



Airflow Testing Report

Prepared for

Portland Public Schools

August 2021





9700 SW Capitol Hwy, Suite 110
Portland, OR 97219
ameresco.com

PROJECT OVERVIEW

As part of the continuing process to ensure a safe return to in-person learning, Portland Public Schools has contracted with Ameresco to test the airflow and ventilation of all educational and office spaces in each school. The data is reviewed by both Ameresco and PPS personnel to identify any potential shortcomings in the airflow from the HVAC systems. To accomplish this task, Ameresco has partnered with a local NEBB certified Test-Adjust-Balance (TAB) firm, Neudorfer Engineers, who will measure the airflow to each zone with calibrated measurement equipment in accordance with current testing standards and procedures. As part of this effort, HVAC professionals will review the operation of the HVAC equipment serving every educational and office space in each school.

Ameresco is pleased to have partnered with PPS over the last decade as the district's Energy Services Company (ESCO) on six energy efficiency construction projects, four service projects, and numerous energy audits. Our partnership has resulted in reducing over 3,000 tons of CO₂ and other GHG emissions and over \$1,000,000 in utility cost savings per year. Ameresco appreciates this opportunity to play a small role in the safe reopening of schools.

About Ameresco, Inc.

Founded in 2000, Ameresco, Inc. (NYSE:AMRC) is a leading cleantech integrator and renewable energy asset developer, owner and operator. Our comprehensive portfolio includes energy efficiency, infrastructure upgrades, asset sustainability and renewable energy solutions delivered to clients throughout North America and the United Kingdom. Ameresco's sustainability services in support of clients' pursuit of Net Zero include upgrades to a facility's energy infrastructure and the development, construction, and operation of distributed energy resources. Ameresco has successfully completed energy saving, environmentally responsible projects with Federal, state and local governments, healthcare and educational institutions, housing authorities, and commercial and industrial customers. With its corporate headquarters in Framingham, MA, Ameresco has more than 1,000 employees providing local expertise in the United States, Canada, and the United Kingdom. For more information, visit www.ameresco.com.

Explanation of ASHRAE Total Effective Air Changes per Hour (ACH_e) Calculation

ASHRAE has been updating their Building Readiness document to reflect the most current understanding in the engineering community for how to operate and maintain buildings during the pandemic. Their update on 4/27/2021 provided an explanation of the impact air filters and air cleaning devices have on the air in buildings. They provided the methodology, formulas, and an Excel-based tool for determining the equivalent outside air a space is receiving by having a mix of outside air, filtered recirculated air, and additional air filtration or cleaning devices in the room. Here is the explanation from ASHRAE:

Epidemic Conditions in Place



Equivalent Outdoor Air:

The equivalent outdoor air calculation indicates that the outdoor air can be calculated by using the combination of the actual outdoor air, impact of filtration or air cleaning technologies on recirculated air, and the impact of air cleaning technologies in the space.

This is using the principal of filters in series and the effectiveness at reducing particles. For items in series, the initial item would see the recirculated airflow to clean. The second item in the series would see the “cleaned” air from Item 1 and so the impact of Item 1 must be accounted for in Item 2.

As part of the airflow testing project that Portland Public Schools has partnered with Ameresco to complete, we are including the calculation of the Total Effective Air Changes per Hour (ACH_e) to show the impact of the air filtration that is active in nearly all spaces in the PPS schools. The formula for doing so is:

$$ACH_e = (ACH_{oa} + ACH_f) * E_z + ACH_{ir}$$

where:

- ACH_{oa} = air changes per hour of outside air = outside airflow in cubic feet per minute * 60 minutes per hour / room volume in cubic feet
- ACH_f = air changes per hour of clean air from filtered recirculated air with filters of the specified MERV rating as determined by ASHRAE
- E_z = Zone Air Distribution Effectiveness = how effective the HVAC system is at circulating and mixing the air to distribute the clean air throughout the room
- ACH_{ir} = the air changes per hour of clean air from portable air filters in the room = number of filters * CADR * 60 minutes per hour / room volume in cubic feet
 - CADR = Clear Air Delivery Rate = the CFM of clean air as specified by the manufacturer of the air filter

In order to include these calculations in the airflow testing reports, Ameresco and PPS have made the following assumptions as not all the variables are known:

1. PPS is in process of upgrading the air filters in their HVAC systems to MERV 13 and plans to be complete with that project for the start of the '21-'22 school year. In this report and for the sake of the ACH_e calculation, we are using the filters that are in place at the time of the measurements, so some of them are still MERV 8.
2. ASHRAE has guidelines for what should be used for the Zone Air Distribution Effectiveness (E_z) based on the HVAC system configuration, but they do not provide a value for every HVAC system and room configuration. For the majority of PPS rooms, an E_z of 0.8 – 1.0 would be most appropriate, so we have made the conservative assumption of using 0.8 for every space as that yields the lower ACH_e.
3. The CADR for a given air filter is from manufacturer ratings and is based on certain conditions (fan speed, particulate size, filter cleanliness, etc.) that change with operating conditions.



NEUDORFER ENGINEERS INC.

**TEST REPORT TYPE:
SURVEY REPORT**

**Portland Public Schools Airflow Testing
McDaniel HS
2735 NE 82nd Ave., Portland, OR 97220**

Job Number: 2021-0297

Project Completion Date: October 2021

Revision Date:

-

Revision Number:

-



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Neudorfer Engineers, Inc.

Consulting Engineers Seattle, Washington - Portland, Oregon



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**Portland Public Schools Airflow Testing
McDaniel HS**

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Consulting Engineers Seattle, Washington - Portland, Oregon



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REPORT TITLE

CERTIFIED TEST: SURVEY REPORT

Project: Portland Public Schools Airflow Testing
McDaniel HS

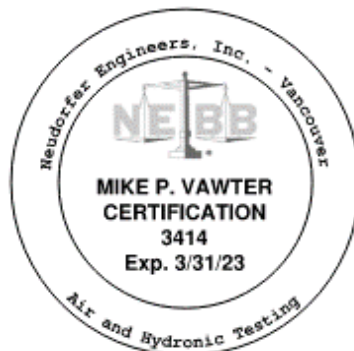
NEI Job#: 2021-0297

Mechanical Engineer: NA

Architect: NA

HVAC Contractor: NA

TAB Firm: Neudorfer Engineers Inc
Test Engineer: Jason Coutu



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CERTIFICATION

Portland Public Schools Airflow Testing

The data presented in this report is a record of system measurements and final adjustments that have been obtained in accordance with the current edition of the NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems. Any variances from design quantities, which exceed NEBB tolerances, are noted in the Test-Adjust-Balance Report Project Summary.

Significant / Noteworthy Remarks are noted on the General Remarks and General Field Notes pages. Other remarks are noted on individual test sheets.

Noted deficiencies are not the TAB firms responsibility to repair. Prior to issuance of this report, Deficiency Reports are forwarded to our contracted agent.

Warranty is limited to one year from date of this report. Within that time, any discrepancies, ambiguities, or omissions found in this report will be retested, adjusted, or balanced as needed. A written notification will be required.

Submitted and Certified by:

NEBB TAB Firm: **Neudorfer Engineers Inc**

Certification No: **3414**

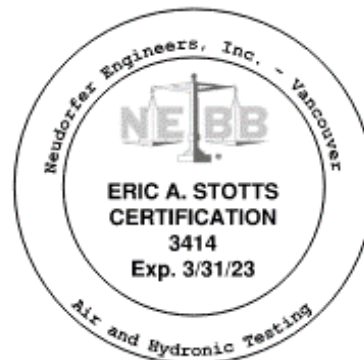
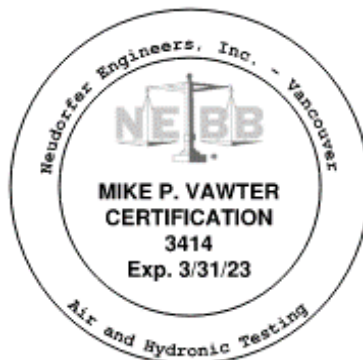
Expiration Date: **March 31, 2023**

Certification Date: **March 31, 2021**

(Date completed) **Signed and Sealed by:**

NEBB Supervisor: **Mike Vawter P.E.**

NEBB Supervisor: **Eric Stotts**





Neudorfer Engineers, Inc.

