VAN ZELM ENGINEERS

McKinley Elementary School

60 Thompson Street
Fairfield, CT 06824

FAIRFIELD PUBLIC SCHOOLS

MCKINLEY ELEMENTARY

Fairfield Public Schools Recommissioning (RCx) and Testing, Adjusting, & Balancing (TAB) Study

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TABLE OF CONTENTS

McKinley Elementary School

FAIRFIELD PUBLIC SCHOOLS RECOMMISSIONING (RCX) AND TESTING, ADJUSTING, & BALANCING (TAB) STUDY

EXECUTIVE SUMMARY

McKinley Elementary School was deemed to be school priority number eleven by Fairfield Public Schools. The following report will indicate the compliance or non-compliance of this school with current International Mechanical Code (2015 IMC) regarding Ventilation for Acceptable Indoor Air Quality.

This School is located at 60 Thompson Street Fairfield, CT and serves as an educational facility for approximately 441 students as of the May 2022 census and up to 145 faculty and staff. The original structure was built in 1928 with classroom and office additions completed in 1951. Fairfield added an additional one-story section to the cafeteria and media center in 1973. In 2000, the roof was replaced with an asphalt, built-up roofing membrane, though later that year and unrelated to the roof work from what can be seen, an envelope study was performed to assess why occupants were becoming ill and the school was temporarily shuttered. Moisture and organic growth concerns were discovered and the school underwent a renovation shortly after to generally improve all building systems including HVAC.

The school ventilation systems comprise mainly of eight AHUs located in several MER rooms and two smaller AHUs (9 and 10). These units are mostly Trane Climate changers, utilizing two pipe chilled water cooling coils and hot water heating coils with system manual change over. Outside economizer with inline Greenheck return/exhaust fans helps to allow for proper shoulder season cooling with outdoor air. The building units do not utilize an energy recovery, which could make it more difficult to increase airflow without increasing costs. These systems did all appear to be operational, however additional review is required to verify proper operation. The Building Automation (BAS) control system consists of Metasys DDC controls. An ALC integrated WebCTRL lays on top of JCI and retains full control of heating plant, which essentially brings this building under ALC control.

We performed our on-site RCx inspection starting on April 14, 2022, and TAB review starting on July 25, 2022. The goal of this study is primarily focused towards addressing the outside air and outside air change rates of the occupied spaces. Although there are code exhaust air requirements for spaces like storage rooms, electrical rooms, mechanical rooms, etc., these spaces are often not directly ventilated with outside air, nor are they required to be since they typically have occupancy totals of zero (actual or expected). These spaces typically do not affect building occupants since they are typically provided with some form of exhaust which drives these spaces negative to the surrounding area. At worst, improper levels of exhaust would drive a negative building further negative, but it does not introduce air from these locations to classroom or office spaces. Should the district pursue additional work for the building including recommissioning, balancing, and controls upgrades, these spaces would be addressed as a component of that process.

Overall, the performance of the building with regard to ventilation was found to be poor and, in most cases, entire sections of the building were not satisfied with enough outside air. Findings from the Retro-Commissioning (RCx) and air-side Testing Adjusting and Balancing (TAB) process found significant issues that should be addressed immediately to improve building environmental control, reduce energy usage, and improve building ventilation compliance with the 2015 version of the International Mechanical Code (2015 IMC). Although there are additional guidelines and recommendations put forward by

organizations dedicated to the research and implementation of healthy buildings that have plenty of overlap with IMC 2015, these were not the driving factors for this assessment. Please be aware that many of these changes on their own will not reduce energy consumption, but rather will increase it; in some cases, this increase could be significant. Measures should be considered that offset this additional energy use with control upgrades that adjust ventilation systems based on use and measured values. The remainder of this report will address these concerns directly and provide a path forward for Fairfield Public Schools.

EVALUATION

For the purposes of this study, the Fairfield Public Schools district had five primary questions about the capability and performance of each of the school buildings. Based on our findings, we have some insight into each of these below.

2015 International Mechanical Code (IMC) Compliance

As the accompanying spreadsheet indicates, most of the individual occupied spaces at this school do not fully comply with the applicable building codes or guidelines regarding indoor air quality and outdoor ventilation. The measured ventilation air being delivered into each occupied space would be considered a worst-case scenario only while utilizing automatic operation. There are a handful of zones that are severely overventilated, which drive the overall ventilation flow numbers for the building up but don't actually improve the ventilation rates for nearby spaces. This is typically because these zones are served by a single, dedicated unit.

The supply of outside air to interior occupied spaces is governed by the 2018 Connecticut Building Code, which is based on the 2015 International Mechanical Code. This code prescribes the flow rate of outside air that must be supplied mechanically to occupied areas based on occupancy classifications. Depending on the type of use of a space, outdoor air flow rates in cubic feet per minute (CFM) per person are defined when the number of occupants within a space is known. When total occupants per space are unknown, the code defines occupant density for each classification type in number of occupants per space floor area. The final flow rate in CFM for every occupied space can thus be calculated. Please note that, although this is a school, some spaces like an office will not be indicated as being part of an "education" occupancy classification because the IMC does not distinguish between an office in an office building, a school, or anywhere else. This applies to nearly every space that is not considered a space for traditional classroom activities including, but not limited to, nurse and healthcare offices, gymnasium, assembly halls, etc.

As an alternative to providing outside air mechanically to occupied spaces, the building code also allows for outside air to enter occupied areas naturally through operable windows. If the area of operable windows for an occupied space is at least 4% of the space's floor area, mechanical ventilation for that space is not required by code. However, although spaces with sufficient operable window area may satisfy code requirements, this is not a realistic way of providing adequate ventilation during periods of cold or hot weather, and this often adversely affects the temperature and humidity levels within the building. In any case, some sort of equipment is provided in every occupied space here including in spaces with operable windows, but whether it was supplying ventilation is a different question.

The amount of outside air supplied to occupied spaces is important for occupant comfort and health because contaminants generated by people and materials in the space must be removed or they will build up to unhealthy levels. Diluting interior air with outside air reduces the concentration of various airborne contaminants, including viral particles that carry the COVID-19 virus and other viral and bacterial contaminants.

Outside Air Flow and Air Change Rate Findings

The "Ventilation Data Calculations" Appendix contains the data from all RCx findings and TAB measurements regarding ventilation within occupied spaces. This data conforms to the requirements within IMC 2015 and the results are calculated based on individual space classification and category. Additionally, these readings rely on the "worst case" scenario, whereby each space is considered fully occupied and the associated air handling units are operating with minimum outside air to satisfy the controlled parameters. The reason for using this method is to ensure that if a building is capable of maintaining required outside air flow in this minimum ventilation mode, it will definitely maintain them when more outside air is introduced. It does not necessarily mean that the units will handle thermal or humidity regulation in maximum ventilation modes. As a caveat, it is important to understand that forcing the worst case is not necessarily typical building operation but it is necessary to discover root issues behind the ventilation control of the building. It is possible that correcting certain issues regarding outside airflow will cause different issues to be revealed, which in turn would need to be addressed.

For the occupied zones within this building, the total minimum required ventilation airflow came out to **15,488 CFM**. The TAB process actually revealed that **16,257 CFM** of outside air is delivered to the spaces, resulting in a **809 CFM** surplus or **105.2%** of the required minimum flow. However, the ventilation calculations revealed that only **11.9%** or **8 out of 67** of the occupied zones actually met the requirements. This means there is a massive disparity between a handful of zones receiving excessive quantities of ventilation air while the rest of the building is completely unsatisfied. A significant quantity of spaces received little ventilation, mostly because the damper minimum positions during occupied mode were set to 0%, but also because the outside air dampers could not open through the controls. The biggest offenders for overventilation include the Cafeteria AHU-1 with 5408 CFM (164.9% of required), the Media Center AHU-6 with 4371 CFM (480.3% of required), and the mechanical room supply air fan with 1935 CFM. Combined, these three spaces alone account for 11,714 CFM or 72% of all ventilation air in the building. Each of these spaces has a dedicated unit as mentioned above, and the units for the remaining spaces in the building had dampers mostly or completely closed down.

A common calculation used for measuring the amount of air flushed through the space every hour is the Air Change Rate (ACH), and for this analysis specifically we are concerned with the Outside Air Change Rate (OACH). At its core, this is a ratio of the volume of air that can theoretically completely fill the volume of each space and how many times it can do that every hour. For example, a 1000 ft^2 room with 10 ft ceilings will have a volume of 10,000 ft^3. If 250 CFM is delivered to this space, that results in 15,000 ft^3 of air. Every hour, the space will be flushed with that much air, resulting in an ACH of 1.5. This number on its own will not determine if a space satisfies code requirements and it does not mean that every molecule of the air in that space has been replaced after the hour, but it helps to give an idea into the type of performance that could be expected and there are guidelines for many space regarding the OACH. While general spaces like classrooms and offices are among the space categories that do not have outside air ACH requirements, these rates help to give some insight into overall performance. Current recommendations prescribe a total ACH of at least 3 throughout the building, without falling below the minimum outside air CFM. Taking the entire building volume and air delivered cycled through the building, which includes outside air and filtered, return air, this building was capable of achieving 4.417 ACH. This is well beyond the recommended 3 ACH, and based on our findings there is definitely potential for the building to increase outside air where there is too little in order to meet the code requirements, but then reduce total unit airflow to save on energy lost on the added outside air. This can be further broken out by spaces that meet or fail to meet code. Among the spaces that failed to meet code, the outside air ACH was 0.383; for spaces that at least met or exceeded code, the outside air ACH was 5.269; the combined outside air ACH for the entire building was 1.548. Special rooms such as a nurse's suite do require an outside air ACH of at least 2 and total ACH of 6, the outside air component of which

was not met in this building (0.692 OACH and 7.741 ACH respectively). This is in addition to other recommendations or requirements such as negative pressure relative to adjacent spaces, extra filtration requirements for recirculated air, space pressure profiles for nurse suite spaces, etc..

Total ACH (RA + OA)	Total OACH (OA/EA)	OACH for zones that do not meet code	OACH for zones that meet code
4.417	1.548	0.383	5.269

Outside Air Flow Improvement Recommendations

Immediate action should be taken for units with outside air dampers fully or mostly closed. These adjustments might be capable through the controls alone, but should be performed with the assistance of a mechanical technician and TAB Contractor to confirm proper control operation and positioning of the unit dampers such that the proper amount of air can be provided. This alone will necessarily improve building performance as a result. The HVAC systems should holistically be rebalanced to current design requirements. This includes a review of the existing BAS system to confirm full equipment operation and communication.

Aside from the above, since the emergence of the COVID-19 virus in December 2019, the specific requirements and precautions taken regarding outside air have become more stringent. For example, ASHRAE has been continuously investigating the transmission of COVID-19 through HVAC systems and has made recommendations on how to adapt existing HVAC systems to minimize transmission of COVID-19. Changes to building systems to address the virus also positively improve the performance of the ventilation systems with handling the filtration of other particulate that directly impacts building air quality. On April 14, 2020, ASHRAE released a document "ASHRAE Position Document on Infectious Aerosols". This report was provided in an Appendix to previous ventilation reports submitted to FPS. ASHRAE also gave a presentation on June 16, 2020, regarding Recommendations and Activities for re-opening schools for the fall 2020 academic semester. These recommendations remain relevant as COVID and other contaminants that impact indoor air quality continue to remain a concern. Although this report is primarily concerned with meeting 2015 IMC for compliance, ASHRAE's insight into addressing the code is invaluable. Their recommendations for reducing the transmission of infectious aerosols through HVAC systems as they apply to schools are as follows:

- Increase outdoor ventilation rates (Dilution) for all zones with deficit minimum outside air by adjusting the outside air damper minimum position of the associated air handling equipment. Generally, more is better, but any changes should follow ASHRAE Standard 62.1 as a minimum and should not overpower the capability of the heating or cooling equipment so as to maintain temperature and humidity requirements in the occupied spaces.
- Filter changes should become more frequent. Current policy indicates a twice-annual filter change at all schools. The filters had been scheduled to be changed at the time of inspection as the last change recorded was October 2021, and almost all of them were very dirty, which decreases the filter's efficiency and forces the unit fans to run at higher speeds (more energy consumption) or to deliver less outdoor ventilation air to the space.

- Increase total air change rates to between 3 and 6 ACH where possible while still satisfying minimum OA ventilation.
- Flush or purge building before and after occupancy for at least two (2) hours, if possible.
- While all units appear to have MERV 13 filters now installed, units that have both final and pre-filters have MERV 13 filters in both positions. Having two of the same efficiency filters in series does not significantly improve the filtration efficiency and mostly just reduces total airflow. MERV 8 pre-filters can be used in double bank racks to act as an inexpensive shield for the more expensive MERV 13 or 14 filters.
- Consider installation of UV-C or bi-polar ionization to recirculating air systems where installation of these systems do not interfere with the unit construction or operation.
- Provide humidification to maintain 40% RH during the heating seasons, if possible.
- Provide dehumidification in the summer to maintain room RH below 60%.
- Supplement poorly or un-ventilated areas with portable HEPA filtration units in classrooms until such time as proper ventilation can be delivered to the space.
- Add low return / high supply airflow paths or utilize displacement ventilation where possible.
- Increase restroom exhaust where possible while maintaining a positive building pressurization to the exterior.
- Perform duct cleaning for existing systems.

