Facility Update – May 2025

Prepared by: Heather Rivera, Interim Maintenance Director

1. Multi-Zone Ductless Split System (Dry Storage & Science Storage Room) (attachments)

Walker Mechanical completed installation of the new multi-zone ductless split system serving the dry storage and science storage rooms. Both indoor fan coil units are operational and maintaining stable temperatures in the mid to upper 50s. However, we are continuing to experience elevated humidity levels — consistently measuring above 75% relative humidity — in both locations.

Further investigation is underway to identify contributing factors. A large vertical gap was discovered along the wall adjacent to the walk-in refrigerator in dry storage. This opening extends from floor to ceiling and may be allowing humid air to enter or conditioned air to escape. Aaron and Steve from Walker Mechanical flagged this as a possible source of the issue. DC Contractors inspected the space and recommended sealing the gap, insulating the area above the ceiling, and addressing wall surfaces that are transferring heat from the kitchen side. An estimate for this work is pending.

2. Gym Louvers Replacement & Outside Wall (attachments)

Replacement louvers for the large gym have arrived and are currently in the possession of Walker Mechanical. Installation is scheduled to begin on June 10, weather permitting, once the parking area behind the gym is cleared.

Walker Mechanical modified the protective cages by adding additional brackets to ensure secure attachment to the exterior wall. The cages were delivered to Snap Painting Plus, who coordinated with Kevin at Dages Paint to match the school's trim color ("Anchorage Red"). Walker will retrieve and install the cages along with the louvers.

Surrounding EIFS wall surfaces show visible damage and wear, raising concerns about potential water intrusion. Julius Schnurr & Sons previously submitted a proposal for $14,360 to repair and refinish the area, including patching eleven holes in the EIFS system.

3. Middle School Flooring & Stairs

Work in the middle school hallway has been completed. The correct baseboard has been installed.

The Innovation Lab has offered to produce new riser signs in place of FastSigns. Their equipment is expected to be up and running soon. The reflective stair strips, which continue to peel, have not yet been replaced. Continued delays with KV Flooring have prompted consideration of alternative vendors for future flooring needs.

4. Classroom 206 (Amber Elder's Room) (attachments)

Ceiling repairs in Room 206 are complete. Painting is scheduled as part of summer maintenance. Snap Painting Plus provided a quote of $1,800 to repaint the affected wall and ceiling section. Work will begin sometime after July 1.

5. Roof Leaks – Library Stairwell Cleaning (attachments)

The stairwell to the library continues to show signs of moisture intrusion. Based on photos sent to Kyle Jennings of PuroFirst, the white residue on the interior block walls has been identified as efflorescence — a mineral deposit caused by moisture passing through masonry. PuroFirst is preparing a quote for cleaning.

Robert Cook from Highland Roofing inspected the rooftop and identified several potential entry points near the roof drain and wall seams. His team is scheduled to complete repairs on May 22, weather permitting. Since that inspection, new water streaks have appeared near Room 205, which will also be evaluated.

Additionally, a gutter near the red tile roof appears to be twisting outward and may be directing water toward the building. This issue will also be addressed during the upcoming roof work.

6. Staff Café HVAC Leak

The leaking actuator in the ceiling HVAC unit above the Staff Café will be repaired during the summer boiler shutdown. A new isolation valve will also be installed to simplify future maintenance.

7. Boiler Wet Storage & Closed Loop Treatment (attachments)

On May 15, Drue Scott from Atom Chemical treated the closed loop and placed the school's boiler into wet storage for the summer. The system is now stabilized and will remain offline until October, when regular operation resumes.

8. Room 211 (Brigid Breetz's Room) – Flooring Damage (attachments)

A section of flooring in Room 211 has torn, revealing the subfloor beneath. Duct tape was applied to secure the area and reduce tripping risk.

Because this area is covered with non-VCT flooring, a patch repair is not possible. Addressing the issue will require either replacing the entire dark brown section (including the adjoining bathroom) or fully replacing the room's floor with seamless material. A final decision will be made by the incoming maintenance team.

9. Bat Incident – Rabies Testing Follow-Up (attachments)

On Sunday, May 4, 2025, a live bat was discovered in the middle school hallway leading to the staff café. At the time, several parents and a child were present in the building decorating the staff café for Teacher Appreciation Week. By the time we arrived, the bat was no longer moving, and it was assumed to be deceased. The bat was safely placed in a sealed box and stored in the basement until Monday, May 5, when the Health Department could be contacted.

Upon speaking with the Louisville Metro Department of Public Health and Wellness, I was informed that while testing a deceased bat for rabies is not mandatory, it was recommended in a school environment. The bat was taken to the Public Health and Wellness office and submitted for rabies examination with the accompanying $5 fee.

Test results (Rabies Examination #787), returned on May 7, confirmed the bat tested negative for the rabies virus. No physical contact or exposure to students or staff occurred, and no further action was necessary.

10. Attic HVAC Units – Ductwork Condition & Repair Plan (attachments)

A review of all seven attic HVAC units revealed widespread deterioration in flex ducts, insulation, and collar connections. Attic Units 1, 2, 4, 5, and 6 were noted for torn

insulation, unsealed joints, and potential air leaks. Units 3 and 7 are in good condition and require no action.

A repair estimate of $5,750 was approved with Walker Mechanical, and work began on May 21. These attic units serve upper-level front classrooms such as Rooms 201 and 202, where humidity issues have been reported. Correcting structural duct issues is a critical step in ensuring system performance and may reduce moisture problems by restoring proper airflow and insulation.

11. Early Cooling Season Issues & Repairs

a. Attic Unit – Rooms 204A through 206:

Staff in Room 205 reported warm classroom temperatures during initial cooling. CPS confirmed the condenser fan motor had failed on the attic unit serving this area. This newer unit originally used an ECM motor, which was not available locally within the needed timeframe. A standard motor with a capacitor was installed instead. Given that ECM motors offer efficiency primarily at startup, and standard motors have proven more reliable in our system, this replacement is expected to perform comparably.

b. Room 109 Wall Unit:

An F0 error code indicated low refrigerant. CPS located the leak behind the indoor coil unit and repaired it before recharging the system. The unit is now functioning properly.

12. Spring HVAC Preventive Maintenance (attachments)

Over spring break, Comfort & Process Solutions (CPS) completed a one-time spring preventive maintenance visit. This was not part of an ongoing preventive maintenance contract but rather a standalone service that CPS agreed to perform for one-fourth of their originally quoted price. No contract has been signed, and the school will reassess whether to engage CPS for future maintenance.

Their work included seasonal coil cleaning, inspection of fan blades and electrical components, checks for refrigerant and water leaks, drain line clearing, and confirmation of safety and operational controls across all major HVAC systems.

During the same period, Hyland Filters was on site to complete the spring filter replacement across all indoor, outdoor, and rooftop units. As part of our regular filter maintenance schedule, Hyland replaces all filters three times per year using MERV 8 filters, helping to support indoor air quality and system performance.

13. HVAC Systems Summary & Equipment Index (attachments)

A comprehensive HVAC inventory has been completed for the Anchorage School campus, totaling 53 distinct HVAC systems. Many of these systems consist of multiple components - such as paired air handlers and condensers, or integrated ventilation modules - meaning there are over 100 individual pieces of HVAC equipment actively in use throughout the building. These include rooftop units (RTUs), air handling units (AHUs), unit ventilators, ceiling-mounted fan coils, wall-mounted ductless systems, and window units.

The inventory process has involved extensive on-site walkthroughs, rooftop inspections, ceiling and attic reviews to identify equipment type, location, and general operating condition. Additional labeling and documentation are ongoing, and this inventory will serve as a working reference for continued data collection.

In addition to the 53 systems that actively condition interior air (heating, cooling, or both), a separate index has been created for supporting ventilation components, including three rooftop exhaust fans and one rooftop intake fan. These are essential for maintaining proper airflow and indoor air quality but are not included in the core HVAC system count.

As part of this inventory, we identified numerous older systems that continue to operate using R-22 refrigerant. It is important to note that the production and import of R-22 was banned in the United States as of January 1, 2020, under the EPA's phaseout of ozone-depleting substances. While systems using R-22 may still function if refrigerant is recovered and recycled, replacement refrigerant is increasingly scarce and expensive, and repairs to these systems will become more difficult over time. For this reason, it is strongly recommended that the school begin long-term planning for the phased replacement of all R-22 systems, prioritizing those that are older or show signs of wear.

This inventory provides a foundation for long-range HVAC planning, maintenance tracking, and future system upgrades.

14. APS Plumbing Overview & Shutoff Valves (attachments)

A comprehensive plumbing system overview has been completed to document the location of all known shutoff valves, hot water heaters, and sump pumps throughout the facility. This reference guide serves as a critical resource for emergency response,

routine maintenance, and future planning. Each valve location has been matched to its respective room or system zone, including ceiling and access panel placements where applicable.

The index includes six hot water heaters and seven sump pumps across multiple mechanical spaces, closets, and exterior entry points. Serial numbers and model data are recorded where available to support equipment tracking and replacement planning.

15. Plumbing Issue in Room 201 and Crawl Space Off Room 105 (attachments)

A plumbing issue was identified in Room 201 when signs of leakage became visible around the base of the toilet. Upon inspection, it appeared water was seeping below the tile and possibly down into the crawl space beneath. Entry into the crawl space off Room 105 revealed clear signs of water intrusion—visible moisture, staining, and surface mold on the floor joists and surrounding wood. This prompted a call to both HMC and PuroFirst.

PuroFirst confirmed the presence of surface mold and agreed with HMC's recommendation that the bathroom floor in Room 201 will likely need to be removed due to water damage. While airborne mold was not suspected, both companies recommended testing out of an abundance of caution. Metric Environmental was contacted and scheduled to perform surface and air mold testing on May 27 after school.

As part of this visit, we also asked that Metric test Room 121. This area, which was previously part of a mold remediation effort, has continued to hold elevated humidity levels. Although no immediate concerns are present, we are including this space in the upcoming testing to ensure air quality remains within acceptable levels.

Following the Room 201 discovery, a proactive inspection was also done beneath Room 211 to rule out any similar issues. The plumbing in Room 211 runs through the ceiling of the staff café furnace closet. A flush test was performed and no leaks or concerns were observed at this time.

16. Plumbing & Basement Water Management

a. Grease Interceptor Pumping

The next quarterly grease interceptor pump-out, required by MSD, is scheduled for

June 2. This service is performed by Pat Garvin with HMC and ensures continued compliance with municipal requirements for kitchen wastewater systems.
b. Basement Drainage & Sump Pump System

The newly installed sump pump at the base of the basement stairwell entrance is performing as intended. Despite several recent heavy rains, there has been no backup or water collection at the stairwell drain, and the basement remains dry.

Additionally, there have been no further signs of water intrusion since sealing the concrete cracks and stabilizing the drain line. The post-flood conditions from April now appear well-managed and under control.

17. Storm Drain Basin – Concrete Repair (Rear Parking Lot) (attachments)

Following the spring storm event and subsequent inspection, it was determined that the concrete surrounding the storm water drain basin near the rear parking lot and basketball court had significantly deteriorated. The manhole cover was no longer fully stable, posing a safety concern for both vehicles and foot traffic.

DCI General Contractors submitted a proposal to complete the necessary concrete work for $9,950. This includes removing the existing 10' x 10' x 2' thick concrete slab surrounding the manhole, forming a new lid using the existing grates, and pouring new 4,000 psi steel-reinforced concrete to restore structural integrity. Work will be completed during standard business hours.

This company was referred by Steve Murray of Walker Mechanical, who noted that DCI is their preferred partner for concrete work across multiple projects. He facilitated direct contact with the contractor, allowing us to work with them independently. Fortunately, the storm water vault itself does not need to be replaced — the repairs will focus only on the surrounding concrete area.

18. Summer Mold Prevention Plan – 2025

In preparation for the summer months, we are implementing proactive steps to reduce the risk of mold reoccurrence, particularly in high-risk areas such as the cafeteria. Beginning June 2, custodial staff will perform a full surface cleaning and disinfecting of all cafeteria walls, tables, chair undersides, and floors. While this will not serve as our full summer deep clean, it will focus on removing any organic matter, food residue, or buildup that could support mold growth if airborne spores are present.

We will also verify that all HVAC thermostats are set to 'Auto' (fan runs only when calling for cooling), and confirm that fresh air dampers are fully closed to prevent humid outdoor air from being introduced into the space when unnecessary. These settings will be checked and documented as part of the preparation process.

In addition, Aaron Singleton from Walker Mechanical will be brought in to inspect the HVAC units serving this area and verify that all equipment is functioning properly. His expertise will help ensure that no mechanical factors are contributing to moisture buildup or air imbalance in these vulnerable spaces.

19. Fire Safety Compliance and Annual Inspection (attachments)

As part of our regular summer preparations, all fire extinguishers and the fire alarm system are tested annually each June. I confirmed with Choate Fire Protection that we are on the schedule for this year's inspection, which will take place as usual during the summer months. The last inspection was completed in June 2024, and our equipment is currently up to date and compliant. This routine service ensures continued readiness and adherence to local fire safety codes and inspection requirements.

20. Fire Sprinkler System – Crawl Space Leak Repair (attachments)

Anchorage School's fire sprinkler system receives an annual inspection every July. I spoke with Roger Mayfield at Alpha Mechanical, and he confirmed that our school is already on their schedule for this July. He will reach out with the exact date as the inspection window approaches.

During this upcoming inspection, we have also scheduled a repair to address a leak in one of the sprinkler heads located in the crawl space off Room 105. The pipe is corroded at a threaded joint and shows visible signs of deterioration. This concern was initially identified during a crawl space inspection, and PuroFirst advised proactively addressing the issue to prevent any potential water damage should the pipe fail. The quote received from Alpha Mechanical to perform this repair is $936.50. The repair includes cutting out the affected section of 1-inch sprinkler pipe and replacing it.

This scheduled repair will help ensure the continued reliability of the fire suppression system and avoid emergency response situations in the future.

21. Radon Reduction Systems (attachments)

Anchorage School currently operates five radon reduction systems throughout the building, as outlined in the facility map. These systems were installed to lower radon

gas levels in basement and ground-level areas in alignment with public health recommendations. Over the past several months, we have scheduled multiple service appointments with Vance Walker of Radon Management of KY to complete necessary repairs. Several systems were identified as having inoperative fans, uncalibrated manometers, or missing audible alarms, which are required for school compliance.

While prior service dates were postponed, I have followed up again with Vance to confirm when repairs will be completed. During this visit, he will replace the non-functioning fan near the front entrance system, calibrate manometers across all five systems, and install audible radon alarms on four systems that currently lack them. These steps are essential to bring our systems into proper working condition and ensure full compliance with state requirements for school-based radon mitigation.

Metric Environmental recently removed equipment that had been collecting radon level data in the basement since October 2024. We are now awaiting their final report. While additional school-wide testing is not scheduled at this time, we continue to follow EPA recommendations, which advise that lower-level radon testing in schools be performed at least once every two years. Our current priority is to ensure that all existing mitigation systems are fully functional and equipped with alarms before further testing or system expansion is considered.

22. Large Gym Bleacher Repairs – Future Consideration (attachments)

The large gym bleachers have been identified as needing structural and mechanical repairs to ensure safe operation. Several boards are damaged or loose, and the extension/retraction mechanism requires service. A formal estimate of $6,265 was received to complete the recommended repairs.

While these repairs are not scheduled at this time, they will need to be addressed in the near future. This item is included here for awareness and future planning purposes, particularly as facility use increases and student events resume in full capacity.

23. Humidity Management and Environmental Controls (attachments)

As we move into the warmer months, humidity control becomes a key component of maintaining a healthy school environment, particularly in rooms with known moisture sensitivity or limited airflow. Based on past experience—including mold concerns that

arose last summer—we are approaching the season with a more intentional plan to monitor and manage indoor moisture levels.

At Anchorage, our internal guideline is that indoor humidity should remain at 60% or below. When levels consistently reach the mid to upper 60s, we begin actively monitoring the affected areas to determine if intervention is needed. If humidity reaches the 70% range for extended periods, this becomes a clear action threshold, and immediate steps must be taken to minimize moisture levels and investigate contributing sources. These thresholds apply to sustained conditions, not brief spikes caused by temporary weather events.

While some may reference the residential recommendation of maintaining humidity below 50%, this standard does not translate to a school facility. Larger volumes of air, central HVAC systems, older building materials, and daily traffic patterns make schools structurally different from homes. As outlined in ASHRAE's 2024 Position Document on Limiting Indoor Mold and Dampness in Buildings, persistent indoor dampness—not occasional fluctuations—is the primary concern, as it can contribute to mold growth, poor air quality, and health risks for occupants.

Our current strategy aligns with guidance from multiple ASHRAE resources, which emphasize that:

"Persistent indoor dampness is neither normal nor desirable and can lead to health risks for occupants… All building professionals… should take actions that will help keep buildings and their systems as dry as possible."
— *ASHRAE Position Document on Limiting Indoor Mold and Dampness in Buildings (2024)*

Further, the 2023 ASHRAE Design Guidance for Education Facilities (Version 2.0) classifies humidification and dehumidification systems as a medium priority, and stresses the importance of ventilation verification and system condition assessments before investing in additional humidity control infrastructure:

"Without initial steps such as ventilation verification and baseline system assessments, it is not possible to develop a comprehensive IAQ strategy."
— *ASHRAE Design Guidance for Education Facilities, p. 8*

Accordingly, our immediate focus is on addressing mechanical issues that may be contributing to poor humidity control—specifically, the condition of our attic ductwork. Known issues such as disconnected runs, damaged insulation, and open gaps are being corrected, and once those repairs are complete, we will monitor conditions to determine whether further intervention is needed.

This intentional, phased approach ensures that we address root causes before layering on potential solutions like commercial dehumidifiers. By correcting and optimizing the systems already in place, we are laying the foundation for sustainable humidity and air quality management throughout the school.

Closing Note

As I conclude this report, I want to express my sincere gratitude for the opportunity to serve this school and community in the role of Interim Maintenance Director. It has been an honor to care for a building so full of purpose and history, and to work alongside so many people who are dedicated to creating a safe, welcoming space for students and staff.

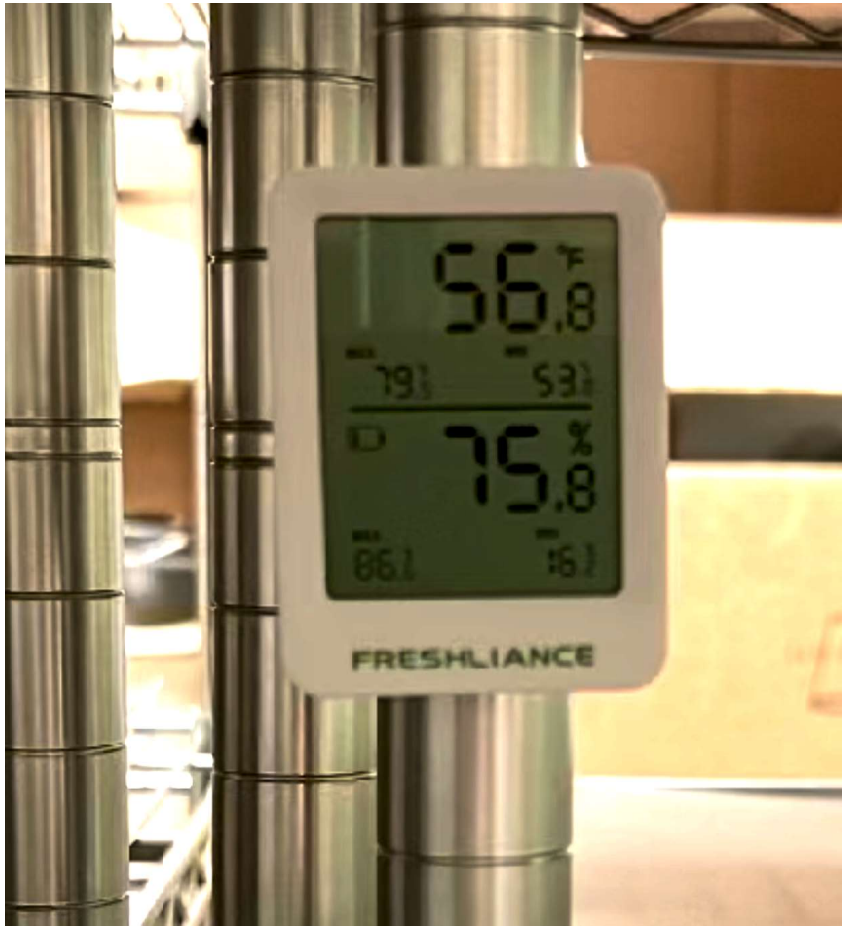
This report reflects months of work across all areas of our campus—from mechanical systems and infrastructure to safety planning and long-term improvements. My goal has been to leave behind a detailed and transparent record that not only supports the daily operations of the school, but also helps guide future planning with clarity and care.

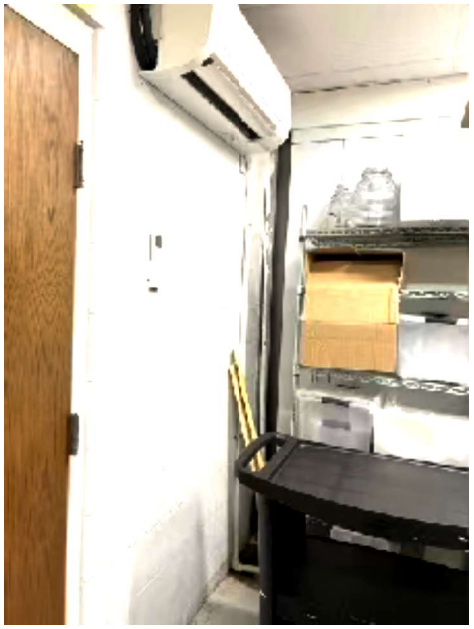
Thank you again for the trust you've placed in me. It has meant more than I can express.

With gratitude,

Heather Rivera
Interim Maintenance Director

Dry Storage Room post Multi-Zone Ductless Split System





Large Gym Outside Wall Damage

Large Gym Outside Wall Damage

Large Gym Outside Wall Damage

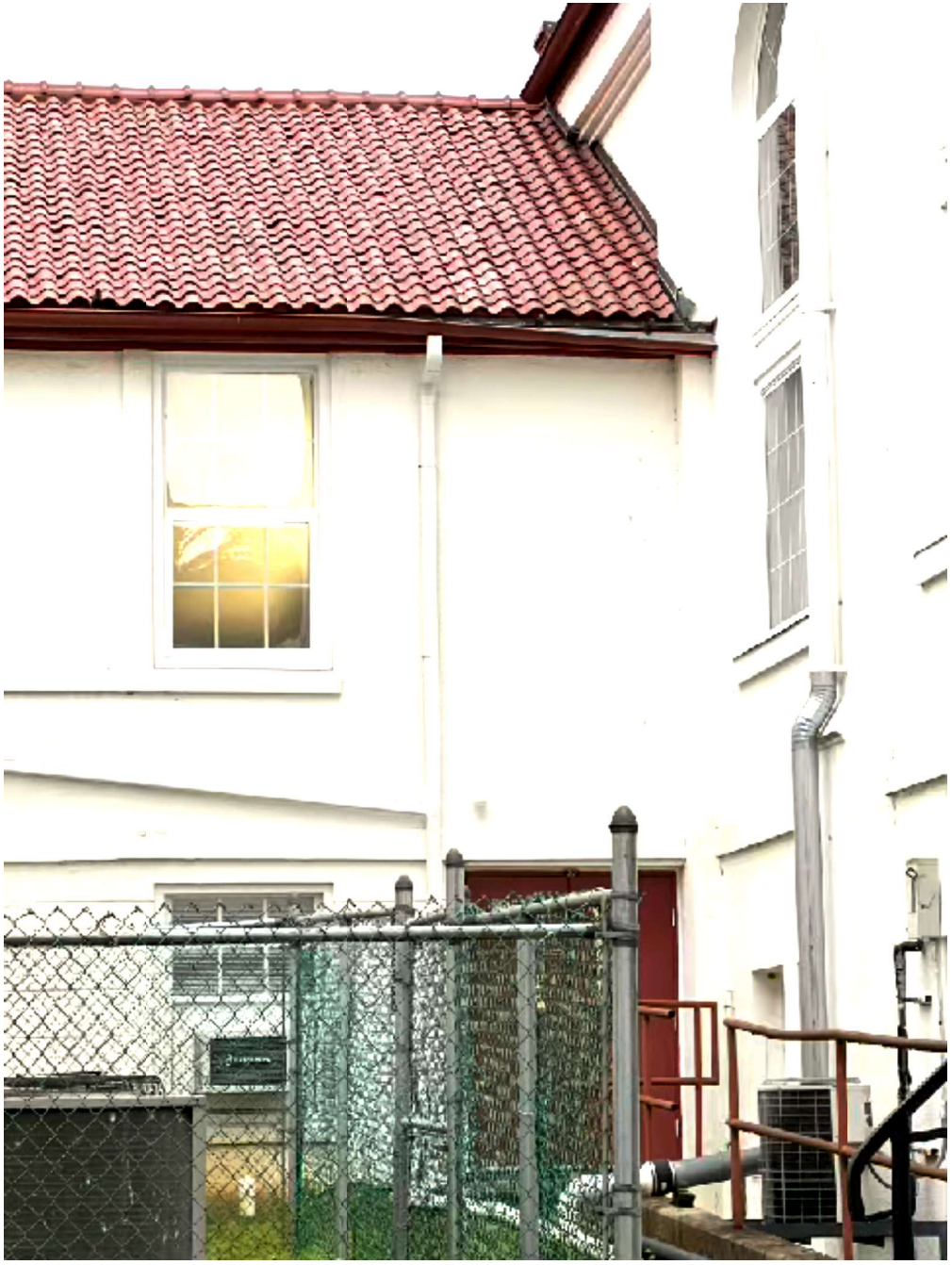
Room 206 Painting

Roof Repairs over Library Stairwell

Water Intrusion in Library Stairwell

Inside Hallway Across from 205

Outdoor Gutter in West Courtyard



Visit Report

Thursday, May 15, 2025 9:38 AM EDT

Anchorage Independent School District
Anchorage School
11400 Ridge Rd.
Anchorage KY 40223
(502) 245-8927

Report Number: **12781**
Recorded By: **Drue Scott**
(812) 949-2866
druescott@atomchemical.com
On-Site Time: **9:30 AM EDT to 10:45 AM EDT**

Main - Steam Boiler Systems

Visit Comment

Today I wet stored steam boiler #2 and feed tank for the summer shutdown. Steam boiler #1 has been decommissioned and it is dry stored. As we do every year, I slowly added 5 gallons of 201-ACL to make sure we had adequate protection at all levels of the boiler (top, middle, and bottom). Nitrite residual at top of boiler was 1200 ppm after boiler was filled. System is now properly laid up for the summer. Do not run boiler with 201-ACL in it. It is a nitrite based inhibitor which is not compatible with the boiler treatment 306-ACB. Once cooler weather arrives, drain and fill boilers at least twice to fully empty systems of the nitrite residuals. Then fill and fire as normal. I also took chemical pump offline today and flushed fresh water through it. I capped 306-ACB treatment drum as well. We will see you again in the fall when cooler weather arrives.

