

IEA, INC.

2023 - 2024 Ventilation Assessment



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Saint Paul Public Schools Frost Lake Elementary School

Assessment Date:
4/7/2023 - 4/10/2023

Project Description

IEA conducted a ventilation inspection in Frost Lake Elementary School by IEA representative, Sashya Wandmaker, with the intent of gathering visual observations and overall ventilation information which will assist the District in making informed and proactive decisions to improve and maintain acceptable air quality in the building. This inspection is based upon the Environmental Protection Agency's (EPA's) Tools for Schools IAQ guidelines and the recommended Minnesota Department of Education (MDE) portion of a school district's IAQ management plan. Ventilation verification is also recommended by American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

Some observations gathered during the inspection may identify issues which may require additional testing, evaluation, further investigation, or maintenance on the ventilation systems.

The findings, conclusions and recommendations presented herein are believed to be accurate and representative of the building on the date and time of the inspection.

GENERAL COMMENTS

The analysis and opinions expressed in this report are based upon data obtained from Saint Paul Public Schools at the indicated locations. This report does not reflect variations in conditions that may occur across the site, property, or facility. Actual conditions may vary and may not become evident without further assessment.

The report is prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted indoor air quality practices. Other than as provided in the preceding sentence, no warranties are extended or made.

Building Information

General information regarding the building was collected by IEA during an interview with building maintenance staff. The information gathered during this process is a vital component, as it is helpful in determining how these items may play a role in possible IAQ related issues.

Below is a summary of the information gathered during the interview:

- Automation controls are managed internally.
- A Building Automation System is present. The automation control software program is Tridium and controls can not be accessed remotely.
- Schedules:

Ventilation operation:

Day:	Occupied?	Start Time:	End Time:
Monday-Friday	Yes	5:30 AM	5:30 PM
Monday-Friday	Yes	7:30 AM	5:30 PM

Typical occupancy:

Day:	Occupied?	Start Time:	End Time:
Monday-Friday	Yes	8:00 AM	4:00 PM
Saturday	No		
Sunday	No		
Holiday	No		
Notes: Monday and Wednesday until 9, Tuesday, Thursday, and Friday out at normal time			

- It is not known whether or not CO2 sensors are associated with the ventilation system.
- VAVs are present. They are fan powered with a Unknown filter.
- It is not known whether or not the building has variable frequency drives (VFD).
- The heating system is a steam boiler.
- A cooling system is present and is a Dx type system.
- Filters used are:

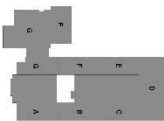
Filter Type	MERV Rating
Pleated	MERV 11
Pleated	MERV 13
Pleated	MERV 8

- Filters are changed 3 times.
- Energy Recovery Units are present.
- Units do not contain system Enhancements.
- Personal air purifiers are supplied for individual rooms. They are of unknown make or model.
 - Location: all classrooms
- It is not known whether or not the building was commissioned during the original construction.

