

**RIVER DELL VENTILATION REPORT**

**AUGUST 2020**

**UPDATED AUGUST 2021**

## **BACKGROUND**

Schools are required to provide an exchange of air for each instructional space based upon a formula that considers the square footage of the spaces. They are also required to provide a certain amount of ventilation air/outside air based upon a similar calculation.

However, no authoritative body has defined any specifics as to required values for ventilation as required for COVID-19 mitigation. This makes it very difficult to state that all those requirements have been met. As a result, we based the responses in this report upon our understanding of the CDC “guidelines”, current NJ Mechanical Code, ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) recommendations, and other limited guidance such as the NJ Department of Education’s *The Road Back* issued in June 2020 and *The Road Forward* issued in June 2021.

### **HVAC EQUIPMENT OPERATIONS:**

Current NJ mechanical code requires that each space within school buildings to have a certain amount of outside ventilation to maintain proper indoor air quality. These amounts are determined by calculations conducted during the design of the systems and the systems will continue to provide those specified rates if they are properly maintained and operational. There are various systems employed to provide and meet these requirements. The most common systems employed on school are described below:

#### **□ ROOF TOP UNITS (RTU’S)**

- Roof top units are mechanical systems typically mounted on the roof of a building and provide supply and return air through a system of ductwork that runs above the ceiling.
- The air supplied to each room is balanced to ensure the code required cubic feet/minute (CFM’s). This includes a prescribed amount of outside ventilation air as well.

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#### **□ UNIT VENTILATORS (UV’S)**

- Unit Ventilators are mechanical systems, that come in a variety of forms that are designed to provide supply and return air into a room and can be either ducted or “free-flow”.
- Under window units, resemble a medium sized credenza, typically installed under a window in between bookcases in an instructional space.
- Vertical units, resembling a refrigerator, can be placed in the corner of a room to provide self-contained air-conditioning.
- Cassette units / split systems are typically wall mounted or installed in the ceiling grid.

## □ EXHAUST FAN'S

- Exhaust fans are mechanical systems, that are designed to remove air from a room / building and discharge it to the outdoors, while fresh air is sucked into the building through vents in a wall. These systems can be either roof mounted and ducted or window / wall mounted.
  - Typical exhaust fan locations would be:
    - Toilet Rooms which are required to have 100% exhaust to the exterior.
    - Hallway ceilings serve as return ducts to remove air from the building
    - Other rooms include Janitor's Closets, kitchens, locker rooms, mechanical rooms, and electrical rooms.

## **AIR QUALITY & HVAC/FILTER MANAGEMENT**

As noted above, current NJ mechanical code requires that each space within our buildings to have a certain amount of outside ventilation to maintain proper indoor air quality. The code requires a calculation for CFM (cubic feet of air per minute), however there is NO Code requirement for "air changes per hour" in schools; that is a typical requirement for Hospitals and Laboratory spaces; not schools.

Our engineer provided a comparative calculation that while not exact, will provide an approximation of air changes per hour for instructional spaces in school. Most "average sized" classrooms (750sf with 9'-6" ceilings) with properly designed, installed, and working unit ventilators should yield an average of 2 to 2.5 air changes per hour.

For rooms without mechanical means to bring in outside air, the code allows for windows that open to provide fresh air to meet the needed outside air component

For rooms without windows such as interior instructional spaces, these are required to be air-conditioned as per DOE requirements and required to have ducted mechanical outside ventilation air to meet mechanical code requirements.

As part of the district's preventive maintenance plan, filters are inspected and replaced according to manufacturer's recommendations. This occurs an average every three (3) months. The recommended filters remove fine particles from the air and are specified to fit our units.

There are NO minimum filter requirements per code, but we use MERV 8 as a baseline.

However, we installed portable HEPA filtration units (air purifiers) in the nurses' offices in all buildings as an added precaution.

## **AIR PURIFICATION PROTOCOLS**

During the Spring and Summer of 2021, all standalone unit ventilators and rooftop air handlers received a retrofit that included Needle Point Bi-polar ionization technology. The technology treats the incoming air that is released into the classroom\building space. It is designed to kill mold, bacteria and viruses including the SARS-CoV-2 (COVID-19) and is highly effective.

## **INSPECTION PROTOCOLS**

District officials and facilities staff inspected each room in each building utilizing the occupancy charts used to determine student and staff class sizes.

Our architect and engineering consultants reviewed the buildings to verify that mechanical systems alone or a combination of mechanical systems and access to fresh air through windows, would align with the current CDC, DOE and ASHRAE recommendations for re-opening schools and determined that the systems if designed per code, and if operating properly would provide the appropriate amounts of ventilation air.

Appendices 1 and 2 contain the results of the inspections.