Control Sequence Update Recommendations

Without a specific retro-commissioning of the BAS control system itself, it is not possible to tell exactly what systems and components of the BAS needs repair or upgrade, but a cursory review of what was available indicates great need to:

- Repair or replace all faulty equipment controllers and end Input/Output devices.
- Look to program units to provide a pre and post occupancy purge for all occupied spaces.
- Generally, increase airflow to each space or decrease if the supplied air is significantly beyond necessary levels. Decreasing air to some locations might seem counterintuitive but some zones are being supplied with significantly more than 100% of what is required, so backing these down will help move air to where it needs to go. This item should not be addressed without a certified TAB contractor to verify flow adjustments are correct.
- Increase the minimum OA damper position for each unit, where possible.
- Confirm that trending and alarms have been set up for all units and establish alarm points for units operating below required minimum ventilation levels during occupied modes
- Implement CO_2 and Demand Control Ventilation (DCV) sequences for units to adjust ventilation air being delivered automatically and efficiently based on actual individual space occupancy. Not only will these sequences save a substantial amount of money in energy costs, but they remove

the guesswork for facilities and control personnel for how much air each space needs, and code/guidelines incorporate these capabilities into exceptions for blanket minimum outside air flow rates. The implementation of this control strategy is especially vital since increased ventilation to the building will increase all energy costs as it has a direct impact on the heating and cooling systems as well.

Equipment Upgrade or Replacement Recommendations

Where any building areas are not meeting ventilation requirements due to a lack of mechanical ventilation, undersized units or those that are otherwise are in a state of disrepair, or for any units that need to be replaced, we recommend considering Energy Recovery Ventilators (ERV). These do not need to be directly associated with a nearby unit, however, and can often come standalone with additional coils for heating and cooling. Energy Recovery Ventilators are packaged heat recovery units that mostly utilize an air to air heat exchanger to recover waste heat from the exhaust air and transfer it to the outside air, powered by supply and exhaust air fans. ERVs require ducted outside and exhaust air to the outside of the building; the inlet and exhaust air openings should be at least 10 feet apart to comply with the Building Code. Depending on the location, general exhaust fan ductwork could be repurposed for these units. There are two main types of air-to-air energy recovery units: energy wheel and cross-flow heat exchangers. Energy wheel units tend to be more expensive and have some additional operating costs due to the wheel motor, but they have higher heat transfer efficiency than cross-flow units. Both styles of units require filters to protect the heat exchanger media and operate best during peak load conditions. Sometimes an existing unit can be retro-fit with some form of heat recovery system, but it is highly dependent on the unit configuration and requires engineering calculations to determine sizing, including if the current unit fans can accommodate the increased static pressure losses that would be incurred.

Generally, the more outside air that can be supplied to occupied areas, the better. Each existing air handler should have outside air flow rates increased above current setpoints if they can be obtained. Even units that currently meet code requirements for ventilation flow rates could be increased, but should not be increased beyond the capacity of the unit to heat or cool the air. Total space air change rates should also be increased to the extent possible along with increases in outside air flow to better remove contaminants from the air. If a unit at maximum fan speeds is still incapable of providing at least the minimum ventilation or ACH required, then the system should be evaluated further to determine the best solution such a total system modification, or the installation of a self-contained HEPA filtration unit in areas where increasing fresh air is limited.

Supplemental air cleaning technology, such as ultraviolet-C (UV-C) light or bi-polar ionization, is available could be considered if additional disinfection measures are desired. UV-C is short wavelength ultraviolet light that has been found to effectively kill COVID-19 particles. UV-C systems are already used in other HVAC systems where they are installed in air streams to kill bacteria and other harmful living organisms. These systems can be installed relatively easily in already constructed system ductwork or air handlers without major modifications. Bi-polar ionization systems are also installed in ductwork or air handlers and use an electric charge to create a concentration of positively and negatively charged particles in an airstream. These particles cause pathogens to stick to each other and become larger, thus increasing the probability of them being captured by air filters. The charged particles created also leave the ductwork and remain charged when they enter occupied spaces. If the particles come in contact with pathogens in the occupied space, the charge removes hydrogen from the pathogen so that it is no longer able to sustain itself. For this reason, bi-polar ionization is preferred to UV-C air cleaning because bi-polar ionization has the ability to decontaminate pathogens outside of the ductwork whereas UV-C only decontaminates pathogens that enter the ducts.

ASHRAE recommends relative humidity values between 40 and 65% as these values have been shown to hamper the ability of COVID-19 and other pathogens to travel and thrive. When cooling systems are in operation, ensure dehumidification is adequate to keep relative humidity below 65%. During heating system operation, relative humidity values are typically less than 40%. Adding humidification to the existing HVAC systems is often exceedingly difficult and costly; additionally, humidification for HVAC systems can be problematic if not well maintained and adds to operating costs. For this reason, recommendations discussed above should be enacted before humidification is considered.

In order to best confirm that the implementation of the above recommendations is met as well as other improvements, we recommend performing Recommissioning of each school. This is an extensive procedure that will help with fully documenting the building systems, their capabilities, and optimizes the control system to maintain the best performance while conserving the most energy. In general, Recommissioning should be performed approximately once every five years to keep the buildings operating smoothly.

For any unit that operates *only* with 100% outside air (e.g., makeup air units, dedicated outside air units, etc.) MERV 8 filters can be used instead of MERV 13s. This will allow for fan energy savings and increased ventilation without sacrificing indoor air quality. Where any of these units need to be replaced, we recommend considering a unit with some form of energy recovery (either a wheel or cross-flow heat exchanger). This will conserve additional energy and will still allow for systems to operate with more outside air.

Most units allow for some amount of recirculation, so the following are recommendations for upgrading the air handling units:

- Where any unit has a two filter racks where the first has room for 2” filters and the second has room for 4” or greater filters, the 2” filters can be MERV 8 for pre-filtering, but the larger filters should remain MERV 13.
- Based upon our observations HVAC unit filter changes should be performed more frequently. The party responsible for changing the filters should note which unit filters become dirty quicker and should further increase the frequency of changes to those units.
- Consider adding Bi-polar ionization or another means of air disinfection wherever possible.
- Consider investigating the potential of increasing the ventilation air flow rate wherever possible.
- For any defunct units or disabled units needing serious repair or replacement, consider replacing with a unit that has energy recovery (either a wheel or cross-flow heat exchanger). This might require changes to the ductwork or balance of the air system since replacing a mixed air unit with a 100% OA unit might result in less total airflow required.
- All of the items noted within the RCx and TAB field finding appendices should be addressed by the facilities personnel. These items are separated by category: IAQ/Ventilation items, Maintenance items, Control items, and Information Only. While these lists are not a substitute for a full-building commissioning service, these corrections contain many of the significant issues that will quickly improve indoor air quality and energy consumption rates. Some typical issues include, but are not limited to:

- Some of the Mechanical Rooms are being utilized as a return air plenum space, however these rooms have become excessively dusty and dirty so this air is being pulled into the units. Although the units have filters, the filters will not block *everything*, and they will become loaded quicker than if they were direct ducted. If the current arrangement is to remain, it would benefit the school to have the mechanical rooms cleaned thoroughly and continued to be cleaned as they are essentially part of the HVAC system.
- Cleaning all unit coils: Some are in worse shape than others. Cleaning the coils will improve airflow patterns through the coil, increasing coil effectiveness and preventing deterioration due to rust or corrosion.
- Damper cleaning and lubrication: All unit dampers should be cleaned and lubricated and tested throughout their movement range from the BAS. As dampers age, lubrication fails and dirt builds up causing the actuator to need to push harder to move the damper. Too much build-up can result in control actuators failures or broken damper hardware, which would need to be replaced.
- Exterior Insulation: ductwork and piping insulation should have UV-resistant coating or shields. Typically, foil-faced aluminum insulation or banded aluminum jacketing works for this. For exposed refrigerant piping, these should be reinsulated with elastomeric insulation and coated with a UV-resistant paint. This will prevent deterioration from the sun and avoid costly repairs since almost all air handling and refrigerant equipment is located on the roof.
- General Unit Cleanliness: All units should be cleaned to remove any dirt or debris that has accumulated. Some units were observed with loose paper, cardboard, and other materials within the units that can become a breeding ground for bacteria and molds should those materials absorb moisture. Sections of units that have developed rust or corrosion should be kept dry and cleaned with appropriate chemicals for removing the build-up before repainting or repairs tasks.
- Fan Belt Tension and Wheel Alignment: All fan motor pulley's, sheaves and belts should be reviewed for proper alignment and tension. Some motors might need to be repositioned in the unit to fix the tension or adjust for alignment. Some fan wheels also wobble or pulleys could be misaligned. Consider adjust motor positions if out of alignment and installing belt tensioners where possible to extend intervals between belt changes without compromising unit efficiency as the belt wears.

CONCLUSIONS

Fairfield Public Schools has likely taken measures in the past to address identified deficiencies regarding the recommended proper filtration upgrades for indoor air quality (IAQ) improvements, this study found that McKinley Elementary School does not meet the current minimum ventilation requirements per 2015 IMC mainly due to severe underventilation throughout the building. The van Zelm, Wings, and Fairfield Public Schools team will collectively discuss options and estimate costs for correcting issues and code deficiencies discovered as part of this study. The cost analysis portion will be a continual process.

While some recommendations will help improve performance, there are a number of key recommendations that should be implemented immediately since the school is currently occupied. These

include bringing into proper operation the outside air dampers for all units and greatly increasing outside airflow throughout the building. Given the results of this survey, we highly recommend further evaluation to be performed including whole-building Recommissioning, BAS controls upgrade and rebalancing, possibly including engineered ventilation calculations/modifications aid in code compliance and generally better working order.

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APPENDICES

APPENDIX 1 – Issues List

ISSUES LIST

Issue List General Discussion

The following sections within this appendix include observations we made as a part of the study. Some of these items directly impact Indoor Air Quality (IAQ) or Ventilation and, since this is the primary concern of the study, are recommended to be addressed immediately. Other items are overdue/improper maintenance, control system issues, or general observations. Just because an issue is not included in the IAQ/Ventilation sections does not necessarily mean that it will have no effect on improving the building environment, but it is more likely that the effects are minimal or would only indirectly address a concern. In some cases, these could potentially *reduce* overall building outside airflow, even if in such instances it would keep the associated spaces within code compliance. While this might seem counterintuitive, given the concerns, it is a way to manage a healthy, code-compliant building environment while also saving energy.

The nature of this process being one that affects almost the entire building means that a response to this issue list should be through a holistic approach. Any one issue correction on its own might locally improve the condition of the served areas, but if an adjacent, non-functioning unit is also not corrected then the positive effects will be diminished. The interconnectivity of the issues cannot be easily indicated due to the complexity of the built environment, but a thorough review of all issues and an implementation plan will provide better results overall for the building and its stakeholders.

It should be noted that the inspections we performed as part of this study were undertaken during the month of April 2022 , so it is possible that some noted concerns, particularly maintenance items or issues already known about could have been addressed prior to the distribution of this report. Ongoing discussions with Fairfield Public Schools will allow us to update these items as we continue through other schools and into the implementation phase later in the year.

To aid in the process of addressing and tracking these issues, we have included a column indicating when action has been taken by Fairfield Public Schools or a hired contractor to address any individual issues, and will allow the district to document and timestamp issues that have been corrected since the initial inspection.

Indoor Air Quality And Ventilation Issue Findings

Below is a compilation of findings from our commissioning indoor space evaluation, TAB verification effort, and the air handling equipment analysis that relate to indoor air quality or ventilation status of the building. These findings should be considered as a high priority for budgeting and action steps. Many of the listed issues might lend clarity as to why the ventilation findings of throughout were found to be deficient. Addressing these issues individually will not correct any systemic, unit, or building-wide issues related to the IAQ or ventilation of the building..

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (30)
	Open	156 Stage	Airflow	This space has no ventilation or exhaust
	Open	AHU-1	Coils	The unit coil was dirty and needed to be cleaned
	Open	AHU-1	Cafeteria	A sheetmetal screw was found interfering with unit damper operation. This should be removed or relocated
	Open	AHU-2	Dampers	The Outside Air Damper minimum position was set to 0% and the actual damper was found at 0% open
	Open	AHU-2	Gym	This is an AHU that pulls air directly from the MER, and the room is filled with dirt and dust. The MER should be kept clean especially if the units are drawing air from this space.
	Open	AHU-3	Dampers	The Outside Air Damper minimum position was set to 0% and the actual damper was found at 0% open
	Open	AHU-4	Coils	The unit coil was dirty and needed to be cleaned
	Open	AHU-4	Dampers	The Outside Air Damper minimum position was set to 0% and the actual damper was found at 0% open
	Open	AHU-5	Coils	The unit coil was very dirty and needed to be cleaned
	Open	AHU-5	Dampers	The Outside Air Damper actual position was found at 0% open
	Open	AHU-6	Main Office	This is an AHU that pulls air directly from the MER, and the room is filled with dirt and dust.