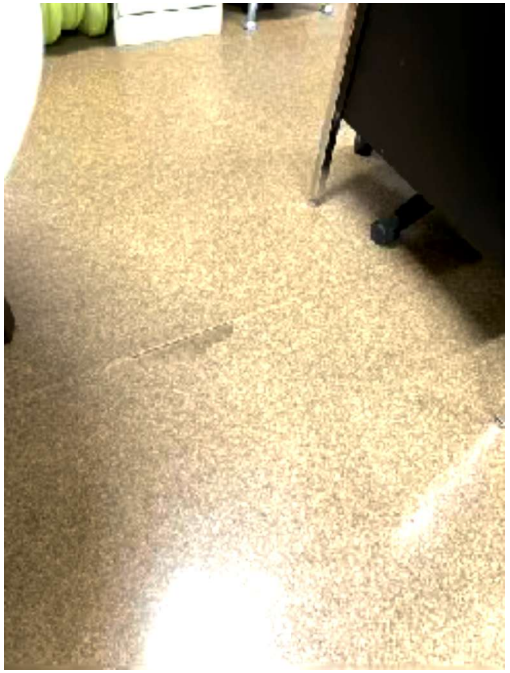
Chemical Used

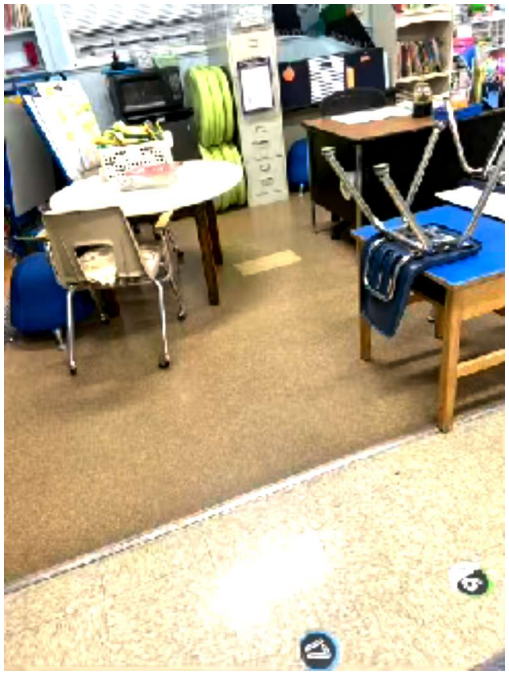
1-5 gallon 201-ACL

Signed By

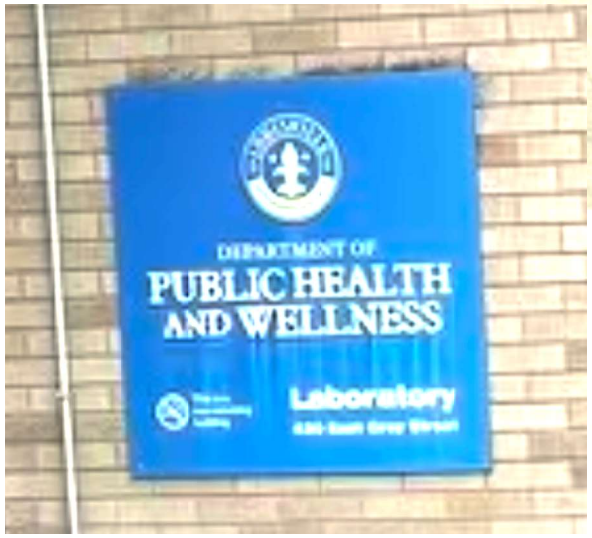
Name	Date & Time
	May 15, 2025 10:53 AM

Room 211 Floor Damage





May 4, 2024 - MS Center Hallway



PUBLIC HEALTH AND WELLNESS
LOUISVILLE, KENTUCKY

CRAIG GREENBERG
MAYOR

CONNIE MENDEL, BS, MPH
CHIEF HEALTH STRATEGIST

May 7, 2025

Heather Rivera
11400 Ridge Rd
Louisville, KY 40223

RE: RABIES EXAMINATION #787

Dear Heather Rivera:

A cell culture test has been completed on brain tissue from the animal (bat) to which you may have been exposed. The result is negative for the presence of rabies virus. This result means that you have not had an exposure to rabies.

If you have any questions regarding this test, please call the Louisville Metro Department of Public Health and Wellness Communicable Disease program at 574-6570.

Sincerely,

Ciara Warren

Environmental Health Manager
Public Facilities/Rabies Control Program

c:

Rev. 1/12

Summary of Attic HVAC Unit Conditions for Review

Attic Unit 1
Key Observations:

- Multiple duct takeoffs are unsealed or damaged with pink fiberglass insulation visibly exposed.
- Insulation is pulled back or torn at collar connections.
- Flex ducts appear unsecured or deteriorating, some may be leaking.

Photos Included in PDF:
IMG_1226.jpeg, IMG_1227.jpeg, IMG_1228.jpeg, IMG_1231.jpeg

Attic Unit 2
Key Observations:

- One duct shows heavy insulation damage and separation at the collar.
- Torn insulation and visible fiberglass.
- Return duct may be partially disconnected based on visual gap at the wall-side connection.

Photos Included in PDF:
IMG_1243.jpeg, IMG_1244.jpeg, IMG_1245.jpeg, Screenshot 2025-05-10 at 6.25.39 PM.png

Attic Unit 3
Key Observations:

- Unit and ductwork are in good condition overall.
- Minor concern with a slightly bent metal support rail near the secondary drain pan.

Photos Included in PDF:
No photos for this unit

Attic Unit 4
Key Observations:

- This is the unit already approved for repair due to widespread damage to flex duct insulation and unsealed plenum connections.

Photos Included in PDF:
(Previously submitted and not included in current PDF)

No action needed — scheduled for repair.

Attic Unit 5
Key Observations:

- Multiple torn or sagging ducts, with insulation exposed or folded back at the collar.
- Two connections appear to be part of an exhaust fan system with exposed insulation.

Photos Included in PDF:
IMG_1251.jpeg, IMG_1253.jpeg, IMG_1254.jpeg, IMG_1255.jpeg, IMG_1256.jpeg, IMG_1257.jpeg, IMG_1258.jpeg, IMG_1259.jpeg, IMG_1261.jpeg, IMG_1263.jpeg

Attic Unit 6
Key Observations:

- Several ducts have torn outer jackets and exposed fiberglass.
- One connection has a large tear where the flex duct meets the metal collar.

Photos Included in PDF:
IMG_1268.jpeg, IMG_1269.jpeg, IMG_1270.jpeg, IMG_1271.jpeg, IMG_1272.jpeg, IMG_1273.jpeg, IMG_1274.jpeg, IMG_1275.jpeg, IMG_1276.jpeg, IMG_1277.jpeg

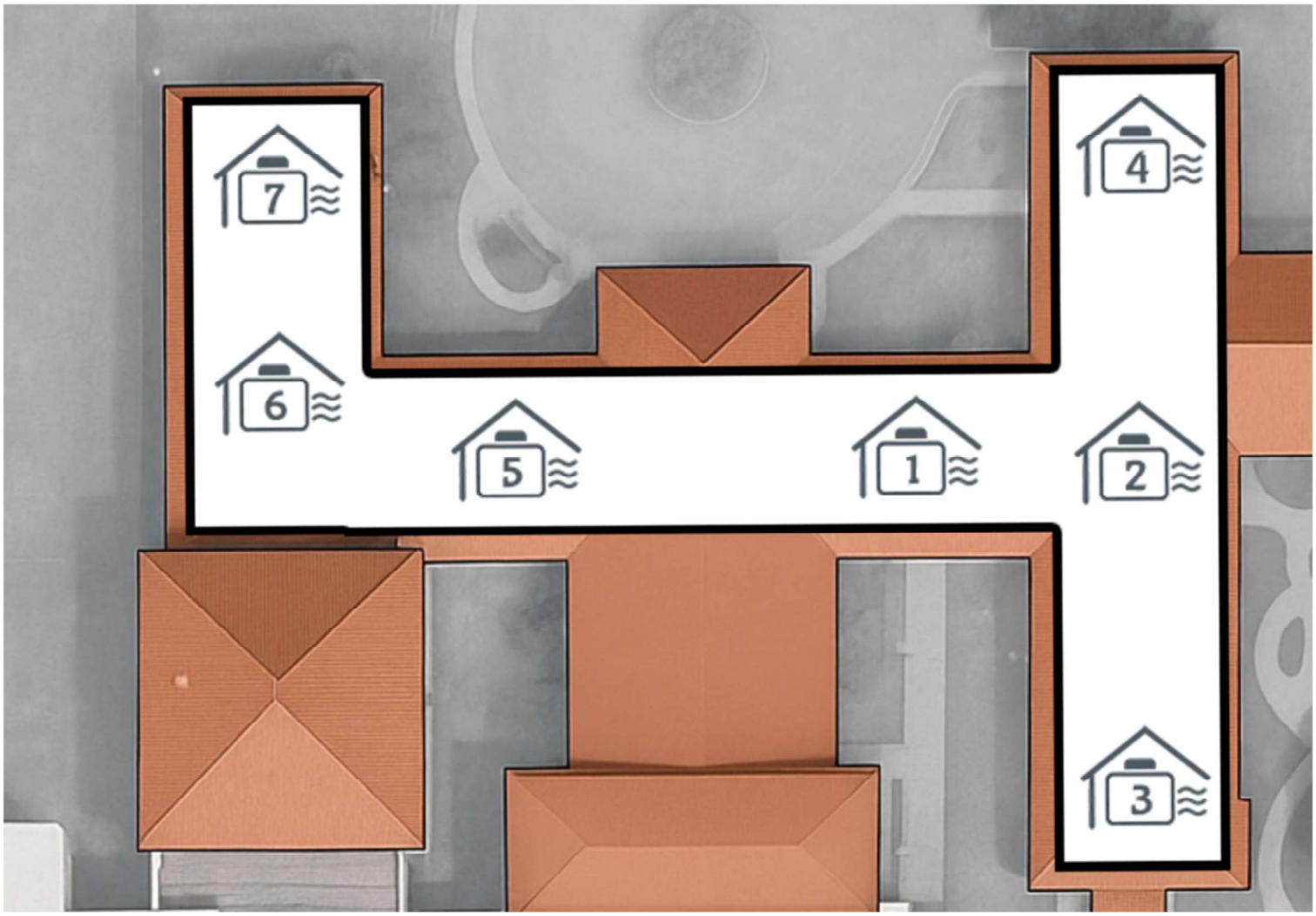
Attic Unit 7
Key Observations:

- No concerns noted at this time. Unit and ductwork appear in good condition.

Photos Included in PDF:
None submitted.

No action requested.

Attic Unit Layout



Attic Unit 1

IMG_1226

IMG_1227

IMG_1228

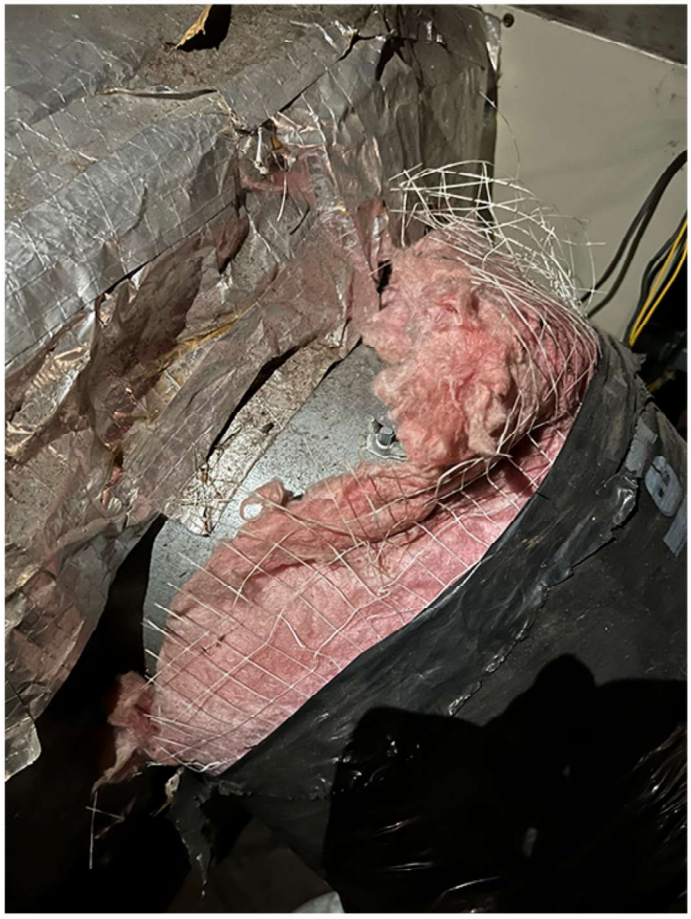
IMG_1231

Attic Unit 2

IMG_1243

Screenshot 2025-05-10

IMG_1244



IMG_1245

Attic Unit 5

IMG_1253

IMG_1254

IMG_1257

IMG_1259

Attic Unit 5

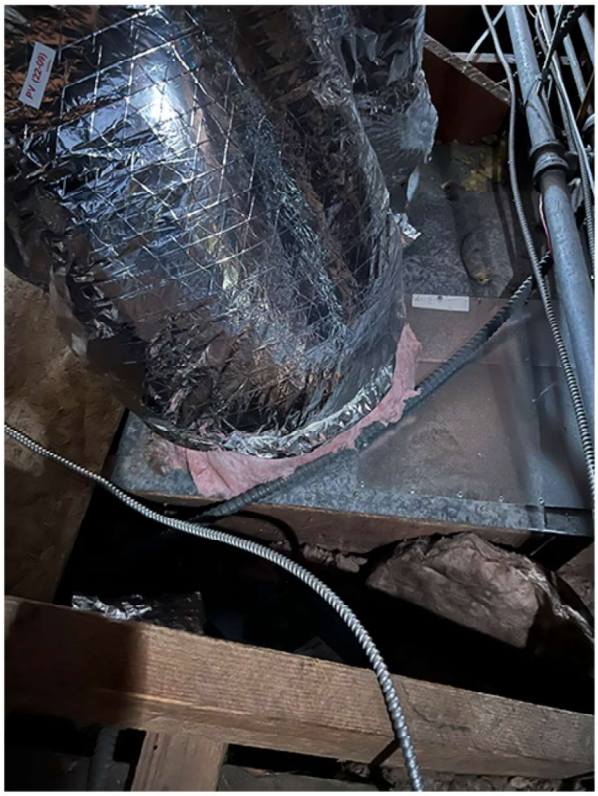
IMG_1261

IMG_1262

IMG_1263

Attic Unit 6

IMG_1268



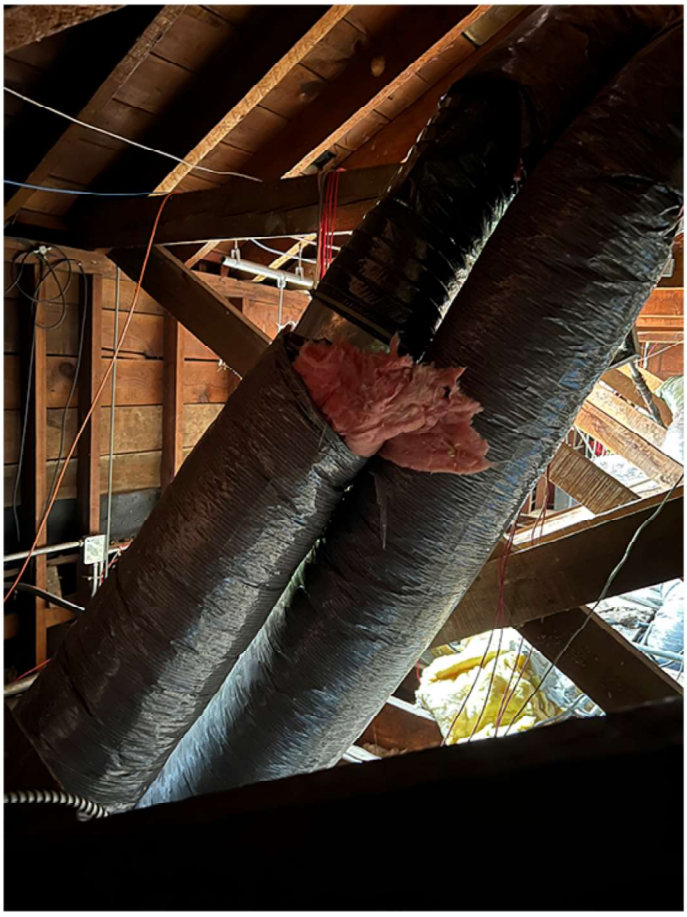
IMG_1269

IMG_1270

IMG_1271

Attic Unit 6

IMG_1273



IMG_1275

Service Address:

ANCHORAGE BOARD OF EDUCATION
11400 RIDGE ROAD
ANCHORAGE, KY 40223
502-245-2121

Hyland Filter Service, Inc.

610 Locust Ln.
Louisville, KY 40217
(502) 637 - 3364
(800) 536 - 0097

Service Date: 4/2/25

Message To Technician:
~~CHARLIE BRYANT~~
~~502-593-1030 / LISA~~
~~DORCEY 270-320-3640~~
Heather Rivera
502-333-8501

ANCHORAGE BOARD OF EDUCATION
ATTN: ACCOUNTS PAYABLE
11400 RIDGE ROAD
ANCHORAGE,KY 40223

Invoice Number: 1060314
Account Number: 4435
Method of Payment: Charge
PO Number:
Contact: ~~CHARLIE BRYANT~~ Heather Rivera

Svc	Qty	Amount	Tax
FILTER SERVICE	156	~~$1,148.10~~ $1,140.10	$0.00

Qty	Item	Notes
1	12x22x2 MERV 8	ROOM 110
2	16x22x2 MERV 8	ROOMS 112 & 117 CLOSET
2	20x22x1 MERV 8	ROOMS 106 & 116
1	WASHABLE	CAFE – Storage room ←
~~57~~	16x20x2 MERV 8 Delete 2	ROOMS 105, 107, 113, 114
4	16x25x1 MERV 8	ROOM 126 BY THE KITCHEN
1	16x32x2 MERV 8	ROOM 111
2	20x20x2 MERV 8	ROOM 108
1	WASHABLE	ROOM 109
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6	16x20x2 MERV 8	OUTSIDE MECHANICAL ROOM
2	16x25x2 MERV 8	OUTSIDE MECHANICAL ROOM
	---	---
6	16x20x2 MERV 8	INSIDE MECH. ROOM UPSTAIRS
4	16x24x2 MERV 8	INSIDE MECH. ROOM DOWNSTAIRS
2	16x25x2 MERV 8	INSIDE MECH. ROOM UPSTAIRS
	---	---
4	16x25x2 MERV 8	ADMINISTRATION BUILDING
2	20x25x2 MERV 8	ADMINISTRATION BUILDING
1	WASHABLE	SERVER CLOSET
	---	---
1	20x20x1 MERV 8	ROOF
8	16x20x2 MERV 8	ROOF
2	16x25x2 MERV 8	ROOF
4	20x20x2 MERV 8	ROOF
2	20x30x2 MERV 8	ROOF
6	20x25x2 MERV 8	ROOF
4	16x25x1 MERV 8	ROOF - SCOOPS
16	20x25x2 MERV 8	ROOF - AMU
8	20x25x2 MERV 8	ROOF - AMU
3	21x36x1 MERV 8	ROOF - SCOOPS

Room ~~105~~ 105 washable

PO# 62993

Service Person: Roberto C. Rivera 07122024

Received By:

1/3

PLEASE PAY FROM THIS INVOICE - TERMS: NET 10 DAYS

Service Address:

ANCHORAGE BOARD OF EDUCATION
11400 RIDGE ROAD
ANCHORAGE, KY 40223
502-245-2121

Hyland Filter Service, Inc.

610 Locust Ln.
Louisville, KY 40217
(502) 637 - 3364
(800) 536 - 0097

Message To Technician:
~~CHARLIE BRYANT~~
~~502-533-1030 / LISA~~
~~D ORCEY 270-320-3640~~

Service Date: 4/2/25

ANCHORAGE BOARD OF EDUCATION
ATTN: ACCOUNTS PAYABLE
11400 RIDGE ROAD
ANCHORAGE, KY 40223

Invoice Number: 1060314
Account Number: 4435
Method of Payment: Charge
PO Number:
Contact: ~~CHARLIE BRYANT~~

1	16x30x1 MERV 8	ROOF - SCOOP
4	16x20x2 MERV 8	ROOF - AMU
	---	---
1	WASHABLE	FRONT OFFICE WINDOW UNIT
2	20x25x1 MERV 8	ATTIC - RIGHT SIDE
1	20x22x1 MERV 8	ATTIC - LEFT SIDE
1	20x20x1 MERV 8	ATTIC - LEFT SIDE
1	WASHABLE	ROOM 208 WINDOW UNIT
1	8x16x1 MERV 8	ROOM 209 WINDOW UNIT
2	16x25x1 MERV 8	ATTIC - RIGHT SIDE
2	16x20x2 MERV 8	ATTIC - RIGHT SIDE
4	16x25x2 MERV 8	ATTIC - RIGHT SIDE
4	16x25x2 MERV 8	ATTIC - LEFT SIDE
	---	---
3	10x20x1 MERV 8	INSIDE UPSTAIRS
2	10x30x1 MERV 8	INSIDE UPSTAIRS
6	14x20x1 MERV 8	INSIDE UPSTAIRS ROOMS 223-229
2	14x24x2 MERV 8	INSIDE UPSTAIRS ROOMS 223-229
1	14x30x2 MERV 8	INSIDE UPSTAIRS ROOM 221
1	14x24x2 MERV 8	INSIDE UPSTAIRS ROOM 221
	---	---
10	14x24x2 MERV 8	ROOMS 122, 123, 124
5	14x30x2 MERV 8	ROOMS 122, 123, 124

DROP OFF		12	$64.90	$0.00

Qty	Item	Notes
12	20x25x2 MERV 8	DROP OFF FOR AMU ON ROOF

Boston

Service Person: 07122024

Received By:

2/3

PLEASE PAY FROM THIS INVOICE - TERMS: NET 10 DAYS

Service Address:

ANCHORAGE BOARD OF EDUCATION
11400 RIDGE ROAD
ANCHORAGE, KY 40223
502-245-2121

Hyland Filter Service, Inc.

