VAN ZELM ENGINEERS

Timothy Dwight Elementary School

1600 Redding Road
Fairfield, CT 06824

FAIRFIELD PUBLIC SCHOOLS

TIMOTHY DWIGHT ELEMENTARY

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

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EXECUTIVE SUMMARY

Timothy Dwight Elementary School (referred to in shorthand as either "DES" or "Dwight") was deemed to be school priority number three by Fairfield Public Schools and is indicated as the highest priority elementary school within the district for this ventilation study. 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.

Timothy Dwight Elementary School is located at 1600 Redding Road, Fairfield, CT at the heart of the Greenfield Hill region and serves as an elementary educational facility for around 262 students (as of May 2022) and around 40 faculty and staff. Fairfield has a long history of providing education services for students, particularly to those of current elementary school age, starting as early as 1695. Timothy Dwight Elementary School originally started as a private school called Greenfield Academy (AKA "The Academy") in 1790 by the now eponymous Timothy Dwight who was an early educator that went on to become the president of Yale College. This academy was regulated by the Greenfield School Society at the time and would eventually see some major overhauls. In 1854, the entire building was replaced and then, over 100 years later in 1963, the school was relocated to its present location at 1600 Redding Road. In the late 1960s, the district added the southeast art rooms and northeast classroom/Gym area. Multiple portable classrooms have been utilized throughout the years but no other major structural renovations have occurred since the addition. The school continues to operate and provide elementary education from grades K-5 for northwestern Fairfield residents.

Since the 1963 construction, the building has seen the installation of packaged rooftop air handling equipment for key locations as well as some control upgrades. The latest upgrade and renovation took place in 2019, and included a fully automated Building Management System (BMS) integrated into a district-wide Building Automation Server. Automated Logic was the successful BMS provider, who performed the replacement of existing older digital controllers, all legacy pneumatic controls and end devices such as control actuators, sensors, and heating control valves. Van Zelm was involved in this project, performing a number of tasks including the design, commissioning, and contract administration services. This work was completed in early 2020 and what was installed at the time remains as the control system for the building. The school ventilation systems comprise seven (7) air handling units that feed the Main Office, Multi-Purpose room, Library/Media Center (two units), Kitchen, Gymnasium, and the Gym Office. Additional ventilation is provided by twelve (12) exhaust fans, two of which are the primary source of ventilation for half of the classrooms each, while the other fans generally serve as means of air removal for storage/supplemental space or as an ancillary component for one of the air handling units. Many spaces have operable windows, which might vary in use depending on the particular occupant or environmental conditions, but these are not directly tied into any monitoring system. For classroom spaces, these *are* expected to be used for the purposes of providing fresh outside air as a component of the building ventilation, but as indicated later in the report there are concerns both with building security, and energy utilization if windows are used as the prime source of ventilation.

van Zelm had performed our on-site RCx inspection starting on March 24, 2022, and TAB review starting on April 21, 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 no routine occupancy. These spaces typically are isolated from faculty, students, and support staff are provided with some form of dedicated exhaust which would produce a negative air pressure to the surrounding space. At worst, too much exhaust would impact overall building negative pressurization and infiltrate additional unconditioned outside air into the building. This would benefit overall ventilation exchange rates but could have negative impact with drafts, general indoor air quality, and high energy use. 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.

The overall performance of the building with regard to ventilation was found to be inadequate, mainly due to the fact that every classroom space and some offices were designed without direct outdoor air ventilation means, nor a filtration source to capture and remove airborne pathogens. Some support spaces, like the main office, gymnasium, library, multipurpose room, and kitchen, all have dedicated rooftop HVAC units as expected for a school and these spaces generally exceed ventilation and air exchange requirements, but the vast majority of spaces serving the school population do not have the same capability. The overall quality of the air within the building is not ideal, which is supported by numerous complaints from the occupants that helped to drive this elementary school towards the top of the district priority list.

To recap, 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 levels with the 2015 version of the International Mechanical Code (2015 IMC). It should be noted that options to improve space ventilation and air exchange rates would involve additional design services and would require extensive and costly renovation measures as the existing mechanical ventilation equipment for classroom spaces in particular cannot be retrofitted to meet code requirements.

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 the recommendations 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 DES do not fully comply with the applicable building codes or guidelines regarding indoor air quality and outdoor ventilation. The measured ventilation air being delivered into each occupied space would be considered a worst-case scenario only, but still there are some areas within the building that do meet and exceed these ventilation requirements by a significant amount. With so few spaces being supplied with any air directly,

never mind design or code-required ventilation, these areas also might have a challenging time maintaining thermal comfort for occupants and might end up wasting energy.

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 predetermined 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, IMC 2015 also allows for outside air to enter occupied areas naturally through operable windows, doors, or other means but there are caveats. The area of operable windows for an occupied space needs to be at least 4% of the space's floor area in order for mechanical ventilation for that space to not be 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. Few occupants would be willing to keep the windows open year-round due to these comfort concerns, and energy consumption would be increased if the heating or cooling equipment is used in an attempt to condition the space appropriately. Additionally, even if the windows can be used at all times, none of the air introduced into the building this way is filtered, so exterior contaminants such as pollen, dust, and other allergens will have easy paths of infiltration directly into occupied zones. One final point regarding opening of windows would be a real security concern for building occupants, especially with the remoteness of this school in the community.

There are a few sections within IMC 2015 that address this issue specifically, and referenced below:

- **402.1 Natural Ventilation**: *Natural Ventilation* of an occupied space shall be through windows, doors, louvers, or other openings to the outdoors. The operating mechanism for such openings shall be provided with ready access so that openings are readily controllable by the building occupants.
    - Although many classrooms in this building have exterior doors, for security reasons it is highly inadvisable that doors be propped open in any way to allow their use as part of the ventilation system.
- **402.2 Ventilation Area Required**: The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.
    - Each of the major classrooms comes with five (5) large windows with an accompanying openable, smaller section towards the bottom (about 3 feet A.F.F.) that, if opened fully, would account for approximately 3.2 ft^2 area *per window*, totaling to 16 ft^2 openable area to the outside per standard classroom.
    - The standard classroom comprises approximately 760 ft^2 floor area, which puts the percentage of openable area at a little more than 2% per space. Although there are exceptions in both directions, these are minor and no space in this building has the

necessary 4% openable area as required by this section of code. These findings do *not* account for windows that are inaccessible, locked, broken, etc.

- **402.3 Adjoining Spaces**: Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining rooms shall be unobstructed and shall have an area not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet. The minimum openable area to the outdoors shall be based on the total floor area being ventilated.
    - Should the windows for any particular space be closed, the air is drawn through from the corridor and potentially from other classrooms. The corridors are *not* provided with outside air in any sense except for what might be incidentally drawn into the building via negative pressure. In this case, the corridor would not count as an "adjoining space" for purposes of satisfying this component of the code.
- **403.3.1.2 Exhaust Ventilation**: Exhaust airflow rate shall be provided in accordance with the requirements of Table 403.3.1.1. Outdoor air introduced into a space by an exhaust system shall be considered as contributing to the outdoor airflow required by Table 403.3.1.1 (Note: this table was used to determine the airflow requirements used to develop the Ventilation Calculation spreadsheets included within Appendix 2)
    - A supplemental ventilation calculation spreadsheet that includes the exhaust rates is provided as part of this appendix. Although these exhaust fans run during occupied modes, the natural ventilation numbers <u>are not</u> considered as part of the "worst case" scenario for this report. The data is promising that it *could* be used, but it fully relies on the windows in each space being fully accessible (some of which are partially or completely blocked by school supplies) and opened at all times during occupancy (for which there is no guarantee since this relies on individual occupant action with no automation).

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.

<u>Outside Air Flow and Air Change Rate Findings</u>

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 intentionally 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. This school is unique given its age and design such that standard ventilation calculations do not apply to a majority of building floor area, as much of it relies on two large exhaust fans, one per classroom wing, to

draw air out of the classrooms for ventilation purposes. As mentioned in the executive summary, this is acceptable by code *if* certain conditions have been met, and for this building they have *not* been met.

For the occupied zones within this building, the total minimum required ventilation airflow came out to **12,476 CFM**. The following additional data will be broken out into purely filtered ventilation and accounting for exhaust:

- **For discounting the exhaust air (worst case):** The TAB process revealed that only **4,566 CFM** of outside air is delivered to the spaces, resulting in a **7,860 CFM** deficit or **36.6%** of the required minimum flow. Only **21.7%** of the occupied zones (10 out of 46) met the requirements based on this setup, largely due to no filtered outside air being introduced any of the classroom spaces. Spaces served by dedicated units largely met requirements, though there are some exceptions, namely the Multi-Purpose room, which is essentially a cafeteria that also serves as a school assembly and event hall, which lacks appropriate ventilation at fire marshal code occupancy listings or at expected capacity.

- **For including the exhaust air (potential consideration, but not suggested for Natural Ventilation code compliance through IMC 2015 section 402 & 403):** The TAB process revealed that **15,829 CFM** of outside air is delivered to the spaces or is exhausted from the spaces, resulting in a **3,403 CFM** surplus or **126.9%** of the required minimum flow. **71.7%** of the occupied zones (33 out of 46) met the flow requirements based on this setup, which means that even during the best consideration for code compliance 13 of the rooms, mostly classrooms, still do not provide adequate ventilation. However, this exhaust component requires the openings of windows or doors in each space used to provide ventilation be of sufficient area equal to a minimum of 4% of the total space floor area. As mentioned in the note within the executive summary regarding IMC 2015 section 402.2, a total of **30** spaces are managed in this way and none of them had sufficient window opening *potential* to meet code, most of which having only about **2%** openable area and the best case being **3.19%.** Worse yet, there are numerous examples of the operable section of windows being blocked by shelves, books, and other classroom materials. While each classroom has an exterior door, adding this into the openable area would bring most rooms above the minimum 4% *if* the doors were all propped completely open, which is a bad decision for security and safety reasons. For a functioning natural ventilation system and associated protocol, these windows all need to be in good condition and easily accessible, with occupants opening them during occupied periods. Adverse weather conditions that would dissuade the occupant from opening the windows (e.g., heat, cold, humidity, rain, etc.) are not exceptions to the requirements. A well-designed natural ventilation system either accounts for these conditions at the openings or has a backup purely mechanical system that can handle the entire building, neither of which are implemented here.

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. A summary of those findings can be found below including an outline of issues for correction, which are expanded on in the appendices. Normally, this section would only include actual air handlers but since many spaces rely on exhaust fans as the primary means of ventilation those units are also included:

- EF-1 and EF-2 serve the two classroom wings. These fans are what allow the overwhelming majority of the building floor area and occupants to receive any form of ventilation, though the

quality of this air and the way in which the building is controlled are questionable at best. Each classroom and some nearby offices operate in a constant negative pressure condition during occupied modes, which causes them to fail to meet code under normal considerations. Accounting for provisions to meet "natural ventilation" code, these rooms continue to not meet the requirements since the available means of outside air that could be introduced is limited by the size of the windows or the security issues that would stem from opening the exterior doors of the rooms. In this sense, every classroom could be considered as residing within a grey area for code purposes, but for the sake of this study they all fail to meet code.

- EF-LX-18M was installed after the late 1960s addition and serves a cluster of small rooms and offices along the southern classroom corridor, namely reading, speech & language pathology, and resource rooms. Some of these rooms have access to a window for ventilation but the openable area is significantly less than a regular classroom, and despite the smaller size the ratio for these rooms is generally lower as well. The Speech & Language office has no capability of direct air, relying solely on corridor air to makeup the exhaust.

- EF-LX-24 was installed alongside the above fan and serves four rooms along the northern classroom corridor; two offices, a faculty room, and a special education/therapy room that was previously the Music classroom. Much like the above exhaust fan, ventilation capability is limited here and the two small offices have no means of makeup air per code.

- Gym H&V RTU feeds the gym and has two associated exhaust fans (EF-8 and EF-9) used in tandem. This RTU is one of the oldest units at the school, showing major wear of access doors, filter frames, and other components. Despite the unit condition, measurements indicate that the gym receives more than enough airflow to meet code. This space has no spectator seating so only a classroom worth of children would be involved in activities here, likely relying on other big events to take place in the Multi-Purpose room. Gymnasiums trade calculations based on population count for direct ventilation based on floor area, so changes in population would have no effect on code. Given this unit's age, it is highly advised that it is replaced soon by a similar size unit. This would improve the service and maintainability of the gym HVAC systems.

- Gym Office RTU lies directly above the gym office and feeds air to this space alone. At most, this room is occupied by a single person, the gym teacher and only occasionally, otherwise acting as a second storage room for gym, supplies. The calculations show that this room is incredibly overventilated providing more than **900%** of the required flow but this only amounts to **123** extra CFM. The bigger issue is that the supply and return ducts are right next to each other in the ceiling at the back of the room, so short cycling is a major concern. It is not clear if there are significant beneficial adjustments that could be made to this unit to save energy, though integrating the unit with the occupancy sensor would help.

