



# HVAC UPDATE - LANE SCHOOL

Facilities Dept  
March 3, 2021



# Technical Terms & Technical Help

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- **CFM:** CFM is the acronym for Cubic Feet per Minute — the measure of air volume moved by the fan blower
- **ACH:** Air Changes/Per Hour
- **ASHRAE**
- **Northeast Engineering & Commissioning ( Consultants)**
- **ENE Controls - SOW (Contractor)**
- **E.L Barrett TAB – SOW ( Contractor)**
- **Facilities Staff**

# CFM Rate – Educational Buildings

## CFM Rate – Educational Buildings

**TABLE 6-1 MINIMUM VENTILATION RATES IN BREATHING ZONE**  
(This table is not valid in isolation; it must be used in conjunction with the accompanying notes.)

Occupancy Category	People Outdoor Air Rate		Area Outdoor Air Rate		Notes	Default Values			Air Class
	$R_p$		$R_a$			Occupant Density (see Note 4)	Combined Outdoor Air Rate (see Note 5)		
	cfm/person	L/s-person	cfm/ft <sup>2</sup>	L/s-m <sup>2</sup>		#/1000 ft <sup>2</sup> or #/100 m <sup>2</sup>	cfm/person	L/s-person	
Correctional Facilities									
Cell	5	2.5	0.12	0.6		25	10	4.9	2
Dayroom	5	2.5	0.06	0.3		30	7	3.5	1
Guard stations	5	2.5	0.06	0.3		15	9	4.5	1
Booking/waiting	7.5	3.8	0.06	0.3		50	9	4.4	2
Educational Facilities									
Daycare (through age 4)	10	5	0.18	0.9		25	17	8.6	2
Daycare sickroom	10	5	0.18	0.9		25	17	8.6	3
Classrooms (ages 5–8)	10	5	0.12	0.6		25	15	7.4	1
Classrooms (age 9 plus)	10	5	0.12	0.6		35	13	6.7	1
Lecture classroom	7.5	3.8	0.06	0.3		65	8	4.3	1
Lecture hall (fixed seats)	7.5	3.8	0.06	0.3		150	8	4.0	1
Art classroom	10	5	0.18	0.9		20	19	9.5	2
Science laboratories	10	5	0.18	0.9		25	17	8.6	2
University/college laboratories	10	5	0.18	0.9		25	17	8.6	2
Wood/metal shop	10	5	0.18	0.9		20	19	9.5	2
Computer lab	10	5	0.12	0.6		25	15	7.4	1
Media center	10	5	0.12	0.6	A	25	15	7.4	1
Music/theater/dance	10	5	0.06	0.3		35	12	5.9	1
Multi-use assembly	7.5	3.8	0.06	0.3		100	8	4.1	1
Food and Beverage Service									
Restaurant dining rooms	7.5	3.8	0.18	0.9		70	10	5.1	2
Cafeteria/fast-food dining	7.5	3.8	0.18	0.9		100	9	4.7	2
Bars, cocktail lounges	7.5	3.8	0.18	0.9		100	9	4.7	2
Kitchen (cooking)	7.5	3.8	0.12	0.6		20	14	7.0	2

# Code – ASHRAE - Studies

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### HEALTHY BUILDINGS

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- Increase outdoor air ventilation
- Filter indoor air
- Supplement with portable air cleaners
- Verify ventilation and filtration performance
- Consider advanced air quality techniques
- Use plexiglass as physical barrier
- Install no-contact infrastructure
- Keep surfaces clean
- Focus on bathroom hygiene

### HEALTHY POLICIES

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- Establish and reinforce a culture of health, safety, and shared responsibility
- Form a COVID-19 response team and plan
- Prioritize staying home when sick
- Promote viral testing and antibody testing
- Establish plans for when there is a case
- Support remote learning options
- De-densify school buildings
- Protect high-risk students and staff

