         222         2071         14.9         31         197         5318           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280           7         9.33         59.98         9.33         222         2071         14.3         30         257         9280           5         9.33         41.32         9.33         222         2071         13.3	13       9.33       115.96       9.33       222       2071       15.3       32       103       1542         12       9.33       106.63       9.33       222       2071       15.3       32       103       1542         11       9.33       97.30       9.33       222       2071       15.1       31       135       2508         11       9.33       97.30       9.33       222       2071       15.1       31       166       3767         10       9.33       87.97       9.33       222       2071       14.9       31       197       5318         9       9.33       78.64       9.33       222       2071       14.3       30       226       7157         8       9.33       69.31       9.33       222       2071       14.3       30       257       9280         7       9.33       59.98       9.33       222       2071       14.3       30       257       9280         6       9.33       50.65       9.33       222       2071       13.7       28       315       14349         5       9.33       41.32       9.33       222	14	10.66	125.29	9 995	22	2219	15.8	35	72	873
12         9.33         106.63         9.33         222         2071         15.2         31         135         2508.           11         9.33         97.30         9.33         222         2071         15.1         31         135         2508.           10         9.33         97.30         9.33         222         2071         15.1         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14.3         30         257         9280.           7         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           6         9.33         50.65         9.33         222         2071         13.3	12         9.33         106.63         9.33         222         2071         15.2         31         135         2508           11         9.33         97.30         9.33         222         2071         15.1         31         166         3767           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280           7         9.33         59.98         9.33         222         2071         14.3         30         257         9280           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284           4         9.33         31.99         9.33         222         2071         12.8         27	13	9.33	115.96	9.33	222	2213	15.0	32	103	1542
11         9.33         97.30         9.33         222         2071         151         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8 <t< td=""><td>11         9.33         97.30         9.33         222         2071         1.51         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14.3         30         257         9280.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8</td><td>12</td><td>9.33</td><td>106.63</td><td>9.33</td><td>222</td><td>2071</td><td>15.2</td><td>31</td><td>135</td><td>2508</td></t<>	11         9.33         97.30         9.33         222         2071         1.51         31         166         3767.           10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14.3         30         257         9280.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8	12	9.33	106.63	9.33	222	2071	15.2	31	135	2508
10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         <	10         9.33         87.97         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.9         31         197         5318.           9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         <	11	9.33	97.30	9.33	222	2071	15.1	31	166	3767
9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4	9         9.33         78.64         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.7         30         228         7157.           8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4	10	9.33	87.97	9.33	222	2071	14.9	31	197	5318
8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.	8         9.33         69.31         9.33         222         2071         14.3         30         257         9280.           7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	9	9.33	78.64	9.33	222	2071	14.7	30	228	7157.
7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.	7         9.33         59.98         9.33         222         2071         14         29         286         11679.           6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	8	9.33	69.31	9.33	222	2071	14.3	30	257	9280.
6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.	6         9.33         50.65         9.33         222         2071         13.7         28         315         14349.           5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	7	9.33	59.98	9.33	222	2071	14	29	286	11679.
5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.	5         9.33         41.32         9.33         222         2071         13.3         28         342         17284.           4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	6	9.33	50.65	9.33	222	2071	13.7	28	315	14349.
4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.	4         9.33         31.99         9.33         222         2071         12.8         27         369         20476.           3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	5	9.33	41.32	9.33	222	2071	13.3	28	342	17284.
3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.	3         9.33         22.66         9.33         222         2071         12.3         25         394         23915.           2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	4	9.33	31.99	9.33	222	2071	12.8	27	369	20476.
2 9.33 13.33 11.33 222 2515 11.4 29 423 27591.	2         9.33         13.33         11.33         222         2515         11.4         29         423         27591.           1         13.33         0.00         6.665         222         1480         -         -         -         33227.	3	9.33	22.66	9.33	222	2071	12.3	25	394	23915.
	<u>1 13.33 0.00 6.665 222 1480 33227.</u>	2	9.33	13.33	11.33	222	2515	11.4	29	423	27591.
1 13.33 0.00 6.665 222 1480 33227.		1									

