

Stratfield Elementary School

1407 Melville Avenue
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Fairfield Public Schools Recommissioning (RCx) and Testing, Adjusting, & Balancing (TAB) Study van Zelm Project # 2020102.00 (13-SES) October 07, 2022

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
EVALUATION.....	2
2015 International Mechanical Code (IMC) Compliance.....	2
Outside Air Flow and Air Change Rate Findings	3
Outside Air Flow Improvement Recommendations	4
Control Sequence Update Recommendations.....	5
Equipment Upgrade or Replacement Recommendations	6
CONCLUSIONS.....	7

APPENDICES

APPENDIX 1 – Issues List

APPENDIX 2 – Ventilation Data Calculations

APPENDIX 3 – Roof Map

APPENDIX 4 – TAB Airflow Survey Data

APPENDIX 5 – RCx Unit and Room Take-Off Data

Stratfield Elementary School

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

EXECUTIVE SUMMARY

Stratfield Elementary School was deemed to be school priority number 13 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.

Stratfield Elementary School is located at 1407 Melville Avenue Fairfield, CT and serves as an educational facility for approximately 416 students as of the May 2022 census and up to 94 faculty and staff. Stratfield Elementary was originally constructed in 1929 and remains in use in the same location. The building saw renovations throughout the years including one in 1948 and another in 1972, but the most recent was a major renovation that took place in 2008-09 to modernize the school, including new building sections and upgrades to the HVAC equipment and controls. This upgrade is the system currently in place for this study.

The school ventilation systems comprises nine (9) Air Handling Units, four of which are dedicated to the gymnasium (AHU-2-6 and AHU-1A-1D), five (5) energy recovery ventilators (ERV-1-5), and exhaust fans for various purposes including, but not limited to, toilet exhaust, kitchen exhaust, mechanical/electrical space ventilation, etc. Additionally, twenty-nine (29) VRF systems are installed for additional space heating/cooling capability, split ACs in various cooling-only zones, and fin tube radiation/convectors installed for supplemental heating. Some spaces, particularly in the older building sections, have operable windows, which might vary in use depending on the particular occupant or environmental conditions. However, these are not directly tied into any monitoring system nor are expected to be used for the purposes of providing fresh outside air as a component of the building ventilation. The Building Automation (BAS) control system utilizes a newer Distech control system installed by CTC to replace what was a Talon DDC system, but there was little information available as to I/O points and actual operation. The packaged RTUs had wires labeled CO2 but unable to confirm such exist and DCV is in place. These operate based on their own internal controls with limited integration or visibility through the building control system.

We performed our on-site RCx inspection starting on April 20, 2022, and TAB review starting in July 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 lacking with many sections of the building 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, many of the individual occupied spaces at this school do not 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 as a part of this survey are considered as the worst-case scenario only, and even as such, there are some areas within the building that actually do meet and exceed these ventilation requirements by a significant amount.

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. Since the major HVAC renovation in 2008, this would not be the primary means of ventilation even if the building were capable of it.

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 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 16,278 CFM. The TAB process revealed that only 14,771 CFM of outside air is delivered to the spaces, resulting in a 1,507 CFM deficit or 90.7% of the required minimum flow. Additionally, the ventilation calculations reveal that only 41.2% of the occupied zones actually met the requirements (28 of 68). This means there is some disparity in zones either receiving far too little ventilation or far too much. A significant quantity of spaces received little ventilation, a majority of the clustered spaces were due to ERV-2 being off completely, though AHU-6’s outside air damper was not operational and two of the four gym units were also off. An analysis of the rooms based on the associated air handling unit reveals additional reasons why clusters of rooms might have failed to meet code, which is expanded on within the Issues List appendix.

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 ft² room with 10 ft ceilings will have a volume of 10,000 ft³. If 250 CFM is delivered to this space, that results in 15,000 ft³ 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 approximately 2.444 ACH. This does not meet the recommended 3 ACH, but this is not a requirement. The total ACH being below 3.000 indicates that it might not be capable of increasing the ventilation to every space, though this school utilizes ERVs that operate at 100% outside air, one of which was non-functional, so it changes the normal distribution. For spaces that are found to exceed the air change rate, the school could reduce total unit airflow associated with those spaces and perform rebalancing to save on energy lost on any 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 0.717; for spaces that at least

met or exceeded code, the outside air ACH was 3.796; the combined outside air ACH for the entire building was 1.614. Special rooms such as a nurse’s suite do require an outside air ACH of at least 2 and total ACH of 6, which was not met in this building. 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 Building ACH	Total OACH (OA/EA)	OACH for zones that do <u>not</u> meet code	OACH for zones that meet code
2.444	1.614	0.717	3.796

Outside Air Flow Improvement Recommendations

ERV-2 should be repaired immediately. There are nine (9) rooms spanning the first through third floors that receive no ventilation, drastically reducing the total building performance. This correction alone would increase the pass rate to about 60%, where the remaining occupied zones short on ventilation would need more involved investigation. The HVAC systems should holistically be rebalanced to current design requirements and the BAS control system end devices should be reviewed through a point-to-point checkout to verify correct mapping, as well as confirming calibration. A general BAS repair of any non-functioning devices to get the system working properly will improve building performance. Non-functioning energy recovery wheels should be brought back into operation to save money through energy cost while maintaining favorable conditions for increased outside air. The two broken gym units should be reviewed and repaired.

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 the FPS high school ventilation summary reports. 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. Dirty filters decrease 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. Many of these units also have outside air screens that have become severely loaded. These screens can be cleaned rather than swapped out, and doing so more frequently than filter changes will keep the units running with more airflow for less power consumption.
- Increase total air change rates to between 3 and 6 ACH where possible while still satisfying minimum OA ventilation, except for spaces served by exclusively outside air then 2 ACH is acceptable if the units can maintain thermal load requirements.
- 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.
- 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 in particular any valve or damper actuators that are not functional.
- 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 or fan speeds for 100% outside air units, where needed and if 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 CO₂ 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

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 the 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.

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.
- 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:
 - 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.
 - 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.

CONCLUSIONS

Fairfield Public Schools has taken measures in the past to address identified deficiencies regarding the recommended proper filtration upgrades for indoor air quality (IAQ) improvements, but this study found

that the Stratfield Elementary School is challenged to fully meet the current minimum ventilation requirements per 2015 IMC despite this being a more recently renovated building in the district. 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 repairing all non-functional units, correcting mismatched BAS references for proper monitoring and control, bringing into proper operation the outside air dampers for all units, reviewing all on-board HVAC equipment devices for functionality/calibration, repairing all energy recovery wheel motors, and generally 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 review and rebalancing, possibly including engineered ventilation calculations/modifications aid in code compliance and generally better working order. Since the last renovation is relatively recent, this could facilitate the process and help return the building to the ideal operating conditions designed for back in 2008.

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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 (44)
	Open	102 Band Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	102A Orchestra Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	103 Music Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	201C Language Arts	Airflow	There is a concern about potential air short cycling concern based on RGD layout in the ceiling. This should be reviewed to ensure adequate air mixing to maintain ventilation efficiency
	Open	202 Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	202A Instructional Improvement	Airflow	There is a concern about potential air short cycling concern based on RGD layout in the ceiling. This should be reviewed to ensure adequate air mixing to maintain ventilation efficiency
	Open	202A Instructional Improvement	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	203 Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	204 Kindergarten	Airflow	Supply diffuser should be served by ERV-3 but is ducted to corridor diffuser and is transfer only.

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (44)
	Open	204 Kindergarten	Airflow	This space does not have any ventilation provided to it
	Open	301C Classroom	Airflow	There is a concern about potential air short cycling concern based on RGD layout in the ceiling. This should be reviewed to ensure adequate air mixing to maintain ventilation efficiency
	Open	302 Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	302A Classroom	Airflow	There is a concern about potential air short cycling concern based on RGD layout in the ceiling. This should be reviewed to ensure adequate air mixing to maintain ventilation efficiency
	Open	302A Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	303 Classroom	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	AHU-1A	Dampers	The outside air damper minimum setpoint was 10% open and the damper would not modulate to 100% open. This prevented the measurement of the unit total
	Open	AHU-1A	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	AHU-1B	Building Pressure	This unit is operating in an extreme Negative Pressure condition and starving for Air.
	Open	AHU-1B	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	AHU-1C	Dampers	The outside air damper minimum setpoint was 10% open and the damper would not modulate to 100% open. This prevented the measurement of the unit total

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (44)
	Open	AHU-1D	Dampers	The outside air damper minimum setpoint was 10% open and the damper would not modulate to 100% open. This prevented the measurement of the unit total
	Open	AHU-3	Cleaning	The unit interior is dirty and needs to be cleaned
	Open	AHU-3	Coils	The cooling coil is very dirty and should be cleaned
	Open	AHU-3	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	AHU-3	Filters	The filters had presumably been changed only one month prior to the site visit yet they were significantly dirtier than expected. These might need more frequent changes if this zone develops more dust
	Open	AHU-3	Filters	The outside air intake screen is missing
	Open	AHU-4	Airflow	There is significant air leakage under the cooling coil. This should be reviewed to maintain unit efficiency and performance for thermal and humidity regulation
	Open	AHU-4	Dampers	The outside air damper minimum setpoint was 10% open and the damper would not modulate to 100% open. This prevented the measurement of the unit total
	Open	AHU-5	Dampers	The outside air damper minimum setpoint was 10% open and the damper would not modulate to 100% open. This prevented the measurement of the unit total
	Open	AHU-6	Dampers	The outside air damper for this unit was not operational
	Open	AHU-6	Dampers	The outside air damper minimum setpoint was 10% open and the damper would not modulate to 100% open. This prevented the measurement of the unit total

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (44)
	Open	Air Handling Equipment	Coils	All unit coils were dirty and need to be cleaned
	Open	Air Handling Equipment	Dampers	All dampers should be cleaned, lubricated, and have their seals checked
	Open	ERV-1	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	ERV-2	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	ERV-2	Operation	This unit was not operational during TAB testing
	Open	ERV-3	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	ERV-4	Cleaning	The unit interior is dirty and needs to be cleaned
	Open	ERV-4	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	ERV-5	ERW	The energy recovery wheel is in awful shape with the sections showing discoloration and warping. This will inhibit proper energy transfer and can negatively affect the IAQ
	Open	ERVs	Filters	The primary metal filters, particularly those on the ERVs, were very dirty and were restricting airflow during initial observations
	Open	ERVs	Filters	The primary filters are washable, and these should be cleaned more often than the disposable filters need to be replaced. The expected interval for this is about once every 3 months, depending on the season. This will

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (44)
				help to maintain high fan efficiency but also prevent the internal filters from loading quickly
	Open	ERVs	Seals	Many of the unit air seals are missing, damaged, or are laying in the units. These should be reattached to maintain unit casing integrity and performance
	Open	Gym AHUs	Filters	Although the filters had been changed within 4 months of this inspection, the two running units' filters were showing signs of significant accumulation. If all units were operating, this load would be distributed across the line

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 (40)
	Open	101A Kiln	Water Damage	Water staining was observed on the ceiling
	Open	101C Boiler Room	Glycol	Noted low glycol mixture in tank
	Open	102B Boys Toilet	Airflow	Ceiling Fan is not operational
	Open	102B Boys Toilet	Temperature	This space was noticeably cold
	Open	200G OT/PT	Noise	Hot water was loud here and there was a rumbling noise above the ceiling
	Open	204A Toilet	Noise	It is very loud in this space
	Open	212B Psychologist Office	Water Damage	Water staining was observed on the ceiling
	Open	212H Health Suite	Noise	There are loud noises above the ceiling
	Open	212K Nurse Office	Noise	There is a rumbling noise above the ceiling
	Open	300 Classroom	Noise	Supply air was noticeably loud
	Open	301 Classroom	Noise	Supply air was noticeably loud
	Open	302 Classroom	Noise	Supply air was noticeably loud

Action Taken	Status	Unit/Zone	Serving/Room Name	Maintenance Issue (40)
	Open	303 Classroom	Noise	Supply air was noticeably loud, Water staining on ceiling
	Open	303 Classroom	Water Damage	Water staining was observed on the ceiling
	Open	305 Classroom	Noise	Supply air was noticeably loud
	Open	306A Small Group Instruction	Noise	Supply air was noticeably loud
	Open	307 Classroom	Noise	Supply air was noticeably loud
	Open	AHU-1A	Coils	The heating coil was inaccessible
	Open	AHU-1C	Drain Pan	After coils have been cleaned, the drain pan should be cleaned out as well
	Open	AHU-1D	ERW	The energy recovery wheel was inoperable during inspection
	Open	AHU-2	Drain Pan	The condensate trap is broken and needs a repair
	Open	AHU-3	Drain Pan	After coils have been cleaned, the drain pan should be cleaned out as well
	Open	AHU-3	ERW	The belt on the energy recovery wheel is broken and should be repaired
	Open	AHU-4	Coils	The coils are showing significant signs of fin damage. These should be combed straight or replaced if not possible.
	Open	AHU-4	Drain Pan	After coils have been cleaned, the drain pan should be cleaned out as well
	Open	AHU-6	Drain Pan	The condensate trap is broken and needs a repair
	Open	ERV-1	Drain Pan	After coils have been cleaned, the drain pan should be cleaned out as well

Action Taken	Status	Unit/Zone	Serving/Room Name	Maintenance Issue (40)
	Open	ERV-1	Identification	The condenser unit nameplate was concealed by the disconnect switch.
	Open	ERV-1	Insulation	Exposed supply ductwork insulation has failed and should be repaired to maintain thermal efficiency and the vapor barrier
	Open	ERV-1	Insulation	The refrigerant piping insulation is failing in some locations. This should be repaired
	Open	ERV-2	Coils	The heating coil was inaccessible
	Open	ERV-2	Identification	The condenser unit nameplate was concealed by the disconnect switch.
	Open	ERV-3	Belts	The return fan belt is loose
	Open	ERV-3	Drain Pan	After coils have been cleaned, the drain pan should be cleaned out as well
	Open	ERV-3	Identification	The condenser unit nameplate was concealed by the disconnect switch.
	Open	ERV-4	Coils	The heating coil was inaccessible
	Open	ERV-4	Dampers	The exhaust air damper is stuck open
	Open	ERV-4	Identification	The condenser unit nameplate was concealed by the disconnect switch.
	Open	ERV-5	Coils	The heating coil was inaccessible
	Open	ERV-5	Identification	The condenser unit nameplate was concealed by the disconnect switch.