Air Handling Unit Designations & Service Zones: 1st Floor



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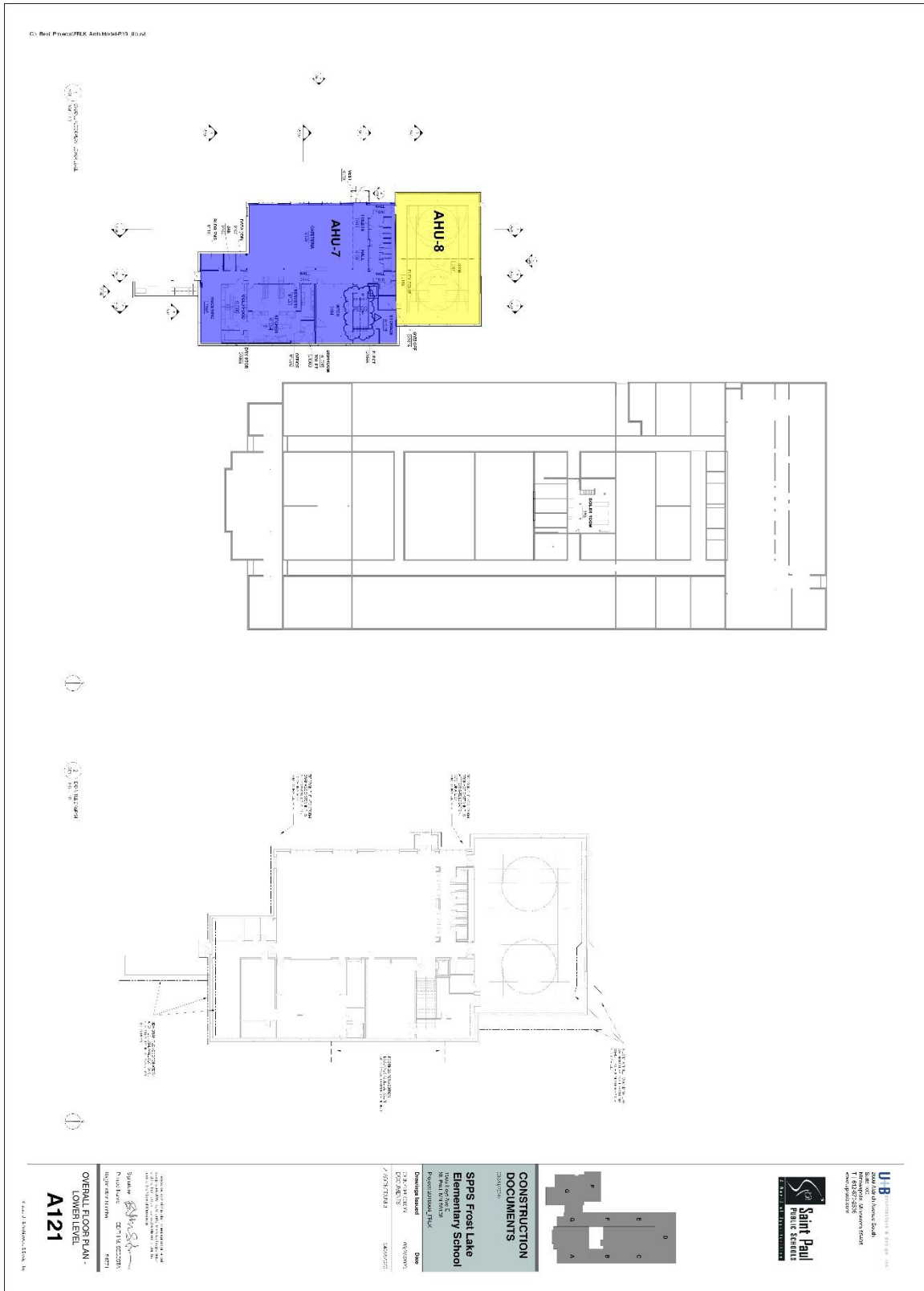


CONSTRUCTION DOCUMENTS
 SPPS Frost Lake Elementary School
 PRELIMINARY DESIGN

Prepared by: Date: 03/24/14
Checked by: Date: 03/24/14
Drawn by: Date: 03/24/14

Overall Floor Plan - Main Level
A122

Air Handling Unit Designations & Service Zones: Basement



Assessment

Ventilation System

The following information was gathered by IEA on 4/7/2023 - 4/10/2023 with support from the district building representative during the on-site interview. The type of heating, ventilating and air-conditioning (HVAC) system and its assessment is included for each unit below:

Unit Designation:	AHU-05	
Location of Unit:	Mechanical room 1418	
Areas Served:	See attached map N Classrooms	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> Supply System - Constant Volume Heating - Hot Water Cooling - None Energy Recovery Unit (ERU) - None Filter Type - Mixed <ul style="list-style-type: none"> Pre-filter: None Main filter: Pleated, MERV 11 	<p>Outdoor air intake is inaccessible</p> <p>Outdoor air intake is located on the roof.</p> <p>It is not known if there are nearby pollution sources.</p> <p>Outdoor air intake is in good condition.</p>	<p>Outdoor air filters are not present.</p> <p>Return air filters are not present.</p> <p>Mixed air pre-filters are not present. Mixed air main filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Mixed air main filters are installed correctly.</p> <p>Drain pans are not applicable or not present. Drain pan condition is not known.</p> <p>Heating coils are clean.</p> <p>Heat wheels are not present.</p> <p>Exterior ducting is visible. Exterior ducting insulation is in good condition.</p> <p>Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness.</p> <p>Air handling room is free of trash/chemicals.</p> <p>Outside damper is open, and its condition is good.</p> <p>Return damper is open, and its condition is good.</p> <p>The general condition of the unit is good.</p>