## **ISOLATION ROOMS**

As a part of ongoing safety protocols, we identified an isolation room in each building should a student or staff member exhibit symptoms of COVID once class is in session. Students and staff will stay in the isolation area until they can safely exit the facility.

## **DISCLAIMER**

Please note that mechanical ventilation and air conditioning systems require constant maintenance. There will always be some aspect of the system that needs replacement or upgrades.

## **Appendix 1**

### **MIDDLE SCHOOL VENTILATION CHART**

**RIVER DELL MIDDLE SCHOOL VENTILATION CHART**

LEVEL	NUMBER	NAME	AREA	MECHANICAL VENTILATION	AIR CONDITIONING	WINDOWS	IONIZERS
Level 1	N/A	Gymnasium	7812 SF	Yes	No	No	Yes
Level 1	N/A	Cafeteria "B"	1660 SF	Yes	Yes	Yes	Yes
Level 1	N/A	Cafeteria "A"	1388 SF	Yes	Yes	Yes	Yes
Level 1	N/A	Stage	1153 SF	Yes	No	No	Yes
Level 1	N/A	Auditorium	4317 SF	Yes	NO	No	Yes
Level 1	N/A	MEDIA CENTER	3908 SF	Yes	Yes	Yes	Yes
Level 1	N/A	COMPUTER LAB	726 SF	Yes	Yes	Yes	Yes
Level 1	100	LLD	1044 SF	Yes	Yes	Yes	Yes
Level 1	101	Classroom	756 SF	Yes	Yes	Yes	Yes
Level 1	101A	Office*	N/A	No	No	Yes	N/A
Level 1	102	Classroom	764 SF	Yes	Yes	Yes	Yes
Level 1	103	Classroom	761 SF	Yes	Yes	Yes	Yes
Level 1	110	Classroom	649 SF	Yes	Yes	Yes	Yes
Level 1	111	Science Lab	880 SF	Yes	Yes	Yes	Yes
Level 1	112	Classroom	655 SF	Yes	Yes	Yes	Yes
Level 1	113	Science Lab	867 SF	Yes	Yes	Yes	Yes
Level 1	114	Classroom	655 SF	Yes	Yes	Yes	Yes
Level 1	127/129	Home EC	1457 SF	Yes	Yes	Yes	Yes
Level 1	131	Music	870 SF	Yes	Yes	Yes	Yes
Level 1	140	Office*	N/A	No	Yes	Yes	N/A
Level 1	143	Music Room	1044 SF	Yes	Yes	Yes	Yes
Level 1	144	Art Room	931 SF	Yes	Yes	Yes	Yes
Level 1	145	STEM Room	1541 SF	Yes	Yes	Yes	Yes
Level 1	146	Tech Room	737 SF	Yes	Yes	Yes	Yes
Level 1	147	Tech Room	1208 SF	Yes	Yes	Yes	Yes
Level 1	Guidance Suite						
Level 1	Room A	Office*	N/A	No	Yes	Yes	N/A
Level 1	Room B	Office*	N/A	No	Yes	Yes	N/A
Level 1	Room C	Office*	N/A	No	Yes	Yes	N/A
Level 1	Conference Room	Office*	N/A	No	Yes	No	N/A

RIVER DELL MIDDLE SCHOOL VENTILATION CHART							
LEVEL	NUMBER	NAME	AREA	MECHANICAL VENTILATION	AIR CONDITIONING	WINDOWS	IONIZERS
Level 2	200	Classroom	649 SF	Yes	Yes	Yes	Yes
Level 2	201	Science Lab	880 SF	Yes	Yes	Yes	Yes
Level 2	202	Classroom	655 SF	Yes	Yes	Yes	Yes
Level 2	203	Science Lab	867 SF	Yes	Yes	Yes	Yes
Level 2	204	Classroom	655 SF	Yes	Yes	Yes	Yes
Level 2	206	Classroom	693 SF	Yes	Yes	Yes	Yes
Level 2	207	Classroom	729 SF	Yes	Yes	Yes	Yes
Level 2	208	Classroom	616 SF	Yes	Yes	Yes	Yes
Level 2	210	Classroom	603 SF	Yes	Yes	Yes	Yes
Level 2	211	RESOURCE ROOM	780 SF	Yes	Yes	Yes	Yes
Level 2	212	RESOURCE ROOM	775 SF	Yes	Yes	Yes	Yes
Level 2	212A	Office*	N/A	No	Yes	No	N/A
Level 2	214	Classroom	724 SF	Yes	Yes	Yes	Yes
Level 2	215	Classroom	770 SF	Yes	Yes	Yes	Yes
Level 2	216	Classroom	729 SF	Yes	Yes	Yes	Yes
Level 2	218	Classroom	663 SF	Yes	Yes	Yes	Yes
Level 2	219	Classroom	670 SF	Yes	Yes	Yes	Yes
Level 2	220	Classroom	644 SF	Yes	Yes	Yes	Yes
Level 2	221	Office	N/A	Yes	Yes	Yes	Yes
Level 2	222	Classroom	666 SF	Yes	Yes	Yes	Yes
Level 2	223	Classroom	673 SF	Yes	Yes	Yes	Yes
Level 2	224	Classroom	779 SF	Yes	Yes	Yes	Yes
Level 2	225	SE	663 SF	Yes	Yes	Yes	Yes
Level 2	226	Classroom	734 SF	Yes	Yes	Yes	Yes
Level 2	227	SGI	338 SF	Yes	Yes	Yes	Yes
Level 2	228	Classroom	748 SF	Yes	Yes	Yes	Yes
Level 2	229	SGI	234 SF	Yes	Yes	Yes	Yes
Level 2	229	Office*	N/A	No	Yes	Yes	N/A
Level 2	230	SGI	373 SF	Yes	Yes	Yes	Yes