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 (28)
	Open	200C Women	Operation	Controlled by AHU-6 on BMS
	Open	200D Conference	Operation	Controlled by AHU-6 on BMS
	Open	200J Speech	Operation	Controlled by AHU-2 on BMC
	Open	200M Speech	Operation	Controlled by AHU-2 on BMS
	Open	301A Boys Toilet	Exhaust	The light switch here controls the exhaust fan but it does not work like this in the nearby Girls Toilet 302C. During occupied hours, the toilet exhaust fans should run continuously but at a low speed, if possible
	Open	AHU-1A	ERV's	This unit has both a standard AHU section paired with an ERV section. CTC could not control the ERV section, which was not running and could not be commanded on for testing. This had a negative impact on total airflow but it is not clear how much
	Open	AHU-1A	Operation	The BAS was sending a run command to the unit but both unit sections were off
	Open	AHU-1B	Dampers	The outside air damper on the ERV and the return air damper on the main unit were both closed.
	Open	AHU-1B	Operation	The ERV section unit wheel and fans were not operating

Action Taken	Status	Unit/Zone	Serving/Room Name	Control Issue (28)
	Open	AHU-1C	Dampers	The outside air damper was open while the unit was off
	Open	AHU-1C	Operation	This unit was shut off during inspection.
	Open	AHU-1D	Dampers	The outside air damper was open while the unit was off
	Open	AHU-1D	ERV's	This unit has both a standard AHU section paired with an ERV section. CTC could not control the ERV section, which was not running and could not be commanded on for testing. This had a negative impact on total airflow but it is not clear how much
	Open	AHU-1D	Operation	This unit was shut off during inspection.
	Open	AHU-2	Programming	On the BAS, "AHU-6" controls the unit AHU-2
	Open	AHU-2	Temperature	The cooling was running with only the minimum outside air intake when outdoor conditions were favorable for free cooling
	Open	AHU-3	Economizer	The economizer seems that it would be present but it does not currently appear that it is functional
	Open	AHU-3	ERV's	This unit has both a standard AHU section paired with an ERV section. CTC could not control the ERV section, which was not running and could not be commanded on for testing. This had a negative impact on total airflow but it is not clear how much
	Open	AHU-3	Fans	The exhaust fan was off at the time of inspection but it should have been running
	Open	AHU-3	General	Overall sequences of operation for this unit are not clear and should be thoroughly reviewed
	Open	AHU-5	Programming	On the BAS, "AHU-2" controls the unit AHU-5
	Open	AHU-6	Dampers	The outside air damper has a bad controller and needs a replacement

Action Taken	Status	Unit/Zone	Serving/Room Name	Control Issue (28)
	Open	AHU-6	Programming	On the BAS, "AHU-5" controls the unit AHU-6
	Open	AHU-6	Temperature	The cooling was running with 0% outside air intake when outdoor conditions were favorable for free cooling
	Open	BAS	IO Points	The Talon system was replaced with CTC Distech controls but little information is available as to IO points list and general operation
	Open	ERV-4	Dampers	Exhaust Damper Actuator is non-functioning
	Open	Gym AHUs	Operation	Only two of the four units were operating, and of those units neither of the energy recovery wheels were running properly with both the wheel and exhaust fan off. The damper control arrangement was causing reduced outside air to be delivered.
	Open	Packaged Units	DCV	Although the packaged air handling units had wiring labeled for CO2 control, it is not clear if the units are operating with a demand control ventilation sequence and there is not a way to check at this time.

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 (17)
	Info Only	104A General Storage	GGM Key	GGM Key did not work on these doors
	Info Only	105 Storage	GGM Key	GGM Key did not work on these doors
	Info Only	105A Mech	GGM Key	GGM Key did not work on these doors
	Info Only	105B Electrical	GGM Key	GGM Key did not work on these doors
	Info Only	201D LA Storage	Airflow	This space does not have any ventilation provided to it
	Info Only	202B II Storage	Airflow	This space does not have any ventilation provided to it
	Info Only	205F Storage	Airflow	This space does not have any ventilation provided to it
	Info Only	206A Shared Storage 206/207	Airflow	This space does not have any ventilation provided to it
	Info Only	206B Small Storage	Airflow	This space does not have any ventilation provided to it
	Info Only	213B Kitchen Storage	Airflow	This space does not have any ventilation provided to it
	Info Only	213D Boys	Airflow	This space does not have any ventilation provided to it

Action Taken	Status	Unit/Zone	Serving/Room Name	Information Only Findings (17)
		Toilet Storage		
	Info Only	213D Boys Toilet Storage	GGM Key	GGM Key did not work on these doors
	Info Only	302B Storage	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Info Only	303B Storage	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Info Only	303B Storage	GGM Key	GGM Key did not work on these doors
	Info Only	304B Storage	Airflow	ERV-2 was not running, so this space was receiving no ventilation
	Open	AHU-5	Temperature	This unit did not have any source of heating. This is unusual in this climate, and if it needs to run in the winter it could lead to the associated space overcooling

APPENDIX 2 – Ventilation Data Calculations

Project Name:	Fairfield Public Schools RCx & TAB Study
Project Number:	2020102.00.13
Scope:	Ventilation Calculation by Building
Date:	October 7, 2022

Stratfield Elementary School



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)
L	100	Computer Lab	Education	Computer lab	ND	100%	NA	ERV-1	1225	108	11100	32	10.0	0.12	25	467	372	-95	-20.3%	FAILS	2.011
L	100A	Media Center	Education	Media Center	ND	23%	10%	AHU-6	2450	10	24500	42	10.0	0.12	25	714	276	-438	-61.3%	FAILS	0.676
L	100B	Office	Offices	Office spaces	ND	23%	10%	AHU-6	155	10	1550	2	5.0	0.06	5	19	70	51	262.7%	Meets	2.710
L	100F	Art Storage	None	None	ND	100%	NA	ERV-1	85	9.4	799	1	0.0	0.00	0	0	31	31	0.0%	N/A	2.328
L	100G	MDF/I.T.	None	None	ND	NA	NA	NA	50	9.3	465	1	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
L	100H	Custodian Storage	None	None	ND	100%	NA	ERV-1	160	12	1920	1	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
L	100J	Tech Office	Workrooms	Computer (w/o printing)	ND	100%	NA	ERV-1	85	9.3	791	1	5.0	0.06	4	10	0	-10	-100.0%	FAILS	0.000
L	101	Art Classroom	Education	Art Classroom	ND	100%	NA	ERV-1	750	11	8250	25	10.0	0.18	20	385	351	-34	-8.8%	FAILS	2.553
L	101A	Kilin	Storage	Warehouses	ND	100%	NA	ERV-1	100	9.1	910	1	0.0	0.06	0	6	247	241	4016.7%	Meets	16.286
L	101B	Tutor	Offices	Office spaces	ND	100%	NA	ERV-1	140	9.4	1316	4	5.0	0.06	5	28	30	2	5.6%	Meets	1.368
L	101C	Boiler Room	None	None	ND	NA	NA	NA	850	11.6	9860	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
L	101F	Girls Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-16	65	9.3	605	1	0.0	0.00	0	0	65	65	0.0%	N/A	6.452
L	101G	Janitor/Custodian	Storage	Warehouses	ND	NA	NA	EF-17	19	9.3	177	1	0.0	0.06	0	1	181	180	15777.2%	Meets	61.460
L	102	Band Classroom	Education	Music/theater/dance	ND	NA	NA	ERV-2	485	11	5335	30	10.0	0.06	35	329	0	-329	-100.0%	FAILS	0.000
L	102A	Orchestra Classroom	Education	Music/theater/dance	ND	NA	NA	ERV-2	485	10.7	5190	30	10.0	0.06	35	329	0	-329	-100.0%	FAILS	0.000
L	102B	Boys Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	Ceiling Fan	75	9.3	698	1	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
L	103	Music Classroom	Education	Music/theater/dance	ND	NA	NA	ERV-2	725	11	7975	25	10.0	0.06	35	294	0	-294	-100.0%	FAILS	0.000
M	200	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-1	700	11	7700	25	10.0	0.12	25	334	410	76	22.8%	Meets	3.195
M	200A	PTA Storage/Office	Offices	Office spaces	ND	No Access	10%	AHU-1A	75	8.3	623	1	5.0	0.06	5	10	43	34	352.6%	Meets	4.145
M	200C	Women	Public Spaces	Toilet rooms - public	ND	20.5%	10%	EF-3 / AHU-5	80	9.3	744	2	0.0	0.00	0	0	157	157	0.0%	N/A	12.661
M	200D	Conference	Offices	Conference rooms	ND	20.5%	10%	AHU-5	285	9.3	2651	9	5.0	0.06	50	62	87	25	40.1%	Meets	1.969
M	200E	Men	Public Spaces	Toilet rooms - public	ND	20.5%	10%	EF-3/RTU-5	60	9.3	558	2	0.0	0.00	0	0	165	165	0.0%	N/A	17.742
M	200F	Small Group Instruction	Education	Classroom (ages 5-8)	ND	20.5%	10%	RTU-5	125	9.3	1163	3	10.0	0.12	25	45	0	-45	-100.0%	FAILS	0.000
M	200G	OT/PT	Hospitals nursing and convalescent homes	Physical Therapy	ND	20.5%	10%	RTU-5	230	9.3	2139	10	15.0	0.00	20	150	0	-150	-100.0%	FAILS	0.000
M	200H	Speech	Education	Classroom (ages 5-8)	ND	20.5%	10%	RTU-5	130	9.3	1209	6	10.0	0.12	25	76	80	4	5.8%	Meets	3.970
M	200J	Speech	Education	Classroom (ages 5-8)	ND	20.5%	10%	AHU-5	250	9.3	2325	5	10.0	0.12	25	80	84	4	5.0%	Meets	2.168
M	200M	Speech	Education	Classroom (ages 5-8)	ND	20.5%	10%	AHU-5	250	9.3	2325	10	10.0	0.12	25	130	37	-93	-71.5%	FAILS	0.955

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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)
M	201	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-1	750	11	8250	25	10.0	0.12	25	340	377	37	10.9%	Meets	2.742
M	201A	Girls Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-4	275	10	2750	4	0.0	0.00	0	0	166	166	0.0%	N/A	3.622
M	201B	Female Staff Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-4	50	8.5	425	1	0.0	0.00	0	0	41	41	0.0%	N/A	5.788
M	201C	Language Arts	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-1	205	11	2255	6	10.0	0.12	25	85	160	75	89.1%	Meets	4.257
M	201D	LA Storage	None	None	ND	NA	NA	NA	20	10	200	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	202	Classroom	Education	Classroom (ages 5-8)	ND	NA	NA	ERV-2	750	11	8250	25	10.0	0.12	25	340	0	-340	-100.0%	Fails	0.000
M	202A	Instructional Improvement	Education	Classroom (ages 5-8)	ND	NA	NA	ERV-2	205	11	2255	6	10.0	0.12	25	85	0	-85	-100.0%	Fails	0.000
M	202B	II Storage	None	None	ND	NA	NA	NA	20	10	200	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	203	Classroom	Education	Classroom (ages 5-8)	ND	NA	NA	ERV-2	700	11	7700	25	10.0	0.12	25	334	0	-334	-100.0%	Fails	0.000
M	204	Kindergarten	Education	Classroom (ages 5-8)	ND	NA	NA	NA	750	11.5	8625	25	10.0	0.12	25	340	0	-340	-100.0%	Fails	0.000
M	204A	Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-6	65	9.4	611	1	0.0	0.00	0	0	71	71	0.0%	N/A	6.972
M	205	Kindergarten	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-3	750	11.5	8625	25	10.0	0.12	25	340	610	270	79.4%	Meets	4.243
M	205B	Cust	Storage	Warehouses	ND	NA	NA	EF Unknown	30	8.8	264	1	0.0	0.06	0	2	0	-2	-100.0%	Fails	0.000
M	205F	Storage	None	None	ND	---	---	---	50	9.3	465	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	205G	Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-6	65	9.4	611	1	0.0	0.00	0	0	74	74	0.0%	N/A	7.267
M	206	Kindergarten	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-4	975	10.8	10530	25	10.0	0.12	25	367	294	-73	-19.9%	Fails	1.675
M	206A	Teachers Lounge	Food and beverage service	Dining Rooms	ND	100%	NA	ERV-4	275	11	3025	6	7.5	0.18	70	95	94	-1	-0.5%	Fails	1.864
M	206A	Shared Storage 206/207	None	None	ND	NA	NA	NA	75	9.3	698	1	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	206B	Teachers Lounge Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF Unknown	30	9.3	279	1	0.0	0.00	0	0	63	63	0.0%	N/A	13.548
M	206B	Small Storage	None	None	ND	NA	NA	NA	40	9.3	372	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	206E	Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-10	50	9.3	465	1	0.0	0.00	0	0	65	65	0.0%	N/A	8.387
M	207	Kindergarten	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-4	975	10.8	10530	25	10.0	0.12	25	367	302	-65	-17.7%	Fails	1.721
M	207A	Girls	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-111	175	10	1750	3	0.0	0.00	0	0	177	177	0.0%	N/A	6.069
M	207B	Boys	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-12	175	10	1750	3	0.0	0.00	0	0	333	333	0.0%	N/A	11.417
M	207C	Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-10	50	9.3	465	1	0.0	0.00	0	0	65	65	0.0%	N/A	8.387
M	208	Classroom	Education	Classroom (ages 5-8)	ND	100%	100%	ERV-5	785	9.3	7301	25	10.0	0.12	25	344	379	35	10.1%	Meets	3.115
M	209	Classroom	Education	Classroom (ages 5-8)	ND	100%	100%	ERV-5	785	9.3	7301	25	10.0	0.12	25	344	269	-75	-21.8%	Fails	2.211