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (30)
				The MER should be kept clean especially if the units are drawing air from this space.
	Open	AHU-7	Dampers	The Outside Air Damper minimum position was set to 0% and the actual damper was found at 5% open
	Open	AHU-8	Airflow	The return fan for this unit was found off as it had failed
	Open	AHU-8	Dampers	The Outside Air Damper minimum position was set to 0% and the actual damper was found at 5% open
	Open	AHU-8	Cafeteria	This is an AHU that pulls air directly from the MER, and the room is filled with dirt and dust. The MER should be kept clean especially if the units are drawing air from this space.
	Open	AHU-9	Dampers	The Outside Air Damper minimum position was set to 0% and the actual damper was found at 5% open
	Open	AHUs	Drain Pan	AHU drain pans are generally rusty and should be cleaned out
	Open	General	Coils	AHU coils generally need to be cleaned
	Open	SF-2	Kitchen	The kitchen hood makeup air fan SF-2 has the supply duct blanked off
	Open	VAV-7-02	236 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-7-12	184 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-7-18	194 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-7-19	195 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-8-03	214 Classroom	This VAV box read 0 CFM at the BAS during testing

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (30)
	Open	VAV-8-04	215 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-8-05	216 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-8-06	217 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-8-08	219 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-8-15	174 Classroom	This VAV box read 0 CFM at the BAS during testing
	Open	VAV-8-18	181 Art	This VAV box read 0 CFM at the BAS during testing

Maintenance Issue Findings

Below is a compilation of findings from our commissioning indoor space evaluation, TAB verification effort, and the air handling equipment analysis that relate to indoor air quality or ventilation status of the building. The priority level of these findings will vary, and correcting any of them could improve the associated unit's performance, which might have an incidental effect on the indoor air quality or ventilation in the spaces. These issues do not necessarily explain reasons why the ventilation findings of the associated spaces were found to be deficient but should be corrected, nonetheless.

Action Taken	Status	Unit/Zone	Serving/Room Name	Maintenance Issue (06)
	Open	195 Classroom	Noise	There was excessive air noise in this space
	Open	AHU-1	Cafeteria	The unit casing was corroded in some located
	Open	AHU-6	Main Office	The refrigerant piping insulation is destroyed/missing and should be replaced
	Open	FCU-1 AC	242 IDF	This unit was found recirculating only with both split AC units on the wall not running.
	Open	General	Dampers	Many damper seals have failed throughout the units and should be replaced
	Open	MERs	Cleaning	The mechanical rooms are full of dust and debris. It is not clear if the janitors shake the brooms out here. It also appears as though the MERs are also used as plenum space since not all returns are ducted, which could also explain the dust.

Control Issue Findings

Below is a compilation of findings from our commissioning indoor space evaluation, TAB verification effort, and the air handling equipment analysis that relate to the status of the control system within the building. The priority level of these findings will vary, and correcting any of them could improve the associated unit's performance, which might have an incidental effect on the indoor air quality or ventilation in the spaces. Some control issues do affect whether or not facilities or maintenance personnel are informed of issues at systems or equipment, which can result in delays to maintenance or repairs that would otherwise have been quick to correct. These issues do not necessarily explain reasons why the ventilation findings of the associated spaces were found to be deficient but should be corrected, nonetheless.

Action Taken	Status	Unit/Zone	Serving/Room Name	Control Issue (08)
	Open	AHU-5	Dampers	The Outside Air Damper minimum position was set to 50% but the actual damper was found at 0% open
	Open	AHUs	Cleaning	AHU airflow probes need to be cleaned and calibrated to ensure accurate readings can be measured through the controls. Bearing and motor grease was witnessed in excess and it has coated some probes.
	Open	VAV-4-01	115 Principal	The control contractor for ALC had no communication to this box during testing
	Open	VAV-4-05	104 Nurse	The control contractor for ALC had no communication to this box during testing
	Open	VAV-7-13	184 Classroom	The control contractor for ALC had no communication to this box during testing
	Open	VAV-7-16	190 Classroom	The control contractor for ALC had no communication to this box during testing
	Open	VAV-8-12	200 Work Room	The control contractor for ALC had no communication to this box during testing
	Open	VAV-8-19	180 Staff	The control contractor for ALC had no communication to this box during testing

Information Only Findings

Below is a list of the general "information only" findings from the room take-off measurements, TAB verification effort, and the air handling equipment analysis. If a correction can be made to these items, it will not affect improving the indoor air quality or ventilation for occupied spaces. Some of these items might actually speak to *reducing* outside airflow, particularly if a space is significantly overventilated or has inconsistent/large swings in occupancy, in which case their status has been indicated as "Energy Savings".

Action Taken	Status	Unit/Zone	Serving/Room Name	Information Only Findings (01)
	Open	SF-1	Kitchen	SF-1 and SF-2 are swapped based on what the original schedule calls for

APPENDIX 2 – Ventilation Data Calculations

Project Name:	**Fairfield Public Schools RCx & TAB Study**
Project Number:	**2020102.00.11**
Scope	**Ventilation Calculation by Building**
Date	**September 15, 2022**

McKinley Elementary School

VAN ZELM ENGINEERS

Zone Identification																				
												IMC 2015 Ventilation Calculations								
Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1	101	Conference	Offices	Conference rooms	**224**	0%	50%	AHU-5 VAV 5-5	217	9.2	1996	12	5.0	0.06	50	73	**0**	-73	-100.0%	**Fails**	**0.000**
1	102	Office	Offices	Office spaces	**162**	0%	50%	AHU-5 VAV 5-5	145	9.2	1334	5	5.0	0.06	5	34	**0**	-34	-100.0%	**Fails**	**0.000**
1	103	Storage	None	None	**106**	0%	50%	AHU-5 VAV 5-5	75	9.3	698	0	0.0	0.00	0	0	**0**	0	0.0%	N/A	**0.000**
1	104	Nurse	Hospitals nursing and convalescent homes	Patient rooms	**425**	9% - 237	0%	AHU-4 VAV 4-5	358	9.2	3294	3	25.0	0.00	10	75	**38**	-37	-49.3%	**Fails**	**0.692**
1	105	Toilet	Public Spaces	Toilet rooms - public	**-76**	---	---	EF-15	51	8	408	1	0.0	0.00	0	0	**---**	N/A	0.0%	N/A	
1	107	Office	Offices	Office spaces	**124**	9% - 237	0%	AHU -4	97	9	873	2	5.0	0.06	5	16	**11**	-5	-30.5%	**Fails**	**0.756**
1	107A	Storage	None	None	**0**	0%	50%	AHU-5	34	8	272	0	0.0	0.00	0	0	**0**	0	0.0%	N/A	**0.000**
1	108	Main Office	Offices	Office spaces	**917**	9% - 237	0%	AHU-4 VAV 4-4	886	9.2	8151	10	5.0	0.06	5	103	**83**	-20	-19.5%	**Fails**	**0.611**
1	111	Toilet	Public Spaces	Toilet rooms - public	**-75**	---	---	EF-18	50	8	400	1	0.0	0.00	0	0	**---**	N/A	0.0%	N/A	
1	112	Office	Offices	Office spaces	**645**	9% - 237	0%	AHU-4 VAV 4-4	178	8.3	1477	4	5.0	0.06	5	31	**58**	27	89.0%	**Meets**	**2.355**
1	113	MER	None	None	**---**	---	---	----	226	13.8	3119	0	0.0	0.00	0	0	**---**	N/A	0.0%	N/A	
1	114	Office	Offices	Office spaces	**50**	9% - 237	0%	AHU-4 VAV 4-2	211	9.3	1962	6	5.0	0.06	5	43	**5**	-38	-89.5%	**Fails**	**0.138**
1	115	Principal	Offices	Office spaces	**289**	9% - 237	0%	AHU-4 VAV 4-1	237	9.1	2157	5	5.0	0.06	5	39	**26**	-13	-33.7%	**Fails**	**0.723**
1	120	Kindergarten	Education	Classroom (ages 5-8)	**404**	0%	50%	AHU-5 VAV 5-4	892	9.5	8474	20	10.0	0.12	25	307	**0**	-307	-100.0%	**Fails**	**0.000**
1	121	Cust	Storage	Warehouses	**32**	---	---	EF-7	61	9	549	1	0.0	0.06	0	4	**0**	-4	-100.0%	**Fails**	**0.000**
1	122	Toilet	Public Spaces	Toilet rooms - public	**86**	---	---	EF-9	44	8.9	392	1	0.0	0.00	0	0	**---**	N/A	0.0%	N/A	
1	123	Toilet	Public Spaces	Toilet rooms - public	**---**	---	---	---	45	8	360	1	0.0	0.00	0	0	**---**	N/A	0.0%	N/A	
1	124	Storage	None	None	**0**	0%	50%	AHU-5	120	9	1080	0	0.0	0.00	0	0	**0**	0	0.0%	N/A	**0.000**
1	125	Kindergarten	Education	Classroom (ages 5-8)	**110**	0%	50%	AHU-5 VAV 5-3	911	9.5	8655	20	10.0	0.12	25	309	**0**	-309	-100.0%	**Fails**	**0.000**
1	126	Prep	Offices	Office spaces	**0**	---	---	AHU-5 VAV 5-3	89	9.5	846	1	5.0	0.06	5	10	**0**	-10	-100.0%	**Fails**	**0.000**
1	130	Kindergarten	Education	Classroom (ages 5-8)	**281**	0%	50%	AHU-5 VAV 5-2	908	9.5	8626	20	10.0	0.12	25	309	**0**	-309	-100.0%	**Fails**	**0.000**

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McKinley Elementary School

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1	131	Storage	None	None	---	---	---	---	61	9.2	561	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	132	Toilet	Public Spaces	Toilet rooms - public	-93	---	---	EF-11	45	8.9	401	1	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	133	Toilet	Public Spaces	Toilet rooms - public	---	---	---	----	45	8.9	401	1	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	134	Storage	None	None	0	0%	50%	AHU-5	120	9	1080	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1	135	Kindergarten	Education	Classroom (ages 5-8)	222	0%	50%	AHU-5 VAV 5-1	845	9.5	8028	20	10.0	0.12	25	301	0	-301	-100.0%	Fails	0.000
1	136	Prep	Offices	Office spaces	0	0%	50%	AHU-5 VAV 5-1	89	9.5	846	1	5.0	0.06	5	10	0	-10	-100.0%	Fails	0.000
1	139	Mechanical	None	None	---	---	---	---	225	14.3	3218	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	140A	Media Center	Education	Media Center	4749	92% - 4371	100%	AHU-6	2944	20	58880	40	10.0	0.12	25	753	4371	3618	480.3%	Meets	4.454
1	141	Storage	None	None	---	---	---	---	173	9.2	1540	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	142	Computer Lab	Education	Computer lab	970	45% - 436	100%	AHU-9	629	8.9	5598	27	10.0	0.12	25	345	436	91	26.2%	Meets	4.673
1	142	Work Room	Workrooms	Copy, printing rooms	235	92% - 4371	100%	AHU-6 VAV 6-1	185	9.2	1702	4	5.0	0.06	4	31	216	185	594.5%	Meets	7.615
1	143	Office	Offices	Office spaces	129	92% - 4371	100%	AHU-6 VAV 6-1	110	9.2	1012	2	5.0	0.06	5	17	119	102	616.9%	Meets	7.055
1	144	Server	None	None	---	---	---	AC	129	9.3	1148	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	148	Women	Public Spaces	Toilet rooms - public	32	---	---	EF-4	223	8.9	1985	3	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	149	Men	Public Spaces	Toilet rooms - public	41	---	---	EF-4	222	8.9	1976	3	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	150	Gynasium (AHU-2)	Sports and amusement	Gym, stadium, arena (play area)	5883	11% - 802	0% Both	AHU-2	2550	22.5	57375	20	0.0	0.30	0	765	646	-119	-15.6%	Fails	0.676
1	150	Gynasium (AHU-3)	Sports and amusement	Gym, stadium, arena (play area)	1312	11% - 802	0% Both	AHU-3	2550	22.5	57375	20	0.0	0.30	0	765	144	-621	-81.2%	Fails	0.151
1	150A	Gym Office	Offices	Office spaces	42	7.7% - 715	0%	AHU-8 VAV 8-20	150	9.3	1395	2	5.0	0.06	5	19	3	-16	-84.2%	Fails	0.129
1	151	Toilet	Public Spaces	Toilet rooms - public	0	---	---	N/A	63	8.9	561	1	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	152	Storage	None	None	0	---	---	N/A	39	9.3	363	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	153	Storage	None	None	---	---	---	---	39	8.9	347	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	

