



Airflow Testing Report

Prepared for

Portland Public Schools

October 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 Ida Wells (Wilson) HS

Job Number: 2021-0297

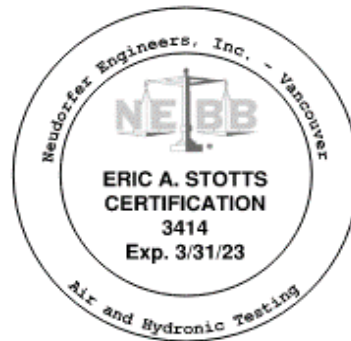
Project Completion Date: October 2021

Revision Date:

-

Revision Number:

-



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Neudorfer Engineers, Inc.

Consulting Engineers Seattle, Washington - Portland, Oregon



www.NeudorferEngineers.com

Portland Public Schools Airflow Testing Ida Wells (Wilson) HS

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Neudorfer Engineers, Inc.

Consulting Engineers Seattle, Washington - Portland, Oregon



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REPORT TITLE

CERTIFIED TEST: SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Ida Wells (Wilson) HS

NEI Job#: 2021-0297

Mechanical Engineer: NA

Architect: NA

HVAC Contractor: NA

TAB Firm: Neudorfer Engineers Inc
Test Engineer: Zach Mayer



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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**

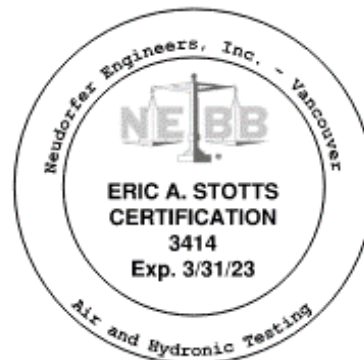
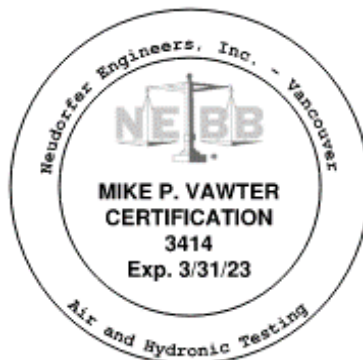
Expiration Date: **March 31, 2023**

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

AH or AHU Air Handler or Air Handling Unit

ACH Air Changes per Hour

AVG Average

BHP Brake Horsepower

CAV Constant Air Volume

CBV Calibrated Balancing Valve
(Circuit Setter)

CC Cooling Coil

CD Ceiling Diffuser

CFM Cubic Feet per Minute

CH Chiller

CHWS Chilled Water Supply

CHWR Chilled Water Return

CP Circulating Pump

CR Ceiling Register

CRAC Computer Room Air Conditioner

CRU Computer Room Unit

CT Cooling Tower

CU Condenser Unit

CUH Cabinet Unit Heater

CWS Condenser Water Supply

CWR Condenser Water Return

DAT Discharge Air Temperature

DB Dry Bulb

DD Direct Drive

DDC Direct Digital Controls: EMS Control
System for the HVAC

Des. Design

Dia. Diameter

Disch. Discharge

EA Exhaust Air

EAT Entering Air Temperature

Economizer Controls and components that allow an
air handler to logically utilize outdoor air
for cooling as opposed to the use of
mechanical cooling.

EF Exhaust Fan

EG Exhaust Grille

EMCS Energy Management Control System

ERU Energy Recovery Unit

E.S.P. External Static Pressure

HRC Heat Recovery Coil

EWT Entering Water Temperature

FCU Fan Coil Unit

FD Fire Damper

FSD Fire Smoke Damper

FLA Full Load Amperage: Maximum
amperage a motor can draw.

Flow Hood Instrument that captures air and
converts the reading to CFM.

FHT Fume Hood Test

FPB Fan Powered Box

FPM Feet per Minute

FR Field Report

FT Foot, Feet

FTU Fan Terminal Unit

GPM Gallons per Minute

HC Heating Coil

TDH Pressure Difference across the entering
and leaving side of a pump.

HEPA High Efficiency Particulate Absorbing

HP Horsepower

HVAC Heating Ventilation and Air Conditioning

HWS Heating Water Supply

HWR Heating Water Return

HX Heat Exchanger

HZ Hertz, cycle per second

in. inches

in.w.g. inches of water gauge

Kfactor Correction factor to the free area need to
calculate CFM.

KW Kilowatts

LAT Leaving Air Temperature

LBWG Low Wall Grille

LWR Low Wall Register

LWT Leaving Water Temperature

MAU Make-up Air Handling Unit

MBH 1,000 BTUH

N/A Not Applicable

OSA Outside Air

OBD Opposed Blade Damper

ΔP Pressure Drop.

PH Phase

PSI Pounds per Square Inch

RA Return Air

RAT Return Air Temperature

RF Return Fan

RH Relative Humidity

RHC Reheat Coil

RPM Revolutions per Minute

RTU Roof Top Unit

SA Supply Air

SAT Supply Air Temperature

S.F. Service Factor

SF Supply Fan

SFD Smoke/Fire Damper

SP Static Pressure

sq.ft. square feet

Suct. Suction

SWG Sidewall Grille

SWR Sidewall Register

TAB Test; Adjust; and Balance

TSP Total Static Pressure: Difference
between the entering and leaving
static pressure of a fan.

UH Unit Heater

VAV Variable Air Volume; box that
contains a motorized damper that
modulates airflow.

VD Volume Damper

VFD Variable Frequency Drive

Velgrid Instrument that reads used to read
velocity in feet per minute.

VVT Variable Volume Terminal

WC Water Column

W.G. Water Gauge

WB Wet Bulb

INSTRUMENT CALIBRATIONS

Portland Public Schools Airflow Testing

Ida Wells (Wilson) HS

Instrument Type	Air Data Meter with Flowhood	Instrument Serial #	M97410
Instrument Manufacturer	Shortridge	Calibration Date	10/4/2021
Instrument Model Number	ADM 860	Calibration Due	10/4/2022
Instrument Type	Differential Pressure Water Meter	Instrument Serial #	W12178
Instrument Manufacturer	Shortridge	Calibration Date	10/4/2021
Instrument Model Number	HDM-250	Calibration Due	10/4/2022
Instrument Type	Psychrometer	Instrument Serial #	181128924
Instrument Manufacturer	Extech	Calibration Date	10/1/2021
Instrument Model Number	RH390	Calibration Due	10/1/2022
Instrument Type	Tachometer	Instrument Serial #	B185B5022P
Instrument Manufacturer	Nidec	Calibration Date	10/1/2021
Instrument Model Number	MT-200	Calibration Due	10/1/2022
Instrument Type	Amp Probe	Instrument Serial #	33380179WS
Instrument Manufacturer	Fluke	Calibration Date	10/1/2021
Instrument Model Number	323 Clamp Meter	Calibration Due	10/1/2022
Instrument Type	Digital Thermometer	Instrument Serial #	45400509WS
Instrument Manufacturer	Fluke	Calibration Date	10/1/2021
Instrument Model Number	52 II	Calibration Due	10/1/2022
Instrument Type	Manometer	Instrument Serial #	M97410
Instrument Manufacturer	Shortridge	Calibration Date	10/4/2021
Instrument Model Number	ADM 860	Calibration Due	10/4/2022
Instrument Type	Thermal Anemometer	Instrument Serial #	AVM440808002
Instrument Manufacturer	Alnor Instruments	Calibration Date	9/22/2021
Instrument Model Number	AVM 440	Calibration Due	9/22/2022
Instrument Type	Ultrasonic Flow Meter	Instrument Serial #	N1F1823T
Instrument Manufacturer	Fuji	Calibration Date	9/20/2021
Instrument Model Number	Portaflow-C	Calibration Due	9/20/2022



PROJECT	Portland Public Schools Airflow Testing
LOCATION	Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219