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					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(%)		(AC/hr)	
M	210	Classroom	Education	Classroom (ages 5-8)	ND	100%	100%	ERV-5	785	9.3	7301	25	10.0	0.12	25	344	373	29	8.4%	Meets	3.066
M	211	Classroom	Education	Classroom (ages 5-8)	ND	100%	100%	ERV-5	785	9.3	7301	25	10.0	0.12	25	344	278	-66	-19.2%	Fails	2.285
M	212	Main Office	Offices	Reception Areas	ND	19%	10%	AHU-4	675	9.3	6278	8	5.0	0.06	30	81	117	37	45.3%	Meets	1.118
M	212A	Principal	Offices	Office spaces	ND	19%	10%	AHU-4	150	9.3	1395	3	5.0	0.06	5	24	70	46	191.7%	Meets	3.011
M	212B	Psychologist Office	Offices	Office spaces	ND	19%	10%	AHU-4	160	9.3	1488	5	5.0	0.06	5	35	13	-22	-62.4%	Fails	0.524
M	212C	Office	Offices	Office spaces	ND	19%	10%	AHU-4	150	9.3	1395	6	5.0	0.06	5	39	15	-24	-61.5%	Fails	0.645
M	212E	Conference	Offices	Conference rooms	ND	11%	10%	AHU-2	300	9.3	2790	12	5.0	0.06	50	78	96	18	23.1%	Meets	2.065
M	212F	Copier	Workrooms	Copy, printing rooms	ND	11%	10%	AHU-2	80	9.3	744	1	5.0	0.06	4	10	17	7	73.5%	Meets	1.371
M	212G	Storage	None	None	ND	11%	10%	AHU-2	85	9.3	791	1	0.0	0.00	0	0	11	11	0.0%	N/A	0.835
M	212H	Health Suite	Hospitals nursing and convalescent homes	Patient rooms	ND	19%	10%	AHU-4	315	9.3	2930	10	25.0	0.00	10	250	85	-165	-66.0%	Fails	1.741
M	212J	Nurse Toilet	Public Spaces	Toilet rooms - public	ND	19%	10%	EF-4, AHU-4	68	9	612	1	0.0	0.00	0	0	151	151	0.0%	N/A	14.804
M	212K	Nurse Office	Offices	Office spaces	ND	19%	10%	AHU-4	171	9.3	1590	4	5.0	0.06	5	30	18	-12	-40.5%	Fails	0.679
M	213	Cafeteria	Food and beverage service	Cafeteria, fast food	ND	20%	10%	Ahu-3	2950	23	67850	194	7.5	0.18	100	1986	269	-1717	-86.5%	Fails	0.238
M	213A	Kitchen	Food and beverage service	Kitchens (cooking)	ND	NA	NA	Kit Hood EF-2a & EF-2B	1050	10	10500	25	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	213B	Kitchen Storage	None	None	ND	NA	NA	NA	160	10	1600	3	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	213C	Boys Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-5	300	10	3000	4	0.0	0.00	0	0	322	322	0.0%	N/A	6.440
M	214	Gymnasium	Sports and amusement	Gym, stadium, arena (play area)	ND	no access	100%	AHU-1A-1D	3250	19.3	62725	200	0.0	0.30	0	975	0	-975	-100.0%	Fails	0.000
M	214A	Stage	Theaters	Stages, studios	ND	no access	100%	AHU-1A	890	24.2	21538	30	10.0	0.06	70	353	0	-353	-100.0%	Fails	0.000
M	214B	Office	Offices	Office spaces	ND	no access	100%	AHU-1A	75	8.3	623	2	5.0	0.06	5	15	0	-15	-100.0%	Fails	0.000
M	214D	Gym Storage	None	None	ND	NA	NA	NA	800	13.5	10800	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
M	214E	Exterior Storage	None	None	ND	NA	NA	NA	65	13.5	878	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
U	300	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-1	700	11	7700	25	10.0	0.12	25	334	448	114	34.1%	Meets	3.491
U	300A	Storage	None	None	ND	100%	NA	ERV-1	155	9.2	1426	2	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
U	300E	Elev Mech	None	None	ND	NA	NA	NA	75	11.5	863	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
U	301	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-1	750	11	8250	25	10.0	0.12	25	340	410	70	20.6%	Meets	2.982
U	301A	Boys Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-1	315	10	3150	4	0.0	0.00	0	0	448	448	0.0%	N/A	8.533
U	301B	Storage	None	None	ND	NA	NA	NA	20	10	200	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000

Project Name:	Fairfield Public Schools RCx & TAB Study
Project Number:	2020102.00.13
Scope:	Ventilation Calculation by Building
Date:	October 7, 2022

Stratfield Elementary School



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)
U	301C	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-1	205	11	2255	6	10.0	0.12	25	85	55	-30	-35.0%	FAILS	1.463
U	301D	Boys Toilet Custodian	Storage	Warehouses	ND	NA	NA	NA	32	10.3	330	0	0.0	0.06	0	2	0	-2	-100.0%	FAILS	0.000
U	302	Classroom	Education	Classroom (ages 5-8)	ND	NA	NA	ERV-2	750	11	8250	25	10.0	0.12	25	340	0	-340	-100.0%	FAILS	0.000
U	302A	Classroom	Education	Classroom (ages 5-8)	ND	NA	NA	ERV-2	205	11	2255	6	10.0	0.12	25	85	0	-85	-100.0%	FAILS	0.000
U	302B	Storage	None	None	ND	NA	NA	ERV-2	20	10	200	0	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
U	302C	Girls	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-2	270	10	2700	4	0.0	0.00	0	0	326	326	0.0%	N/A	7.244
U	302D	Female Staff Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-2	55	9.3	512	1	0.0	0.00	0	0	251	251	0.0%	N/A	29.443
U	303	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-2	700	11	7700	25	10.0	0.12	25	334	0	-334	-100.0%	FAILS	0.000
U	304	Science Classroom	Education	Science Laboratories	ND	100%	NA	ERV-3	730	11.7	8541	25	10.0	0.18	25	381	96	-285	-74.8%	FAILS	0.674
U	304A	Prep	Education	Science Laboratories	ND	NA	NA	EF-14	85	9	765	1	10.0	0.18	25	25	0	-25	-100.0%	FAILS	0.000
U	304B	Storage	None	None	ND	100%	NA	ERV-2	90	8.1	729	1	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
U	305	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-3	650	11.7	7605	25	10.0	0.12	25	328	595	267	81.4%	MEETS	4.694
U	306	Small Group Instr. Corr. OT/PT	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-3	80	8.8	704	2	10.0	0.12	25	30	87	57	193.9%	MEETS	7.415
U	306A	Small Group Instruction	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-3	150	8.8	1320	7	10.0	0.12	25	88	273	185	210.2%	MEETS	12.409
U	306B	Small Group Instruction	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-3	215	8.8	1892	4	10.0	0.12	25	66	237	171	260.2%	MEETS	7.516
U	307	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-4	850	11.7	9945	25	10.0	0.12	25	352	968	616	175.0%	MEETS	5.840
U	307A	Custodian	Storage	Warehouses	ND	NA	NA	EF-13	18	8.6	155	1	0.0	0.06	0	1	97	96	8881.5%	MEETS	37.597
U	308	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-4	815	11.7	9536	25	10.0	0.12	25	348	336	-12	-3.4%	FAILS	2.114
U	308B	Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-13	55	8.6	473	1	0.0	0.00	0	0	123	123	0.0%	N/A	15.603
U	308C	Copier	Workrooms	Copy, printing rooms	ND	100%	NA	ERV-4	60	8.6	516	1	5.0	0.06	4	9	86	77	900.0%	MEETS	10.000
U	309	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-4	750	11.7	8775	25	10.0	0.12	25	340	310	-30	-8.8%	FAILS	2.120
U	309A	Girls Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-111	175	9.8	1715	3	0.0	0.00	0	0	254	254	0.0%	N/A	8.886
U	309B	Boys Toilet	Public Spaces	Toilet rooms - public	ND	NA	NA	EF-12	175	9.8	1715	3	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
U	310	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-5	785	11.5	9028	25	10.0	0.12	25	344	359	15	4.3%	MEETS	2.386
U	311	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-5	785	11.5	9028	25	10.0	0.12	25	344	323	-21	-6.2%	FAILS	2.147
U	312	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-5	785	11.5	9028	25	10.0	0.12	25	344	333	-11	-3.3%	FAILS	2.213
U	313	Classroom	Education	Classroom (ages 5-8)	ND	100%	NA	ERV-5	785	11.5	9028	25	10.0	0.12	25	344	295	-49	-14.3%	FAILS	1.961

APPENDIX 3 – Roof Map



Unit Identification Tag	Location	Area Served	Supply Air/ Outside Air (CFM)
AHU-1a	Roof	Stage / Gymnasium	5,000/2,425
AHU-1b	Roof	Gymnasium	5,000/2,425
AHU-1c	Roof	Gymnasium	5,000/2,425
AHU-1d	Roof	Gymnasium	5,000/2,425
AHU-2	Roof	Special Ed	2,000/350
AHU-3	Roof	Cafeteria	8,000/3,000
AHU-4	Roof	Principal's Office	3,000/390
AHU-5	Roof	Media Center	2,000/350
AHU-6	Roof	Conference Room	1,200/150

Unit Identification Tag	Location	Area Served
ERV-1	Roof	NE Wing Classrooms
ERV-2	Roof	SE Wing Classrooms
ERV-3	Roof	South Wing Classrooms
ERV-4	Roof	West Wing Classrooms
ERV-5	Roof	North Wing Classrooms



APPENDIX 4 – TAB Airflow Survey Data



WING'S TESTING & BALANCING CO., INC.

Fairfield Public Schools

Stratfield Elementary School

* * * *

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

August 1, 2022



WING'S TESTING & BALANCING CO., INC.

August 1, 2022

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

Re: Stratfield Elementary School / Air Flow Testing

Dear Bill,

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

- ERV-2 was not operational during testing
- AHU-2, AHU-5 & AHU-6 do not match up with BMS controls. On BMS "AHU-2" controls AHU-5, "AHU-5" controls AHU-6, and "AHU-6" controls AHU-2.
- AHU-6 outside air damper was not operational.
- AHU-1A-1D & AHU-3 have standard AHU sections paired with ERV sections, CTC could not control the ERV sections, only the AHUs; ERV sections were not running and could not be commanded on for testing.

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

Nicholas Carrano

Certified TABB Technician #BB1160780T
CT SM-2 License 7484



VELOCITY PRESSURE READINGS								
PROJECT: FPS- Stratfield Elementary						DATE: 8/1/2022		
AREA SERVED: All						TECH: NC		
TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN		CENT. STAT. PRESS."	TEST		NOTES
			FPM	CFM		FPM	CFM	
AHU-1A OA	60"x17"	7.08	---	ND	w/Velgrid	56	397	(2)
AHU-1B OA	60"x17"	7.08	---	---	---	---	---	(3)
AHU-1C OA	60"x17"	7.08	---	ND	w/Velgrid	42	297	(2)
AHU-1D OA	60"x17"	7.08	---	ND	w/Velgrid	35	248	(2)
AHU-3 OA	60"x17"	7.08	ND	ND	w/Velgrid	38	269	(1)
AHU-3 Suppy Tot.	30"x30"	6.25	ND	ND	+0.02"	213	1331	
AHU-3 Ret. Calc.	---	---	---	---	---	---	1062	
AHU-4 OA	36"x15"	3.75	ND	ND	w/Velgrid	138	518	(2)
AHU-5 OA	36"x15"	3.75	ND	ND	w/Velgrid	82	308	(2)
AHU-6 OA	36"x15"	3.75	ND	ND	w/Velgrid	46	173	(2,4)
REMARKS								
(1) OA intake screen is missing. (2) OA damper min setpoint 10%, damper would not modulate to 100% open so unit total could not be measured. (3) Not running at time of testing. (4) Bad OAD controller.								
NA Not Available ND No Design DD Direct Drive N/R No Requirement								

AIR DEVICE REPORT										
PROJECT: FPS - Stratfield Elementary							DATE: 7/12/22, 7/15/22			
SYSTEM / AREA: EFS / Various							TECH: NC			
LOCATION	NO.	SIZE	A K	DESIGN		TEST		FINAL		NOTES
				FPM	CFM	FPM	CFM	FPM	CFM	
EF-10										
Toilet 206 E	E1	6"x6"	FH	---	ND	---	65			
Toilet 207C	E2	6"x6"	FH	---	ND	---	65			
EF-11										
Girls 207A	E1	8"x8"	FH	---	ND	---	177			
Girls 309A	E2	8"x8"	FH	---	ND	---	254			
EF-17 Cust 101G										
	E1	8"x8"	FH		ND	---	181			
EF-12										
Boys 207B	E1	8"x8"	FH	---	ND	---	333			
Boys 309B	E2	8"x8"	FH	---	ND	---	0			
EF-1										
Boys 301A	E1	16"x2"	0.16	---	ND	1650	264			
Boys 301A	E2	16"x2"	0.16	---	ND	1150	184			
							448			
EF-2										
Girls 302C	E1	16"x2"	0.16	---	ND	1150	184			
Girls 302C	E2	16"x2"	0.16	---	ND	885	142			
Fem Staff Toilet	E3	8"x8"	0.32	---	ND	785	251			
							577			
EF-13										
Staff toilet 308B	E1	6"x6"	---	---	ND	---	123			
Custodian 307A	E2	6"x6"	---	---	ND	---	97			
							220			
Boys 102B	E1	12"x12"	---	---	ND	---	0			(1)
Girls 101F	E1	12"x12"	---	---	ND	---	65			
REMARKS										
(1) Ceiling fan not operational.										
NA Not Available ND No Design DD Direct Drive N/R No Requirement										