- MAU-1 and KEF serve the kitchen, servery, and dishwashing area. Generally, a kitchen does not have direct outside air ventilation requirements, but this unit does run and exhausts enough air from the kitchen space. The dishwashing area does not have any direct ventilation, and even though it is open to the kitchen there is little air circulation here. A propeller fan was found in this area, presumably to promote air mixing, though these fans do not provide any ventilation on their own and their use has been ill-advised because of the COVID pandemic.

- Multi-Purpose H&V Unit serves the Multi-Purpose room. This space is primarily used as a cafeteria for the students at the school. The unit was noted as providing some quantity of outside air but commands to the unit did not adjust flow. Upon investigation, it was observed that the outside air damper actuator linkage was removed so there is no adjustment. This needs to be rectified for two reasons: (1) Without being able to close off the outside air during unoccupied periods, during cold nights you could have air introduced into the ductwork and space that could potentially lead to freezing concerns, and (2) the space failed to meet the code required ventilation numbers. The fire marshal signage indicates a maximum occupancy of 400, which is less than the total building population but would make sense for staggered lunch periods, which would only have approximately 200 seated. Even at this reduced population count, the unit still does not meet minimum ventilation requirements, falling short by about 500 cfm (it is short over 2000 cfm at the 400 person capacity). It is suspected that the unit could make up this missing airflow if the damper could modulate, but until it is fixed it can't be known for certain. Given this unit's age, it is highly advised that it is replaced soon by a similar size unit. This would improve the service and maintainability of the HVAC systems.

- Main Office RTU serves the Main Office, waiting area, and Nurse Office. This unit was functional and provided more than enough air to satisfy the spaces, including the necessary amount of ventilation to meet nurse/healthcare office ACH requirements. This unit could be turned down to save energy as long as it can maintain temperature and humidity requirements, though reducing ventilation airflow from any units should be carefully considered given the state of this building.

- Media Center RTU-1 & RTU-2 were replaced in 2021, providing new HVAC to the associated zone. This space is unique in that two air handling units feed the same space, though RTU-2 also feeds the Media Center office while RTU-1 also feeds the connected "work room" area. The combination of these two units are delivering well above the minimum total and ventilation air to the spaces, however RTU-1 was not providing any measurable air to the work room for some reason that would require further investigation. It should be noted that the work room is not a separate space, rather it is open to the media center, and therefore does meet ventilation requirements.

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). The total ACH comprises all air regardless of source. At its core, this is a ratio of the volume of air that can theoretically completely fill the volume of each space and how many times it can do that every hour. For example, a 1000 ft^2 room with 10 ft ceilings will have a volume of 10,000 ft^3. If 250 CFM is delivered to this space, that results in 15,000 ft^3 of air. Every hour, the space will be flushed with that much air, resulting in an ACH of 1.5. This number on its own will not determine if a space satisfies code requirements and it does not mean that every molecule of the air in that space has been replaced within each hour of operation, 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. This building utilizes an outdated ventilation practice of providing

large exhaust fans to draw air out of the building through the occupied spaces. While this does move air, it does not promote proper mixing, it limits thermal and humidity control, and it does not provide occupants in the affected spaces with filtered or otherwise uncontaminated air. If the exhaust rates are considered as part of the "total" building ACH, this provides the building with an ACH of **4.141**, but again the recommended value does not normally include unfiltered air unless a building was specifically designed with natural ventilation sequences and equipment in place, which this building does not have. Considering the above and taking the entire building volume and air delivered directly to the occupied spaces, which includes outside air and filtered return air, this building was capable of achieving only **0.982 ACH**. This is significantly below the recommended 3 ACH, and it indicates that there is significant deficit in filtered air.

When considering only the OACH, the exhaust cannot necessarily be considered so the total building OACH is a mere **0.721**. This can be further broken out by spaces that meet or fail to meet code: Among those that failed, the OACH was **0.297**; for those that met or exceeded code, the OACH was **2.068**. When the exhaust *is* included as a component of the total building OACH per section 402, the resulting OACH is **2.500**. Again, this can be further broken out by spaces that meet or fail to meet code: Among those that failed, the OACH was **1.187**; for those that met or exceeded code, the OACH was **3.394**. Special rooms such as a nurse's suite or health office do additionally require an outside air ACH of at least 2 and total ACH of 6. For this building, the health office did have an OACH of **2.269** and total ACH of **10.825** so this space was satisfied. The small quantity of spaces that had units directly feeding them generally passed, but the majority of the building area and occupants do not receive this air.

IMC Code Type	Total ACH (RA + OA)	Total OACH (OA/EA)	OACH for zones that do not meet code	OACH for zones that meet Code
Excluding Exhaust per IMC 2015 section 401	0.982	0.721	0.297	2.068
Including Exhaust per IMC 2015 section 402 & 403	4.141	2.500	1.187	3.394

During the investigation, the building occupants were asked about the IAQ and their comfort levels. A number of individuals stated that the space conditions were poor, indicating that they develop headaches, fatigue, and dizziness while within the building but recover shortly after leaving. There are a number of specific reasons why the occupants might develop these symptoms but, generally, this could be considered as "Sick Building Syndrome" or SBS. When a building ages, has malfunctioning equipment, improper ventilation, or poorly-managed lighting/noise, occupants can become adversely affected. This can lead to physical ailments as described above and including other potential symptoms like nausea, coughing, sneezing, etc., but also reduces awareness, alertness, and productivity. Addressing the ventilation issues in the building will almost certainly improve conditions, but there might be more to investigate beyond the scope of a ventilation study. As with many older buildings, plenty of buildings were constructed with practices that are unacceptable today. During the information discovery process, we found an Envelope and IAQ report from Hoffman Architects from 2003 that goes into detail about the school at that time, indicating issues with CO_2 levels, potential mold growth, and odor concerns. Many of the concerns regarding the building itself were addressed as a result of the report but of the HVAC systems revised, no new systems were implemented that had a meaningful effect on the classrooms. The

biggest takeaway from the HVAC portion of that report aligns with our assessment that the building is in dire need of additional outside air ventilation, particularly for the classrooms where most of the occupants spend their time.

Outside Air Flow Improvement Recommendations

Immediate action should be taken regarding the delivery of outside air to classroom and adjacent spaces. This requires one of two paths: (1) The removal of the existing roof-mounted exhaust fans used for ventilation of the classroom wings and the installation of new rooftop Direct Outside Air units capable of satisfying the spaces or (2) the removal of existing windows and installation of new windows capable of meeting the 4% minimum openable area requirement per code. Any changes will necessarily require that the HVAC systems be rebalanced to current design requirements, including any changes/upgrades needed to the BAS control system or end devices to satisfy the adjustments.

Something else to consider is the building pressurization. Generally, ideal building operation maintains a slightly positive pressure to the exterior to prevent unwanted air, moisture, and contaminants from infiltrating into the building. Operating a majority of spaces in a negative pressure state will necessarily reduce the controllability of the building and could adversely affect indoor air quality (IAQ). As stated previously, IAQ is a concern raised by some building occupants. Even if the building is maintained in this setup for the occupied spaces, something ought to be done to make the building as a whole slightly positive, potentially by pressurizing the corridor spaces. This would encourage the air brought in through classroom windows to be the primary source of air and reduce mixing between zones. Swapping the classroom exhaust fans out for air handling units could easily make up the building pressure, whereas relying on existing ventilation practices would only exacerbate the issue.

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 included in an Appendix to the FPS high school ventilation summary reports that van Zelm produced during ventilation studies for those two schools. ASHRAE also gave a presentation on June 16, 2020, regarding Recommendations and Activities for re-opening schools for the fall 2020 academic semester. These recommendations remain relevant as COVID and other contaminants that impact indoor air quality continue to remain a concern. Although this report is primarily concerned with meeting 2015 IMC for compliance, ASHRAE’s insight into addressing the code is invaluable. Their recommendations for reducing the transmission of infectious aerosols through HVAC systems as they apply to schools are as follows:

- Increase outdoor ventilation rates (Dilution) for all zones with deficit minimum outside air by adjusting the outside air damper minimum position of the associated air handling equipment. Generally, more is better, but any changes should follow ASHRAE Standard 62.1 as a minimum and should not overpower the capability of the heating or cooling equipment so as to maintain temperature and humidity requirements in the occupied spaces.
- Filter changes should become more frequent. Current policy indicates a twice-annual filter change at all schools. The filters had been scheduled to be changed at the time of inspection as

the last change recorded was October 2021, and almost all of them were very dirty, which decreases the filter's efficiency and forces the unit fans to run at higher speeds (more energy consumption) or to deliver less outdoor ventilation air to the space. Spaces that utilize natural ventilation will not be capable of properly filtering the outside air before it is introduced to the space. As such, any exhaust-only occupied spaces could be supplemented with portable HEPA filtration units in classrooms until such time as proper ventilation can be delivered to the space.

- Increase total air change rates to between 3 and 6 ACH where possible while still satisfying minimum OA ventilation.
- Flush or purge building before and after occupancy for at least two (2) hours, if possible.
- For any units with two sets of filters (final and pre-filters), 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. Any systems that utilize 100% outside air can rely only MERV 8 filters alone.
- Consider installation of UV-C or bi-polar ionization to recirculating air systems where installation of these systems do not interfere with the unit construction or operation.
- Provide humidification to maintain 40% RH during the heating seasons, if possible.
- Provide passive or active dehumidification in the summer to maintain room RH below 60%.
- Add low return / high supply airflow paths or utilize displacement ventilation where possible.
- Increase restroom exhaust where possible while maintaining a positive building pressurization to the exterior.
- Perform duct cleaning for existing systems.

Control Sequence Update Recommendations

A BAS replacement and upgrade project was performed at DES back in late 2019/early 2020, but this was largely to address issues and performance of the hydronic hot water system and taking over the system generally for better control. Since then, some changes have been made to rooftop equipment but little fundamental to the design of the building. With that said, and 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 at least some of the following would be beneficial:

- Repair or replace any faulty equipment controllers and end Input/Output devices.
- Look to program units to provide a pre and post occupancy purge for all occupied spaces.
- Generally, increase airflow to each space or decrease if the supplied air is significantly beyond necessary levels. Decreasing air to some locations might seem counterintuitive but some zones are being supplied with significantly more than 100% of what is required, so backing these down will help move air to where it needs to go. This item should not be addressed without a certified TAB contractor to verify flow adjustments are correct.
- Increase the minimum OA damper position for each unit, where possible.

- Review trending and alarms for all units and establish alarm points for units operating below required minimum ventilation levels during occupied modes
- Implement CO_2 and Demand Control Ventilation (DCV) sequences for units to adjust ventilation air being delivered automatically and efficiently based on actual individual space occupancy, particularly for fluctuating occupancy spaces like the Multi-Purpose room, Gymnasium, and Media Center. Not only will these sequences save a substantial amount of money in energy costs, but they remove the guesswork for facilities and control personnel for how much air each space needs, and code/guidelines incorporate these capabilities into exceptions for blanket minimum outside air flow rates. The implementation of this control strategy is especially vital since increased ventilation to the building will increase all energy costs as it has a direct impact on the heating and cooling systems as well.

Equipment Upgrade or Replacement Recommendations

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

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

Supplemental air cleaning technology, such as ultraviolet-C (UV-C) light or bi-polar ionization, is available could be considered if additional disinfection measures are desired. UV-C is short wavelength ultraviolet light that has been found to effectively kill COVID-19 particles. UV-C systems are already in 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. This recommissioning effort would not need to occur immediately as the recent control upgrade involved some recommissioning, but if the district decides to install new units, it would be highly advised to bring a Cx firm onboard to ensure proper operation.

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

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

- Where any unit only has a 4” filter, upgrade the air filters to 4” MERV 13 and add in a 2” pre-filter rack with MERV 8 pre-filters.
- 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.
- All existing filters should be replaced with the new filters of the same style. None of the currently installed filters were identified in acceptable condition during the time of the evaluation.
- Based upon our observations HVAC unit filter changes should be performed more frequently. The party responsible for changing the filters should note which unit filters become dirty quicker and should further increase the frequency of changes to those units.
- Consider adding Bi-polar ionization or another means of air disinfection wherever possible.

