



Ventilation Systems Review and COVID-19 Response Actions

Keith Middle School

September 25, 2020

A handwritten signature in blue ink, appearing to read "Leo H. Tramm".

Leo H. Tramm, P.E.
Project Director

Prepared For:

New Bedford Public Schools

Prepared By:

TRC
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A handwritten signature in blue ink, appearing to read "Glenn N. Potter".

Glenn N. Potter
Office Practice Leader - BSI

TABLE OF CONTENTS

1.	Background and Scope	1
2.	Current COVID-19 Ventilation Guidance for Schools	1
3.	Review of Keith Middle School Building	3
4.	Overall Observations and Recommendations	4

Appendix A Assessment Report and Mechanical Equipment Schedules

1. Background and Scope

During the week of September 14, 2020, at the request of New Bedford Public Schools in response to COVID-19 concerns, TRC Environmental Corporation (TRC) conducted a review and inspection of the ventilation systems currently serving the Keith Middle School building. This building was constructed in 2006, with a remodel of the associated mechanical systems in 2012, which reportedly consisted of updating the energy management system. The building has a total footprint of 231,510 square feet on all floors. Maximum occupancy of the building is 1,720. New Bedford School District requested TRC's assistance in conducting a review and inspection of the ventilation systems serving each of these buildings with the objective of confirming that the installed systems and maintenance of the systems is consistent with the latest requirements of the CDC and other health and safety protocols relative to the COVID-19 virus, or to recommend system and maintenance improvements which may be reasonably feasible. The review considered the age and condition of each system, distribution and air volumes to critical areas of the buildings such as classrooms, gymnasiums, offices, bathrooms, and food service areas, heating and cooling capacity, outside air capacity, and current system filtration.

Following the onsite reviews and inspections, TRC also evaluated the feasibility of increasing facility ventilation rates (e.g., open windows through fall, increasing outside air rates, etc.) and an assessment of maintenance practices.

TRC reviewed options for modifying the existing building mechanicals, adding new, or implementing portable systems for specific area control, addressing the following:

- Controlling airflow patterns – routing airflow to higher occupancy areas
- Zoning – pressure differential and directional control to limit the spread of contaminants
- Outside Air – increasing outside air rates, or providing 100% outside air to potential high contaminant zones
- Filtration – improving an existing air handling system, or deploying portable single space filtration units
- Ultraviolet Germicidal Irradiation (UVGI) or Bipolar Ionization – modifying the existing air handling systems to include ultraviolet lamps in the return or bipolar ionization technology, or deploying localized, portable disinfection systems
- Personalized Ventilation – providing local exhaust and supply to high occupancy areas

In many cases, these options are impractical, because of technical limitations and TRC considered these limitations in our presentation of options.

2. Current COVID-19 Ventilation Guidance for Schools

As airborne transmission of infectious particles at a long distance from the source, such as via the ventilation systems within a building, cannot be ruled out, guidance is available from federal, state, and local health agencies related to heating, ventilation, and air conditioning (HVAC) systems and actions are suggested, to potentially limit the spread of the virus. The following

presents a review of schools reopening guidelines that were considered in the evaluation of the New Bedford Public Schools buildings:

- a. Centers for Disease Control (CDC)¹
 - i. Increase ventilation rates.
 - ii. Ensure ventilation systems operate properly and provide acceptable indoor air quality for the current occupancy level for each space.
 - iii. Increase outdoor air ventilation, using caution in highly polluted areas. With a lower occupancy level in the building, this increases the effective dilution ventilation per person.
 - iv. Disable demand-controlled ventilation (DCV).
 - v. Further open minimum outdoor air dampers (as high as 100%) to reduce or eliminate recirculation. In mild weather, this will not affect thermal comfort or humidity. However, this may be difficult to do in cold or hot weather.
 - vi. Improve central air filtration to the MERV-13 or the highest compatible with the filter rack, and seal edges of the filter to limit bypass.
 - vii. Check filters to ensure they are within service life and appropriately installed.
 - viii. Keep systems running longer hours, 24/7 if possible, to enhance air exchanges in the building space.

- b. World Health Organization (WHO)²
 - i. Clean, natural ventilation should be used inside buildings where possible, without re-circulating the air. If air re-circulation is necessary, filters and duct systems should be cleaned regularly and routinely changed according to the manufacturer's instructions. Heating and cooling systems should be well maintained.