AIR DEVICE REPORT										
PROJECT: FPS - Stratfield Elementary							DATE: 8/1/2022			
SYSTEM / AREA: EFS / Various							TECH: NC			
LOCATION	NO.	SIZE	A K	DESIGN		TEST		FINAL		NOTES
				FPM	CFM	FPM	CFM	FPM	CFM	
EF-4										
Girls 201A	E1	16"x2"	0.16	---	ND	569	91			
Girls 201A	E2	16"x2"	0.16	---	ND	469	75			
Staff Toilet 201B	E3	8"x8"	FH	---	ND	---	41			
Nurse Toilet 212J	E4	8"x8"	FH	---	ND	---	<u>151</u>			
							358			
EF-5										
Boys 213C	E1	16"x2"	0.16	---	ND	1186	190			
Boys 213C	E2	16"x2"	0.16	---	ND	823	<u>132</u>			
							322			
Kitchen Hoods										
Hood 1	KH-1	130"x18"	16.25	---	ND	165	2681			
Hood2	KH-2	130"x18"	16.25	---	ND	170	2763			
EF-16										
Girls Toilet 101F	E1	12"x12"	FH	---	ND	---	65			
EF-17										
Custodial 101G	E1	8"x8"	FH	---	ND	---	181			
REMARKS										

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

AIR DEVICE REPORT										
PROJECT: FPS - Stratfield Elementary							DATE: 7/12/22. 7/15/22			
SYSTEM / AREA: ERV's 1,2,3 / Various							TECH: NC			
LOCATION	NO.	SIZE	A K	DESIGN		TEST		FINAL		NOTES
				FPM	CFM	FPM	CFM	FPM	CFM	
ERV-1										
Computer Lab 100	1	14"x12"	FH	---	ND	---	372			
Classroom 101	2	14"x12"	FH	---	ND	---	351			
101B	3	6"x6"	FH	---	ND	---	30			
Art Stor. 100F	4	6"x6"	FH	---	ND	---	31			
Kiln 101A	5	6"x6"	FH	---	ND	---	0			
Classroom 200	6	14"x12"	FH	---	ND	---	410			
Classroom 201	7	14"x12"	FH	---	ND	---	377			
Lang Arts 201C	8	6"x6"	FH	---	ND	---	160			
Classroom 300	9	14"x12"	FH	---	ND	---	448			
Classroom 301	10	14"x12"	FH	---	ND	---	410			
Classroom 301C	11	6"x6"	FH	---	ND	---	55			
Storage 301A	12	6"x6"	FH	---	ND	---	0			
ERV-3 Supply										
204	1	14"x12"	FH	---	ND	---	-45			(1)
205	2	14"x12"	FH	---	ND	---	610			
304	3		FH		ND	---	96			
305	4		FH		ND	---	595			
Sm Group 306A	5	6"x6"	FH	---	ND	---	273			
Sm Group 306B	6	6"x6"	FH	---	ND	---	237			
Sm Group Cor 306	7	6"x6"	FH	---	ND	---	87			
REMARKS										
(1) This is only a transfer duct connected to corridor diffuser. It is not connected to ERV-3. Room 204 has no OA due to this.										
NA Not Available ND No Design DD Direct Drive N/R No Requirement										

AIR DEVICE REPORT										
PROJECT: FPS - Stratfield Elementary							DATE: 7/13/22,7/14,7/15			
SYSTEM / AREA: ERV-4,5							TECH: NC			
LOCATION	NO.	SIZE	A K	DESIGN		TEST		FINAL		NOTES
				FPM	CFM	FPM	CFM	FPM	CFM	
ERV-4 Supply										
Classroom 206	1	14"x12"	FH	---	ND	---	294			
Classroom 207	2	14"x12"	FH	---	ND	---	302			
Lounge 206A	3	14"x12"	FH	---	ND	---	94			
Classroom 307	4	14"x12"	FH	---	ND	---	968			
Classroom 308	5	14"x12"	FH	---	ND	---	336			
Classroom 309	6	14"x12"	FH	---	ND	---	310			
Copier 308C	7	6"x6"	FH	---	ND	---	86			
ERV-5 Supply										
Classroom 208	1	14"x12"	FH	---	ND	---	379			
Classrom 209	2	14"x12"	FH	---	ND	---	269			
Classroom 210	3	14"x12"	FH	---	ND	---	373			
Classroom 211	4	14"x12"	FH	---	ND	---	278			
Classroom 310	5	14"x6"	FH	---	ND	---	359			
Classroom 311	6	14"x6"	FH	---	ND	---	323			
Classroom 312	7	14"x6"	FH	---	ND	---	333			
Classroom 313	8	14"x6"	FH	---	ND	---	295			
Corridor	9	9"x9"	FH	---	ND	---	85			
AHV-6 Supply										
Media Center	1	22"x22"	FH	---	ND	---	336			
Media Center	2	22"x22"	FH	---	ND	---	352			
Media Center	3	22"x22"	FH	---	ND	---	368			
Media Center	4	22"x22"	FH	---	ND	---	336			
100B Office	5	12"x12"	FH	---	ND	---	303			
							1695			
AHU-6 Return										
Media Center	R1	22"x22"	FH	---	ND	---	109			
Media Center	R2	22"x22"	FH	---	ND	---	1007			
100B	R3	12"x22"	FH	---	ND	---	260			
							1376			
REMARKS										

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

AIR DEVICE REPORT

PROJECT: FPS- Stratfield Elementary **DATE:** 8/1/2022
SYSTEM / AREA: AHU-4 / Main Office, Nurse **TECH:** FPS

LOCATION	NO.	SIZE	A K	DESIGN		TEST		FINAL		NOTES
				FPM	CFM	FPM	CFM	FPM	CFM	
AHU-4 Supply										
Main Office 212	1	12" x 12"	FH	---	ND	---	183			
Main Office 212	2	12" x 12"	FH	---	ND	---	232			
Main Office 212	3	12" x 12"	FH	---	ND	---	202			
Principle 212A	4	12" x 12"	FH	---	ND	---	371			
Office 212B	5	6" x 6"	FH	---	ND	---	71			
Office 212C	6	6" x 6"	FH	---	ND	---	81			
Health 212H	7	9" x 9"	FH	---	ND	---	85			
Nurse 212K	8	9" x 9"	FH	---	ND	---	88			
Nurse Toilet	9	6" x 6"	FH	---	ND	---	67			
							1380			
AHU-4 Return										
Main Office 212	R1	15" x 15"	FH	---	ND	---	440			
Principle 212A	R2	12" x 12"	FH	---	ND	---	208			
Office 212B	R3	8" x 8"	FH	---	ND	---	0			
Office 212C	R4	8" x 8"	FH	---	ND	---	206			
Health 212H	R5	10" x 10"	FH	---	ND	---	220			
Nurse 212K	R6	8" x 8"	FH	---	ND	---	49			
							1123			

REMARKS

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

Project Name:	Fairfield Public Schools RCx: Stratfield Elementary School
Project Number:	2020102.00.13
Scope	TAB Data
Date	

Zone Identification								
Floor	Room#	Room Name	Design Min CFM (cfm)	Actual OA at Min (OA cfm)	Unit Actual OA % (OA% of Total)	BAS OA Damper Cond (pos. %)	Space Served By RTU/AHU Unit	Notes
L	100	Computer Lab	ND	372	100%	NA	ERV-1	
L	100A	Media Center	ND	276	23%	10%	AHU-6	
L	100B	Office	ND	70	23%	10%	AHU-6	
L	100F	Art Storage	ND	31	100%	NA	ErRV-1	
L	100G	MDF/I.T.	ND	No OA served, split only	NA	NA	NA	
L	100H	Custodian Storage	ND	0	100%	NA	ERV-1	
L	100J	Tech Office	ND	0	100%	NA	ERV-1	
L	101	Art Classroom	ND	351	100%	NA	ERV-1	
L	101A	Kiln	ND	-247 / 0	100%	NA	ERV-1	
L	101B	Tutor	ND	30	100%	NA	ERV-1	
L	101C	Boiler Room	ND	EF splls into Boiler Rm	NA	NA	NA	
L	101F	Girls Toilet	ND	-65	NA	NA	EF-16	
L	101G	Janitor/Custodian	ND	-181	NA	NA	EF-17	
L	102	Band Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
L	102A	Orchestra Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
L	102B	Boys Toilet	ND	0	NA	NA	Ceiling Fan	Ceiling Fan Not Operational
L	103	Music Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
L	104A	General Storage	ND	NA	NA	NA	NA	
L	105	Storage	ND	NA	NA	NA	NA	
L	105A	Mech	ND	NA	NA	NA	NA	
L	105B	Electrical	ND	NA	NA	NA	NA	
M	200	Classroom	ND	410	100%	NA	ERV-1	
M	200A	PTA Storage/Office	ND	43	No Access	10%	AHU-1A	

Project Name:	Fairfield Public Schools RCx: Stratfield Elementary School
Project Number:	2020102.00.13
Scope	TAB Data
Date	

Zone Identification								
Floor	Room#	Room Name	Design Min CFM (cfm)	Actual OA at Min (OA cfm)	Unit Actual OA % (OA% of Total)	BAS OA Damper Cond (pos. %)	Space Served By RTU/AHU Unit	Notes
M	200C	Women	ND	-157 / 9	20.5%	10%	EF-3 / AHU-5	Controlled by AHU-6 on BMS
M	200D	Conference	ND	87	20.5%	10%	AHU-5	Controlled by AHU-6 on BMS
M	200E	Men	ND	-165 / 15	20.5%	10%	EF-3 / RTU-5	
M	200F	Small Group Instruction	ND	0	20.5%	10%	RTU-5	
M	200G	OT/PT	ND	ND	20.5%	10%	RTU-5	
M	200H	Speech	ND	80	20.5%	10%	RTU-5	

Project Name:	Fairfield Public Schools RCx: Stratfield Elementary School
Project Number:	2020102.00.13
Scope	TAB Data
Date	

Zone Identification								
Floor	Room#	Room Name	Design Min CFM (cfm)	Actual OA at Min (OA cfm)	Unit Actual OA % (OA% of Total)	BAS OA Damper Cond (pos. %)	Space Served By RTU/AHU Unit	Notes
M	200J	Speech	ND	84	20.5%	10%	AHU-5	Controlled by AHU-2 on BMC
M	200M	Speech	ND	37	20.5%	10%	AHU-5	Controlled by AHU-2 on BMS
M	201	Classroom	ND	377	100%	NA	ERV-1	
M	201A	Girls Toilet	ND	-166	NA	NA	EF-4	
M	201B	Female Staff Toilet	ND	-41	NA	NA	EF-4	
M	201C	Language Arts	ND	160	100%	NA	ERV-1	
M	201D	LA Storage	ND	NA	NA	NA	NA	No Ventilation
M	202	Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
M	202A	Instructional Improvement	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
M	202B	II Storage	ND	NA	NA	NA	NA	No Ventilation
M	203	Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
M	204	Kindergarten	ND	Transfer Only	NA	NA	NA	Supply diffuser should be served by ERV-3 but is ducted to corridor diffuser and is transfer only. Rm has no ventilation
M	204A	Toilet	ND	-71	NA	NA	EF-6	
M	205	Kindergarten	ND	610	100%	NA	ERV-3	
M	205B	Cust	ND	0	NA	NA	Ef Unknow	
M	205F	Storage	ND	---	---	---	---	No Ventilation
M	205G	Toilet	ND	-74	NA	NA	EF-6	
M	206	Kindergarten	ND	294	100%	NA	ERV-4	
M	206A	Teachers Lounge	ND	94	100%	NA	ERV-4	
M	206A	Shared Storage 206/207	ND	NA	NA	NA	NA	No Ventilation
M	206B	Teachers Lounge Toilet	ND	-63	NA	NA	EF Unknown	
M	206B	Small Storage	ND	NA	NA	NA	NA	No Ventilation
M	206E	Toilet	ND	-65	NA	NA	EF-10	

Project Name:	Fairfield Public Schools RCx: Stratfield Elementary School
Project Number:	2020102.00.13
Scope	TAB Data
Date	

Zone Identification								
Floor	Room#	Room Name	Design Min CFM (cfm)	Actual OA at Min (OA cfm)	Unit Actual OA % (OA% of Total)	BAS OA Damper Cond (pos. %)	Space Served By RTU/AHU Unit	Notes
M	207	Kindergarten	ND	302	100%	NA	ERV-4	
M	207A	Girls	ND	-177	NA	NA	EF-111	
M	207B	Boys	ND	-333	NA	NA	EF-12	
M	207C	Toilet	ND	-65	NA	NA	EF-10	
M	208	Classroom	ND	379	100%	100%	ERV-5	
M	209	Classroom	ND	269	100%	100%	ERV-5	
M	210	Classroom	ND	373	100%	100%	ERV-5	
M	211	Classroom	ND	278	100%	100%	ERV-5	
M	212	Main Office	ND	117	19%	10%	AHU-4	
M	212A	Principal	ND	70	19%	10%	AHU-4	
M	212B	Psychologist Office	ND	13	19%	10%	AHU-4	
M	212C	Office	ND	15	19%	10%	AHU-4	
M	212E	Conference	ND	96	11%	10%	AHU-2	
M	212F	Copier	ND	17	11%	10%	AHU-2	
M	212G	Storage	ND	11	11%	10%	AHU-2	
M	212H	Health Suite	ND	85	19%	10%	AHU-4	
M	212J	Nurse Toilet	ND	-151 / 67	19%	10%	EF-4, AHU-4	
M	212K	Nurse Office	ND	18	19%	10%	AHU-4	
M	213	Cafeteria	ND	269	20%	10%	Ahu-3	
M	213A	Kitchen	ND	-5444 Hood Exhaust	NA	NA	Kit Hood EF-2a & EF-2B	
M	213B	Kitchen Storage	ND	NA	NA	NA	NA	No Ventilation
M	213C	Boys Toilet	ND	-322	NA	NA	EF-5	
M	213D	Boys Toilet Storage	ND	NA	NA	NA	NA	No Ventilation