610 Locust Ln.
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Message To Technician:

Service Date: 4/2/25

ANCHORAGE BOARD OF EDUCATION
ATTN: ACCOUNTS PAYABLE
11400 RIDGE ROAD
ANCHORAGE, KY 40223

Invoice Number: 1060314
Account Number: 4435
Method of Payment: Charge
PO Number:
Contact: ~~CHARLIE BRYANT~~

Total Qty:		166 ~~168~~
Total Service:	$	~~1,213.00~~ $1205.00
Sales Tax:	$	0.00
Total:	$	~~1,213.00~~ $1205.00

EMAIL HEATHER BEFORE SERVICE AT: 502-245-2121, EXT. 2126 / ATTN ROUTERS: WANTS SERVICE IN MARCH, JULY, & OCTOBER OR NOVEMBER / SCHEDULE SERVICE FOR FRIDAY WHEN SCHOOL IS IN SESSION, SCHOOL IS OUT 1 HOUR EARLIER / SALES TAX EXEMPT

Service Person: Boston

07122024

Received By:

3/3

PLEASE PAY FROM THIS INVOICE - TERMS: NET 10 DAYS

COMFORT & PROCESS SOLUTIONS

A MODIGENT COMPANY

COMFORT & PROCESS SOLUTIONS, LLC
LockBox # 880653 | P.O. Box 29650
Phoenix, AZ, 85038-9650
(859) 294-4400

Job Report #LEX01088-1

Apr 28, 2025

TYPE	CUSTOMER NAME	ADDRESS	PROPERTY NAME	PROPERTY ADDRESS
Quarterly/operational Visit	Anchorage Independent School District	11400 Ridge Rd Anchorage, KY, 40223	Anchorage Independent School	11400 Ridge Rd Anchorage, KY, 40223

AUTHORIZED BY	CUSTOMER PO#	CUSTOMER WO#
-	-	-

Job Description

7 references to RTU6

* belt type/size : A49 belt

Provide Quarterly service on the following Equipment
39 split systems
*Provide inspection of filters (Notify customer if needs replaced)
*Provide cleaning of condenser coil (Spring visit)
*Provide check of condenser fan blades
*Provide check for refrigerant and water leak
*Provide check of burners (Fall visit)
*Provide check for gas leaks (Fall visit)
*Provide check of all electrical connections and contactors
*Provide drain line blow out
*Provide check of all safety and operations controls

2 Makeup air units
*Provide check of filters (Notify customer if needs replaced)
*Provide cleaning of condenser coil (Spring visit)
*Provide check of condenser fan blades
*Provide check for refrigerant and water leak
*Provide check of burners (Fall visit)
*Provide check for gas leaks (Fall visit)
*Provide check of all electrical connections and contactors
*Provide check of all safety and operations controls

7 Roof Top Units
*Provide inspection of filters (Notify customer if needs replaced)
*Provide cleaning of condenser coil (Spring visit)
*Provide check of condenser fan blades
*Provide check for refrigerant and water leak
*Provide check of burners (Fall visit)
*Provide check for gas leaks (Fall visit)
*Provide check of all electrical connections and contactors
*Provide drain line blow out
*Provide check of all safety and operations controls

4 Exhaust Fans (Belt Drive)
*Provide check of unusual vibrations and noise
*Provide adjustment or replace belt (Change belt 1 time a year for 4 fans)
*Provide check of pulleys
*Provide lubrication of fans and motors

Provide Fall, Winter, and Spring service On Steam Boiler and 3 Condensate return pumps

*Provide check of glass for leaks and pressure gauges
*Provide inspection of burner
*Provide cleaning of low water cutoff
*Provide check of all electrical connections
*Provide inspection and cleaning of ignition electrode and flame sensor
*Provide check of gas lines, piping and supports for leaks
*Provide check of 3 pumps (Lubricate pumps as needed)
*Provide combustion check of boiler
*Provide shut of boiler and pumps (Spring Visit)

*Once service has been completed, report finding to customer

Job Summary

Visit 001

DATE PERFORMED

Mar 31, 2025

TECHNICIAN(S)

Chase Centers

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#16 Split System			
#15 Split System			
#17 Split System			
#13 Split System			
#18 Split System			
#1 Split System			

WORK SUMMARY

Cleaning ground condenser coils pulling hail guards and cleaning behind and cleaning any debris inside of condenser

Checking components of system

Visit 002

DATE PERFORMED

Mar 31, 2025

TECHNICIAN(S)

Cameron Scruggs

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#31 Split System			
#4 Split System			
#24 Split System			
#9 Split System			
#17 Split System			
#16 Split System			
#6 RTU			
#11 Split System			
#1 RTU			
#27 Split System			
#2 Split System			
#5 RTU			
#5 Split System			
#25 Split System			
#34 Split System			
#29 Split System			
#10 Split System			
#3 RTU			
#6 Split System			
#28 Split System			
#33 Split System			
#36 Split System			
#18 Split System			
#4 RTU			
#7 RTU			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#1 Split System			
#30 Split System			
#19 Split System			
#3 Split System			
#22 Split System			
#39 Split System			
#38 Split System			
#20 Split System			
#8 Split System			
#26 Split System			
#7Split System			
#12 Split System			
#37 Split System			
#15 Split System			
#32 Split System			
#21 Split System			
#14 Split System			
#23 Split System			
#35 Split System			
#2 RTU			
#13 Split System			

WORK SUMMARY

Arrived on job and had a walk through with heather to show us around the school and where all the unit were located. After that we got to work. We cleaned 6 units coils and got the leafs and mud out the bottom of the unit. Then we rinsed the coil down with water and sprayed with coil cleaner. After letting them each sit for a while. We rinsed down with water. Then we went inside to check the mini split unit filters. Job not complete. Will need to turn Wednesday.

Visit 003

DATE PERFORMED

Apr 2, 2025

TECHNICIAN(S)

Chase Centers

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#17 Split System			
#15 Split System			
#16 Split System			
#11 Split System			
#14 Split System			
#10 Split System			
#12 Split System			

WORK SUMMARY

Continued cleaning condensers and checking outdoor units

Visit 004

DATE PERFORMED

Apr 3, 2025

TECHNICIAN(S)

Caden Coleman

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#33 Split System			
#7 RTU			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#12 Split System			
#11 Split System			
#2 RTU			
#4 Split System			
#10 Split System			
#18 Split System			
#23 Split System			
#4 Exhaust Fan			
#1 Split System			
#32 Split System			
#28 Split System			
#26 Split System			
#15 Split System			
#38 Split System			
#8 Split System			
#30 Split System			
#2 Split System			
#31 Split System			
#39 Split System			
#35 Split System			
#3 Split System			
#13 Split System			
#25 Split System			
#29 Split System			
#4 RTU			
#17 Split System			
#24 Split System			
#5 Split System			
#20 Split System			
#22 Split System			
#9 Split System			
#1 RTU			
#14 Split System			
#19 Split System			
#3 RTU			
#27 Split System			
#37 Split System			
#21 Split System			
#7Split System			
#34 Split System			
#5 RTU			
#6 RTU			
#3 Exhaust Fan			
#1 Exhaust Fan			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#2 Exhaust Fan			
#16 Split System			
#6 Split System			
#36 Split System			

WORK SUMMARY

04/03/25. 07:30AM-12:30PM.

Arrived on site and met with Chase. Began cleaning coils on condenser units on ground. Finished cleaning coils on ground. Began cleaning coils on roof top units, checking exhaust fans, and make up airs.

Visit 005

DATE PERFORMED

Apr 3, 2025

TECHNICIAN(S)

Chase Centers

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#7Split System			
#32 Split System			
#20 Split System			
#36 Split System			
#12 Split System			
#21 Split System			
#16 Split System			
#1 MUA			
#31 Split System			
#15 Split System			
#8 Split System			
#17 Split System			
#39 Split System			
#38 Split System			
#6 Split System			
#2 MUA			
#35 Split System			
#27 Split System			
#22 Split System			
#28 Split System			
#11 Split System			
#6 RTU			
#9 Split System			
#24 Split System			
#1 Split System			
#5 RTU			
#14 Split System			
#18 Split System			
#2 Split System			
#4 Split System			
#1 RTU			
#2 RTU			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#19 Split System			
#23 Split System			
#37 Split System			
#10 Split System			
#5 Split System			
#7 RTU			
#13 Split System			
#34 Split System			
#26 Split System			
#33 Split System			
#25 Split System			
#30 Split System			
#29 Split System			
#3 RTU			
#4 RTU			
#3 Split System			

WORK SUMMARY

Continued cleaning condensers.

Checked 5 town stairs console inits.

Checked belts on roof tops and checked on exhaust fans

Visit 006

DATE PERFORMED

Apr 4, 2025

TECHNICIAN(S)

Chase Centers

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#38 Split System			
#20 Split System			
#30 Split System			
#2 MUA			
#2 Split System			
#6 RTU			
#33 Split System			
#29 Split System			
#3 Split System			
#8 Split System			
#22 Split System			
#37 Split System			
#21 Split System			
#26 Split System			
#13 Split System			
#10 Split System			
#34 Split System			
#3 Exhaust Fan			
#12 Split System			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#6 Split System			
#36 Split System			
#17 Split System			
#1 Exhaust Fan			
#25 Split System			
#28 Split System			
#1 RTU			
#31 Split System			
#2 RTU			
#3 RTU			
#16 Split System			
#14 Split System			
#7 RTU			
#4 RTU			
#11 Split System			
#24 Split System			
#4 Split System			
#18 Split System			
#5 Split System			
#4 Exhaust Fan			
#27 Split System			
#9 Split System			
#15 Split System			
#7Split System			
#39 Split System			
#2 Exhaust Fan			
#23 Split System			
#32 Split System			
#5 RTU			
#19 Split System			
#1 MUA			
#35 Split System			
#1 Split System			

WORK SUMMARY

Finding and checking indoor air handlers and numbering them. Starting and checking outdoor unit and charge found issues with 3 condensers and made list for them.

There are 4 small condensers on roof to finish cleaning.

4 air handlers in attic left to check for Monday.

Visit 007

DATE PERFORMED

Apr 3, 2025

TECHNICIAN(S)

Neal Puryear

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
RM 221 Unit Ventilator	Trane		

WORK SUMMARY

Performed unit inspection on down stair consoles and outdoor rooftops

Visit 008

DATE PERFORMED

Apr 3, 2025

TECHNICIAN(S)

Greg Wilson

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#4 Split System			
#16 Split System			
#6 Split System			
#27 Split System			
#9 Split System			
#28 Split System			
#23 Split System			
#17 Split System			
#29 Split System			
#6 RTU			
#4 RTU			
#26 Split System			
#2 Split System			
#35 Split System			
#1 Split System			
#34 Split System			
#12 Split System			
#10 Split System			
#8 Split System			
#15 Split System			
#2 RTU			
#13 Split System			
#7 RTU			
#30 Split System			
#3 RTU			
#11 Split System			
#21 Split System			
#18 Split System			
#20 Split System			
#19 Split System			
#32 Split System			
#14 Split System			
#36 Split System			
#3 Split System			
#25 Split System			
#5 Split System			
#7Split System			
#33 Split System			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#24 Split System			
#1 RTU			
#38 Split System			
#22 Split System			
#31 Split System			
#5 RTU			
#39 Split System			
#37 Split System			

WORK SUMMARY

Picked up a few gallons of coil cleaner from SWH, headed to job site and assisted with PM.

Visit 009

DATE PERFORMED

Apr 4, 2025

TECHNICIAN(S)

Jeremiah Barber

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#22 Split System			
#14 Split System			
#2 Split System			
#6 RTU			
#5 RTU			
#3 Split System			
#23 Split System			
#20 Split System			
#3 RTU			
#2 RTU			
#4 Split System			
#18 Split System			
#13 Split System			
#35 Split System			
#10 Split System			
#19 Split System			
#36 Split System			
#9 Split System			
#7 RTU			
#25 Split System			
#5 Split System			
#21 Split System			
#11 Split System			
#26 Split System			
#32 Split System			
#29 Split System			
#31 Split System			
#1 Split System			
#16 Split System			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#24 Split System			
#30 Split System			
#1 RTU			
#15 Split System			
#4 RTU			
#6 Split System			
#27 Split System			
#12 Split System			
#34 Split System			
#38 Split System			
#7Split System			
#33 Split System			
#39 Split System			
#28 Split System			
#37 Split System			
#17 Split System			
#8 Split System			

WORK SUMMARY

Drove to job site. Located all units that needed to be checked today. Checked operations on all units. Verified filters were good. Verified belts were good. Made sure all units were running as they should. Found one unit was low on charge. Will provide details on which unit and type of refrigerant after full pm is completed.

Visit 010

DATE PERFORMED

Apr 4, 2025

TECHNICIAN(S)

Neal Puryear

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
Steam Boiler			

WORK SUMMARY

Cleaned rooftop coils

Visit 011

DATE PERFORMED

Apr 7, 2025

TECHNICIAN(S)

Chase Centers

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#34 Split System			
#29 Split System			
#38 Split System			
#23 Split System			
#24 Split System			
#26 Split System			
#2 Exhaust Fan			
#7Split System			
#4 Split System			
#1 Exhaust Fan			
#4 RTU			
#22 Split System			

ASSET	MAKE	MODEL NUMBER	SERIAL NUMBER
#28 Split System			
#18 Split System			
#3 RTU			
#37 Split System			
#31 Split System			
#12 Split System			
#11 Split System			
#5 Split System			
#2 RTU			
#17 Split System			
#30 Split System			
#3 Exhaust Fan			
#14 Split System			
#27 Split System			
#4 Exhaust Fan			
#33 Split System			
#13 Split System			
#21 Split System			
RM 221 Unit Ventilator	Trane		
#16 Split System			
#1 MUA			
#7 RTU			
#36 Split System			
#1 Split System			
#6 RTU			
#15 Split System			
#39 Split System			
#9 Split System			
#19 Split System			
#1 RTU			
#5 RTU			
#2 MUA			
#35 Split System			
#20 Split System			
#2 Split System			
#6 Split System			
#10 Split System			
#3 Split System			
#25 Split System			
#32 Split System			
#8 Split System			

WORK SUMMARY

First pm

Checked all split systems.

WORK SUMMARY

Air handlers In the rooms. Matched indoors to outdoors and numbered them accordingly.

- Room 111 system number 3. #3 - indoor unit
  - Blower is startling up weak but does still come on.
- Condenser number 4 has a condenser fan that is not running like it should it is spinning very slow.
- Condenser number 6 needs to be chargered. - Room 112

Found the new exhaust fan had a wire that came loose from wire nut.

Re attached wire with new wire nut.

Turned exhaust and make up air and it is now working.

Checked 6 air handlers that are in attic. - have 7

Screws were stripped on two roof top units. Doors had fallen out. Put new screws in the doors so that doors will not fall off.

Cleaned mini split condensers with water only.

Cleaned standards with cleaner.

Brushed condenser coils in mechanical room for walk ins.

Checked belts and pulleys.

Everything is in goods shape other then what is listed.

9 Kitchen condenser -7

3 ceiling tiles:
Library to replace

		System Type AHU Location	Serial Number	Mfg Date	Condenser Location	Serial Number	Refrigerant	Mfg Date
1	District Building	Mechanical Room AHU	3506X25212 3506X25103	08/2006 06/2006	Bellewood Side U01&03	8378W041126921 8378W021111711	R-22	01/2011 01/2011
2	District Building Server Room	Ductless Split System	G009134	12/2018	Bellewood Side U02	G009096	R-410A	12/2018
3	105	Window Unit	1903N18639	03/2019	Front Wall Window Well	N/A	R-410A	N/A
4	106	Vertical Room AHU	1501A61937	2001	Courtyard East U06	1101E13267	R-22	2001
5	107	Closet Ceiling Horizontal AHU	R8920000004	Not Visible	School East Wall U01	8378W041126920	R-22	01/2011
6	108	Classroom Ceiling Horizontal AHU	W050645986	08/2005	Courtyard East U08	2805E11779	R-22	2005
7	109	Ductless Split System	63229981521	Not Visible	Courtyard East U04	63229981522	R-410A	Not Visible
8	110	Closet Vertical AHU	3401A60534	Not Visible	Front Wall Window Well	3701E03577	R-22	2001
9	111	Classroom Ceiling Horizontal AHU	W180807487	Not Visible	Courtyard East U03	W271822761	R-410A	07/2018
10	112	Classroom Ceiling Horizontal AHU	3001A74760	Not Visible	Courtyard East U01	EBHM035143	R-22	2003
11	113	Classroom Ceiling Horizontal AHU	2503A80007	Not Visible	Courtyard West U01	2303E14346	R-22	2003
12	114	Classroom Ceiling Horizontal AHU	W050644892	Not Visible	Courtyard West U02	Not Visible	R-22	Not Visible
13	115	Window Unit	1906M41083	Not Visible	Courtyard West U03	N/A	R-410A	N/A
14	116	Closet Vertical AHU	A071368385	03/2007	School West Wall U01	E083305817	R-22	08/2008
15	117	Closet Vertical AHU	A071270206	03/2007	Courtyard West U05	E073204251	R-22	07/2007
16	118	Indoor Mechanical Room 1 AHU	----	----	Courtyard West U07&08	----	R-22	----
	119	Indoor Mechanical Room 1 AHU	----	----	Courtyard West U07&08	----	R-22	----
	120	Indoor Mechanical Room 1 AHU	----	----	Courtyard West U07&08	----	R-22	----
	MS West Hallway Common Area	Indoor Mechanical Room 1 AHU	2102F55065	Not Visible	Courtyard West U07&08	2002E30922 2002E30941	R-22	2002 2002
17	Science Storage	Ductless Split System	23U25808B	Not Visible	Courtyard West U10	49E83229	R-410A	09/2024

		System Type AHU Location	Serial Number	Mfg Date	Condenser Location	Serial Number	Refrigeran t	Mfg Date
	Dry Storage	Ductless Split System	----	----	Courtyard West U10	3017473T	R-410A	08/2023
18	Kitchen	Science Storage Closet Ceiling AHU	F361700402	09/2017	Courtyard West U09	W501914184	R-410A	12/2019
19	Kitchen	Makeup Air Unit - MAU2 (over stoves)	20479348	Not Visible	N/A	N/A	N/A	N/A
20	Cafeteria	Outside Mechanical Room AHU	3UF00373-04	Not Visible	Outdoor Mechanical Room Rooftop U01&02	G083101206 G082740185	R-22	2008 2008
21	Small Gym Lobby	Ceiling Fan Coil Unit	Not Visible	Not Visible	None	N/A	N/A	N/A
22	Large Gym	Makeup Air Unit - MAU1	18323403	Not Visible	N/A	N/A	N/A	N/A
23	Large Gym Offices	RTU07	F21157174	5/1991	in RTU07	N/A	R-22	N/A
24	Gym Lobby	RTU02	G072030800	2007	in RTU02	N/A	R-22	N/A
	3rd Grade Student Restrooms	RTU02	----	----	in RTU02	----	R-22	----
	3rd Grade Hall Common Area	RTU02	----	----	in RTU02	----	R-22	----
25	121	Classroom Unit Ventilator	T10M71539	Not Visible	Rooftop Condenser U01	6025UA03F	R-22	01/2006
26	122	Classroom Unit Ventilator	T10A01898	Not Visible	Rooftop Condenser U02	8376W301108698	R-22	07/2011
27	123	Classroom Unit Ventilator	T11J47987	Not Visible	Rooftop Condenser U03	Not Visible	R-22	Not Visible
28	124	Classroom Unit Ventilator	T10A01897	Not Visible	Rooftop Condenser U04	F03252631	R-22	01/1991
29	125	Classroom Unit Ventilator	H20A01472	Not Visible	Rooftop Condenser U05	19195TDJ3F	HFC-410A	05/2019
30	Maintenance Office	Window/Wall Unit	LW1516ERY7	Not Visible	Maintenance Wall West	N/A	R-32	N/A
31	200	Window Unit	ZA657314	01`/2016	Front Wall Receptionist East Wall	N/A	R-410A	N/A
32	201	Attic Unit 04	Not Visible	Not Visible	School East Wall U02	G073420103	R-22	Not Visible
	202	Attic Unit 04	----	----	School East Wall U02	----	R-22	----
	203	Attic Unit 04	----	----	School East Wall U02	----	R-22	----

		System Type AHU Location	Serial Number	Mfg Date	Condenser Location	Serial Number	Refrigeran t	Mfg Date
33	204	Attic Unit 02	FB4ANF036	Not Visible	School East Wall U03	8344W481004845	R-22	11/2010
34	204A	Attic Unit 03	21771878	Not Visible	Courtyard East U07	W082120424	R-410A	02/2021
	205	Attic Unit 03	----	----	Courtyard East U07	----	R-410A	----
	206	Attic Unit 03	----	----	Courtyard East U07	----	R-410A	----
35	207A - Principal	Attic Unit 01	1837553M3V	09/2018	Courtyard East U05	18383KK3BF	R-410A	09/2018
	207B - Bookkeeper	Attic Unit 01	----	----	Courtyard East U05	----	R-410A	----
	207Common	Attic Unit 01	----	----	Courtyard East U05	----	R-410A	----
36	Auditorium	RTU03	2919P22398	2019	in RTU03	N/A	R-410A	N/A
37	208 Asst Principal	Window Unit	FL295279P	03/2018	Front Wall Asst Principal West Wall	N/A	R-32	N/A
38	209 Nurse	Ductless Split System	G010121	01/2017	Courtyard East U02	RX08NMVJU	R-410A	03/2016
39	210 Sick Room	Attic Unit 05	180517WT3V	01/2018	Courtyard West U04	18023J1K3F	R-410A	01/2018
	K/2 Student Restrooms	Attic Unit 05	----	----	Courtyard West U04	----	R-410A	----
40	211	Attic Unit 07	3502A72103	Not Visible	School West Wall U03	2302E06584	R-22	2002
41	212	Attic Unit 06	282106496	Not Visible	School West Wall U02	W082120431	R-410A	02/2021
	213	Attic Unit 06	----	----	School West Wall U02	----	R-410A	----
42	214	Indoor Mechanical Room 2 AHU	1103F20989	Not Visible	Courtyard West U06	2003F31887	R-22	Not Visible
	215	Indoor Mechanical Room 2 AHU	----	----	Courtyard West U06	----	R-22	----
43	216	Indoor Mechanical Room 2 AHU Ductless Split System	---- G006010	---- 03/2017	Courtyard West U06 Outdoor Mechanical Room Rooftop U03	---- Daikin - G006987	R-22 R-410A	---- 04/2017
	2nd Grade Hall Common Area	Indoor Mechanical Room 2 AHU	----	----	Courtyard West U06	----	R-22	----
44	217 - Robotics	RTU04	G083850304	2008	in RTU04	N/A	R-22	N/A