Consulting Engineers Seattle, Washington - Portland, Oregon



www.NeudorferEngineers.com

TERMS AND ABBREVIATIONS

Project: **Portland Public Schools Airflow Testing**

AC or ACU Air Conditioner or Air Conditioning Unit	HEPA High Efficiency Particulate Arrestance
AH or AHU Air Handler or Air Handling Unit	HP Horsepower
AVG Average	HVAC Heating Ventilation and Air Conditioning
BHP Brake Horsepower	HWS Heating Water Supply
CAV Constant Air Volume	HWR Heating Water Return
CBV Calibrated Balancing Valve (Circuit Setter)	HX Heat Exchanger
CC Cooling Coil	HZ Hertz, cycle per second
CD Ceiling Diffuser	in. inches
CFM Cubic Feet per Minute	in.w.g. inches of water gauge
CH Chiller	Kfactor Correction factor to the free area need to calculate CFM.
CHWS Chilled Water Supply	KW Kilowatts
CHWR Chilled Water Return	LAT Leaving Air Temperature
CP Circulating Pump	LWG Low Wall Grille
CR Ceiling Register	LWR Low Wall Register
CRAC Computer Room Air Conditioner	LWT Leaving Water Temperature
CRU Computer Room Unit	MAU Make-up Air Hanging Unit
CT Cooling Tower	MBH 1,000 BTUH
CU Condenser Unit	N/A Not Applicable
CUH Cabinet Unit Heater	OSA Outside Air
CWS Condenser Water Supply	OBD Opposed Blade Damper
CWR Condenser Water Return	ΔP Pressure Drop.
DAT Discharge Air Temperature	PH Phase
DB Dyr Bulb	PSI Pounds per Square Inch
DD Direct Drive	RA Return Air
DDC Direct Digital Controls: EMS Control System for the HVAC	RAD Radiator
Des. Design	RAT Return Air Temperature
Dia. Diameter	RF Return Fan
Disch. Discharge	RH Relative Humidity
EA Exhaust Air	RHC Reheat Coil
EAT Entering Air Temperature	RPM Revolutions per Minute
Economizer Controls and components that allow an air handler to logically utilize outdoor air for cooling as opposed to the use of mechanical cooling.	RTU Roof Top Unit
EF Exhaust Fan	SA Supply Air
EG Exhaust Grille	SAT Supply Air Temperature
EMCS Energy Management Control System	S.F. Service Factor
ERU Energy Recovery Unit	SF Supply Fan
E.S.P. External Static Pressure	SFD Smoke/Fire Damper
HRC Heat Recovery Coil	SP Static Pressure
EWT Entering Water Temperature	sq.ft. square feet
FCU Fan Coil Unit	Suct. Suction
FD Fire Damper	SWG Sidewall Grille
FLA Full Load Amperage: Maximum amperage a motor can draw.	SWR Sidewall Register
Flow Hood Instrument that captures air and converts the reading to CFM.	TAB Test; Adjust; and Balance
FHT Fume Hood Test	TSP Total Static Pressure: Difference between the entering and leaving static pressure of a fan.
FPB Fan Powered Box	UH Unit Heater
FPM Feet per Minute	VAV Variable Air Volume; box that contains a motorized damper that modulates airflow.
FR Field Report	VD Volume Damper
FT Foot, Feet	VFD Variable Frequency Drive
FTU Fan Terminal Unit	Velgrid Instrument that reads used to read velocity in feet per minute.
GPM Gallons per Minute	VVT Variable Volume Terminal
HC Heating Coil	WC Water Column
TDH Pressure Difference across the entering and leaving side of a pump.	W.G. Water Gauge
	WB Wet Bulb

INSTRUMENT CALIBRATIONS

Portland Public Schools Airflow Testing

Instrument Type	Air Data Meter with Flowhood	Instrument Serial #	M00475
Instrument Manufacturer	Shortridge	Calibration Date	11/4/2020
Instrument Model Number	ADM 870	Calibration Due	11/4/2021
Instrument Type	Differential Pressure Water Meter	Instrument Serial #	W14090
Instrument Manufacturer	Shortridge	Calibration Date	10/16/2020
Instrument Model Number	HDM-250	Calibration Due	10/16/2021
Instrument Type	Psychrometer	Instrument Serial #	8084305
Instrument Manufacturer	Extech	Calibration Date	10/13/2020
Instrument Model Number	RH390	Calibration Due	10/13/2021
Instrument Type	Tachometer	Instrument Serial #	B185B5022P
Instrument Manufacturer	Nidec	Calibration Date	10/11/2020
Instrument Model Number	MT-200	Calibration Due	10/11/2021
Instrument Type	Amp Probe	Instrument Serial #	33380179WS
Instrument Manufacturer	Fluke	Calibration Date	10/9/2020
Instrument Model Number	323 Clamp Meter	Calibration Due	10/9/2021
Instrument Type	Digital Thermometer	Instrument Serial #	45400509WS
Instrument Manufacturer	Fluke	Calibration Date	10/9/2020
Instrument Model Number	52 II	Calibration Due	10/9/2021
Instrument Type	Manometer	Instrument Serial #	M00475
Instrument Manufacturer	Shortridge	Calibration Date	11/4/2020
Instrument Model Number	ADM 870	Calibration Due	11/4/2021
Instrument Type	Thermal Anemometer	Instrument Serial #	AVM440742003
Instrument Manufacturer	Alnor Instruments	Calibration Date	11/9/2020
Instrument Model Number	AVM 440	Calibration Due	11/9/2021
Instrument Type	Ultrasonic Flow Meter	Instrument Serial #	N5K1435T
Instrument Manufacturer	Fuji	Calibration Date	10/14/2020
Instrument Model Number	Portaflow-C	Calibration Due	10/14/2021



PROJECT	Portland Public Schools Airflow Testing
LOCATION	McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220

REPORT SUMMARY

This project has been surveyed per plans and specifications using the National Environmental Balancing Bureau (NEBB) standards and procedures.

The scope of work for this project was to assess the current airflows for each classroom, office, and special purpose space. Air changes per hour were calculated along with the % of OSA for the spaces and any deficiencies found for each piece of equipment has been noted in the following report.

All ventilation equipment was commanded to run by the BMS system. Ventilation units were measured with a flowhood on the supply outlets. Outside air was recorded with a flowhood on the OSA louvre where accessible. AK factors were calculated from flowhood readings. The remaining OSA values were recorded with a velgrid. AHU supply air was recorded by a summation of the outlets as recorded by flowhood or velgrid when appropriate. Outside air was recorded with a velgrid or airfoil and calculated by the free area method.

The measured airflows in this report represent the performance of the equipment at the time of measurement, which vary over time based on operating conditions. There are factors outside the control of Neudorfer that impact airflow, and variance in those factors is expected and normal. One significant factor is the MERV rating and condition of the air filters on the equipment. During the summer of 2021, PPS began upgrading the filters on all their fan systems to MERV 13. Those upgraded filters are more effective at capturing particles but also impact the amount of airflow from the equipment. These filter changes were occurring while the airflow measurement project was happening, so some schools had the new filters, and some had the old filters at the time of measurement. On the data page included this report, there is a line stating whether or not the upgraded filters were in place at the time of measurement.