Project Name:	Fairfield Public Schools RCx: Stratfield Elementary School
Project Number:	2020102.00.13
Scope	TAB Data
Date	

Zone Identification								
Floor	Room#	Room Name	Design Min CFM (cfm)	Actual OA at Min (OA cfm)	Unit Actual OA % (OA% of Total)	BAS OA Damper Cond (pos. %)	Space Served By RTU/AHU Unit	Notes
M	214	Gymnasium	ND	No access for total	No access for total	100%	AHU-1A-1D	
M	214A	Stage	ND	No access for total	No access for total	100%	AHU-1A	
M	214B	Office	ND	No access for total	No access for total	100%	AHU-1A	
M	214D	Gym Storage	ND	No Ventilation	NA	NA	NA	
M	214E	Exterior Storage	ND	NA	NA	NA	NA	
U	300	Classroom	ND	448	100%	NA	ERV-1	
U	300A	Storage	ND	0	100%	NA	ERV-1	
U	300E	Elev Mech	ND	NA	NA	NA	NA	
U	301	Classroom	ND	410	100%	NA	ERV-1	
U	301A	Boys Toilet	ND	-448	NA	NA	EF-1	
U	301B	Storage	ND	NA	NA	NA	NA	
U	301C	Classroom	ND	55	100%	NA	ERV-1	
U	301D	Boys Toilet Custodian	ND	NA	NA	NA	NA	
U	302	Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
U	302A	Classroom	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
U	302B	Storage	ND	NA	NA	NA	ERV-2	ERV-2 Not Running
U	302C	Girls	ND	-326	NA	NA	EF-2	
U	302D	Female Staff Toilet	ND	-251	NA	NA	EF-2	
U	303	Classroom	ND	NA	100%	NA	ERV-2	ERV-2 Not Running
U	303B	Storage	ND	NA	100%	NA	ERV-2	ERV-2 Not Running
U	304	Science Classroom	ND	96	100%	NA	ERV-3	
U	304A	Prep	ND	NA	NA	NA	EF-14	
U	304B	Storage	ND	NA	100%	NA	ERV-2	ERV-2 Not Running

Project Name:	Fairfield Public Schools RCx: Stratfield Elementary School
Project Number:	2020102.00.13
Scope	TAB Data
Date	

Zone Identification								
Floor	Room#	Room Name	Design Min CFM (cfm)	Actual OA at Min (OA cfm)	Unit Actual OA % (OA% of Total)	BAS OA Damper Cond (pos. %)	Space Served By RTU/AHU Unit	Notes
U	305	Classroom	ND	595	100%	NA	ERV-3	
U	306	Small Group Instr. Corr. OT/PT	ND	87	100%	NA	ERV-3	
U	306A	Small Group Instruction	ND	273	100%	NA	ERV-3	
U	306B	Small Group Instruction	ND	237	100%	NA	ERV-3	
U	307	Classroom	ND	968	100%	NA	ERV-4	
U	307A	Custodian	ND	-97	NA	NA	EF-13	
U	308	Classroom	ND	336	100%	NA	ERV-4	
U	308B	Toilet	ND	-123	NA	NA	EF-13	
U	308C	Copier	ND	86	100%	NA	ERV-4	
U	309	Classroom	ND	310	100%	NA	ERV-4	
U	309A	Girls Toilet	ND	-254	NA	NA	EF-111	
U	309B	Boys Toilet	ND	0	NA	NA	EF-12	
U	310	Classroom	ND	359	100%	NA	ERV-5	
U	311	Classroom	ND	323	100%	NA	ERV-5	
U	312	Classroom	ND	333	100%	NA	ERV-5	
U	313	Classroom	ND	295	100%	NA	ERV-5	

APPENDIX 5 – RCx Unit and Room Take-Off Data

Project Name:	Fairfield Public Schools RCx		RCM, RA, JRK
Project Number:	2020102.13		
Scope	Room Take-Off Data		
Date	April 20, 2022		
Stratfield Elementary School			

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures Y/N
L	100	Computer Lab	650 575	10 8	11100	32	2 SA 2 RA FTR, 30x Computers, 2x Copiers		
L	100A	Media Center	2450	10	24500	42	5 SA 2 RA FTR, 1x CUH by doors		
L	100B	Office	155	10	1550	2	1 SA 1 RA FTR		
L	100F	Art Storage	85	9.4	799	1	2 SA FTR		
L	100G	MDF/I.T.	50	9.3	465	1	1 SA, 1x Mitsubishi Split AC		
L	100H	Custodian Storage	160	12	1920	1	1x HW UH		
L	100J	Tech Office	85	9.3	790.5	1	2 SA 1 RA FTR		
L	101	Art Classroom	750	11	8250	25	3 SA 1 RA FTR		
L	101A	Kiln	100	9.1	910	1	1 SA FTR, 1x Kiln	Water staining on ceiling	Y
L	101B	Tutor	140	9.4	1316	4	2 SA 1 RA		
L	101C	Boiler Room	850	11.6	9860	0	1 SA 1 EA 1x Supply Fan, 2x HW UH	Noted very low glycol mixture in tank	
L	101F	Girls Toilet	65	9.3	604.5	1	1 EA FTR		
L	101G	Janitor/Custodian	19	9.3	176.7	1	1 EA		
L	102	Band Classroom	485	11	5335	30	2 SA 1 RA FTR, open foldable partition shared with Orchestra		
L	102A	Orchestra Classroom	485	10.7	5189.5	30	2 SA 1 RA FTR, open foldable partition shared with Band		
L	102B	Boys Toilet	75	9.3	697.5	1	1 EA FTR	Noticeably cold	
L	103	Music Classroom	725	11	7975	25	4 SA 1 RA FTR		
L	104A	General Storage	6243	11.6	72418.8	0		GGM Key did not work on these doors	
L	105	Storage	1554	11.6	18026.4	0		GGM Key did not work on these doors	
L	105A	Mech	225	11.6	2610	0		GGM Key did not work on these doors	
L	105B	Electrical	230	11.6	2668	0		GGM Key did not work on these doors	
M	200	Classroom	700	11	7700	25	2 SA 2 RA FTR		
M	200A	PTA Storage/Office	75	8.3	622.5	1	1 SA 1 RA		
M	200C	Women	80	9.3	744	2	1 SA 1 EA FTR		
M	200D	Conference	285	9.3	2650.5	9	2 SA 1 RA FTR		
M	200E	Men	60	9.3	558	2	1 SA 1 EA FTR		
M	200F	Small Group Instruction	125	9.3	1162.5	3	1 SA 1 RA		
M	200G	OT/PT	230	9.3	2139	10	1 SA 1 RA FTR	Hot water was loud here and there was a rumbling noise above the ceiling	
M	200H	Speech	130	9.3	1209	6	1 SA 1 RA FTR		
M	200J	Speech	250	9.3	2325	5	1 SA 1 RA FTR, Closed foldable partition with Speech 200M		
M	200M	Speech	250	9.3	2325	10	1 SA 1 RA FTR, Closed foldable partition with Speech 200J		
M	201	Classroom	750	11	8250	25	2 SA 2 RA FTR		
M	201A	Girls Toilet	275	10	2750	4	2 EA FTR		
M	201B	Female Staff Toilet	50	8.5	425	1	1 EA		
M	201C	Language Arts	205	11	2255	6	2 SA 1 RA FTR	Air short cycling concern based on layout	
M	201D	LA Storage	20	10	200	0	Nothing		
M	202	Classroom	750	11	8250	25	2 SA 2 RA FTR		

Project Name:	Fairfield Public Schools RCx		RCM, RA, JRK
Project Number:	2020102.13		
Scope	Room Take-Off Data		
Date	April 20, 2022		
Stratfield Elementary School			

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures
									Y /N
M	202A	Instructional Improvement	205	11	2255	6	2 SA 1 RA FTR	Air short cycling concern based on layout	
M	202B	II Storage	20	10	200	0	Nothing		
M	203	Classroom	700	11	7700	25	2 SA 2 RA FTR		
M	204	Kindergarten	750	11.5	8625	25	2 SA 2 RA FTR		
M	204A	Toilet	65	9.4	611	1	1 EA	It is very loud in this space	
M	205	Kindergarten	750	11.5	8625	25	2 SA 2 RA FTR		
M	205B	Cust	30	8.8	264	1	1x EF		
M	205F	Storage	50	9.3	465	0	Nothing, shared between 204 & 205		
M	205G	Toilet	65	9.4	611	1	1 EA		
M	206	Kindergarten	975	10.8	10530	25	2 SA 2 RA FTR		
M	206A	Teachers Lounge	275	11	3025	6	1 SA FTR, 1x Mitsubishi Split AC		
M	206A	Shared Storage 206/207	75	9.3	697.5	1	Nothing		
M	206B	Teachers Lounge Toilet	30	9.3	279	1	1x EF		
M	206B	Small Storage	40	9.3	372	0	Nothing		
M	206E	Toilet	50	9.3	465	1	1 EA, open to 207C		
M	207	Kindergarten	975	10.8	10530	25	2 SA 2 RA FTR		
M	207A	Girls	175	10	1750	3	1 EA FTR		
M	207B	Boys	175	10	1750	3	1 EA FTR		
M	207C	Toilet	50	9.3	465	1	1 EA, open to 206E		
M	208	Classroom	785	9.3	7300.5	25	5 SA 2 RA FTR		
M	209	Classroom	785	9.3	7300.5	25	5 SA 2 RA FTR		
M	210	Classroom	785	9.3	7300.5	25	5 SA 2 RA FTR		
M	211	Classroom	785	9.3	7300.5	25	5 SA 2 RA FTR		
M	212	Main Office	675	9.3	6277.5	8	3 SA 1 RA FTR		
M	212A	Principal	150	9.3	1395	3	1 SA 1 RA		
M	212B	Psychologist Office	160	9.3	1488	5	1 SA 1 RA	Water staining on ceiling	
M	212C	Office	150	9.3	1395	6	1 SA 1 RA		
M	212E	Conference	300	9.3	2790	12	2 SA 1 RA FTR		
M	212F	Copier	80	9.3	744	1	1 SA 1 RA, 1x large copier		
M	212G	Storage	85	9.3	790.5	1	1 SA 1 RA		
M	212H	Health Suite	315	9.3	2929.5	10	1 SA 1 RA FTR	There are loud noises above the ceiling	
M	212J	Nurse Toilet	68	9	612	1	1 SA 1 EA FTR		
M	212K	Nurse Office	171	9.3	1590.3	4	1 SA 1 RA	There is a rumbling noise above the ceiling	
M	213	Cafeteria	2950	23	67850	194	6 SA, 3 RA, chair count is 128, FM sign indicates up to 194 seated		
M	213A	Kitchen	1050	10	10500	25	1x CUH, 2x Range Hood, 2x Oven, 3x Fridge, 1x Freezer		
M	213B	Kitchen Storage	160	10	1600	3	1x Elec. UH		
M	213C	Boys Toilet	300	10	3000	4	2 EA FTR		

Project Name:	Fairfield Public Schools RCx	<i>RCM, RA, JRK</i>
Project Number:	2020102.13	
Scope	Room Take-Off Data	
Date	April 20, 2022	
Stratfield Elementary School		