- Consider investigating the potential of increasing the ventilation air flow rate wherever possible.
- For any defunct units or disabled units needing serious repair or replacement, consider replacing with a unit that has energy recovery (either a wheel or cross-flow heat exchanger). This might require changes to the ductwork or balance of the air system since replacing a mixed air unit with a 100% OA unit might result in less total airflow required.
- All of the items noted within the RCx and TAB field finding appendices could be addressed by the facilities personnel or service provider. 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. Coils will become dirty over time particularly if filter change intervals are too long.
    - 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. This includes reviewing damper linkages and replacing damper end or blade-to-blade seals as needed.
    - Exterior Insulation: ductwork and piping insulation should have UV-resistant coating or shields. Typically, foil-faced aluminum insulation or banded aluminum jacketing works for this. For exposed refrigerant piping, these should be reinsulated with elastomeric insulation and coated with a UV-resistant paint. This will prevent deterioration from the sun and avoid costly repairs since almost all air handling and refrigerant equipment is located on the roof.
    - General Unit Cleanliness: All units should be cleaned to remove any dirt or debris that has accumulated. Any sections of units that have developed rust or corrosion should be kept dry and cleaned with appropriate chemicals for removing the build-up before repainting or repairs tasks.
    - Fan Belt Tension and Wheel Alignment: Any fan motor pulleys, sheaves and belts should be reviewed for proper alignment and tension. Some motors might need to be repositioned in the units to fix the tension or adjust for alignment. Many of the rooftop units, particularly the newer ones, are packaged units that come equipped with direct drive motors and these tend to have fewer imbalance issues. Still, maintenance procedures should still include these checks to account for any possible wear.

CONCLUSIONS

While Fairfield Public Schools has taken measures in the past to address some of the identified deficiencies regarding some of the recommended measures for indoor air quality (IAQ) improvements,

this study found that the Timothy Dwight Elementary School cannot meet the current minimum ventilation requirements per 2015 IMC. 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, which will be a continual process.

Although 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 alterations to the classroom wings to allow bringing proper quantities of outside air into the building by either installing new windows or new rooftop units. Improvements to the maintenance of and repair of equipment like the Gym H&V unit and Multi-Purpose Room unit will yield improved air quality and allow these spaces to meet code requirements up to the maximum occupancy. Space condition monitoring systems including but not limited to CO_2 control for high-occupancy spaces and on any new equipment associated with the classrooms will help the operations staff dial back fan speeds when energy consumption is high and address occupant concerns that indicate ongoing sick building syndrome symptoms.

Given the results of this survey, we highly recommend a full HVAC system renovation to supply all spaces with code required ventilation air. From there, further evaluation should be performed comprising whole-building Recommissioning and rebalancing, including the necessary, engineered ventilation calculations needed for the modification of systems to meet code compliance and generally better the systems of the building. Indoor air quality testing might also be beneficial to head off any future concerns that might be raised, which could lead into an IAQ management plan that caters to this school.

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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 in late March through mid-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. Some specific issues that were expected to have been addressed include filters within the air handling equipment were anticipated to be changed within a few weeks of the initial inspections. 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 (43)
	Open	Filtration	General	Since air moved through the classroom spaces is exhaust only, it is necessarily unfiltered. This will allow dust, pollen, and other airborne contaminants to infiltrate into the building. There is no guarantee that the filtered ventilation air from spaces served by rooftop equipment will make its way to the classrooms.
	Open	Thermal Control	General	Since air moved through the classroom spaces is exhaust only, it is more difficult to control the space temperature setpoints and even more so to maintain appropriate humidity levels. Driving these rooms negative will pull air from wherever the room can get it: outside, the corridor, interstitial spaces, etc..
	Open	Ventilation	Occupant Health	During the investigations, some building occupants, particularly teachers, indicated that they feel noticeably worse when within the building and better upon leaving for the day. Symptoms listed include headaches and dizziness, which are both common occurrences when a building is experiencing Sick Building Syndrome (SBS). This is not surprising given the building's age and lack of ventilation in the classroom spaces.
	Open	H&V-Gym	Gym	The outside air bird screen is damaged in some locations and should be repaired while the unit is in use.
	Open	H&V-Gym	Gym	The outside air metal bird screen is plugged and needs to be cleaned
	Open	H&V-MP	Multi-Purpose Room	This space did not receive adequate ventilation based on the code requirements

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (43)
	Open	H&V-MP	Stage	This space did not receive adequate ventilation based on the code requirements
	Open	RTU-1	Media Center Workroom	Despite RTU-1 running with the OA damper open some, this space received no airflow at all.
	Open	Ventilation	01 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	02 Computer Room	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	03 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	04 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	05 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	06 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	07 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	08 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	09 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	10 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (43)
	Open	Ventilation	11 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	12 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	13 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	14 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	15 Kindergarten	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	16 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	17 Kindergarten	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	18 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	19 Kindergarten	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	20 Classroom	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	21 Kindergarten	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Can Wash	There is no ventilation, supply or exhaust for this space

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (43)
	Open	Ventilation	Cust. Office	This space is only provided with exhaust however it is frequently occupied by the custodial staff and should have direct ventilation
	Open	Ventilation	Dishwashing	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Faculty Room	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Faculty Room Office (Psychologist)	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Girl's Room	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	IT Office	This space is only provided with exhaust however it is occasionally occupied by the IT staff and should have direct ventilation
	Open	Ventilation	Office/Storage	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	OT/PT (Formerly Music)	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Reading	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Resource	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Social Worker/Math Resource	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.
	Open	Ventilation	Speech/Language	This room was not designed or provided with any direct, filtered ventilation, only general exhaust from the rooftop EF.

Action Taken	Status	Unit/Zone	Serving/Room Name	Indoor Air Quality And Ventilation Issue (43)
	Open	Ventilation	Work Room	There is no ventilation, supply or exhaust for this space

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 (17)
	Open	H&V-Gym	Gym	The unit access doors are damaged or are otherwise in poor condition, which limits the accessibility of the unit for service and maintenance. These should be repaired.
	Open	H&V-Gym	Gym	With the inability to open the unit, the internal filter status is unknown it is not clear if they have been changed recently.
	Open	H&V-Gym	Gym	With the inability to open the unit, the damper status is unknown it is not clear if they are in good condition.
	Open	H&V-Gym	Gym	With the inability to open the unit, the heating coil status is unknown it is not clear if it is in good condition.
	Open	H&V-Gym	Gym	This unit is old and is likely beyond or nearly beyond its service life expectancy. Even though it still operates for the moment, the district should consider replacement of this unit.
	Open	H&V-MP	Multi-Purpose Room	Unit accessibility is difficult for service and maintenance
	Open	H&V-MP	Multi-Purpose Room	At the time of inspection, the filters were dirty and required a change.
	Open	H&V-MP	Multi-Purpose Room	The heating coil is dirty and needs to be cleaned
	Open	MAU	Kitchen	At the time of inspection, the filters were dirty and required a change.
	Open	RTU-1	Library	At the time of inspection, the filters were dirty and required a change.

Action Taken	Status	Unit/Zone	Serving/Room Name	Maintenance Issue (17)
	Open	RTU-2	Library	At the time of inspection, the filters were dirty and required a change.
	Open	RTU-Gym Office	Gym Office	At the time of inspection, the filters were dirty and required a change.
	Open	RTU-Gym Office	Gym Office	The condensate drain vacuum break section is taped over. If this is for winterization of the unit, this would need to be removed during the cooling season. A screw-type plug would be better for this use as well.
	Open	RTU-Office	Main Office/Nurse	At the time of inspection, the filters were dirty and required a change.
	Open	RTU-Office	Main Office/Nurse	The cooling coil is dirty and needs to be cleaned
	Open	RTU-Office	Main Office/Nurse	The roof supports for the gas piping serving this unit are in poor condition or non-existent and should be corrected to prevent damage.
	Open	Split AC	17 Kindergarten	The AC unit in this space leaks condensate

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 (9)
	Open	Schedules	General	Unit schedules through the BAS should be reviewed and adjusted based on actual use. There are instances where operational periods could be reduced without adversely affecting the occupants, which would save on heating/cooling energy use.
	Open	Exhaust	Storage/Kiln	This space is served only by the Kiln EF, which is turned on/off by a toggle switch. This fan should not be considered constant
	Open	H&V-MP	Multi-Purpose Room	The outside air damper linkage was removed from the actuator and the position of the physical damper is unknown. During the TAB process, readings were able to be taken which indicates that some quantity of ventilation is being provided (not enough in any case) but it also means that this damper is open all the time. This could have undesirable consequences during cold periods.
	Open	RTU-1	Library	The unit comes with a packaged averaging bulb attachment for damper operation. It could not be verified at the time of inspection that this properly operates the damper based on the control parameters
	Open	RTU-2	Library	There is wiring within the control damper section that is not properly tied off to the unit casing and it can interfere with the damper.
	Open	RTU-Gym Office	Gym Office	The unit was found off at the time of inspection but it was not clear why. The unit was later able to be operated for determining airflow during the TAB portion. The compressor was observed to be

Action Taken	Status	Unit/Zone	Serving/Room Name	Control Issue (9)
				wrapped with acoustical insulation, so if the unit is being shut off due to noise concerns then this should be further investigated
	Open	RTU-Office	Main Office/Nurse	Wires were found unattached to the insulated electrical stakeons within the control cabinet
	Open	RTU-Office	Main Office/Nurse	The unit controllers are not mounted properly
	Open	RTU-Office	Main Office/Nurse	Although this unit did provide code-required ventilation to these spaces, many zones received more air than required. The unit shouldn't simply be turned down, though, as it would require rebalancing since two of the spaces are near code levels while others are significantly overventilated

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 (16)
	Open	RTU-1	Library	This unit (and RTU-2) provide excessive ventilation to the media center. The damper or unit fan speed could be adjusted to reduce this quantity.
	Open	RTU-2	Library	This unit (and RTU-1) provide excessive ventilation to the media center. The damper or unit fan speed could be adjusted to reduce this quantity.
	Open	RTU-Gym	Gym	This unit provides about 75% extra ventilation than required by code. If the fan is capable of modulation, the unit could be turned down during occupied periods as long as thermal and humidity requirements are still met.
	Open	RTU-Gym Office	Gym Office	This unit provides almost ten times as much ventilation air as required by code. Although the quantity of air provided by this unit is small, there could be potential energy savings if reduced.
	Open	Ventilation	Boiler Room	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Equipment Storage	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	External Storage	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Main Office Storage	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Stage Storage Left	There is no ventilation, supply or exhaust for this space

Action Taken	Status	Unit/Zone	Serving/Room Name	Information Only Findings (16)
	Open	Ventilation	Stage Storage Right	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Storage	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Storage Health Room	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Storage Main Office "Supplies"	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Storage Workroom	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Transformer	There is no ventilation, supply or exhaust for this space
	Open	Ventilation	Yard Storage	There is no ventilation, supply or exhaust for this space

APPENDIX 2 – Ventilation Data Calculations

Project Name:	Fairfield Public Schools RCx & TAB Study
Project Number:	2020102.00.03
Scope	Ventilation Calculation by Building
Date	June 21, 2022