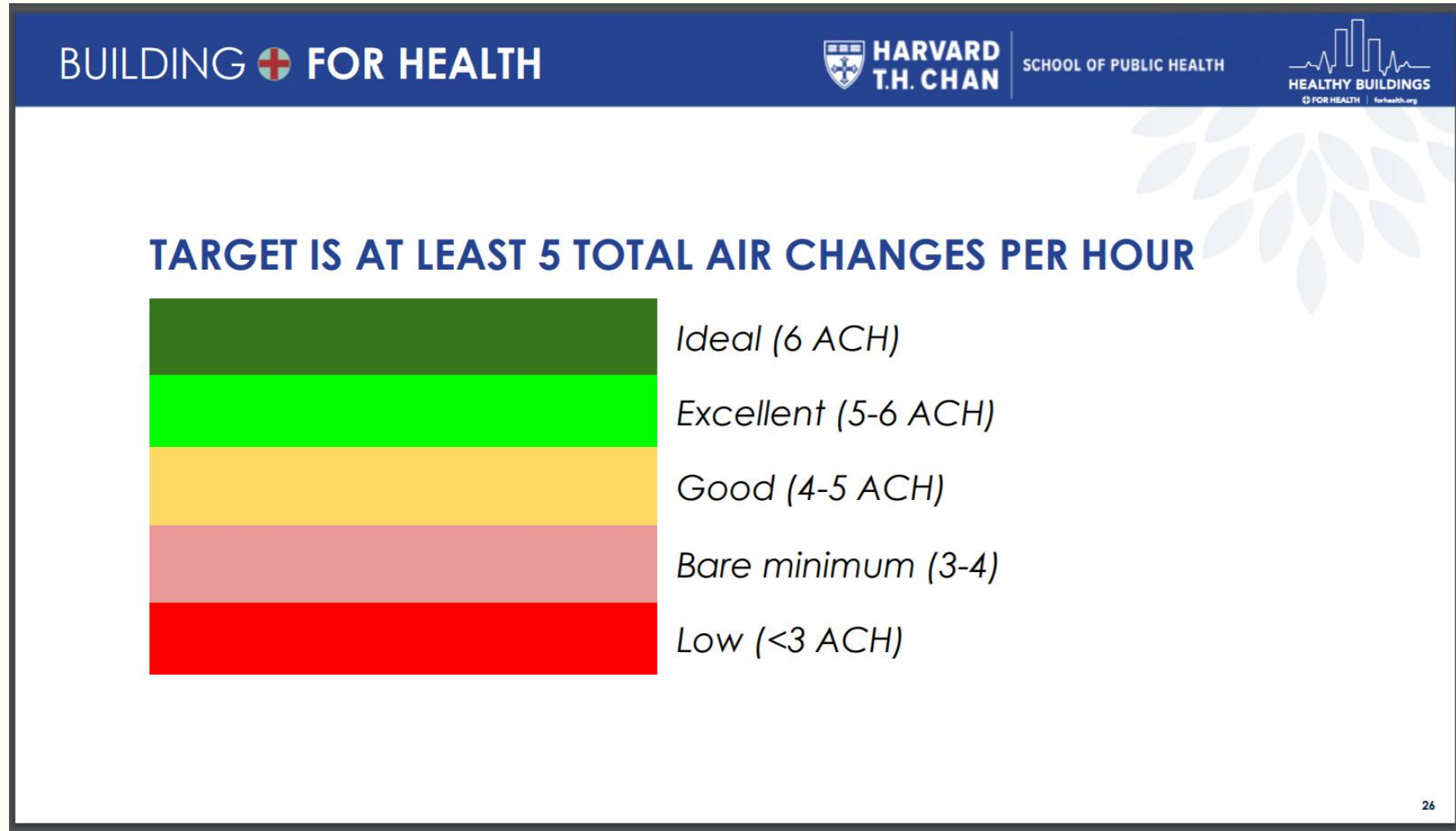
# ASHEAR GUIDANCE FOR THE RE-OPENING OF SCHOOLS

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Protecting the health, safety and welfare of the world's students, faculty, and administrators from the spread of SARS-CoV-2 (the virus that causes the COVID-19 disease) is essential to protecting the entire population. ASHRAE's guidance for schools provides practical information and checklists to help minimize the chance of spreading SARS-CoV-2. A summary of key general recommendations related to HVAC and water supply systems appears below. Many different HVAC system types are used in educational facilities, so adaptation of these guidelines to specific cases is necessary. ***Please consult the full guidance for important details and consider reaching out to qualified design professionals for detailed analysis as needed.***