\* - These rooms rely on windows only for outside air. While code compliant, they may become uncomfortable as the seasons change. As a result, the district will add portable ventilation units in each area.

**Appendix 2**

**HIGH SCHOOL VENTILATION CHART**



**RIVER DELL HIGH SCHOOL CLASSROOM VENTILATION CHART**

LEVEL	NUMBER	NAME	AREA	MECHANICAL VENTILATION	AIR CONDITIONING	WINDOWS	IONIZERS
Level 1	104	Office	N/A	Yes	Yes	No	Yes
Level 1	105	MEDIA CENTER	4830 SF	Yes	Yes	Yes	Yes
Level 1	105A	COMP. LAB	734 SF	Yes	Yes	No	Yes
Level 1	105B	Office	N/A	Yes	Yes	No	Yes
Level 1	105C	Office	N/A	Yes	Yes	No	Yes
Level 1	107	Office	N/A	Yes	Yes	Yes	Yes
Level 1	Guidance Suite	Office	N/A	Yes	Yes	Yes	Yes
Level 1	Guidance Outer	Office	N/A	Yes	Yes	No	Yes
Level 1	Tech Suite	Office	N/A	Yes	Yes	Yes	Yes
Level 1	133	AUDITORIUM	5416 SF	Yes	Yes	No	Yes
Level 1	135	STAGE	2383 SF	Yes	Yes	No	Yes
Level 1	202	TECH. CLASSROOM	516 SF	Yes	Yes	Yes	Yes
Level 1	204	ART STUDIO	1324 SF	Yes	Yes	Yes	Yes
Level 1	210	Office*	N/A	No	Yes	Yes	N/A
Level 1	212	ART/PHOTO ROOM	955 SF	Yes	Yes	Yes	Yes
Level 1	214	ART STUDIO	1832 SF	Yes	Yes	Yes	Yes
Level 1	216	TECH/GRAPHIC ARTS	1539 SF	Yes	Yes	Yes	Yes
Level 1	218	TECH. CLASSROOM	1447 SF	Yes	Yes	Yes	Yes
Level 1	300	INST MUSIC	2837 SF	Yes	Yes	Yes	Yes
Level 1	301	VOCAL MUSIC	1574 SF	Yes	Yes	Yes	Yes
Level 1	302	BIO/CHEM LAB	1132 SF	Yes	Yes	Yes	Yes
Level 1	303	Office	N/A	Yes	Yes	No	Yes
Level 1	Music Suite	Office	N/A	Yes	Yes	No	Yes
Level 1	304	Office	N/A	Yes	Yes	No	Yes
Level 1	305	CLASSROOM	749 SF	Yes	Yes	No	Yes
Level 1	306	BIO/CHEM LAB	1173 SF	Yes	Yes	Yes	Yes
Level 1	307	CLASSROOM	734 SF	Yes	Yes	Yes	Yes
Level 1	308	BIO/CHEM LAB	1188 SF	Yes	Yes	Yes	Yes
Level 1	309	CLASSROOM	743 SF	Yes	Yes	Yes	Yes
Level 1	311	CLASSROOM	734 SF	Yes	Yes	Yes	Yes
Level 1	312	BIO/CHEM LAB	1186 SF	Yes	Yes	Yes	Yes
Level 1	313	CLASSROOM	721 SF	Yes	Yes	Yes	Yes
Level 1	314	PHYSICS	1186 SF	Yes	Yes	Yes	Yes