Unit Designation:	AHU-06	
Location of Unit:	Mechanical room 1111	
Areas Served:	See attached map S Classrooms	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> • Supply System - Constant Volume • Heating - Hot Water • Cooling - None • Energy Recovery Unit (ERU) - None 	<p>Outdoor air intake is inaccessible</p> <p>Outdoor air intake is located in an unknown location.</p> <p>It is not known if there are nearby pollution sources.</p>	<p>Outdoor air filters are not present.</p> <p>Return air filters are not present.</p> <p>Mixed air pre-filters are not present. Mixed air main filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Mixed air main filters are installed correctly.</p> <p>Drain pans are not applicable or not present. Drain pan condition is not known.</p>
Filter Type - Mixed <ul style="list-style-type: none"> • Pre-filter: None • Main filter: Pleated, MERV 8 	<p>Outdoor air intake is in good condition.</p>	<p>Heating coils are clean.</p> <p>Heat wheels are not present.</p> <p>Exterior ducting is visible. Exterior ducting insulation is in good condition.</p> <p>Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness.</p> <p>Air handling room is free of trash/chemicals.</p> <p>Outside damper is inaccessible, and its condition is not known.</p> <p>Return damper is inaccessible, and its condition is not known.</p> <p>The general condition of the unit is good.</p>

Unit Designation:	AHU-07	
Location of Unit:	Mech room 0104	
Areas Served:	See attached map Cafeteria	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> • Supply System - VAV • Heating - Hot Water • Cooling - Dx • Energy Recovery Unit (ERU) - None 	Outdoor air intake is accessible Outdoor air intake is located on the roof. No nearby pollution sources were found. Outdoor air intake is in good condition.	Outdoor air filters are not present. Return air filters are not present. Mixed air pre-filters are clean and not in need of replacement (scoring 2 out of 5) and fit well. Mixed air pre-filters are installed incorrectly. Mixed air main filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Mixed air main filters are installed incorrectly. Drain pans are not applicable or not present. Drain pan condition is not known. Heating coils are clean and cooling coils are clean. Heat wheels are not present. Exterior ducting is visible. Exterior ducting insulation is in good condition. Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness. Air handling room is free of trash/chemicals. Outside damper is inaccessible, and its condition is not known. Return damper is open, and its condition is good. The general condition of the unit is good.
Filter Type - Mixed <ul style="list-style-type: none"> • Pre-filter: Pleated, MERV 8 • Main filter: Pleated, MERV 13 		

Unit Designation:	AHU-08	
Location of Unit:	1502 mechanical room	
Areas Served:	See attached map Gymnasium	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> • Supply System - Constant Volume • Heating - Hot Water • Cooling - None • Energy Recovery Unit (ERU) - None Filter Type - Mixed <ul style="list-style-type: none"> • Pre-filter: Pleated, MERV 8 • Main filter: Pleated, MERV 13 	<p>Outdoor air intake is inaccessible</p> <p>Outdoor air intake is located on an exterior wall.</p> <p>No nearby pollution sources were found.</p> <p>Outdoor air intake is in good condition.</p>	<p>Outdoor air filters are not present.</p> <p>Return air filters are not present.</p> <p>Mixed air filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Mixed air filters are installed correctly.</p> <p>Drain pans are not applicable or not present. Drain pan condition is not known.</p> <p>Heating coils are clean.</p> <p>Heat wheels are not present.</p> <p>Exterior ducting is visible. Exterior ducting insulation is in good condition.</p> <p>Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness.</p> <p>Air handling room is free of trash/chemicals.</p> <p>Outside damper is open, and its condition is good.</p> <p>Return damper is open, and its condition is good.</p> <p>The general condition of the unit is good.</p>

Unit Designation:	DOAS-01	
Location of Unit:	Mech room 1316	
Areas Served:	See attached map West classrooms	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> Supply System - Constant Volume Heating - Hot Water Cooling - Dx Energy Recovery Unit (ERU) - Fixed Plate 	Outdoor air intake is accessible Outdoor air intake is located on the roof. It is not known if there are nearby pollution sources.	Outdoor air pre-filters are somewhat dirty and on the border of needing replacement (scoring 4 out of 5) and fit well. Outdoor air pre-filters are installed correctly. Outdoor air main filters are dirty and in need of replacement (scoring 5 out of 5) and fit well. Outdoor air main filters are installed correctly. Return air pre-filters are not present. Return air main filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Return air main filters are installed correctly. Drain pans are not applicable or not present. Drain pan condition is not known.
Filter Type - Outdoor <ul style="list-style-type: none"> Pre-filter: Pleated, MERV 8 Main filter: Pleated, MERV 13 	Outdoor air intake is in good condition.	Heating coils are clean and cooling coils are clean. Heat wheels are inaccessible. Exterior ducting is visible. Exterior ducting insulation is in good condition.
Filter Type - Return <ul style="list-style-type: none"> Pre-filter: None Main filter: Pleated, MERV 8 		Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness. Air handling room is free of trash/chemicals. Outside damper is open, and its condition is good. Return damper is open, and its condition is good. The general condition of the unit is good.