- • **Inspection and Maintenance:** Consider assessing the condition of systems and making necessary repairs. All building owners and service professionals should follow ASHRAE Standard 180-2018 "Standard Practice for the Inspection and Maintenance of Commercial HVAC Systems."
- • **Ventilation:** A good supply of outside air, in accordance with ASHRAE Standard 62.1-2019, to dilute indoor contaminants is a first line of defense against aerosol transmission of SARS-CoV-2. Pre- and post-occupancy purge cycles are recommended to flush the building with clean air.
- • **Filtration:** Use of at least MERV-13 rated filters is recommended if it does not adversely impact system operation. If MERV-13 filters cannot be used, including when there is no mechanical ventilation of a space, portable HEPA air cleaners in occupied spaces may be considered.
- • **Air Cleaning:** Air cleaners such as germicidal ultraviolet air disinfection devices may also be considered to supplement ventilation and filtration. Technologies and specific equipment should be evaluated to ensure they will effectively clean space air without generating additional contaminants or negatively impacting space air distribution.
- • **Energy Use Considerations:** In selecting mitigation strategies, consideration should be given to energy use as there may be multiple ways to achieve performance goals that have greatly different energy use impact. Control changes and use of energy recovery to limit or offset the effect of changes in outdoor air ventilation rate and filter efficiency may reduce or offset energy and operating cost penalties.
- • **Water System Precautions:** Buildings that have been unoccupied could have stagnant water, and water systems should be flushed to remove potential contaminants. Utilizing ASHRAE Standard 188 and Guideline 12 can help minimize the risk of water-borne pathogens such as legionella.

# Title and Content Layout with List








# What Has Been Done To Improve Ventilation

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# What Has Been Done To Improve Ventilation

Classic 680i/690i/605 technical specifications*			
CADR (cfm)**:	Smoke	Dust	Pollen
	 500	 500	 640
Room size	775 sq.ft. (72 m <sup>2</sup> )		
Air Changes per Hour ***	5		
Airflow (Speed 1-2-3)	150-275-660 cfm		
Size (HxWxD):	26 x 20 x 13 in. (660 x 500 x 340 mm)		
Product weight:	35 lbs (16 kg)		
Energy consumption (Speed 1-2-3)****	15-65-100 W		
Operating frequency:	2412-2472 MHz		
Output power:	13.69 dBm		
Sound pressure levels (Speed 1-2-3)	33-44-62 dBA		
Filter replacement indicator	Yes		
Speed control options	680i/690i 605	1-2-3, non-touch, smartphone (Automodel) 1-2-3, non-touch, smartphone	
Air quality sensors	680i/690i 605	Built-in sensors for VOC, PM2.5, temperature and humidity No sensors - optional use with Blueair Aware	
The entire unit can be recycled.			
External network issues affecting the product performance are beyond the control of Blueair. Please contact your Internet service provider for assistance.			

\* Specifications based on U.S. model 680i/690i/605





# Consultants SOW

NORTHEAST ENGINEERING AND COMMISSIONING SERVICES, INC.  
20 Meadowbrook Road, Westwood, MA 02090 (781) 326-7700

September 2, 2020  
ENE – Controls Scope of Work  
Typical of Lane, Davis, JGMS and BHS

1. **Minimum Outdoor Air Ventilation - Adjust classroom outdoor air minimums to match the original design documents.** The pre-balance or baseline damper % open setting is based upon the simple ratio of outdoor airflow/total airflow, minus 5% for conservatism and lower actual EWT. A table of settings by room with design reference is attached.
2. **Demand Controlled Ventilation** – In all classroom spaces where DCV was an original design feature and the equipment has adequate heating capacity, the DCV sequence shall remain provided that the OA minimum is raised according to minimums listed in the table. **The threshold control set point should be lowered to 600 ppm.** In spaces where DCV was added as an energy conservation measure and/or the heating capacity is unknown, the DCV function should be disabled and the minimums set per the table.
3. **Heating Pump Speed Control** – If variable speed pumping based on return water temperature has been added to a system with 3-way control valves, the minimum speed shall be set at 100% for temperatures below 30F, and allowed to modulate based on the sequence at temperatures above that.
4. **Boiler Water Reset** – If a boiler water reset sequence has been implemented via the EMS, the linear reset schedule shall be narrowed to <30F to 60F OAT = 180F – 160F boiler supply set point. If condensing type boilers have been installed that do not allow for this temperature range then the alternative maximum settings shall be used. If possible, non-condensing boilers should be lead and condensing set as lag during colder conditions.
5. **Schedules and Warm-up** – **The new occupancy schedule is 6a – 6p seven days a week.** If a warm-up sequence has been implemented that limits outdoor air during warm-up, the schedule shall be adjusted to ensure that outdoor air dampers are open to the programmed minimums by 6a. Verify that all associated classroom exhaust air systems are enabled during occupied mode. The unoccupied mode should operate normally – OA dampers can close and fan cycling to maintain minimum temperature can remain. **Boilers and pumps should operate normally 24/7.**
6. **Set points** – The baseline occupied space temperature set point is 72F. The baseline unoccupied set point is 68F. The control tolerance on each should be no more than +/- 2F. Facilities staff will be allowed to modify the occupied set point on a classroom by classroom basis via the front end.