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: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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	
Lower Level 1																
Rm 1	1-S-8	AHU	18.6	27.7	515	11.1	5,719	525	525	100%	5.5	5.5	1	14.4	4.4	Not ducted for return.
5	1-S-8	AHU	10.8	19.3	208	10.9	2,272	150	150	100%	4.0	4.0	1	28.3	3.2	Not ducted for return.
6	1-S-8	AHU	18.8	18.7	352	11.1	3,902	245	245	100%	3.8	3.8	1	17.6	3.0	Not ducted for return.
Rm 7	1-S-4	AHU	30.8	37.8	1,164	11.1	12,923	855	0	0%	4.0	0.0	1	7.3	2.9	OSA damper 0% open. Return damper 100% open.
7A	1-S-4	AHU	8.0	10.9	87	9.0	785	30	0	0%	2.3	0.0	1	74.3	1.7	OSA damper 0% open. Return damper 100% open.
7B	-	-	6.9	12.5	86	9.0	776	-	-	-	0.0	0.0	0	N/A	0.0	Ventilation provided by adjacent spaces.
Rm 8	1-S-4	AHU	29.1	41.8	1,216	11.0	13,380	1,140	0	0%	5.1	0.0	1	7.9	3.7	OSA damper 0% open. Return damper 100% open.
Rm 9	1-S-3	AHU	32.7	49.9	1,632	9.0	14,686	440	0	0%	1.8	0.0	1	5.2	1.3	OSA damper 0% open. Return damper 100% open.
15B	1-S-3	AHU	7.8	19.6	153	9.0	1,376	235	0	0%	10.2	0.0	1	48.8	7.4	OSA damper 0% open. Return damper 100% open.
Rm 15	1-S-3	AHU	35.8	39.7	1,421	11.1	15,776	980	0	0%	3.7	0.0	1	6.3	2.7	OSA damper 0% open. Return damper 100% open.
12	3-S-1	AHU	20.4	35.5	724	10.0	7,242	725	0	0%	6.0	0.0	1	12.2	4.3	Note #3
12A	3-S-1	AHU	5.5	10.1	56	8.0	444	40	0	0%	5.4	0.0	1	132.1	3.9	Note #3
10	-	-	10.8	19.0	205	7.1	1,457	-	-	-	0.0	0.0	1	39.1	0.0	Ventilation provided by adjacent spaces.
14D	3-S-3	AHU	27.6	29.2	806	13.2	10,638	1,040	0	0%	5.9	0.0	1	9.6	4.2	Note #4
14	3-S-2	AHU	45.6	68.1	3,105	11.5	35,712	1,645	1,645	100%	2.8	2.8	1	3.8	2.2	Not ducted for return.
14A	-	-	8.9	10.6	2,502	8.0	20,016	-	-	-	0.0	0.0	1	2.8	0.0	Ventilation provided by adjacent spaces.
Cafeteria 17	3-S-1	AHU	138.0	68.1	8,891	13.3	118,248	14,720	0	0%	7.5	0.0	1	5.9	5.4	Note #3
Rm 19	3-S-9	AHU	29.0	26.9	780	13.2	10,297	445	445	100%	2.6	2.6	1	7.6	2.1	OSA damper 0% open. Return damper 100% open.
Rm 18	3-S-4	AHU	57.3	60.2	2,277	11.1	25,280	1,405	0	0%	3.3	0.0	1	4.7	2.4	Note #2
18A	3-S-4	AHU	10.3	20.2	208	11.1	2,309	110	0	0%	2.9	0.0	1	26.7	2.1	Note #2
16	-	-	8.9	16.3	145	9.0	1,306	-	-	-	0.0	0.0	1	43.7	0.0	Ventilation provided by adjacent spaces.
Rm 24	4-S-4	AHU	28.7	28.4	815	11.0	8,966	1,050	1,050	100%	7.0	7.0	1	12.0	5.6	Not ducted fo return.
Rm 25	4-S-3	AHU	29.5	28.4	838	11.0	9,216	555	350	63%	3.6	2.3	1	9.0	2.8	
Rm 26	4-S-3	AHU	29.8	28.3	843	11.0	9,277	845	532	63%	5.5	3.4	1	10.4	4.2	

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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	
Lower Level 1																
Rm 27	4-S-9	AHU	29.9	28.2	843	11.0	9,275	895	716	80%	5.8	4.6	1	10.7	4.5	
Rm 28	4-S-9	AHU	29.5	26.4	779	11.0	8,567	1,250	1,000	80%	8.8	7.0	1	13.5	6.9	
Rm 29	4-S-10	AHU	29.0	27.6	800	11.0	8,804	395	359	91%	2.7	2.4	1	8.6	2.1	
Rm 30	4-S-11	AHU	39.8	28.3	1,126	11.0	12,390	685	534	78%	3.3	2.6	1	7.2	2.6	
Rm 31	4-S-8	AHU	29.4	26.4	776	11.0	8,538	290	165	57%	2.0	1.2	1	8.2	1.6	
Rm 32	4-S-8	AHU	29.8	28.3	843	11.0	9,277	570	325	57%	3.7	2.1	1	9.0	2.8	
Rm 33	4-S-2	AHU	30.0	28.2	846	11.0	9,306	125	58	46%	0.8	0.4	1	6.7	0.6	
Rm 34	4-S-2	AHU	29.5	28.2	832	11.0	9,151	160	74	46%	1.0	0.5	1	7.0	0.8	
35	4-S-1	AHU	55.6	28.4	1,579	11.0	17,369	585	269	46%	2.0	0.9	1	4.8	1.5	
38	4-S-1	AHU	19.5	17.5	341	11.0	3,754	160	74	46%	2.6	1.2	1	17.1	1.9	
36A	4-S-6	AHU	10.4	11.9	124	11.2	1,386	465	465	100%	20.1	20.1	1	57.2	16.1	Not ducted for return.
39	4-S-6	AHU	20.2	11.6	234	11.2	2,624	445	445	100%	10.2	10.2	1	29.9	8.1	Not ducted for return.
40	-	-	15.2	10.4	158	9.9	1,565	-	-	-	0.0	0.0	1	36.4	0.0	Ventilation provided by adjacent spaces.
42B	5-S-5	AHU	7.0	29.7	208	9.2	1,913	85	85	100%	2.7	2.7	1	31.9	2.1	Not ducted for return.
42A	5-S-5	AHU	29.7	17.9	532	9.3	4,944	770	770	100%	9.3	9.3	1	19.0	7.5	Not ducted for return.
42	5-S-5	AHU	108.9	65.5	3,527	9.2	32,448	2,295	2,295	100%	4.2	4.2	1	5.2	3.4	Not ducted for return.
43	5-S-6	AHU	32.7	55.2	1,805	17.7	31,949	1,950	1,950	100%	3.7	3.7	2	6.5	2.9	Not ducted for return.
51A	-	-	9.1	29.9	272	13.6	3,700	-	-	-	0.0	0.0	1	15.4	0.0	Ventilation provided by adjacent spaces.
51	5-S-6	AHU	57.9	32.6	1,888	17.5	33,032	1,935	1,935	100%	3.5	3.5	1	4.5	2.8	Not ducted for return.
52A	5-S-5	AHU	25.2	12.4	312	9.2	2,875	360	360	100%	7.5	7.5	1	25.8	6.0	Not ducted for return.
52B	5-S-5	AHU	29.7	12.4	368	9.2	3,388	575	575	100%	10.2	10.2	1	25.0	8.1	Not ducted for return.
52	5-S-5	AHU	52.7	91.3	3,457	10.5	36,293	2,070	2,070	100%	3.4	3.4	1	4.3	2.7	Not ducted for return.
53	-	-	7.8	15.0	117	9.3	1,088	-	-	-	0.0	0.0	1	52.4	0.0	Ventilation provided by adjacent spaces.
54	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0	N/A	0.0	This is a shower.