Unit Designation:	DOAS-02	
Location of Unit:	Mech room 1316	
Areas Served:	See attached map East classrooms	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> Supply System - Constant Volume Heating - Hot Water Cooling - Dx Energy Recovery Unit (ERU) - Fixed Plate 	<p>Outdoor air intake is accessible</p> <p>Outdoor air intake is located on an exterior wall.</p> <p>It is not known if there are nearby pollution sources.</p> <p>Outdoor air intake is in good condition.</p>	<p>Outdoor air filters are somewhat dirty and on the border of needing replacement (scoring 4 out of 5) and fit well. Outdoor air filters are installed correctly.</p> <p>Return air pre-filters are not present. Return air main filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Return air main filters are installed incorrectly.</p> <p>Drain pans are not applicable or not present. Drain pan condition is not known.</p> <p>Heating coils are clean and cooling coils are clean.</p> <p>Heat wheels are inaccessible.</p> <p>Exterior ducting is visible. Exterior ducting insulation is in good condition.</p> <p>Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness.</p> <p>Air handling room is free of trash/chemicals.</p> <p>Outside damper is open, and its condition is good.</p> <p>Return damper is open, and its condition is good.</p> <p>The general condition of the unit is good.</p>
Filter Type - Outdoor <ul style="list-style-type: none"> Pre-filter: Pleated, MERV 8 Main filter: Pleated, MERV 13 		
Filter Type - Return <ul style="list-style-type: none"> Pre-filter: None Main filter: Pleated, MERV 8 		

Unit Designation:	DOAS-03	
Location of Unit:	mechanical room 1502	
Areas Served:	See attached map.	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> Supply System - Constant Volume Heating - Hot Water Cooling - Dx Energy Recovery Unit (ERU) - None 	<p>Outdoor air intake is accessible</p> <p>Outdoor air intake is located on an exterior wall.</p> <p>No nearby pollution sources were found.</p>	<p>Outdoor air filters are somewhat dirty and on the border of needing replacement (scoring 4 out of 5) and fit well. Outdoor air filters are installed correctly.</p> <p>Return air pre-filters are not present. Return air main filters are somewhat dirty and on the border of needing replacement (scoring 3 out of 5) and fit well. Return air main filters are installed correctly.</p> <p>Drain pans are not applicable or not present. Drain pan condition is not known.</p>
Filter Type - Outdoor <ul style="list-style-type: none"> Pre-filter: Pleated, MERV 8 Main filter: Pleated, MERV 13 	<p>Outdoor air intake is in good condition.</p>	<p>Heating coils are clean and cooling coils are clean.</p> <p>Heat wheels are not present.</p> <p>Exterior ducting is visible. Exterior ducting insulation is in good condition.</p>
Filter Type - Return <ul style="list-style-type: none"> Pre-filter: None Main filter: Pleated, MERV 8 		<p>Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness.</p> <p>Air handling room is free of trash/chemicals.</p> <p>Outside damper is open, and its condition is good.</p> <p>Return damper is open, and its condition is good.</p> <p>The general condition of the unit is good.</p>

Unit Designation:	MAU-01 (100% OA)	
Location of Unit:	mechanical room 0104	
Areas Served:	See attached map Kitchen hood	
System Enhancements:	None	
Supply System	Outdoor Air	Cleanliness and Observations
Type <ul style="list-style-type: none"> • Supply System - Constant Volume • Heating - Hot Water • Cooling - None • Energy Recovery Unit (ERU) - None 	<p>Outdoor air intake is accessible</p> <p>Outdoor air intake is located on the roof.</p> <p>No nearby pollution sources were found.</p>	<p>Outdoor air pre-filters are not present. Outdoor air main filters are somewhat dirty and on the border of needing replacement (scoring 4 out of 5) and fit well. Outdoor air main filters are installed correctly.</p> <p>Return air filters are not present.</p> <p>Drain pan plugged status is not known. Drain pan condition is not known.</p> <p>Heating coils are clean.</p>
Filter Type - Outdoor <ul style="list-style-type: none"> • Pre-filter: None • Main filter: Pleated, MERV 8 	<p>Outdoor air intake is in good condition.</p>	<p>Heat wheels are not present.</p> <p>Exterior ducting is visible. Exterior ducting insulation is in good condition.</p> <p>Interior ducting is not visible. Interior ducting insulation is in an unknown condition. Interior ducting is of unknown cleanliness.</p> <p>Air handling room is free of trash/chemicals.</p> <p>Outside damper is open, and its condition is good.</p> <p>Return damper is not present.</p> <p>The general condition of the unit is good.</p>

Recommendations

Dirty or poorly fitting filters were observed in units AHU-07, DOAS-01 and DOAS-02 during the ventilation inspection.