Timothy Dwight Elementary School

2A - Exhaust Excluded

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	Room#	Room Name	Occupancy Classification	Category	Total Airflow	Unit Actual OA %	BAS OA Damper Cond	Served By	Zone Area, Az, per space	Ceiling Height	Volume, per space	Zone Population, Pz, per space	People OA Rate in Breathing Zone, Rp	Area OA Rate in Breathing Zone, Ra	Default Occupant Density	Min. Required Ventilation Airflow	ACTUAL MEASURED VENTILATION AIR FLOW	Excess Ventilation Air (negative indicates deficit)	Excess Ventilation Air Percentage	PASS/FAIL	Ventilation ACH
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1	1	Classroom	Education	Classroom (ages 5-8)	**-382**	---	---	EF-1	760	8.9	6764	25	10.0	0.12	25	341	**0**	-341	-100.0%	**Fails**	**0.000**
1	2	Computer Room	Education	Computer lab	**-327**	---	---	EF-1	891	8.9	7930	12	10.0	0.12	25	227	**0**	-227	-100.0%	**Fails**	**0.000**
1	3	Classroom	Education	Classroom (ages 5-8)	**-364**	---	---	EF-1	762	8.9	6782	25	10.0	0.12	25	341	**0**	-341	-100.0%	**Fails**	**0.000**
1	4	Classroom	Education	Classroom (ages 5-8)	**-432**	---	---	EF-1	781	8.9	6951	25	10.0	0.12	25	344	**0**	-344	-100.0%	**Fails**	**0.000**
1	5	Classroom	Education	Classroom (ages 5-8)	**-495**	---	---	EF-1	764	8.9	6800	25	10.0	0.12	25	342	**0**	-342	-100.0%	**Fails**	**0.000**
1	6	Classroom	Education	Classroom (ages 5-8)	**-329**	---	---	EF-1	764	8.9	6800	25	10.0	0.12	25	342	**0**	-342	-100.0%	**Fails**	**0.000**
1	7	Classroom	Education	Classroom (ages 5-8)	**-577**	---	---	EF-1	769	8.9	6844	25	10.0	0.12	25	342	**0**	-342	-100.0%	**Fails**	**0.000**
1	8	Classroom	Education	Classroom (ages 5-8)	**-295**	---	---	EF-1	765	8.9	6809	25	10.0	0.12	25	342	**0**	-342	-100.0%	**Fails**	**0.000**
1	9	Classroom	Education	Classroom (ages 5-8)	**-472**	---	---	EF-1	740	8.9	6586	16	10.0	0.12	25	249	**0**	-249	-100.0%	**Fails**	**0.000**
1	10	Classroom	Education	Classroom (ages 5-8)	**-365**	---	---	EF-1	927	8.9	8250	25	10.0	0.12	25	361	**0**	-361	-100.0%	**Fails**	**0.000**
1	11	Classroom	Education	Classroom (ages 5-8)	**-368**	---	---	EF-1	784	8.9	6978	25	10.0	0.12	25	344	**0**	-344	-100.0%	**Fails**	**0.000**
1	12	Classroom	Education	Classroom (ages 5-8)	**-407**	---	---	EF-LX-18M	852	8.9	7583	25	10.0	0.12	25	352	**0**	-352	-100.0%	**Fails**	**0.000**
1	13	Classroom	Education	Classroom (ages 5-8)	**-478**	---	---	EF-2	846	8.9	7529	25	10.0	0.12	25	352	**0**	-352	-100.0%	**Fails**	**0.000**
1	14	Classroom	Education	Classroom (ages 5-8)	**-225**	---	---	EF-2	840	8.9	7476	25	10.0	0.12	25	351	**0**	-351	-100.0%	**Fails**	**0.000**
1	15	Kindergarten	Education	Classroom (ages 5-8)	**-129**	---	---	EF-2	869	8.9	7734	25	10.0	0.12	25	354	**0**	-354	-100.0%	**Fails**	**0.000**
1	16	Classroom	Education	Classroom (ages 5-8)	**-508**	---	---	EF-2	837	8.9	7449	25	10.0	0.12	25	350	**0**	-350	-100.0%	**Fails**	**0.000**
1	17	Kindergarten	Education	Classroom (ages 5-8)	**-531**	---	---	EF-2	891	8.9	7930	25	10.0	0.12	25	357	**0**	-357	-100.0%	**Fails**	**0.000**
1	18	Classroom	Education	Classroom (ages 5-8)	**-75**	---	---	EF-2	829	8.9	7378	25	10.0	0.12	25	349	**0**	-349	-100.0%	**Fails**	**0.000**
1	19	Kindergarten	Education	Classroom (ages 5-8)	**-160**	---	---	EF-2	801	8.9	7129	25	10.0	0.12	25	346	**0**	-346	-100.0%	**Fails**	**0.000**
1	20	Classroom	Education	Classroom (ages 5-8)	**-159**	---	---	EF-2	805	8.9	7165	25	10.0	0.12	25	347	**0**	-347	-100.0%	**Fails**	**0.000**
1	21	Kindergarten	Education	Classroom (ages 5-8)	**-174**	---	---	EF-2	792	8.9	7049	25	10.0	0.12	25	345	**0**	-345	-100.0%	**Fails**	**0.000**

Project Name:	**Fairfield Public Schools RCx & TAB Study**
Project Number:	**2020102.00.03**
Scope	**Ventilation Calculation by Building**
Date	**June 21, 2022**

Timothy Dwight Elementary School

2A - Exhaust Excluded

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1		Main Office	Offices	Reception Areas	**328**	21%	10%	Office RTU	225	8.9	2003	2	5.0	0.06	30	24	**69**	46	193.6%	**Meets**	**2.067**
1		Office	Offices	Office spaces	**155**	21%	10%	Office RTU	154	8.9	1371	1	5.0	0.06	5	14	**33**	19	131.7%	**Meets**	**1.445**
1		Office	Offices	Office spaces	**195**	21%	10%	Office RTU	156	8.9	1388	5	5.0	0.06	5	34	**41**	7	19.3%	**Meets**	**1.772**
1		Principal	Offices	Office spaces	**223**	21%	10%	Office RTU	202	8.9	1798	3	5.0	0.06	5	27	**47**	20	73.3%	**Meets**	**1.569**
1		Storage	Storage	Warehouses	**---**	---	---	---	80	8.9	712	0	0.0	0.06	0	5	**---**	N/A		**N/A**	
1		Health Room	Hospitals, nursing and convalescent homes	Patient rooms	**501**	21%	10%	Office RTU	312	8.9	2777	3	25.0	0.00	10	75	**105**	30	40.0%	**Meets**	**2.269**
1		Toilet Health Room	Public Spaces	Toilet rooms - public	**-142**	---	---	EF-3	16	8	128	1	0.0	0.00	0	0	**0**	0	0.0%	**N/A**	**0.000**
1		Storage Health Room	Storage	Warehouses	**---**	---	---	---	6	7.5	45	0	0.0	0.06	0	0	**---**	N/A		**N/A**	
1		Storage Main Office "Supplies"	Storage	Warehouses	**---**	---	---	---	70	7.9	553	0	0.0	0.06	0	4	**---**	N/A		**N/A**	
1		Waiting Room	Offices	Reception Areas	**508**	21%	10%	Office RTU	268	8.9	2385	5	5.0	0.06	30	41	**107**	66	160.5%	**Meets**	**2.692**
1		Stage	Theaters	Stages, studios	**477**	22%	10%	Multipurpose H&V	425	20.3	8628	25	10.0	0.06	70	276	**105**	-171	-61.9%	**Fails**	**0.730**
1		Stage Storage RIght	Storage	Warehouses	**---**	---	---	---	80	9.2	736	0	0.0	0.06	0	5	**---**	N/A		**N/A**	
1		Stage Storage Left	Storage	Warehouses	**---**	---	---	---	80	9.2	736	0	0.0	0.06	0	5	**---**	N/A		**N/A**	
1		All Purpose Room	Education	Multiuse assembly	**5290**	22%	10%	Multipurpose H&V	2895	24.8	71796	400	7.5	0.06	100	3174	**1164**	-2010	-63.3%	**Fails**	**0.973**
1		Boiler Room	None	None	**---**	---	---	---	1040	16	16640	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1		Transformer	None	None	**---**	---	---	---	133	8.9	1184	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1		Yard Storage	None	None	**---**	---	---	---	150	8.9	1335	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1		Kitchen	Food and beverage service	Kitchens (cooking)	**564**	100%	100%	MAU-1	527	8.9	4690	3	0.0	0.00	0	0	**564**	564	0.0%	**N/A**	**7.215**
1		Can Wash	Food and beverage service	Kitchens (cooking)	**---**	---	---	---	70	8.9	623	1	0.0	0.00	0	0	**0**	0	0.0%	**N/A**	**0.000**
1		Office/Storage	Offices	Office spaces	**0**	---	---	---	97	8.9	863	1	5.0	0.06	5	11	**0**	-11	-100.0%	**Fails**	**0.000**
1		Dishwashing	Food and beverage service	Kitchens (cooking)	**---**	---	---	---	552	8.9	4913	3	0.0	0.00	0	0	**0**	0	0.0%	**N/A**	**0.000**

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Timothy Dwight Elementary School

2A - Exhaust Excluded

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	Room#	Room Name	Occupancy Classification	Category	Total Airflow	Unit Actual OA %	BAS OA Damper Cond	Served By	Zone Area, Az, per space	Ceiling Height	Volume, per space	Zone Population, Pz, per space	People OA Rate in Breathing Zone, Rp	Area OA Rate in Breathing Zone, Ra	Default Occupant Density	Min. Required Ventilation Airflow	ACTUAL MEASURED VENTILATION AIR FLOW	Excess Ventilation Air (negative indicates deficit)	Excess Ventilation Air Percentage	PASS/FAIL	Ventilation ACH
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1		External Storage	Storage	Warehouses	---	---	---	---	323	11.4	3682	0	0.0	0.06	0	19	---	N/A		N/A	
1		Cust. Office	Offices	Office spaces	-180	---	---	EF-4	180	12	2160	1	5.0	0.06	5	16	0	-16	-100.0%	Fails	0.000
1		IT Office	Workrooms	Computer (w/o printing)	-332	---	---	EF-4	120	9.2	1104	2	5.0	0.06	4	17	0	-17	-100.0%	Fails	0.000
1		Women	Public Spaces	Toilet rooms - public	-179	---	---	EF-5B	97	9.2	892	2	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1		Men	Public Spaces	Toilet rooms - public	-167	---	---	EF-5A	103	9.2	948	2	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1		Storage Workroom	Storage	Warehouses	---	---	---	---	8	8	64	0	0.0	0.06	0	0	---	N/A		N/A	
1		Work Room	Workrooms	Copy, printing rooms	0	23%	10%	RTU-1	263	10.5	2762	6	5.0	0.06	4	46	0	-46	-100.0%	Fails	0.000
1		Storage Kiln	Storage	Warehouses	-109	---	---	Kiln EF	201	8.3	1668	1	0.0	0.06	0	12	0	-12	-100.0%	Fails	0.000
1		Media Center	Education	Media Center	3266	22.6% & 21.8%	10% & 10%	RTU-1 & RTU-2	1463	13	19019	25	10.0	0.12	25	426	726	300	70.6%	Meets	2.290
1		Media Center Office	Offices	Office spaces	342	22%	10%	RTU-2	122	13	1586	2	5.0	0.06	5	17	75	58	333.0%	Meets	2.837
1		Storage	Storage	Warehouses	---	---	---	---	74	7.4	548	0	0.0	0.06	0	4	---	N/A		N/A	
1		Boy's Room	Public Spaces	Toilet rooms - public	-360	---	---	EF-4	208	9.2	1914	4	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1		Girl's Room	Public Spaces	Toilet rooms - public	-323	---	---	EF-4	200	9.2	1840	4	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1		Custodian	Storage	Warehouses	-103	---	---	EF-7	35	9.1	319	1	0.0	0.06	0	2	0	-2	-100.0%	Fails	0.000
1		Boy's Room	Public Spaces	Toilet rooms - public	-222	---	---	EF-7	87	8.6	748	2	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1		Girl's Room	Public Spaces	Toilet rooms - public	-143	---	---	EF-7	60	9.2	552	2	0.0	0.00	0	0	0	0	0.0%	N/A	0.000
1		Gym	Sports and amusement	Gym, stadium, arena (play area)	3983	35%	10%	Gym H&V	2600	17.5	45500	30	0.0	0.30	0	780	1394	614	78.7%	Meets	1.838
1		Gym Office	Offices	Office spaces	386	35%	10%	Gym Office RTU	133	11	1463	1	5.0	0.06	5	13	136	123	947.8%	Meets	5.578
1		Equipment Storage	Storage	Warehouses	---	---	---	---	100	11	1100	0	0.0	0.06	0	6	---	N/A		N/A	
1		Reading	Offices	Office spaces	-213	---	---	EF-LX-18M	133	8.4	1117	4	5.0	0.06	5	28	0	-28	-100.0%	Fails	0.000
		Speech/Language	Offices	Office spaces	0	---	---	EF-LX-18M	92	8.3	764	3	5.0	0.06	5	21	0	-21	-100.0%	Fails	0.000

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Timothy Dwight Elementary School

2A - Exhaust Excluded

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	Room#	Room Name	Occupancy Classification	Category	Total Airflow	Unit Actual OA %	BAS OA Damper Cond	Served By	Zone Area, Az, per space	Ceiling Height	Volume, per space	Zone Population, Pz, per space	People OA Rate in Breathing Zone, Rp	Area OA Rate in Breathing Zone, Ra	Default Occupant Density	Min. Required Ventilation Airflow	ACTUAL MEASURED VENTILATION AIR FLOW	Excess Ventilation Air (negative indicates deficit)	Excess Ventilation Air Percentage	PASS/FAIL	Ventilation ACH
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1		Resource	Offices	Office spaces	**-274**	---	---	EF-LX-18M	212	8.3	1760	5	5.0	0.06	5	38	**0**	-38	-100.0%	**Fails**	**0.000**
1		Faculty Room	Offices	Office spaces	**-337**			EF-LX-24	502	8.8	4418	12	5.0	0.06	5	90	**0**	-90	-100.0%	**Fails**	**0.000**
1		Faculty Room Office (Psychologist)	Offices	Office spaces	**-164**			EF-LX-24	92	9.1	837	4	5.0	0.06	5	26	**0**	-26	-100.0%	**Fails**	**0.000**
1		OT/PT (Formerly Music)	Education	Classroom (ages 5-8)	**-175**			EF-LX-24	554	9.1	5041	5	10.0	0.12	25	116	**0**	-116	-100.0%	**Fails**	**0.000**
1		Social Worker/Math Resource	Offices	Office spaces	**-588**			EF-LX-24	92	9.1	837	4	5.0	0.06	5	26	**0**	-26	-100.0%	**Fails**	**0.000**

Project Name:	Fairfield Public Schools RCx & TAB Study
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Timothy Dwight Elementary School