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH_e) with Portable Filter	Total Effective Air Changes per Hour (ACH_e) without Portable Filter	
Level G1																
Rm G119	FC-G-04	FCU	Note #1	Note #1	245	9.0	2,205	460	14	3%	12.5	0.4	1	34.9	9.0	
Rm G109	FC-G-06/AHU-08	FCU/AHU	Note #1	Note #1	310	9.0	2,790	785	235	30%	16.9	5.1	1	33.0	12.6	
Rm G107	FC-G-06/AHU-08	FCU/AHU	Note #1	Note #1	310	9.0	2,790	795	245	31%	17.1	5.3	1	33.2	12.7	
Rm G105	FC-G-06/AHU-08	FCU/AHU	Note #1	Note #1	580	9.0	5,220	770	215	28%	8.9	2.5	1	17.5	6.6	
Rm G103	FC-G-05	FCU	Note #1	Note #1	479	10.0	4,790	345	97	28%	4.3	1.2	1	15.1	3.2	
Rm G100	FC-G-07/FC-G-08	FCU	Note #1	Note #1	2,837	10.0	28,370	3,635	1,475	41%	7.7	3.1	1	7.8	5.8	
Rm G122	FC-G-13	FCU	Note #1	Note #1	2,568	10.0	25,680	1,820	765	42%	4.3	1.8	1	5.4	3.2	
Office G121A	FC-G-10	FCU	Note #1	Note #1	195	9.0	1,755	450	30	7%	15.4	1.0	1	43.6	11.2	
Office G125A	FC-G-11	FCU	Note #1	Note #1	195	9.0	1,755	455	30	7%	15.6	1.0	1	43.8	11.3	
Level G2																
Aux Gym G201	AHU-09	AHU	Note #1	Note #1	3,540	32.5	115,050	6,280	1,775	28%	3.3	0.9	1	2.9	2.4	
Main Gym G200	AHU-10	AHU	Note #1	Note #1	8,530	32.5	277,225	14,315	4,410	31%	3.1	1.0	1	2.5	2.3	
Level 0																
Rm 047	FC-D-01	FCU	Note #1	Note #1	886	10.0	8,860	935	430	46%	6.3	2.9	1	11.2	4.8	
Rm 045	FC-D-02	FCU	Note #1	Note #1	450	10.0	4,500	780	310	40%	10.4	4.1	1	20.5	7.8	
Rm 043	FC-D-03	FCU	Note #1	Note #1	857	10.0	8,570	675	425	63%	4.7	3.0	1	10.3	3.6	
Rm 041	FC-D-04	FCU	Note #1	Note #1	847	10.0	8,470	665	420	63%	4.7	3.0	1	10.4	3.6	
Rm 039	FC-D-05	FCU	Note #1	Note #1	841	10.0	8,410	665	425	64%	4.7	3.0	1	10.4	3.7	
Rm 037	FC-D-06	FCU	Note #1	Note #1	817	10.0	8,170	675	460	68%	5.0	3.4	1	10.8	3.8	
Office 033	FC-D-09	FCU	Note #1	Note #1	795	10.0	7,950	495	135	27%	3.7	1.0	1	9.9	2.8	
Office 031	FC-E-08	FCU	Note #1	Note #1	1,176	10.0	11,760	1,105	199	18%	5.6	1.0	1	9.0	4.1	
Office 031A	FC-E-08	FCU	Note #1	Note #1	110	9.4	1,036	75	14	18%	4.3	0.8	1	58.2	3.2	
Office 031B	FC-E-08	FCU	Note #1	Note #1	111	10.0	1,110	140	25	18%	7.6	1.4	1	56.9	5.6	
Office 031C	FC-E-08	FCU	Note #1	Note #1	91	10.0	910	180	32	18%	11.9	2.1	1	71.3	8.7	

Date: 9/14/2021

Readings By: Jason Coutu



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH _e) with Portable Filter	Total Effective Air Changes per Hour (ACH _e) without Portable Filter	
Level 0																
Office 031D	FC-E-08	FCU	Note #1	Note #1	93	10.0	930	65	12	18%	4.2	0.8	1	64.4	3.1	
Office 031E	FC-E-08	FCU	Note #1	Note #1	98	10.0	980	65	12	18%	4.0	0.7	1	61.1	2.9	
Conf Rm 029	FC-E-06	FCU	Note #1	Note #1	236	8.8	2,084	245	76	31%	7.1	2.2	1	32.6	5.3	
Rm 027	FC-E-06	FCU	Note #1	Note #1	206	8.8	1,819	225	70	31%	7.4	2.3	1	36.9	5.5	
Rm 015	FC-E-02	FCU	Note #1	Note #1	646	10.0	6,460	370	303	82%	3.4	2.8	1	11.5	2.7	
Rm 013A	FC-E-01	FCU	Note #1	Note #1	979	10.0	9,790	950	460	48%	5.8	2.8	1	10.2	4.4	
Rm 013B	FC-E-03	FCU	Note #1	Note #1	978	10.0	9,780	925	450	49%	5.7	2.8	1	10.1	4.3	
Level 1																
Health 161	FC-A-03	FCU	Note #1	Note #1	153	10.0	1,530	255	26	10%	4.8	0.5	1	21.3	3.5	
Reception 161K	-	-	Note #1	Note #1	167	10.0	1,670	-	-	-						Supply air is provided by Health 161.
Office 161A	FC-A-03	FCU	Note #1	Note #1	120	10.0	1,200	255	26	10%	12.8	1.3	1	56.8	9.3	
Office 161B	FC-A-03	FCU	Note #1	Note #1	161	10.0	1,610	250	25	10%	9.3	0.9	1	42.2	6.8	
Office 161C	FC-A-03	FCU	Note #1	Note #1	121	10.0	1,210	230	23	10%	11.4	1.1	1	55.4	8.3	
Conf Rm 161D	FC-A-01	FCU	Note #1	Note #1	167	10.0	1,670	495	50	10%	17.8	1.8	1	47.1	12.9	
Lab 161E	FC-A-02	FCU	Note #1	Note #1	152	10.0	1,520	460	55	12%	18.2	2.2	1	50.7	13.2	
Exam 161G	FC-A-04	FCU	Note #1	Note #1	110	10.0	1,100	165	38	23%	9.0	2.1	1	58.5	6.6	
Exam 161H	FC-A-04	FCU	Note #1	Note #1	110	10.0	1,100	155	36	23%	8.5	1.9	1	58.1	6.2	
Exam 161J	FC-A-04	FCU	Note #1	Note #1	130	10.0	1,300	155	36	23%	7.2	1.6	1	49.1	5.3	
Choir 163	FC-A-05	FCU	Note #1	Note #1	1,534	14.0	21,476	1,460	642	44%	4.1	1.8	1	5.7	3.1	
Office 163A	FC-A-05	FCU	Note #1	Note #1	160	10.0	1,600	90	40	44%	3.4	1.5	1	38.2	2.5	
Practice 165E	FC-A-06	FCU	Note #1	Note #1	99	10.0	990	80	29	36%	4.8	1.7	1	61.2	3.6	
Practice 163B	FC-A-06	FCU	Note #1	Note #1	92	10.0	920	85	31	36%	5.5	2.0	1	66.1	4.1	
Practice 165D	FC-A-06	FCU	Note #1	Note #1	91	10.0	910	85	31	36%	5.6	2.0	1	66.8	4.2	
Practice 165C	FC-A-06	FCU	Note #1	Note #1	91	10.0	910	85	31	36%	5.6	2.0	1	66.8	4.2	