- c. Environmental Protection Agency (EPA)³
 - i. Most schools, offices, and commercial buildings have HVAC systems with filters on them. Typically, these systems are maintained by building or HVAC professionals. Professionals who operate school, office, and commercial buildings should consult guidance by American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and other professional and government organizations for information on ventilation and air filtration to help reduce risks from SARS CoV-2, the virus that causes COVID-19. In general, increasing ventilation and filtration is usually appropriate; however, due to the complexity and diversity of building types, sizes, construction styles, HVAC system components, and other building features, a professional should interpret ASHRAE guidelines for their specific building and circumstances.

Increasing ventilation with all or mostly outside air may not always be possible or practical. In such cases, the effective rate of ventilation per person can also be increased by limiting the number of people present in the building in general, or in specific rooms. Administrative practices that encourage remote participation and reduce room occupancy can help reduce risks from the virus that causes COVID-19. See ASHRAE for more

information on ventilation rates for different types of buildings and other important engineering controls to manage ventilation, moisture, and temperature in a building.

- d. State Specific Reopening Guidelines⁴
 - i. Consider ways to increase facility ventilation (e.g., open windows through fall, perform an HVAC inspection). Ensure that proper maintenance protocols are followed in terms of changing filters, etc.
- e. US Department of Labor, Occupational Safety and Health Administration⁵

Engineering Controls - Engineering controls involve isolating employees from work related hazards. In workplaces where they are appropriate, these types of controls reduce exposure to hazards without relying on worker behavior and can be the most cost-effective solution to implement. Engineering controls for SARS-CoV-2 include:

- i. Installing high-efficiency air filters.
 - ii. Increasing ventilation rates in the work environment.
 - iii. Installing physical barriers, such as clear plastic sneeze guards.
 - iv. Installing a drive-through window for customer service.
 - v. Specialized negative pressure ventilation in some settings, such as for aerosol generating procedures in healthcare environments (e.g., airborne infection isolation rooms in healthcare settings and specialized autopsy suites in mortuary settings).
- f. American Society of Heating, Refrigerating and Air-Conditioning (ASHRAE)⁷ building operation guidelines, and system operating enhancements for infection control recommendations, including:
 - i. Increase outdoor air ventilation
 - ii. Disable demand-controlled and energy recovery ventilation
 - iii. Open minimum outdoor air dampers, eliminating recirculation within the limits of thermal comfort and humidity
 - iv. Improve air filtration to MERV-13 or the highest compatible with the filter rack, and seal edges of the filter to limit bypass
 - v. Operate air handling systems in occupied mode, 24/7 if possible
 - vi. Consider portable room air cleaners with HEPA filters
 - vii. Consider ultraviolet germicidal irradiation (UVGI) particularly in high-risk spaces

3. Review of Keith Middle School

Table 1 presents a summary of the ventilation systems in place at the Keith Middle School, along with an evaluation of the key ventilation parameters, such as occupancy density, air delivery rates per occupant, air delivery rates per square foot, overall air changes, and heating and cooling capacity, associated with the building. Note that the values in Table 1 are based on the information supplied by New Bedford Public Schools District personnel, gathered by TRC during the site visit to each school building, or calculated, and represent an average for the total building assuming the maximum occupancy and design minimum outside air rates.

The key values in Table 1 are Outside Air per Occupant and Outside Air per Square Foot, which if we consider Table 6.2.2.1 in ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality, provide targets of greater than 10 cubic feet per minute (CFM) of Outside Air per Occupant, and greater than 0.12 CFM of Outside Air per Square Foot, typical for general classrooms. The Keith Middle School building exceeds both the per Occupant target and the per Square Foot targets.

Appendices A contains the information supplied by the New Bedford Public Schools District and gathered by TRC during the site visit to Keith Middle School. The information obtained includes mechanical equipment schedules and a record of the inspection of available and accessible equipment.

The review found the ventilation systems at the Keith Middle School building to be consistent with what is expected for mechanical systems typically installed in the year that the last remodel of the mechanical systems took place. The mechanical systems were observed to be well maintained, with the supply side equipment [e.g., return air units (RTUs), air handling units (AHUs), unit ventilators or heaters (UVs or HVs), and fan coil units (FCs)] functioning well. As the unit ventilators (UVs) provide the greatest source of outside air in the building, attention to maintenance and operation of these units to maximize outside air rates will be a critical objective. Exhaust side equipment [e.g., exhaust fans (EFs)], were also found to be well maintained and in good working order.

