Infiltration in Tall Buildings

All energy and loads programs have the necessary input data (envelope & air systems) for analyzing the stack effect of tall buildings. The eQUEST program is ideal because the building can be modeled graphically by tracing AutoCAD drawings in shells (vertical sections of floors), each with different dimensional configurations and different design criteria. In the Design Development Wizard you can create vertical shells and assign different infiltration cfm/sqft of envelope area (Figure 2). In the Detailed Edit Mode you can use other methods to estimate infiltration but some the input parameters have to be calculated. In the Excel spreadsheet you have to estimate leakage and flow coefficient. In the Excel spreadsheet (Figures 3-6) you can get any infiltration you want by adjusting these two factors. http://bepan.info/engg-calcs_4b-Bldg_Stack_Effect, Wind Press + Envel Leakg Calcs_ The DOE2.1E method (the Building Description Language) is shown Figure 7

There was a public TV documentary about prefabricated curtain walls that are manufactured off-site and hoisted and snapped to place in the building. Examples were the Trump Tower in Chicago and some building in the Middle East. Construction workers worked from inside. In the case of a spherical shaped building, the surface panels are manufactured off-site. The panels are cut by numerical control machines using computers and software that generate the curved surfaces. The tolerances can be very small and therefore the leakage areas are small. A Stack Effect program needs data on leakage areas and flow coefficients for different types of envelopes. From the leakage measurement you can work backwards with the equation and get the percentage leakage areas for typical envelopes. I think it is easier and more accurate to measure envelope leakage areas and coefficients under lab test conditions and not on complete buildings especially in the case where whole sections of envelope are manufactured offsite. A more expensive method would be set up a lab test building of 3 (need a neutral level) or more floors and test different envelope types.

After writing the Excel spreadsheet Stack program, these are some of things I think need to be done. I am sure that there are lots of other features and refinements necessary. It would require a regular compiled program not an Excel spreadsheet. This is based on the High-Rise Mixed-Use Building. <u>http://bepan.info/proj-bldgs</u> <u>Proj-13 - eQ-DOE21E - High-Rise-Multi-Use Bldg</u>

All tall buildings typically have vertical sections with different foot prints, floor types and floor-to floor heights. The floors may not identical but they change by vertical sections of multiple floors. The ground floor has many openings and so does the mechanical floor (intakes and exhausts) and this affects the stack effect. Some floors are pressurized with sealed envelopes (offices) and others (hotels) are not. Offices have a return air ceiling plenum with a negative pressure relative to the space below. In the office section of the multi-use bldg example, every three floors there is a 3-level atrium in two corners. Hotel corridors are supplied with outdoor air which is exhausted from the rooms and is at a positive pressure relative to the rooms. Exhaust shafts in hotel rooms connect

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toilets and kitchens. In a hospital building every room has pressure relationship (negative or positive) with other rooms. Operating rooms require 25 air changes of outdoor air. Retail, restaurant, hotel services floors are different. In the core space (all building types), exhaust shafts connect electrical, telecom, janitor, storage, and mechanical rooms. Infiltration is affected by the type of HVAC system serving sections of the building. The stairwells are pressurized with outdoor air. All this affects the stack effect and wind pressure calculations of buildings. Tall building sections could be based on similar continuous floor types (offices, hotels) or the floors served by a mechanical floor.