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures
									Y/N
M	213D	Boys Toilet Storage	20	10	200	0		GGM Key did not work on these doors	
M	214	Gymnasium	3250	19.3	62725	200	18 SA, 3 big RA, 6 small transfers to the stage		
M	214A	Stage	890	24.2	21538	30	8 SA 1 RA		
M	214B	Office	75	8.3	622.5	2	1 SA 1 RA		
M	214D	Gym Storage	800	13.5	10800	0	2x HW UH, Roof access		
M	214E	Exterior Storage	65	13.5	877.5	0	1x Elec. UH		
U	300	Classroom	700	11	7700	25	2 SA 2 RA FTR	Supply air was noticeably loud	
U	300A	Storage	155	9.2	1426	2	1 SA		
U	300E	Elev Mech	75	11.5	862.5	0	1x EF, 1x Elec. UH		
U	301	Classroom	750	11	8250	25	2 SA 2 RA FTR	Supply air was noticeably loud	
U	301A	Boys Toilet	315	10	3150	4	2 EA FTR	The lightswitch here controls the exhaust fan but it does not work like	
U	301B	Storage	20	10	200	0	Nothing		
U	301C	Classroom	205	11	2255	6	2 SA 1 RA FTR	Air short cycling concern based on layout	
U	301D	Boys Toilet Custodian	32	10.3	329.6	0	FTR, Roof Access		
U	302	Classroom	750	11	8250	25	2 SA 2 RA FTR	Supply air was noticeably loud	
U	302A	Classroom	205	11	2255	6	2 SA 1 RA FTR	Air short cycling concern based on layout	
U	302B	Storage	20	10	200	0	Nothing		
U	302C	Girls	270	10	2700	4	2 EA FTR		
U	302D	Female Staff Toilet	55	9.3	511.5	1	1 EA FTR		
U	303	Classroom	700	11	7700	25	3 SA 2 RA	Supply air was noticeably loud, Water staining on ceiling	Y
U	303B	Storage	0	0	0	0	Void/Cavity, door removed and wall sealed	GGM Key did not work on these doors	Y
U	304	Science Classroom	730	11.7	8541	25	2 SA 2 RA FTR		
U	304A	Prep	85	9	765	1	1 SA 1 RA FTR, 1x Transfer to Classroom 304		
U	304B	Storage	90	8.1	729	1	1 SA		
U	305	Classroom	650	11.7	7605	25	2 SA 2 RA FTR	Supply air was noticeably loud	
U	306	Small Group Instr. Corr. OT/PT	80	8.8	704	2	2 SA		
U	306A	Small Group Instruction	150	8.8	1320	7	2 SA 2 RA FTR	Supply air was noticeably loud	
U	306B	Small Group Instruction	215	8.8	1892	4	2 SA 2 RA FTR		
U	307	Classroom	850	11.7	9945	25	2 SA 2 RA FTR	Supply air was noticeably loud	
U	307A	Custodian	18	8.6	154.8	1	1 EA		
U	308	Classroom	815	11.7	9535.5	25	2 SA 2 RA FTR		
U	308B	Toilet	55	8.6	473	1	1 EA		
U	308C	Copier	60	8.6	516	1	1 SA 1 RA, 1x large copier, semi-Electrical room		
U	309	Classroom	750	11.7	8775	25	2 SA 2 RA FTR		
U	309A	Girls Toilet	175	9.8	1715	3	1 EA FTR		
U	309B	Boys Toilet	175	9.8	1715	3	1 EA FTR		
U	310	Classroom	785	11.5	9027.5	25	4 SA 3 RA FTR		

Project Name:	Fairfield Public Schools RCx	
Project Number:	2020102.13	<i>RCM, RA, JRK</i>
Scope	Room Take-Off Data	
Date	April 20, 2022	
Stratfield Elementary School		

Zone Identification									
Floor	Room#	Room Name	Area (SF)	Ceiling Height	Volume	People	Notes	Identified Defficiencies	Pictures
									Y/N
U	311	Classroom	785	11.5	9027.5	25	4 SA 3 RA FTR		
U	312	Classroom	785	11.5	9027.5	25	4 SA 3 RA FTR		
U	313	Classroom	785	11.5	9027.5	25	4 SA 3 RA FTR		

PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

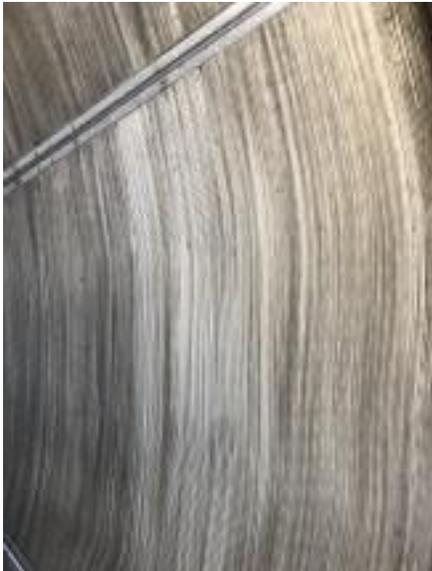
<u>Unit Tag</u>	<u>AHU-1A</u>	<u>Addition comments descriptions</u>
Date: 5-10-22	Auditor: RCM	
Location	Gymnasium Roof	
Serving	Stage/Gymnasium	
Config/Style	Rooftop AHU with packaged CU	
Mfr.	Trane Thycurb ERV	
Model #	TCD151E30AAB	Thybar: TV5230DF
Serial #	102310019D	Thybar: C0105094
Age (years)	2010	
System CFM	5000	
Max OA CFM	2425	
V/Hz/Ph	230/60/3	
SF Qty/HP	3 HP	BX68 Belt OK
SF VFD Data		
RF Qty/HP	OA FAN in ERV 2HP with AP45 Belt EXH Fan in ERV 2HP wth AX48 Belt ERW .5 HO	
RF VFD Data		
Filter Data (Size Quantity)	OA (3) 20 X 24 X 2, RA (3) 20 X 24 X 2 Main: (8) 20 X 25 X 2	
Filter Status	Moderate and changed last 4-14-22	
Controls Type	Package/DDC	
Controls Mfr.	Trane/Thybar/Distech CTC	
Economizer	Yes	
CO ₂ DCV	Wires on CO2 terminals	
Damper Styles	Multiple Opposed Blade	
Damper Status		
Heating Type	HW Coil	
Heating Coil Condition	Not accessible	
Cooling Type	Digital Scroll (2)	
Cooling Coil Condition	Clean	
Drain Pan Status		
Notes:	Both Trane and Thycurb Off but commanded On by DDC	

PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

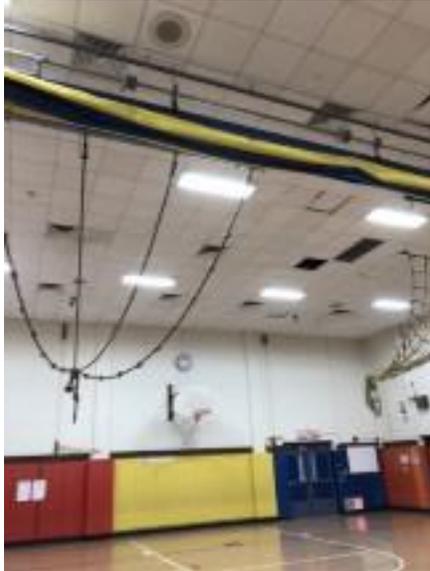
Photos



PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET



PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET



PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

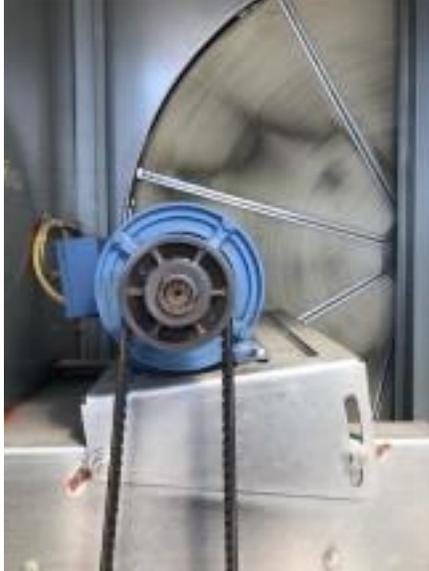


PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

<u>Unit Tag</u>	<u>AHU-1B</u>	<u>Addition comments descriptions</u>
Location	Gymnasium Roof	
Serving	Gymnasium	
Config/Style	Rooftop Cooling/Heating with ERW Section	
Mfr.	Trane Thybar ERV	
Model #	TCD151E30AAB	Thybar: TV5230DF
Serial #	102310010D	Thybar: C0105094
Age (years)	2010	
System CFM	5000	
Max OA CFM	2425	
V/Hz/Ph	230/60/3	
SF Qty/HP	3 HP	BX68 Belt OK
SF VFD Data		
RF Qty/HP	OA FAN in ERV 2HP with AP45 Belt EXH Fan in ERV 2HP wth AX48 Belt ERW .5 HO	
RF VFD Data		
Filter Data (Size Quantity)	OA (3) 20 X 24 X 2, RA (3) 20 X 24 X 2 Main: (8) 20 X 25 X 2	
Filter Status	Moderate and changed last 4-14-22	
Controls Type	Package/DDC	
Controls Mfr.	Trane/Thybar/Distech CTC	
Economizer	Yes	
CO ₂ DCV	Wires on CO2 terminals	
Damper Styles	Multiple Opposed Blade	
Damper Status	Functional, clean lubricate and adjust	
Heating Type	HW Coil	
Heating Coil Condition	OK	
Cooling Type	DX 2 compressors	
Cooling Coil Condition		
Drain Pan Status		
Notes:	ERV unit wheel nor fans operating Trane running extreme Negative Pressure starving for Air. ODA on Trane closed and ERV as well as RA on Trane ERW very dirty both sides but more on OA	

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DATA SHEET

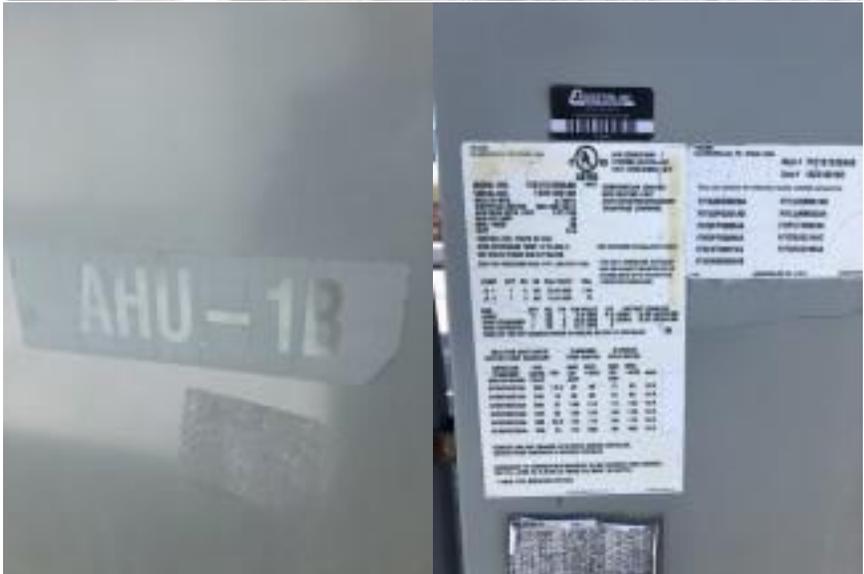
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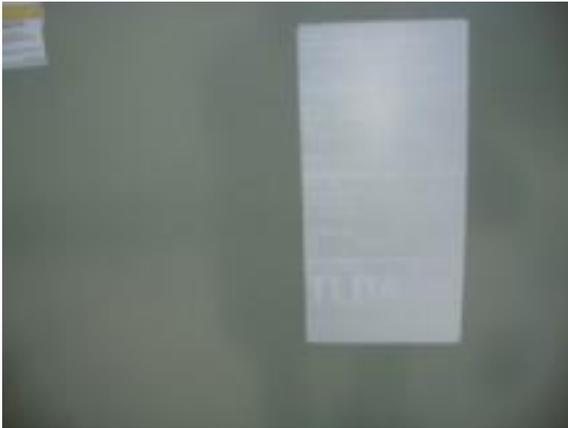
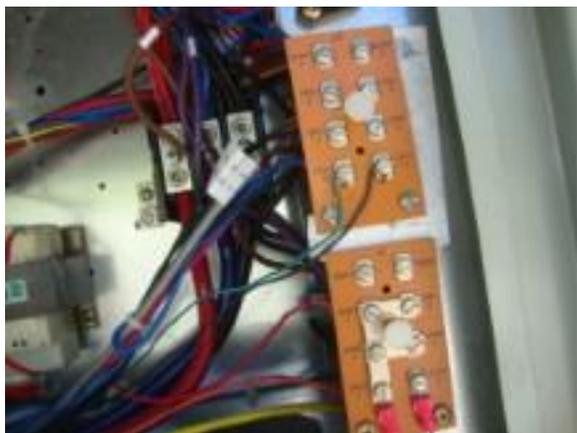


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DATA SHEET

<u>Unit Tag</u>	<u>AHU-1C</u>	<u>Addition comments descriptions</u>
Location	Gymnasium Roof	Unit Off!!
Serving	Gymnasium	
Config/Style	Rooftop AHU with packaged CU HW Heating Coil	Packaged Heat recovery wheel, fan, dampers, and filters
Mfr.	Trane Voyager	Thybar Corporation
Model #	TCD151E30AAB	TV5230DF
Serial #	102310046D	C0105094
Age (years)	6/2010	6/2010
System CFM	5000	
Max OA CFM	2425	
V/Hz/Ph	208-230/60/3	208-230/60/3
SF Qty/HP	3.0 Standard 5.0 Oversized	2.0 (1) AP-45 Fan Off
SF VFD Data	N/A	N/A
RF Qty/HP	N/A	2.0 (1) AX-48 Fan Off
RF VFD Data		
Filter Data (Size Quantity)	(8) 20x25x2	(6) 20x24x2
Filter Status	Clean 4-14-22	
Controls Type	Packaged with DDC interface	
Controls Mfr.	Trane/Thybar/Distech CTC	
Economizer	Yes, available, operation in question	Operation in question
CO ₂ DCV	Wires connected to unit CO ₂ terminals, will need to explore BAS drawings	
Damper Styles	Trane, Flap	Thybar Parallel, BDD
Damper Status	OK, operation in question	OK, operation in question
Heating Type	Hot Water OK, system off operation unknown	Damper open, system off
Heating Coil Condition	Unknown	
Cooling Type	DX 2-Circuit R-410A	
Cooling Coil Condition	OK	
Wheel	OK but not operating,	Thybar ½ H.P. (OFF)
Drain Pan Status	Ok but should be flushed	
Notes:	Metal O.A. Pre-filters are Dirty, clean and or replace.	

