

Executive Summary

- Included in these procedures is building flushout period and calculated air exchanges per hour tabulations. Typical spaces have been used as the buildings were designed with the similar outside air requirements for each space/room type i.e.; classroom, office etc. The information for air changes were taken from existing drawings, balancing reports and other studies. We recommend that a Balancing Contractor verify the ventilation air flow for each type of space/room.
- The Sequence of Operations included are specific to each building as HVAC systems are not typical.
- Recommendations are included at the end of the Sequence of Operations.
- Cleaning and disinfection procedures for COVID are included at the end of HVAC Procedures for each school.

SPACE AIR-EXCHANGE PER HOUR CALCULATOR

CAMBRIDGEPORT SCHOOL, 89 ELM STREET, CAMBRIDGE, MA									8/4/2020
ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
Main Office			12.0	207.0	2484.0	70	70	1.7	690.0
Gymnasium			25.0	4955.0	123875.0	2250	2250	1.1	513.9
Cafeteria			12.0	1550.0	18600.0	740	740	2.4	488.7
Kitchen			12.0	585.0	7020.0	120	120	1.0	1137.5
Typ. Classroom			12.0	1000.0	12000.0	306	306	1.5	762.5
Avg								1.5	718.5
								or	29.9 Days

AMIGOS SCHOOL JK-8 , 15 UPTON STREET CAMBRIDGE, MA									8/6/2020
Office			12.5	360.0	4500.0	N/A	N/A	N/A	N/A
Gymnasium			30.0	2865.0	85950.0	5000	5000	3.5	133.7
Cafeteria			12.5	2903.0	36287.5	1100	1100	1.8	615.8
Kitchen			12.5	617.0	7712.5	250	250	1.9	575.9
Typ. Classroom			12.5	918.0	11475.0	400	400	2.1	535.5
Library			12.5	1665.0	20812.5	600	600	1.7	647.5
Avg								1.8	483.1
								or	20.1 Days

Note: Kitchen area is removed from the average number above.

JOHN M. TOBIN ELEMENTARY SCHOOL, 197 VESSAL LN, CAMBRIDGE, MA									8/5/2020
Office			12.0	1900.0	22800.0	1315	1315	3.5	337.1
Gymnasium			35.0	6650.0	232750.0	5000	5000	1.3	310.3
Cafeteria			20.0	3450.0	69000.0	2750	2750	2.4	292.7
Kitchen			12.0	1400.0	16800.0	5600	5600	20.0	58.3
Typ. Classroom			12.0	1064.0	12768.0	415	370	1.7	598.2
Auditorium			25.0	4026.0	100650.0	2840	2840	1.7	330.8
Library			12.0	2600.0	31200.0	1245	1245	2.4	487.3
Avg								2.2	392.7
								or	16.4 Days

Note: Kitchen area is removed from the average number above.

KENNEDY-LONGFELLOW SCHOOL, 158 SPRING LANE CAMBRIDGE, MA									8/7/2020
EXAMPLE	85.0	10.0	9.0	850.0	7650.0	255	200	1.6	777.8
Office			10.0	608.0	6080.0	243	243	2.4	583.8
Gymnasium			30.0	6372.0	191160.0	NA	NA	NA	NA
Cafeteria			12.0	3218.0	38616.0	NA	NA	NA	NA
Kitchen			12.0	2234.0	26808.0	NA	NA	NA	NA
Typ. Classroom			10.0	900.0	9000.0	250	250	1.7	840.0
Auditorium			25.0	2981.0	74525.0	2200	2200	1.8	316.2
Library			20.0	2218.0	44360.0	1008	1008	1.4	513.4
Avg								1.8	563.4
								or	23.5 Days

Note: Gymnasium, Cafeteria and Kitchen areas are removed from the average number above.

MARIA L. BALDWIN SCHOOL, 85 OXFORD ST, CAMBRIDGE, MA									8/5/2020
ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
EXAMPLE	85.0	10.0	9.0	850.0	7650.0	255	200	1.6	777.8
Office			12.0	2220.0	26640.0	2040	2040	4.6	253.9
Gymnasium			30.0	5785.0	173550.0	12000	12000	4.1	112.5
Cafeteria			12.0	3880.0	46560.0	2920	2920	3.8	310.0
Kitchen			12.0	840.0	10080.0	880	880	5.2	222.7
Classroom Cluster			12.0	1824.0	21888.0	1000	720	2.0	425.6
Library			30.0	3225.0	96750.0	1680	1680	1.0	447.9
Avg								3.1	310.0
								or	12.9

Days

Note: Kitchen area is removed from the average number above.