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Air Change Method — Air Changes/Hour:		n/a	Crack Method Neutral Zone Height:	n/a ft	Œ	RESIDENTIAL	The infiltration rate is determined by the values of RES-INF-COEF and depend on wind speed and outside-inside temperature difference.
Infiltration Flow:		n/a cfm/ft2	ASHRAE Enhanced Method —		E	S-G	Sherman-Grimsrud Infiltration Method. Applies only to single-zone. Uses keywords HOR-LEAK-FRAC, NEUTRAL LEVEL and FRAC-LEAK AREA.
Sherman-Grimsrud Mel Horizontal Leak Rat	thod	n/a ratio	Flow Coefficient: Stack Coefficient:	4,560.3		CRACK	In the case of the Crack Method, a value should be entered for the INF-COEF keyword in the EXTERIOR-WALL instruction, and for the keyword INF-COEF in WINDOW instruction.
Neutral Level: Leak Fraction of Fk	oor Area:	n/a n/a ratio	Wind Coefficient: Shelter Factor: Pressure Exponent:	0.001313 0.640 ratio		ASHRAE-ENHANCED	The infiltration rate is determined using the "Enhanced" method as described the <u>2005 ASHRAE Handbook - Fundamentals</u> , pp. 27.21-22. Uses the keywor FLOW-COEF, STACK-COEF, WIND-COEF, PRESSURE-EXP and SHELTER-FACTOR
Residential Resid. Infil. Constan Resid. Infil. Wind: Resid. Infil. Temper	nt:	n/a n/a 1/knots		1			The enhanced model uses pressurization test results to characterize house air leakage through the leakage coefficients and the pressure exponent. The mod is sensitive to these coefficients, which may be quite difficult to determine.
	1	<i>4</i>					The default values for these keywords are taken from the first example given this method in ASHRAE (Example 4). The default FLOW-COEF scales accordin the space VOLUME.

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| | XX XX XX XX XX 1,089 S 989 S 889 S 839 S 809 A 779 A-k 609 S 542 A 407 Y 272 S 3 XX 144 129 2-A X 76 58 20 O 0 | XX XX 1,089 989 8 989 8 889 >> 5 28.8 8 839 5 809 4 779 >> 4-k 24.8 24.3 5 609 1 542 5 474 407 - 7 272 >> 3 3 36.0 (XX 144 129 >> 2-A 60.5 (XX 76 58 > 1 20 0 | XX XX XX XX XX XX XX XX XX XX 13.872 XX 13.922 XX 13.922 XX 13.973 XX 13.973 XX 13.973 XX 13.999 XX 14.014 XY 14.117 XY 14.117 XY 14.221 XY 14.221 XY 14.221 XY 14.221 XY 14.221 XX 14.357 129 XX XX XX </td <td>X XX XX XX XX XX 3 1,089 13.872 9.16 3 989 13.872 9.16 3 889 13.922 8.78 3 889 13.973 8.40 >> 5 28.8 13.973 8.40 Alt psi Wnd-V 14.014 8.09 A 779 14.029 7.98 >> 4-k 24.3 14.117 7.33 1 56 609 14.117 7.33 1 542 14.151 7.07 5 474 14.221 6.55 7 272 14.291 6.04 > 3 36.0 Alt psi Wnd-V XX 14.357 5.55 14.365 5.49 >> 2.0 14.402 5.22 > 14.393 5.29 14.402 5.22 > 1 89.6 2.0 14.432 5.00</td> <td>X XX XX XX XX XX 3 1,089 13.872 9.16 91.12 3 989 13.972 8.78 91.48 3 889 13.973 8.40 91.84 3 839 13.973 8.40 91.84 3 839 13.973 8.40 91.84 4 779 14.014 8.09 92.12 14.029 7.98 92.23 Alt psi Wnd-V OA-DB 14.014 8.09 92.12 14.029 7.98 92.23 Alt psi Wnd-V OA-DB 14.117 7.33 92.83 14.117 7.33 92.83 14.1151 7.07 93.07 14.186 6.81 93.31 14.221 6.55 93.55 14.291 6.04 94.03 Alt psi Wnd-V OA-DB XX XX XX 14.357 5.55 94.49 14.355 5.49</td> <td>XX XX <td< td=""><td>X XX <th< td=""><td>XX XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<></td></th<></td></th<></td></th<></td></th<></td></td<></td> | X XX XX XX XX XX 3 1,089 13.872 9.16 3 989 13.872 9.16 3 889 13.922 8.78 3 889 13.973 8.40 >> 5 28.8 13.973 8.40 Alt psi Wnd-V 14.014 8.09 A 779 14.029 7.98 >> 4-k 24.3 14.117 7.33 1 56 609 14.117 7.33 1 542 14.151 7.07 5 474 14.221 6.55 7 272 14.291 6.04 > 3 36.0 Alt psi Wnd-V XX 14.357 5.55 14.365 5.49 >> 2.0 14.402 5.22 > 14.393 5.29 14.402 5.22 > 1 89.6 2.0 14.432 5.00 | X XX XX XX XX XX 3 1,089 13.872 9.16 91.12 3 989 13.972 8.78 91.48 3 889 13.973 8.40 91.84 3 839 13.973 8.40 91.84 3 839 13.973 8.40 91.84 4 779 14.014 8.09 92.12 14.029 7.98 92.23 Alt psi Wnd-V OA-DB 14.014 8.09 92.12 14.029 7.98 92.23 Alt psi Wnd-V OA-DB 14.117 7.33 92.83 14.117 7.33 92.83 14.1151 7.07 93.07 14.186 6.81 93.31 14.221 6.55 93.55 14.291 6.04 94.03 Alt psi Wnd-V OA-DB XX XX XX 14.357 5.55 94.49 14.355 5.49 | XX XX <td< td=""><td>X XX <th< td=""><td>XX XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<></td></th<></td></th<></td></th<></td></th<></td></td<> | X XX XX <th< td=""><td>XX XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<></td></th<></td></th<></td></th<></td></th<> | XX XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<></td></th<></td></th<></td></th<> | X XX XX <th< td=""><td>X XX <th< td=""><td>X XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<></td></th<></td></th<> | X XX XX <th< td=""><td>X XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<></td></th<> | X XX XX <th< td=""><td>X X X X</td><td>X X XX <</td><td>XX XX XX<</td></th<> | X X X X | X X XX < | XX XX< |