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

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Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
Filter Status: Upgraded

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Lower Level 1																
44	-	-	7.8	15.0	117	9.3	1,088	-	-	-	0.0	0.0	1	52.4	0.0	Ventilation provided by adjacent spaces.
55	5-S-8	AHU	44.4	11.0	488	9.2	4,493	515	515	100%	6.9	6.9	1	18.2	5.5	Not ducted for return.
56	5-S-8	AHU	14.5	12.7	184	9.3	1,713	125	125	100%	4.4	4.4	1	36.8	3.5	Not ducted for return.
56A	5-S-8	AHU	10.6	10.2	108	9.3	1,006	140	140	100%	8.4	8.4	1	63.4	6.7	Not ducted for return.
56B	5-S-8	AHU	23.2	8.9	206	12.0	2,478	210	210	100%	5.1	5.1	1	27.1	4.1	Not ducted for return.
57	5-S-8	AHU	28.0	9.7	272	9.1	2,472	105	105	100%	2.5	2.5	1	25.1	2.0	Not ducted for return.
58	5-S-8	AHU	13.9	18.7	260	10.2	2,651	345	345	100%	7.8	7.8	1	27.7	6.2	Not ducted for return.
59	-	-	9.2	10.6	98	8.6	839	-	-	-	0.0	0.0	1	68.0	0.0	Ventilation provided by adjacent spaces.
60	5-S-8	AHU	16.2	16.6	269	14.7	3,953	155	155	100%	2.4	2.4	1	16.3	1.9	Not ducted for return.
Team C	5-S-8	AHU	22.8	32.6	743	9.2	6,838	720	720	100%	6.3	6.3	1	13.4	5.1	Not ducted for return.
D	-	-	6.8	16.1	109	7.6	832	-	-	-	0.0	0.0	1	68.5	0.0	Ventilation provided by adjacent spaces.
C	-	-	6.8	16.1	109	7.6	832	-	-	-	0.0	0.0	1	68.5	0.0	Ventilation provided by adjacent spaces.
B	-	-	6.8	16.1	109	7.6	832	-	-	-	0.0	0.0	1	68.5	0.0	Ventilation provided by adjacent spaces.
Team B	5-S-8	AHU	23.4	16.1	377	9.4	3,541	365	365	100%	6.2	6.2	1	21.0	4.9	Not ducted for return.
A	-	-	6.8	16.0	109	7.6	827	-	-	-	0.0	0.0	1	68.9	0.0	Ventilation provided by adjacent spaces.
Team A	5-S-8	AHU	23.4	15.6	365	9.3	3,395	245	245	100%	4.3	4.3	1	20.3	3.5	Not ducted for return.
46	5-S-8	AHU	12.7	14.5	184	9.3	1,713	90	90	100%	3.2	3.2	1	35.8	2.5	Not ducted for return.
46A	5-S-8	AHU	10.3	10.6	109	9.3	1,015	75	75	100%	4.4	4.4	1	59.7	3.5	Not ducted for return.
47	5-S-8	AHU	24.5	8.9	218	11.9	2,595	275	275	100%	6.4	6.4	1	27.1	5.1	Not ducted for return.
48	5-S-8	AHU	9.9	13.9	138	10.5	1,445	75	75	100%	3.1	3.1	1	41.9	2.5	Not ducted for return.
49	5-S-8	AHU	30.8	12.7	391	11.5	4,498	160	160	100%	2.1	2.1	1	14.4	1.7	Not ducted for return.
45	5-S-8	AHU	44.4	11.0	488	9.2	4,493	515	515	100%	6.9	6.9	1	18.2	5.5	Not ducted for return.
First Floor																
Rm 101	1-S-7	AHU	27.6	28.6	789	11.0	8,683	710	0	0%	4.9	0.0	1	10.1	3.5	OSA damper 0% open. Return damper 100% open.

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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	
First Floor																
Rm 102	1-S-7	AHU	27.6	29.4	811	11.0	8,926	750	0	0%	5.0	0.0	1	10.0	3.6	OSA damper 0% open. Return damper 100% open.
Rm 103	1-S-7	AHU	27.6	28.5	787	11.0	8,653	730	0	0%	5.1	0.0	1	10.2	3.6	OSA damper 0% open. Return damper 100% open.
104J	1-S-2	AHU	14.9	24.0	358	9.1	3,254	320	0	0%	5.9	0.0	1	21.8	4.2	OSA damper 0% open. Return damper 100% open.
Rm 104	1-S-1	AHU	32.2	44.3	1,426	20.1	28,672	2,440	976	40%	5.1	2.0	2	7.8	3.8	
105A	1-S-1	AHU	13.9	15.3	213	10.0	2,127	560	224	40%	15.8	6.3	1	38.7	11.9	
105B	1-S-1	AHU	15.8	17.4	275	10.0	2,749	90	36	40%	2.0	0.8	1	22.2	1.5	
Rm 105	1-S-1	AHU	32.5	33.1	1,076	19.3	20,762	1,275	510	40%	3.7	1.5	2	8.3	2.8	
Rm 106	1-S-7	AHU	27.6	29.3	809	11.0	8,895	380	0	0%	2.6	0.0	1	8.3	1.8	OSA damper 0% open. Return damper 100% open.
Rm 107	1-S-7	AHU	27.6	29.4	811	11.1	9,007	790	0	0%	5.3	0.0	1	10.1	3.8	OSA damper 0% open. Return damper 100% open.
Rm 108	2-S-2	AHU	27.0	59.5	1,607	11.0	17,672	1,450	0	0%	4.9	0.0	1	6.8	3.5	OSA damper 0% open. Return damper 100% open.
109	2-S-2	AHU	10.4	28.9	301	11.0	3,306	110	0	0%	2.0	0.0	1	18.7	1.4	OSA damper 0% open. Return damper 100% open.
114	3-S-5	AHU	8.1	9.6	78	9.0	700	30	0	0%	2.6	0.0	1	83.3	1.9	OSA damper 0% open. Return damper 100% open.
115	3-S-5	AHU	19.3	29.7	573	11.0	6,305	400	0	0%	3.8	0.0	1	11.8	2.7	OSA damper 0% open. Return damper 100% open.
Rm 116	3-S-5	AHU	27.7	29.4	814	11.0	8,958	555	0	0%	3.7	0.0	1	9.0	2.7	OSA damper 0% open. Return damper 100% open.
Rm 117	3-S-5	AHU	27.6	29.5	814	11.0	8,956	545	0	0%	3.7	0.0	1	9.0	2.6	OSA damper 0% open. Return damper 100% open.
Rm 118	3-S-5	AHU	27.7	49.5	1,371	11.0	15,083	675	0	0%	2.7	0.0	1	5.7	1.9	OSA damper 0% open. Return damper 100% open.
Rm 119	3-S-8	AHU	27.8	29.5	820	11.0	9,021	720	382	53%	4.8	2.5	1	10.0	3.6	
Rm 120	3-S-8	AHU	27.7	29.5	817	11.0	8,989	390	207	53%	2.6	1.4	1	8.3	2.0	
121	3-S-8	AHU	20.6	19.7	406	11.0	4,464	235	125	53%	3.2	1.7	1	15.2	2.4	
Rm 126	4-S-4	AHU	27.6	28.6	789	11.0	8,683	560	560	100%	3.9	3.9	1	9.7	3.1	Not ducted for return.
Rm 127	4-S-3	AHU	27.8	29.4	817	9.7	7,928	500	315	63%	3.8	2.4	1	10.1	2.9	
Rm 128	4-S-3	AHU	27.8	30.0	834	11.0	9,174	650	410	63%	4.3	2.7	1	9.5	3.3	
Rm 129	4-S-3	AHU	27.6	29.8	822	11.0	9,047	795	501	63%	5.3	3.3	1	10.4	4.1	
Rm 130	4-S-9	AHU	27.6	29.5	814	9.6	7,816	870	696	80%	6.7	5.3	1	12.5	5.2	