ulatio	n of Wall	Rigidities			Ш Ц	Et(4(h <sub>x</sub> /L) <sup>3</sup> +	3(h <sub>x</sub> /L)) <sup>-1</sup>		Ш	57000*fc. <sup>5</sup>		fc = /	:000psi
		N-S	s-N	E-W	S-N	S-N	E-W	S-N	N-S	E-W	N-S		
		A.1E	A.2W	A.3	B.1E	B.2W	B.3	U	υ	E.X	E.Y		
	WALL	<del>.</del> –	7	m	4	ъ	ى	7	ω	<b>б</b>	10		
	t (in)	14	14	10	14	14	10	10	10	10	10	ΣR	ΣR
(H)	L (ft)	10	10	17.883	10	10	17	13.875	13.875	29.4167	29.4167	s-n	E-W
1. 1	16												
47.1	15							0.003				0.003	0.000
36.1	14							0.003				0.003	0.000
25.3	13							0.003		0.028	0.003	0.006	0.028
16	12							0.004		0.035	0.004	0.008	0.035
0 <u>6</u> .6	11							0.005		0.045	0.005	0.010	0.045
7.3	10							200.0		0.058	0.006	0.014	0.058
88	<b>б</b>							0.010	0.010	0.078	0.009	0.028	0.078
8.64	ω							0.013	0.013	0.107	0.012	0.039	0.107
6.9 9.3	7							0.019	0.019	0.152	0.017	0.056	0.152
00	و							0:030	0:030	0.225	0.025	0.084	0.225
0.65	ហ							0.049	0.049	0.352	0.039	0.136	0.352
1.32	4							0.087	0.087	0.588	0.065	0.240	0.588
8	m	0.100	0.100	0.354	0.100	0.100	0.309	0.179	0.179	1.070	0.119	0.874	1.733
2.66	2	0.262	0.262	0.838	0.262	0.262	0.742	0.448	0.448	2.174	0.242	2.187	3.754
	-	1.039	1.039	2.569	1.039	1.039	2.336	1.555	1.555	5.197	0.577	7.845	10.102

# Appendix E – Shear Distribution

Shear Dis	tribution	- %Rigidi	ty								
				N-	s	N	-S	E-\	/	N	-s
She	ar			A.1	IE	A.2	2W	A.S	3	В.	1E
(K	)	h.		1		2	2	3		4	ŀ
N-S	E-W	(ft)		R/ΣR	Shear	R/ΣR	Shear	RIΣR	Shear	R/ΣR	Shear
139	139	163.1	16								
340	340	147.1	15								
582	582	136.1	14								
782	782	125.3	13								
989	989	116	12								
1,176	1176	106.6	11								
1,343	1343	97.3	10								
1,491	1491	88	9								
1,620	1620	78.64	8								
1,731	1731	69.3	7								
1,824	1824	60	6								
1,899	1899	50.65	5								
1,958	1958	41.32	4								
2,001	2001	32	3	0.11	222.9	0.11	222.9	0.20	399.5	0.11	222.9
1,193	2030	22.66	2	0.12	240.2	0.12	240.2	0.22	446.5	0.12	240.2
1,222	2060	13.33	1	0.13	158.0	0.13	158.0	0.25	516.2	0.13	158.0
			ΣM		14682		14682		29784		14682

N	-S	E-	W	N-	s	N	s	E-	W	N-	s
B.2	2W	B.	.3	0	;	С	1	E	.1	E.	2
Į	5	6	3	7		8		9		10	)
RIΣR	Shear	RIΣR	Shear	R/ΣR	Shear	RIΣR	Shear	RIΣR	Shear	R/ΣR	Shear
				1.00	139.4						
				1.00	340.4						
				0.52	302.6			1.00	582.2	0.5	279.5
				0.52	407.7			1.00	782.4	0.5	374.
				0.52	517.1			1.00	989.2	0.5	472.
				0.52	617.2			1.00	1176.0	0.5	558.3
				0.35	463.8	0.35	463.8	1.00	1343.0	0.3	415.4
				0.35	517.2	0.35	517.2	1.00	1490.9	0.3	456.
				0.35	565.5	0.35	565.5	1.00	1620.0	0.3	489.
				0.35	609.4	0.35	609.4	1.00	1730.6	0.3	511.
				0.36	650.5	0.36	650.5	1.00	1823.5	0.3	522.
				0.36	690.9	0.36	690.9	1.00	1899.1	0.3	517.4
0.11	222.9	0.18	349.6	0.20	400.1	0.20	400.1	0.62	1209.0	0.1	266.2
0.12	240.2	0.20	395.7	0.20	409.9	0.20	409.9	0.58	1159.2	0.1	221.
0.13	158.0	0.23	469.4	0.20	236.5	0.20	236.5	0.51	1044.4	0.1	87.5
	14682		26412		511210		243980		1084817		382778

		Contor of h	A						
		Center or N	400.0		 				
		N-5	132.8		 				
		5-W	114						
		Center of F	Rigidity	Level 1-3			Center of F	Rigidity	Level 4-9
		N-S					N-S		
		R	L	RL			R	L	RL
	Wall		(ft.)			Wall		(ft.)	
A.1E	1	1.04	135	140.28	A.1E	1		135	0.00
A.2V	2	1.04	154	160.02	A.2∀	2		154	0.00
A.3	3			0.00	A.3	3			0.00
B.1E	4	1.04	135	140.28	B.1E	4		135	0.00
B.2V	5	1.04	153	158.98	B.2∀	5		153	0.00
B.3	6			0.00	B.3	6			0.00
С	7	1.56	33	51.33	С	7	0.09	33	2.88
C1	8	1.56	42.5	66.11	C1	8	0.09	42.5	3.71
E.1	9			0.00	E.1	9			0.00
E.2	10	0.6	171	98.75	E.2	10	0.1	171	11.18
	Σ	7.84	Σ	815.74		Σ	0.24	Σ	17.77
		ΣRL/ΣR	104				ΣRL/ΣR	74	