:.u	5.0	5.0	5.0	5.0	7.5	7.5	7.5	7.5	7.5	7.5	8.U	8.U	8.0	8.0	,	8.U	8.0	8.0
	Calc	Floor	Floor	Flr	From	Sheet		Calcs'	wir	ITER	Annual		1	7		1		1
L	ID #	Lvl #	Hgt	Lk-A							КМН			25				
Г	_	• • • •								0/5	Heating			24				
	Sec	tion >>	8	25.2	Alt psi	Wnd-V	OA-DB	OA-d	Q cfm	Q/Env-A	KWH			23				
	24	101	1,289		13.770	19.92	-20.59	0.0848	-2,093	-0.25	-18,042			-				
	23	100	1,274		13.778	19.87	-20.54	0.0849	-2,069	-0.25	-17,830			22				
	Sec	tion >>		22.4	Alt psi	Wnd-V	OA-DB	OA-d	Q cfm	Q/ENV-A	KWH			21				
	22	XX	XX		XX	XX	F	XX	1 710	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	XX 14740			20				
	21	93	1,189		XX	XX	-20.59	XX	-1,/10	-0.20	-14,740			-				
	20	88	1,139	10.0	13.821	19.542	-20.54	0.0851	-1,630	-0.19	-14,051			19				
-	Sect	tion >>	6 (X)	19.6	Alt psi	wnd-v	UA-DB	UA-d	Q cfm	U/ENV-A	KWH			18				
-	19	XX	XX 4 000			~~~~	~~~~	~~~~	1 252	0.16	11 662			17				
	18	83	1,089		12.072	10.100	10.077	AA 0.0050	-1,355	-0.10	-11,003							
	1/	/3	989		13.072	19.100	-19.0//	0.0055	1 012	-0.14	-10,291			- 0				
	10	03	889	20.0	15.922	10.//0	-19.521	0.0650	-1,012	-0.1Z	-0,719			15				
	3ec	cion >>	3	28.8	Alt psi	10 20F	10.007		1 222	0.16				14				
	13	58	839		13.999	10.205	-10.907	0.0059	1 222	-0.10	10 6 2 4			-				
	14	20	809		14 014	18.205	-10.90/	0.0859	-1,233	-0.13	-10,024			-				
	15	54	119	24.2		10.090	-10.000	0.060.0	-1,125	-0.15	-9,001		- I I	12				
	12	26	600	24.5	14 117	17 226	19 169	0.0865	_/13.9	_0.05	_2 772			11				
	11	21	542		14.117	17.320	18 168	0.0865	-430	-0.05	-3,773			10				
	10	26	J4Z		14.117	17.068	-17 928	0.0865	-593	-0.00	-5 110			-				
-	- 10	20	4/4		14.131	16.811	-17.520	0.0868	-659	-0.08	-5 682			9				
-	9 9	17	272		14.100	16 553	-17 //7	0.0870	-779	-0.00	-6 716			8				
	Sec		212	36.0		Wnd-V	04-DB	0,00.0	0 cfm	O/Env-A	KWH			7				
	7	XX	XX	30.0	XX	XX	XX	XX	XX	XX	XX			-				
-	6	8	144		14.357	15.550	-16.513	0.0876	2.517	0.30	21.698			6				
	5	7	129		14.365	15.493	-16.459	0.0877	2.555	0.30	22.023			5				
	Sec	tion >>	2-A	60.5	Alt psi	Wnd-V	OA-DB	OA-d	O cfm	Q/Env-A	KWH			4				
	4	XX	XX		XX	XX	XX	XX	XX	XX	XX			-				
	3	4	76		XX	XX	XX	XX	2,684	0.32	23,132			3				
- F	2	3	58		14.393	15.290	-16.271	0.0878	2,726	0.32	23,496			2				
	Sec	tion >>	1	89.6	Alt psi	Wnd-V	OA-DB	OA-d	Q cfm	2/Env-A	KWH			1				
	2	2	20		14.422	15.076	-16.071	0.0879	7,099	0.85	61,191							
-	1	1	0		14.422	15.076	-16.071	0.0879	7,208	0.86	62,132	-4,000	-2,000	0	2,000	4,000	6,000	8,000
_																		