HAGGERTY SCHOOL, 110 CUSHING ST, CAMBRIDGE, MA									8/10/2020
ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
EXAMPLE	85.0	10.0	9.0	850.0	7650.0	255	200	1.6	777.8
Office			9.5	3200.0	30400.0	2200	2200	4.3	339.4
Gymnasium			24.0	3640.0	87360.0	8000	8000	5.5	106.2
Cafeteria / Kitchen			9.5	2390.0	22705.0	2680	2680	7.1	208.1
Comm / Multi Purpose			9.5	3325.0	31587.5	1720	1720	3.3	451.1
Typical Classroom			9.5	925.0	8787.5	500	500	3.4	431.7
Library			10.5	2300.0	24150.0	1000	1000	2.5	536.7
Art, Music, Science, Pre-K			9.5	1000.0	9500.0	600	600	3.8	388.9
Avg								3.8	375.6
								or	15.7

Days

Note: Cafeteria/Kitchen area is removed from the average number above.

LONGFELLOW COMMUNITY SCHOOL, 359 BROADWAY, CAMBRIDGE, MA									8/10/2020
ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
Office			12.0	305.0	3660.0	70	70	1.1	1016.7
Gymnasium			25.0	5407.0	135175.0	2000	2000	0.9	630.8
Cafeteria			12.0	1750.0	21000.0	980	980	2.8	416.7
Kitchen			12.0	1400.0	16800.0	1500	1500	N/A	N/A
Typ. Classroom			12.0	665.0	7980.0	175	175	1.3	886.7
Auditorium			0.0	0.0	0.0	2840	2840	N/A	N/A
Library			12.0	1300.0	15600.0	310	310	1.2	978.5
Avg								1.2	785.9
								or	32.7

Days

Note: Kitchen and Auditorium areas are removed from the average number above.

FLETCHER MAYNARD SCHOOL, 225 WINDSOR STREET CAMBRIDGE, MA **8/11/2020**

ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
Office			12.0	590.0	7080.0	360	360	3.1	382.4
Gymnasium			25.0	6796.0	169900.0	3630	3630	1.3	436.8
Cafeteria			12.0	2352.0	28224.0	775	775	1.6	708.1
Typ. Classroom			12.0	725.0	8700.0	220	220	1.5	768.9
Auditorium			25.0	N/A	N/A	0	0	N/A	N/A
Library			20.0	1457.0	29140.0	650	650	1.3	523.0

Avg **1.8** or **563.9**
or **23.5** Days

Note: Auditorium area is removed from the average number above.

MLK SCHOOL, 102 PUTNAM AVE, CAMBRIDGE, MA **8/4/2020**

ERV-1 Pre-School			10.0	1868.0	18680.0	1200	1080	3.5	363.2
ERV-2 Fitness			10.0	1251.0	12510.0	1200	1080	5.2	243.3
ERV-3 Large Gym			30.0	3608.0	108240.0	1600	1440	0.8	526.2
ERV-4 Large Gym			30.0	3608.0	108240.0	1600	1440	0.8	526.2
ERV-5 Community			10.0	5075.0	50750.0	2000	1800	2.1	592.1
ERV-6 Reading			10.0	4244.0	42440.0	2000	1800	2.5	495.1
ERV-7 Perf Arts			10.0	2032.0	20320.0	1600	1440	4.3	296.3
ERV-8 Small Gym			20.0	4326.0	86520.0	1700	1440	1.0	593.8
DOAS-1 Upper School			10.0	21970.0	219700.0	10200	10200	2.8	502.6
DOAS-2 Lower School			10.0	19970.0	199700.0	9000	9000	2.7	517.7
DOAS-3 Café/Serv			10.0	4616.0	46160.0	3200	3200	4.2	336.6
AHU-1 Auditorium			25.0	3849.0	96225.0	12000	12000	7.5	74.8
Heat Pump (typ class) (1203 Voc Tech)			10.0	1203.0	12030.0	1825	530	2.6	153.8

Avg **2.1** or **474.5**
or **19.8** Days

Note: Fitness, Performing Arts, Café/Serv and Auditorium areas are removed from the average number above.