2B - Exhaust Included

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	Room#	Room Name	Occupancy Classification	Category	Total Airflow	Unit Actual OA %	BAS OA Damper Cond	Served By	Zone Area, Az, per space	Ceiling Height	Volume, per space	Zone Population, Pz, per space	People OA Rate in Breathing Zone, Rp	Area OA Rate in Breathing Zone, Ra	Default Occupant Density	Min. Required Ventilation Airflow	ACTUAL MEASURED VENTILATION AIR FLOW	Excess Ventilation Air (negative indicates deficit)	Excess Ventilation Air Percentage	PASS/FAIL	Ventilation ACH
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1	1	Classroom	Education	Classroom (ages 5-8)	**-382**	---	---	EF-1	760	8.9	6764	25	10.0	0.12	25	341	**382**	41	12.0%	**Meets**	**3.389**
1	2	Computer Room	Education	Computer lab	**-327**	---	---	EF-1	891	8.9	7930	12	10.0	0.12	25	227	**327**	100	44.1%	**Meets**	**2.474**
1	3	Classroom	Education	Classroom (ages 5-8)	**-364**	---	---	EF-1	762	8.9	6782	25	10.0	0.12	25	341	**364**	23	6.6%	**Meets**	**3.220**
1	4	Classroom	Education	Classroom (ages 5-8)	**-432**	---	---	EF-1	781	8.9	6951	25	10.0	0.12	25	344	**432**	88	25.7%	**Meets**	**3.729**
1	5	Classroom	Education	Classroom (ages 5-8)	**-495**	---	---	EF-1	764	8.9	6800	25	10.0	0.12	25	342	**495**	153	44.9%	**Meets**	**4.368**
1	6	Classroom	Education	Classroom (ages 5-8)	**-329**	---	---	EF-1	764	8.9	6800	25	10.0	0.12	25	342	**329**	-13	-3.7%	**Fails**	**2.903**
1	7	Classroom	Education	Classroom (ages 5-8)	**-577**	---	---	EF-1	769	8.9	6844	25	10.0	0.12	25	342	**577**	235	68.6%	**Meets**	**5.058**
1	8	Classroom	Education	Classroom (ages 5-8)	**-295**	---	---	EF-1	765	8.9	6809	25	10.0	0.12	25	342	**295**	-47	-13.7%	**Fails**	**2.600**
1	9	Classroom	Education	Classroom (ages 5-8)	**-472**	---	---	EF-1	740	8.9	6586	16	10.0	0.12	25	249	**472**	223	89.7%	**Meets**	**4.300**
1	10	Classroom	Education	Classroom (ages 5-8)	**-365**	---	---	EF-1	927	8.9	8250	25	10.0	0.12	25	361	**365**	4	1.0%	**Meets**	**2.654**
1	11	Classroom	Education	Classroom (ages 5-8)	**-368**	---	---	EF-1	784	8.9	6978	25	10.0	0.12	25	344	**368**	24	7.0%	**Meets**	**3.164**
1	12	Classroom	Education	Classroom (ages 5-8)	**-407**	---	---	EF-LX-18M	852	8.9	7583	25	10.0	0.12	25	352	**407**	55	15.5%	**Meets**	**3.220**
1	13	Classroom	Education	Classroom (ages 5-8)	**-478**	---	---	EF-2	846	8.9	7529	25	10.0	0.12	25	352	**478**	126	36.0%	**Meets**	**3.809**
1	14	Classroom	Education	Classroom (ages 5-8)	**-225**	---	---	EF-2	840	8.9	7476	25	10.0	0.12	25	351	**225**	-126	-35.9%	**Fails**	**1.806**
1	15	Kindergarten	Education	Classroom (ages 5-8)	**-129**	---	---	EF-2	869	8.9	7734	25	10.0	0.12	25	354	**129**	-225	-63.6%	**Fails**	**1.001**
1	16	Classroom	Education	Classroom (ages 5-8)	**-508**	---	---	EF-2	837	8.9	7449	25	10.0	0.12	25	350	**508**	158	45.0%	**Meets**	**4.092**
1	17	Kindergarten	Education	Classroom (ages 5-8)	**-531**	---	---	EF-2	891	8.9	7930	25	10.0	0.12	25	357	**531**	174	48.8%	**Meets**	**4.018**
1	18	Classroom	Education	Classroom (ages 5-8)	**-75**	---	---	EF-2	829	8.9	7378	25	10.0	0.12	25	349	**75**	-274	-78.5%	**Fails**	**0.610**
1	19	Kindergarten	Education	Classroom (ages 5-8)	**-160**	---	---	EF-2	801	8.9	7129	25	10.0	0.12	25	346	**160**	-186	-53.8%	**Fails**	**1.347**
1	20	Classroom	Education	Classroom (ages 5-8)	**-159**	---	---	EF-2	805	8.9	7165	25	10.0	0.12	25	347	**159**	-188	-54.1%	**Fails**	**1.332**
1	21	Kindergarten	Education	Classroom (ages 5-8)	**-174**	---	---	EF-2	792	8.9	7049	25	10.0	0.12	25	345	**174**	-171	-49.6%	**Fails**	**1.481**

Project Name:	**Fairfield Public Schools RCx & TAB Study**
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Timothy Dwight Elementary School

2B - Exhaust Included

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	**Room#**	**Room Name**	**Occupancy Classification**	**Category**	**Total Airflow**	**Unit Actual OA %**	**BAS OA Damper Cond**	**Served By**	**Zone Area, Az, per space**	**Ceiling Height**	**Volume, per space**	**Zone Population, Pz, per space**	**People OA Rate in Breathing Zone, Rp**	**Area OA Rate in Breathing Zone, Ra**	**Default Occupant Density**	**Min. Required Ventilation Airflow**	**ACTUAL MEASURED VENTILATION AIR FLOW**	**Excess Ventilation Air (negative indicates deficit)**	**Excess Ventilation Air Percentage**	**PASS/FAIL**	**Ventilation ACH**
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1		Main Office	Offices	Reception Areas	**328**	21%	10%	Office RTU	225	8.9	2003	2	5.0	0.06	30	24	**69**	46	193.6%	**Meets**	**2.067**
1		Office	Offices	Office spaces	**155**	21%	10%	Office RTU	154	8.9	1371	1	5.0	0.06	5	14	**33**	19	131.7%	**Meets**	**1.445**
1		Office	Offices	Office spaces	**195**	21%	10%	Office RTU	156	8.9	1388	5	5.0	0.06	5	34	**41**	7	19.3%	**Meets**	**1.772**
1		Principal	Offices	Office spaces	**223**	21%	10%	Office RTU	202	8.9	1798	3	5.0	0.06	5	27	**47**	20	73.3%	**Meets**	**1.569**
1		Storage	Storage	Warehouses	**---**	---	---	---	80	8.9	712	0	0.0	0.06	0	5	**---**	N/A		**N/A**	
1		Health Room	Hospitals, nursing and convalescent homes	Patient rooms	**501**	21%	10%	Office RTU	312	8.9	2777	3	25.0	0.00	10	75	**105**	30	40.0%	**Meets**	**2.269**
1		Toilet Health Room	Public Spaces	Toilet rooms - public	**-142**	---	---	EF-3	16	8	128	1	0.0	0.00	0	0	**142**	142	0.0%	**N/A**	**66.563**
1		Storage Health Room	Storage	Warehouses	**---**	---	---	---	6	7.5	45	0	0.0	0.06	0	0	**---**	N/A		**N/A**	
1		Storage Main Office "Supplies"	Storage	Warehouses	**---**	---	---	---	70	7.9	553	0	0.0	0.06	0	4	**---**	N/A		**N/A**	
1		Waiting Room	Offices	Reception Areas	**508**	21%	10%	Office RTU	268	8.9	2385	5	5.0	0.06	30	41	**107**	66	160.5%	**Meets**	**2.692**
1		Stage	Theaters	Stages, studios	**477**	22%	10%	Multipurpose H&V	425	20.3	8628	25	10.0	0.06	70	276	**105**	-171	-61.9%	**Fails**	**0.730**
1		Stage Storage RIght	Storage	Warehouses	**---**	---	---	---	80	9.2	736	0	0.0	0.06	0	5	**---**	N/A		**N/A**	
1		Stage Storage Left	Storage	Warehouses	**---**	---	---	---	80	9.2	736	0	0.0	0.06	0	5	**---**	N/A		**N/A**	
1		All Purpose Room	Education	Multiuse assembly	**5290**	22%	10%	Multipurpose H&V	2895	24.8	71796	400	7.5	0.06	100	3174	**1164**	-2010	-63.3%	**Fails**	**0.973**
1		Boiler Room	None	None	**---**	---	---	---	1040	16	16640	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1		Transformer	None	None	**---**	---	---	---	133	8.9	1184	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1		Yard Storage	None	None	**---**	---	---	---	150	8.9	1335	0	0.0	0.00	0	0	**---**	N/A	0.0%	**N/A**	
1		Kitchen	Food and beverage service	Kitchens (cooking)	**564**	100%	100%	MAU-1	527	8.9	4690	3	0.0	0.00	0	0	**564**	564	0.0%	**N/A**	**7.215**
1		Can Wash	Food and beverage service	Kitchens (cooking)	**---**	---	---	---	70	8.9	623	1	0.0	0.00	0	0	**0**	0	0.0%	**N/A**	**0.000**
1		Office/Storage	Offices	Office spaces	**0**	---	---	---	97	8.9	863	1	5.0	0.06	5	11	**0**	-11	-100.0%	**Fails**	**0.000**
1		Dishwashing	Food and beverage service	Kitchens (cooking)	**---**	---	---	---	552	8.9	4913	3	0.0	0.00	0	0	**0**	0	0.0%	**N/A**	**0.000**

Project Name:	Fairfield Public Schools RCx & TAB Study
Project Number:	2020102.00.03
Scope	Ventilation Calculation by Building
Date	June 21, 2022

Timothy Dwight Elementary School

2B - Exhaust Included

VANZELM ENGINEERS

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	Room#	Room Name	Occupancy Classification	Category	Total Airflow	Unit Actual OA %	BAS OA Damper Cond	Served By	Zone Area, Az, per space	Ceiling Height	Volume, per space	Zone Population, Pz, per space	People OA Rate in Breathing Zone, Rp	Area OA Rate in Breathing Zone, Ra	Default Occupant Density	Min. Required Ventilation Airflow	ACTUAL MEASURED VENTILATION AIR FLOW	Excess Ventilation Air (negative indicates deficit)	Excess Ventilation Air Percentage	PASS/FAIL	Ventilation ACH
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1		External Storage	Storage	Warehouses	---	---	---	---	323	11.4	3682	0	0.0	0.06	0	19	---	N/A		N/A	
1		Cust. Office	Offices	Office spaces	-180	---	---	EF-4	180	12	2160	1	5.0	0.06	5	16	180	164	1039.2%	Meets	5.000
1		IT Office	Workrooms	Computer (w/o printing)	-332	---	---	EF-4	120	9.2	1104	2	5.0	0.06	4	17	332	315	1830.2%	Meets	18.043
1		Women	Public Spaces	Toilet rooms - public	-179	---	---	EF-5B	97	9.2	892	2	0.0	0.00	0	0	179	179	0.0%	N/A	12.035
1		Men	Public Spaces	Toilet rooms - public	-167	---	---	EF-5A	103	9.2	948	2	0.0	0.00	0	0	167	167	0.0%	N/A	10.574
1		Storage Workroom	Storage	Warehouses	---	---	---	---	8	8	64	0	0.0	0.06	0	0	---	N/A		N/A	
1		Work Room	Workrooms	Copy, printing rooms	0	23%	10%	RTU-1	263	10.5	2762	6	5.0	0.06	4	46	0	-46	-100.0%	Fails	0.000
1		Storage Kiln	Storage	Warehouses	-109	---	---	Kiln EF	201	8.3	1668	1	0.0	0.06	0	12	109	97	803.8%	Meets	3.920
1		Media Center	Education	Media Center	3266	22.6% & 21.8%	10% & 10%	RTU-1 & RTU-2	1463	13	19019	25	10.0	0.12	25	426	726	300	70.6%	Meets	2.290
1		Media Center Office	Offices	Office spaces	342	22%	10%	RTU-2	122	13	1586	2	5.0	0.06	5	17	75	58	333.0%	Meets	2.837
1		Storage	Storage	Warehouses	---	---	---	---	74	7.4	548	0	0.0	0.06	0	4	---	N/A		N/A	
1		Boy's Room	Public Spaces	Toilet rooms - public	-360	---	---	EF-4	208	9.2	1914	4	0.0	0.00	0	0	360	360	0.0%	N/A	11.288
1		Girl's Room	Public Spaces	Toilet rooms - public	-323	---	---	EF-4	200	9.2	1840	4	0.0	0.00	0	0	323	323	0.0%	N/A	10.533
1		Custodian	Storage	Warehouses	-103	---	---	EF-7	35	9.1	319	1	0.0	0.06	0	2	103	101	4804.8%	Meets	19.403
1		Boy's Room	Public Spaces	Toilet rooms - public	-222	---	---	EF-7	87	8.6	748	2	0.0	0.00	0	0	222	222	0.0%	N/A	17.803
1		Girl's Room	Public Spaces	Toilet rooms - public	-143	---	---	EF-7	60	9.2	552	2	0.0	0.00	0	0	143	143	0.0%	N/A	15.543
1		Gym	Sports and amusement	Gym, stadium, arena (play area)	3983	35%	10%	Gym H&V	2600	17.5	45500	30	0.0	0.30	0	780	1394	614	78.7%	Meets	1.838
1		Gym Office	Offices	Office spaces	386	35%	10%	Gym Office RTU	133	11	1463	1	5.0	0.06	5	13	136	123	947.8%	Meets	5.578
1		Equipment Storage	Storage	Warehouses	---	---	---	---	100	11	1100	0	0.0	0.06	0	6	---	N/A		N/A	
1		Reading	Offices	Office spaces	-213	---	---	EF-LX-18M	133	8.4	1117	4	5.0	0.06	5	28	213	185	661.3%	Meets	11.439
1		Speech/Language	Offices	Office spaces	0	---	---	EF-LX-18M	92	8.3	764	3	5.0	0.06	5	21	0	-21	-100.0%	Fails	0.000