**RIVER DELL HIGH SCHOOL CLASSROOM VENTILATION CHART**

LEVEL	NUMBER	NAME	AREA	MECHANICAL VENTILATION	AIR CONDITIONING	WINDOWS	IONIZERS
Level 1	315	CLASSROOM	732 SF	Yes	Yes	Yes	Yes
Level 1	316	Office	N/A	Yes	Yes	Yes	Yes
Level 1	317	Office	N/A	Yes	Yes	Yes	Yes
Level 1	319	SGI	701 SF	Yes	Yes	Yes	Yes
Level 1	318	PHYSICS LAB	1181 SF	Yes	Yes	Yes	Yes
Level 1	320	CLASSROOM	861 SF	Yes	Yes	Yes	Yes
Level 1	321	SGI	378 SF	Yes	Yes	Yes	Yes
Level 1	321	Office	N/A	Yes	Yes	Yes	Yes
Level 1	400	CLASSROOM	723 SF	Yes	Yes	Yes	Yes
Level 1	401	CLASSROOM	728 SF	Yes	Yes	Yes	Yes
Level 1	402	CLASSROOM	730 SF	Yes	Yes	Yes	Yes
Level 1	403	CLASSROOM	714 SF	Yes	Yes	Yes	Yes
Level 1	404	SE/SGI	354 SF	Yes	Yes	Yes	Yes
Level 1	405	SE/SGI	357 SF	Yes	Yes	Yes	Yes
Level 1	406	SCIENCE LAB	1098 SF	Yes	Yes	Yes	Yes
Level 1	410	SCIENCE LAB	1073 SF	Yes	Yes	Yes	Yes
Level 1	411	SGI/COMP. RM.	317 SF	Yes	Yes	Yes	Yes
Level 1	500	CLASSROOM	819 SF	Yes	Yes	Yes	Yes
Level 1	501	DEMO LAB	933 SF	Yes	Yes	Yes	Yes
Level 1	502	CLASSROOM	747 SF	Yes	Yes	Yes	Yes
Level 1	504	CLASSROOM	842 SF	Yes	Yes	Yes	Yes
Level 1	505	DEMO LAB	936 SF	Yes	Yes	Yes	Yes
Level 1	515	Office*	N/A	No	Yes	Yes	N/A
Level 1	517	Office*	N/A	No	Yes	Yes	N/A
Level 1	600	Classroom	728 SF	Yes	Yes	Yes	Yes
Level 1	606	COMPUTER LAB	933 SF	Yes	Yes	Yes	Yes
Level 1	607	CAFETERIA	5717 SF	Yes	Yes	No	Yes
Level 1	608	COMPUTER LAB	925 SF	Yes	Yes	Yes	Yes
Level 1	614	GYMNASIUM	8538 SF	Yes	Yes	Yes	Yes
Level 1	800	GYMNASIUM 2	6829 SF	Yes	Yes	Yes	Yes
Level 1	809	HEALTH CLASSROOM	873 SF	Yes	Yes	Yes	Yes
Level 1	811	HEALTH CLASSROOM	872 SF	Yes	Yes	Yes	Yes

**RIVER DELL HIGH SCHOOL CLASSROOM VENTILATION CHART**

LEVEL	NUMBER	NAME	AREA	MECHANICAL VENTILATION	AIR CONDITIONING	WINDOWS	IONIZERS
Level 2	901	CLASSROOM	791 SF	Yes	Yes	Yes	Yes
Level 2	902	CLASSROOM	584 SF	Yes	Yes	Yes	Yes
Level 2	904	CLASSROOM	607 SF	Yes	Yes	Yes	Yes
Level 2	905	CLASSROOM	749 SF	Yes	Yes	Yes	Yes
Level 2	906	CLASSROOM	598 SF	Yes	Yes	Yes	Yes
Level 2	907	CLASSROOM	742 SF	Yes	Yes	Yes	Yes
Level 2	908	CLASSROOM	604 SF	Yes	Yes	Yes	Yes
Level 2	909	SGI	364 SF	Yes	Yes	Yes	Yes
Level 2	910	Office	N/A	Yes	Yes	Yes	Yes
Level 2	910 Outer	Office*	N/A	Yes	Yes	No	Yes
Level 2	911	CLASSROOM	607 SF	Yes	Yes	Yes	Yes
Level 2	914	CLASSROOM	588 SF	Yes	Yes	Yes	Yes
Level 2	916	CLASSROOM	583 SF	Yes	Yes	Yes	Yes
Level 2	921	CLASSROOM	725 SF	Yes	Yes	Yes	Yes
Level 2	922	CLASSROOM	663 SF	Yes	Yes	Yes	Yes
Level 2	923	CLASSROOM	725 SF	Yes	Yes	Yes	Yes
Level 2	924	CLASSROOM	696 SF	Yes	Yes	Yes	Yes
Level 2	925	Room	728 SF	Yes	Yes	Yes	Yes
Level 2	926	CLASSROOM	688 SF	Yes	Yes	Yes	Yes
Level 2	928	Office	N/A	Yes	Yes	Yes	Yes
Level 2	930	Room	485 SF	Yes	Yes	Yes	Yes
Level 2	932	Office	N/A	Yes	Yes	No	Yes

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