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DATA SHEET

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DATA SHEET

<u>Unit Tag</u>	<u>AHU-1D</u>	<u>Addition comments descriptions</u>
Location	Gymnasium Roof	Unit Off!
Serving	Stage-Gymnasium	
Config/Style	Rooftop AHU with packaged CU and HW Heating Coil	Packaged Heat recovery wheel, fan, dampers, and filters
Mfr.	Trane Voyager	Thybar Corporation
Model #	TCD151E30AAB	TV523DDF
Serial #	102310073D	C0105094
Age (years)	6/2010	7/6/2010
System CFM	5000	
Max OA CFM	2425	
V/Hz/Ph	208-230/60/3	
SF Qty/HP	3.0 Standard 5.0 Oversized	2.0 (1) AP-45 Fan Off
SF VFD Data	N/A	N/A
RF Qty/HP	N/A	2.0 (1) AX-48 Fan Off
RF VFD Data	N/A	N/A
Filter Data (Size Quantity)	(8) 20x25x2	(6) 20x24x2
Filter Status	Clean 4-14-22	
Controls Type	Packaged with DDC interface	
Controls Mfr.	Trane/Thybar/Distech CTC	
Economizer	Yes, available, operation in question	Operation in question
CO ₂ DCV	Wires connected to unit CO ₂ terminals, will need to explore BAS drawings	
Damper Styles	Trane, Flap. Functional, clean lubricate and adjust.	Thybar Parallel, BDD
Damper Status	OK, system off operation unknown	Damper open, system off
Heating Type	Hot Water	
Heating Coil Condition	Unknown	
Cooling Type	DX 2-Circuit R-410A	
Cooling Coil Condition	OK	
Wheel Mfr.		Thybar ½ H.P. (OFF)
Wheel Condition		OK but not operating,
Drain Pan Status	Ok but should be flushed	
Notes:	Metal O.A. Pre-filters are Dirty, clean and or replace.	

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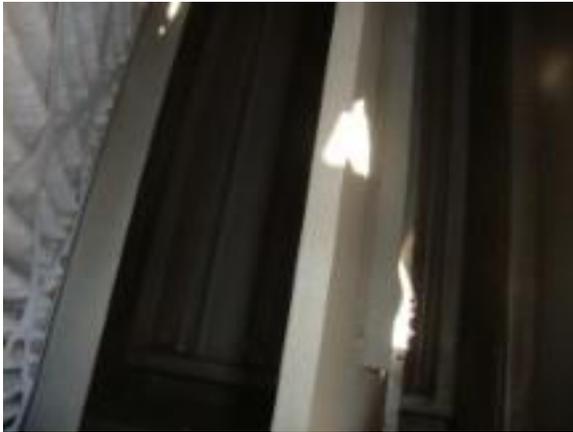
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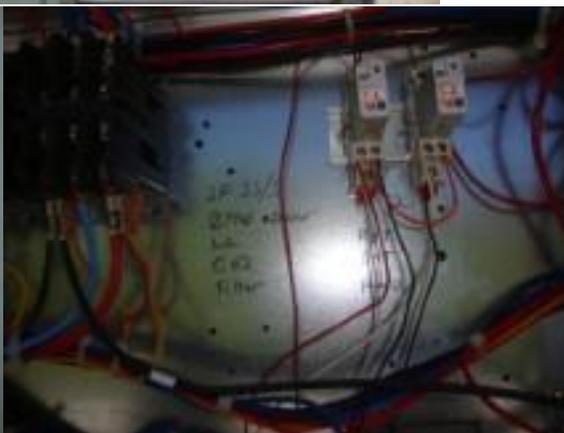
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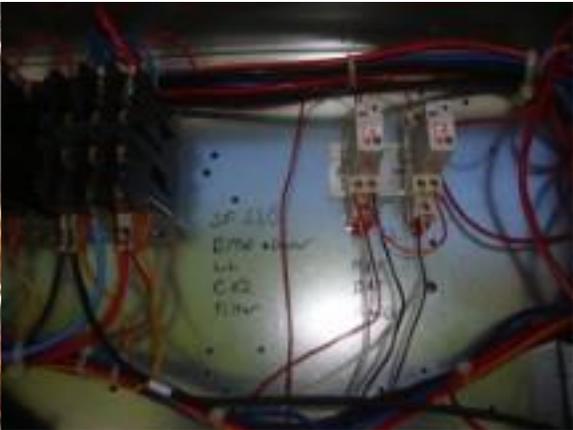
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DATA SHEET



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DATA SHEET

<u>Unit Tag</u>	<u>AHU-2 5-10-22 by RCM</u>	<u>Addition comments descriptions</u>
Location	Special Ed Roof	
Serving	Special Ed	
Config/Style	Rooftop AHU with packaged CU	
Mfr.	Trane	
Model #	THC036E3R0A17J8	
Serial #	102111?05L??	
Age (years)	+5	
System CFM	2000	
Max OA CFM	350	
V/Hz/Ph	208/230	
SF Qty/HP	Direct Drive ¾ HP	
SF VFD Data		
RF Qty/HP		
RF VFD Data		
Filter Data (Size Quantity)	(2) 20 x 30 x2	
Filter Status	Clean	
Controls Type	Package CTI	
Controls Mfr.	Trane with Distech relay interface	
Economizer	Package	
CO ₂ DCV	No	
Damper Styles	Flapper	
Damper Status		
Heating Type	NA	
Heating Coil Condition		
Cooling Type	DX Single stage 3 ton	
Cooling Coil Condition	Clean	
CU Mfr.		
CU Model		
CU Serial		
Drain Pan Status	Clean but Trap broken off	
Notes:	On a 60 degree day only Min ODA being introduced	

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DATA SHEET

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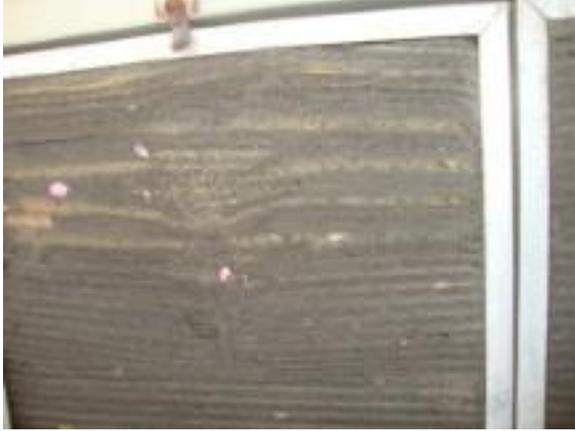
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DATA SHEET

<u>Unit Tag</u>	<u>AHU-3</u>	<u>Addition comments descriptions</u>
Location	Cafeteria Roof Parapet.	
Serving	Cafeteria	
Config/Style	Rooftop AHU with packaged CU	
Mfr.	Trane Voyager	Energy Recovery Cassette, Thybar
Model #	TFD241E30AAB	
Serial #	102310059D	
Age (years)	6/2010	
System CFM	8000	
Max OA CFM	3000	
V/Hz/Ph	208-230/60/3	
SF Qty/HP	5.0	
SF VFD Data	N/A	
EF Qty/HP	2.0 (1) AX-48	OFF
EF VFD Data	N/A	
Filter Data (Size Quantity)	(8) 20x20x2 (4) 16x20x2 coil (6) 20x24x2 wheel	
Filter Status	Not Great for 1 month Old, Dirty	Metal Pre-Filters need replacement
Controls Type	Packaged with DDC interface	
Controls Mfr.	Trane/Thybar/Distech CTC	
Economizer	Yes, available, operation in question	Operation in question
CO ₂ DCV	Wires connected to unit CO2 terminals, will need to explore BAS drawings	
Damper Styles	Trane, Flap. Functional, clean lubricate and adjust.	Thybar Parallel, BDD
Damper Status	OK, functionality to be verified	
Heating Type	Hot Water	
Heating Coil Condition	Unknown	
Cooling Type	DX R-410A	
Cooling Coil Condition	Very Dirty	
Wheel	Aire Xchange Inc. Ser. 124526/1023 Mod. ERC-5245-04-X30 Energy Cassette-1/6 HP	BELT ON WHEEL BROKEN
Drain Pan Status	Dirty	
Notes:	Supply fan on, O.A fan on, No exhaust, no wheel	Operation, sequence in question

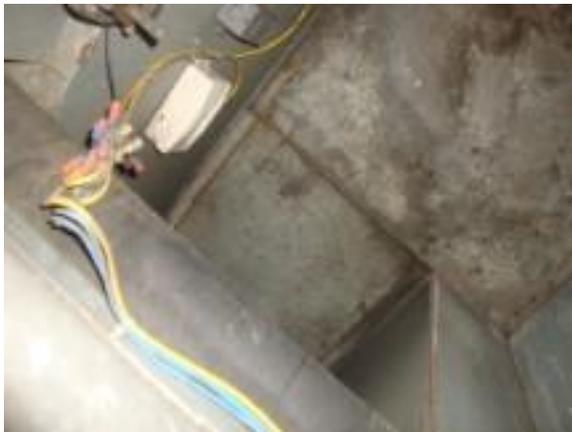
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DATA SHEET



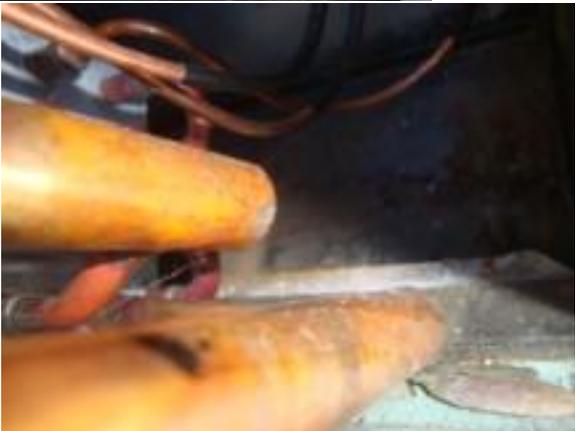
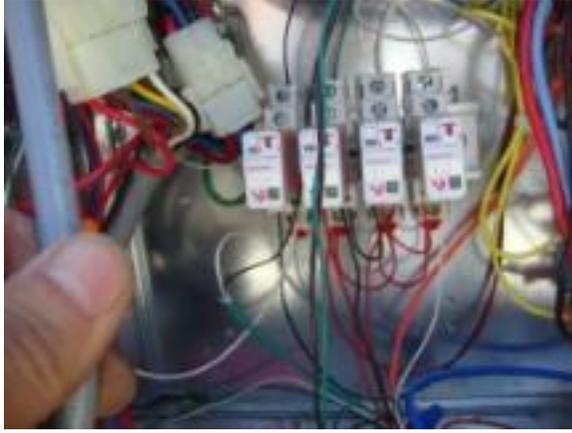
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DATA SHEET

<u>Unit Tag</u>	<u>AHU-4 REA 5-10-22</u>	<u>Addition comments descriptions</u>
Location	Administration Roof	
Serving	Conference	
Config/Style	Rooftop DX cooling Hot water heating	
Mfr.	Trane Precedent	
Model #	TCH092E3ROA03EOB1A1B00004E	
Serial #	102111905L	
Age (years)	2010	
System CFM	3000	
Max OA CFM	390	
V/Hz/Ph	208-230/60/3	
SF Qty/HP	Direct Drive	
SF VFD Data	ECM .75 HP	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(6) 20 X 25 X 2	
Filter Status	Standard filters Clean, Metal Pre filters are plugged, should be replaced	4-14-22
Controls Type	Packaged with DDC interface	
Controls Mfr.	CTC BAS Vendor	
Economizer	Yes	
CO ₂ DCV	Wires connected to unit CO2 terminals, will need to explore BAS drawings	
Damper Styles	Flapper packaged	
Damper Status	OK	
Heating Type	Hot water	
Heating Coil Condition	OK	
Cooling Type	DX Dual Compressor	
Cooling Coil Condition	Dirty	
Drain Pan Status	Dirty	
Notes:	Lots of air leakage under cooling coil. Should be reviewed.	

Photos



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DATA SHEET



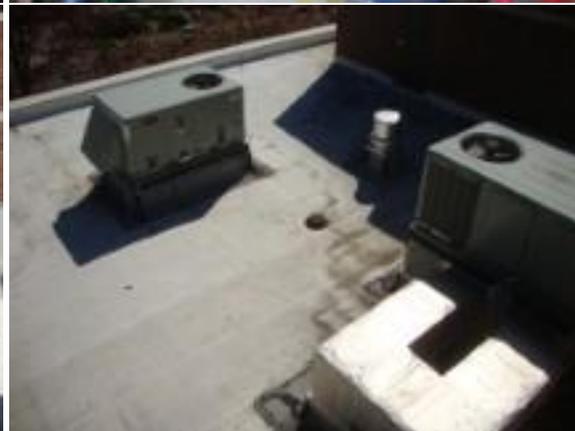
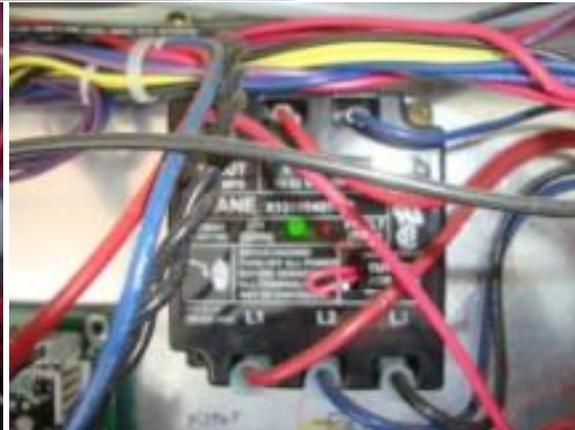
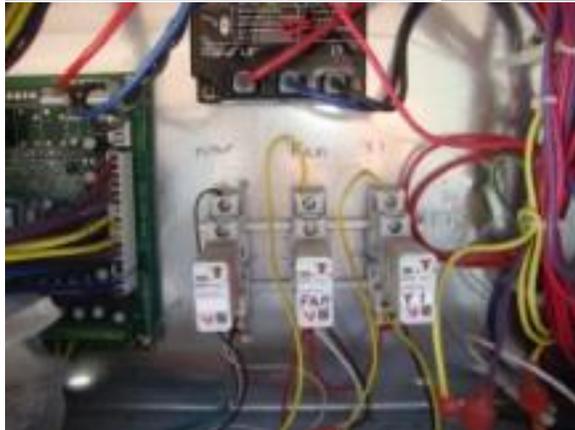
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DATA SHEET