4. Overall Observations and Recommendations

Considering the recommendations of ASHRAE summarized in Section 2.0, the following overall observations and recommendations were made for the New Bedford Public Schools buildings:

1. **Increase outdoor air ventilation** – change each piece of air handling equipment where the outside air damper could be adjusted to allow an increase in the outside air exchange rate to the building. The heating capacity of the systems in the building appear to allow the units to have high outside air rates well into the winter heating season.
2. **Disable demand-controlled and energy recovery ventilation** – defeat all demand-controlled and energy recovery ventilation, allowing for extended operation of the ventilation systems and increased outside air rates. Wherever the supply side air handling units are thermostatically controlled, these systems should be allowed to run in the occupied mode, even in a fan only mode to maximize outdoor air exchange rates.
3. **Open minimum outdoor air dampers, eliminating recirculation within the limits of thermal comfort and humidity** – as discussed in Items 1 and 2 above, adjust all outside air dampers to increase the outside air exchange rate to the school building. When temperature and humidity control become a concern, the outside air dampers can be readjusted.
4. **Improve air filtration to MERV-13 or the highest compatible with the filter rack, and seal edges of the filter to limit bypass** – wherever possible, filters in the supply side, air handling equipment should be replaced with MERV-13 filters, or higher, as soon as

possible. A maintenance schedule should be established to replace these filters regularly, typically quarterly, or more frequently if found to be necessary based upon increases in differential pressure through the MERV-13 filters.

5. **Operate air handling systems in occupied mode, 24/7 if possible** – all ventilation equipment, supply and exhaust side, should be run continuously, even in a fan only mode, to maximize outdoor air exchange rates.
6. **Consider portable room air cleaners with HEPA filters** – the outside air exchange rates at the Keith Middle School building were found to be such that the use of portable room air cleaners would not be necessary. If New Bedford Public Schools would elect to utilize portable room cleaners at Keith Middle School, the rooms where these might provide the most benefit include areas with low outside air turnover or higher risk areas such as medical services office and administration offices, or in rooms of the buildings to which forced mechanical ventilation is not provided.
7. **Consider ultraviolet germicidal irradiation (UVGI) particularly in high-risk spaces** – retrofit of the existing supply side, air handling units with UVGI was found to be only practical for biological protection of the cooling coil, where there are cooling coils installed. There is no current evidence that the air handling systems in schools would benefit from installation of UVGI on the supply side, either within the unit itself or in the supply distribution ductwork, due to insufficient residence time and construction of the units being susceptible to damage by the ultraviolet light. Therefore, UVGI cannot be recommended at this time for the systems at Keith Middle School. There is also no convincing, scientific evidence that other emerging technologies, such as bipolar ionization, would provide effective biological reduction in commercial air handling systems.

Sources:

1. <https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html>
<https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/schools.html>
2. <https://www.who.int/news-room/q-a-detail/q-a-schools-and-covid-19>
3. <https://www.epa.gov/coronavirus/ventilation-and-coronavirus-covid-19>
4. <https://www.mass.gov/doc/dese-fall-reopening-guidance/download>
5. <https://www.osha.gov/Publications/OSHA3990.pdf>
6. <https://www.ashrae.org/technical-resources/reopening-of-schools-and-universities>

**Table 1
Summary of HVAC System Evaluation
Keith Middle School, New Bedford**

Parameter	Keith Middle School
Location	225 Hathaway Blvd
Building Type	Multistory
Year Built	2006
Year Remodeled	2012
Age of Mechanicals, Years	14
Significant Air Handling Equipment	(2) AHUs (8) HVs (94) UVs (6) RTUs (21) FCs (54) EFs
Total Square Feet	231510
Average Ceiling Height, Feet	10
Total CF:	2315100
Maximum Occupancy	1720
Occupant Density, # per 1000 Square Foot	7
Outside Air CFM per Occupant	53.9
Total Air CFM per Occupant	120.7
Outside Air CFM per Square Foot	0.40
Total Air CFM per Square Foot	0.90
Air Changes per Hour, Outside Air	2.4
Air Changes per Hour, Total Air	5.4
Air Changes per Hour, Exhaust	2.5
Average Delta T, Heating	85.2
Average Delta T, Cooling	6.7

Appendix A

Mechanical Schedules and Photos

BSI - COVID-19 HVAC Assessment

Generic HVAC Assessment app for schools.