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Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1	154	Storage	None	None	---	---	---	---	320	8.9	2848	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	156	Stage	Education	Music/theater/dance	---	---	---	---	722	20.8	15018	30	10.0	0.06	35	343	---	N/A		N/A	
1	157	Storage	None	None	---	---	---	---	133	20.8	2766	0	0.0	0.00	0	0	**0**	0	0.0%	N/A	**0.000**
1	158	Storage	None	None	---	---	---	---	144	8.25	1188	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	161	Cafeteria	Food and beverage service	Cafeteria, fast food	**5766**	94% - 5408	100%	AHU-1	3008	16.8	50534	200	7.5	0.18	100	2041	**5408**	3367	164.9%	**Meets**	**6.421**
1	162	Kitchen	Food and beverage service	Kitchens (cooking)	**1148**	86% - 1132	100%	AHU-10	868	8.6	7465	6	0.0	0.00	0	0	**988**	988	0.0%	N/A	**7.941**
1	162A	Severy/ Part of Kitchen	Food and beverage service	Kitchens (cooking)	---	---	---	---	121	8.6	1041	10	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	163	Office	Offices	Office spaces	**90**	86% - 1132	100%	AHU-10	163	8.6	1402	1	5.0	0.06	5	15	**77**	62	421.0%	**Meets**	**3.296**
1	164	Storage	None	None	**77**	86% - 1732	100%	AHU-10	154	7.5	1155	1	0.0	0.00	0	0	**66**	66	0.0%	N/A	**3.429**
1	165	Loading	None	None	---	---	---	---	240	8	1920	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	166	Cust Office	Offices	Office spaces	---	---	---	---	106	8	848	2	5.0	0.06	5	16	---	N/A		N/A	
1	167	Switchgear	None	None	**-550**	---	---	EF-19	166	8	1328	0	0.0	0.00	0	0	**0**	0	0.0%	N/A	**0.000**
1	168	Exterior Storage	None	None	**-364**	---	----	EF-17	130	8	1040	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
1	169	Mechanical Room	None	None	**1935**	100%	100%	SF-1	1197	8	9576	0	0.0	0.00	0	0	**1935**	1935	0.0%	N/A	**12.124**
1	170	Music	Education	Music/theater/dance	**290**	7.7% - 715	0%	AHU-8 VAV 8-14	884	9.2	8133	12	10.0	0.06	35	173	**22**	-151	-87.3%	**Fails**	**0.162**
1	171	Office	Offices	Office spaces	**275**	7.7% - 715	0%	AHU-8 VAV 8-14	142	9.2	1306	1	5.0	0.06	5	14	**21**	7	55.3%	**Meets**	**0.964**
1	172	Storage	None	None	**0**	7.7% - 715	0%	AHU-8 VAV 8-15	315	9.3	2930	1	0.0	0.00	0	0	**0**	0	0.0%	N/A	**0.000**
1	173	Cust	Storage	Warehouses	**0**	---	---	N/A	37	9.3	344	1	0.0	0.06	0	2	**0**	-2	-100.0%	**Fails**	**0.000**
1	174	Classroom	Education	Classroom (ages 5-8)	**1201**	7.7% - 715	0%	AHU-8 VAV 8-15	742	9.3	6901	10	10.0	0.12	25	189	**93**	-96	-50.8%	**Fails**	**0.809**
1	175	Classroom	Education	Classroom (ages 5-8)	**42**	7.7% - 715	0%	AHU-8 VAV 8-16	459	9.3	4269	12	10.0	0.12	25	175	**3**	-172	-98.3%	**Fails**	**0.042**
1	176	Office	Offices	Office spaces	**0**	7.7% - 715	0%	AHU-8 VAV 8-16	94	9.3	874	2	5.0	0.06	5	16	**0**	-16	-100.0%	**Fails**	**0.000**

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					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1	177	Work Room	Workrooms	Copy, printing rooms	**40**	7.7% - 715	0%	AHU-8 VAV 8-16	105	9.3	977	3	5.0	0.06	4	21	**3**	-18	-85.9%	**Fails**	**0.184**
1	178	Storage	None	None	**41**	7.7% - 715	0%	AHU-8 VAV 8-16	134	9.3	1246	0	0.0	0.00	0	0	**3**	3	0.0%	**N/A**	**0.144**
1	179	Kiln	Storage	Warehouses	**-158**	---	---	Kiln Fan EF-9	126	9.3	1172	1	0.0	0.06	0	8	**---**	N/A		**N/A**	
1	180	Staff	Workrooms	Copy, printing rooms	**269**	7.7% - 715	0%	AHU-8 VAV 8-19	560	9.2	5152	1	5.0	0.06	4	39	**21**	-18	-45.6%	**Fails**	**0.245**
1	181	Art Classroom	Education	Art Classroom	**265**	7.7% - 715	0%	AHU-8 VAV 8-17	972	9.3	9040	25	10.0	0.18	20	425	**20**	-405	-95.3%	**Fails**	**0.133**
1	184	Classroom	Education	Classroom (ages 5-8)	**553**	7.6% - 736	0%	AHU-7 VAV 7-13	719	9.2	6615	20	10.0	0.12	25	286	**42**	-244	-85.3%	**Fails**	**0.381**
1	186	Classroom	Education	Classroom (ages 5-8)	**262**	7.6% - 736	0%	AHU-7 VAV 7-14	759	9.2	6983	20	10.0	0.12	25	291	**20**	-271	-93.1%	**Fails**	**0.172**
1	187	Men	Public Spaces	Toilet rooms - public	**0**	---	---	EF-11	187	9	1683	1	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1	188	Classroom	Education	Classroom (ages 5-8)	**168**	7.6% - 736	0%	AHU-7 VAV 7-15	755	9.2	6946	20	10.0	0.12	25	291	**13**	-278	-95.5%	**Fails**	**0.112**
1	189	Toilet	Public Spaces	Toilet rooms - public	**0**	---	---	EF-13	54	9	486	1	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1	190	Classroom	Education	Classroom (ages 5-8)	**307**	7.6% - 736	0%	AHW-7 VAV 7-16	751	9.2	6909	20	10.0	0.12	25	290	**23**	-267	-92.1%	**Fails**	**0.200**
1	191	Women	Public Spaces	Toilet rooms - public	**0**	---	---	EF-11	191	9	1719	3	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1	192	Classroom	Education	Classroom (ages 5-8)	**187**	7.6% - 736	0%	AHU-7 VAV 7-17	774	9.2	7121	20	10.0	0.12	25	293	**14**	-279	-95.2%	**Fails**	**0.118**
1	193	Classroom	Education	Classroom (ages 5-8)	**540**	7.6% - 736	0%	AHU-7 VAV 7-20	765	9.2	7038	22	10.0	0.12	25	312	**41**	-271	-86.9%	**Fails**	**0.350**
1	194	Classroom	Education	Classroom (ages 5-8)	**773**	7.6% - 736	0%	AHU-7 VAV 7-18	748	9.2	6882	20	10.0	0.12	25	290	**59**	-231	-79.6%	**Fails**	**0.514**
1	194.1	Exterior Storage	None	None	**-106**		---	EF-20	145	9.2	1334	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1	195	Classroom	Education	Classroom (ages 5-8)	**831**	7.6% - 736	0%	AHU-7 VAV 7-19	670	9.2	6164	20	10.0	0.12	25	280	**63**	-217	-77.5%	**Fails**	**0.613**
2	200	Classroom	Education	Classroom (ages 5-8)	**913**	7.7% - 715	0%	AHU-8	455	9.2	4186	8	10.0	0.12	25	135	**70**	-65	-48.0%	**Fails**	**1.003**
2	201	Classroom	Education	Classroom (ages 5-8)	**314**	7.7% - 715	0%	AHU-8	703	9.2	6468	6	10.0	0.12	25	144	**24**	-120	-83.4%	**Fails**	**0.223**
2	203	Men	Public Spaces	Toilet rooms - public	**0**	---	---	EF-2	172	8.9	1531	3	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
2	204	Women	Public Spaces	Toilet rooms - public	**0**	---	---	EF-2	176	8.9	1566	3	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	

Project Name:	**Fairfield Public Schools RCx & TAB Study**
Project Number:	**2020102.00.11**
Scope	**Ventilation Calculation by Building**
Date	**September 15, 2022**

McKinley Elementary School

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
2	205	Mechanical	None	None	---	---	---	---	1185	9.3	11021	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	206	Elec	None	None	0	---	---	EF 3	105	9.3	977	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	207	Cust	Storage	Warehouses	0	---	---	EF 3	78	9.3	725	1	0.0	0.06	0	5	---	N/A		N/A	
2	208	Toilet	Public Spaces	Toilet rooms - public	0	---	---	EF-4	54	9	486	1	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	210	Classroom	Education	Classroom (ages 5-8)	516	7.7% - 715	0%	AHU-8	594	9.3	5524	12	10.0	0.12	25	191	40	-151	-79.1%	Fails	0.434
2	211	Classroom	Education	Classroom (ages 5-8)	874	7.7% - 715	0%	AHU-8	469	9.3	4362	12	10.0	0.12	25	176	67	-109	-62.0%	Fails	0.922
2	212	Classroom	Education	Classroom (ages 5-8)	349	7.7% - 715	0%	AHU-8 VAV 8-1	764	9.3	7105	20	10.0	0.12	25	292	27	-265	-90.7%	Fails	0.228
2	213	Classroom	Education	Classroom (ages 5-8)	303	7.7% - 715	0%	AHU-8 VAV 8-2	752	9.3	6994	20	10.0	0.12	25	290	23	-267	-92.1%	Fails	0.197
2	214	Classroom	Education	Classroom (ages 5-8)	1280	7.7% - 715	0%	AHU-8 VAV 8-3	753	9.3	7003	20	10.0	0.12	25	290	99	-191	-65.9%	Fails	0.848
2	215	Classroom	Education	Classroom (ages 5-8)	540	7.7% - 715	0%	AHU-8 VAV 8-4	757	9.3	7040	20	10.0	0.12	25	291	42	-249	-85.6%	Fails	0.358
2	216	Classroom	Education	Classroom (ages 5-8)	948	7.7% - 715	0%	AHU-8 VAV 8-5	750	9.3	6975	20	10.0	0.12	25	290	73	-217	-74.8%	Fails	0.628
2	217	Classroom	Education	Classroom (ages 5-8)	1280	7.7% - 715	0%	AHU-8 VAV 8-6	723	9.3	6724	20	10.0	0.12	25	287	99	-188	-65.5%	Fails	0.883
2	218	Classroom	Education	Classroom (ages 5-8)	168	7.7% - 715	0%	AHU-8 VAV 8-7	745	9.3	6929	20	10.0	0.12	25	289	13	-276	-95.5%	Fails	0.113
2	219	Classroom	Education	Classroom (ages 5-8)	1111	7.7% - 715	0%	AHU-8 VAV 8-8	754	9.3	7012	20	10.0	0.12	25	290	86	-204	-70.4%	Fails	0.736
2	220	Elec	None	None	-28	---	---	EF-12	105	9.3	977	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	221	Cust	Storage	Warehouses	-29	---	---	EF-12	78	9.3	725	1	0.0	0.06	0	5	---	N/A		N/A	
2	222	Mechanical	None	None	---	---	---	---	1185	9.3	11021	0	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	223	Classroom	Education	Classroom (ages 5-8)	598	7.6%-736	0%	AHU-7 VAV7-11	492	9.2	4526	12	10.0	0.12	25	179	45	-134	-74.9%	Fails	0.597
2	224	Women	Public Spaces	Toilet rooms - public	0	---	---	EF-13	176	8.9	1566	3	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	225	Toilet	Public Spaces	Toilet rooms - public	28	---	---	EF-5	54	9	486	1	0.0	0.00	0	0	---	N/A	0.0%	N/A	
2	226	Men	Public Spaces	Toilet rooms - public	70	---	---	EF-13	172	8.9	1531	3	0.0	0.00	0	0	---	N/A	0.0%	N/A	

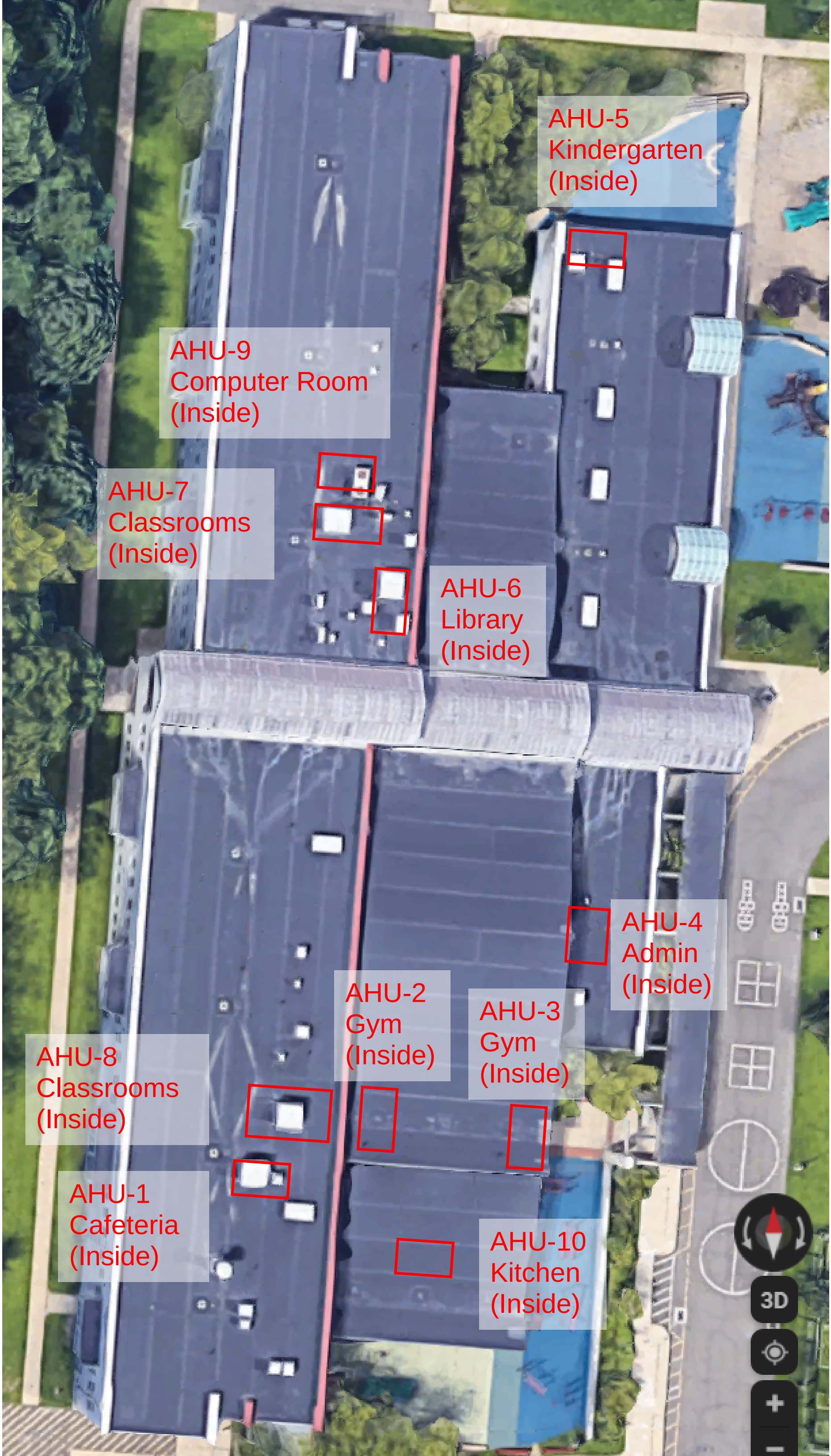
Project Name:	**Fairfield Public Schools RCx & TAB Study**
Project Number:	**2020102.00.11**
Scope	**Ventilation Calculation by Building**
Date	**September 15, 2022**