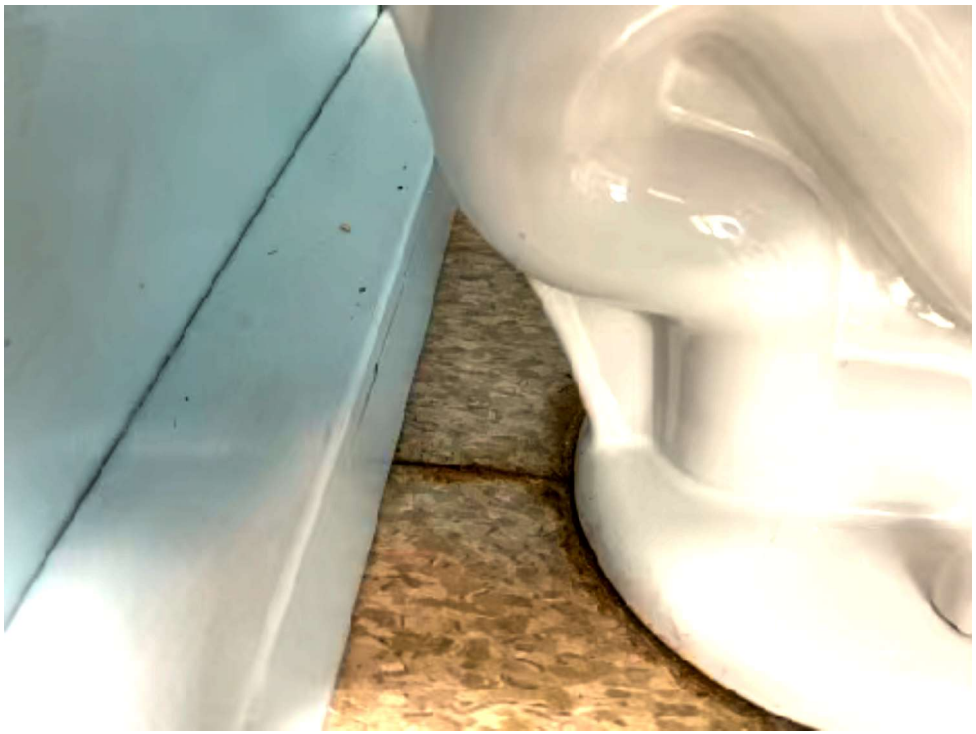
		System Type AHU Location	Serial Number	Mfg Date	Condenser Location	Serial Number	Refrigeran t	Mfg Date
	218 - Library Classroom	RTU04	----	----	in RTU04	----	R-22	----
	219 - Think Tank	RTU04	----	----	in RTU04	----	R-22	----
	220 - Library Office	RTU04	----	----	in RTU04	----	R-22	----
45	Library Front	RTU05	G083651687	2008	in RTU05	N/A	R-22	N/A
46	Library Back	RTU06	G072030803	2007	in RTU06	N/A	R-22	N/A
47	221	Classroom Unit Ventilator	TI8C10224	Not Visible	Rooftop Condenser U06	18073J7D3F	R-410A	02/2018
48	222	RTU01	G083621724	2008	in RTU01	N/A	R-22	N/A
49	223	Classroom Unit Ventilator	T16J37588	Not Visible	Rooftop Condenser U07	16353WLA3F	R-410A	08/2016
	224	RTU01	----	----	in RTU01	N/A	R-22	N/A
50	225	Classroom Unit Ventilator	8F1028602	Not Visible	Rooftop Condenser U08	ECCM098955	R-22	03/1998
	226	RTU01	----	----	in RTU01	N/A	R-22	N/A
51	227	Classroom Unit Ventilator	68399800323-6468	Not Visible	Rooftop Condenser U09	W322247372	R-410A	08/2022
52	228	Classroom Unit Ventilator	T17G33291	Not Visible	Rooftop Condenser U10	17265PM2AF	R-410A	06/2017
53	229	Classroom Unit Ventilator	T16G32886	Not Visible	Rooftop Condenser U11	162948HU3F	R-410A	07/2016
	230	RTU01	----	----	in RTU01	N/A	R-22	N/A
	4/5 Student Restrooms	RTU01	----	----	in RTU01	N/A	R-22	N/A
	4/5 Common Area Outside Restrooms	RTU01	----	----	in RTU01	N/A	R-22	N/A
	4/5 Common Area Hallway	RTU01	----	----	in RTU01	N/A	R-22	N/A

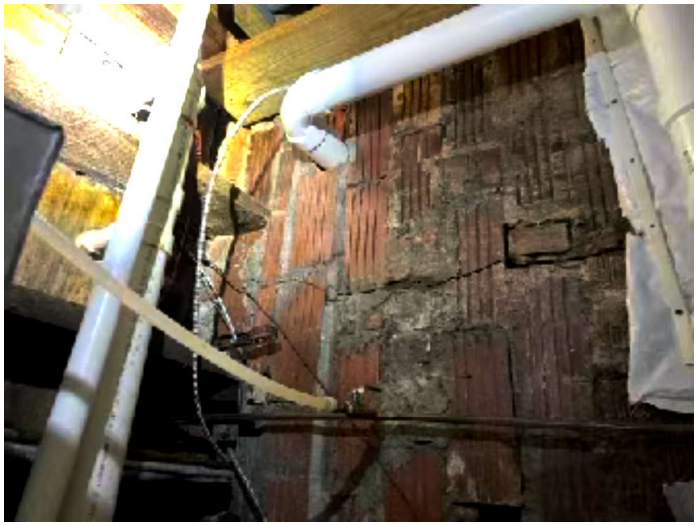
ROOM #	VALVE LOCATION
District Office Building Main Shutoff	2" RPZ in storage room
District Office Building mens and womens restrooms	Janitors closet behind access panel in wall
Zone Middle School Main Shutoff	3" RPZ in room 105 closet
107	Maintence closet
110 Office	No valves above ceiling
114	Above ceiling 114
Middle School boys and girls restrooms	Above ceiling 114
116 Staff Cafe	Closet next to sink in Staff Café
119	Room 119 inside far right cabinet
120	Room 120 inside cabinet of center sink
Middle School Staff Restroom	Above ceiling in hallway outside of room 118
Middle School drinking foutntain next to Staff RR	Above drinking fountain in ceiling
Zone K/1 Upper Level Main Shutoff	3" RPZ in room 105 closet
200 Office Staff Restroom	Piping located above ceiling 110 Office (no valves visible)
201 Office Staff Restroom	Shutoff valve on commode and sink - piping in ceiling of crawl space off 105
208 Office Staff Restroom	Piping located above ceiling 110 Office (no valves visible)
209 Office	No valves visible
211 Staff Restroom	116 closet
212	No valves visible
214	Zone Middle School washing machine room
215	Above ceiling of room 119
Zone K/1 Upper Level Staff Restrooms	Zone Middle School washing machine room
Zone K/1 Upper Level boys and girls cold water	Above ceiling in hallway outside of room 118
Zone K/1 Upper Level boys and girls hot water	Zone Middle School washing machine room
218	Above Kitchen ceiling
219	Above Kitchen ceiling
Kitchen/Cafeteria Isolation Shutoff	Above double doors over ramp going into cafeteria
Cafeteria boys restroom	Above ceiling in cafeteria boys restroom
Cafeteria girls restroom	Above ceiling in cafeteria girls restroom
Kitchen restroom cold water	Above ceiling in dry food storage
Kitchen sinks/dishwasher	Above ceiling at fixture served
Kitchen hot water	Water heater located in outside mechanical room. Shutoff valve at water heater
Zone 2/3 Lower Level Main Shutoff	3" RPZ in Zone 2/3 Janitorial Station
121	Gym Lobby boys restroom in ceiling above sinks

122	Gym Lobby boys restroom in ceiling above sinks
123	Gym Lobby boys restroom in ceiling above sinks
124	Gym Lobby boys restroom in ceiling above sinks
125	Gym Lobby boys restroom in ceiling above sinks
Gym Lobby boys restroom toilets/urinals	Above ceiling in boys restoom handicap stall
Gym Lobby boys restroom sinks	Above ceiling over sinks
Gym Lobby girls restroom toilets	Above ceiling in boys restoom handicap stall
Gym Lobby girls restroom sinks	Above ceiling in girls restroom over sinks
Concession Stand	Above ceiling in gym lobby girls restroom
Big Gym Staff Restroom	Big Gym Storage Room
Big Gym boys and girls locker rooms	Lower Level Janitorial Station near water heater
Outside hose bib off corner of girls locker room	Above hard ceiling of girls locker room (no direct access)
Zone 4/5 Upper Level Main Shutoff	3" RPZ in Zone 2/3 Janitorial Station
201 Staff Restroom	Valves not visible (hard ceiling beneath)
204A	108 Music Maintenance Room
205	108 Music Maintenance Room
206	108 music Maintenance Room
221	Gym Lobby boys restroom in ceiling above sinks
223	Gym Lobby boys restroom in ceiling above sinks
224	Zone 2/3 Janitorial Station
225	Gym Lobby boys restroom in ceiling above sinks
226	Zone 2/3 Janitorial Station
227	Gym Lobby boys restroom in ceiling above sinks
228	Zone 2/3 Janitorial Station
229	Gym Lobby boys restroom in ceiling above sinks
Zone 4/5 boys restroom toilets/urinals	Gym Lobby boys restroom above ceiling in handicap stall
Zone 4/5 boys restroom sinks	Gym Lobby boys restroom above ceiling in handicap stall
Zone 4/5 girls restroom toilets	Gym Lobby boys restroom above ceiling in handicap stall
Zone 4/5 girls restroom sinks	Gym Lobby boys restroom above ceiling in handicap stall
Hot Water Heaters	
Hot Water Heater - District Bldg Mechanical Room	Serial # 1606A001490
Hot Water Heater - Outside Mehcanical Room	Serial # 1821110518100
Hot Water Heater - Utility Closet 117	Serial # GB12936334
Hot Water Heather - Staff Café Under Sink	Serial # GE 1103301599 - 11/2003
Hot Water Heater - Utility Closet Music Room	Serial # 1549A023841

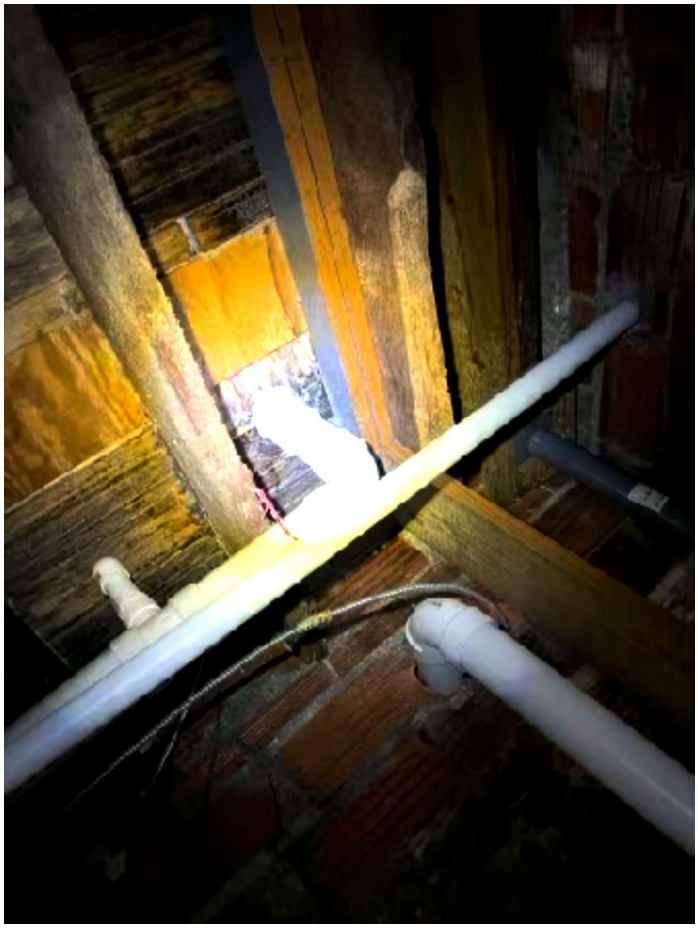
Hot Water Heater - Basement	Serial # 1426M001339
Sump Pumps	
Sump Pump - Basement Outdoor (by back door)	Zoeller - Serial # Z252D1106, Model Number: M53-0001, Mfg Date 2.5.25
Sump Pump - Basement Indoor (by boiler)	Zoeller - Serial # Z1828C2229, Model Number: M98-0001, Mfg Date 2.9.18
Sump Pump - Utility Closet 105	Liberty Pump - No Data Available
Sump Pump - Middle School Main Hallway (under bench	No Data Available
Sump Pump - Utility Closet 110	Liberty Pump - No Data Available
Sump Pump - Under Steps Closet 114	No Data Available
Sump Pump - Outside Small Gym Rear Door	Zoeller - Serial # Z192LC1168, Model Number: M98-0001, Mfg Date 2.21.19

May 4, 2024 - MS Center Hallway






Vision
TIP
SCALE



PROJECT ESTIMATE QUOTE

METRIC ENVIRONMENTAL
3701 Taylorsville Road, Suite 1
Louisville , Kentucky 40220
(t) (502) 484-8530
(f) (502) 484-8528
(w) www.metricenv.com

CLIENT:	Anchorage Public Schools	EMAIL:	Heather.Rivera@anchorage.kyschools.us
ATTENTION:	Heather Rivera	CLIENT PHONE:	(502) 333-8501
TITLE:	Maitenance Director		
CLIENT ADDRESS:	11400 Ridge Road	JOB NUMBER:	25-0284-32
	Anchorage KY 40223	RATE TABLE:	MARKET
SURVEY SITE:	Room 105, Room 201 Room 121	DATE:	5/20/2025

CONSULTANT NAME / PROJECT MANAGER	JOB NAME	PAYMENT TERMS	DUE DATE
Andrew Peters	Indoor Air Quality testing in room 105, 105 crawlspace, 201 and 121.	Net 30 Days	

LABOR CHARGES

LABOR ACTIVITIES	Sr Project Manager 4	Project Manager 2	Project Manager 1	Asst Project Manager	Staff Scientist 2	Staff Scientist 1	Project Coord. 2	Project Coord. 1	Total
	$200.00	$140.00	$130.00	$120.00	$115.00	$100.00	$110.00	$75.00	
INSPECTION and FIELD ACTIVITIES	**0.00**	**5.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**$770.00**
Field Preparation (subcontracts, equip, pick-up, coordination, etc.)		0.50							$70.00
HASP/QAPP Development, Hours									$0.00
Travel Time, Hours									$0.00
Field Work Sampling, Hours		4.00							$560.00
Project Management / PIF, Hours		0.50							$70.00
Sample Consolidation, Hours									$0.00
Sample Drop off		0.50							$70.00
Custom Manual Entry									$0.00
LAB ANALYSIS	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**$0.00**
In-house Lab Analysis, Hours									$0.00
Ext. Lab Coordination/Sample drop off, Hours									$0.00
Shipping, Hours									$0.00
Custom Manual Entry									$0.00
REPORT DEVELOPMENT	**0.50**	**2.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**$380.00**
Data Download and Field Date Management									$0.00
Report Development, Hours									$0.00
Report Writing, Hours		2.00							$280.00
Exhibits and Attachments									$0.00
QAQC - Internal and with Client, Hours	0.50								$100.00
Custom Manual Entry									$0.00
LABOR SUBTOTAL	**0.50**	**7.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**$1,150.00**

LAB / REIMBURSABLE EXPENSES

QUANTITY SUM TOTAL	DESCRIPTION	UNIT PRICE RATE C	Vendor Name ABC Company	Analytical In-house (YES)	TOTAL
0	Asbestos PCM Air Testing and Analysis, per NIOSH 7400 - 24 Hr	$10.00			$0.00
0	Asbestos PLM Bulk Sample Analysis per EPA/600/R-93/116 - 24 Hr	$25.00			$0.00
0	Asbestos Bulk Sample Analysis by 400 Point Count - 24 Hr	$65.00			$0.00
0	Asbestos TEM Air Sample Analysis by AHERA 40 CFR 763 Appx A - 24 Hr	$100.00			$0.00
0	Lead Wipe Sample Analysis - 24 Hr	$25.00			$0.00
6	Mold Spore Trap (Micro5) Analysis	$75.00			$450.00
2	Mold Tape Lift Analysis	$60.00			$120.00
0	Radon 2-4 day Charcoal	$75.00			$0.00
0	Radon Long term Alpha Track (Accustar)	$75.00			$0.00
0	PCB Wipes or Bulk Liquid Analysis	$240.00			$0.00
0	Hexavalent Chromium WipeS	$240.00			$0.00
0	TCLP - 8 RCRA Metals	$500.00			$0.00
0	Total Dust Analysis	$75.00			$0.00
0	Respirable Dust Analysis	$75.00			$0.00
0	Each Additional Room to Survey	$175.00			$0.00
0	Custom 2 - Manual Entry	$0.00			$0.00
8	(for Lump Sum agreements lab costs will be billed at quantity quoted)				$570.00

QUANTITY	DESCRIPTION	RATE	TOTAL
0	Mileage	$0.70	$0.00
	Shipping	$0.00	$0.00
	Custom 1 - Manual Entry	$0.00	$0.00
0	Custom 2 - Manual Entry	$0.00	$0.00
			$0.00

BRIEF PROJECT DESCRIPTION:	Indoor air quality testing in room 105, 105 crawlspace, 201, and room 121. Spot checking areas in previous remediation for growth. Air samples are not collected in unlivable areas, tape lifts will be used in crawlspace. Additional rooms to inspect would be $175 per room to cover additional report time, inspection time, and sample costs.	
	PROJECT SUMMARY QUOTE	$1,720.00

ENGAGEMENT CONTRACT FOR SERVICES

METRIC ENVIRONMENTAL
3701 Taylorsville Road, Suite 1
Louisville, KY 40220
(t) 502-454-8530
(w) www.metricenv.com

Metric Environmental, LLC ("Metric") is providing Industrial Hygiene / Occupational Safety services to Anchorage Public Schools ("Client"). This Agreement is to confirm the scope of services and to outline terms of Metric's contractual arrangement with the Client.

SCOPE OF SERVICES:

Survey Site: Room 105, Room 201 Room 121

Scope of Services are briefly described below:

Indoor air quality testing in room 105, 105 crawlspace, 201, and room 121. Spot checking areas in previous remediation for growth. Air samples are not collected in unlivable areas, tape lifts will be used in crawlspace. Additional rooms to inspect would be $175 per room to cover additional report time, inspection time, and sample costs.

ADDITIONAL SERVICES: Services resulting from significant changes in the scope, extent or character of the Project designed or specified by Metric, revising previously accepted studies, unforeseen conditions or any other causes beyond Metric's control shall entitle Metric to an adjustment in compensation. Metric shall notify the Client of these changes prior to providing such services.

COMPENSATION: The Services will be performed under this contract for a sum of **$1,720.00** .

PAYMENT TERMS: Payment shall be due thirty (30) days from date of invoice upon receipt of the invoice.
Invoices not contested in writing within ten (10) business days of receipt are considered accepted by Client and are payable in full. Failure to make payment as provided herein could result in Metric filing a lien on the real property which is the subject of this Contract. Interest at 1½% per month will be due and payable on amounts not paid within thirty (30) days. Metric shall be entitled to attorney's fees and other costs incurred by us in collecting delinquent accounts. REIMBURSABLE EXPENSES: Costs for advances and other reimbursables including but not limited to, copies, photography, laboratory analysis, equipment charges, courier fees and mileage are included in our fee and estimated at $570.00 This is an estimate of the labor and materials required to complete the scope of work. It is based upon an estimated (8) samples. No credit will be issued to the final invoice for unprocessed samples. Reimbursable expenses in excess of this estimate, shall result in an increase to the total fee.
Credit card and ACH payment methods are available upon request.

DEPOSIT / PREPAYMENT: Residential projects with a value less than $500 shall be prepaid prior to start of work; Residential or Commercial projects with a value greater than $500 will require a deposit of 50% at time of contracting and balance within (30) days.
Deliverables may be withheld as a result of non-payment of a deposit or requested prepayment.

INVOICES: Unless otherwise agreed upon, Metric will submit to the Client for Services performed and advances to date. Our invoice will be sent to individual identified in the Project Summary Quote unless instructed otherwise

LIMIT OF LIABILITY: Client acknowledges and agrees that our total aggregate liability to Client or any third party arising from negligent professional acts, errors, omissions or breach of the above-described standard of care and warranty, shall not exceed the amounts, limits, coverage or conditions of our professional liability insurance or our total fee, whichever is less.

INSTRUMENTS OF SERVICE: Drawings, specifications and other documents, including those in electronic format, prepared by Metric and its consultants, are Instruments of Service for use solely with respect to this project. Any unauthorized use of the Instruments of Service shall be at Client's sole risk and without liability to etric and/or Metric's consultants.

PROVIDED DOCUMENTATION: Metric shall be entitled to rely on the accuracy and completeness of information furnished by the **Client.** Metric shall provide prompt written notice to the Client if Metric becomes aware of any errors, omissions or inconsistencies in such services or information and it shall be the responsibility of Client to correct any errors, omissions or inconsistencies.

GOVERNING LAW: The laws of the State of Indiana shall govern as to all questions arising under this Engagement Contract for Services.

This agreement represents the entire understanding between the parties in respect to this project and can only be modified in writing signed by both parties. **Upon receipt of all pages of this executed contract, Metric will proceed with this order as written. This agreement is valid for a period of thirty (30) days from the date of issue.**

Anchorage Public Schools

Signature Sharla Six
Name Printed Sharla Six
Title Interim Superintendent
Date: 5-21-2025

METRIC ENVIRONMENTAL, LLC

Signature _____
Name Printed _____
Title _____
Date: _____

P.O. Box 91389
Louisville, KY 40291
Office: 502-239-6171

5/8/25

Heather Rivera
Anchorage Independent School
11400 Ridge Road
Louisville, KY 40223

REF: Concrete repair

Dear Heather,

DCI Inc. proposes to provide labor, material, and equipment to remove existing 10’ X 10’ X 2’ thick concrete around manhole grate, form for new concrete lid around manhole (using existing manhole grates), pour 4000psi steel reinforced concrete around manhole, and wreck forms inside of manhole for the total sum of $ 9,950.00

- Price is based on work being performed during regular business hours Monday – Friday.

If you should have any questions, please do not hesitate to contact our office.

Thank you,

Todd Craig

Fire Safety Compliance & Annual Inspection

Fire Sprinkler System - Crawl Space Leak Repair

PROPOSAL

Alpha Energy Solutions
7200 Distribution Drive
Louisville, KY 40258-2827
Voice-888-212-6324 **Fax**-866-296-8035
Web Site-www.alphamechanicalservice.com **E-mail- Roger.mayfield@aamservice.com**

May 21, 2025

To: Anchorage Public School
Attn: Heather Rivera
Location:11400 Ridge Rd.
Louisville, Ky 40223

Job Name: Sprinkler Leak
Estimating Job Number: 984861

We are pleased to propose the following for your approval:

Scope of work:

- **Cut out 1" sprinkler pipe that is leaking in a thread and replace.**

Exclusion:

- **No overtime. All work to be performed during normal business hours, Monday through Friday, 7:00am – 3:30pm.**
- **Customer must make Alpha aware of any present asbestos prior to start of service/work.**
- **Not responsible for asbestos abatement or removal.**

* ***Alpha Energy Solutions cannot be responsible for any delays in material/equipment past the target ship date(s).***

The customer is solely responsible for ensuring that open and closed hydronic systems are properly chemically treated and filtered per equipment manufacturer recommendations.

We propose hereby to furnish material and labor – complete in accordance with these specifications, for the sum of:

Nine Hundred Thirty-Six Dollars and 50/100 [$936.50]

Payable as follows: FOR PROJECTS WITH A QUOTED PRICE OF $20,000.00 OR MORE, UPON EXECUTION OF PROPOSAL, ALPHA ENERGY SOLUTIONS WILL REQUIRE A 50% DEPOSIT TO COVER MOBILIZATION AND PROCUREMENT OF MATERIALS. UPON COMPLETION OF JOB, ALPHA ENERGY SOLUTIONS. WILL REQUIRE THE REMAINDER TO BE PAID WITHIN 30 DAYS.
**A CONVENIENCE FEE OF 3% OF THE INVOICE AMOUNT WILL BE CHARGED FOR PAYMENTS BY CREDIT CARD. PAYMENTS BY CHECK, CASH, ACH, WIRE TRANSFER OR ECHECK ARE NOT SUBJECT TO THE CONVENIENCE FEE.*

All material is guaranteed to be as specified. **Material pricing may change due to market volatility.** All work to be completed in a workmanlike manner according to standard practices. Any alteration or deviation from above specifications involving extra costs will be executed only upon written orders, and will become an extra charge over and above the estimate. All agreements contingent upon strikes, accidents or delays beyond our controls. Owner to carry fire, tornado, and other necessary insurance. We are fully covered by General Liability and Workman's Compensation Insurance. **This proposal may be withdrawn by us if not accepted within 7 days.**

Warranty: The customer should be made aware that any warranty work completed by Alpha Energy Solutions will be billed direct to the customer upon completion. ALPHA ENERGY SOLUTIONS will file necessary paperwork with the manufacturer/warranty company, etc. When ALPHA ENERGY SOLUTIONS receives credit from the manufacturer/warranty company for the part(s) that are covered under warranty, this credit will be passed to the customer as a credit memo on their account. Credits to the customers may not offset what was originally invoiced to the customer, and therefore the customer is responsible for any amounts above the credit given by the manufacturer/warranty company.