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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	
First Floor																
Rm 131	4-S-10	AHU	27.6	29.1	803	11.0	8,835	400	364	91%	2.7	2.5	1	8.6	2.2	
Rm 132	4-S-11	AHU	40.0	27.7	1,108	11.0	12,188	620	484	78%	3.1	2.4	1	7.1	2.4	
Rm 133	4-S-8	AHU	29.8	27.7	825	9.5	7,842	350	200	57%	2.7	1.5	1	9.3	2.0	
Rm 134	4-S-8	AHU	29.8	27.5	820	11.0	9,015	650	371	57%	4.3	2.5	1	9.6	3.3	
Rm 135	4-S-2	AHU	29.8	27.5	820	11.0	9,015	100	46	46%	0.7	0.3	1	6.8	0.5	
Rm 136	4-S-2	AHU	29.4	27.5	809	9.8	7,923	200	92	46%	1.5	0.7	1	8.3	1.1	
Rm 137	4-S-1	AHU	29.4	27.5	809	9.8	7,923	555	255	46%	4.2	1.9	1	10.4	3.2	
Rm 138	4-S-1	AHU	25.3	27.2	688	11.0	7,570	450	207	46%	3.6	1.6	1	10.2	2.7	
139E	4-S-1	AHU	9.6	17.3	166	9.5	1,578	80	37	46%	3.0	1.4	1	38.4	2.3	Not ducted for return.
139D	4-S-6	AHU	10.0	16.2	162	9.7	1,571	80	80	100%	3.1	3.1	1	38.7	2.4	Not ducted for return.
139C	4-S-6	AHU	11.0	16.1	177	11.0	1,948	55	55	100%	1.7	1.7	1	30.6	1.4	Not ducted for return.
Conf. Room 139B	4-S-6	AHU	16.2	20.4	330	11.0	3,635	305	305	100%	5.0	5.0	1	19.7	4.0	Not ducted for return.
139A	4-S-6	AHU	11.1	15.9	176	8.9	1,571	270	270	100%	10.3	10.3	1	44.5	8.3	Not ducted for return.
139	4-S-6	AHU	12.2	24.8	303	8.9	2,693	445	445	100%	9.9	9.9	1	29.1	7.9	Not ducted for return.
140E	-	-	24.4	10.6	259	11.7	3,026	-	-	-	0.0	0.0	0	N/A	0.0	This is storage.
140C	-	-	5.8	5.7	33	7.9	261	-	-	-	0.0	0.0	0	N/A	0.0	This is storage.
140D	-	-	5.8	24.5	142	11.7	1,663	-	-	-	0.0	0.0	0	N/A	0.0	This is storage.
140B	5-S-6	AHU	5.8	10.7	54	9.5	513	175	175	100%	20.5	20.5	1	127.5	16.4	Not ducted for return.
140A	5-S-6	AHU	10.7	10.5	108	9.6	1,040	290	290	100%	16.7	16.7	1	68.2	13.4	Not ducted for return.
Gym 140	5-S-1,2,3&4	AHU	100.0	135.8	13,580	29.2	396,536	50,225	0	0%	7.6	0.0	2	5.8	5.5	Note #1
140F	-	-	4.7	9.3	44	10.0	437	-	-	-	0.0	0.0	0	N/A	0.0	This is storage.
140H	-	-	-	-	-	-	-	-	-	-	0.0	0.0	-	-	0.0	No access. Door lock broken.
Rm 141	3-S-9	AHU	28.4	49.1	1,394	11.1	15,478	480	480	100%	1.9	1.9	1	5.2	1.5	OSA damper 100% open. Return damper 0% open.
Rm 142	3-S-9	AHU	27.6	49.1	1,355	11.1	15,042	1,070	1,070	100%	4.3	4.3	1	7.2	3.4	OSA damper 100% open. Return damper 0% open.

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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	
First Floor																
Rm 143	3-S-6	AHU	27.6	49.5	1,366	11.1	15,165	1,645	1,645	100%	6.5	6.5	1	9.0	5.2	Not ducted for return.
Rm 144	3-S-6	AHU	27.6	29.1	803	11.0	8,835	1,005	1,005	100%	6.8	6.8	1	11.9	5.5	Not ducted for return.
Rm 145	2-S-6	AHU	30.1	38.6	1,162	11.0	12,780	1,390	0	0%	6.5	0.0	1	9.2	4.7	OSA damper 0% open. Return damper 100% open.
146	2-S-5	AHU	9.7	14.3	139	9.0	1,248	200	0	0%	9.6	0.0	1	52.6	6.9	OSA damper 0% open. Return damper 100% open.
146A	2-S-5	AHU	10.9	9.2	100	9.0	903	210	0	0%	14.0	0.0	1	73.2	10.0	OSA damper 0% open. Return damper 100% open.
146C	2-S-5	AHU	15.4	14.6	225	11.0	2,473	80	0	0%	1.9	0.0	1	24.4	1.4	OSA damper 0% open. Return damper 100% open.
146D	2-S-5	AHU	15.4	14.3	220	11.0	2,422	200	0	0%	5.0	0.0	1	27.1	3.6	OSA damper 0% open. Return damper 100% open.
146E	2-S-5	AHU	9.3	11.8	110	9.0	988	40	0	0%	2.4	0.0	1	59.5	1.7	OSA damper 0% open. Return damper 100% open.
148	2-S-5	AHU	15.6	20.5	320	11.0	3,518	150	0	0%	2.6	0.0	1	18.0	1.8	OSA damper 0% open. Return damper 100% open.
Main Office 147	2-S-4&5	AHU	28.2	46.5	1,755	10.0	17,553	1,335	0	0%	4.6	0.0	2	9.8	3.3	OSA damper 0% open. Return damper 100% open.
147A	2-S-4	AHU	14.3	19.1	273	9.0	2,458	440	0	0%	10.7	0.0	1	30.9	7.7	OSA damper 0% open. Return damper 100% open.
147B	2-S-4	AHU	14.7	19.2	282	9.0	2,540	575	0	0%	13.6	0.0	1	32.2	9.8	OSA damper 0% open. Return damper 100% open.
151	2-S-4	AHU	9.4	14.5	136	9.0	1,227	525	0	0%	25.7	0.0	1	64.9	18.5	OSA damper 0% open. Return damper 100% open.
152	2-S-4	AHU	9.6	13.9	133	9.0	1,201	620	0	0%	31.0	0.0	1	69.7	22.3	OSA damper 0% open. Return damper 100% open.
152A	2-S-4	AHU	9.4	9.3	87	8.2	717	465	0	0%	38.9	0.0	1	107.5	28.0	OSA damper 0% open. Return damper 100% open.
154A	-	-	9.8	7.7	75	8.2	619	-	-	-	0.0	0.0	1	92.1	0.0	Ventilation provided from adjacent spaces.
Conf. Room 154	2-S-4	AHU	9.3	8.4	78	8.2	641	310	0	0%	29.0	0.0	1	109.9	20.9	OSA damper 0% open. Return damper 100% open.
155	2-S-4	AHU	48.5	12.1	373	8.2	3,057	705	0	0%	13.8	0.0	1	28.6	10.0	OSA damper 0% open. Return damper 100% open.
155A	-	-	6.6	7.9	52	8.2	428	-	-	-	0.0	0.0	1	133.3	0.0	Open ceiling to room 155.
155B	2-S-4	AHU	7.7	19.3	149	8.2	1,219	185	0	0%	9.1	0.0	1	53.3	6.6	OSA damper 0% open. Return damper 100% open.
155E	-	-	7.7	9.5	73	8.2	600	-	-	-	0.0	0.0	1	95.0	0.0	Ventilation provided from adjacent spaces.
Auditorium 162	2-S-1	AHU	85.0	95.6	8,126	35.3	286,848	30,895	9,269	30%	4.6	1.4	1	3.5	3.4	Note #6. Non-rectangular room.
Stage 166	-	-	79.5	29.8	2,369	50.0	118,455									Open and shared with Auditorium.
Balcony 200C	-	-	-	-	-	-	-									Open and shared with Auditorium.