8.U

0 5.0	5.0	5.0	5.0	2.0 6.0	6.0	6.0	6.0	6.0	7.5	7.5	2.0	6.0	6.0	6.0	6.0	6.0	7.5	7.5
Calc	Floor	Floor	Flr	Er	om Sh	oot 'SM		alce	Infltr	Cooling		Ero	m Sha	ot '\//		alce	Infltr	Heating
ID #	Lvi #	Hgt	Lk-A		UIII SII	et Siv	IIVIN-C	aits	SHG	Energy/Yr			in she		VIN-Co	aics	SHL	Energy/Yr
		8	25.2	OA-D	B V _o ft3/	lb H _o bu/lt	oQ ft3/mi	r Q lbs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	Q ft3/mii	Q lbs/hr	btuh	K-btuh/yr
24	101	1289		90.4	1 15.06	35.41	722	2,878	12,018	2,090		-20.59	11.79	-4.56	-2,093	-10,653	209,303	-18,042
23	100	1274		90.4	6 15.05	35.45	713	2,841	11,902	2,309	1	-20.54	11.78	-4.55	-2,069	-10,533	206,726	-6,702
		7	22.4	OA-D	B V _o ft3/	lb H _o bu/lb	ב ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	Ղ ft3/miւ	Q lbs/hr	btuh	K-btu/yr
22	XX	XX		XX	XX	XX	XX	XX	XX	XX	1	XX	XX	XX	XX	XX	XX	XX
21	93	1189		90.7	7 15.01	35.66	582	2,326	9,912	1,886		-20.23	15.01	-4.47	-1,710	-6,834	170,345	-5,541
20	88	1139		90.9	5 14.99	35.79	548	2,195	9,445	1,777		-20.05	14.99	-4.43	-1,630	-6,524	162,066	-5,282
		6 (x)	19.6	OA-D	B V _o ft3/	lb H _o bu/lb	ב ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	Ղ ft3/miւ	Q lbs/hr	btuh	K-btu/yr
19	XX	XX		XX	XX	XX	XX	XX	XX	XX		XX	XX	XX	XX	XX	XX	XX
18	83	1089		91.1	2 14.97	35.91	448	1,794	7,796	1,451	1	-19.88	11.72	-4.38	-1,353	-6,926	134,259	-4,384
17	73	989		91.4	8 14.93	36.17	372	1,495	6,622	1,206	1	-19.52	11.69	-4.29	-1,194	-6,129	118,012	-3,868
16	63	889		91.8	4 14.89	36.42	271	1,092	4,927	878	1	-19.16	11.66	-4.20	-1,012	-5,207	99,596	-3,277
		5	28.8	OA-D	B V _o ft3/	lb H _o bu/lt	ם ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	્ર ft3/mii	Q lbs/hr	btuh	K-btu/yr
15	58	839		92.0	1 14.87	36.55	293	1,183	5,385	950		-18.99	11.64	-4.15	-1,333	-6,873	131,012	-4,320
14	56	809		92.1	2 14.86	36.62	204	823	3,768	660		-18.88	11.63	-4.12	-1,233	-6,359	120,977	-3,994
13	54	779		92.2	3 14.84	36.70	-59	-236	-1,089	-190		-18.77	11.62	-4.10	-1,123	-5,800	110,111	-3,639
		4-k	24.3	OA-D	B V _o ft3/	lb H _o bu/lb	ם ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	Չ ft3/mi	Q lbs/hr	btuh	K-btu/yr
12	36	609		92.8	3 14.77	37.14	-438	-1,778	-8,431	-1,418		-18.17	11.56	-3.94	-438	-2,272	-35,601	1,185
11	31	542		93.0	7 73.07	37.31	-520	-427	-10,151	-1,685		-17.93	11.54	-3.88	-520	-2,704	-71,344	2,380
10	26	474		93.3	1 73.31	37.48	-593	-485	-11,725	-1,921		-17.69	11.52	-3.82	-593	-3,088	-94,083	3,147
9	21	407		93.5	5 73.55	37.66	-659	-538	-13,208	-2,136		-17.45	11.50	-3.75	-659	-3,440	-112,041	3,758
8	17	272		94.0	3 74.03	38.01	-779	-631	-16,016	-2,524		-16.97	11.45	-3.63	-779	-4,081	-140,633	4,742
		3	36.0	OA-D	B V _o ft3/	lb H _o bu/lt	oQ ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	Q ft3/mii	Q lbs/hr	btuh	K-btu/yr
7	XX	XX		XX	XX	XX	XX	XX	XX	XX		XX	XX	XX	XX	XX	XX	XX
6	8	144		94.4	9 14.59	38.35	-1,306	-5,374	-27,496	-4,233		-16.51	11.41	-3.51	2,517	13,234	-240,643	8,156
5	7	129		94.5	4 14.58	38.38	-1,324	-5,447	-27,934	-4,289		-16.46	11.41	-3.50	2,555	13,438	-244,101	8,278
		2-A	60.5	OA-D	B V _o ft3/	lb H _o bu/lt	ם ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	Ղ ft3/mi	Q lbs/hr	btuh	K-btu/yr
4	XX	XX		XX	XX	XX	XX	XX	XX	XX		XX	XX	XX	XX	XX	XX	XX
3	4	76		94.7	3 14.56	38.52	-2,324	-9,576	-49,516	-7,529		-16.27	11.39	-3.45	2,684	14,136	-255,846	8,695
2	3	<mark>58</mark>		94.7	9 14.55	38.57	-2,357	-9,719	-50,392	-7,638		-16.21	11.39	-3.43	2,726	14,366	-259,681	8,832
		1	89.6	OA-D	B V _o ft3/	lb H _o bu/lb	oQ ft3/mi	r Q Ibs/hr	btuh	K-btu/yr		OA-DB	V _o ft3/lb	H _o bu/lb	્ર ft3/mii	Q lbs/hr	btuh	K-btu/yr
2	2	20		94.9	3 14.54	38.67	-3,340	-13,783	-71,879	-10,820		-16.07	11.37	-3.40	7,099	37,452	-675,246	23,001
1	1	0		95.0	0 14.53	38.73	-3,397	-14,030	-73,385	-11,008		-16.00	11.37	-3.38	7,208	38,050	-685,084	23,355