Authorized Signature _____

Name: **N/A**
Phone:
Title:

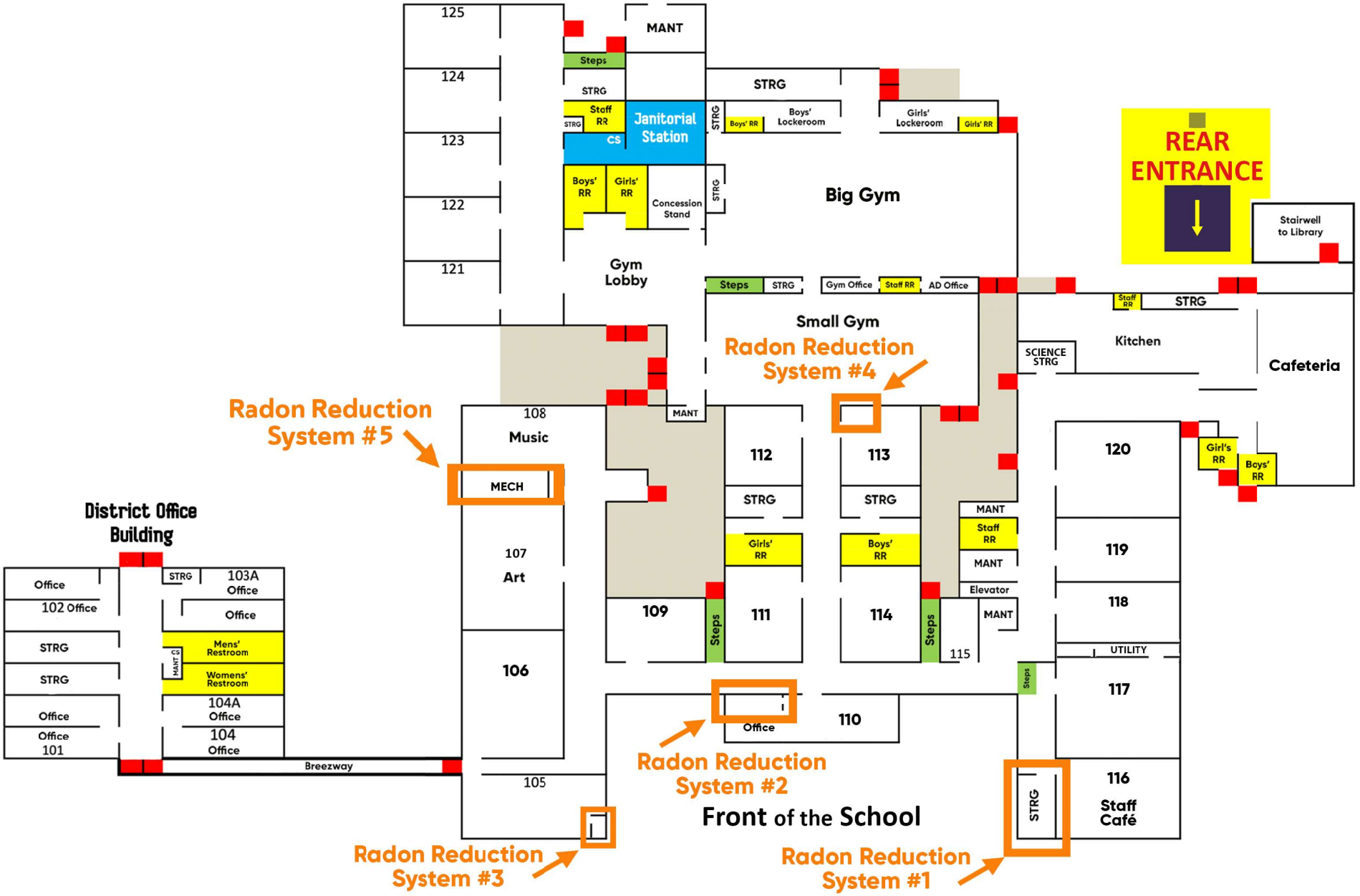
Authorized Signature _____

Name: Roger Mayfield
Phone: 502.558.5943
Title: General Foreman

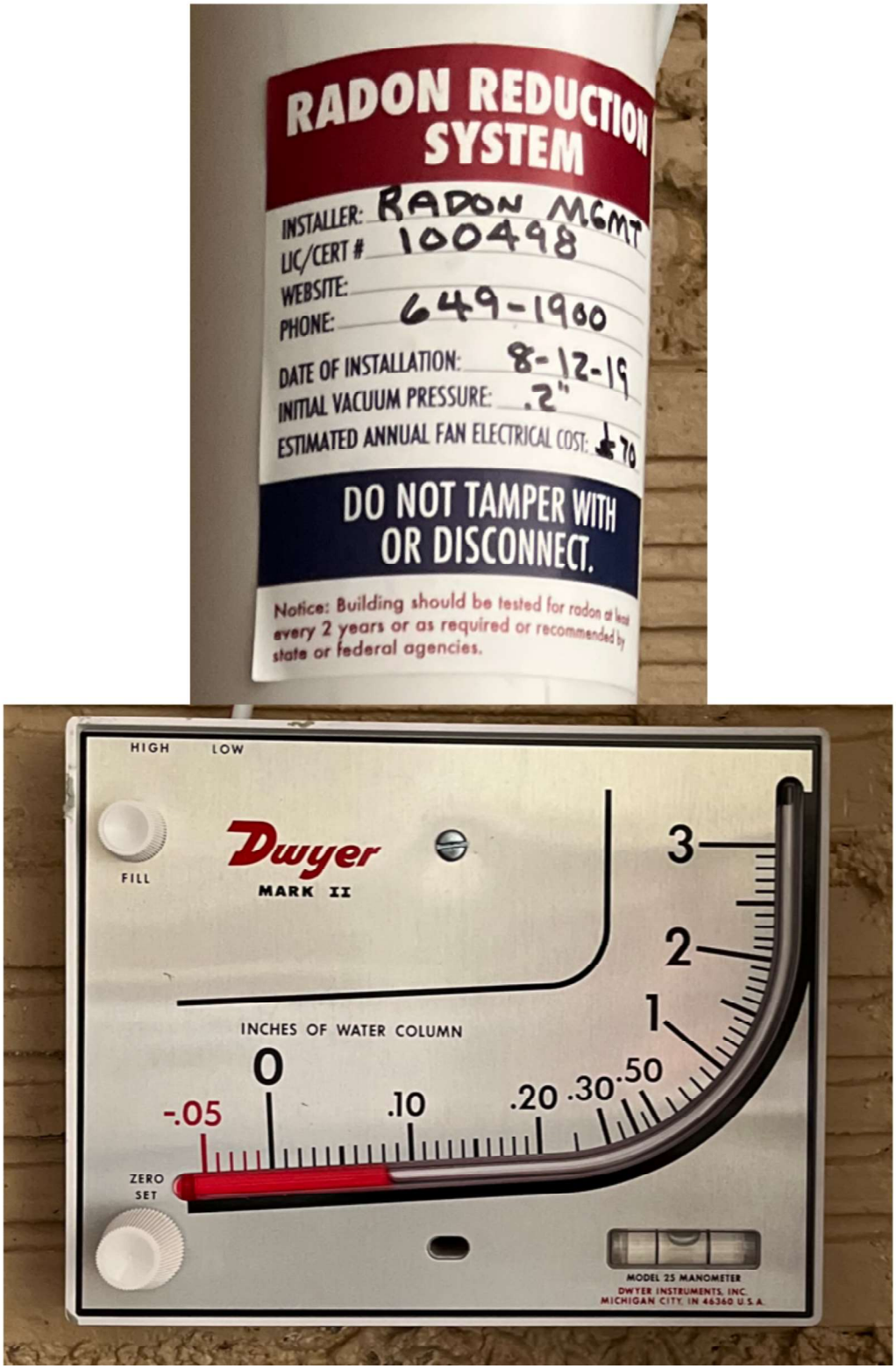
Acceptance of this proposal – The price, specifications and conditions are satisfactory and are hereby accepted. You are authorized to do the work as specified. Payment will be made as outlined above. Please sign and return or fax.

Signature: _____ Date: _____ P.O. #_____

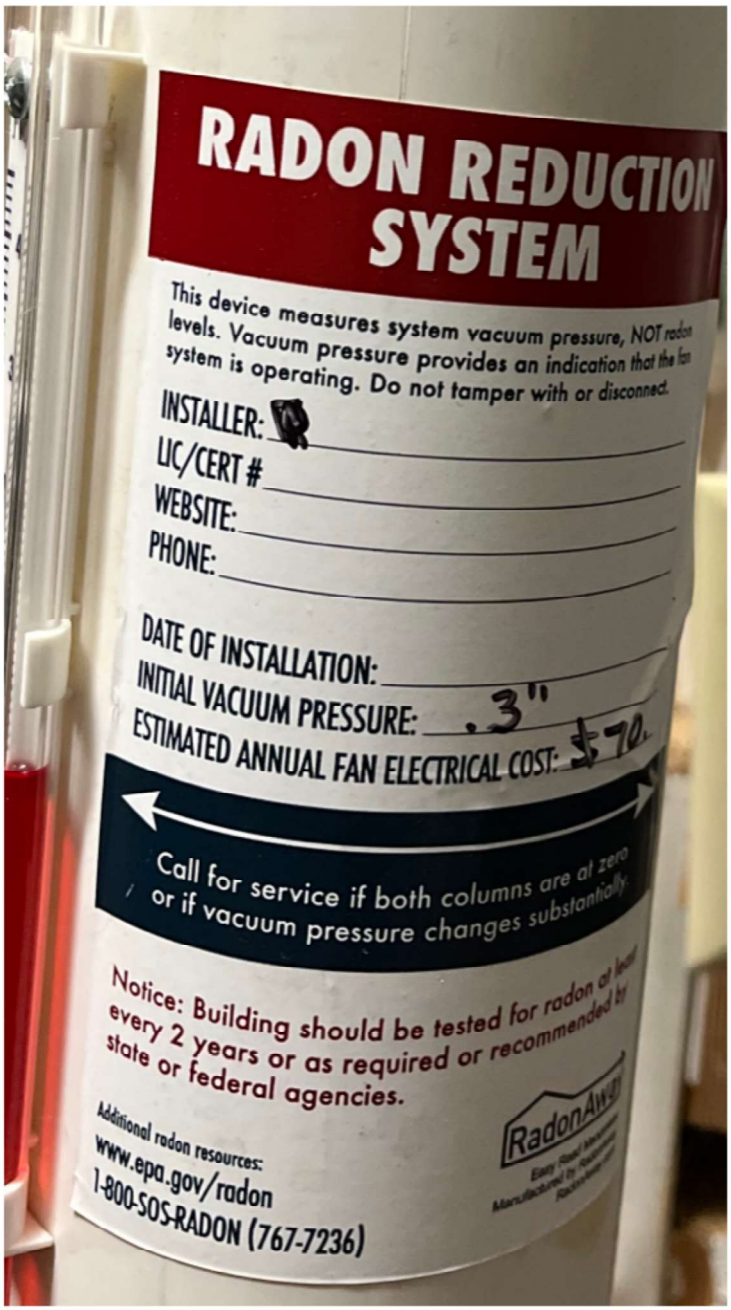
Anchorage Public School
Lower Level
Radion Reduction Systems

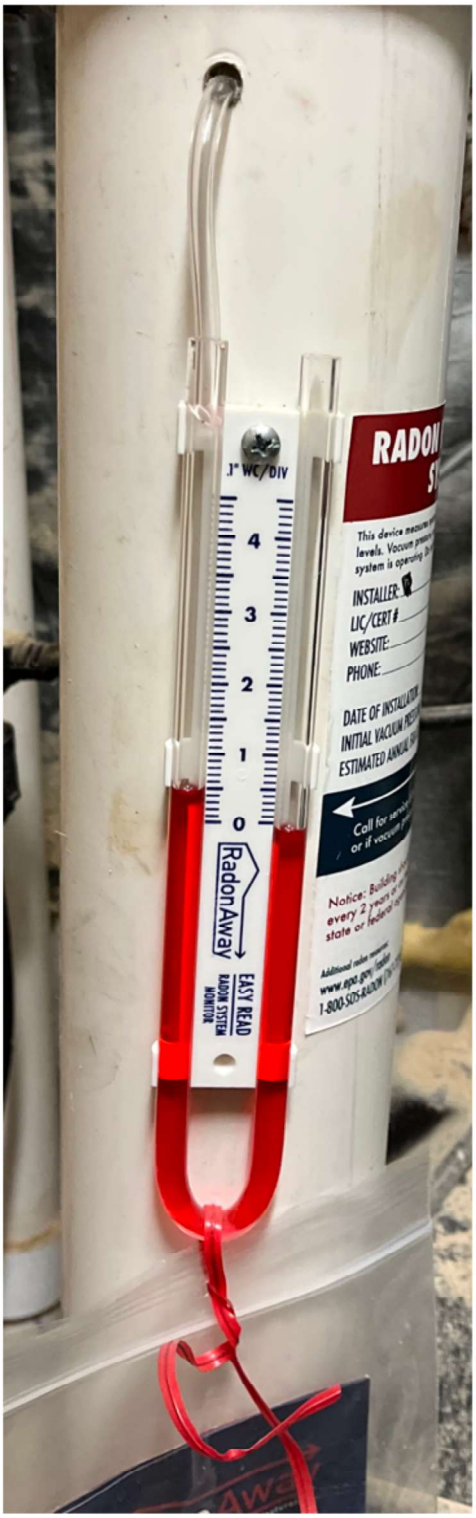


Records Room - Installed August 12, 2019

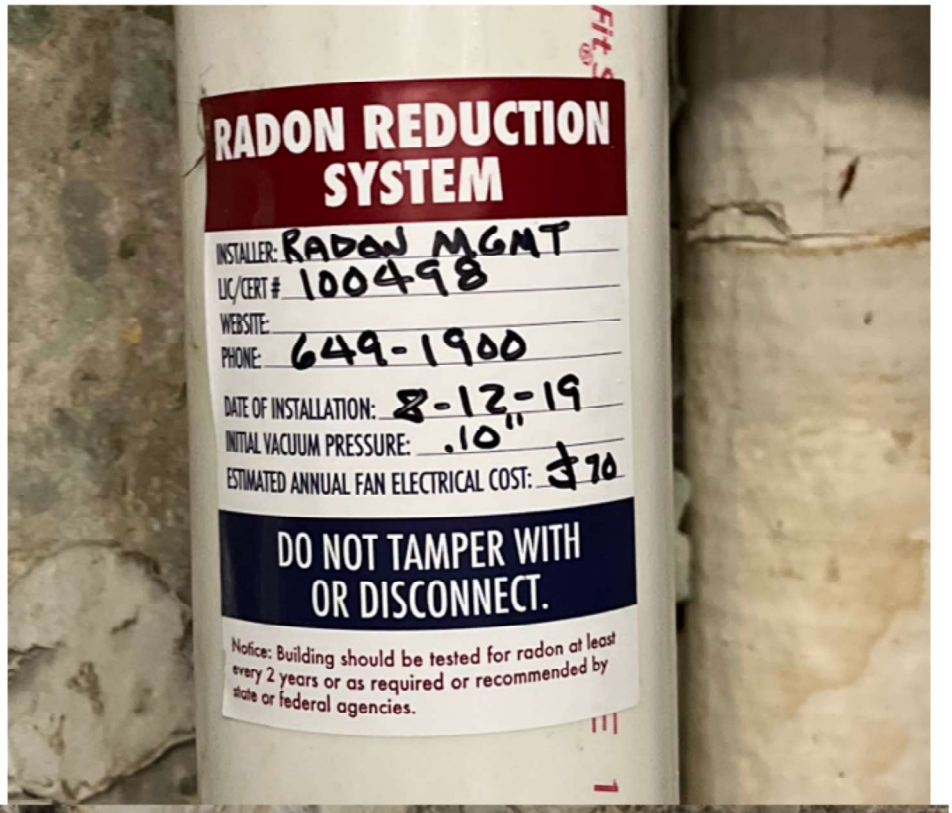


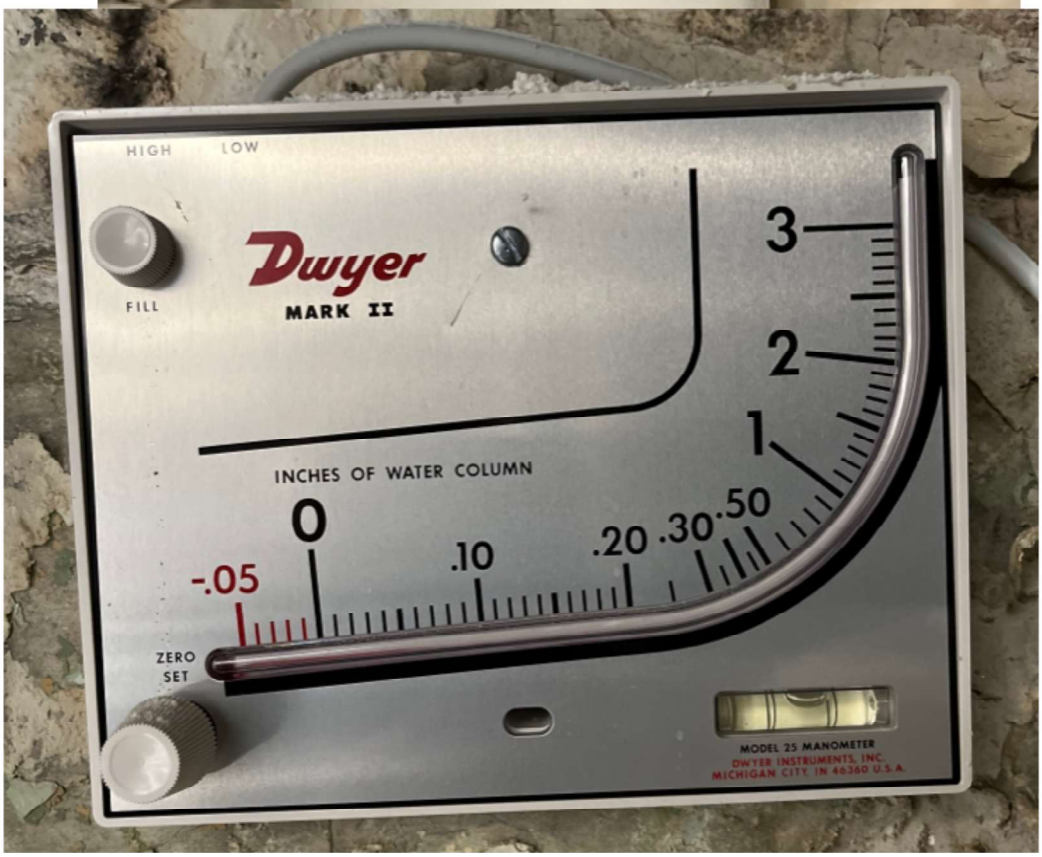
Room 110 - Installed UNKNOWN



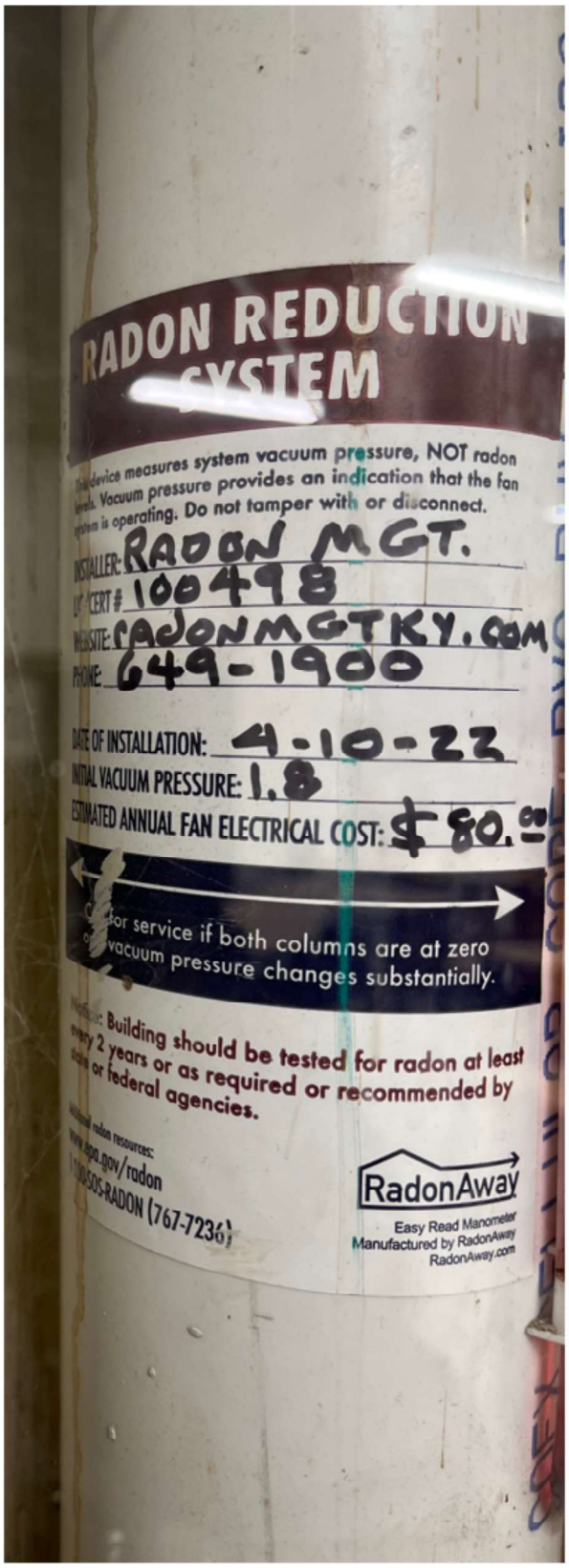


Room 105 - Installed August 12, 2019





Room 113 - Installed April 10, 2022



Room 108 - Installed UNKNOWN

TOADVINE

Date: 1/29/2025

Quotation To: Anchorage School
Heather Rivera
11400 Ridge Rd
Louisville, KY 40223

Re: Bleacher Seats

Customer Phone: 502-333-8501
Customer Email:
Sales Rep: Ben Toadvine
Phone: 502-241-6010
Fax: 502-241-2288

TERMS:	F.O.B:	Delivery:

Quantity	DESCRIPTION	UNIT	Amount
5	Interkal 10" ESM Seats (Royal Blue)	$ 75.00	$ 375.00
1	(Pair) Endcaps	$ 40.00	$ 40.00
1	Hardware Kit	$ 50.00	$ 50.00
1	Shipping		$ 200.00
	TOTAL MATERIALS DELIVERED		$ 665.00
	***** Installation On Separate Quote By Vine & Branch LLC***		
	Above prices are good for 30 days.	**TOTAL**	$ 665.00

A 10% Retainage allowed on disputed accounts until resolved, 90% due as per above terms.

A SERVICE CHARGE AT THE RATE OF 1.5% PER MONTH WILL BE ADDED ON PAST DUE ACCOUNTS

Signing this quotation denotes a contract when accepted and approved and will be subject to terms and conditions of this quotation and Page 2 general terms & conditions.

Return signed original of this quotation and Page 2 general conditions to place a order, If sales tax is not applicable, please provide certificate of exemption.