New Bedford Public Schools , Keith Middle School

9/17/2020, 2:32:51 PM EDT



CREATED

9/15/2020, 3:01:48 PM EDT

by Glenn Potter

UPDATED

9/17/2020, 2:32:51 PM EDT

by Glenn Potter

LOCATION

41.644456, -70.948846

PROJECT INFORMATION

Project Name	New Bedford Public Schools
Property Name	Keith Middle School
Project Address	225 Hathaway Blvd New Bedford MA
TRC Project Number	411451
TRC Project Manager	G. Potter
Inspection Start Date	September 16, 2020
Inspector(s)	Cameron Cooke
Client	New Bedford Public Schools
Client Contact Name	Andrew B. O'Leary
Client Email	aboleary@newbedfordschools.org
Client Address	455 County Street New Bedford MA 02740
Background	

FACILITY INFORMATION SECTION

Building Layout Plans Provided	Yes
Building Mechanical Plans Provided	Yes
Mechanical Equipment Schedule Provided	Yes
Room Air Exchange Rate Calculations / Schedule Provided	No
Original Year of Construction	2006
Year of Latest Modification for Mechanicals	2012
Total Building Square Footage	231510
Average Ceiling Height (FT)	10

Overview Photo



Google Earth Image



Facility North Elevation Image



Facility South Elevation Image



Facility East Elevation Image



Facility West Elevation Image





Equipment - 1. Aeon, Roof Top Unit

Equipment Type Note

Roof Top Unit

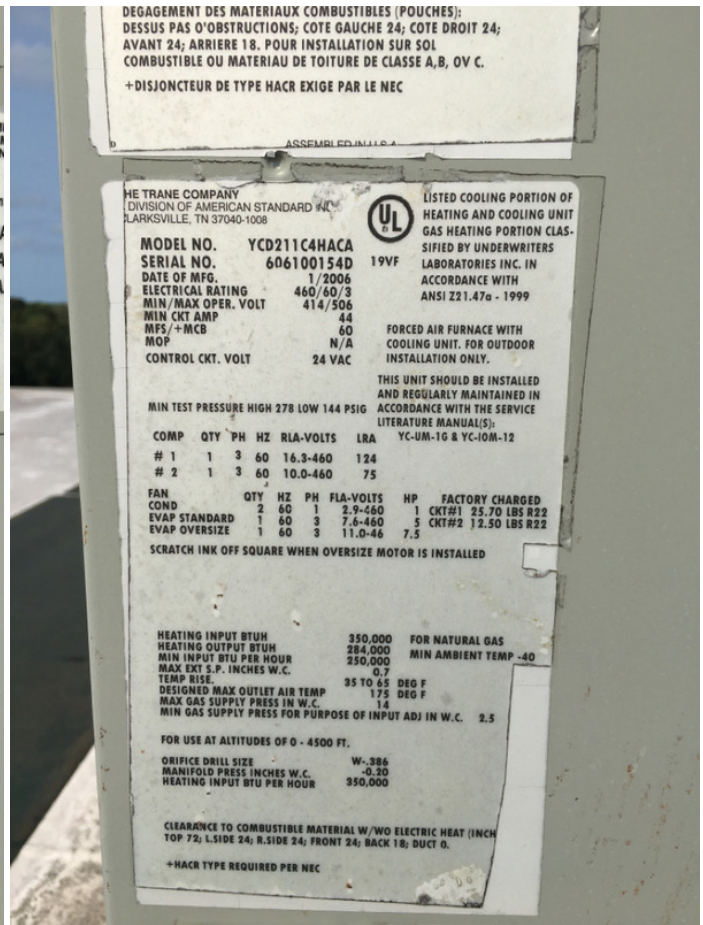
Equipment Photo







Nameplate Photo



Filter Rack Photo



Make	Aaon
Model	64464
Mounting Type	Roof
Manufacture Date	September 16, 2006
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	52

Filter Width (Inches)	40
Filter Depth (Inches)	2
Filter MERV Rating	8
Supply Width (Inches)	36
Supply Height (Inches)	24
Return Width (Inches)	36
Return Height (Inches)	24
Outside Air Width (Inches)	41
Outside Air Height (Inches)	21
Rooms / Areas Served	3- kitchen 6- girls locker room 7- boys locker room 8-boiler room
Condition Assessment	Good
Window Notes	No windows
Window Photos	
Note	HV 3,6,7,8

Equipment - 2. Aeon, Roof Top Unit

Equipment Type Note	Roof Top Unit
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Equipment Photo