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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		
First Floor																	
150	2-S-3	AHU	14.0	18.5	259	11.1	2,875	115	115	100%	2.4	2.4	1	21.7	1.9	Not ducted for return.	
149	2-S-3	AHU	17.7	27.5	487	9.8	4,770	250	250	100%	3.1	3.1	1	14.5	2.5	Not ducted for return.	
156A	2-S-3	AHU	6.0	12.0	72	8.5	612	60	60	100%	5.9	5.9	1	97.8	4.7	Not ducted for return.	
Second Floor																	
205B	2-S-3	AHU	21.5	22.2	477	9.0	4,296	265	265	100%	3.7	3.7	1	16.2	3.0	Not ducted for return.	
205C	2-S-3	AHU	15.2	25.1	382	11.0	4,197	435	435	100%	6.2	6.2	1	18.6	5.0	Not ducted for return.	
Rm 206	1-S-7	AHU	27.6	24.6	679	11.0	7,469	705	0	0%	5.7	0.0	1	11.7	4.1	OSA damper 0% open. Return damper 100% open.	
Rm 207	1-S-5	AHU	25.6	43.6	1,116	10.1	11,273	1,455	0	0%	7.7	0.0	1	10.6	5.6	OSA damper 0% open. Return damper 100% open.	
Rm 208	1-S-5	AHU	27.6	43.6	1,203	10.1	12,154	1,215	0	0%	6.0	0.0	1	9.0	4.3	OSA damper 0% open. Return damper 100% open.	
209	1-S-5	AHU	29.6	30.8	912	11.0	10,028	1,260	0	0%	7.5	0.0	1	11.1	5.4	OSA damper 0% open. Return damper 100% open.	
209C	-	-	-	-	-	-	-	-	-	-	0.0	0.0	1	-	0.0	209 and 209C are one room.	
209A	1-S-5	AHU	7.6	10.8	82	9.0	739	100	0	0%	8.1	0.0	1	83.0	5.8	OSA damper 0% open. Return damper 100% open.	
211	-	-	-	-	-	-	-	-	-	-	0.0	0.0	-	-	0.0	This is a water closet.	
Rm 212	-	-	7.7	17.8	137	7.7	1,055	-	-	-	0.0	0.0	1	54.0	0.0	Ventilation provided by adjacent spaces.	
Rm213	1-S-6	AHU	27.6	49.3	1,361	11.0	14,967	1,110	0	0%	4.4	0.0	1	7.0	3.2	OSA damper 0% open. Return damper 100% open.	
Rm 214	2-S-2	AHU	27.6	44.3	1,063	11.0	11,693	1,070	0	0%	5.5	0.0	1	8.8	4.0	OSA damper 0% open. Return damper 100% open.	
214A	-	-	8.0	10.0	1,063	11.0	11,693	-	-	-	0.0	0.0	1	4.9	0.0	Ventilation provided by adjacent spaces.	
214B	-	-	8.0	10.0	1,063	8.9	9,461	-	-	-	0.0	0.0	1	6.0	0.0	Ventilation provided by adjacent spaces.	
Rm 215	2-S-2	AHU	27.6	35.5	980	11.0	10,778	1,080	0	0%	6.0	0.0	1	9.6	4.3	OSA damper 0% open. Return damper 100% open.	
Rm 220	3-S-5	AHU	19.6	28.3	555	11.0	6,101	175	0	0%	1.7	0.0	1	10.6	1.2	OSA damper 0% open. Return damper 100% open.	
221	3-S-5	AHU	19.6	28.3	555	11.0	6,101	250	0	0%	2.5	0.0	1	11.1	1.8	OSA damper 0% open. Return damper 100% open.	
Rm 222	3-S-5	AHU	28.3	29.4	832	11.0	9,152	530	0	0%	3.5	0.0	1	8.7	2.5	OSA damper 0% open. Return damper 100% open.	
Rm 223	3-S-5	AHU	28.4	29.5	838	11.0	9,216	505	0	0%	3.3	0.0	1	8.6	2.4	OSA damper 0% open. Return damper 100% open.	
Rm 224	3-S-8	AHU	28.4	29.5	838	11.0	9,216	405	215	53%	2.6	1.4	1	8.2	2.0		

Date: 10/15/2021

Readings By: Mayer/White/Ramos



AIRFLOW SURVEY REPORT

Project: Portland Public Schools Airflow Testing
Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
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	
Second Floor																
Rm 225	3-S-8	AHU	28.4	29.5	838	11.0	9,216	335	178	53%	2.2	1.2	1	7.8	1.7	
Rm 226	3-S-8	AHU	28.4	29.5	838	11.0	9,216	340	180	53%	2.2	1.2	1	7.9	1.7	
Rm 227	3-S-8	AHU	28.4	29.5	838	11.0	9,216	380	201	53%	2.5	1.3	1	8.1	1.9	
Rm 232	4-S-4	AHU	26.7	38.7	1,033	11.1	11,470	530	530	100%	2.8	2.8	1	7.2	2.2	Not ducted for return.
Rm 233	4-S-3	AHU	26.7	38.7	1,033	11.1	11,470	820	517	63%	4.3	2.7	1	8.3	3.3	
233A	-	-	9.6	15.4		11.0		-	-	-	0.0	0.0	1	-	0.0	Ventilation provided by adjacent spaces.
Rm 234	4-S-9	AHU	27.6	39.9	1,101	11.1	12,224	695	556	80%	3.4	2.7	1	7.3	2.7	
Rm 235	4-S-10	AHU	27.6	39.9	1,101	11.1	12,224	660	601	91%	3.2	2.9	1	7.2	2.6	
Rm 236	4-S-11	AHU	27.6	39.9	1,101	11.1	12,224	370	289	78%	1.8	1.4	1	6.1	1.4	
Rm 237	4-S-8	AHU	27.6	39.9	1,101	11.1	12,224	590	336	57%	2.9	1.7	1	6.9	2.2	
Rm 238	4-S-2	AHU	27.6	49.5	1,366	11.0	15,028	210	97	46%	0.8	0.4	1	4.4	0.6	
Rm 239	4-S-1	AHU	26.5	44.3	1,174	11.0	12,913	910	419	46%	4.2	1.9	1	7.6	3.2	
239A	4-S-1	AHU	13.3	14.4	192	11.0	2,107	290	133	46%	8.3	3.8	1	33.3	6.2	
Rm 241	4-S-6	AHU	27.6	41.1	1,134	11.0	12,478	865	865	100%	4.2	4.2	1	7.9	3.3	Not ducted for return.
Rm 243	3-S-9	AHU	27.6	29.3	809	11.0	8,895	720	720	100%	4.9	4.9	1	10.3	3.9	OSA damper 100% open. Return damper 0% open.
244C	3-S-9	AHU	10.2	17.1	174	9.1	1,587	40	40	100%	1.5	1.5	1	37.1	1.2	OSA damper 100% open. Return damper 0% open.
244D	3-S-9	AHU	10.2	10.2	104	11.1	1,155	240	240	100%	12.5	12.5	1	59.3	10.0	OSA damper 100% open. Return damper 0% open.
Library 244	3-S-7	AHU	34.5	148.5	5,123	19.5	99,903	2,665	0	0%	1.6	0.0	2	2.3	1.2	Note #5. Split ceiling.
Conf. Room 244A	3-S-7	AHU	9.7	12.1	117	9.2	1,080	150	0	0%	8.3	0.0	1	58.8	6.0	Note #5
Conf. Room 244B	3-S-7	AHU	9.7	12.1	117	9.2	1,080	40	0	0%	2.2	0.0	1	54.4	1.6	Note #5
Rm 245	2-S-6	AHU	27.7	33.7	933	12.8	11,949	955	0	0%	4.8	0.0	1	8.2	3.5	OSA damper 0% open. Return damper 100% open.
Rm 246	2-S-6	AHU	28.5	36.7	1,046	11.0	11,505	905	0	0%	4.7	0.0	1	8.3	3.4	OSA damper 0% open. Return damper 100% open.
Rm 247	2-S-5	AHU	28.5	42.4	1,208	11.0	13,292	920	0	0%	4.2	0.0	1	7.3	3.0	OSA damper 0% open. Return damper 100% open.
248A	2-S-5	AHU	14.6	14.6	213	11.0	2,345	365	0	0%	9.3	0.0	1	31.0	6.7	OSA damper 0% open. Return damper 100% open.

Date: 10/15/2021

Readings By: Mayer/White/Ramos



Project:	Portland Public Schools Airflow Testing
Location:	Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219
Filter Status:	Upgraded

Date: 10/15/2021 Readings By: Mayer/White/Ramos



Neudorfer Engineers, Inc.