Recommendation: The operations and maintenance program for filter changes should be reviewed and revised to ensure proper filter changes to optimize filtration capacity.

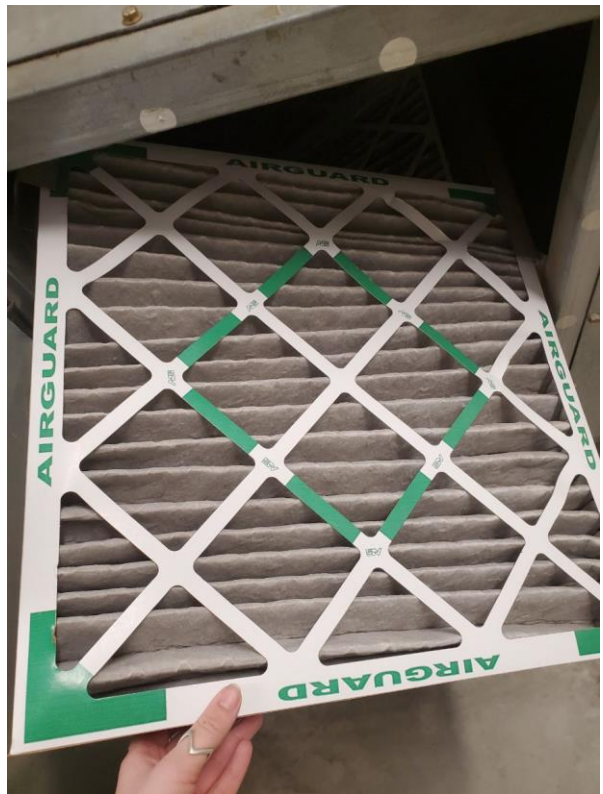
Appendix A

Photo Documentation



AHU-05

Mixed Main Filter Cleanliness



AHU-06

Mixed Main Filter Cleanliness



AHU-07

Mixed Pre-Filter Installation



AHU-07

Mixed Main Filter Cleanliness



AHU-07

Mixed Main Filter Installation



AHU-08

Mixed Pre-Filter Cleanliness



AHU-08

Mixed Main Filter Cleanliness



DOAS-01

Outdoor Pre-Filter Cleanliness



DOAS-01

Outdoor Main Filter Cleanliness



DOAS-01

Return Main Filter Cleanliness



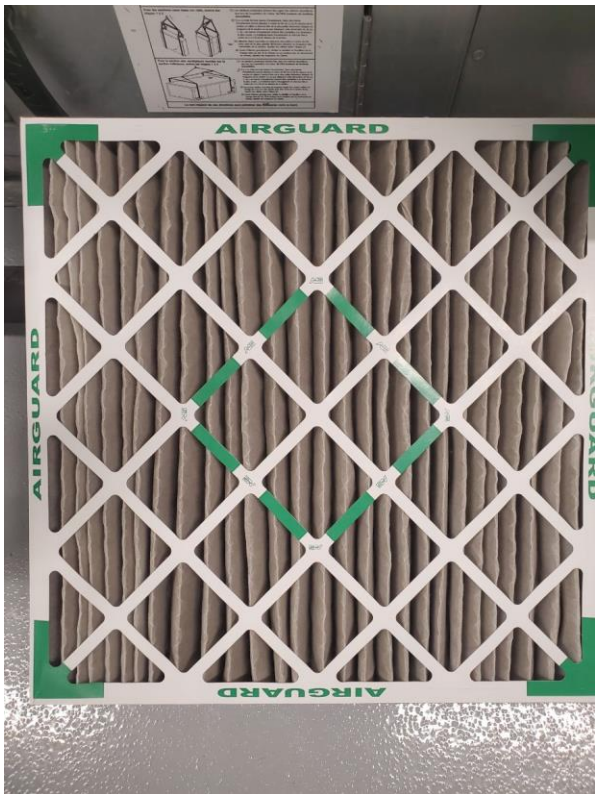
DOAS-02

Outdoor Pre-Filter Cleanliness



DOAS-02

Outdoor Main Filter Cleanliness



DOAS-02

Return Main Filter Cleanliness



DOAS-02

Return Main Filter Installation



DOAS-03

Outdoor Pre-Filter Cleanliness



DOAS-03

Outdoor Main Filter Cleanliness



DOAS-03

Return Main Filter Cleanliness



MAU-01 (100% OA)

Outdoor Main Filter Cleanliness