Project Name:	Fairfield Public Schools RCx & TAB Study
Project Number:	2020102.00.03
Scope	Ventilation Calculation by Building
Date	June 21, 2022

Timothy Dwight Elementary School

2B - Exhaust Included

Zone Identification												IMC 2015 Ventilation Calculations									
Floor	Room#	Room Name	Occupancy Classification	Category	Total Airflow	Unit Actual OA %	BAS OA Damper Cond	Served By	Zone Area, Az, per space	Ceiling Height	Volume, per space	Zone Population, Pz, per space	People OA Rate in Breathing Zone, Rp	Area OA Rate in Breathing Zone, Ra	Default Occupant Density	Min. Required Ventilation Airflow	ACTUAL MEASURED VENTILATION AIR FLOW	Excess Ventilation Air (negative indicates deficit)	Excess Ventilation Air Percentage	PASS/FAIL	Ventilation ACH
					(cfm)	(%)	(%)		(sq.ft)	(ft)	(cu.ft)	Adult	(cfm/ person)	(cfm/sf)	(#/1000sf)	(cfm)	(cfm)	(cfm)	(%)		(AC/hr)
1		Resource	Offices	Office spaces	**-274**	---	---	EF-LX-18M	212	8.3	1760	5	5.0	0.06	5	38	**274**	236	626.4%	**Meets**	**9.343**
1		Faculty Room	Offices	Office spaces	**-337**			EF-LX-24	502	8.8	4418	12	5.0	0.06	5	90	**337**	247	273.9%	**Meets**	**4.577**
1		Faculty Room Office (Psychologist)	Offices	Office spaces	**-164**			EF-LX-24	92	9.1	837	4	5.0	0.06	5	26	**164**	138	542.6%	**Meets**	**11.753**
1		OT/PT (Formerly Music)	Education	Classroom (ages 5-8)	**-175**			EF-LX-24	554	9.1	5041	5	10.0	0.12	25	116	**175**	59	50.2%	**Meets**	**2.083**
1		Social Worker/Math Resource	Offices	Office spaces	**-588**			EF-LX-24	92	9.1	837	4	5.0	0.06	5	26	**588**	562	2204.1%	**Meets**	**42.140**

APPENDIX 3 – Roof Map


Kitchen MAU
KEF
EF-2
EF-3
(Inside)
Multipurpose
H&V (Inside)
Library RTU-1
EF-LX-24
Office RTU
Library RTU-2
EF-8
EF-7
GYM H&V
EF-9
EF-1
GYM Office RTU
EF-LX-18M

APPENDIX 4 – TAB Airflow Survey Data

WING'S TESTING & BALANCING CO., INC.

Fairfield Public Schools

Timothy Dwight Elementary School

Ventilation Survey

* * * *

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

April 21st, 2022

94 North Branford Road • Suite One • Branford, CT 06405
(203) 481-4988 • Fax (203) 488-5634 • wings@wingstesting.com
SM-1 License #6803
www.wingstesting.com

WING'S TESTING & BALANCING CO., INC.

April 21st, 2022

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

Re: Fairfield Public Schools – Timothy Dwight Elementary Schools / HVAC Survey

Dear Bill,

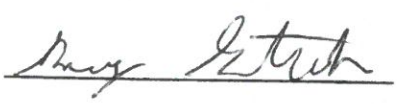
Wing's has completed the HVAC/Fresh Air Ventilation Survey at the above referenced location. The results are as follows:

- Several spaces have neither supply nor exhaust ventilation.
- All classrooms have exhaust only.
- The media center is served by both RTU-1 and RTU-2.
- Storage/Kiln is served only by Kiln EF which is turned on/off by a toggle switch.
  - Unit shouldn't be considered constant exhaust.
- There is no ventilation for the dishwasher area which is openly attached to the kitchen.

The following pages are your record of current operating conditions. They also include the highlighted prints illustrating the location of diffusers and RTUs.

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



Barry Stratos
Certified TABB Technician
CT SM-2 License 6386
MA SM-2 13595

VELOCITY PRESSURE READINGS

PROJECT:	Fairfield Public Schools - Timothy Dwight Elementary School	**DATE:**	4/21/22
AREA SERVED:	Various	**TECH:**	BS

TRAVERSE LOCATIONS	DUCT SIZE "	AREA SQ.FT.	DESIGN FPM	DESIGN CFM	CENT. STAT. PRESS."	TEST FPM	TEST CFM	NOTES
Gym H+V								
Total	---	---	---	ND	---	---	3238	(1)
O.A.	52" x 18"	6.5	---	ND	w/ Velgrid	212	1378	
Return	---	---	---	ND	Calculated	---	2605	
Gym Office RTU								
Total	---	---	---	ND	---	---	386	(1)
O.A.	20" x 16"	2.22	---	ND	w/ Velgrid	61	136	
Return	---	---	---	ND	Calculated	---	250	
Library RTU-1								
Total	---	---	---	ND	---	---	1870	(1)
O.A.	28" x 12"	2.33	---	ND	w/ Velgrid	181	422	
Return	---	---	---	ND	Calculated	---	1448	
Library RTU-2								
Total	---	---	---	ND	---	---	1949	(1)
O.A.	28" x 12"	2.33	---	ND	w/ Velgrid	182	424	
Return	---	---	---	ND	Calculated	---	1525	
Office RTU								
Total	---	---	---	ND	---	---	1909	(1)
O.A.	36" x 16"	4.0	---	ND	w/ Velgrid	100	400	
Return	---	---	---	ND	Calculated	---	1509	
MP H+V								
Total	---	---	---	ND	---	---	5767	(1)
O.A.	114" x 39"	30.9	---	ND	w/ Velgrid	41	1266	
Return	---	---	---	ND	Calculated	---	4501	
Kitchen								
MAU Total	18" x 46"	5.75	---	ND	w/ Velgrid	98	564	
Hood Total	15" x 78"	9.1	---	ND	w/ Velgrid	197	1793	

REMARKS

(1) Unit total found by diffuser readings.

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

Project Name:	Fairfield Public Schools - Timothy Dwight Elementary School							
Project #:	*2020102*							
Scope:	TAB Data							
Date:	4/21/22							
ZONE IDENTIFICATION								
FLOOR	ROOM NO.	ROOM NAME	TEST CFM	ACTUAL OA AT MIN	ACTUAL OA %	BAS OA Dmpr Comnd	SPACE SERVED BY	NOTES
1	1	Classroom	-382	---	---	---	EF-1	Exhaust only.
1	2	Computer Room	-327	---	---	---	EF-1	Exhaust only.
1	3	Classroom	-364	---	---	---	EF-1	Exhaust only.
1	4	Classroom	-432	---	---	---	EF-1	Exhaust only.
1	5	Classroom	-495	---	---	---	EF-1	Exhaust only.
1	6	Classroom	-329	---	---	---	EF-1	Exhaust only.
1	7	Classroom	-577	---	---	---	EF-1	Exhaust only.
1	8	Classroom	-295	---	---	---	EF-1	Exhaust only.
1	9	Classroom	-472	---	---	---	EF-1	Exhaust only.
1	10	Classroom	-365	---	---	---	EF-1	Exhaust only.
1	11	Classroom	-368	---	---	---	EF-1	Exhaust only.
1	12	Classroom	-407	---	---	---	EF-LX-18M	Exhaust only.
1	13	Classroom	-478	---	---	---	EF-2	Exhaust only.
1	14	Classroom	-225	---	---	---	EF-2	Exhaust only.
1	15	Kindergarten	-129	---	---	---	EF-2	Exhaust only.
1	16	Classroom	-508	---	---	---	EF-2	Exhaust only.
1	17	Kindergarten	-531	---	---	---	EF-2	Exhaust only.
1	18	Classroom	-75	---	---	---	EF-2	Exhaust only.
1	19	Kindergarten	-160	---	---	---	EF-2	Exhaust only.
1	20	Classroom	-159	---	---	---	EF-2	Exhaust only.
1	21	Kindergarten	-174	---	---	---	EF-2	Exhaust only.
1		Main Office	328	69	21%	10%	Office RTU	
1		Office	155	33	21%	10%	Office RTU	
1		Office	195	41	21%	10%	Office RTU	
1		Principal	223	47	21%	10%	Office RTU	
1		Storage	0	NA	NA	NA	---	No ventilation.
1		Health Room	501	105	21%	10%	Office RTU	
1		Toilet Health Rm	-142	---	---	---	EF-3	Exhaust only.
1		Storage Health Rm	0	NA	NA	NA	---	No ventilation.
1		Storage Main Off.	0	NA	NA	NA	---	No ventilation.
1		Boiler Room	---	---	---	---	---	No ventilation.
1		Transformer	---	---	---	---	---	No ventilation.
1		Yard Storage	---	---	---	---	---	No ventilation.
1		Kitchen	564	564	100%	100%	MAU-1	MAU-1 is a 100% O.A. unit.
1		Can Wash	---	---	---	---	---	No ventilation.
1		Office/Storage	---	---	---	---	---	No ventilation.
1		Dishwashing	---	---	---	---	---	No ventilation.
1		External Storage	---	---	---	---	---	No ventilation.
1		Cust. Office	-180	---	---	---	EF-4	Exhaust only.
1		Office	-332	---	---	---	EF-4	Exhaust only.
1		Women's Room	-179	---	---	---	EF-5B	Exhaust only.
1		Men's Room	-167	---	---	---	EF-5A	Exhaust only.
1		Storage Workroom	---	---	---	---	---	No ventilation.

Project Name:	Fairfield Public Schools - Timothy Dwight Elementary School
Project #:	*2020102*
Scope:	TAB Data
Date:	4/21/22

ZONE IDENTIFICATION

FLOOR	ROOM NO.	ROOM NAME	TEST CFM	ACTUAL OA AT MIN	ACTUAL OA %	BAS OA Dmpr Comnd	SPACE SERVED BY	NOTES
1		Workroom	0	0	22.6%	10%	RTU-1	No ventilation.
1		Storage Kiln	-109	---	---	---	Kiln EF	Room only has toggle switch Kiln-EF.
1		Media Center	3266	726	22.6%+21.8%	10%+10%	RTU-1+RTU-2	RTU-1 O.A.=401 | RTU-2 O.A.=325
1		Office	342	75	21.8%	10%	RTU-2	
1		Storage	NA	NA	NA	NA	---	No ventilation.
1		Boys Room	-360	---	---	---	EF-4	Exhaust only.
1		Girls Room	-323	---	---	---	EF-4	No ventilation.
1		Waiting Room	508	107	21%	10%	Office RTU	
1		Stage	477	105	22%	10%	Multiporp. H+V	
1		Storage Stage Right	NA	NA	NA	NA	---	No ventilation.
1		Storage Stage Left	NA	NA	NA	NA	---	No ventilation.
1		All purpose Room	5290	1164	22%	10%	Multiporp. H+V	
1		Custodian	-103	NA	NA	NA	EF-7	Exhaust only.
1		Boy's Room	-222	NA	NA	NA	EF-7	Exhaust only.
1		Girl's Room	-143	NA	NA	NA	EF-7	Exhaust only.
1		Gym	3983	1394	35%	10%	Gym H+V	
1		Gym Office	386	136	35.2%	10%	Gym Off. RTU	
1		Equipment Storage	NA	NA	NA	NA	---	No ventilation.
1		Reading	-213	---	---	---	EF-LX-18M	Exhaust only.
1		Resource	-274	---	---	---	EF-LX-18M	Exhaust only.