McKinley Elementary School

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
2	227	Office	Offices	Office spaces	**107**	7.6% - 736	0%	AHU-7 VAV 7-10	83	9.3	767	1	5.0	0.06	5	10	**8**	-2	-19.6%	**Fails**	**0.626**
2	228	Office	Offices	Office spaces	**99**	7.6% - 736	0%	AHU-7 VAV 7-10	82	9.3	763	1	5.0	0.06	5	10	**8**	-2	-24.4%	**Fails**	**0.590**
2	229	Office	Offices	Office spaces	**112**	7.6% - 736	0%	AHU-7 VAV 7-10	81	9.3	753	1	5.0	0.06	5	10	**9**	-1	-13.8%	**Fails**	**0.677**
2	230	Classroom	Education	Classroom (ages 5-8)	**556**	7.6% - 736	0%	AHU-7 VAV 7-9	495	9.25	4579	6	10.0	0.12	25	119	**42**	-77	-64.8%	**Fails**	**0.550**
2	231	Classroom	Education	Classroom (ages 5-8)	**532**	7.6% - 736	0%	AHU-7 VAV 7-7	440	9.3	4092	6	10.0	0.12	25	113	**40**	-73	-64.5%	**Fails**	**0.587**
2	232	Office	Offices	Office spaces	**112**	7.6% - 736	0%	AHU-7 VAV 7-8	83	9.3	772	1	5.0	0.06	5	10	**9**	-1	-14.8%	**Fails**	**0.661**
2	233	Office	Offices	Office spaces	**128**	7.6% - 736	0%	AHU-7 VAV 7-8	84	9.3	781	1	5.0	0.06	5	10	**10**	0	-0.4%	**Fails**	**0.768**
2	234	Closet	None	None	**120**	7.6% - 736	0%	AHU-7 VAV 7-8	44	9.3	409	1	0.0	0.00	0	0	**9**	9	0.0%	N/A	**1.320**
2	235	Classroom	Education	Classroom (ages 5-8)	**182**	7.6% - 736	0%	AHU-7 VAV 7-1	741	9.3	6891	25	10.0	0.12	25	339	**14**	-325	-95.9%	**Fails**	**0.122**
2	236	Classroom	Education	Classroom (ages 5-8)	**546**	7.6% - 736	0%	AHU-7 VAV 7-2	759	9.3	7059	25	10.0	0.12	25	341	**42**	-299	-87.7%	**Fails**	**0.357**
2	237	Classroom	Education	Classroom (ages 5-8)	**1160**	7.6% - 736	0%	AHU-7 VAV 7-3	750	9.3	6975	25	10.0	0.12	25	340	**88**	-252	-74.1%	**Fails**	**0.757**
2	238	Classroom	Education	Classroom (ages 5-8)	**752**	7.6% - 736	0%	AHU-7 VAV 7-4	748	9.3	6956	25	10.0	0.12	25	340	**57**	-283	-83.2%	**Fails**	**0.492**
2	239	Storage	None	None	**347**	7.6% - 736	0%	AHU-7 VAV 7-5	274	9.3	2548	0	0.0	0.00	0	0	**26**	26	0.0%	N/A	**0.612**
2	240	Prep	Education	Science Laboratories	**211**	7.6% - 736	0%	AHU-7 VAV 7-4	170	9.3	1581	1	10.0	0.18	25	41	**16**	-25	-60.6%	**Fails**	**0.607**
2	241	Science Classroom	Education	Science Laboratories	**1082**	7.6% - 736	0%	AHU-7 VAV 7-5	1064	9.3	9895	25	10.0	0.18	25	442	**82**	-360	-81.4%	**Fails**	**0.497**
2	242	IDF	None	None	**---**	---	---	FCU-1 AC	70	8	560	0	0.0	0.00	0	0	**---**	N/A	0.0%	N/A	

APPENDIX 3 – Roof Map


AHU-5
Kindergarten
(Inside)
AHU-9
Computer Room
(Inside)
AHU-7
Classrooms
(Inside)
AHU-6
Library
(Inside)
AHU-4
Admin
(Inside)
AHU-2
Gym
(Inside)
AHU-3
Gym
(Inside)
AHU-8
Classrooms
(Inside)
AHU-1
Cafeteria
(Inside)
AHU-10
Kitchen
(Inside)
3D

APPENDIX 4 – TAB Airflow Survey Data

WING'S TESTING & BALANCING CO., INC.

Fairfield Public Schools

McKinley Elementary School

Ventilation Survey

* * * *

VanZelm Engineers
Attn: Bill Donald
10 Talcott Notch Road
Farmington, CT 06032

July 29, 2022

94 North Branford Road • Suite One • Branford, CT 06405
(203) 481-4988 • Fax (203) 488-5634 • wings@wingstesting.com

SM-1 License #6803

www.wingstesting.com

WING'S TESTING & BALANCING CO., INC.

July 29, 2022

VanZelm Engineers
Attn: Bill Donald
10 Talcott Notch Road
Farmington, CT 06032

Re: McKinley Elementary School / Air Flow Testing

Dear Bill,

The ventilation testing of the above referenced location has been completed as noted on our attached data sheets. The following are our results:

- We measured air flow (total and outside air) rates on all 10 air handling units in the school, as well supply fans SF-1 total flow for boiler room.
- We have noted that kitchen hood make up air fan SF-2 has the supply duct blanked off (see photo)
- For testing, VAV boxes attached to AHUs 4, 5, 7, and 8 were forced to their minimum setpoint.
- The following boxes were reading 0 flow on BMS computer: 7-2, 7-12, 7-18, 7-19, 8-3, 8-4, 8-5, 8-6, 8-8, 8-15, 8-18.
- Control contractor for ALC has no communication to the following boxes: 4-1, 4-5, 7-13, 7-16, 8-12, 8-19.
- We noted that VFD for return fan of AHU-8 has been turned off as failed.

The following pages are your record of current operating conditions. If you have any questions, or if we can be of further service, please do not hesitate to call.

Very truly yours,

Wing's Testing & Balancing Co., Inc.
ICB Certified Contractor for:
TABB—Commissioning—Fire/Life Safety L1&L2—Sound & Vibration

Marek Sadowski
Certified TABB Technician #BB1083468T
CT SM-2 License #7078
MA SM-2 4508
HVAC Fire Life Safety Level 1 Tech FLS11083468T
EPA Universal Technician AA2804U0003

94 North Branford Road • Suite One • Branford, CT 06405
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SM-1 License #6803
www.wingstesting.com

WING'S TESTING & BALANCING CO., INC.

July 26, 2022

Fairfield Public Schools
McKinley Elementary School

Field Worksheet

Unit #	Condition		VFD Frequency		Outside Air Setting	Damper Actual Position
	Filter	Coil	Supply	Return		
AHU-1	Good	Little Dirty	N/A	N/A	100%	100%
AHU-2	Good	Good	30Hz	30Hz	**0%**	**0%**
AHU-3	Good	Good	15Hz	15Hz	**0%**	**0%**
AHU-4	Good	Little Dirty	45Hz	39Hz	**0%**	**0%**
AHU-5	Good	**Dirty**	36Hz	36Hz	50%	**0%**
AHU-6	Good	Good	N/A	N/A	100%	100%
AHU-7	Good	Good	59.5Hz	53.5Hz	**0%**	**5%**
AHU-8	Good	Good	(1)	(1)	**0%**	**5%**
AHU-9	Good	Good	N/A	N/A	**0%**	**5%**
AHU-10	Good	Good	N/A	N/A	100%	100%
(1) Bad VFD. Off at disconnect.						

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SM-1 License #6803
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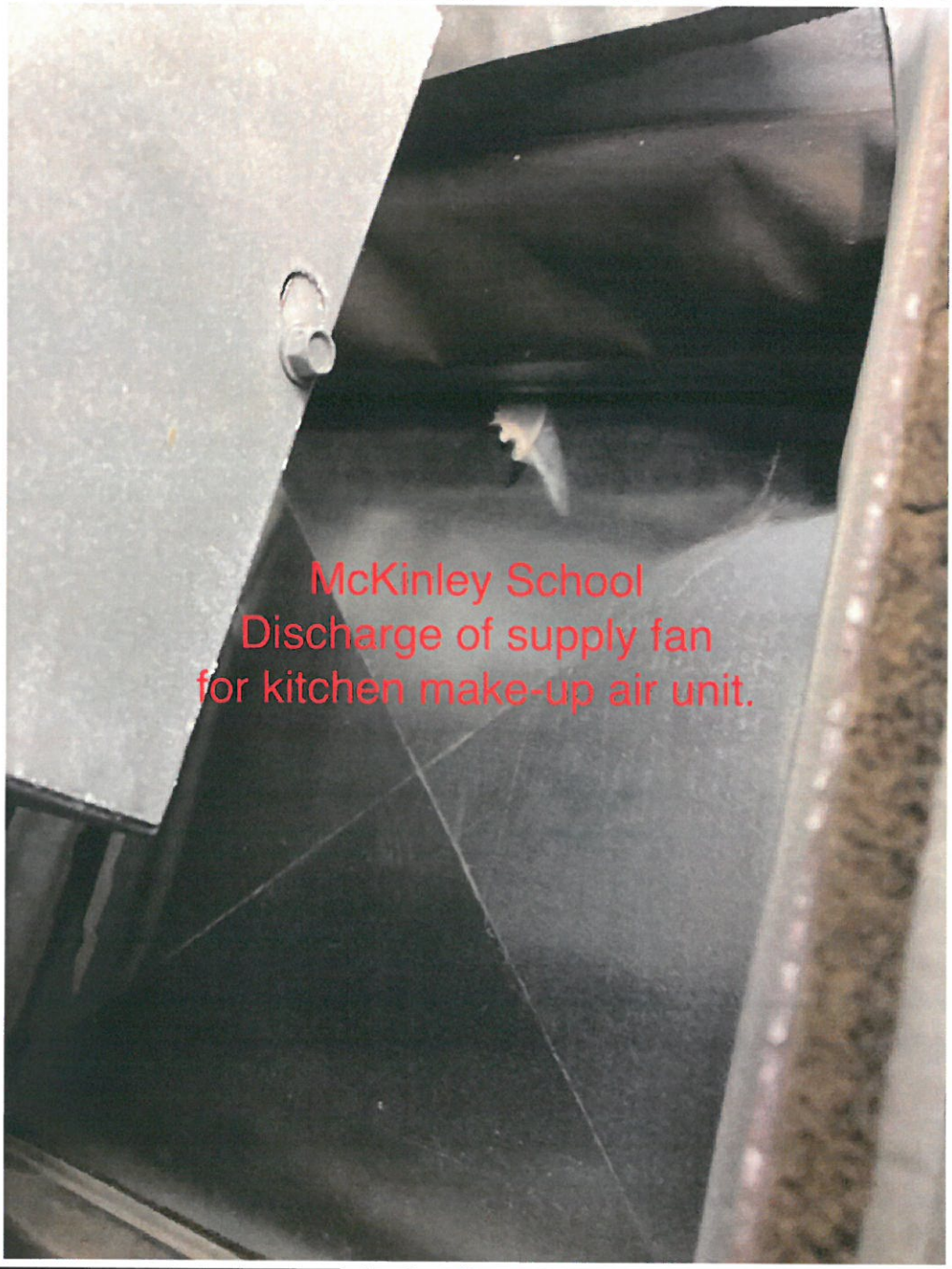
FPS- McKinley Elementary School



VELOCITY PRESSURE READINGS

PROJECT:	FPS - McKinley Elementary School					**DATE:**	7/25/2022	
AREA SERVED:	1st & 2nd Floor					**TECH:**	MS	
TRAVERSE LOCATIONS	**DUCT SIZE "**	**AREA SQ.FT.**	**DESIGN**		**CENT. STAT. PRESS."**	**TEST**		**NOTES**
			FPM	**CFM**		**FPM**	**CFM**	
AHU-1								
Total	28"x28"	5.44	---	6500	+0.24"	1060	5766	(2)
OA	28"x24"	4.67	---	3200	-1.1"	1158	5408	(2)
AHU-2								
Return	48"x48"	9.33	---	12,000	w/Velgrid	563	5253	(2)
OA	36"x24"	6	---	5625	-0.33"	105	630	(2)
						Total	5883	
AHU-3								
Return	36"x30"	7.5	---	12,000	-0.08"	152	1140	(2)
OA	34"x28"	6.6	---	5625	w/Velgrid	26	172	(2)
						Total	1312	
						S		
AHU-4								
Total	22"x20"	3.06	---	3760	+1.1	838	2565	(2)
OA	24"x18"	3	---	360	-0.34"	79	237	(2)
AHU-5								
Total	---	---	---	7800	---	---	1017	(1,2)
OA	53"x53"	19.5	---	1800	w/Velgrid	0	0	(2)
AHW-6								
Total	28"x24"	4.67	---	6550	-0.7"	1017	4749	(2)
OA	42"x16"	4.67	---	2100	-0.28"	936	4371	(2)
AHU-7								
Total	---	---	---	23,850	---	---	9667	(1,2)
OA for 6 and 7	48"x40"	13.3	---	13,360	-0.17"	384	5107	(2,3)
OA for 7						CALC	736	

REMARKS

(1) Summation of distribution.
(2) Design from original schedule DWG M-11 2002.
(3) Flow for AHU-7 and AHU-6.

NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement

VELOCITY PRESSURE READINGS

PROJECT:	FPS - McKinley Elementary School	**DATE:**	7/22/2022
AREA SERVED:	1st & 2nd Floor	**TECH:**	MS

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENT. STAT. PRESS."	TEST		NOTES
			FPM	CFM		FPM	CFM	
AHU-8								
Total	---	---	---	24,315	---	---	9269	(3)
OA	96"x18.5"	12.33		13,600	w/Velgrid	58	715	
AHU-9								
Total	---	---	---	2000	---	---	970	(3)
OA	16"x16"	1.78	---	620	-0.11"	245	436	
AHU-10								
Total	---	---	---	1700	---	---	1315	(3)
OA	22"x16"	2.44	---	1600	-0.95"	464	1132	
SF-2								
Total	16"x16"	1.78	---	1600	+0.0003"	40	71	(1,4,5)
Kitchen Hood EX	172"x18"	21.5	---	4000	w/Velgrid	170	4386	(2)
SF-1								
Total	37"x35"	9	---	4000	w/Velgrid	215	1935	(5)

REMARKS

(1) Kitchen make-up air.
(2) Area x factor 1.2
(3) Test reading is summation of distribution.
(4) Discharge side of the fan is blanked off (see photo).
(5) SF-1 and SF-2 swapped between onsite actual and schedule.

General Note: Design CFM from 2002 original schedule DWG M11
NA Not Available | **ND** No Design | **DD** Direct Drive | **N/R** No Requirement

Project Name:	**Fairfield Public Schools RCx: McKinley Elementary School**
Project Number:	*2020102.00.11*
Scope	**TAB Data**
Date	**[DATE] 7/25/2022**

Zone Identification								
Floor	Room#	Room Name	TAB Measured (cfm)	Calc. OA CFM @ Min. (OA cfm)	Meas. unit OA % (OA cfm)	BAS Damper Command (pos. %)	Associated VAV & RTU/AHU Unit	Notes
1	101	Conference	224	0	0	50%	AHU-5 VAV 5-5	
1	102	Office	162	0	0	50%	AHU-5 VAV 5-5	
1	103	Storage	106	0	0	50%	AHU-5 VAV 5-5	
1	104	Nurse	425	38	9% - 237	0%	AHU-4 VAV 4-5	ALC - No control VFD -S=46Hz R=40Hz
1	105	Toilet	EX 76	---	---	---	EF-15	Exhaust only
1	107	Office	124	11	9% - 237	0%	AHU -4	
1	107A	Storage	0	0	0	50%	AHU-5	Actual OA damper is 0% VFD S 36Hz , R36Hz
1	108	Main Office	917	83	9% - 237	0%	AHU-4 VAV 4-4	
1	111	Toilet	EX 75	---	---	---	EF-18	Exhaust only
1	112	Office	645	58	9% - 237	0%	AHU-4 VAV 4-4	
1	113	MER	---	---	---	---	----	No ventilation or exhaust
1	114	Office	50	4.5	9% - 237	0%	AHU-4 VAV 4-2	
1	115	Principal	289	26	9% - 237	0%	AHU-4 VAV 4-1	No communication
1	120	Kindergarten	404	0	0	50%	AHU-5 VAV 5-4	
1	121	Cust	32	---	---	---	EF-7	Exhaust only
1	122	Toilet	86	---	---	---	EF-9	1 room Exhaust only
1	123	Toilet	---	---	---	---	---	Included in above
1	124	Storage	0	0	0	50%	AHU-5	
1	125	Kindergarten	110	0	0	50%	AHU-5 VAV 5-3	
1	126	Prep	0	---	---	---	AHU-5 VAV 5-3	
1	130	Kindergarten	281	0	0	50%	AHU-5 VAV 5-2	
1	131	Storage	---	---	---	---	---	
1	132	Toilet	EX 93	---	---	---	EF-11	1 Room
1	133	Toilet	---	---	---	---	----	Included in above
1	134	Storage	0	0	0	50%	AHU-5	
1	135	Kindergarten	222	0	0	50%	AHU-5 VAV 5-1	

Project Name:	**Fairfield Public Schools RCx: McKinley Elementary School**
Project Number:	*2020102.00.11*
Scope	**TAB Data**
Date	**[DATE] 7/25/2022**

Zone Identification								
Floor	Room#	Room Name	TAB Measured (cfm)	Calc. OA CFM @ Min. (OA cfm)	Meas. unit OA % (OA cfm)	BAS Damper Command (pos. %)	Associated VAV & RTU/AHU Unit	Notes
1	136	Prep	0	0	0	50%	AHU-5 VAV 5-1	
1	139	Mechanical	---	---	---	---	---	No ventilation or exhaust
1	140A	Media Center	4749	4371	92% - 4371	100%	AHU-6	

Project Name:	**Fairfield Public Schools RCx: McKinley Elementary School**
Project Number:	*2020102.00.11*
Scope	**TAB Data**
Date	**[DATE] 7/25/2022**

Zone Identification								
Floor	Room#	Room Name	TAB Measured (cfm)	Calc. OA CFM @ Min. (OA cfm)	Meas. unit OA % (OA cfm)	BAS Damper Command (pos. %)	Associated VAV & RTU/AHU Unit	Notes
1	141	Storage	---	---	---	---	---	No supply or exhuast, transfer grille only
1	142	Computer Lab	970, R 784	45% - 436	45% - 436	100%	AHU-9	
1	142	Work Room	235	216	92% - 4371	100%	AHU-6 VAV 6-1	
1	143	Office	129	119	92% - 4371	100%	AHU-6 VAV 6-1	
1	144	Server	---	---	---	---	AC	Split wall unit
1	148	Women	EX 32	---	---	---	EF-4	Exhaust only
1	149	Men	EX 41	---	---	---	EF-4	Exhaust only
1	150	Gynasium	5883, 1312	791	11% - 802	0% Both	AHU-2 AHU-3	
1	150A	Gym Office	42	3	7.7% - 715	0%	AHU-8 VAV 8-20	
1	151	Toilet	EX 0	---	---	---	N/A	
1	153	Storage	0	---	---	---	N/A	
1	154	Storage	---	---	---	---	---	No ventilation or exhaust
1	156	Stage	---	---	---	---	---	No ventilation or exhaust
1	157	Storage	---	---	---	---	---	No ventilation or exhaust
1	158	Storage	---	---	---	---	---	No ventilation or exhausst, transfer grill only
1	161	Cafeteria	5766	5408	94% - 5408	100%	AHU-1	
1	162	Kitchen	1148	988	86% - 1132	100%	AHU-10	SF-2 71CFM, Hood Ex 4386 CFM
1	162A	Severy/ Part of Kitchen	---	---	---	---	---	1 Space- included in kitchen
1	163	Office	90	77	86% - 1132	100%	AHU-10	
1	164	Storage	77	66	86% - 1732	100%	AHU-10	
1	165	Loading	---	---	---	---	---	No supply or exhaust
1	166	Cust Office	---	---	---	---	---	No supply or exhaust
1	167	Switchgear	EX 550	---	---	---	EF-19	
1	168	Exterior Storage	EX 364	---	---	----	EF-17	
1	169	Mechanical Room	1935	1935	100%	100%	SF-1	
1	170	Music	290	22	7.7% - 715	0%	AHU-8 VAV 8-14	

Project Name:	**Fairfield Public Schools RCx: McKinley Elementary School**
Project Number:	*2020102.00.11*
Scope	**TAB Data**
Date	**[DATE] 7/25/2022**

Zone Identification								
Floor	Room#	Room Name	TAB Measured (cfm)	Calc. OA CFM @ Min. (OA cfm)	Meas. unit OA % (OA cfm)	BAS Damper Command (pos. %)	Associated VAV & RTU/AHU Unit	Notes
1	171	Office	275	21	7.7% - 715	0%	AHU-8 VAV 8-14	
1	172	Storage	0	0	7.7% - 715	0%	AHU-8 VAV 8-15	
1	173	Cust	0	---	---	---	N/A	
1	159	Staft Tlt	EX 0	---	---	---	N/A	
1	174	Classroom	1201	93	7.7% - 715	0%	AHU-8 VAV 8-15	
1	175	Classroom	42	3	7.7% - 715	0%	AHU-8 VAV 8-16	
1	176	Office	0	0	7.7% - 715	0%	AHU-8 VAV 8-16	
1	177	Work Room	40	3	7.7% - 715	0%	AHU-8 VAV 8-16	
1	178	Storage	41	3	7.7% - 715	0%	AHU-8 VAV 8-16	
1	179	Kiln	EX 106, 52	---	---	---	Kiln Fan EF-9	Exhaust only
1	180	Staff	269	21	7.7% - 715	0%	AHU-8 VAV 8-19	
1	181	Art Classroom	265	20	7.7% - 715	0%	AHU-8 VAV 8-17	
1	184	Classroom	553	42	7.6% - 736	0%	AHU-7 VAV 7-13	ALC has no communication
1	186	Classroom	262	20	7.6% - 736	0%	AHU-7 VAV 7-14	
1	187	Men	0	---	---	---	EF-11	OBD closed
1	188	Classroom	168	13	7.6% - 736	0%	AHU-7 VAV 7-15	
1	189	Toilet	0	---	---	---	EF-13	
1	190	Classroom	307	23	7.6% - 736	0%	AHW-7 VAV 7-16	ALC has no communication
1	191	Women	0	---	---	---	EF-11	
1	192	Classroom	187	14	7.6% - 736	0%	AHU-7 VAV 7-17	
1	193	Classroom	540	41	7.6% - 736	0%	AHU-7 VAV 7-20	ALC has no communication
1	194	Classroom	773	59	7.6% - 736	0%	AHU-7 VAV 7-18	
1	194.1	Exterior Storage	EX 106	---		---	EF-20	
1	195	Classroom	831	63	7.6% - 736	0%	AHU-7 VAV 7-19	
2	200	Classroom	913	70	7.7% - 715	0%	AHU-8	
2	201	Classroom	314	24	7.7% - 715	0%	AHU-8	

Project Name:	**Fairfield Public Schools RCx: McKinley Elementary School**
Project Number:	*2020102.00.11*
Scope	**TAB Data**
Date	**[DATE] 7/25/2022**

Zone Identification								
Floor	Room#	Room Name	TAB Measured (cfm)	Calc. OA CFM @ Min. (OA cfm)	Meas. unit OA % (OA cfm)	BAS Damper Command (pos. %)	Associated VAV & RTU/AHU Unit	Notes
2	203	Men	0	---	---	---	EF-2	
2	204	Women	0	---	---	---	EF-2	
2	205	Mechanical	---	---	---	---	---	No ventilatiion or exhaust
2	206	Elec	0	---	---	---	EF 3	
2	207	Cust	0	---	---	---	EF 3	
2	208	Toilet	0	---	---	---	EF-4	
2	210	Classroom	516	40	7.7% - 715	0%	AHU-8	
2	211	Classroom	874	67	7.7% - 715	0%	AHU-8	
1	185	Janitor	EX 0	---	---	---	N/A	Not marked on dwg.
2	212	Classroom	349	27	7.7% - 715	0%	AHU-8 VAV 8-1	
2	213	Classroom	303	23	7.7% - 715	0%	AHU-8 VAV 8-2	
2	214	Classroom	1280	99	7.7% - 715	0%	AHU-8 VAV 8-3	
2	215	Classroom	540	42	7.7% - 715	0%	AHU-8 VAV 8-4	
2	216	Classroom	948	73	7.7% - 715	0%	AHU-8 VAV 8-5	
2	217	Classroom	1280	99	7.7% - 715	0%	AHU-8 VAV 8-6	
2	218	Classroom	168	13	7.7% - 715	0%	AHU-8 VAV 8-7	
2	219	Classroom	1111	86	7.7% - 715	0%	AHU-8 VAV 8-8	
2	220	Elec	EX 28	---	---	---	EF-12	
2	221	Cust	EX29	---	---	---	EF-12	
2	222	Mechanical	---	---	---	---	---	No ventilation or exhaust
2	223	Classroom	598	45	7.6%-736	0%	AHU-7 VAV7-11	
2	224	Women	0	---	---	---	EF-13	
2	225	Toilet	28	---	---	---	EF-5	
2	226	Men	70	---	---	---	EF-13	
2	227	Office	107	8	7.6% - 736	0%	AHU-7 VAV 7-10	
2	228	Office	99	7.5	7.6% - 736	0%	AHU-7 VAV 7-10	