# Consultants SOW

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## NORTHEAST ENGINEERING AND COMMISSIONING SERVICES, INC.

20 Meadowbrook Road, Westwood, MA 02090 (781) 326-7700

September 3, 2020

TAB Contractor – Scope of Work DRAFT

Typical of Lane, Davis, JGMS and BHS

### Priority one:

1. Set the Unit Ventilators to high speed, measure and record the total existing supply CFM in each school classroom. Leave the unit ventilators on high speed after the measurement. Test, adjust and balance exhaust airflow (CFM) in each classroom to the design values listed in the table below per room.
2. Measure and record each school existing hot water heating pump flow rate (GPM). Measure both primary and secondary pumping loops.
3. Take samples of Hot water heating loop water and verify the percentage of glycol in the hot water heating system. Each school shall have a minimum of 30% propylene in the hot water system. The Bedford Facility group will contract with a vendor to test the systems and add glycol to the heating systems to ensure 30% glycol level.

### Priority two:

4. Measure and record total and outdoor air flow CFM on all HVAC equipment not associated with priority one. Measure and record total exhaust air CFM for all exhaust fans not associated with priority one. Refer to attached HVAC plans and schedules for list of equipment and design values.

# Consultants SOW

## NORTHEAST ENGINEERING AND COMMISSIONING SERVICES, INC. 20 Meadowbrook Road, Westwood, MA 02090 (781) 326-7700

### LANE SCHOOL

#### PRIORITY ONE:

Room	Total CFM	OA CFM	OA Dmpr Min.	Tag No.	Schedule Ref.	Location Ref.	Exhaust CFM HIGH/LOW	Fan number	Schedule Ref.
003	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
005	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
007	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
010	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
012	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
014	*								
016	*								
017	*								
018	*								
022	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
023	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
024	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
025	1000	430	38%	UV-4	M0.3	M1.3	900/400	EF-1	M0.2
032	2200	635		FCU-1	M0.3	M1.3			
038	750	260	30%	UV-3	M0.3	M1.3	670/180	EF-2	M0.2
040	1000	430	38%	UV-4	M0.3	M1.3	920/350	EF-3	M0.2
041	1000	430	38%	UV-4	M0.3	M1.3	920/350	EF-3	M0.2
042A	750	200	22%	UV-2	M0.3	M1.3	710/175	EF-2	M0.2
042B	750	200	22%	UV-2	M0.3	M1.3	710/175	EF-2	M0.2
203	750	260	30%	UV-3	M0.3	M1.4	720/230	EF-12	M0.2
204	750	260	30%	UV-3	M0.3	M1.4	720/230	EF-12	M0.2
205	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
206	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
208	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
209	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
211	*								
213	*								
214	*								
215	*								
216	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
217	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
218	1000	430	38%	UV-4	M0.3	M1.4	900/400	EF-1	M0.2
219	750	260	30%	UV-3	M0.3	M1.4	720/230	EF-11	M0.2
220	750	260	30%	UV-3	M0.3	M1.4	720/230	EF-11	M0.2
232	750	260	30%	UV-3	M0.3	M1.4	670/180	EF-2	M0.2

# Classroom UVs Tests-And-Balance (TAB)

LANE SCHOOL  
66 SWEETWATER AVE  
BEDFORD, MA

E. L. BARRETT  
COMPANY, INC.

3/5/2021

UNIT VENTILATORS (BEFORE CLEANINGS)

OUTLET NO.	LOCATION	TYPE	SIZE	AREA	DESIGN C.F.M.		SPEED	ACTUAL CFM
SUPPLY	003	UV SUP	54X8	*	1000		HI	820
OUTSIDE AIR	003	LOUVER	48X12	*	430			99
SUPPLY	005	UV SUP	54X8	*	1000		HI	800
OUTSIDE AIR	005	LOUVER	48X12	*	430			166
SUPPLY	007	UV SUP	54X8	*	1000		HI	826
OUTSIDE AIR	007	LOUVER	48X12	*	430			139
SUPPLY	010	UV SUP	54X8	*	1000		HI	995
OUTSIDE AIR	010	LOUVER	48X12	*	430			189
SUPPLY	012	UV SUP	54X8	*	1000		HI	527
OUTSIDE AIR	012	LOUVER	48X12	*	430			105
SUPPLY	014	UV SUP	46X7	*	NL			NR
OUTSIDE AIR	014	LOUVER	48X12	*	NL			
SUPPLY	016	UV SUP	34X7	*	NL		HI	475
OUTSIDE AIR	016	LOUVER	48X12	*	NL			136
SUPPLY	017	UV SUP	34X7	*	NL			NR
OUTSIDE AIR	017	LOUVER	48X12	*	NL			