Consulting Engineers Seattle, Washington - Portland, Oregon



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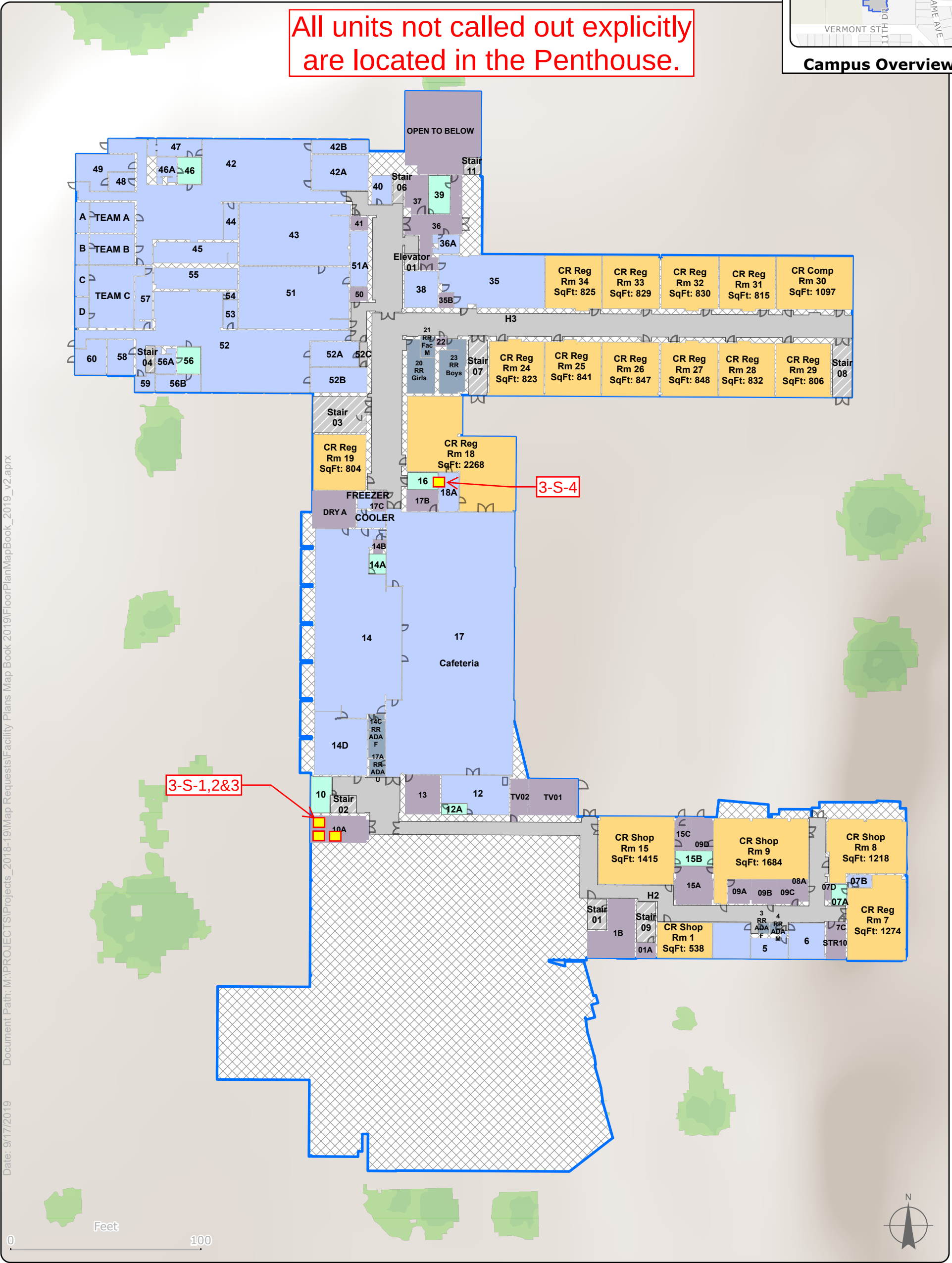
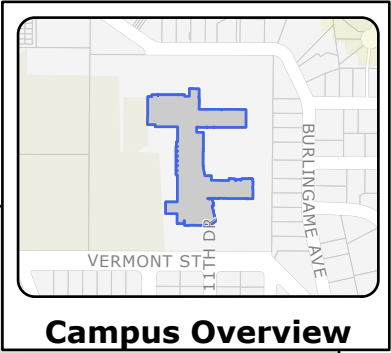
Project: Portland Public Schools Airflow Testing

Location: Ida Wells (Wilson) HS; 1151 SW Vermont St, Portland, OR 97219

NOTE #	NOTE DESCRIPTION
1	5-S-1,2,3,&4 OSA dampers closed. Return dampers 100% open.
2	3-S-4. Unable to trace OSA duct due to hardlid ceiling. Return airflow same as supply. May not be ducted for OSA.
3	3-S-1, OSA damper closed. Return damper 100% open but broken. Fan is starved.
4	3-S-3, OSA damper closed. Return damper 100% open and connected to 3-S-1 return. Fan is starved.
5	3-S-7 OSA damper closed.
6	2-S-1, OSA damper closed but broken. Recorded OSA is leakage past damper.

WILSON: Lower Level 1

All units not called out explicitly
are located in the Penthouse.

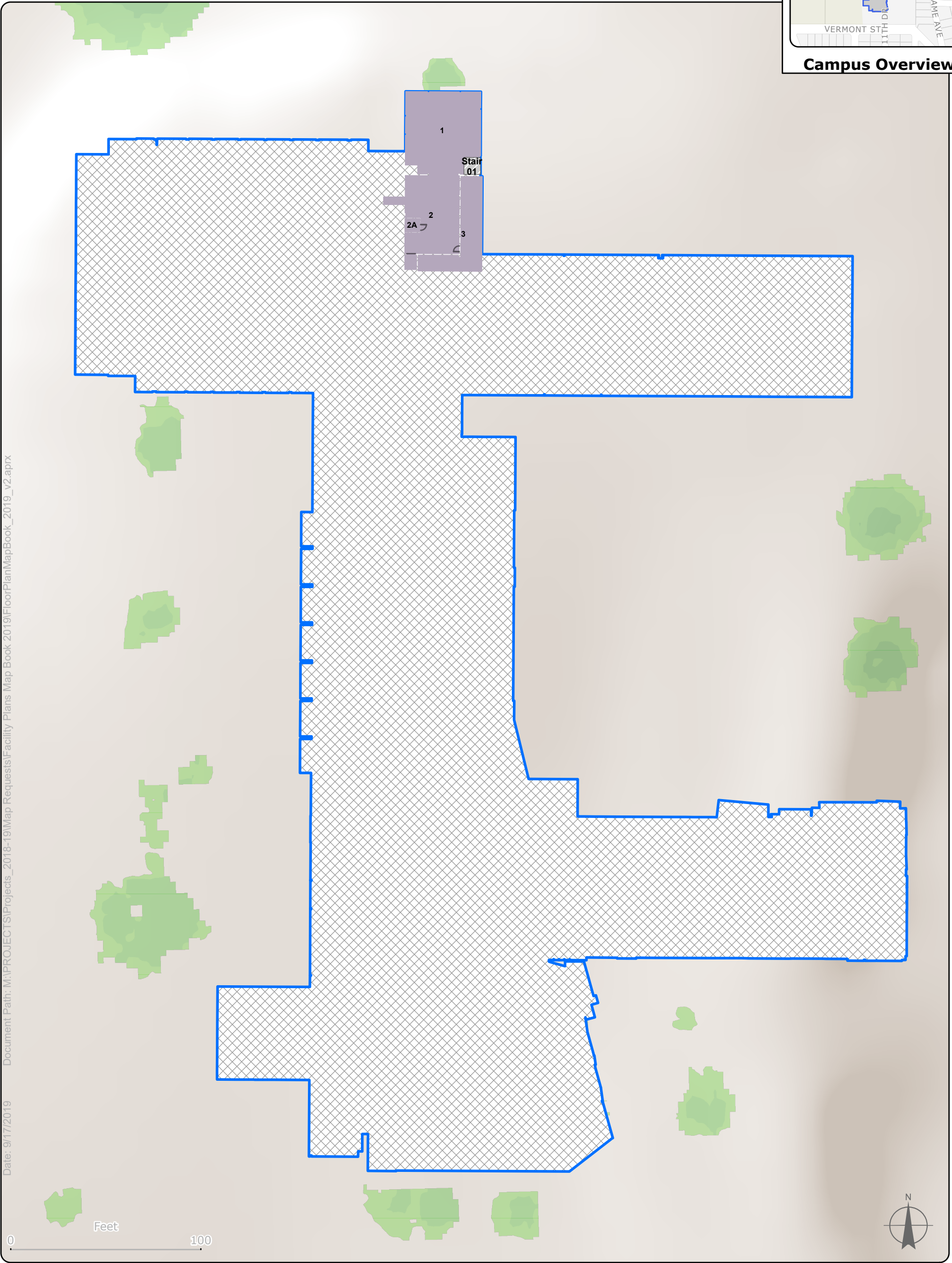
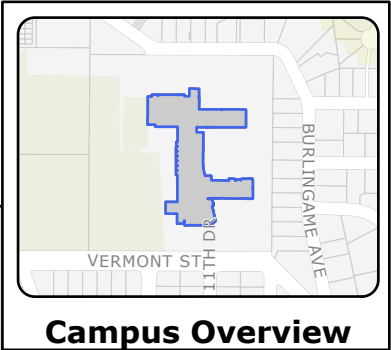