<u>Unit Tag</u>	<u>AHU-5</u>	<u>Addition comments descriptions</u>
Location	Media Center Roof	
Serving	Media Center	
Config/Style	Rooftop AHU with packaged CU	
Mfr.	Trane	
Model #	THC060E3R0A0PEOB1A1B00004C	
Serial #	102111876L	
Age (years)	2010	
System CFM	2000	
Max OA CFM	350	
V/Hz/Ph	208-230/60/3	
SF Qty/HP	7.6 Amps	
SF VFD Data	ECM	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(4) 16x25x2	
Filter Status	Clean 4/14/22	
Controls Type	Packaged with DDC interface	
Controls Mfr.	CTC BAS Vendor	
Economizer	Yes	
CO ₂ DCV	Wires connected to unit CO2 terminals, will need to explore BAS drawings	
Damper Styles	Flap	
Damper Status	OK	
Heating Type	N/A	
Heating Coil Condition	N/A	
Cooling Type	DX Cooling R-410A	
Cooling Coil Condition	OK	
Drain Pan Status	OK	
Notes:	No heat in unit	

Photos



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DATA SHEET

<u>Unit Tag</u>	<u>AHU-6</u>	<u>Addition comments descriptions</u>
Date: 5-10-11	Auditor: RCM	
Location	Media Center Roof	
Serving	Conference Room	
Config/Style	Rooftop Cooling Only	
Mfr.	Trane	
Model #	THC060ER0A0PE0B1A1B00004	
Serial #	102111866L	
Age (years)	2010	
System CFM	1200	
Max OA CFM	150	
V/Hz/Ph	208-230/60/3	
SF Qty/HP	1HP	
SF VFD Data	ECM	
RF Qty/HP		
RF VFD Data		
Filter Data (Size Quantity)	(4) 16 X 25 X 2	
Filter Status	Clean	
Controls Type	Packaged with DDC interface	Fan/Y1/Filter/Motor Status
Controls Mfr.	CTC BAS Vendor	
Economizer	Yes	
CO ₂ DCV	Wires connected to unit CO ₂ terminals, will need to explore BAS drawings	
Damper Styles	Flapper	
Damper Status	OK	
Heating Type	NA	
Heating Coil Condition		
Cooling Type		
Cooling Coil Condition		
Drain Pan Status	OK, trap needs repair	
Notes:	Cooling Running with 0% OA Intake	

Photos



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DATA SHEET



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DATA SHEET



PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

<u>Unit Tag</u>	<u>ERV-1</u>	<u>Addition comments descriptions</u>
Location	Northeast Wing Classroom Roof	
Serving	Northeast Wing Classrooms	
Config/Style	Rooftop Energy Recovery Ventilator	
Mfr.	Greenheck ERV	Wheel is dirty, Wheel has VFD.
Model #	ERCH-45H-15	
Serial #	12108440	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	208/60/3	
SF Qty/HP	3.0 (1) AX-53	
SF VFD Data	N/A	
RF Qty/HP	3.0 (1) AX-53	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(6) 20x25x2	
Filter Status	Metal Pre-Filters should be replaced, plugged	Large Pressure drop across pre-filters,
Controls Type	Package with DDC interface	
Controls Mfr.	Distech, CTC	
Economizer	No	
CO ₂ DCV	100% OA	
Damper Styles	Opposed	
Damper Status	Functional, clean lubricate and adjust	
Heating Type	HW	
Heating Coil Condition	Not Accessible	
Cooling Type	DX R-410A Dual Circuit	Refrigerant insulation has failed
Cooling Coil Condition	OK, could use a wash down	
CU Mfr.	CU-1 Trane	
CU Model	Disconnect covers Data Plate	
CU Serial	10022PEGAD	
Drain Pan Status	Ok, but should be verified after coil wash	
Notes:	Exposed supply ductwork insulation has failed, see Photos	

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DATA SHEET

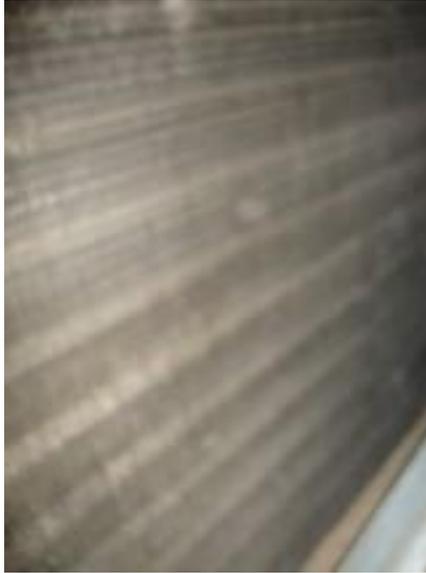
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DATA SHEET



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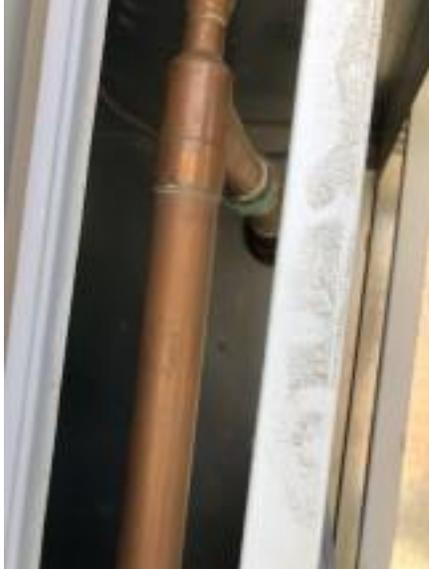


PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

Unit Tag	ERV-2	Addition comments descriptions
Location	Southeast Wing Classroom Roof	
Serving	Southeast Wing Classrooms	
Config/Style	Rooftop Energy Recovery Ventilator	
Mfr.	Greenheck with Trane CU	
Model #	ERCH-45H-15	
Serial #	12108439	
Age (years)	2010	
System CFM		
Max OA CFM		
V/Hz/Ph		
SF Qty/HP	3 HP	AX 53 Belt
SF VFD Data	Yaskawa J100	
EF Qty/HP	3 HP ERW .17 HP	AX 53
EF VFD Data		
Filter Data (Size Quantity)	OA (3) 20 X 25 X 2, RA (3) 20 X 25 X 2 OA Prefilter Metal: 15.5 X 19.5 X .5	
Filter Status	Clean last changed	
Controls Type	Package with DDC interface	SST, Frost, Status
Controls Mfr.	Distech, CTC	
Economizer	No	
CO ₂ DCV	100% OA	
Damper Styles	Opposed	
Damper Status	Functional but OA intake Dirty	
Heating Type	HW	
Heating Coil Condition	Not Accessible	
Cooling Type		
Cooling Coil Condition		
CU Mfr.	Trane 2 Compressor/Stage	
CU Model	Tag covered by Disconnect	
CU Serial		
Drain Pan Status	Clean	
Notes:	OA intake very restricted due to plugged OA Metal Pre-Filters causing high negative pressure bypassing ERW with OA intake. OA door seals partially missing or had fallen off	

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DATA SHEET

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DATA SHEET





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DATA SHEET



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PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

Unit Tag	ERV-3	Addition comments descriptions
Location	South Wing Classroom Roof	
Serving	South Wing Classrooms	
Config/Style	Rooftop Energy Recovery wheel Ventilator, DX cooling hot water heating	
Mfr.	Greenheck ERV-3	Trane CU-3
Model #	ERCH-45L-15	
Serial #	12108443	
Age (years)		
System CFM		
Max OA CFM		
V/Hz/Ph	208/60/3	
SF Qty/HP	2.0 (1) AX-51	
SF VFD Data	N/A	
RF Qty/HP	2.0 (1) AP-54, Belt is loose	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(6) 20x25x2	
Filter Status	Metal Pre-Filters should be replaced, plugged	Although recently changed, partially dirty
Controls Type	Package with DDC interface	
Controls Mfr.	Distech, CTC	
Economizer	No	
CO ₂ DCV	100% OA	
Damper Styles	Parallel	
Damper Status	Functional, clean lubricate and adjust	
Heating Type	HW	
Heating Coil Condition	Not Accessible	
Cooling Type	DX R-410A Dual Circuit	
Cooling Coil Condition	OK, could use a wash down	
CU Mfr.	CU-3 Trane	
CU Model	Disconnect covers Data Plate	
CU Serial	---0082RUXAD	
Drain Pan Status	Ok, but should be verified after coil wash	
Notes:	Door access seals have failed, coils/wheel are dirty	

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DATA SHEET

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DATA SHEET



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DATA SHEET



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DATA SHEET

<u>Unit Tag</u>	<u>ERV-4</u>	<u>Addition comments</u>
Location	West Wing Classroom Roof	
Serving	West Wing Classrooms	
Config/Style	Rooftop Energy Recovery Ventilator	
Mfr.	Greenheck with Trane CU	
Model #	ERCH-45H-15	
Serial #	12108442	
Age (years)	2010	
System CFM		
Max OA CFM		
V/Hz/Ph		
SF Qty/HP	3 HP	AX 53 Belt
SF VFD Data	Yaskawa J100	
RF Qty/HP	3 HP ERW .17 HP	AX 53
RF VFD Data		
Filter Data (Size Quantity)	OA (3) 20 X 25 X 2, RA (3) 20 X 25 X 2 OA Prefilter Metal: 15.5 X 19.5 X .5	
Filter Status	Clean last changed	
Controls Type	Package with DDC interface	SST, Frost, Status
Controls Mfr.	Distech, CTC	
Economizer	No	
CO ₂ DCV	100% OA	
Damper Styles	Opposed	
Damper Status	Exhaust Damper Actuator non-functioning. OA intake Dirty	
Heating Type	HW	
Heating Coil Condition	Not Accessible	
Cooling Type	Remote DX Single Compressor	
Cooling Coil Condition		
CU Mfr.	Trane	
CU Model	Tag Covered	
CU Serial		
Drain Pan Status	Moderate	
Notes:	Exh Damper Stuck open. OA intake very restricted due to plugged OA Metal Pre-Filters causing high negative pressure bypassing ERW with OA intake. OA door seals partially missing or had fallen off	

Photos



PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET



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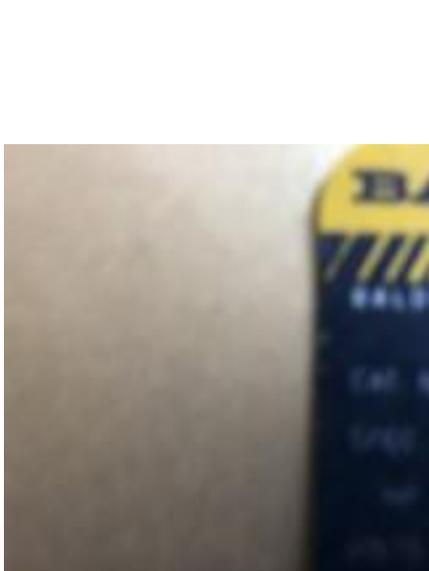


PROJECT: 2020102.13 FAIRFIELD PUBLIC SCHOOLS – STRATFIELD ELEMENTARY SCHOOL EQUIPMENT
DATA SHEET

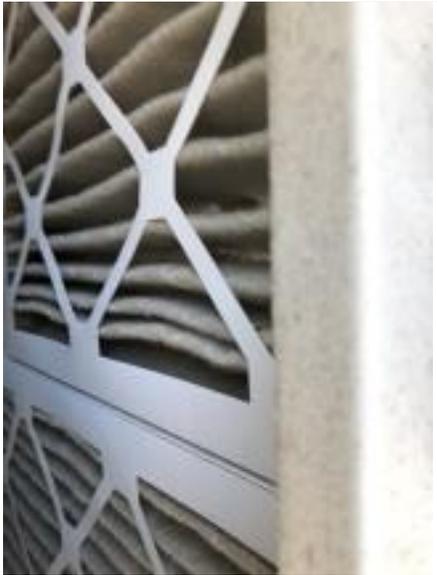
<u>Unit Tag</u>	<u>ERV-5</u>	<u>Addition comments</u>
Location	North Wing Classroom Roof	
Serving	North Wing Classrooms	
Config/Style	Rooftop Energy Recovery Ventilator	
Mfr.	Greenheck with Trane CU	
Model #	ERCH-45H-15	
Serial #	12108441	
Age (years)	2010	
System CFM		
Max OA CFM		
V/Hz/Ph		
SF Qty/HP	3 HP	AX 53 Belt
SF VFD Data	Yaskawa J100	
RF Qty/HP	3 HP ERW .17 HP	AX 53
RF VFD Data		
Filter Data (Size Quantity)	OA (3) 20 X 25 X 2, RA (3) 20 X 25 X 2 OA Prefilter Metal: 15.5 X 19.5 X .5	
Filter Status	Clean last changed	
Controls Type	Package with DDC interface	SST, Frost, Status
Controls Mfr.	Distech, CTC	
Economizer	No	
CO ₂ DCV	100% OA	
Damper Styles	Opposed	
Damper Status	Functional but OA intake Dirty	
Heating Type	HW	
Heating Coil Condition	Not Accessible	
Cooling Type		
Cooling Coil Condition		
CU Mfr.	Trane 2 Compressor/Stage	
CU Model	Tag covered by Disconnect	
CU Serial		
Drain Pan Status	Dirty	
Notes:	OA intake very restricted due to plugged OA Metal Pre-Filters causing high negative pressure bypassing ERW with OA intake. OA door seals partially missing or had fallen off	

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