		Center of F	enter of Rigidity Lev				Center of R	igidity	Level 13-15
		N-S					N-S		
		R	L	RL			R	L	RL
	Vall		(ft.)			Wall		(ft.)	
A.1E	1		135	0.00	A.1E	1		135	0.00
A.2∀	2		154	0.00	A.2V	2		154	0.00
A.3	3			0.00	A.3	3			0.00
B.1E	4		135	0.00	B.1E	4		135	0.00
B.2∀	5		153	0.00	B.2V	5		153	0.00
B.3	6			0.00	B.3	6			0.00
C	7	0.01	33	0.24	C	7	0.00	33	0.09
1	8		42.5	0.00	C1	8	0.00	42.5	0.00
E.1	9			0.00	E.1	9			0.00
E.2	10	0.0	171	1.11	E.2	10	0.0	171	0.00
	Σ	0.01	Σ	1.34		Σ	0.00	Σ	0.09
		ΣRL/ΣR	99				ΣRL/ΣR	33	

		Torsional 9	Shear		Level 1		60% 70%		
		N-S							
		R	x,wall	×	Bx	Bx²	BxłΣBx²	Mt	٧t
	Wall								
A.1E	1	1.039	136	32	33.3	1065.0	0.001415	34375	49
A.2W	2	1.039	154	50	52.0	2599.2	0.0022107	34375	76
A.3	3	2.569					0		
B.1E	4	1.039	136	32	33.3	1065.0	0.001415	34375	49
B.2V	5	1.039	155	51	53.0	2704.1	0.0022549	34375	78
B.3	6	2.336					0		
С	7	1.555	34	70	108.9	7618.6	0.0046306	34375	159
C1	8	1.555	43	61	94.9	5785.1	0.0040351	34375	139
E.1	9	5.197					0		
E.2	10	0.577	172	68	39.3	2671.4	0.0016708	34375	57
					ΣBx2	23508.3			

		Torsional S	Shear		Level 9	40% - 50%			
		N-S							
		R	x,wall	×	Bx	Bx <sup>2</sup>	Rx/ΣRx²	Mt	Vt
Wall	Level								
A.1E	1								
A.2V	2								
A.3	3								
B.1E	4								
B.2W	5								
B.3	6								
С	9	0.010	34	40	0.4	15.4	0.003588	78902	283
C1	9	0.010	43	31	0.3	9.3	0.002782	78902	220
E.1	9								
E.2	9	0.009	172	98	0.8	82.7	0.00786	70086	551
					ΣBx2	107.4			

		Torsional	Shear		Level 13		40 - 50%		
		N-S							
		B	x,wall	8	Bx	Bx <sup>2</sup>	Rx/ΣRx²	Mt	Vt
	Wall								
A.1E	1								
A.2V	2								
A.3	3								
B.1E	4								
B.2V	5								
B.3	6								
С	7	0.003	34	65	0.2	14.0	0.0070582	19924	141
C1	8								
E.1	9								
E.2	10	0.003	172	73	0.2	16.7	0.0074119	19924	148

# Appendix E – Drift Check

			Story Dr	ift - Shear	Wall C.1	Ec=	3605				
			-								
_		t	b	h	Aw		P	∆ flexure	∆ shear	Story Drift	Total Drift
	Level	(in.)	(in.)	(in.)	(in <sup>2</sup> )	(in <sup>4</sup> )	(k)	(in)	(in)	(in)	(in)
	9	10	166.5	112.0	1665.0	585386.7	695.7169	0.03859733	0.03608909	0.07468642	0.73955775
	8	10	166.5	112.0	1665.0	585386.7	775.8338	0.0430421	0.04024501	0.08328711	0.66487133
	7	10	166.5	112.0	1665.0	585386.7	848.2177	0.04705785	0.04399979	0.09105764	0.58158423
	6	10	166.5	112.0	1665.0	585386.7	914.1307	0.0507146	0.04741891	0.09813351	0.49052658
	5	10	166.5	112.0	1665.0	585386.7	975.7083	0.05413083	0.05061314	0.10474398	0.39239307
	4	10	166.5	112.0	1665.0	585386.7	1036.304	0.05749262	0.05375646	0.11124908	0.28764909
	3	10	166.5	112.0	1665.0	585386.7	600.1305	0.03329434	0.03113071	0.06442505	0.17640001
	2	10	166.5	112.0	1665.0	585386.7	614.8298	0.03410984	0.03189321	0.06600305	0.11197496
	1	10	166.5	160.0	1665.0	1705387.0	354.8185	0.0196848	0.02628711	0.04597191	0.04597191