Date: 9/14/2021

Readings By: Jason Coutu



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Level 1																
Practice 165B	FC-A-06	FCU	Note #1	Note #1	89	10.0	890	80	29	36%	5.4	1.9	1	68.1	4.0	
Office 165A	FC-A-06	FCU	Note #1	Note #1	232	10.0	2,320	75	27	36%	1.9	0.7	1	26.0	1.5	
Band 165	FC-A-07	FCU	Note #1	Note #1	2,243	15.5	34,767	1,545	726	47%	2.7	1.3	1	3.7	2.0	
Practice 165H	FC-A-08	FCU	Note #1	Note #1	271	10.0	2,710	355	75	21%	7.9	1.7	1	26.8	5.8	
Dress Rm 175	FC-A-09	FCU	Note #1	Note #1	819	11.3	9,279	385	127	33%	2.5	0.8	1	8.0	1.9	
Office 171A	FC-A-09	FCU	Note #1	Note #1	111	10.0	1,110	150	50	33%	8.1	2.7	1	57.4	6.0	
Theater 179	AHU-02	AHU	Note #1	Note #1	4,227	39.0	164,853	8,130	3,195	39%	3.0	1.2	1	2.6	2.2	
Stage 177	FC-A-27/FC-A-28	FCU	Note #1	Note #1	3,103	26.0	80,678	3,275	450	14%	2.4	0.3	1	2.5	1.8	
Art 2D 176	FC-A-23	FCU	Note #1	Note #1	1,184	10.0	11,840	1,370	560	41%	6.9	2.8	1	10.0	5.2	
Flex Space 174	FC-A-22	FCU	Note #1	Note #1	564	10.0	5,640	660	265	40%	7.0	2.8	1	15.4	5.3	
Photography 172	FC-A-21	FCU	Note #1	Note #1	1,172	10.0	11,720	1,805	490	27%	9.2	2.5	1	11.7	6.9	
Art 3D 168	FC-A-20	FCU	Note #1	Note #1	1,294	10.0	12,940	1,835	770	42%	8.5	3.6	1	10.8	6.4	
Const. Lab 156	FC-A-18/FC-A-19	FCU	Note #1	Note #1	2,333	10.0	23,330	2,980	630	21%	7.7	1.6	1	8.1	5.6	
Office 159A	FC-A-14	FCU	Note #1	Note #1	109	10.0	1,090	100	30	30%	5.5	1.7	1	56.4	4.1	
Toddler Rm 159B	FC-A-13	FCU	Note #1	Note #1	481	10.0	4,810	480	210	44%	6.0	2.6	1	16.4	4.5	
Crawler Rm 159C	FC-A-15	FCU	Note #1	Note #1	434	10.0	4,340	495	135	27%	6.8	1.9	1	18.2	5.1	
Infant Rm 159D	FC-A-16	FCU	Note #1	Note #1	479	10.0	4,790	500	220	44%	4.4	1.9	1	11.6	3.3	
Nap Area 159E	FC-A-16	FCU	Note #1	Note #1	206	10.0	2,060	-	-	-						Space is common to infant room 159D.
Cust. Office 155A	FC-A-17	FCU	Note #1	Note #1	147	10.0	1,470	230	28	12%	9.4	1.1	1	45.6	6.8	
Cust. Break 155B	FC-A-17	FCU	Note #1	Note #1	236	10.0	2,360	235	28	12%	6.0	0.7	1	28.5	4.4	
Behavioral 147	FC-D-11	FCU	Note #1	Note #1	888	10.0	8,880	935	395	42%	6.3	2.7	1	11.2	4.8	
Rm 145	FC-D-12	FCU	Note #1	Note #1	436	9.6	4,199	470	301	64%	6.7	4.3	1	18.8	5.2	
Office 140	FC-D-14	FCU	Note #1	Note #1	559	10.0	5,590	485	125	26%	5.2	1.3	1	14.1	3.9	
Rm 138	FC-D-16	FCU	Note #1	Note #1	1,400	10.0	14,000	1,315	495	38%	5.6	2.1	1	8.3	4.2	

Date: 9/14/2021

Readings By: Jason Coutu



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH _e) with Portable Filter	Total Effective Air Changes per Hour (ACH _e) without Portable Filter	
Level 1																
Conf Rm 143	FC-D-13	FCU	Note #1	Note #1	110	10.0	1,100	235	47	20%	12.8	2.6	1	61.2	9.4	
Rm 141E	FC-D-13	FCU	Note #1	Note #1	94	10.0	940	235	47	20%	15.0	3.0	1	71.7	11.0	
Office 141D	FC-D-15	FCU	Note #1	Note #1	81	10.0	810	75	38	51%	5.6	2.8	1	74.6	4.2	
Skills 141	FC-D-15	FCU	Note #1	Note #1	792	10.0	7,920	480	245	51%	3.6	1.9	1	10.0	2.8	
Rm 141C	FC-D-15	FCU	Note #1	Note #1	193	10.0	1,930	95	48	51%	3.0	1.5	1	31.8	2.2	
Skills 139	FC-D-17	FCU	Note #1	Note #1	809	10.0	8,090	655	315	48%	4.9	2.3	1	10.7	3.7	
Flex 136	FC-D-18	FCU	Note #1	Note #1	624	10.0	6,240	485	150	31%	4.7	1.4	1	12.6	3.5	
CTE Eng. 134	FC-D-20	FCU	Note #1	Note #1	1,366	10.0	13,660	1,330	495	37%	5.8	2.2	1	8.6	4.4	
CTE Tex. 137	FC-D-19	FCU	Note #1	Note #1	820	10.0	8,200	660	415	63%	4.8	3.0	1	10.7	3.7	
Media 132	FC-D-25	FCU	Note #1	Note #1	1,046	10.0	10,460	825	825	100%	4.7	4.7	1	9.2	3.8	
Res. Center 133	FC-D-24	FCU	Note #1	Note #1	802	10.0	8,020	660	440	67%	4.9	3.3	1	10.9	3.8	
Work Rm 131	FC-E-10	FCU	Note #1	Note #1	1,152	10.0	11,520	490	105	21%	2.6	0.5	1	6.8	1.9	
Rm 130	FC-E-12	FCU	Note #1	Note #1	1,418	10.5	14,889	1,340	540	40%	5.4	2.2	1	7.9	4.1	
Library 129	FC-E-05/FC-E-09	FCU	Note #1	Note #1	6,169	10.0	61,690	3,600	1,455	40%	3.5	1.4	1	3.6	2.6	
Multi Use 129A	FC-E-09	FCU	Note #1	Note #1	203	9.0	1,827	105	-	-	3.4	0.0	1	33.7	2.5	Unit is not ducted for OSA.
Office 129B	FC-E-09	FCU	Note #1	Note #1	120	9.0	1,080	75	-	-	4.2	0.0	1	55.8	3.0	Unit is not ducted for OSA.
Rm 181	FC-C-01	FCU	Note #1	Note #1	870	10.0	8,700	675	420	62%	4.7	2.9	1	10.1	3.6	
Rm 183	FC-C-03	FCU	Note #1	Note #1	857	10.0	8,570	670	415	62%	4.7	2.9	1	10.3	3.6	
Rm 185	FC-C-04	FCU	Note #1	Note #1	857	10.0	8,570	680	420	62%	4.8	2.9	1	10.3	3.7	
Rm 187	FC-C-05	FCU	Note #1	Note #1	855	10.0	8,550	680	415	61%	4.8	2.9	1	10.3	3.7	
Rm 189	FC-C-06	FCU	Note #1	Note #1	843	10.0	8,430	650	420	65%	4.6	3.0	1	10.3	3.6	
Servery 184	FC-C-02/AHU-04	FCU/AHU	Note #1	Note #1	1,276	9.5	12,122	1,330	130	10%	6.6	0.6	1	9.5	4.8	
Kitchen 186	FC-C-10/MAU-1	FCU/MAU	Note #1	Note #1	2,111	9.5	20,055	5,040	301	36%	15.1	0.9	1	13.8	10.9	MAU supplies 4,205cfm of total airflow into kitchen.
Office 186F	FC-C-10	FCU	Note #1	Note #1	117	9.5	1,112	100	36	36%	5.4	1.9	1	55.3	4.0	