Seller

Signature

Print Name

Purchaser

Signature

Print Name

TOADVINE

TERMS AND CONDITIONS - PRICE QUOTE

1. **Entire Agreement:** The terms and conditions as hereinafter written shall supersede the terms and conditions of Buyer's order, invoices or any other document in the event of contradiction or inconsistency herewith and no understanding, agreement, term, condition, or trade custom at variance herewith shall be binding on the Seller, unless expressly accepted in writing. Acceptance of delivery of any shipment hereunder shall constitute acceptance of Seller's terms and conditions.
2. **Delivery and Risk of Loss:** This quote is based on current freight rates and the price for materials is subject to adjustment in the event that a change in such rates affects Seller's cost of performance hereunder. All materials shipped in accordance with the terms and conditions described in this quote are F.O.B. place of shipment.
3. **Credit, Terms of Payment, and Order Acknowledgment:** The quote is conditioned upon acceptance by Seller and approval of Buyer's, credit and/or credit arrangements satisfactory to Seller. Interest at the rate of one and one half percent (1½%) per month or the maximum rate allowed by law whichever is less, will be charged on past due accounts. Seller may suspend the credit arrangements and refuse shipment whenever Seller believes Buyer's credit is unsatisfactory, unless and until satisfactory assurances for payment to Seller are made. The collection notion is undertaken on any unpaid amounts. Buyer agrees to pay all costs of collection and reasonable attorney fees.
4. **Storage Fees:** A charge of $50 per day storage fee will be made for materials being held for Buyer's disposition.
5. **Taxes:** Unless otherwise specified, prices do not include sales, use, excise or similar taxes or duties. If Seller should be required to pay the same, the prices will be increased accordingly.
6. **Delays and Force Majeure:** Seller's shipping dates are approximate and Seller shall be given a reasonable time in which to make delivery of materials. In no event shall Seller be liable for any delay or damages due to occurrences or circumstances beyond Seller's control. Seller is not subject to any liquidated damages.
7. **Unloading and Demurrage:** All unloading shall be done by Buyer. Buyer shall bear all costs of all demurrage for delays in unloading and responsibility for damages to person or property resulting from such unloading. Damages in shipping noted at time of delivery.
8. **Examination of Materials:** Buyer shall examine materials promptly upon receipt of delivery from the carrier. It is the buyer's responsibility to inventory all items received. Buyer must notify Toadvine Enterprises (A) within two (2) working days of receipt of materials of any shortages, damage or discrepancies from the "Bill of Lading or Freight Bill" and (B) within seven (7) working days of receipt of materials of any shortages or discrepancies from the "Packing List." Failure to advise Toadvine Enterprises constitutes Acceptance of the materials and shall relieve Seller from any claim by Buyer for shortages, damages, workmanship or quality and shall constitute a waiver by Buyer of all claims with respect to said materials.
9. **Warranty:** Subject to the provisions as to notice in paragraph 8 above, materials are guaranteed to be substantially free from defects on material and workmanship under normal use and service for a period of one (1) year from invoice date. THE FOREGOING WARRANTIES ARE EXPRESSED IN LIEU OF ALL OTHER REPRESENTATIONS, PROMISES OR WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THE MERCHANT ABILITY, SUITABILITY OR FITNESS FOR PARTICULAR PURPOSE OF THE MATERIALS SOLD, DELIVERED AND FURNISHED. IN NO EVENT WILL SELLER BE LIABLE FOR INTERRUPTION OF BUSINESS, LOSS OF PROFITS, INDIRECT OR CONSEQUENTIAL
10. **Maximum Liability and Indemnifications:** To the fullest extent allowed by law, Seller's maximum liability to Buyer and to any and all other persons or entities, for injury or death, damage or destruction to property occurring inconnections with the performance of this quote for any and all reason, shall be limited to the sale price of the materials sold. All other remedies, unless expressly set forth herein, are hereby expressly waived by Buyer, and Buyer acknowledges that the exclusion of other remedies is neither unreasonable, nor unconscionable. Buyer agrees to investigate, defend, indemnify and hold harmless Seller from any amounts claimed or incurred, including reasonable attorney's fees, with or without lawsuit, by any person or entity against Seller for any reason in connection with or arising out of the performance of this quote.
11. **Compliance with Applicable Laws:** Seller certifies that its materials are produced in compliance with the Fair Labor Standards Act as amended, the Fair Employment Practices Law, as amended, and the regulations and orders issued pursuant thereto. It is the buyer's responsibility to determine compliance with all state and local laws and building codes.
12. **Lien Rights and Security Interest:** Seller retains any and all lien rights available to the fullest extent allowed by law. Buyer hereby grants Seller as a security interest in the materials sold hereunder (and any proceeds there of) which are deemed to be personal property and further agrees to execute and delivery such additional documents relating to the creation and perfection of such security interest to secure all obligations of payment of the Buyer hereunder as the Seller my request.
13. **Seller's Remedies:** In the event of default by Buyer (1) Seller or upon early cancelation of the contract shall be under no obligation to continue the described work or make any further deliveries; (2) Seller may seek remedies in accordance with Article II of the Uniform Commercial Code and any applicable law; (3) Seller may recover from Buyer the cost of any services and materials prepared or furnished. These remedies shall be deemed cumulative and the exercise of any remedy shall not excludeany other remedy.
14. **Assignment and Delegation:** The rights and obligations of the parties under this proposal may not be assigned or delegated, absent written agreement.
15. **Severability:** If any of the terms and conditions of this quote are found to be unenforceable, the remaining terms and conditions shall remain in full force and effect. If any provision herein is more restrictive than permitted by applicable law, that provision shall be enforced to the extent permitted by applicable law.
17. **Cancellation Fees:** If materials are ordered pursuant to this contract and the Buyer cancels this contract, Buyer shall be responsible for the cost of purchase and storage of materials. If both the Seller and Buyer come to mutual agreement on the cancellation of the contract…..

Initial _____

Quotation To: Anchorage School
Heather Rivera
11400 Ridge Rd
Louisville, KY 40223

Re: Bleacher Seat Install

Date: 1/29/2025

Customer Phone: 502-333-8501
Customer Fax:
Sales Rep.: Ben Toadvine
Phone: (502) 241-6010
Fax: (502) 241-2288

Terms:	Net on Completion	F.O.B:	Job Site	Delivery

Quantity	DESCRIPTION	UNIT	Amount
1	Remove First Row Seats - (1 Section 5 Total Seats)		
1	Install New Interkal 10" ESM Royal Blue Seats & Endcaps		
	Total Removal & Installation		$ 750.00
	***** Client to Keep Old Seats For Future Repairs***		
	***** New Royal Blue Seat Color Will NOT Match Old Seat Color Perfectly***		
	Above prices are good for 30 days.	TOTAL	$ 750.00

A 10% Retainage allowed on disputed accounts until resolved, 90% due as per above terms.

A Service Charge at the rate of 1.5 % per month will be charged on Past Due Accounts.

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Seller

Signature

Print Name

Purchaser

Signature

Print Name

P.O. Box 188 ~ Fisherville, KY 40023

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10. **Maximum Liability and Indemnifications:** To the fullest extent allowed by law, Seller's maximum liability to Buyer and to any and all other persons or entities, for injury or death, damage or destruction to property occurring inconnections with the performance of this quote for any and all reason, shall be limited to the sale price of the materials sold. All other remedies, unless expressly set forth herein, are hereby expressly waived by Buyer, and Buyer acknowledges that the exclusion of other remedies is neither unreasonable, nor unconscionable. Buyer agrees to investigate, defend, indemnify and hold harmless Seller from any amounts claimed or incurred, including reasonable attorney's fees, with or without lawsuit, by any person or entity against Seller for any reason in connection with or arising out of the performance of this quote.
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Initial_____

Inbox

BT

Ben Toadvine
To You

Feb 3

The cost to replace the 2nd row understructure on the one bank would be –

(2) Righthand row two horse- $535 ea
(2) Lefthand row two horse - $535 ea

Total parts - $2140
Shipping - $550

Installation - $1975

Ben Toadvine
P: (502) 912-9496 | C: (502) 593-9994
A: P.O. Box 190 Fisherville, KY 40023
E: ben@toadvine.com | W: toadvine.com
SEATING • ATHLETIC EQUIPMENT • VIDEO SCOREBOARDS

Design Guidance for Education Facilities: Prioritization for Advanced Indoor Air Quality

Version 2.0

Developed by

ASHRAE Technical Committee 9.7, Educational Facilities

ASHRAE®

Peachtree Corners

This document was developed by
ASHRAE Technical Committee (TC) 9.7, Educational Facilities.
ASHRAE TC 9.7 is concerned with the application of heating, ventilating, air-conditioning, refrigeration, life safety, and energy conservation systems to educational facilities.

Primary Contributing Authors

Raj Setty, PE, CxA, LEED AP
Christopher Ruch
Corey Metzger, PE
Tom Jacknisky
Melvin Glass, PE
Kyle Hasenkox
Keith Hammelman, PE
Itzhak Maor, PE, PhD
Catherine Tinkler

Contents

Intent and Scope

This guidance document is a tool for the design professional and mechanical contractor. It is intended to help guide the discussion with school personnel on options available to improve indoor air quality (IAQ) based on regional needs and available funding as well as to provide guidance to owners, operators, designers, and professional service providers on how to best implement IAQ improvements, including risk mitigation strategies, in educational facilities. It will also help facilitate discussion between designers and stakeholders, identify minimum recommendations, and discuss further considerations to improve IAQ and reduce the transmission risk of infectious pathogens and other contaminants of concern. This guide is consistent with other ASHRAE publications and will be updated to align with other standards as they are adopted or updated.

This guidance is intended to assist in the retrofit of existing facilities or as a baseline for new facilities. It is not intended to replace or supersede other documents, including, but not limited to, other standards such as ASHRAE Standard 62.1 or the proposed ASHRAE Standard 241. Instead, this guidance is intended to illustrate principles and practical considerations within the existing framework to mitigate risk. HVAC professionals should use this guidance in conjunction with all relevant bylaws, codes, and standards.

Purpose

This document should be used to prioritize decisions related to heating, ventilating, and air-conditioning (HVAC) system design and operation for existing facilities (commissioning, maintenance, improvement, and retrofit projects) and new facilities to improve indoor air quality while limiting energy consumption.

IAQ upgrades can improve learning outcomes and mitigate the risk of transmission of airborne pathogens within the educational environment.

This guide is intended to help qualified professionals, including HVAC engineers; commissioning agents; testing, adjusting, and balancing (TAB) providers; and facility managers assess existing facilities and identify appropriate design decisions for new facilities. Every school, and its HVAC systems, is unique and requires its own distinct solutions. This document provides prioritization themes but does not replace the efforts of a qualified professional in assessing each facility's unique characteristics.

This document is broken into several sections including Prerequisite Tasks, Very High Priority Tasks, High Priority Tasks, and Medium Priority Tasks. Within each of these sections are steps or HVAC system strategies for consideration, typically with base minimum and advanced IAQ strategies, targets, or requirements.

The "base minimum" recommendations, beyond code requirements, should be implemented to meet a minimum level of air quality and risk mitigation. These strategies were developed through collaboration and review by members of ASHRAE Technical Committee 9.7, Educational Facilities, and members of the Epidemic Task Force (ETF) Schools Team. The recommended strategies have been implemented across many educational facility systems worldwide.

The "advanced IAQ" recommendations are generally believed to represent best practices that may not be appropriate for all applications but are worth consideration for adoption to improve beyond the base minimum recommendations. Various combinations of these strategies have been implemented in facilities to address concerns related to airborne pathogens and indoor air quality in general.

Prioritization for Advanced IAQ: Checklists

Complete	Prerequisite Tasks
	Ventilation verification of HVAC airside components

Base	Improved	Advanced	Very High Priority Tasks
			HVAC equipment filtration upgrade
			HVAC for wellness/nurse suites for pre-K–12
			Classroom and assembly space air distribution effectiveness

Base	Advanced	High Priority Tasks
		IAQ sensors with data aggregation platform
		New HVAC equipment to achieve ASHRAE-recommended air change rates (ACH)
		Classroom-level air cleaning
		Restroom exhaust and air filtration upgrades
		Staff training and documentation organizational platform
		UV-C/UVGI for air handlers

Base	Advanced	Medium Priority Tasks
		Humidification and dehumidification systems
		Energy efficiency offset control schemes for advanced IAQ
		Operable windows

Prioritization for Advanced IAQ: Budgetary Guidelines

Low	High	Units	Prerequisite Tasks
$0.35	$0.75	ft^2	Ventilation verification assessment
$15,000	$25,000	Building	Budgeting and planning

Low	High	Units	Very High Priority Tasks
$0.30	$1.50	cfm	HVAC equipment filtration upgrade
$350	$500	ft^2	HVAC for wellness/nurse suites for pre-K–12
$0.20	$0.35	ft^2	Classroom and assembly space air distribution effectiveness

Low	High	Units	High Priority Tasks
$0.50	$1.00	ft^2	IAQ sensors with data aggregation platform
$5.00	$10.00	ft^2	New HVAC equipment to achieve ASHRAE-recommended ACH
$1000	$2000	Classroom	Classroom-level air cleaning
$1500	$3000	Restroom	Restroom exhaust and air filtration upgrades
$1500	$2000	Cost/person/week	Staff training and documentation organizational platform
$0.35	$0.70	cfm	UV-C/UVGI for air handlers

Low	High	Units	Medium Priority Tasks
$1.50	$4.00	cfm	Humidification and dehumidification systems
$15,000	$35,000	Site	Energy efficiency offset control schemes for advanced IAQ
$1500	$3,500	Window	Operable windows

Note: The budgetary numbers are to be used for capital planning and does not substitute for an actual design and construction bid process. The general ranges can be adjusted based on local and climatic conditions. Users should budget 5% yearly escalation in the cost ranges after 2023. Budgets will vary based on the age and condition of the school and HVAC systems. Budget costs assume minimal architectural work. Structural, phasing, temporary equipment, electrical or plumbing upgrades, extensive demolition of existing system, and replacement of specialty finishes are not included in the ranges.

Prerequisites

Establishing an IAQ building-level improvement plan is a process that involves several components. These prerequisites are about establishing objectives and existing conditions (where applicable). Without these initial steps, it is not possible to develop a comprehensive strategy to mitigate risk and maintain a high level of IAQ. It is important to understand that these strategies reduce, but do not eliminate, the potential for airborne transmission and must be used as part of a comprehensive layered risk management approach. It should also be noted that while the current focus may be on SARS-CoV-2/COVID-19, improving indoor air quality in education facilities will have similar benefits for other airborne pathogens, and studies have shown reduced absenteeism and better performance from students in facilities with better indoor environments.

The first step is to determine the appropriate level of risk tolerance/mitigation and associated general system operating characteristics. Once this step has been completed, the required scope of work for existing facilities or new facilities should be developed. Factors include, but are not limited to, identifying and prioritizing buildings needing improvements, which systems are currently in place, and whether those systems function as intended. Much of the initial data collection can be completed by reviewing existing records and documentation where available. The data may come from record drawings, manuals, control systems, personnel interviews, or maintenance records. The initial data collection process may be shared between facility stakeholders including administrative, maintenance and operations, and HVAC professionals as needed to collect the summary of the systems to be analyzed.

From this initial facility and equipment list, a scope of work can be generated to verify the system performance. An HVAC professional should be engaged to help develop the plan for assessment of the existing equipment and establish a ventilation verification and testing and balancing of HVAC airside components plan. A combination of the records and verification reports will create an accurate picture of the existing systems and their condition.

Next, an initial assessment of HVAC risk can be determined using site-specific risk analysis tools such as the Wells-Riley Equations, Equivalent Outdoor Air Rate Calculator, and/or other assessment tools. The resulting analysis should give an estimate of the risk in specific spaces and may help develop an equitable strategy between facilities and spaces with varying configurations. There are several mitigation strategies that effect other components of risk, such as common areas, but the establishment of a summary of the existing conditions and discussion of risk acceptance are critical in the development of a comprehensive plan, which is why they are considered prerequisites to the process. While variations of these prerequisites will exist in different facilities and areas, the inclusion of this process and the discussion of it between stakeholders and HVAC professionals is foundational in the process.

Ventilation Verification of HVAC Airside Components (Existing Facilities Only)

Overview

Perform a physical assessment of existing HVAC infrastructure and provide a written condition assessment. Verify operation and conditions of existing systems. This baseline assessment must be performed by a skilled, trained, and certified technician. Upon completion, the assessment should be submitted to an HVAC design professional for determination of adjustments, replacements, repairs, and upgrades. Where possible, this can be compared to record drawings, manuals, and noted deficiencies in performance.

Involved Parties

A skilled, trained, and certified technician performs the physical assessment in coordination with facilities personnel and a qualified design professional, as defined by state or provincial guidelines.

Procedure

Refer to Additional Guidance for sample ventilation verification assessment test sheets and method of procedures (MOP). Sample procedures should be altered to meet local requirements, updated recommendations, and site-specific equipment.

Base Minimum

For All Airside Systems

- Document filter Minimum Efficiency Reporting Value (MERV) values and ensure proper installation with minimum bypass air.
- Physically verify and document ventilation rates. Adjust the ventilation rates to accommodate the building elevation and corresponding air density per ASHRAE Standard 62.1, *Ventilation and Acceptable Indoor Air Quality* (6.2.1.1.3).
- Physically verify demand control ventilation (DCV) operates as intended. A minimum of 10% sampling is acceptable for verification. If carbon dioxide is used as a surrogate for occupancy, confirm sensors are installed at space level (not in common return) and confirm calibration of sensors (minimum of five per facility or 10%).
- Document initial and periodic calibration procedure and implement with calibration period not to exceed five years.
- Air distribution: Measure a minimum of 10% of all zones/inlets/outlets for a cfm sampling. These should be representative of the overall HVAC system. Zones measured should be representative of zones in system (closest and furthest from equipment, interior and exterior spaces, etc.).
- Document building differential pressures of rooms temporarily occupied by sick students and staff (i.e., nurses' isolation rooms). Pressure should be read between space of concern and adjacent occupied area(s).

Figure 1 Testing and balancing of HVAC airside components.
Source: www.nemionline.org/testing-adjusting-and-balancing-hvac-systems-an-overview-of-certification-agencies/

- Document existing sequence of operations (SOP/SOO) and operational controls.
- Document ambient outdoor CO_2 conditions and differential to indoor spaces. Trend the CO_2 levels over the duration of peak occupancy. If CO_2 levels exceed recommended limits (typically outside air level +750 ppm set point or 1100–2000 ppm) for 90 minutes, further recording should be implemented. Recommended limits are based on ASHRAE TC 9.7 member author's design experience.
- Perform testing of PM2.5, PM10, and VOC levels in a minimum of 10% of the spaces hourly during occupied times over a minimum period of one week.
- Verify that equipment is operating as outlined in the SOP/SOO.
- Report and remediate any issues and coordinate with the qualified design professional.

Exhaust

- Air distribution: Survey a minimum of 10% of all exhaust inlets, with measurements taken in areas that will represent operation throughout the system. Ensure that systems are all operating in occupied mode.

Limited or No Existing Mechanical Ventilation

In cases where there is limited or no existing mechanical ventilation, the assessment should focus on available strategies to provide ventilation including, but not limited to, operable windows and building chases. Provide the qualified design professional with documentation for future ventilation improvements for concurrence.

Advanced IAQ

For All Airside Systems

- Determine air handler capability to accommodate MERV 13 filter.
- Verify physical ability to increase ventilation above scheduled value.
- Verify physical ability to override and/or disable the DCV.
- Measure 100% of all air distribution inlets/outlets.
- Document building pressure relationships of all rooms as recommended by your HVAC professional.
- Test a minimum of 10% of sensors for accuracy and document the drift of the sensors in comparison to handheld sensor readings. Calibrate sensors.
- Verify operational controls respond correctly.
- Schedule a periodic physical ventilation verification assessment of primary HVAC systems every five years.
- Establish a verification and calibration program to confirm operation of sensors.

Exhaust

- Survey 100% of all air distribution exhaust inlets for a sampling.

Additional Guidance

ASHRAE TC 7.7, Testing and Balancing.

Meyers, F., and T. Pistochini. 2020. Testing, adjusting and balancing HVAC systems: An overview of TAB certification agencies. WCEC technical report. Davis, CA: University of California Davis Western Cooling Efficiency Center. https://wcec.ucdavis.edu/wp-content/uploads/TAB-Technical-Report-051220.pdf.

- Associated Air Balance Council (AABC).
- National Environmental Balancing Bureau (NEBB).
- Testing, Adjusting and Balancing Bureau (TABB).

IEQ Guidelines. 2022. Copy of all IAQ guidelines reports. https://ieqguidelines.org/table.html.

NEMI. 2022. Sample ventilation verification assessment test sheets. https://www.nemionline.org/vvr-for-contractors/.

NEMI. 2022. Ventilation verification specification. https://www.nemionline.org/ventilation-verification-specification/.

Ruch, C., and T. Pistochini. 2021. White paper: Proposed ventilation and energy efficiency verification/repair program for school reopening. NEMI/University

of California Davis Energy and Efficiency Institute. https://ucdavis.app.box.com/v/ProposedVentilationProgram.

UC Davis Energy. 2020. Importance of ventilation in schools. YouTube video, produced by University of California Davis Western Cooling Efficiency Center. https://www.youtube.com/watch?v=F9hB9BgonHs.

Budgeting and Planning

Overview

HVAC system baseline assessment—ventilation verification of HVAC airside components—should be conducted prior to this budgeting exercise if "need-based" is the primary factor in determining funding allocations. When prioritizing IAQ projects and budgeting, stakeholders should evaluate a matrix of need to provide a basis for the funding allocation and project scopes.

The main approaches and factors to consider when creating an equitable plan for improving IAQ across a portfolio of schools are as follows:

- Facility-based approach—disburse funding equally by school
- Need-based approach—disburse funding based on the greatest need as determined during the ventilation verification assessment of HVAC airside components
- Student-based approach—disburse funding based on a per capita ratio
- Risk-mitigation approach—disburse funding to create HVAC-centric projects that reduce the probability of transmission both in the classroom and schoolwide

Involved Parties

Design engineers, facility managers, architects, building operations staff, facility assessment professionals, and local health officials.

Facility-Based Approach

For school systems or multi-facility funding allocation challenges, the facility-based approach simply divides the available funding by the number of facilities, thereby providing an equal amount of funding per building/site. Once the funding allocation has been determined for the school or school system, the projects determined by the prerequisite ventilation verification assessment will be addressed.

Need-Based Approach

The need-based approach is derived from the prerequisite ventilation verification assessment of HVAC airside components, which allows for the school's HVAC systems to be ranked in order of greatest need of IAQ intervention. The physical assessment determines the existing HVAC infrastructure's ability to meet design intent and minimum regional requirements. The goal of this approach is to bring all school buildings to a common standard of IAQ, which will most likely entail varying funding allocations per school. Based on the equipment condition and determined IAQ goal, some schools may require a majority of the available

funding while other schools may receive minimal funding due to unbalanced needs discovered in the ventilation verification assessment.

Student-Based Approach

The student-based approach allocates funding based on each school's student population. The stakeholders divide the total funding available by the school system enrollment to create a per capita allocation amount. The per capita amount is then applied to each school's enrollment. Once the funding allocation has been determined for the school, the projects determined by the prerequisite ventilation verification assessment will be addressed. It is recommend that a sample matrix be created. An example is provided below:

Approach	Weighted Factor	Score	Total Score
Facility-based			
Student-based			
Need-based			
Risk-mitigation			

Reduction of the Probability of Transmission

An IAQ risk assessment should be performed as part of the basis of design for any IAQ upgrade project.

Designers and engineers should evaluate their design approaches for effectiveness in reducing the risk of transmission, and educational facilities should have an understanding of the expected results. A number of calculation tools can be used to compare HVAC options to balance effectiveness and budgetary constraints. It is recommended that stakeholders determine the acceptable level of risk as defined by their governing bodies. For example, based on a risk assessment of a school, it may be determined that the deployment of air cleaners in each classroom provides the fastest, most economical method of increasing the clean air exchange rate, thereby reducing the probability of infection from airborne pathogens.

The following list provides some examples of available risk analysis tools. The site-specific strategy employed should be developed in collaboration with stakeholders and the HVAC professional. Note that inclusion of these calculators is to provide examples of risk assessment tools and is not an endorsement of the tool itself.

- 2020 COVID-19 Aerosol Transmission Estimator
- Harvard–CU Boulder Portable Air Cleaner Calculator for Schools, v1.3
- SETTY-5.2, Small Space Airborne Transmission Infection Rate Estimator

Once the acceptable level of risk has been determined for the school, the projects determined by the prerequisite ventilation verification assessment will be addressed.

Very High Priority Tasks

HVAC Equipment Filtration Upgrades

Overview

By improving the filtration in the air handlers, it is possible to decrease the chance of aerosolized viral particles being spread through the air distribution system.

While higher filtration is more effective, it may not be practical, because there are diminishing returns in improvement of particulate removal and increases in static pressure and cost. Additionally, existing equipment may have several limitations such as fan static capacity. Higher levels of filtration are better; however, research has determined that diminishing returns in the effectiveness of particle removal begin at MERV 13 to MERV 14 filter ratings.

An increase from MERV 8 or MERV 11 represents a substantial increase in the efficacy of filtration of small infectious particles. Filter frame size should be evaluated by your HVAC professional to handle the filter upgrade. If the filter frame cannot be increased, proceed with the highest level MERV filter that will

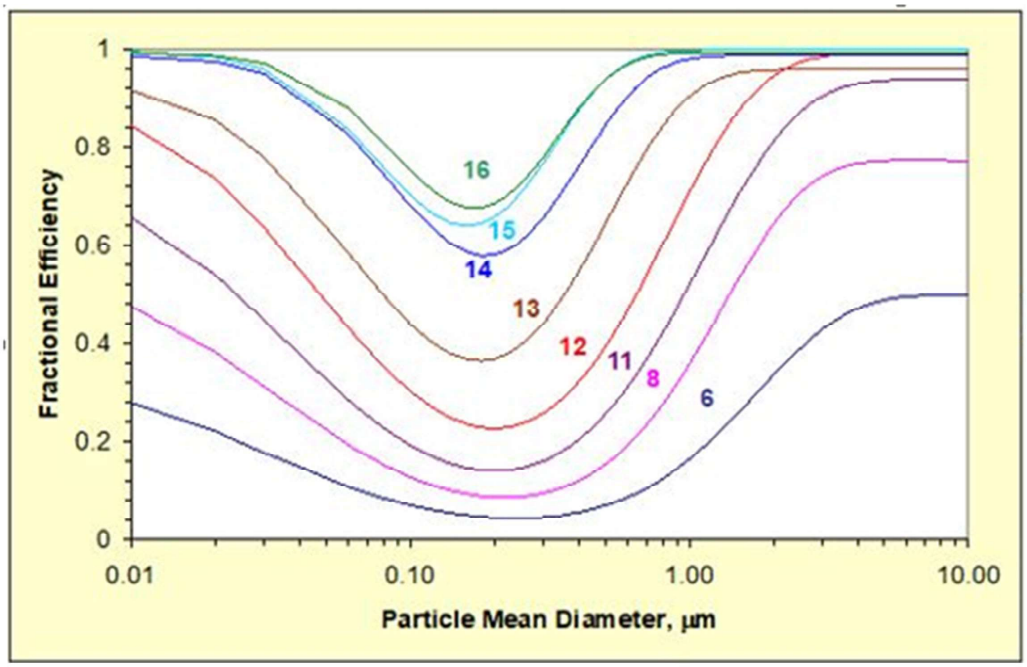

Figure 2 MERV filter models.