Project Name:	Fairfield Public Schools - Timothy Dwight Elementary School
Project #:	*2020102*
Scope:	TAB Data
Date:	4/21/22

ZONE IDENTIFICATION								
FLOOR	ROOM NO.	ROOM NAME	TEST CFM	ACTUAL OA AT MIN	ACTUAL OA %	BAS OA Dmpr Comnd	SPACE SERVED BY	NOTES
1	1	Classroom	-382	---	---	---	EF-1	Exhaust only.
1	2	Computer Room	-327	---	---	---	EF-1	Exhaust only.
1	3	Classroom	-364	---	---	---	EF-1	Exhaust only.
1	4	Classroom	-432	---	---	---	EF-1	Exhaust only.
1	5	Classroom	-495	---	---	---	EF-1	Exhaust only.
1	6	Classroom	-329	---	---	---	EF-1	Exhaust only.
1	7	Classroom	-577	---	---	---	EF-1	Exhaust only.
1	8	Classroom	-295	---	---	---	EF-1	Exhaust only.
1	9	Classroom	-472	---	---	---	EF-1	Exhaust only.
1	10	Classroom	-365	---	---	---	EF-1	Exhaust only.
1	11	Classroom	-368	---	---	---	EF-1	Exhaust only.
1	12	Classroom	-407	---	---	---	EF-LX-18M	Exhaust only.
1	13	Classroom	-478	---	---	---	EF-2	Exhaust only.
1	14	Classroom	-225	---	---	---	EF-2	Exhaust only.
1	15	Kindergarten	-129	---	---	---	EF-2	Exhaust only.
1	16	Classroom	-508	---	---	---	EF-2	Exhaust only.
1	17	Kindergarten	-531	---	---	---	EF-2	Exhaust only.
1	18	Classroom	-75	---	---	---	EF-2	Exhaust only.
1	19	Kindergarten	-160	---	---	---	EF-2	Exhaust only.
1	20	Classroom	-159	---	---	---	EF-2	Exhaust only.
1	21	Kindergarten	-174	---	---	---	EF-2	Exhaust only.
1		Main Office	328	69	21%	10%	Office RTU	

Project Name:	Fairfield Public Schools - Timothy Dwight Elementary School
Project #:	*2020102*
Scope:	TAB Data
Date:	4/21/22

ZONE IDENTIFICATION

FLOOR	ROOM NO.	ROOM NAME	TEST CFM	ACTUAL OA AT MIN	ACTUAL OA %	BAS OA Dmpr Comnd	SPACE SERVED BY	NOTES
1		Office	155	33	21%	10%	Office RTU	
1		Office	195	41	21%	10%	Office RTU	
1		Principal	223	47	21%	10%	Office RTU	
1		Storage	0	NA	NA	NA	---	No ventilation.
1		Health Room	501	105	21%	10%	Office RTU	
1		Toilet Health Rm	-142	---	---	---	EF-3	Exhaust only.
1		Storage Health Rm	0	NA	NA	NA	---	No ventilation.
1		Storage Main Off.	0	NA	NA	NA	---	No ventilation.
1		Boiler Room	---	---	---	---	---	No ventilation.
1		Transformer	---	---	---	---	---	No ventilation.
1		Yard Storage	---	---	---	---	---	No ventilation.
1		Kitchen	564	564	100%	100%	MAU-1	MAU-1 is a 100% O.A. unit.
1		Can Wash	---	---	---	---	---	No ventilation.
1		Office/Storage	---	---	---	---	---	No ventilation.
1		Dishwashing	---	---	---	---	---	No ventilation.
1		External Storage	---	---	---	---	---	No ventilation.
1		Cust. Office	-180	---	---	---	EF-4	Exhaust only.
1		Office	-332	---	---	---	EF-4	Exhaust only.
1		Women's Room	-179	---	---	---	EF-5B	Exhaust only.
1		Men's Room	-167	---	---	---	EF-5A	Exhaust only.
1		Storage Workroom	---	---	---	---	---	No ventilation.

Project Name:	Fairfield Public Schools - Timothy Dwight Elementary School
Project #:	*2020102*
Scope:	TAB Data
Date:	4/21/22

ZONE IDENTIFICATION

FLOOR	ROOM NO.	ROOM NAME	TEST CFM	ACTUAL OA AT MIN	ACTUAL OA %	BAS OA Dmpr Comnd	SPACE SERVED BY	NOTES
1		Workroom	0	0	22.6%	10%	RTU-1	No ventilation.
1		Storage Kiln	-109	---	---	---	Kiln EF	Room only has toggle switch Kiln-EF.
1		Media Center	3266	726	22.6%+21.8%	10%+10%	RTU-1+RTU-2	RTU-1 O.A.=401 | RTU-2 O.A.=325
1		Office	342	75	21.8%	10%	RTU-2	
1		Storage	NA	NA	NA	NA	---	No ventilation.
1		Boys Room	-360	---	---	---	EF-4	Exhaust only.
1		Girls Room	-323	---	---	---	EF-4	No ventilation.
1		Waiting Room	508	107	21%	10%	Office RTU	
1		Stage	477	105	22%	10%	Multiporp. H+V	
1		Storage Stage Right	NA	NA	NA	NA	---	No ventilation.
1		Storage Stage Left	NA	NA	NA	NA	---	No ventilation.
1		All purpose Room	5290	1164	22%	10%	Multiporp. H+V	
1		Custodian	-103	NA	NA	NA	EF-7	Exhaust only.
1		Boy's Room	-222	NA	NA	NA	EF-7	Exhaust only.
1		Girl's Room	-143	NA	NA	NA	EF-7	Exhaust only.
1		Gym	3983	1394	35%	10%	Gym H+V	
1		Gym Office	386	136	35.2%	10%	Gym Off. RTU	
1		Equipment Storage	NA	NA	NA	NA	---	No ventilation.
1		Reading	-213	---	---	---	EF-LX-18M	Exhaust only.
1		Resource	-274	---	---	---	EF-LX-18M	Exhaust only.
1		Faculty Room	-337	---	---	---	EF-2	Exhaust only.

Project Name:	Fairfield Public Schools - Timothy Dwight Elementary School
Project #:	*2020102*
Scope:	TAB Data
Date:	4/21/22

ZONE IDENTIFICATION

FLOOR	ROOM NO.	ROOM NAME	TEST CFM	ACTUAL OA AT MIN	ACTUAL OA %	BAS OA Dmpr Comnd	SPACE SERVED BY	NOTES
1		Faculty Room Office	-164	---	---	---	EF-2	Exhaust only.
1		Music	-175	---	---	---	EF-2	Exhaust only.
1		Music Office	-588	---	---	---	EF-2	Exhaust only.

District Name:	FAIRFIELD PUBLIC SCHOOLS
Building Name:	Timothy Dwight Elementary School
Address:	1600 Redding Road Fairfield, CT 06825

1st Floor

Access Controlled Doors are displayed in ORANGE

Side C

Side B

Side D

Legend

- Chair Lift
- MWT — Bathrooms: Mens, Womens, Unisex
- ST — Storage
- OHD — Overhead Door
- Elevator
- Emergency Phone
- Knox Box
- W — Water Shutoff
- S — Sprinkler Shutoff
- E — Electrical Shutoff
- GAS — Gas Shutoff
- Ramp
- GEN — Emergency Generator
- FACP — Fire Alarm Control Panel
- FDC — Fire Dept. Connection
- FX — Fire Extinguisher

BE SAFE TECHNOLOGIES INC

Side A

1st Floor Plan

1st Floor Plan


Kitchen MAU
Multipurpose
H&V (Inside)
Library RTU-1
Library RTU-2
Office RTU
GYM H&V
GYM Office RTU

APPENDIX 5 – RCx Unit and Room Take-Off Data

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.03*
Scope	**Room Take-Off Data**
Date	**March 24, 2022**
	Dwight Elementary School

RCM, REA, JRK

Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height (FT)	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1	1	Classroom	760	8.9	6764	25	FTR wall to wall, 1-wall exhaust grille		
1	2	Computer Room	891	8.9	7929.9	12	FTR wall to wall, 1-wall exhaust grille		
1	3	Classroom	762	8.9	6781.8	25	FTR wall to wall, 1-wall exhaust grille 036 Wall cooling		
1	4	Classroom	781	8.9	6950.9	25	FTR wall to wall, 1-wall exhaust grille		
1	5	Classroom	764	8.9	6799.6	25	FTR wall to wall, 1-wall exhaust grille 018 Wall cooling		
1	6	Classroom	764	8.9	6799.6	25	FTR wall to wall, 1-wall exhaust grille		
1	7	Classroom	769	8.9	6844.1	25	FTR wall to wall, 1-wall exhaust grille		
1	8	Classroom	765	8.9	6808.5	25	FTR wall to wall, 1-wall exhaust grille		
1	9	Classroom	740	8.9	6586	16	FTR wall to wall, 1-wall exhaust grille		
1	10	Classroom	927	8.9	8250.3	25	FTR wall to wall, 1-wall exhaust grille		
1	11	Classroom	784	8.9	6977.6	25	FTR wall to wall, 1-wall exhaust grille		
1	12	Classroom	852	8.9	7582.8	25	FTR wall to wall, 1-wall exhaust grille		
1	13	Classroom	846	8.9	7529.4	25	FTR wall to wall, 1-wall exhaust grille		
1	14	Classroom	840	8.9	7476	25	FTR- Sanyo DX		
1	15	Kindergarten	869	8.9	7734.1	25	FTR		
1	16	Classroom	837	8.9	7449.3	25	FTR		
1	17	Kindergarten	891	8.9	7929.9	25	FTR wall to wall, 1-wall exhaust grille 036 Wall cooling	DX Cooling Leaks condensate	
1	18	Classroom	829	8.9	7378.1	25	FTR wall to wall, 1-wall exhaust grille 036 Wall cooling		
1	19	Kindergarten	801	8.9	7128.9	25	FTR		
1	20	Classroom	805	8.9	7164.5	25	FTR wall to wall, 1-wall exhaust grille 018 Wall cooling		
1	21	Kindergarten	792	8.9	7048.8	25	FTR wall to wall, 036 Wall cooling		

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.03*
Scope	**Room Take-Off Data**
Date	**March 24, 2022**
	Dwight Elementary School

RCM, REA, JRK

Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height (FT)	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1		Main Office	225	8.9	2002.5	2	2-Supplies FTR		
1		Office	154	8.9	1370.6	1	1-Supplies FTR		
1		Office	156	8.9	1388.4	5	1-Supplies FTR		
1		Principal	202	8.9	1797.8	3	1-Supplies 1- Return FTR		
1		Storage	80	8.9	712	0	1-Supplies FTR		
1		Health Room	312	8.9	2776.8	3	2- Supplies 1-Return		
1		Toilet Health Room	16	8	128	1			
1		Storage Health Room	6	7.5	45	0			
1		Storage Main Office "Supplies"	70	7.9	553	0			
1		Waiting Room	268	8.9	2385.2	5	3-Supplies		
1		Stage	425	20.3	8627.5	25	1-Supplies		
1		Stage Storage RIght	80	9.2	736	0			
1		Stage Storage Left	80	9.2	736	0			
1		All Purpose Room	2895	24.8	71796	400	8 sidewall supplies, Return under stage? Kitchen transfer		
1		Boiler Room	1040	16	16640	0			
1		Transformer	133	8.9	1183.7	0			
1		Yard Storage	150	8.9	1335	0			
1		Kitchen	527	8.9	4690.3	3	MAU-1 Captive Aire	Unit Heater Ceiling	
1		Can Wash	70	8.9	623	1	FTR		
1		Office/Storage	97	8.9	863.3	1			
1		Dishwashing	552	8.9	4912.8	3			

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.03*
Scope	**Room Take-Off Data**
Date	**March 24, 2022**
	Dwight Elementary School

RCM, REA, JRK

Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height (FT)	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1		External Storage	323	11.4	3682.2	0	Electric Unit Heater		
1		Cust. Office	180	12	2160	1	FTR		
1		IT Office	120	9.2	1104	2			
1		Women	97	9.2	892.4	2			
1		Men	103	9.2	947.6	2			
1		Storage Workroom	8	8	64	0			
1		Work Room	263	10.5	2761.5	6			
1		Storage Kiln	201	8.3	1668.3	1	Ladder to roof FTR		
1		Media Center	1463	13	19019	25	9 Supplies 5 Returns		
1		Media Center Office	122	13	1586	2	1 Supply 1 Return transfer		
1		Storage	74	7.4	547.6	0			
1		Boy's Room	208	9.2	1913.6	4			
1		Girl's Room	200	9.2	1840	4			
1		Custodian	35	9.1	318.5	1			
1		Boy's Room	87	8.6	748.2	2			
1		Girl's Room	60	9.2	552	2			
1		Gym	2600	17.5	45500	30			
1		Gym Office	133	11	1463	1	1 SA? 1 EA? FTR		
1		Equipment Storage	100	11	1100	0			
1		Reading	133	8.4	1117.2	4	1 EA FTR		
		Speech/Language	92	8.3	763.6	3	1 EA		

Project Name:	**Fairfield Public Schools RCx**
Project Number:	*2020102.00.03*
Scope	**Room Take-Off Data**
Date	**March 24, 2022**
	Dwight Elementary School