KING OPEN & CAMBRIDGE STREET UPPER SCHOOLS, 850 CAMBRIDGE STREET CAMBRIDGE, MA **8/13/2020**

Office			9.0	98.0	882.0	15	15	1.0	1524.4
Auditorium/Stage			40.0	6059.0	242360.0	5600	5600	1.4	252.5
KO Gymnasium			28.8	6485.0	186768.0	6000	6000	1.9	252.2
CSUS Gymnasium			28.8	7179.0	206755.2	6800	6800	2.0	246.3
Fitness Room			29.0	370.0	10730.0	235	235	1.3	367.4
Cafeteria/Lobby			31.0	10967.0	339977.0	8000	8000	1.4	319.9
Kitchen			16.0	2462.0	39392.0	4640	4640	7.1	123.8
Open Library Area			27.8	5734.0	159405.2	5416	5416	2.0	247.0
Typ. Classroom			10.2	871.0	8884.2	510	510	3.4	398.5

Avg **2.1** or **533.7**
or **22.2** Days

Note: Auditorium/Stage, Fitness Room, Cafeteria/Lobby and Kitchen areas are removed from the average number above.

Cambridge, Ridge & Latin School, 459 BROADWAY, CAMBRIDGE, MA									8/12/2020
ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
RTU-1N Level 2			10.0	23472.0	234720.0	13040	12790	3.3	420.0
RTU-2N Level 1 & 2			10.0	20916.0	209160.0	11620	13000	3.3	420.0
RTU-3N Café South			10.0	8485.0	84850.0	7825	7000	4.9	253.0
RTU-4N Café North			10.0	8485.0	84850.0	7825	7000	4.9	253.0
RTU-5N Level 1 & 2			10.0	9270.0	92700.0	5150	3400	2.2	420.0
RTU-6N Level 1			10.0	22560.0	225600.0	12535	6915	1.8	419.9
RTU-7N Level 1, 2 & 3			10.0	24192.0	241920.0	13440	16410	3.3	420.0
RTU-8N Kitchen Area			10.0	18864.0	188640.0	10480	10480	3.3	420.0
RTU-9N Kitchen Make-Up						10260	10260		
RTU-10N Level 2,3 & 4			10.0	22734.0	227340.0	12630	11810	3.1	420.0
RTU-11N Level 4 & 5			10.0	20025.0	200250.0	11125	11000	3.3	420.0
RTU-12N - Level 2 & 5			10.0	17244.0	172440.0	9580	5560	1.9	420.0
RTU-13N Library			10.0	11680.0	116800.0	17850	12330	6.3	152.7
RTU-14N Level 1			10.0	19440.0	194400.0	10800	6590	2.0	420.0
RTU-15N Level 3			10.0	24237.1	242371.1	10190	4015	1.0	555.0
RTU-16N Level 2			10.0	22258.5	222585.0	12715	9875	2.7	408.5
RTU-17N Auditorium			25.0			15275	14000		
RTU-18N Lower Level & 1			10.0	36803.0	368030.0	12380	12020	2.0	693.6
RTU-19N Stage			25.0			6665	5900		
RTU-20N Guidance			10.0	18500.0	185000.0	10300	7100	2.3	419.1
RTU-21N Carpentry			10.0			11000	10500		
HRU-1 Kilns						3100	3200		
HRU-2 Dark Rooms						3800	4000		
					329165.6			Avg 3.0	407.9
									or 17.0 Days

Note: Kitchen, Kilns, Dart Rooms, Stage, Carpentry and Auditorium areas are removed from the average number above.