\$ Stack Effect Infiltration DOE21E \$

\$-				-\$
\$	Wall/Window/Door Infltr CFMs are added to	Space Infltr Cl	FM (ACH or CFM/SF)	\$
	\$ Typical Infiltratio	n Coefficients :	for Exterior Walls	\$
\$	13" Brick Wall with Plastered Surface	cfh/ft2 = 0.01	Inf-Coeff = 0.002	\$
Ŝ	8" Brick Wall Plain	cfh/ft2 = 5.00	Inf-Coeff = 0.915	Ŝ
ŝ	Curtain Wall, Pressurized Building		Inf-Coeff = 0.005	ŝ
'	\$ Typical Infi	ltration Coeffic	cients for Windows	ŝ
Ś	Sealed Windows (Curtain Wall) Pressurized B	uilding	Inf-Coeff = 0.5	Ś
Ś	1/8" Crack (Wall or Window)	cfm/ft = 0.30	Inf-Coeff = 1.342	Ś
Ś	1/4" Crack (Wall or Window)	cfm/ft = 0.50	Inf-Coeff = 2.236	Ś
Ś	1/2" Crack (Wall or Window)	cfm/ft = 1.10	Inf-Coeff = 4.919	Ś
Ŷ	\$ Typical In	filtration Coef	ficients for Doors	Ś
Ś	3' x 7' Closed Door Residential with Weather	r Stripping	Tnf-Coeff = 2.400	Ś
Ś	3' x 7' Closed Door Residential without Wea	ther Stripping	Tnf-Coeff = 12.00	Ś
Ś	3.5' x 7' Closed Door OFFC	oner sollepping	Inf-Coeff = 3,100	Ś
Ś	3.5' x 7' Closed Door OFFC Open 10%		Inf-Coeff = 13.50	Ś
Ś	3 5' x 7' Closed Door OFFC Open 25%		Tnf-Coeff = 55.00	Ś
Ś	3 5' x 7' Closed Door OFFC Open 50%		Inf-Coeff = 153.00	Ś
Ś	3 5' x 7' Closed Door OFFC Open 10% + Vesti	hule	Inf-Coeff = 9.300	Ś
Ś	Revolving Door (average use)	Duic	Inf = Coeff = 12 00	Ś
Ś	Garage or Shipping Room Door (average use)		Inf = Coeff = 60 00	Ś
ч с				-\$
Ŷ				Ŷ
D۵	RAMETER S Use this Command to vary	design criteria	dimensions etc	Ś
LI	OFC-BLDG-HEIGHT = 400	debigii eriterita	\$ Building Height	Ś
	BLDG-NEUTRAL-LVI 0 5 \$ Neu	tral Level (fra	ation of Bldg Hat)	ч С
	OFC-WALL-INFL-C = 0.005	נומו שטעטו (וומ) ל ז	Wall Infiltr Coeff	с С
	$OEC_WNDW_INEL_C = 0.5$ Ś Window	Infiltr Coeff	Seeled Dressurized	4 4
	OFC-DOOP-INFI-C = 20	d i	Door Infiltr Coeff	4 2
	\$ Infiltration at 2 dfm/IE of window per	$\sin \alpha + \alpha r = [2v(2)]$	$20+9$ $1x^{2} - 916$ of m	4 2
	\Rightarrow Infinite actor at 2 clm/hr of window per \Rightarrow ACH - (916 \times 60)/40000	-1.37 ofm/SF	-916/4000 - 0.23	с С
	$\rho = \frac{1}{27}$	nace Infiltr Ni	= 510,4000 = 0.25	ې د
	$OFC_INFI_CFM/CF = 0.23$	g Chade Intitut All	filtr CEM per COET	ې د
	$OFC_DIFN_ACH = 0.1 \qquad \Leftrightarrow The filty Air Cha$	y space III.	nto Ceiling Dionum	с С
	OFC-FILIN-ACH - 0.1 Ş IIIIICI AII CIIA	indes her under H	Deremotor Command	ې ج
•••		γ μπα OT	Farameter Command	Ŷ