Source: Kowalski, W.J., and W.P. Bahnfleth. 2002. MERV filter models for aerobiological applications. Air Media, Summer.

not require the equipment or ductwork to be changed. The introduction of new filters may create higher O&M and energy costs plus a higher pressure drop, the impacts of which should be reviewed by your HVAC professional.

Involved Parties

Design engineers, facility managers, architects, TAB contractor/technician, and building operations staff.

Base Minimum

- Assess existing filtration levels and create an inventory of existing filtration efficiency (per ASHRAE Standard 52.2) and ventilation volumes.
- Assess ventilation system capacity for higher levels of filtration, including motor and physical dimensions of air handlers.
- Apply the highest MERV filter for the HVAC units (local, central, and DOAS) given limitations with increased pressure drop. MERV 13 is the recommended minimum.
- Create and follow safe procedures for filter maintenance and operations per the Occupational Safety and Health Administration (OSHA) and ASHRAE Standard 180.
- Verify airflows after filtration level changes.
- Monitor loading pattern on filters after changes and adjust filter change schedules to meet new loading patterns.
- Label all filters with the manufacturer's name showing the MERV rating and date of filter change.

Advanced IAQ

- Make duct modifications where required to ensure that a minimum level of MERV 13 is reached in all areas and MERV 14 where possible.
- Consider adding differential pressure sensors to monitor the status of filters.
- Consider alternate filter locations in return duct or grille, but consider static pressure drop implications and relationship with outside air dampers.
- Consider the addition of a prefilter to extend primary filter life.
- Consider UL-listed electrostatic devices.
- Consider adding HEPA filters in critical/ higher density areas with lower outside air volumes.
- Consider additional treatment technology to inactivate airborne infectious aerosols (refer to the ASHRAE Epidemic Task Force's document for reopening schools and universities for additional guidance).
- Consider having facility staff who perform filter change-out procedures to be trained for proper installation and maintenance of new filters and air cleaning systems.

Additional Guidance

ASHRAE. 2017. ASHRAE Standard 52.2-2017, *Method of testing general ventilation air-cleaning devices for removal of efficiency by particle size*. Peachtree Corners, GA: ASHRAE. https://www.techstreet.com/ashrae/standards/ashrae-52-2-2017?product_id=1942059.

ASHRAE. 2021. ASHRAE position document on filtration and air cleaning. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/about/position%20documents/filtration-and-air-cleaning-pd-feb.2.2021.pdf.

EPA. 2022. What is a MERV rating? https://www.epa.gov/indoor-air-quality-iaq/what-merv-rating.

UC Davis Energy. 2021. The importance of filtration in schools. YouTube video, produced by University of California Davis Western Cooling Efficiency Center. https://www.youtube.com/watch?v=ycgLBUfIM_c.

HVAC for Wellness/Nurse Suites for Pre-K–12

Overview

This section focuses on the educational facility's wellness/nurse suite where students with medical issues are placed during the period prior to them being transferred out of the facility. It is intended to be a transitory space to temporarily hold potentially infectious persons. Due to the operation of many facilities, this space is often located at or near the central office, which also acts in a security role by controlling access to the facility. The combination of keeping a potentially infectious person near a specifically designed point where all traffic is being routed presents an increased level of risk, and additional consideration of strategies to mitigate this risk may be warranted.

The facility size should be considered along with its location, risk tolerance, and facility operation. A larger facility may have a medical professional occupying the suite, while in smaller facilities, this task may be completed by persons with some first aid training and consist of a less complex approach.

This section refers to pre-K through grade 12 facilities. For post-secondary facilities, refer to ASHRAE Standard 170 or other standards, as appropriate. Due to the increased possibility of an infected person entering a nurse's suite, greater caution and a higher level of air quality must be designed and installed similar to an airborne isolation room in a hospital. While there are degrees of protection, air should not be recirculated from this space to other occupied building areas.

Isolation of a nurse's suite should consist of architectural barriers and controlled pressure relationships between areas to mitigate the risk of airborne transmission. The pressure of the space should be positive to outside but negative to adjacent spaces, as this approach should reduce risk to the occupants. It is important to consider the pressure relationships, air changes, space exhaust, and operational policies and procedures.

Furthermore, the design approach should accommodate the safety and protection of the attending nurse or staff. When locating a nurse's isolation suite, the safe and efficient movement of a sick person from the nurse's suite out of the building needs to be considered to minimize the release of pathogens in the building.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

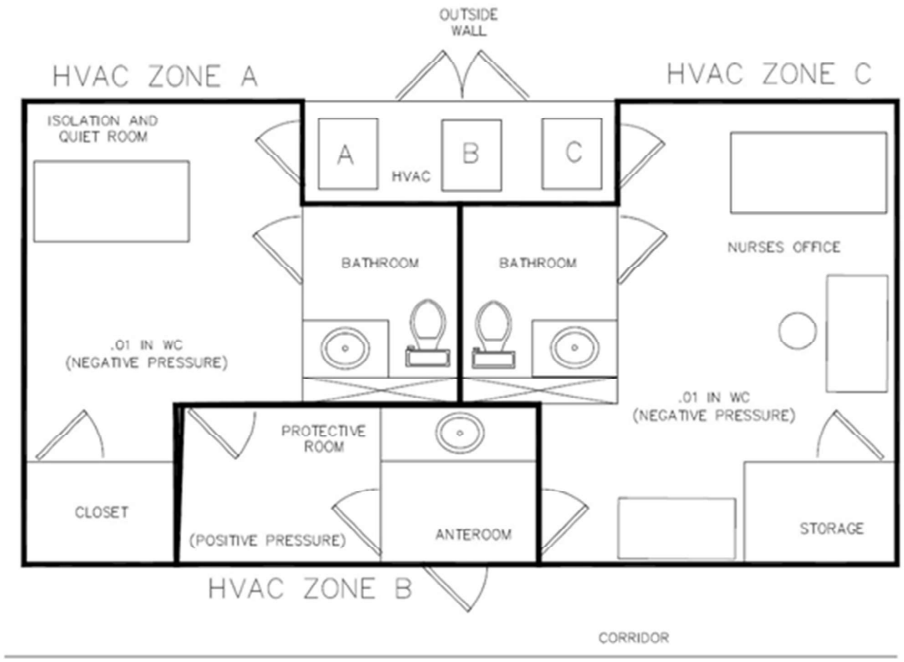

Figure 3 Indicative wellness/nurse suite prototype configuration.
Source: Raj Setty/ASHRAE Epidemic Task Force. 2021. Schools and universities. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-reopening-schools-and-universities-c19-guidance.pdf.

Base Minimum

- Wellness/nurse office or suite (any space intended for occupancy by individuals who are sick or suspected to be sick) should be maintained at a negative pressure with respect to corridors and adjacent spaces.
- Air may be recirculated within the space only but may not be returned and recirculated to other spaces. All air leaving the space should be exhausted to outdoors. Exhaust air may pass through energy recovery devices serving other building areas being exhausted, as long as systems comply with ASHRAE Standard 62.1. Exhaust air intakes should be fully ducted to intakes in space.
- Air recirculated within the space should be filtered through filter media with minimum MERV rating of 13.
- Maintain a minimum air change rate to space of six total air changes per hour (ACH) and minimum of two ACH of outdoor air. All air in the waiting areas and the isolation room should be exhausted when building or space is occupied.
- Special attention should be given to proper location of supply air diffusers and return/exhaust air grilles.

Improved IAQ

- Create a school/building-specific nurse's isolation suite. The number of isolation rooms will depend on the school programming requirements.
- Do not mix supply air and return air from isolation room with any other spaces when in isolation mode.
- Maintain a minimum clean ACH of 6 in all conditioned spaces in the nurse's suite, 10 ACH in the waiting room, and 12 ACH in the isolation room(s). All air in the waiting areas and the isolation room should be exhausted when building or space is occupied.
- Exhaust directly to outdoors. Follow ASHRAE Standard 62.1 requirements to avoid re-entrainment of contaminated air. If there is a concern of recirculation, HEPA filtration on exhaust could be added.
- The nurse's suite should be under negative air pressure in relation to building corridors and adjacent spaces.
- Follow applicable ASHRAE Standard 170's most recent tables for general outpatient spaces (Table 8-2) and 2019 California Mechanical Code (Ventilation).
- Supply air should have a minimum of MERV 13 or higher filtration.
- Special attention should be given to proper location of supply air diffusers and return/exhaust air grilles (low return is recommended). In the isolation room, the exhaust grille should be located close to the patient in the proper elevation.
- Provisions for biohazard waste and personal sanitation including, but not limited to, hand wash, showers, water closets, etc.
- Provisions for PPE storage and application to mitigate the risk of PPE becoming contaminated.

Advanced IAQ

- Create school/building-specific nurse's isolation suite(s) based on the unique school population.
- 100% OA dedicated outdoor air unit (DOAU) with air-to-air energy recovery (no cross contamination/carryover in the energy recovery heat exchanger). The unit should be capable of switching to recirculation/minimum OA when applicable with the ability to provide and control the desired thermal conditions (space temperature and humidity).
- Treat as Airborne Infectious Isolation (AII) per ASHRAE Standard 170 and *ASHRAE Handbook*, Chapter 9 (2019).
- ACH = 12 to 20.
- Add UVGI to dedicated HVAC unit or other approved disinfection technology. Upper air room (with fan as an option) UVGI can be also considered, specifically in critical areas such as isolation and waiting rooms.
- Dedicated bathrooms that should be kept under negative pressure in relation to adjacent spaces.
- Nurse's station infirmary beds should be defined based on the population of the school (typically 1 bed /200 students).
- Recommend locations of nurse's office HVAC on an exterior wall.
- Maintain pressure relationship for room, ante room, and corridor.
- Directional airflow designer to consider the airflow pattern.

- Establish an annual verification program to confirm airflows and pressure relationships by a certified technician.
- Follow maintenance and operations schedule established in ASHRAE Standard 62.1.
- Add a separate power supply for all equipment and ventilation to standby power system.
- Provide permanently mounted sensors for IAQ monitoring and occupancy. At minimum, parameters such as CO_2, total volatile organic compounds (TVOCs), PM2.5, and PM10 should be monitored.

Additional Guidance

ASHRAE. 2017. ASHRAE Standard 170-2017, *Ventilation of healthcare facilities*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/standards-and-guidelines/standards-addenda/ansi-ashrae-ashe-standard-170-2017-ventilation-of-health-care-facilities.

ASHRAE. 2022. ASHRAE Standard 62.1-2022, *Ventilation and acceptable indoor air quality*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2.

ASHRAE Epidemic Task Force. 2021. Schools and universities. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-reopening-schools-and-universities-c19-guidance.pdf.

NIEHS. Handout 1: Infection control checklist for risk assessment and precautions for construction & renovation. https://tools.niehs.nih.gov/wetp/public/Course_download2.cfm?tranid=9806.

Classroom and Assembly Space Air Distribution and Dilution Effectiveness

Overview

While it is possible to identify the location of the potential infector in some applications, that is not applicable in a classroom. Any occupant may potentially be an infector. Given that the potential infector could be anywhere in the room, the best applied strategy should ensure there are no direct drafts that could concentrate infectious aerosols. Maintaining good mixing will also reduce thermal stress and conform to energy standards such as ASHRAE/IES Standard 90.1 for discharge air temperature requirements.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

Base Minimum

- Ensure air grilles and diffusers are in good operating condition and are not configured such that they will create drafts.

- For modifications or new distribution systems, follow ASHRAE/IES Standard 90.1, which limits discharge temperature to 20°F (11°C) above room temperature.
- Design intent should minimize cross-flow between occupants but maximize room volume dilution.
- Minimum outside air should not be substituted with increased ventilation effectiveness strategies.
- Review temporary dividers impact on air distribution to avoid creation of drafts and concentrations of flow.

Advanced IAQ

- Follow ASHRAE Standard 55 requirements to maintain a maximum of 5.4°F (3°C) of temperature difference between the head and foot level of the space and air velocity.
- The *ASHRAE Handbook—HVAC Applications* recommends mixing; however, care must be taken to minimize transfer air among occupants.
- Consider vertical separation in flow patterns including, but not limited to, supply air high and return air low, underfloor air distribution (UFAD), and displacement ventilation (DV). Different strategies should be analyzed for different operating conditions in climate zones where both heating and cooling operation will be required during occupied periods.
- Air cleaners may be considered to improve IAQ, but their impact on existing distribution effectiveness should be reviewed.
- CFD modeling can be used to consider different approaches and model various classroom configurations and desk arrangements.

Additional Guidance

ASHRAE. 2019. ASHRAE/IES Standard 90.1-2019, *Energy standard for buildings except low-rise residential buildings*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standard-90-1.

ASHRAE. 2020. ASHRAE Standard 55-2020, *Thermal environmental conditions for human occupancy*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy.

High Priority Tasks

IAQ Sensors with Data Aggregation Platform

Overview

IAQ sensors distributed throughout the building will provide a baseline IAQ profile of the entire building. The goal of this section is to inform practitioners on how to prepare sensors and interpret readings for an IAQ-centric HVAC system. The driving force for our industry is energy efficiency, which has been the predominant underlying engineering design dogma. This must now be balanced with a high level of indoor air quality for the health and welfare of the learners. The best way to balance IAQ and energy efficiency is to deploy a suite of IAQ sensors to provide a data-driven approach to proper HVAC operations.

The designer must, at a minimum, evaluate $PM_{2.5}/PM_{1.0}/PM_{0.5}$, CO_2, temperature, TVOCs, and humidity, which all paint a picture of the optimal air quality for the teaching space. Baseline should be created in spaces that reflect a minimum of six months of data collection through both occupied and unoccupied times. Sensors should be UL 2905 compliant.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

Base Minimum

- IAQ sensors deployed at all HVAC main central air handling stations during all periods of occupancy.
- IAQ sensors deployed at 10% of the classrooms to provide an IAQ profile of the distribution systems.
- Readings should be taken daily, and trending data shared with a BMS or web/cloud-based data repository and reporting platform. Design team to set thresholds for CO_2, TVOCs, and PM levels. Thresholds should incorporate time elements and be established on local outdoor air quality as the baseline.
- Monitor $PM_{2.5}$, CO_2, temperature, TVOCs, and humidity.
- Establish an ongoing testing and verification program as per Table 8.1 in ASHRAE Standard 62.1:

  Inspection/Maintenance Task

  ad. Verify the accuracy of permanently mounted sensors whose primary function is outdoor air delivery monitoring, outdoor air delivery verification, or dynamic minimum outdoor air control, such as flow stations at an air handler and those used for demand control ventilation, including CO_2 sensors. A sensor failing to meet the accuracy specified in the O&M manual shall be recali-

brated or replaced. Performance verification shall include output comparison to a measurement reference standard consistent with those specified for similar devices in ASHRAE Standard 41.2 or ASHRAE Standard 111.

Advanced IAQ

- IAQ sensors deployed throughout the building at no less than one sensor per 3000 ft^2.
- Readings should be taken every five minutes and trending data shared with a BMS.
- Data aggregation and analysis software to be provided to create an IAQ daily profile.
- BMS should calculate the $PM_{2.5}$, CO_2, temperature, TVOCs, humidity levels of degradation from peak occupancy to baseline normal levels. HVAC should be capable of adjustments to increase clear air delivery rate (CADR) levels to bring the classroom IAQ to baseline levels within 60 minutes of peak. Baseline algorithms should take IAQ alarms and adjust HVAC sequences for flushing, higher ventilation, or airflow changes to improve the IAQ in real time. Possibly incorporate totalizers for number of hours room is outside of specified parameters so that either scheduling or equipment can be modified to improve IAQ.
- Consider monitoring PM_{10}, $PM_{1.0}$, and different types of volatile organic compounds.
- Physically verify sensor accuracy annually.
- Consider revising control strategy to maximize IAQ. If there is good outside quality air of a suitable temperature and humidity, maximize outdoor air.

Additional Guidance

AIRNOW. 2022. Air quality index (AQI) basics. https://www.airnow.gov/aqi/aqi-basics/.

ASHRAE. 2022. ASHRAE Standard 62.1-2022, *Ventilation and acceptable indoor air quality*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2.

CDC. 2019. NIOSH pocket guide to chemical hazards. https://www.cdc.gov/niosh/npg/npgd0103.html.

EPA. 2022. Creating healthy indoor air quality in schools. https://www.epa.gov/iaq-schools.

IEQ Guidelines. 2022. Copy of all IAQ guidelines reports. https://ieqguidelines.org/table.html.

UC Davis Energy. 2020. Importance of ventilation in schools. YouTube video, produced by University of California Davis Western Cooling Efficiency Center. https://www.youtube.com/watch?v=F9hB9BgonHs.

New HVAC Equipment to Achieve ASHRAE-Recommended Air Change Rates

Overview

New HVAC systems should be designed to comply with the most current adopted mechanical and building codes within the jurisdiction where the facility is located, including the code-required minimum ventilation standard. In the absence of a code official or authority having jurisdiction over the design and construction of a new HVAC system, or an adopted code, ASHRAE recommends designing the systems to provide the minimum ventilation rates in the breathing zone or ventilation effectiveness breathing zone as determined using Table 6-1 in ASHRAE Standard 62.1, *Ventilation and Acceptable Indoor Air Quality*.

Your HVAC professional should review system capacity, review air delivery rates to determine the highest MERV filtration for reducing contagions, replace or upgrade filters where needed, and verify that replaced or upgraded filters are installed correctly. Furthermore, clean air delivery rates should be calculated based on filtration, dilution, and disinfection.

Involved Parties

Design engineers, facility managers, and building operations staff.

Base Minimum

As determined in accordance with Table 6-1 in the current or relevant ASHRAE Standard 62.1, MERV 13 filters for all recirculated air. Based on the prerequisite ventilation assessment, unit motor capability and the filter manufacturer's availability must be addressed prior to filter changes. The HVAC professional should perform detailed calculations per ASHRAE guidance to account for CADR and ventilation effectiveness in the breathing zone to refine the design.

Air Distribution

Design systems to provide well-mixed air. Avoid air velocities that create drafts or create airflow across or from one occupant to another.

Breathing Zone

Breathing zones, as defined in the relevant or current ASHRAE Standard 62.1, should be considered when determining distribution effectiveness

Space Total Air Changes Per Hour

To have a target CADR for the purposes of distribution and ventilation effectiveness, design engineers should strive to achieve three to six ACH minimum during occupied periods. The maximum should be based on design loads.

Reduced volume during unoccupied periods is acceptable to conform to energy code requirements.

Air Cleaners

Consider air cleaners with HEPA filtration to supplement ventilation systems and distribution design to ensure minimum space air change CADR levels are met. This can include multiple air cleaners positioned to best provide air cleaning.

Noise

Design systems for maximum 40 dB in classrooms.

Equipment Motor Horsepower

Include a safety factor when sizing fan motors so the unit accommodates an increase of 25% above design external static pressure in the future.

Advanced IAQ

For Dedicated Outdoor Air Systems

Design the systems (equipment size and air distribution network) so they can be set to a pandemic mode of operation and deliver 30% more ventilation air than the code or base minimum. Filter ventilation air with MERV 13 filters.

For Central Station Air Handling Systems

Design the systems (equipment size and air distribution network) so they can be set to a pandemic mode of operation and deliver 30% more ventilation air than the code or base minimum. Filter all outdoor air and recirculated air with MERV 13 filters.

Design units with 100% outside air economizers so units can provide 100% ventilation during times of the year when outside conditions can meet the HVAC loads in the building and maintain thermal comfort.

Space total air changes per hour: six to eight ACH.

Air Cleaners

Consider air cleaners with HEPA filtration to supplement ventilation systems and distribution design to ensure the minimum space air change CADR levels are met. This should include an air cleaner positioned above the teacher's desk or area the teacher should occupy the most during a class.

Additional Guidance

ASHRAE. 2022. ASHRAE Standard 62.1-2022, *Ventilation and acceptable indoor air quality*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2.

Hear-it.org. 2022. School noise detrimental to hearing and learning. https://www.hear-it.org/school-noise-detrimental-hearing-and-learning.

Classroom-Level Air Cleaning

Overview

Air cleaners are intended to work with building ventilation systems and are not to be used as a substitute for building ventilation. While they may assist in

removing infectious particles, they can present additional challenges and risks in the space.

Benefits

The use of in-room air cleaners (either portable or permanently installed) may help reduce concentrations of airborne particulate, including airborne pathogens, from occupied spaces. In-room air cleaners utilizing HEPA filtration may effectively remove nearly all airborne pathogens passing through the unit filter

Concerns

While in-room air cleaners are likely to help reduce airborne pathogen concentrations, they also have implications for operations in the spaces served. Sound power levels, potential negative impacts to space air distribution effectiveness, maintenance personnel safety, and maintenance requirements all need to be considered.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

Base Minimum

Target code-required ventilation (ASHRAE Standard 62.1 requirements or equivalent), good air distribution, and increased filtration efficiency.

Design Considerations

For buildings achieving the minimum actions above, addition of in-room air cleaners may be considered on a case-by-case basis to achieve the owner's defined level of risk tolerance. Each type of classroom use case should be included in the design of air cleaners that will accommodate the peak occupancy. For example, music rooms and conference rooms should be evaluated for higher air cleaner deployments.

Limited or No Existing Mechanical Ventilation

In cases where there is limited or no existing mechanical ventilation, provide in-room air cleaners to provide maximum non-infectious air delivery equivalent (NIADE) rate. Consideration must be given to air distribution in space, sound power levels, and maintenance procedures.

Advanced IAQ

Introduce terminal or portable all-electric HEPA/UV machines in each classroom.

Design Considerations

Target highest achievable NIADE rate for units that will not generate excessive noise or negatively impact space air distribution (should not create drafts that direct air across one occupant and toward others). Ensure flow patterns maximize mixing of air in classrooms.

Maintenance Considerations

- Relevant additions to maintenance schedule and operations training.
- Develop maintenance policies for new/added equipment such as local air cleaners, humidifiers, additional filtration in mechanical equipment, etc.

Portable Unit Specifications

- UV-C light, minimum of 1200 microwatts/cm^2
- HEPA filter
- Cfm adjustable from 200 to 400 cfm
- Noise sound level under NC 35
- Power 110-volt plug in

Suggested Guidance for Portable Classroom Air Cleaner Installation and Operations

- Air cleaner location
  - Place the air cleaner in a centralized location and as close to the main building HVAC return air grilles as possible.
  - For rooms with unit ventilators or HVAC units located near the windows, place the air cleaner in the center of the room.
  - If there is noise or there are safety concerns with the electrical wires, place the air cleaner near the teacher. Generally, adults can generate more infectious particles than children under 14.
  - Make sure the airflow pattern is one way, from occupants to return air. We want to minimize the recirculation of air amount occupants.
  - Location should be adjusted as the classroom furniture is reconfigured. Place the air cleaner near the maximum number of students.
- Air cleaner speeds during class
  - Make sure the air cleaner meets the classroom acoustics requirement and does not hamper the students' ability to hear the teacher.
  - Units have adjustable speeds. Utilize the lower speeds if there are acoustical issues; otherwise, operate at maximum acoustically suitable speed.
  - Turn on units at maximum speed one hour before any occupied event or start of class.
  - If there are any noticeable smells from cleaning products, run the units until the smell dissipates. Cleaning products can increase the level of TVOCs, which can be harmful at high concentrations.
  - Ensure unit placement will not cause additional interaction between occupants and the equipment.
- Air cleaner speeds after class
  - Air cleaner should be running at the full speed allowed during class break and between classes for a minimum of 10 minutes.
  - Turn units off one hour after space is cleaned or is unoccupied.
  - Operate units at maximum speed after class.
- Air cleaner operations for weekends

- Keep units off during unoccupied times (i.e., weekends) unless TVOC levels are high.
- Turn air cleaners on one to two hours prior to class occupancy on Mondays, if possible, at maximum speed.