War Memorial Recreation Center, 1640 CAMBRIDGE St, CAMBRIDGE, MA									8/12/2020
RTU-1 Field House			30.0	21507.0	645210.0	18000	18000	1.7	278.8
RTU-2 Field House			30.0	21507.0	645210.0	18000	18000	1.7	278.8
AHU-1 locker/shower			10.0	16800.0	168000.0	14000	14000	5.0	280.0
AHU-2 weight/fitness			10.0	7680.0	76800.0	10700	3750	2.9	167.5
AHU-3 class/athletic office			10.0	5568.0	55680.0	7000	2450	2.6	185.6
AHU-4 toilet corridors			10.0	5095.0	50950.0	3500	2000	2.4	339.7
AHU-5			25.0	10487.0	262175.0	6500	2000	0.5	376.5
AHU-6			25.0	10487.0	262175.0	6500	2000	0.5	376.5
AHU-7			25.0	10487.0	262175.0	6500	2000	0.5	376.5
AHU-8			25.0	10487.0	262175.0	6500	2000	0.5	376.5
AHU-9 (Lower Pool)						6400			
AHU-10 (Lower Pool)						7400			
RTU-11 (upper Pool)						6000			
								Avg 1.8	303.6
									or 12.7 Days

Note: Pool area is removed from the average number above.

Morse SCHOOL, 40 GRANITE STREET, CAMBRIDGE, MA									
									8/11/2020
ROOM NAME/#	LENGTH (FT)	WIDTH (FT)	CEILING HEIGHT (FT)	FLOOR AREA (FT ²)	VOLUME (FT ³)	VENTILATION AIRFLOW IN (FT ³ /MIN)	EXHAUST/ RETURN AIRFLOW OUT (FT ³ /MIN)	AIR EXCHANGES PER HOUR (MUST BE ≥ 2.0)	FLUSHOUT TIME REQUIRED @ Air Changes/Hr OA (HRS)
EXAMPLE	85.0	10.0	9.0	850.0	7650.0	255	200	1.6	777.8
Main Office			10.0	1500.0	15000.0	600	600	2.4	583.3
Library			12.0	4493.8	53925.6	6000	6000	6.7	174.8
Gymnasium			25.0	6605.0	165125.0	14400	14400	5.2	107.0
Cafeteria			12.0	5980.4	71764.8	8000	8000	6.7	174.4
Auditorium			20.0	10683.1	213662.0	8000	8000	2.2	311.6
Kitchen			12.0	4375.2	52502.4	8120	8120	9.3	125.7
Typ. Classroom			10.9	833.0	9079.7	600	600	4.0	323.9
Avg								2.9	406.3

or **16.9** Days

Note: Library, Gymnasium, Cafeteria and Kitchen areas are removed from the average number above.

PEABODY SCHOOL, 70 RINDGE AVE, CAMBRIDGE, MA									
									8/10/2020
Admin/Art/Media			12.0	7525.0	90300.0	2275	2275	1.5	771.8
Gym			25.0	6500.0	162500.0	3000	3000	1.1	505.6
Kitchen			10.0	1000.0	10000.0	3000	3000	18.0	77.8
Community Center			10.0	1300.0	13000.0	1495	1495	6.9	202.9
Typical Classroom			10.0	980.0	9800.0	450	450	2.8	508.1
Café			15.0	3900.0	58500.0	5570	5570	5.7	163.4
Auditorium			25.0	3850.0	96250.0	2420	2420	1.5	371.2
Play/Multi/Pre-K			12.0	2430.0	29160.0	1300	1300	2.7	436.2
Avg								3.2	422.7

or **17.6** Days

Note: Kitchen area is removed from the average number above.

GRAHAM & PARKS SCHOOL, 44 LINNAEAN ST, CAMBRIDGE, MA									
									8/14/2020
Office			9.0	2880.0	25920.0	420	420	1.0	1600.0
Gymnasium			25.0	6440.0	161000.0	1650	1650	0.6	910.7
Cafeteria			15.0	2560.0	38400.0	1675	1675	2.6	356.6
Kitchen			12.0	1330.0	15960.0	1300	1300	4.9	238.7
Typ. Classroom			12.0	1000.0	12000.0	400	400	2.0	583.3
Industrial Arts			12.0	1500.0	18000.0	1200	1200	4.0	291.7
Auditorium			25.0	2600.0	65000.0	1600	1600	1.5	379.2
Platform			25.0	1485.0	37125.0	1675	1675	2.7	206.9
Avg								2.1	618.3

or **25.8** Days

Note: Kitchen area is removed from the average number above.