Space Use		School Grounds	
	Classroom		Campus Footprints
	Office		Athletic Field
	Rest Room		Playground: Paved
	Special Purpose		Playground: Unpaved
	Corridor		Streets
	Other		Doors
	Stairs/Elevator		

Total Number Of Rooms By Classification

Classrooms: 18	Special Purpose: 46
Office Spaces: 9	Storage: 20

WILSON: Lower Level 2

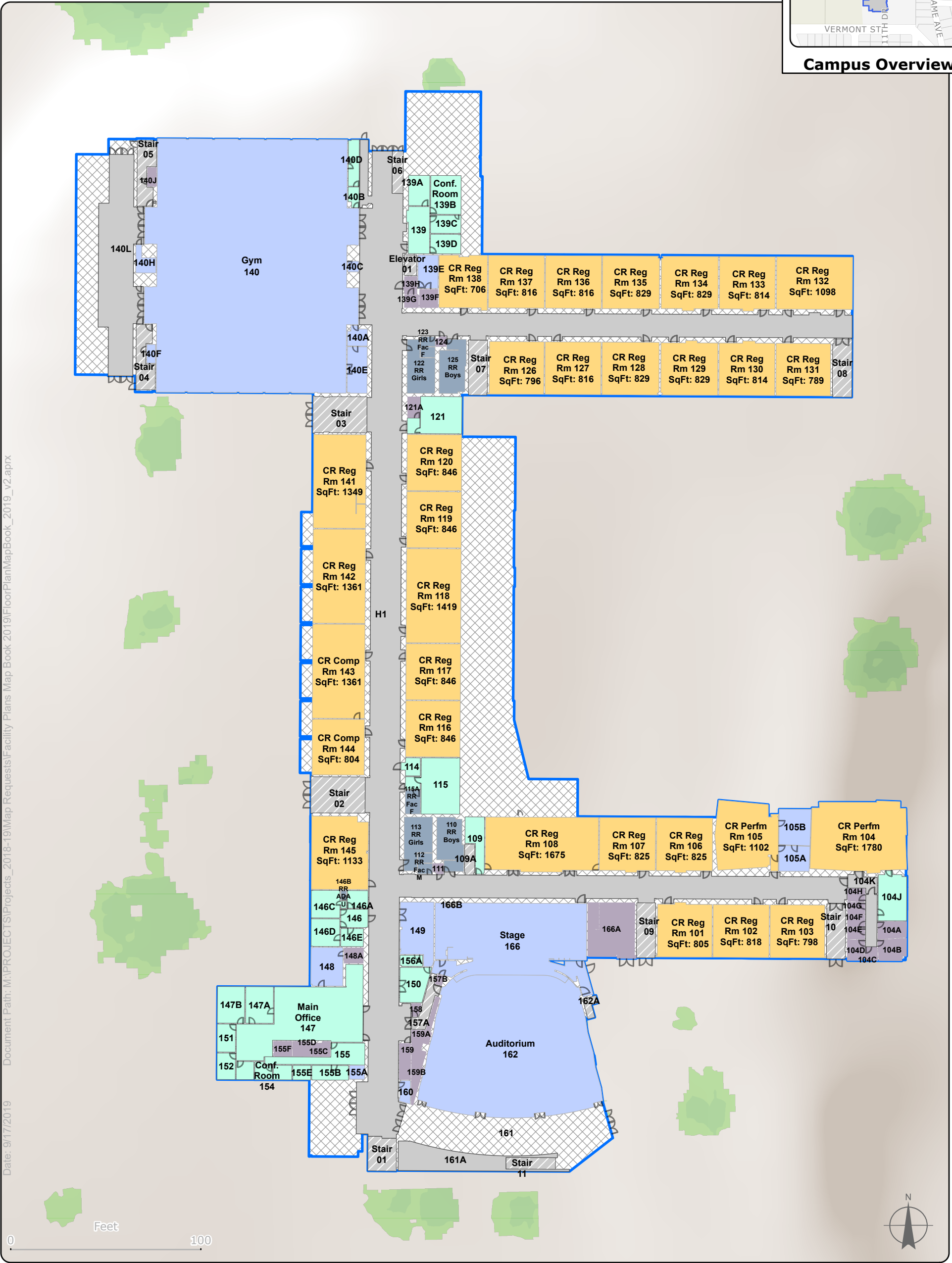
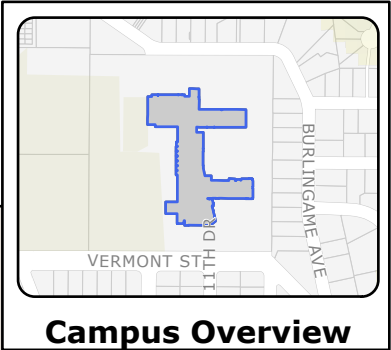


Space Use		School Grounds	
	Classroom		Campus Footprints
	Office		Athletic Field
	Rest Room		Playground: Paved
	Special Purpose		Playground: Unpaved
	Corridor		Streets
	Other		Doors
	Stairs/Elevator		