Additional Guidance

Allen, J., J. Cedeno-Laurent, and S. Miller. 2020. Harvard-CU Boulder portable air cleaner calculator for schools v1.3. https://docs.google.com/spreadsheets/d/1NEhk1IEdbEi_b3wa6gI_zNs8uBJjlSS-86d4b7bW098/edit#gid=1882881703.

ASHRAE. 2021. ASHRAE position document on filtration and air cleaning. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/about/position%20documents/filtration-and-air-cleaning-pd-feb.2.2021.pdf.

ASHRAE. 2021. In-room air cleaner guidance for reducing Covid19 in air in your space/room. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/technical%20resources/covid-19/in-room-air-cleaner-guidance-for-reducing-covid-19-in-air-in-your-space-or-room.pdf.

Restroom Exhaust and Air Filtration Upgrades

Overview

Restrooms present a challenge and risk in most schools. With the configuration of most restrooms, it is not possible to maintain social distancing requirements and the spaces are higher traffic.

When a cohorting strategy is applied, restrooms are often overlooked, though they are used by all groups, presenting a risk of transmission between otherwise isolated groups.

Additionally, toilet flushing and other activities may generate aerosols that may convey infectious particles. Due to the increased risk in these locations, there may be additional consideration warranted to mitigation.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

Base Minimum

- Ensure that all washroom fans are operating correctly and confirm that air volumes are in accordance with ASHRAE Standard 62.1.
- Ensure that washroom exhaust systems are operating continuously during occupied periods and before and after the primary occupancy period.
- Ensure that doors opening and closing will not negatively impact airflows in the washroom. This is relevant where the washroom depends on transfer air.

Advanced IAQ

- Consider application of upper UVGI systems such as recirculating troffer style systems and passive upper air UVGI.

- Consider using air cleaners to achieve two additional air changes in bathrooms.
- Consider using particulate sensors.
- Consider expanding exhaust ductwork grilles to be placed above each water closet. Where possible, installing grilles in the wall closer to the fixture and breathing zone is preferred but may not be possible in many locations.
- Consider increasing exhaust rates to 15% above 62.
- Consider lowering water closet partitions to floor.
- Consider touchless plumbing fixtures.

Additional Guidance

ASHRAE. 2022. ASHRAE Standard 62.1-2022, *Ventilation and acceptable indoor air quality*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2.

Staff Training and Documentation Organizational Platform

Overview

A dedicated school system-level program for IAQ should be established. A maintenance and operational sequence must be adopted and strictly followed to ensure pathogen mitigation efforts and general IAQ objectives are maintained. Safety and health of all staff and students should be the fundamental basis for all maintenance schedules. All maintenance procedures, schedules, adjustments, repairs, upgrades, and replacements should be documented to provide transparency for all stakeholders.

Stakeholders

The maintenance should be assigned to a skilled, trained, and certified workforce. The building automation system (BAS), if applicable, should include data logging and summary reports to identify issues and make energy efficiency improvements that do not degrade performance. However, all staff should be aware of the agreed upon operational plans of the facility to ensure the designed benefits are achieved.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

Base Minimum

Safety and Risk

All maintenance procedures should be evaluated for safety, given site-specific equipment and associated safety concerns. Added safety procedures should be in alliance with OSHA.

Develop a Primary Maintenance Schedule

ASHRAE Standard 62.1, Chapter 8, Operations and Maintenance, provides the minimum maintenance activity and frequency for ventilation system equipment and associated components.

Advanced IAQ

Develop a Comprehensive IAQ and Risk Mitigation Program

Similar to water quality testing, an air quality testing and monitoring system should be established. Each jurisdiction should base their IAQ and risk mitigation program on the goals of "good" air quality in their local region. The program profile should account for outdoor contaminants as well as indoor pollutants. The program should establish HVAC upgrades as part of the capital planning effort to build systems to improve the air quality in the classroom environment. These systems should consider increased ventilation, better air filtration, better distribution of clean air, air cleaners, and continuous monitoring.

Develop a Comprehensive Maintenance Schedule

ASHRAE Standard 180 establishes minimum HVAC inspection and maintenance requirements that preserve a system's ability to achieve acceptable thermal comfort, energy efficiency, and indoor air quality in new and existing commercial buildings. All maintenance personnel should consult ASHRAE Standard 180 to develop a detailed site-specific plan.

Acceptable IAQ parameters should be developed in collaboration with your HVAC professional and relevant authorities having jurisdiction.

Additional Guidance

ASHRAE. 2018. ASHRAE Standard 180-2018, *Standard practice for inspection and maintenance of commercial building HVAC systems*. Peachtree Corners, GA: ASHRAE. https://www.techstreet.com/ashrae/standards/ashrae-180-2018?product_id=2016639.

ASHRAE. 2022. ASHRAE Standard 62.1-2022, *Ventilation and acceptable indoor air quality*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2.

ASHRAE Epidemic Task Force. 2021. Schools & universities. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-reopening-schools-and-universities-c19-guidance.pdf.

NEMI. 2022. Ventilation verification specification. https://www.nemionline.org/ventilation-verification-specification/.

OSHA. 2022. Personal protective equipment. https://www.osha.gov/personal-protective-equipment.

UV-C/UVGI in Air Handling Equipment

Overview

UVC/UVGI equipment has been shown to be very effective in deactivating viruses and other infectious agents. These systems produce light that may be harmful to occupants, so they should be installed such that they will not affect the occupants whether being installed inside an air handler, in the upper air zone of the room, or in a recirculating configuration.

Properly sized and installed UVC/UVGI equipment may act as a supplemental factor in the room's clean air delivery, but it is important that it not replace proper outside air ventilation as defined in ASHRAE Standard 62.1.

UVC/UVGI needs to be serviced regularly to ensure that the bulbs stay clean and have not been affected by changes in temperature. The expected service life of many of the bulbs will require regular changes, so access and cost should be considered along with the additional heat generated by the lamps themselves. As more LED technology is developed, it is likely that the cost and maintenance costs of the equipment will be reduced.

Involved Parties

Design engineers, facility managers, and building operations staff.

Base Minimum

- Consider UV-C/UVGI in spaces that have high occupancy/frequent changeover where it may not be practical to achieve recommended air volumes.
- UV-C/UVGI should be designed in coordination with a professional to ensure the proper level of disinfection is occurring based on the airspeed and UV-C intensity of airside equipment.
- Provide a UVC fan motor interlock to energize UV-C only when the fan is operational.
- Provide a UV-C and access door safety interlock. UV-C should de-energize when door is opened for service.
- Create a dedicated UV-C installation schedule with the following minimum specified requirements:
  - AHU tag
  - Location
  - Peak airflow
  - Air velocity
  - Cross sectional area
  - Distance required
  - Distance available
  - System type
  - UV-C dose @ day 365(μW-sec/cm^2)
  - UV-C intensity @ day 365(μW/cm^2)
- Service considerations should be reviewed on each installation to allow for proper maintenance.

Advanced IAQ

- Install UVC/UVGI in recirculated air systems.
- Install high air UVGI in higher volume spaces.

Additional Guidance

ASHRAE. 2015. ASHRAE position document on filtration and air cleaning. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/about/position%20documents/filtration-and-air-cleaning-pd-feb.2.2021.pdf.

For further resources on UVC use, refer to the following:

- International Ultraviolet Association (IUVA)
- U.S. Environmental Protection Agency (EPA)
- Research Triangle Institute (RTI)

ASHRAE. 2016. Chapter 17, Ultraviolet lamp systems. *ASHRAE handbook—HVAC systems and equipment*. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/file%20library/technical%20resources/covid-19/i-p_s16_ch17.pdf.

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Medium Priority Tasks

Humidification and Dehumidification Systems

Overview

Consider maintaining relative humidity (rh) at 40% to 60%. Optimal relative humidity continues to be an area of active research. Dry air below 40% rh has been shown to:

- Reduce healthy immune system function (respiratory epithelium, skin, etc.).
- Increase transmission of some airborne viruses and droplets (COVID-19 still being studied).
- Increase survival rate of pathogens.
- Decrease effectiveness of hand hygiene and surface cleaning because of surface recontamination or disinfectants drying too quickly.

Concerns

If restarting older humidifiers, take care to confirm proper moisture absorption in the airstream.

Visually inspect humidification and dehumidification devices. Clean and maintain to limit fouling and microbial growth. Measure relative humidity and adjust system controls as necessary per ASHRAE Standard 62.1 Table 8-1 (g).

Watch interior spaces to confirm no condensation is occurring, which would permit mold and moisture issues. Reducing economizer operation is not recommended to improve minimum rh if it means losing negative pressure in rooms or losing once-through airflow if those strategies are part of the surge plan.

Ensure adequate maintenance capacity and water treatment is available to safely operate humidifying equipment.

Involved Parties

Design engineers, facility managers, and building operations staff.

Base Minimum

Design Considerations

Indoor relative humidity is a function of seasonal climate and building HVAC. The range of 40% to 60% rh may reduce contagion and help those who are infected. Summer classroom design guidelines: 75°F (24°C)/40% to 60% rh. Primary guidance is to design to 50% rh in summer, depending on the classroom system.

During periods of time that the building is both occupied and unoccupied, it is recommended that maximum humidity levels are addressed to not cause damage to building materials that may be subject to damage at high humidity levels.

Consider monitoring the humidity levels in a few classrooms within the building. Ensure that humidification systems do not generate an increase in particulate matter.

Advanced IAQ

Design Considerations

Winter classroom design guidelines: 72°F (22°C)/40% to 50% rh. Primary guidance in winter is 40% to 50% rh via humidifiers/active humidification (central or local, depending on the classroom/space system). The humidity minimum, humidifier, and sensor location should be made after consideration of envelope design due to the potential for condensation within the building envelope.

The levels of 40% rh may be difficult to achieve in northern colder climates without formation of condensate on glazing or within the building envelope. Review of the building envelope design is crucial to ensure that damage to the building envelope will not be created.

Summer classroom design guidelines: 75°F (24°C)/40% to 60% rh.

Energy Efficiency Offset Control Schemes for Advanced IAQ

Overview

Generalizing for most HVAC systems, with the increase of more ventilation air, except for economizer mode, it is sufficiently likely to expect higher energy usage. As advanced air quality centers around maximizing the ventilation air and disabling demand control ventilation systems, the logical result will be increased energy to condition the increased outside air being brought into the building in both the heating and cooling season.

With 8760 hours in a year, the best approach for energy efficiency during the period of increased ventilation rates is to focus efforts on unoccupied times. In some schools, this will be 6000+ hours per year. The energy efficiency programs put in place should not diminish the indoor air quality by adverse ventilation scheme changes.

Involved Parties

Design engineers, facility managers, building operations staff, and building controls staff.

Base Minimum

Building management system with all HVAC and lighting integrated.

- Focus on unoccupied hours and adjusting sequences to move to minimal energy usage during unoccupied times.
- Air cleaners for occupied mode operations in lieu of increasing ventilation rates.
- Wider temperature bandwidth ranges for occupied zones 5% outside of ASHRAE Standard 62.1.

- Adjust the discharge temperatures from central air handling stations based on the specific climate zone within 2% of ASHRAE Standard 62.1.

Advanced IAQ

- Building management system with all HVAC, plumbing, equipment, and lighting integrated.
- Focus on unoccupied hours and adjusting sequences to move to minimal energy usage during unoccupied times.
- Air cleaners for occupied mode operations in lieu of increasing ventilation rates.
- Wider temperature bandwidth ranges for occupied zones 10% outside of ASHRAE Standard 62.1.
- Adjust the discharge temperatures from central air handling stations based on the specific climate zone within 3% of ASHRAE Standard 62.1.
- Enhanced air quality mode can be implemented into control systems. This mode will revise CO_2 set points, run times, and system operation in accordance with enhanced air quality parameters. This mode can be quickly activated with one button during periods of elevated pathogen risk. Alarms can be configured to occur on a regular basis to ensure that the mode is not left on beyond the intended time frame.
- Incorporate exhaust air heat recovery.

Additional Guidance

ASHRAE. ASHRAE advanced energy design guide—Achieving zero energy series. Peachtree Corners, GA: ASHRAE. https://www.ashrae.org/technical-resources/aedgs/zero-energy-aedg-free-download.

ASHRAE. 2021. ASHRAE Guideline 36-2021, *High performance sequences of operation for HVAC systems*. Peachtree Corners, GA: ASHRAE. https://www.techstreet.com/ashrae/standards/guideline-36-2021-high-performance-sequences-of-operation-for-hvac-systems?product_id=2229690.

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Operable Windows

Overview

Any operable window usage for natural ventilation needs to be addressed and agreed upon with your HVAC professional. Operable windows may be used to supplement mechanical ventilation, or when no mechanical ventilation exists, natural ventilation should be considered with an understanding of limitations. While operable windows by themselves will not provide consistent ventilation rates, there are steps that may be added to improve the ventilation consistency.

Natural ventilation requires either an automated system that is maintained by facilities or a highly trained staff to consistently open and close windows during scheduled times.

Concerns

- Security
- Noise
- Consistency—Natural ventilation rates are dependent on several factors including pressure and temperature differentials.
- Seasonal Consistency—Occupants will be inclined to close the windows during seasonal high and low temperature fluctuations.
- Contamination
- Air Distribution
- Humidity

The best operational control of window opening criteria is to use a BMS with dew point criteria if relevant to local climatic conditions. There should also be provisions for the individual classrooms to have alarms or alerts to close the windows based on dew point or other local criteria. In the absence of these automated controls, please follow the instructions below if the school system is allowing the teachers to open their windows based on their own personal preference.

Involved Parties

Design engineers, facility managers, architects, and building operations staff.

Base Minimum

Natural Ventilation

Natural ventilation should be performed in accordance with the corresponding section within the adopted mechanical code or regional requirements—UMC Section 402.2 or 402 IMC.

Negative Pressure

To provide a more consistent ventilation rate, the classroom can be operated at a negative pressure, relative to the outside. With common windows open, either manual or automatic, an outside air rate can be introduced. If the classroom is independent of other structures, the ventilation rate can be consistent if the same number of windows are opened during operation. If the classroom is attached to other buildings, the exhaust will pull air from outside or from adjacent rooms based on the path of least resistance. A negative pressure can be introduced by adding exhaust fans or taking advantage of existing exhaust fans depending on location.

Develop Manual Window Opening Guideline

Based on regional climate and safety considerations, the guide below may be used as a starting point with school officials.

Classroom windows may be manually opened during class per the following general guidelines during reopening operations.

- Outside temperatures between 50ºF (10°C) and 90°F (32°C): Windows can be opened.

    - HVAC units that are controlled by temperature will automatically adjust. At lower temperatures, there will be excess running of units during occupied hours.
    - Close windows during unoccupied hours and let HVAC systems run per schedule.
- Outside temperatures between 35°F (1.7°C) and 50°F (10°C): Windows may be opened for 15 minutes each hour during occupied times.
    - Close windows when unoccupied.
    - If the classroom starts to feel too cold, adjust to 5–10 minutes open per hour.
- Outside temperatures below 35°F (1.7°C):
    - Windows can be opened at 50% for 15 minutes every 2 hours.
    - If classrooms have no fresh air, open windows at 50% every 15 minutes every hour. Monitor any water piping and sprinkler piping for freeze potential.
    - If the classroom starts to feel too cold, adjust to 5–10 minutes open per hour.
    - Classroom windows MUST be closed during unoccupied hours and weekends.
- Close windows if it is raining or is a humid day to prevent any mold growth.

Advanced IAQ

- Automated natural ventilation systems may be considered to provide consistent open times. Advanced systems may be linked to a variety of indoor and outdoor climate sensors.
- Occupant indicators may be provided to indicate to occupants that the windows should be open.
- Security indicators may be useful to ensure that windows are closed. This may be accomplished with the addition of end switches on the windows to verify that they are closed.

Shaping Tomorrow's Built Environment Today

ASHRAE Positions on

LIMITING INDOOR MOLD AND DAMPNESS IN BUILDINGS

Approved by the ASHRAE Board of Directors November 10, 2021

Reaffirmed by ASHRAE Technology Council October 29, 2024

Expires October 29, 2027

ASHRAE is a global professional society of over 55,000 members, committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration and their allied fields (HVAC&R). ASHRAE position documents are approved by the Board of Directors and express the views of the Society on specific issues. These documents provide objective, authoritative background information to persons interested in issues within ASHRAE's expertise, particularly in areas where such information will be helpful in drafting sound public policy. The documents also clarify ASHRAE's position for its members and building professionals.

Indoor Dampness is a Public Interest Issue

Persistent dampness in buildings contributes to negative health outcomes for occupants. The causes of health-relevant dampness are complex and involve decisions that often overlap responsibilities of different design professions and are affected by decisions of building contractors, owners, operators and occupants.

Why ASHRAE Takes Positions on Indoor Dampness

ASHRAE consensus standards and design guides provide the technical foundation for international building practices and energy codes that balance the need for energy efficiency with the need to keep the indoor environment healthy and comfortable for occupants. The design, construction and operation of buildings' mechanical systems can improve—or can impede—the buildings' ability to recover from normal wetting events by providing ventilation and indoor air that remains free of excessive humidity.

Consequently, ASHRAE's positions, standards and design guidance can help avoid health risks associated with building dampness by alerting and informing those who make public policy, as well as those who make design and operational decisions for buildings and their mechanical systems.

ASHRAE Takes the Positions that:

- Public health authorities have documented consistent associations between damp buildings and increased risks of adverse health effects, including exacerbation of existing asthma, new asthma, respiratory infections and allergic rhinitis (IOM 2004; WHO 2009). In addition, credible researchers have documented a causal link between damp buildings and

exacerbations in children with asthma (Kanchongkittiphon 2015).

- Health risks are increased when materials are persistently or frequently damp[1] (i.e., when indoor dampness has become typical rather than unusual). Indicators that have each been shown to be associated with health-relevant dampness include moldy/musty odors, visible mold growth, water damage, visible moisture and previous floods or leaks (WHO 2009; Mendell 2011; Kanchongkittiphon 2015).
- Persistent indoor dampness is neither normal nor desirable and can lead to health risks for occupants in the short term and ultimately to structural risks. All building professionals, building occupants, public policymakers and regulators should be aware of this fact and take actions that will help keep buildings and their systems as dry as possible, given their normal functions.

ASHRAE Recommends that:

- Policymakers, government agencies and regulators encourage adoption of ANSI/ASHRAE Standard 62.1-2022 as the minimum requirement for humidity control during both occupied and unoccupied hours to help prevent health-relevant indoor dampness in new buildings and systems.
- When planning and designing ***new buildings and HVAC systems***, building owners and HVAC design professionals provide adequate budget, equipment and controls to encourage normal drying of materials by keeping humidity below a maximum dew-point temperature of 60°F (15°C) during unoccupied hours, as required by ASHRAE Standard 62.1-2022.
- In ***existing buildings***, owners, occupants and building operation and maintenance professionals review the early warning signs and detailed risk reduction measures described in ASHRAE's *Damp Buildings, Human Health and HVAC Design* (available at no cost). Two early warning signs can be easily monitored with low-cost instruments, namely gypsum board moisture content that is consistently above 15% WME[2] and indoor air humidity that remains consistently above a dew-point temperature of 60°F.
- ASHRAE committees continue to update standards and guidance to remain consistent with developing knowledge about preventing persistent indoor dampness.

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[1] The word "persistent" describes dampness that has become typical (i.e., the dampness is occurring or reoccurring for days or weeks at a time rather than as infrequent excursions of a few hours above the early warning thresholds described by *Damp Buildings, Human Health and HVAC Design*).

[2] WME = wood moisture equivalent; readings taken in any material, using a meter calibrated for wood.

Mendell, M.J., A.G. Mirer, K. Cheung, M. Tong, and J. Douwes. 2011. Respiratory and allergic health effects of dampness, mold, and dampness-related agents: A review of the epidemiologic evidence. *Environmental Health Perspectives* 119(6): 748-56.

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ASHRAE. 2020. *Damp Buildings, Human Health and HVAC Design*. Peachtree Corners, GA: ASHRAE.

Additional ASHRAE Resources

ASHRAE. 2008. Chapter 7, Mold and Mildew. In *Humidity Control Design Guide for Commercial and Institutional Buildings*. Peachtree Corners, GA: ASHRAE.

ASHRAE. 2009. Chapter 5, Avoiding Bugs, Mold and Rot. In *ASHRAE Guide for Buildings in Hot & Humid Climates*, 2nd ed. Peachtree Corners, GA: ASHRAE.

ASHRAE. 2009. Chapter 17, Avoiding Mold by Keeping New Construction Dry. In *ASHRAE Guide for Buildings in Hot & Humid Climates*, 2nd ed. Peachtree Corners, GA: ASHRAE.

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AIHA. 2020. Recognition, Evaluation and Control of Indoor Mold, 2nd ed. L.L, Hung, S.M. Caulfield, and J.D. Miller, eds. Falls Church, VA: American Industrial Hygiene Association.

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EPA. 2001. Mold remediation in schools and commercial buildings. Washington, DC: U.S. Environmental Protection Agency.

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NIOSH. 2013. *Preventing Occupational Respiratory Diseases from Exposures Caused by Dampness in Office Buildings, Schools and Other Nonindustrial Buildings*. DHHS NIOSH Publication 2013-102. Atlanta: National Institute for Occupational Safety and Health.

DOCUMENT REVISION COMMITTEE ROSTER

The ASHRAE Position Document on limiting indoor mold and dampness in buildings was developed by the Society's Position Document Revision Committee, formed on November 13th, 2020, with Lew Harriman as its chair.

Philip Agee, PhD
Virginia Tech Center for Housing Research
Blacksburg, VA, USA

George DuBose
Liberty Building Diagnostics
Zellwood, FL, USA

Carl Grimes, IEP
Hayward Health Homes
Denver, CO, USA

Lew Harriman
Mason-Grant Consulting
Portsmouth, NH, USA

John Kane, MPP
Boston Public Housing Authority
Boston, MA, USA

Kevin Kennedy, MPH, CIEC
Children's Mercy Kansas City: Environmental Health Program
Kansas City, MO, USA

Mark Mendell, PhD
Lawrence Berkeley National Laboratory
Berkeley, CA, USA

Cognizant Committees

The chair of ASHRAE Technical Committee 1.12 and the chair of ASHRAE's Environmental Health Committee also served as ex-officio members.

Florian Antretter
TC 1.12, Moisture Management in Buildings
Fraunhofer Institute for Building Physics
Holzkirchen, Germany

Luke Leung
Environmental Health Committee
Skidmore, Owings & Merrill
Chicago, IL, USA

DOCUMENT HISTORY

Background

Since 2001, ASHRAE technical committees have examined the common causes of persistent indoor dampness and have published books, reports, consensus standards, and design guidance to assist building professionals in reducing health risks from indoor dampness, as listed in the Additional ASHRAE Resources section of this position document.

The recommendations and requirements contained in those ASHRAE publications now form the basis of guidance published by the United States Environmental Protection Agency, the National Institute for Occupational Safety and Health, part of the Centers for Disease Control and Prevention, the U.S. General Services Administration, the California Department of Public Health, and the American Industrial Hygiene Association (AIHA).

Publication and Revision History

ASHRAE's Technology Council and the cognizant committee recommend revision, reaffirmation, or withdrawal every 30 months. The history of this position document is described below:

***2/6/2005**—BOD approves Position Document titled Minimizing Indoor Mold Problems through Management of Moisture in Building Systems*

***10/22/2010**—BOD approves revised Position Document titled Limiting Indoor Mold Growth and Managing Moisture in Building Systems*

***6/27/2012**—BOD approves revised Position Document titled Limiting Indoor Mold and Dampness in Buildings*

***1/29/2013**—Technology Council approves reaffirmation (with minor editorial updates) of Position Document titled Limiting Indoor Mold and Dampness in Buildings.*

***1/27/2016**—Technology Council approves reaffirmation (with no changes) of Position Document titled Limiting Indoor Mold and Dampness in Buildings*

***6/27/2018**—Technology Council approves reaffirmation (with no changes) of Position Document titled Limiting Indoor Mold and Dampness in Buildings.*

***6/23/2021**—Technology Council approves reaffirmation (with no changes) of Position Document titled Limiting Indoor Mold and Dampness in Buildings.*

***11/10/2021**—BOD approves revised Position Document titled Limiting Indoor Mold and Dampness in Buildings.*

***10/29/2024**—Technology Council approves reaffirmation of Position Document titled Limiting Indoor Mold and Dampness in Buildings.*