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$-----Infiltration Schedules-----$
SCH-INFL-WNDW = SCHEDULE $ Infltr CFM = Design Infltr CFM x Infltr Fraction $
   THRU FEB 28 (ALL) (1,24)=(1.0)
   THRU APR 30 (ALL) (1, 24) = (0.7)
   THRU OCT 31 (ALL) (1, 24) = (0.5)
  THRU NOV 30 (ALL) (1, 24) = (0.7)
   THRU DEC 31 (ALL) (1, 24) = (1.0)
. .
SCH-INFL-WALL = SCHEDULE
   THRU FEB 28 (ALL) (1,24)=(1.0)
   THRU APR 30 (ALL) (1, 24) = (0.7)
   THRU OCT 31 (ALL) (1, 24) = (0.2)
  THRU NOV 30 (ALL) (1, 24) = (0.7)
   THRU DEC 31 (ALL) (1, 24) = (1.0)
. .
SCH-INFL-DOOR = SCHEDULE
   THRU FEB 28
             (WD) (1,7)=(2) (8,10)=(3) (10,12)=(2) (12,13)=(3) (14,16)=(2)
                                  (17, 18) = (3) (19, 24) = (2)
                 (WEH) (1, 24) = (2)
   THRU APR 30
             (WD) (1,7)=(1.5) (8,10)=(2) (10,12)=(1.5) (12,13)=(2) (14,16)=(1.5)
                                  (17, 18) = (2) (19, 24) = (1.5)
                (WEH) (1,24) = (1.5)
   THRU OCT 31
             (WD) (1,7)=(0.5) (8,10)=(1) (10,12)=(0.5) (12,13)=(1) (14,16)=(0.5)
                                   (17, 18) = (1) (19, 24) = (0.5)
                (WEH) (1, 24) = (0.5)
   THRU NOV 30
             (WD) (1,7)=(1.5) (8,10)=(2) (10,12)=(1.5) (12,13)=(2) (14,16)=(1.5)
                                   (17, 18) = (2) (19, 24) = (1.5)
                (WEH) (1, 24) = (1.5)
   THRU DEC 31
             (WD) (1,7)=(2) (8,10)=(3) (10,12)=(2) (12,13)=(3) (14,16)=(2)
                                  (17, 18) = (3) (19, 24) = (2)
                (WEH) (1,24)=(2)
. .
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Ph.D. Program

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$-----$pace Conditions-----$
SC-OFC-EXT = SPACE-CONDITIONS
                           $ Office Design Criteria for Perimeter Spaces $
ZONE - TYPE = CONDITIONED
                                       $ or = UNCONDITIONED, = PLENUM $
                           $ Wall/Window/Door Infl based on Po, Pi diffr $
INF-METHOD = CRACK
                            $ Enter INF-COEF in WALL/WINDOW/DOOR Command $
$ INF-CFM/SQFT = OFC-INFL-CFM/SF Added to values by other methods if entered $
INF-SCHEDULE = SCH-INFL-WNDW
                                 $ Abbrev = N-Z-H = Hi-Rise Bldg height $
NEUTRAL-ZONE-HT = OFC-BLDG-HEIGHT
NEUTRAL-LEVEL = BLDG-NEUTRAL-LVL $ Default = 0.5 (0.5 x N-Z-H). Limits: (0,1) $
$-----$
SET-DEFAULT FOR EXTERIOR-WALL
                          $ Exposed Widths of all 4 Bldg Sides = 220' $
   INF-COEF = OFC-WALL-INFL-C $ Infilt CFM = Coeff x (Pi-Po)^0.8 x Wall Area $
                                    $ Pi,Po = Inside, Outside Pressure $
SET-DEFAULT FOR WINDOW
                                        $ Applies to all 4 Bldg Sides $
   INF-COEF = OFC-WNDW-INFL-C $ Infilt CFM = Coeff x (Pi-Po)^0.5 x Wndw Perim $
                                    $ Pi,Po = Inside, Outside Pressure $
$_____$
```