Total Number Of Rooms By Classification

Classrooms: 0	Special Purpose: 0
Office Spaces: 0	Storage: 0

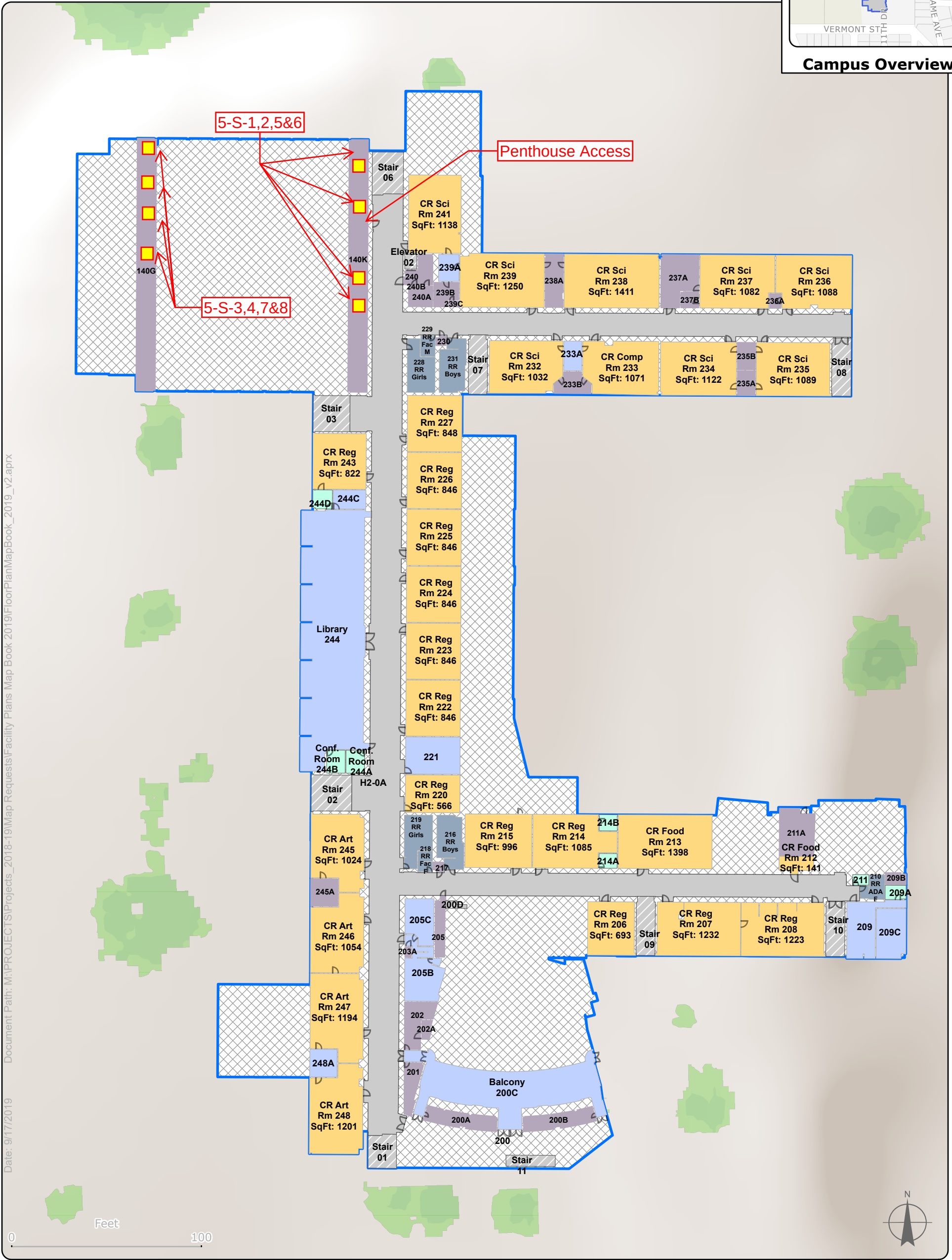
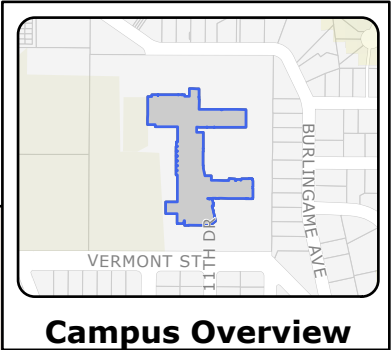
WILSON: First Floor



Space Use	School Grounds
 Classroom	 Campus Footprints
 Office	 Athletic Field
 Rest Room	 Playground: Paved
 Special Purpose	 Playground: Unpaved
 Corridor	 Streets
 Other	 Doors
 Stairs/Elevator	

<u>Total Number Of Rooms By Classification</u>	
Classrooms: 31	Special Purpose: 15
Office Spaces: 30	Storage: 19

WILSON: Second Floor

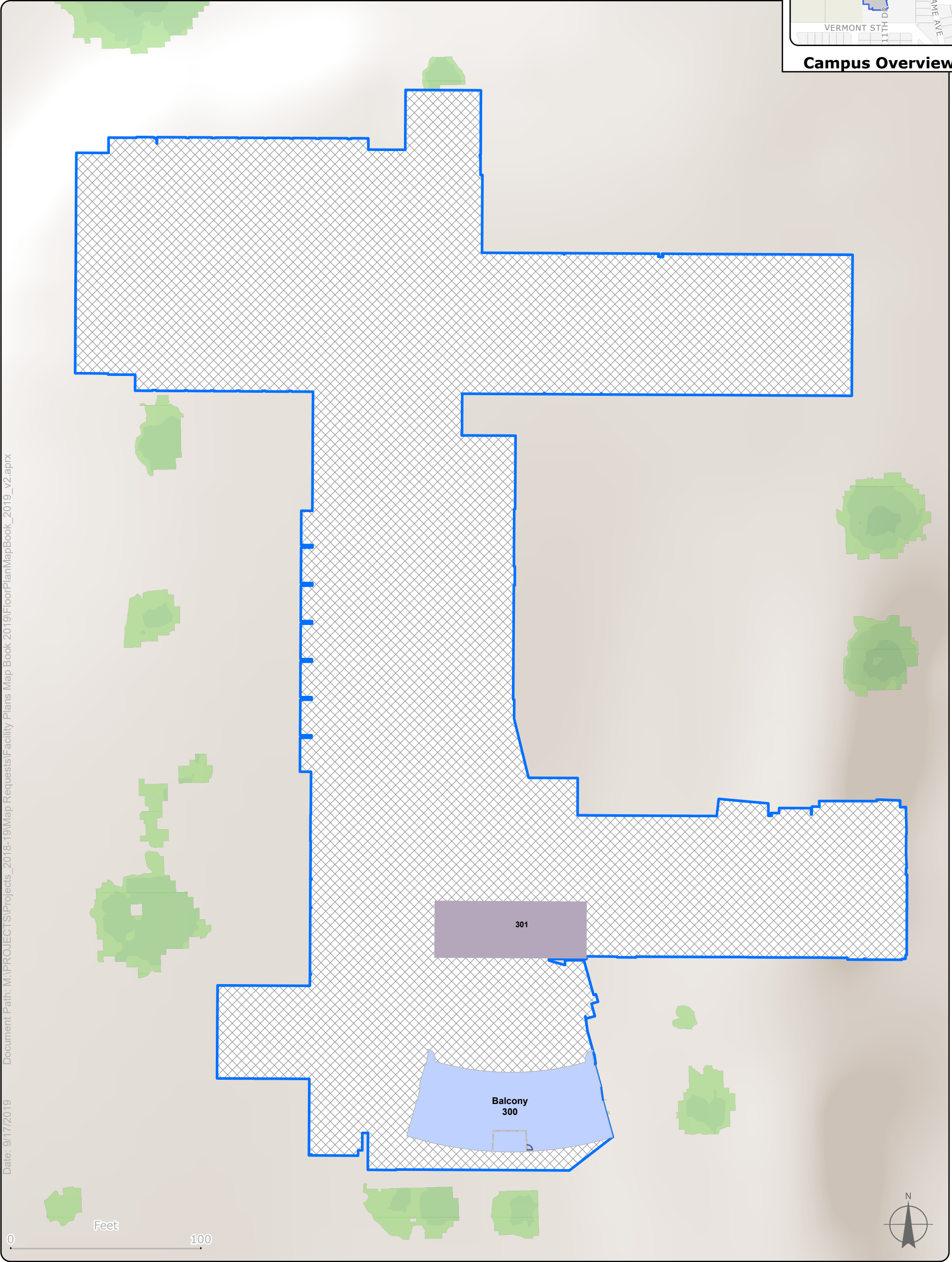
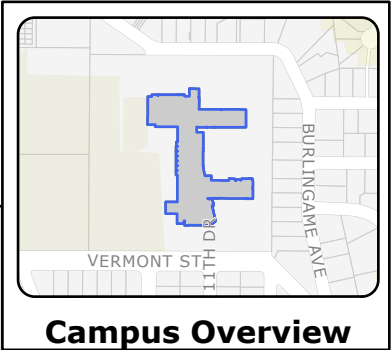


Space Use	School Grounds
Classroom	Campus Footprints
Office	Athletic Field
Rest Room	Playground: Paved
Special Purpose	Playground: Unpaved
Corridor	Streets
Other	Doors
Stairs/Elevator	

Total Number Of Rooms By Classification

Classrooms: 28	Special Purpose: 11
Office Spaces: 7	Storage: 18

WILSON: Third Floor



Space Use	School Grounds
Classroom	Campus Footprints
Office	Athletic Field
Rest Room	Playground: Paved
Special Purpose	Playground: Unpaved
Corridor	Streets
Other	Doors
Stairs/Elevator	

Total Number Of Rooms By Classification

Classrooms: 0	Special Purpose: 2
Office Spaces: 0	Storage: 0