RCM, REA, JRK

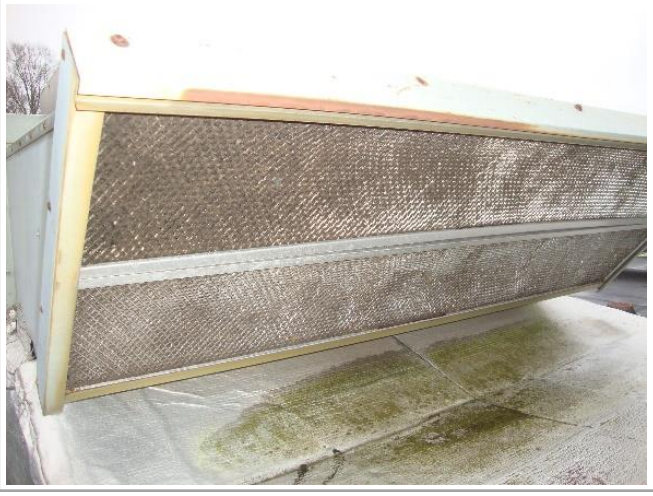
Zone Identification

Floor	Room#	Room Name	Area (SF)	Ceiling Height (FT)	Volume	People	Notes	Identified Defficiencies	Pictures Y /N
1		Resource	212	8.3	1759.6	5	1 EA FTR		
1		Faculty Room	502	8.8	4417.6	12	1 EA FTR, 1x Window AC unit		
1		Faculty Room Office (Psychologist)	92	9.1	837.2	4	1 EA		
1		OT/PT (Formerly Music)	554	9.1	5041.4	5	1 EA FTR		
1		Social Worker/Math Resource	92	9.1	837.2	4	1 EA		

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Gym H&V Unit RTU-3**	**Addition comments descriptions**
Location	High Roof	
Serving	Gymnasium	
Config/Style	Gas/Dx Package	
Mfr.	Trane	
Model #	GRAA35GDKEON28P305UODW	
Serial #	G00F16644	
Age (years)	OLD	
System CFM	4500-6500@.2	
Max OA CFM		
V/Hz/Ph	208V	
SF Qty/HP	3.0	
SF VFD Data	N/A	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	Unit access doors real bad shape, not accessible	
Filter Status	unknown	
Controls Type	unknown	
Controls Mfr.	unknown	
Economizer	unknown	
CO_2 DCV	unknown	
Damper Styles	unknown	
Damper Status	unknown	
Heating Type	Gas Burner	Functional
Heating Coil Condition	unknown	
Cooling Type	N/A	
Cooling Coil Condition	N/A	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	N/A	
Notes:	Unit very old, appears to operate, should be scheduled for replacement	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit Tag Info	
Unit from afar	
Filters	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Gym Office RTU**	**Addition comments descriptions**
Location	Roof	Unit was Off
Serving	Gym Office	
Config/Style	Gas/Dx Package	
Mfr.	Trane	
Model #	YCC018F1LOBJ	
Serial #	4293LUC2H	
Age (years)	7/2004	
System CFM		
Max OA CFM		
V/Hz/Ph	208/230V 60 1-PHASE	
SF Qty/HP	Unknown	
SF VFD Data	N/A	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(1) 22″X16″ (1) 22″X8″	
Filter Status	Change required (9-15-21)	
Controls Type	Factory	
Controls Mfr.		
Economizer	Yes	
CO_2 DCV		
Damper Styles	Opposed	
Damper Status	OK, operational unknown	
Heating Type	Gas	
Heating Coil Condition	Burner	
Cooling Type	DX	
Cooling Coil Condition	OK	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	OK	
Notes:	Unit was off, functionality unknown. Compressor was wrapped, noise concerns?	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit Tag Info	
Unit from afar	
Control Dampers	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Data**	**Exhaust**
Location	Kitchen Roof	
Serving	Kitchen	
Config/Style	Packaged MAU-Exhaust	Upblast
Mfr.	Captive Aire	Captive Aire
Model #	NRTP A-NHMUA1.12-GLO	NCA 14FA
Job Number #	267091	
Age (years)	7/30/2004	
System CFM		
Max OA CFM		
V/Hz/Ph	230/1 Phase	230/1 Phase
SF Qty/HP	(1) .33	
SF VFD Data	N/A	
EF Qty/HP	(1) .75	
EF VFD Data	N/A	
Filter Data (Size Quantity)	Grease Filter, unit not shut down, operational	
Filter Status	Not inspected	
Controls Type	Factory	
Controls Mfr.	-	
Economizer	100% O.A.	
CO_2 DCV	N/A	
Damper Styles	Not inspected	
Damper Status	Not inspected	
Heating Type	Gas	
Heating Coil Condition	Burner	
Cooling Type	N/A	
Cooling Coil Condition	N/A	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	N/A	
Notes:		

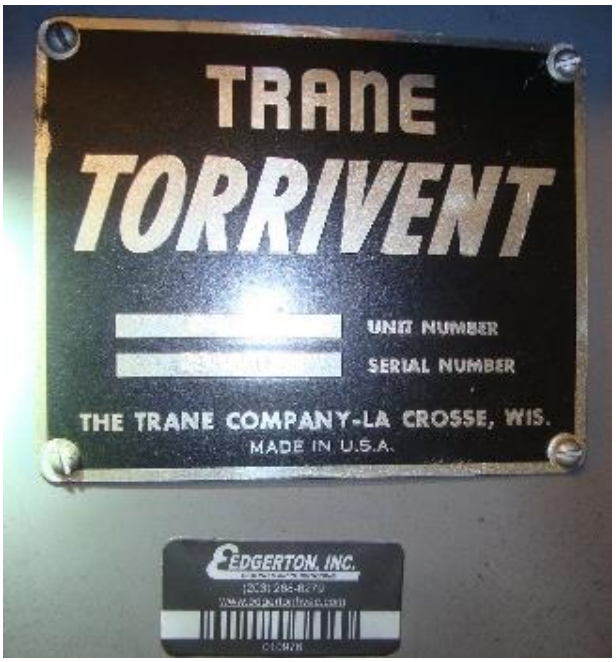
PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit from afar	
Filters	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Multipurpose H&V Unit**	**Addition comments descriptions**
Location	Mezzanine	
Serving	Multipurpose Room	
Config/Style	Heating and Ventilation	
Mfr.	Trane	
Model #	Torrivent T-17	
Serial #	285580	
Age (years)	Original (Old)	
System CFM		
Max OA CFM		
V/Hz/Ph	208-230V	
SF Qty/HP	(1) 1.5	
SF VFD Data	N/A	
RF Qty/HP	Unknown	Trane Utility Fan, Mod. 15G2 BI-4400
RF VFD Data	N/A	Ser. 285398 Belt-4L310
Filter Data (Size Quantity)	Yes, accessibility poor, sizes and quantities unknown, Dirty	Merv 13 9/15/21
Filter Status	Change required.	
Controls Type	ALC	
Controls Mfr.	ALC	
Economizer	Yes, see note	
CO_2 DCV	-	
Damper Styles	Mechanical, see note	
Damper Status	See note	
Heating Type	Hot Water Coil	
Heating Coil Condition	Dirty	
Cooling Type	N/A	
Cooling Coil Condition	N/A	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	N/A	
Notes:	Damper linkage is missing, damper position unknown, needs to be corrected ASAP	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit Tag Info	
Control Dampers: Linkage is not connected. Linkage laying on top of ductwork.	

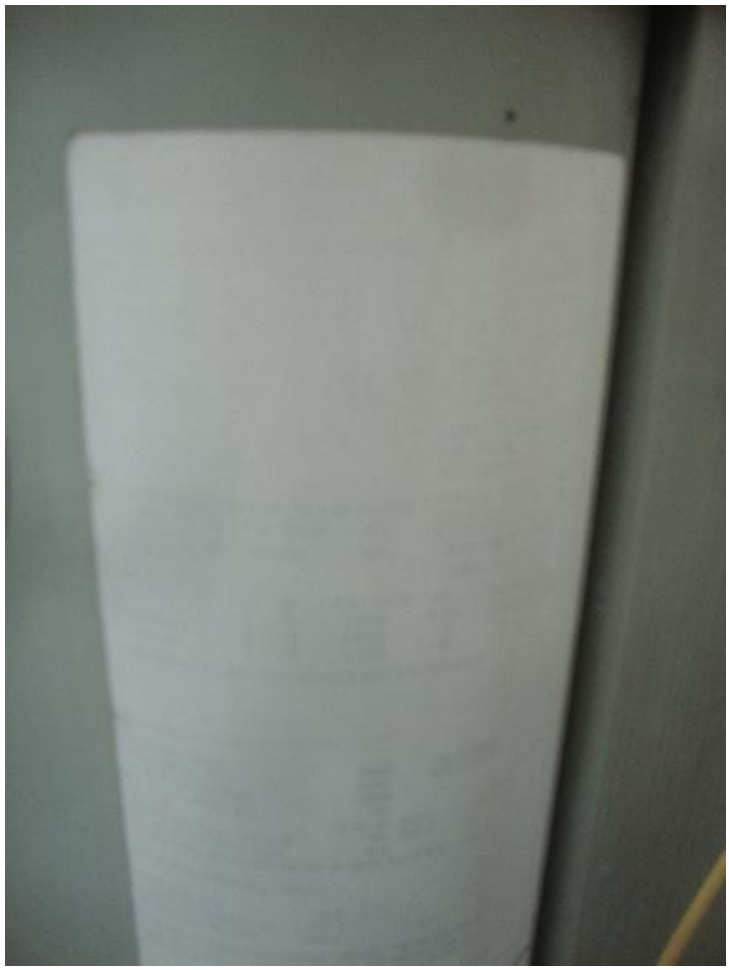
PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Filters: Photo shows heating coil and leaving airside of filters.	
Electrical / Misc.	
Trane Utility Fan (Exhaust)	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Office RTU**	**Addition comments descriptions**
Location	Roof	
Serving	Main Offices	
Config/Style	Gas/Dx Package	
Mfr.	Trane	
Model #	YSC072A3EMA06Z9	
Serial #	432101954L	
Age (years)	8/2004	
System CFM		
Max OA CFM		
V/Hz/Ph	208/230v 60HTz. 3-Phase	
SF Qty/HP	(1) 1.0 Belt drive	
SF VFD Data	N/A	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(4) 16”x25” x2”	
Filter Status	Change due	9/15/21
Controls Type	Package, functionality unknown	Wires were found unattached to the insulated electrical stake ons. Controllers were not mounted properly
Controls Mfr.	Factory	
Economizer	Yes	
CO_2 DCV		
Damper Styles	Factory	
Damper Status	ok	
Heating Type	Gas	
Heating Coil Condition	Burner	
Cooling Type	DX	
Cooling Coil Condition	Dirty	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	Plastic, OK	
Notes:	Cooling not verified, Roof gas line supports poor.	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit Tag Info	 

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit from afar	
Controls	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Library RTU-1**	**Addition comments descriptions**
Location	Roof	
Serving	Library	
Config/Style	Gas/Dx Package	
Mfr.	Trane	
Model #	YSC060G3RHB25D	
Serial #	211312367L	
Age (years)	4-2021	
System CFM		
Max OA CFM		
V/Hz/Ph	208-230V 60HTZ. 3 Phase	
SF Qty/HP	(1) 1.0	
SF VFD Data	ECM	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	(2) 16"x20"x2" (2) 20"x20"x2"	
Filter Status	Change due	
Controls Type	Factory	
Controls Mfr.	Automated Logic	
Economizer	Yes	
CO_2 DCV		
Damper Styles	Factory	
Damper Status	OK	
Heating Type	Gas	
Heating Coil Condition	Burner	
Cooling Type	DX	
Cooling Coil Condition	Good	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	OK	
Notes:	Averaging bulb attachment is in question, does it allow proper damper operation	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit Tag Info	
Unit from afar	
Control Dampers	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Unit Tag	**Library RTU-2**	**Addition comments descriptions**
Location	Roof	
Serving	Library	
Config/Style	Gas/Dx Packaged	
Mfr.	Trane	
Model #	YSC060G3RHB25D	
Serial #	211312335L	
Age (years)	4/2021	
System CFM		
Max OA CFM		
V/Hz/Ph	208-230V 60HZ. 3 Phase	
SF Qty/HP	1.0	
SF VFD Data	ECM	
RF Qty/HP	N/A	
RF VFD Data	N/A	
Filter Data (Size Quantity)	16″x20″x2″ (2) 20″x20″x2″	
Filter Status	Change due	
Controls Type	Factory	
Controls Mfr.	Automated Logic	
Economizer	Yes	
CO_2 DCV		
Damper Styles	Factory	
Damper Status	OK	
Heating Type	Gas	
Heating Coil Condition	Burner	
Cooling Type	DX	
Cooling Coil Condition	Good	
CU Mfr.	N/A	
CU Model	N/A	
CU Serial	N/A	
Drain Pan Status	OK	
Notes:		

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Description	**Photos**
Unit Tag Info	
Unit from afar	

PROJECT: 2020102.00.03 FAIRFIELD PUBLIC SCHOOLS – TIMOTHY DWIGHT ELEMENTARY SCHOOL
EQUIPMENT DATA SHEET

Control Dampers	
Filters