Date: 9/14/2021

Readings By: Jason Coutu



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH _e) with Portable Filter	Total Effective Air Changes per Hour (ACH _e) without Portable Filter	
Level 1																
Rm 124	FC-E-13	FCU	Note #1	Note #1	613	10.0	6,130	665	260	39%	6.5	2.5	1	14.2	4.9	
Rm 122	FC-E-14	FCU	Note #1	Note #1	947	10.0	9,470	685	440	64%	4.3	2.8	1	9.4	3.3	
Rm 120	FC-E-17	FCU	Note #1	Note #1	894	10.0	8,940	695	445	64%	4.7	3.0	1	10.0	3.6	
Rm 117	FC-E-16	FCU	Note #1	Note #1	978	10.0	9,780	875	435	50%	5.4	2.7	1	9.9	4.1	
Rm 115	FC-E-18	FCU	Note #1	Note #1	969	10.0	9,690	915	460	50%	5.7	2.8	1	10.2	4.3	
Office 118A	FC-E-19	FCU	Note #1	Note #1	206	10.0	2,060	185	43	23%	5.4	1.2	1	31.6	4.0	
Bus 118B	FC-E-20	FCU	Note #1	Note #1	151	10.0	1,510	235	16	7%	9.3	0.7	1	44.5	6.8	
AD 118C	FC-E-20	FCU	Note #1	Note #1	151	10.0	1,510	225	16	7%	8.9	0.6	1	44.2	6.5	
AD SUP 118D	FC-E-19	FCU	Note #1	Note #1	130	10.0	1,300	95	22	23%	4.4	1.0	1	47.1	3.2	
Office 118E	FC-E-19	FCU	Note #1	Note #1	120	10.0	1,200	95	22	23%	4.8	1.1	1	51.0	3.5	
Staff Rm 112B	FC-F-03	FCU	Note #1	Note #1	200	10.0	2,000	500	180	36%	15.0	5.4	1	39.7	11.2	
Wrok Rm 112C	FC-F-04	FCU	Note #1	Note #1	352	10.0	3,520	440	55	13%	7.5	0.9	1	21.7	5.5	
Attend 110	FC-F-02	FCU	Note #1	Note #1	135	10.0	1,350	85	29	34%	3.8	1.3	1	45.0	2.8	
Book 114	FC-F-02	FCU	Note #1	Note #1	122	10.0	1,220	75	26	34%	3.7	1.3	1	49.5	2.8	
Rm 113	FC-F-01	FCU	Note #1	Note #1	1,193	9.8	11,632	910	450	49%	4.7	2.3	1	8.5	3.6	
Recep/Wait 100	FC-F-09	FCU	Note #1	Note #1	535	10.0	5,350	185	61	33%	2.1	0.7	1	12.2	1.5	
Office 100A	FC-F-09	FCU	Note #1	Note #1	526	10.0	5,260	270	89	33%	3.1	1.0	1	13.1	2.3	
Office 100B	FC-F-12	FCU	Note #1	Note #1	193	10.0	1,930	250	23	9%	7.8	0.7	1	35.2	5.6	
Office 100C	FC-F-12	FCU	Note #1	Note #1	148	10.0	1,480	215	19	9%	8.7	0.8	1	44.8	6.3	
Office 100D	FC-F-15	FCU	Note #1	Note #1	143	10.0	1,430	235	21	9%	9.9	0.9	1	47.0	7.2	
Office 100E	FC-F-15	FCU	Note #1	Note #1	148	10.0	1,480	230	21	9%	9.3	0.8	1	45.3	6.8	
Office 100F	FC-F-14	FCU	Note #1	Note #1	120	10.0	1,200	125	18	14%	6.3	0.9	1	52.1	4.6	
Conf Rm 100J	FC-F-10	FCU	Note #1	Note #1	250	10.0	2,500	460	75	16%	11.0	1.8	1	30.9	8.1	
Rm 100K	FC-F-14	FCU	Note #1	Note #1	119	10.0	1,190	120	17	14%	6.1	0.8	1	52.3	4.4	

Date: 9/14/2021

Readings By: Jason Coutu



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH_e) with Portable Filter	Total Effective Air Changes per Hour (ACH_e) without Portable Filter	
Level 1																
Sick 100M	FC-F-08	FCU	Note #1	Note #1	195	10.0	1,950	230	23	10%	7.1	0.7	1	34.4	5.1	
Office 1000	FC-F-08	FCU	Note #1	Note #1	118	10.0	1,180	230	23	10%	11.7	1.2	1	56.8	8.5	
Office 102	FC-F-14	FCU	Note #1	Note #1	101	10.0	1,010	130	18	14%	7.7	1.1	1	62.1	5.6	
Rm 101	FC-F-07/AHU-07	FCU/AHU	Note #1	Note #1	1,259	10.0	12,590	2,230	605	27%	10.6	2.9	1	12.4	7.9	
Rm 103	FC-F-13/AHU-07	FCU/AHU	Note #1	Note #1	1,291	10.0	12,910	2,185	605	28%	10.2	2.8	1	11.9	7.5	
Rm 104	FC-F-16/AHU-07	FCU/AHU	Note #1	Note #1	1,298	10.0	12,980	1,510	595	39%	7.0	2.8	1	9.6	5.2	
Rm 105	FC-F-17/AHU-07	FCU/AHU	Note #1	Note #1	1,259	10.0	12,590	2,220	585	26%	10.6	2.8	1	12.4	7.8	
Rm 106	FC-F-19/AHU-07	FCU/AHU	Note #1	Note #1	1,317	10.0	13,170	2,465	610	25%	11.2	2.8	1	12.6	8.3	
Rm FX105	FC-F-18	FCU	Note #1	Note #1	252	11.3	2,855	1,630	210	13%	34.3	4.4	1	45.0	25.0	
Level 2																
Rm 281	AHU-04	AHU	Note #1	Note #1	846	9.5	8,037	420	420	100%	3.1	3.1	1	9.6	2.5	
Rm 283	AHU-04	AHU	Note #1	Note #1	826	9.5	7,847	425	425	100%	3.2	3.2	1	9.9	2.6	
Rm 284	AHU-04	AHU	Note #1	Note #1	976	9.5	9,272	430	430	100%	2.8	2.8	1	8.4	2.2	
Rm 285	AHU-04	AHU	Note #1	Note #1	823	9.5	7,819	420	420	100%	3.2	3.2	1	9.9	2.6	
Rm 286	AHU-04	AHU	Note #1	Note #1	908	9.5	8,626	410	410	100%	2.9	2.9	1	8.9	2.3	
Rm 287	AHU-04	AHU	Note #1	Note #1	823	9.5	7,819	410	410	100%	3.1	3.1	1	9.8	2.5	
Rm 288	AHU-04	AHU	Note #1	Note #1	388	9.6	3,717	130	130	100%	2.1	2.1	1	17.0	1.7	
Rm 289	AHU-04	AHU	Note #1	Note #1	811	9.5	7,705	425	425	100%	3.3	3.3	1	10.0	2.6	
Rm 290	AHU-04	AHU	Note #1	Note #1	874	9.5	8,303	410	410	100%	3.0	3.0	1	9.2	2.4	
Office 291	AHU-04	AHU	Note #1	Note #1	674	9.5	6,403	410	410	100%	3.8	3.8	1	12.0	3.1	
Rm 292	AHU-04	AHU	Note #1	Note #1	875	9.5	8,313	420	420	100%	3.0	3.0	1	9.3	2.4	
Rm 247	AHU-05	AHU	Note #1	Note #1	897	9.5	8,522	335	335	100%	2.4	2.4	1	8.6	1.9	
Rm 245	AHU-05	AHU	Note #1	Note #1	452	9.5	4,294	200	200	100%	2.8	2.8	1	15.5	2.2	
Rm 242	AHU-05	AHU	Note #1	Note #1	972	9.5	9,234	410	410	100%	2.7	2.7	1	8.3	2.1	