ELB CO. JOB #: 6187

COMMENTS: ORIGINAL READINGS BEFORE COIL CLEANINGS



# Title and Content Layout with List

LANE SCHOOL  
66 SWEETWATER AVE  
BEDFORD, MA

E. L. BARRETT  
COMPANY, INC.

2/26/2021

UNIT VENTILATORS (AFTER CLEANINGS)

OUTLET NO.	LOCATION	TYPE	SIZE	AREA	DESIGN C.F.M.		SPEED	ACTUAL CFM
SUPPLY	003	UV SUP	54X8	*	1000		HI	1069
OUTSIDE AIR	003	LOUVER	48X12	*	430			
SUPPLY	005	UV SUP	54X8	*	1000		HI	1048
OUTSIDE AIR	005	LOUVER	48X12	*	430			
SUPPLY	007	UV SUP	54X8	*	1000		HI	1149
OUTSIDE AIR	007	LOUVER	48X12	*	430			
SUPPLY	010	UV SUP	54X8	*	1000		HI	1003
OUTSIDE AIR	010	LOUVER	48X12	*	430			
SUPPLY	012	UV SUP	54X8	*	1000		HI	1140
OUTSIDE AIR	012	LOUVER	48X12	*	430			
SUPPLY	014	UV SUP	46X7	*	NL		HI	
OUTSIDE AIR	014	LOUVER	48X12	*	NL	NOT CLEANED 2/18/2021		
SUPPLY	016	UV SUP	34X7	*	NL		HI	
OUTSIDE AIR	016	LOUVER	48X12	*	NL	NOT CLEANED 2/18/2021		
SUPPLY	017	UV SUP	34X7	*	NL			
OUTSIDE AIR	017	LOUVER	48X12	*	NL	NOT CLEANED 2/18/2021		

ELB CO. JOB #: 6187

COMMENTS: READINGS THIS PAGE AFTER CLEANING UNITS/FILTER CHANGES 2/18/2021

**E. L. BARRETT**  
COMPANY, INC.

LANE SCHOOL  
66 SWEETWATER AVE  
BEDFORD, MA

3/5/2021

UNIT VENTILATORS (AFTER CLEANINGS)

OUTLET NO.	LOCATION	TYPE	SIZE	AREA	DESIGN C.F.M.		SPEED	ACTUAL CFM
SUPPLY	003	UV SUP	54X8	*	1000		HI	1069
OUTSIDE AIR	003	LOUVER	48X12	*	430			371
SUPPLY	005	UV SUP	54X8	*	1000		HI	1048
OUTSIDE AIR	005	LOUVER	48X12	*	430			300
SUPPLY	007	UV SUP	54X8	*	1000		HI	1149
OUTSIDE AIR	007	LOUVER	48X12	*	430			393
SUPPLY	010	UV SUP	54X8	*	1000		HI	1003
OUTSIDE AIR	010	LOUVER	48X12	*	430			94
SUPPLY	012	UV SUP	54X8	*	1000		HI	1140
OUTSIDE AIR	012	LOUVER	48X12	*	430			368
SUPPLY	014	UV SUP	46X7	*	NL		HI	727
OUTSIDE AIR	014	LOUVER	36X12	*	NL			235
SUPPLY	016	UV SUP	34X7	*	NL		HI	549
OUTSIDE AIR	016	LOUVER	48X12	*	NL			167
SUPPLY	017	UV SUP	34X7	*	NL		HI	773
OUTSIDE AIR	017	LOUVER	48X12	*	NL			251

ELB CO. JOB #: 6187

COMMENTS: READINGS THIS PAGE AFTER CLEANING UNITS/FILTER CHANGES 2/18/2021,3/3/2021

## Consultant' Confirmation

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- Taissir:
- *“I would use the outdoor air design value because you have balancer data that shows that total airflow now meets or exceeds spec., and an email from ENE confirming that dampers have been set back to original design values. I’d further say that the enhanced ventilation mode will allow for even greater amounts of outdoor air when temps are above 30F, which will be the case until next November.”*
- *Ron Burke*

# LANE HVAC UPDATE

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- THANK YOU