Project Name:	**Fairfield Public Schools RCx: McKinley Elementary School**
Project Number:	*2020102.00.11*
Scope	**TAB Data**
Date	**[DATE] 7/25/2022**

Zone Identification								
Floor	Room#	Room Name	TAB Measured (cfm)	Calc. OA CFM @ Min. (OA cfm)	Meas. unit OA % (OA cfm)	BAS Damper Command (pos. %)	Associated VAV & RTU/AHU Unit	Notes
2	229	Office	112	8.5	7.6% - 736	0%	AHU-7 VAV 7-10	
2	230	Classroom	556	42	7.6% - 736	0%	AHU-7 VAV 7-9	
2	231	Classroom	532	40	7.6% - 736	0%	AHU-7 VAV 7-7	
2	232	Office	112	8.5	7.6% - 736	0%	AHU-7 VAV 7-8	
2	233	Office	128	10	7.6% - 736	0%	AHU-7 VAV 7-8	
2	234	Closet	120	9	7.6% - 736	0%	AHU-7 VAV 7-8	
2	235	Classroom	182	14	7.6% - 736	0%	AHU-7 VAV 7-1	
2	236	Classroom	546	42	7.6% - 736	0%	AHU-7 VAV 7-2	
2	237	Classroom	1160	88	7.6% - 736	0%	AHU-7 VAV 7-3	
2	238	Classroom	752	57	7.6% - 736	0%	AHU-7 VAV 7-4	
2	239	Storage	347	26	7.6% - 736	0%	AHU-7 VAV 7-5	
2	240	Prep	211	16	7.6% - 736	0%	AHU-7 VAV 7-4	
2	241	Science Classroom	1082	82	7.6% - 736	0%	AHU-7 VAV 7-5	
2	242	IDF	---	---	---	---	FCU-1 AC	Recirculation only. Split units on wall, both not running

APPENDIX 5 – RCx Unit and Room Take-Off Data

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.11*
Scope	**Room Take-Off Data**
Date	**April 14, 2022**
	McKinley Elementary School

RCM, RA, JRK

Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1	101	Conference	217	9.2	1996	12	2- Supplies, 1-Return		
1	102	Office	145	9.2	1334	5	1- Supplies, 1-Return		
1	103	Storage	75	9.3	698	0	1- Supplies, 1-Return		
1	104	Nurse	358	9.2	3294	3	2- Supplies, 1-Exhast/Return		
1	105	Toilet	51	8	408	1	1-Exhaust	Back of nurse	
1	107	Office	97	9	873	2	1- Supplies, 1-Exhast/Return		
1	107A	Storage	34	8	272	0	1-Supply		
1	108	Main Office	886	9.2	8151	10	3- Supplies, 3-Exhast/Return		
1	111	Toilet	50	8	400	1	1-Exhaust		
1	112	Office	178	8.3	1477	4	1- Supplies, 1-Exhast/Return, FTR		
1	113	MER	226	13.8	3119	0	AHU-4, RF-4 UH-1		
1	114	Office	211	9.3	1962	6	1- Supplies, 1-Exhast/Return, FTR		
1	115	Principal	237	9.1	2157	5	1- Supplies, 1-Exhast/Return, FTR		
1	120	Kindergarten	892	9.5	8474	20	3-Supplies, 1-Return		
1	121	Cust	61	9	549	1	1- Exh/Ret		
1	122	Toilet	44	8.9	392	1	1- Exh/Ret		
1	123	Toilet	45	8	360	1	1-Exhaust	Off Kindergarden 125	
1	124	Storage	120	9	1080	0	1- Exh/Ret		
1	125	Kindergarten	911	9.5	8655	20	3-Supplies, 1-Return		
1	126	Prep	89	9.5	846	1	1- Supply, 1-Return		

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.11*
Scope	**Room Take-Off Data**
Date	**April 14, 2022**
	McKinley Elementary School

RCM, RA, JRK

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1	130	Kindergarten	908	9.5	8626	20	3-Supplies, 2-Return		
1	131	Storage	61	9.2	561	0	Nothing		
1	132	Toilet	45	8.9	401	1	1-Exhaust	Off Kindergarden 130	
1	133	Toilet	45	8.9	401	1	1-Exhaust	Off Kindergarden 135	
1	134	Storage	120	9	1080	0	1- Exh/Ret		
1	135	Kindergarten	845	9.5	8028	20	3- Supplies, 1-Exhast/Return		
1	136	Prep	89	9.5	846	1	1-Supply		
1	139	Mechanical	225	14.3	3218	0	AHU-5, RF-5		
1	140A	Media Center	2944	20	58880	40	7 Supply, /7-Return		
1	141	Storage	173	9.2	1540	0	1-Return		avg.
1	142	Computer Lab	629	8.9	5598	27	4- Supplies, 1-Exhast/Return	27 Laptops	
1	142	Work Room	185	9.2	1702	4	1- Supply, 1-Return		
1	143	Office	110	9.2	1012	2	1- Suppky, 1-Return		
1	144	Server	129	9.3	1148	0	3-Ton DX		
1	148	Women	223	8.9	1985	3	1-Exhaust	8 fixtures	
1	149	Men	222	8.9	1976	3	1-Exhaust	8 fixtures	
1	150	Gynasium (AHU-2)	2550	22.5	57375	20	12 Roto jets, 1 wall return	Average height	
1	150	Gynasium (AHU-3)	2550	22.5	57375	20	12 Roto jets, 1 wall return	Average height	
1	150A	Gym Office	150	9.3	1395	2	1-Supply, 1-Return		
1	151	Toilet	63	8.9	561	1	1-Exhaust		

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.11*
Scope	**Room Take-Off Data**
Date	**April 14, 2022**
	McKinley Elementary School

RCM, RA, JRK

Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1	152	Storage	39	9.3	363	0	1- Return		
1	153	Storage	39	8.9	347	0			
1	154	Storage	320	8.9	2848	0	no air 1-UH, heat		
1	156	Stage	722	20.8	15018	30			
1	157	Storage	133	20.8	2766	0			
1	158	Storage	144	8.25	1188	0	Nothing	Exhaust for dryer ven	
1	161	Cafeteria	3008	16.8	50534	200			
1	162	Kitchen	868	8.6	7465	6	4- Supplies Kitchen Hood Exhaust		
1	162A	Severy/ Part of Kitchen	121	8.6	1041	10			
1	163	Office	163	8.6	1402	1	1-Supply		
1	164	Storage	154	7.5	1155	1	1-Supply, 1-Return		
1	165	Loading	240	8	1920	0			
1	166	Cust Office	106	8	848	2			
1	167	Switchgear	166	8	1328	0			
1	168	Exterior Storage	130	8	1040	0			
1	169	Mechanical Room	1197	8	9576	0			
1	170	Music	884	9.2	8133	12	4-Supplies	Furniture out, Occupants ?	
1	171	Office	142	9.2	1306	1	2-Supplies		
1	172	Storage	315	9.3	2930	1	2-Supplies		
1	173	Cust	37	9.3	344	1	1- Exhaust		
1	174	Classroom	742	9.3	6901	10	4-Supplies	Furniture out, Occupants ?	

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.11*
Scope	**Room Take-Off Data**
Date	**April 14, 2022**
	McKinley Elementary School

RCM, RA, JRK

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1	175	Classroom	459	9.3	4269	12	1-Supply, 1-Return		
1	176	Office	94	9.3	874	2	1- Supplies, 1-Return	Interior	
1	177	Work Room	105	9.3	977	3	1- Supplies, 1-Return		
1	178	Storage	134	9.3	1246	0	1- Supplies, 1-Return		
1	179	Kiln	126	9.3	1172	1	1-Supply, 1-Return, Kiln exhaust		
1	180	Staff	560	9.2	5152	1	2- Supplies, 1-Return		
1	181	Art Classroom	972	9.3	9040	25	4-Supplies		
1	184	Classroom	719	9.2	6615	20	3-Supplies, 1-Return		
1	186	Classroom	759	9.2	6983	20	3-Supplies, 1-Return		
1	187	Men	187	9	1683	1	1- Exhaust		
1	188	Classroom	755	9.2	6946	20	3- Supplies, 1-Exhast/Return		
1	189	Toilet	54	9	486	1			
1	190	Classroom	751	9.2	6909	20	3- Supplies, 1-Exhast/Return		
1	191	Women	191	9	1719	3	1- Exhaust		
1	192	Classroom	774	9.2	7121	20	3- Supplies, 1-Exhast/Return		
1	193	Classroom	765	9.2	7038	22	3- Supplies, 1-Exhast/Return		
1	194	Classroom	748	9.2	6882	20	3- Supplies, 1-Exhast/Return		
1	194.1	Exterior Storage	145	9.2	1334	0			
1	195	Classroom	670	9.2	6164	20	3- Supplies, 1-Exhast/Return	Air Noise	
2	200	Classroom	455	9.2	4186	8	2-Supplies, 1-Return		
2	201	Classroom	703	9.2	6468	6	2-Supplies, 1-Return		

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.11*
Scope	**Room Take-Off Data**
Date	**April 14, 2022**
	McKinley Elementary School

RCM, RA, JRK

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
2	203	Men	172	8.9	1531	3			
2	204	Women	176	8.9	1566	3			
2	205	Mechanical	1185	9.3	11021	0	AHU-1,2,8 RF-1,2,8		
2	206	Elec	105	9.3	977	0			
2	207	Cust	78	9.3	725	1			
2	208	Toilet	54	9	486	1			
2	210	Classroom	594	9.3	5524	12	2-Supplies, 1-Return		
2	211	Classroom	469	9.3	4362	12	2-Supplies, 1-Return		
2	212	Classroom	764	9.3	7105	20	4- Supplies, FTR over bump-out		
2	213	Classroom	752	9.3	6994	20	4- Supplies, FTR over bump-out		
2	214	Classroom	753	9.3	7003	20	4- Supplies, FTR over bump-out		
2	215	Classroom	757	9.3	7040	20	4- Supplies, FTR over bump-out		
2	216	Classroom	750	9.3	6975	20	4- Supplies, FTR over bump-out		
2	217	Classroom	723	9.3	6724	20	4- Supplies, FTR over bump-out		
2	218	Classroom	745	9.3	6929	20	4- Supplies, FTR over bump-out		
2	219	Classroom	754	9.3	7012	20	4- Supplies, FTR over bump-out		
2	220	Elec	105	9.3	977	0			
2	221	Cust	78	9.3	725	1			
2	222	Mechanical	1185	9.3	11021	0	AHU-6,7, RF-6,7		
2	223	Classroom	492	9.2	4526	12	2-Supplies, 1-Return		
2	224	Women	176	8.9	1566	3			

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.11*
Scope	**Room Take-Off Data**
Date	**April 14, 2022**
	McKinley Elementary School

RCM, RA, JRK

Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
2	225	Toilet	54	9	486	1			
2	226	Men	172	8.9	1531	3			
2	227	Office	82.5	9.3	767	1	1- Supply, 1-Return		
2	228	Office	82	9.3	763	1	1- Supply, 1-Return		
2	229	Office	81	9.3	753	1	1- Supply, 1-Return		
2	230	Classroom	495	9.25	4579	6	3 Supplies, 1-Return		
2	231	Classroom	440	9.3	4092	6	2-Supplies, 1-Return		
2	232	Office	83	9.3	772	1	1- Supply, 1-Return		
2	233	Office	84	9.3	781	1	1- Supply, 1-Return		
2	234	Closet	44	9.3	409	1	1- Supply, 1-Return		
2	235	Classroom	741	9.3	6891	25	4- Supplies, FTR over bump-out		
2	236	Classroom	759	9.3	7059	25	4- Supplies, FTR over bump-out		
2	237	Classroom	750	9.3	6975	25	4- Supplies, FTR over bump-out		
2	238	Classroom	748	9.3	6956	25	4- Supplies, FTR over bump-out		
2	239	Storage	274	9.3	2548	0	2- Supplies		
2	240	Prep	170	9.3	1581	1	1- Supply, 1-Return		
2	241	Science Classroom	1064	9.3	9895	25	4- Supplies,		
2	242	IDF	70	8	560	0			

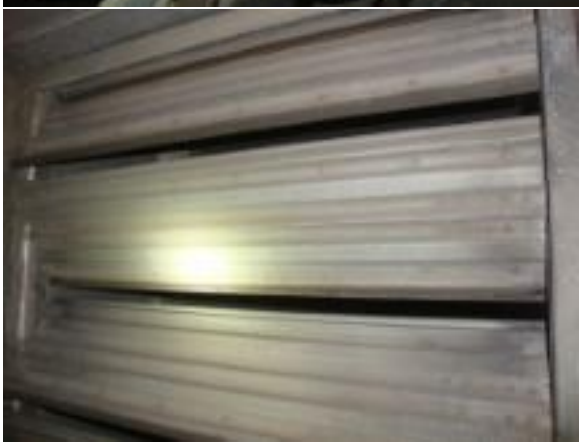
PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET

Unit Tag	**AHU-1**	**Addition comments descriptions**
Location	MER 205	
Serving	Cafeteria	
Config/Style		
Mfr.	Ventrol	
Model #	MCCB012NOA	
Serial #	KO3A00193	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	7.5 (1) BX-42	
SF VFD Data	N/A	
RF Qty/HP	5.0 Inline Greenheck TCF-22	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(6) 20x20x2	
Filter Status	OK	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Opposed blade	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled water	
Cooling Coil Condition	Dirty	
Drain Pan Status	Rusty Galv.	
Notes:	Sheet metal screw interfering with damper operation. Exterior casing corroded.	

PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET

Photos

PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET



PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET

PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET

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PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET

Unit Tag	**AHU-2**	**Addition comments descriptions**
Location	MER 205	
Serving	Gym	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB025UAOAOUA	
Serial #	KO3A00217	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	15 (3) BX70	
SF VFD Data	VFD ABB	
RF Qty/HP	7.5 Inline Greenheck 24-TCF-9 (2) BX-61	
RF VFD Data	VFD ABB	
Filter Data (Size Quantity)	(12) 20x25x2	
Filter Status	OK 4/7/22	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled water	
Cooling Coil Condition	Dirty	
Drain Pan Status	Rusty Galv.	
Notes:	Room full of lint from Gym non ducted return.	

PROJECT: 2020102.11 FAIRFIELD PUBLIC SCHOOLS – MCKINLEY ELEMENTARY SCHOOL EQUIPMENT DATA SHEET

Photos

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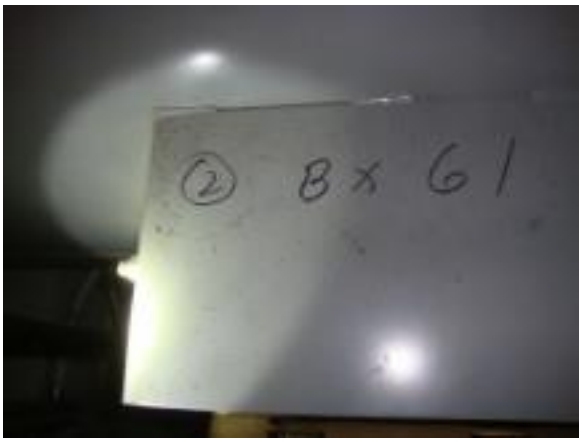

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Unit Tag	**AHU-3**	**Addition comments descriptions**
Location	MEZZ 209	
Serving	-	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB025UAOAOUA	
Serial #	KO3A00204	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	15 (3) BX70	
SF VFD Data	VFD ABB ACH-401	
RF Qty/HP	RF-3 7.5 Inline Greenheck 24 TCF-9 (1) AP-56	
RF VFD Data	VFD ABB	
Filter Data (Size Quantity)	(12) 20x25x2	
Filter Status	OK 4/7/22	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade, no access	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled Water	
Cooling Coil Condition	Dirty, cleaning would improve	
Cu Man		
Cu Model/Serial		
Drain Pan Status	Rusty Galv.	
Notes:	Damper operations unknown,	

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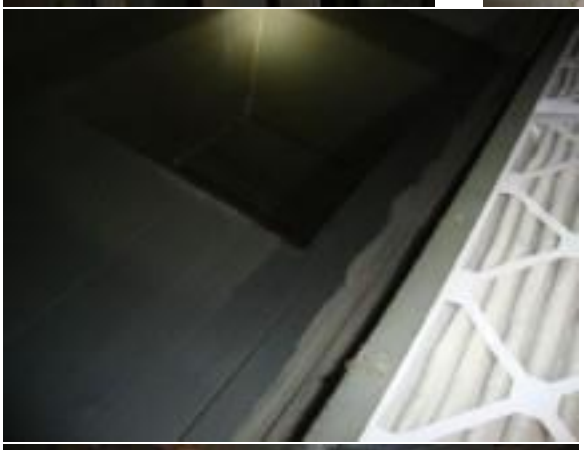

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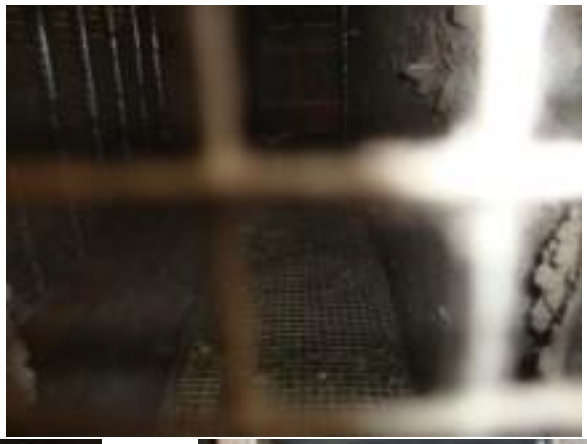

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Unit Tag	**AHU-4**	**Addition comments descriptions**
Location	MER 113	
Serving	Main Offices	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB008UAOAOUB	
Serial #	KO3A00222	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	5 (1) AX60	
SF VFD Data	VFD ABB	
RF Qty/HP	3.0 Inline Greenheck TCF-18 (2) A-60	
RF VFD Data	VFD ABB	
Filter Data (Size Quantity)	(4) 20x20x2	
Filter Status	OK 4/7/22	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled water	
Cooling Coil Condition	Dirty	
Drain Pan Status	Rusty Galv.	
Notes:	Damper operations unknown	

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Unit Tag	**AHU-5**	**Addition comments descriptions**
Location	MER 139	
Serving	Kindergarten	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB017UAOAOUB	
Serial #	KO3A00235	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	7.5 (1) BX6-0	
SF VFD Data	VFD ABB	
RF Qty/HP	7.5 Inline Greenheck TCF-24 (2) A-60	
RF VFD Data	VFD ABB	
Filter Data (Size Quantity)	(4) 16x25x2 (8) 16x20x2	
Filter Status	OK 4/6/22	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled water	
Cooling Coil Condition	Dirty	
Drain Pan Status	Rusty Galv.	
Notes:	Damper operations unknown	

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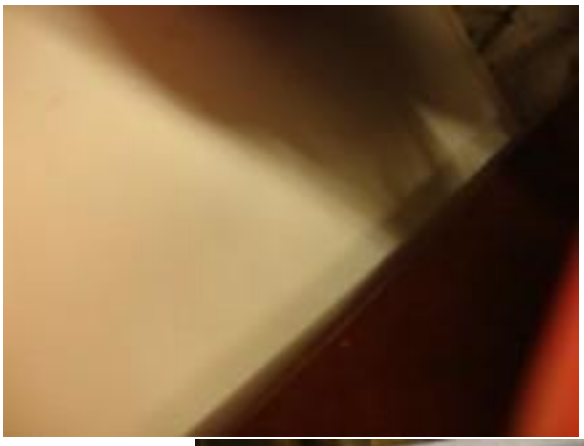

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Unit Tag	**AHU-6**	**Addition comments descriptions**
Location	MER 222	
Serving	Main Offices	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB012UAOAOUA	
Serial #	KO3A00246	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	7.55 (1) BX46	
SF VFD Data	N/A	
RF Qty/HP	3.0 Inline Greenheck TCF-18 (2) A-60	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(6) 20x20x2	
Filter Status	OK 4/7/22	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade, no access	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	DX Condenser on roof	
Cooling Coil Condition	Dirty	
Cu Man	Trane	
Cu Model/Serial	TTA240B400EA/309514JAD 2-Circuit	Ref Pipe insulation failed
Drain Pan Status	Rusty Galv.	
Notes:	Damper operations unknown, Return fan not directly connected to fan, Room plenum	

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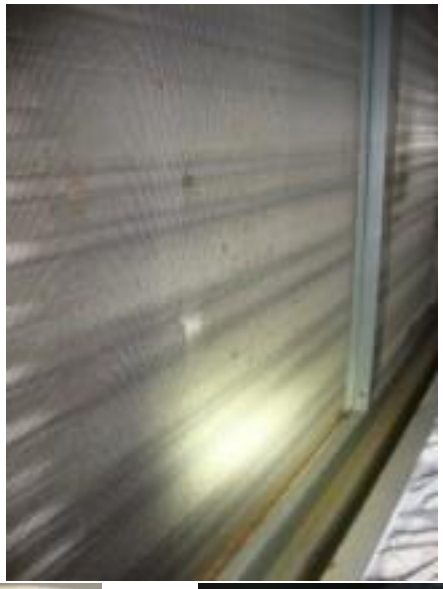
Photos



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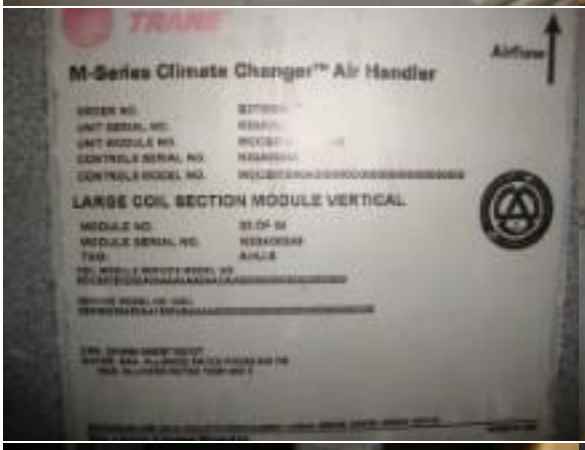

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Unit Tag	**AHU-7**	**Addition comments descriptions**
Location	MER 222	
Serving	-	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB05UAOAOUA	
Serial #	KO3A00180	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	~~25~~ (4) 3VX900	New Motor 20.0 HP
SF VFD Data	VFD ABB ACH-401	
RF Qty/HP	RF-7 10.0 Inline Greenheck 40 TCF-9 (1) AP-56	
RF VFD Data	VFD ABB	
Filter Data (Size Quantity)	(20) 20x25x2 (4) 16x25x2	
Filter Status	OK 4/7/22	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade, no access	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled Water	
Cooling Coil Condition	Dirty, cleaning would improve	
Cu Man		
Cu Model/Serial		
Drain Pan Status	Rusty Galv.	
Notes:	Damper operations unknown, Airflow probes dirty	

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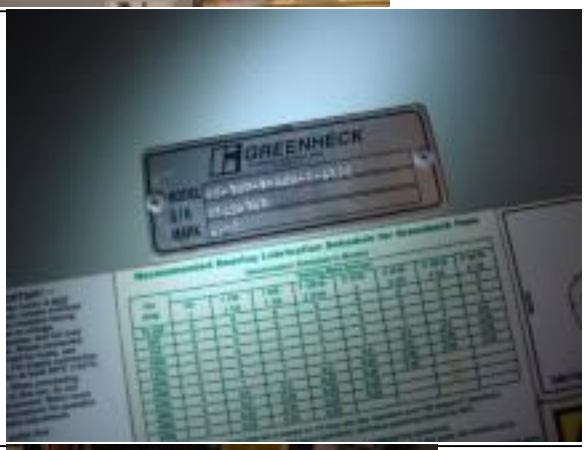
Photos



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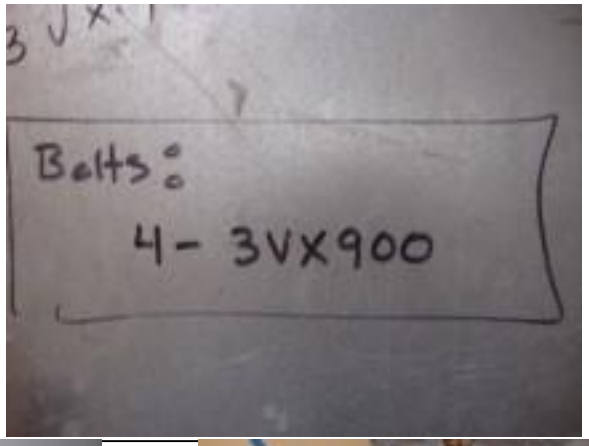

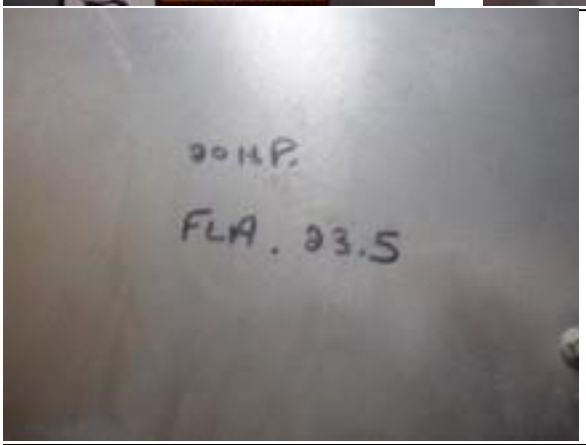

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Unit Tag	**AHU-8**	**Addition comments descriptions**
Location	MER 205	
Serving	Cafeteria	
Config/Style	Climate Changer	
Mfr.	Trane	
Model #	MCCB05OUAOAOUA	
Serial #	KO3A00179	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	460/60/3	
SF Qty/HP	25 (2) 5VX1000	
SF VFD Data	VFD ABB	
RF Qty/HP	10.0 Inline Greenheck TCF-22 (2) BX-93	
RF VFD Data	VFD ABB Fan drive locked out	
Filter Data (Size Quantity)	(20) 20x25x2 (16) 16x25x2	
Filter Status	OK	
Controls Type	DDC Metasys	
Controls Mfr.		
Economizer	Available	
CO_2 DCV		
Damper Styles	Ductwork mounted, Opposed blade	
Damper Status	OK, clean, adjust and lubricate	
Heating Type	Hot Water	
Heating Coil Condition	Dirty	
Cooling Type	Chilled water	
Cooling Coil Condition	Dirty	
Drain Pan Status	Rusty Galv.	
Notes:	Room full of lint from Gym non ducted return.	

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