Date: 9/14/2021

Readings By: Jason Coutu



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH _e) with Portable Filter	Total Effective Air Changes per Hour (ACH _e) without Portable Filter	
Level 2																
Rm 243	AHU-05	AHU	Note #1	Note #1	859	9.5	8,161	440	440	100%	3.2	3.2	1	9.6	2.6	
Rm 240	AHU-05	AHU	Note #1	Note #1	978	9.5	9,291	430	430	100%	2.8	2.8	1	8.4	2.2	
Rm 241	AHU-05	AHU	Note #1	Note #1	853	9.5	8,104	440	440	100%	3.3	3.3	1	9.6	2.6	
Rm 238	AHU-05	AHU	Note #1	Note #1	963	9.5	9,149	420	420	100%	2.8	2.8	1	8.4	2.2	
Rm 239	AHU-05	AHU	Note #1	Note #1	855	9.5	8,123	445	445	100%	3.3	3.3	1	9.6	2.6	
Office 237	AHU-05	AHU	Note #1	Note #1	820	9.5	7,790	160	160	100%	1.2	1.2	1	8.3	1.0	
Rm 236	AHU-05	AHU	Note #1	Note #1	903	9.5	8,579	480	480	100%	3.4	3.4	1	9.3	2.7	
Rm 234	AHU-05	AHU	Note #1	Note #1	846	9.5	8,037	425	425	100%	3.2	3.2	1	9.6	2.5	
Rm 233	AHU-06	AHU	Note #1	Note #1	810	9.5	7,695	405	405	100%	3.2	3.2	1	9.9	2.5	
Rm 232	AHU-06	AHU	Note #1	Note #1	862	10.0	8,620	410	410	100%	2.9	2.9	1	8.9	2.3	
Rm 231	AHU-06	AHU	Note #1	Note #1	831	9.5	7,895	415	415	100%	3.2	3.2	1	9.7	2.5	
Comp. Lab 230	FC-E-22/AHU-06	FCU/AHU	Note #1	Note #1	1,011	9.5	9,605	1,160	490	42%	7.2	3.1	1	11.4	5.5	
Rm 229	AHU-06	AHU	Note #1	Note #1	709	9.5	6,736	255	255	100%	2.3	2.3	1	10.3	1.8	
Career Cent. 227	AHU-06	AHU	Note #1	Note #1	989	9.5	9,396	225	225	100%	1.4	1.4	1	7.2	1.1	
Rm 220	AHU-06	AHU	Note #1	Note #1	971	9.5	9,225	465	465	100%	3.0	3.0	1	8.6	2.4	
Rm 218	AHU-06	AHU	Note #1	Note #1	935	9.5	8,883	415	415	100%	2.8	2.8	1	8.7	2.2	
Rm 217	AHU-06	AHU	Note #1	Note #1	958	9.5	9,101	470	470	100%	3.1	3.1	1	8.7	2.5	
Rm 215	AHU-06	AHU	Note #1	Note #1	971	9.5	9,225	440	440	100%	2.9	2.9	1	8.5	2.3	
Lab 213	AHU-06	AHU	Note #1	Note #1	1,434	9.8	13,982	850	850	100%	3.6	3.6	1	7.0	2.9	
Conf Rm. 209	FC-F-20	FCU	Note #1	Note #1	442	10.0	4,420	485	115	24%	6.6	1.6	1	17.8	4.9	
Lab 201	FC-F-22/AHU-07	FCU/AHU	Note #1	Note #1	1,262	10.0	12,620	1,950	580	30%	9.3	2.8	1	11.4	6.9	
Lab 203	FC-F-25/AHU-07	FCU/AHU	Note #1	Note #1	1,294	10.0	12,940	1,880	585	31%	8.7	2.7	1	10.9	6.5	
Lab 205	FC-F-26/AHU-07	FCU/AHU	Note #1	Note #1	1,256	10.0	12,560	1,960	585	30%	9.4	2.8	1	11.5	7.0	
Office 206	FC-F-29	FCU	Note #1	Note #1	922	10.0	9,220	660	175	27%	4.3	1.1	1	9.4	3.2	

Date: 9/14/2021

Readings By: Jason Coutu



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220
Filter Status: Upgraded

Room	Equipment Info		Room Dimensions					Airflow Measurements			Calculated ACH					Notes
	Served By	Equipment Type	Room Length	Room Width	Room Area	Room Height	Room Volume	Total CFM Supply	OA CFM Supply	OA %	Air Changes per Hour (supply)	Air Changes per Hour (OA)	# of Portable Filters	Total Effective Air Changes per Hour (ACH_e) with Portable Filter	Total Effective Air Changes per Hour (ACH_e) without Portable Filter	
Level 2																
Lab 204	FC-F-27/AHU-07	FCU/AHU	Note #1	Note #1	1,418	10.0	14,180	1,910	610	32%	8.1	2.6	1	10.0	6.0	
Lab 202	FC-F-24/AHU-07	FCU/AHU	Note #1	Note #1	1,361	10.0	13,610	1,930	660	34%	8.5	2.9	1	10.5	6.4	
Lab 200	FC-F-23/AHU-07	FCU/AHU	Note #1	Note #1	1,410	10.0	14,100	1,810	625	35%	7.7	2.7	1	9.8	5.8	
Waiting/Recep 210	AHU-06	AHU	Note #1	Note #1	321	8.5	2,729	45	45	100%	1.0	1.0	1	21.7	0.8	
Office 210B	AHU-06	AHU	Note #1	Note #1	118	8.5	1,003	25	25	100%	1.5	1.5	1	58.0	1.2	
Office 210C	AHU-06	AHU	Note #1	Note #1	120	8.5	1,020	25	25	100%	1.5	1.5	1	57.1	1.2	
Office 210D	AHU-06	AHU	Note #1	Note #1	125	8.5	1,063	25	25	100%	1.4	1.4	1	54.8	1.1	
Office 210E	AHU-06	AHU	Note #1	Note #1	126	9.0	1,134	25	25	100%	1.3	1.3	1	51.3	1.1	
Office 210F	AHU-06	AHU	Note #1	Note #1	120	9.0	1,080	25	25	100%	1.4	1.4	1	53.9	1.1	
Interns 201H	AHU-06	AHU	Note #1	Note #1	171	9.0	1,539	65	65	100%	2.5	2.5	1	39.1	2.0	
Conf Rm 210G	AHU-06	AHU	Note #1	Note #1	173	9.0	1,557	40	40	100%	1.5	1.5	1	37.8	1.2	
Psych 210J	AHU-06	AHU	Note #1	Note #1	124	9.0	1,116	25	25	100%	1.3	1.3	1	52.2	1.1	
Psych 210K	AHU-06	AHU	Note #1	Note #1	119	9.0	1,071	25	25	100%	1.4	1.4	1	54.3	1.1	
Speech 210L	AHU-06	AHU	Note #1	Note #1	121	9.0	1,089	25	25	100%	1.4	1.4	1	53.4	1.1	
Conf Rm 210M	AHU-06	AHU	Note #1	Note #1	221	9.0	1,989	65	65	100%	2.0	2.0	1	30.2	1.6	
Speech 210N	AHU-06	AHU	Note #1	Note #1	106	9.0	954	25	25	100%	1.6	1.6	1	61.0	1.3	
D/A 210P	AHU-06	AHU	Note #1	Note #1	138	8.5	1,173	30	30	100%	1.5	1.5	1	49.8	1.2	

Date: 9/14/2021

Readings By: Jason Coult

Project:

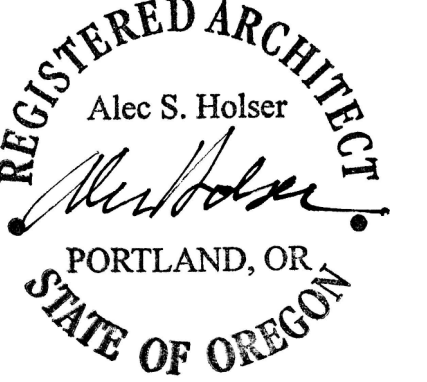
Portland Public Schools Airflow Testing

Location:

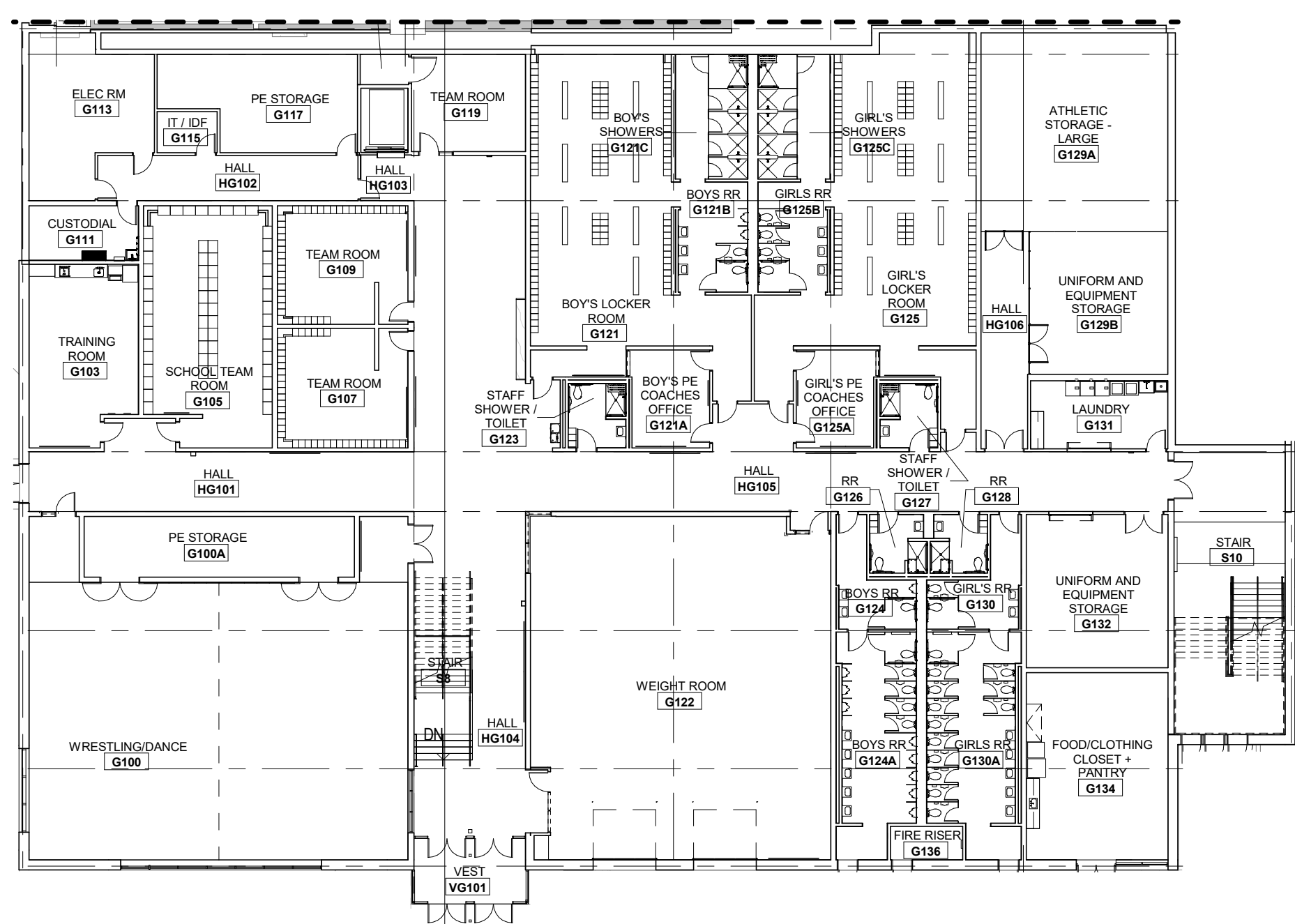
McDaniel HS; 2735 NE 82nd Ave., Portland, OR 97220

NOTE #	NOTE DESCRIPTION
1	Room areas were pulled from the architectural plans for the recent remodel of the school.

Stamp

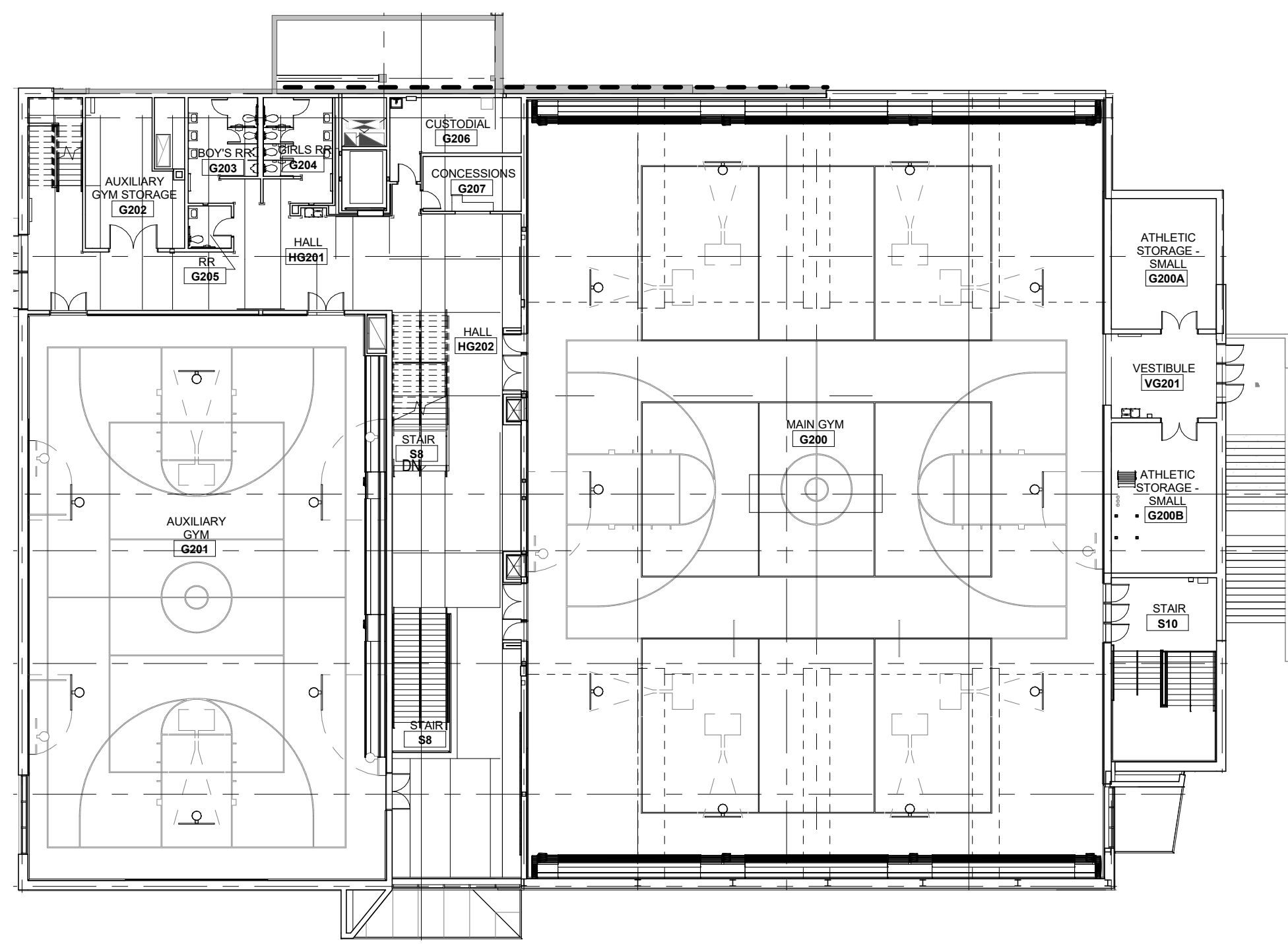


Consultant Logo



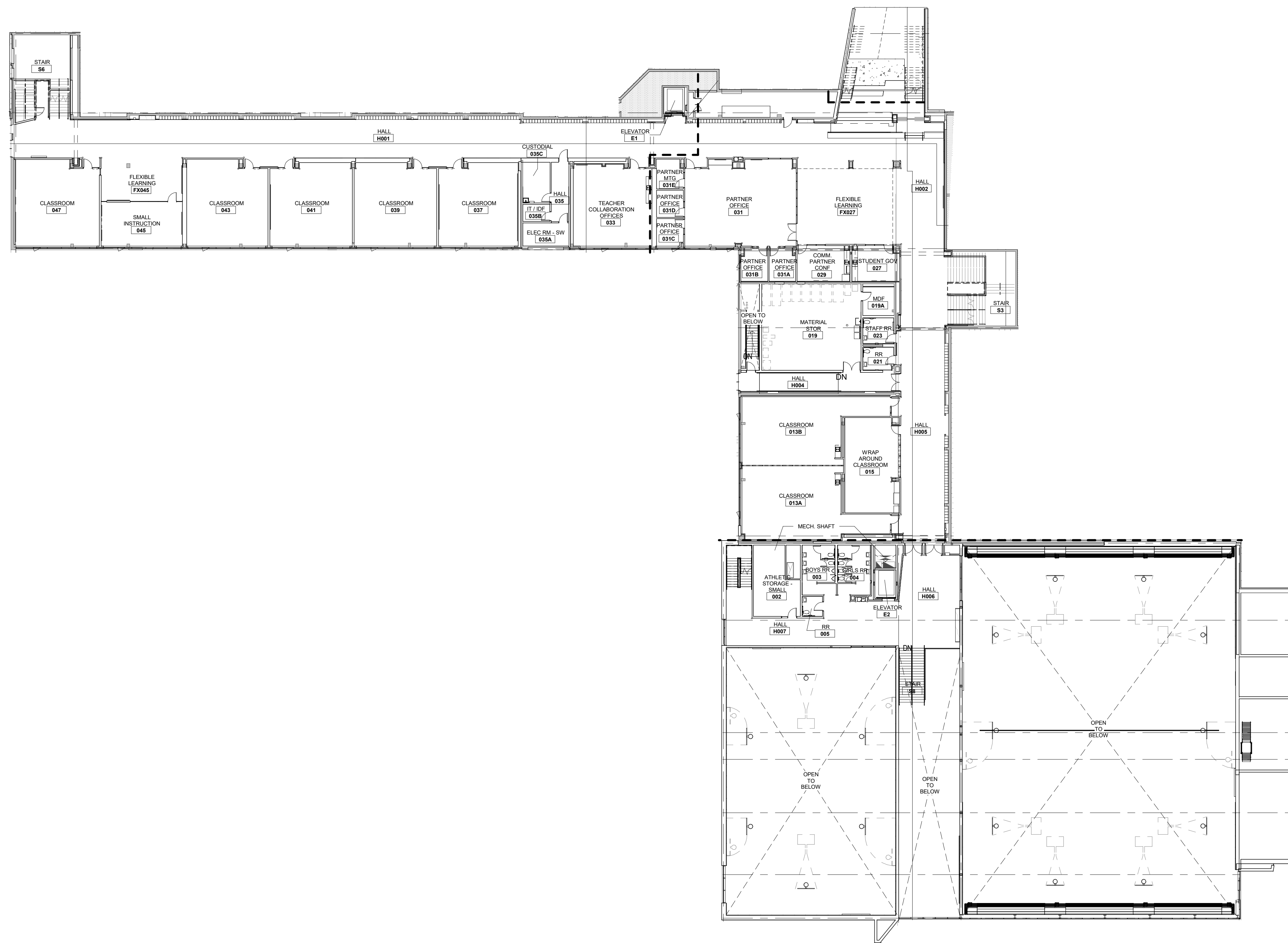
1 | LEVEL G1 FLOOR PLAN

A1.01 3/64" = 1'-0"



1 | LEVEL G2 FLOOR PLAN

A1.02 3/64" = 1'-0"



1 | LEVEL 0 FLOOR PLAN

A1.03 3/64" = 1'-0"

Key Plan

Project Owner:
PORTLAND PUBLIC
SCHOOLSProject Name:
MADISON HIGH SCHOOLProject Address:
2735 NE 82ND AVE.
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Revisions to Sheet		
No.	Revision	Date
4	GMP/ADD 4	06/26/19
	ASI 24	02/07/20
	ASI 28	03/12/20

Status: PACKAGE 3 PERMIT SET

Date: 09/27/2019

Sheet Title
LEVEL 0 FLOOR
PLAN

Sheet No.

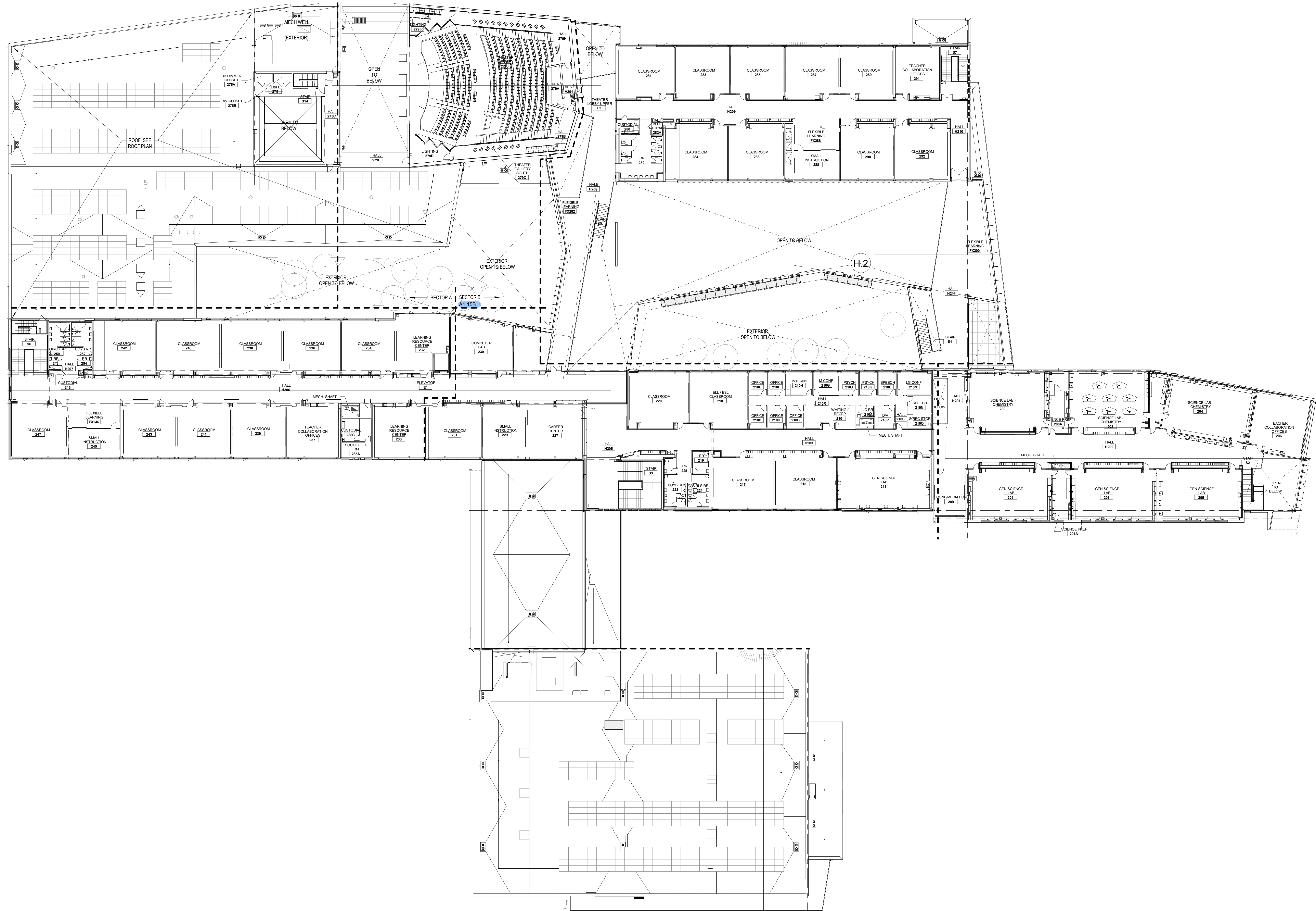
A1.03

Job No.

4722-01



Revisions to Sheet		
No.	Revision	Date
4	GMPI/ADD 4 ASI 28	06/26/19 03/12/20



Stamp

Key Plan

Project Owner:
PORTLAND PUBLIC SCHOOLS



Project Name:
MADISON HIGH SCHOOL

Project Address:
**2735 NE 82ND AVE.
PORTLAND, OR 97220**

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No.	Revision	Date
4	GMP/ADD 4	06/26/19

Status: **GMP SET**

Date: **05/24/2019**

Sheet Title
LEVEL 2 FLOOR PLAN

Sheet No.

A1.05

Job No.

4722-01

1 | LEVEL 2 FLOOR PLAN
A1.05 3/64" = 1'-0"