Nameplate Photo

Filter Rack Photo



Make	Aaon
Model	64472
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	60
Filter Width (Inches)	25

Filter Depth (Inches)	2
Filter MERV Rating	8
Supply Width (Inches)	38
Supply Height (Inches)	66
Return Width (Inches)	12
Return Height (Inches)	6
Outside Air Width (Inches)	55
Outside Air Height (Inches)	21
Rooms / Areas Served	Gymnasium
Condition Assessment	Good
Window Notes	No windows open

Window Photos



Note | HV 5 and HV 4

Equipment - 3. Aeon, Roof Top Unit

Equipment Type Note | Roof Top Unit

Equipment Photo





Nameplate Photo

Filter Rack Photo



Make	Aaon
Model	64463
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	60
Filter Width (Inches)	50
Filter Depth (Inches)	2

Filter MERV Rating	8
Supply Width (Inches)	24
Supply Height (Inches)	24
Return Width (Inches)	36
Return Height (Inches)	36
Outside Air Width (Inches)	55
Outside Air Height (Inches)	30
Rooms / Areas Served	Cafeteria
Condition Assessment	Good
Window Notes	8 windows can open

Window Photos



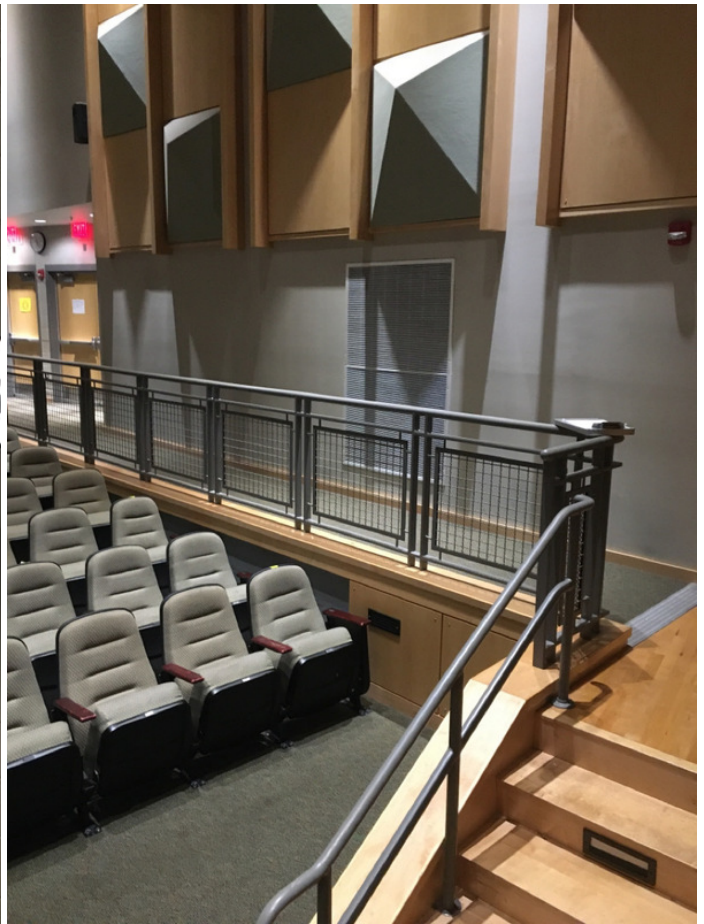
Note | HV 1 and 2

Equipment - 4. Trane, Roof Top Unit

Equipment Type Note | Roof Top Unit

Equipment Photo





Nameplate Photo

Filter Rack Photo



Make	Trane
Model	YHC102A4RHA2G1BOA2B
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	52
Filter Width (Inches)	40
Filter Depth (Inches)	2
Filter MERV Rating	8

Supply Width (Inches)	46
Supply Height (Inches)	68
Return Width (Inches)	24
Return Height (Inches)	24
Outside Air Width (Inches)	41
Outside Air Height (Inches)	18
Rooms / Areas Served	6- two music suites. 4- auditorium
Condition Assessment	Good
Window Notes	No windows open

Window Photos



Note | RTU 6 and 4

Equipment - 5. Trane, Roof Top Unit

Equipment Type Note | Roof Top Unit

Equipment Photo





Nameplate Photo

THE TRANE COMPANY
A DIVISION OF AMERICAN STANDARD INC.
CLARKSVILLE, TN 37040-1008

NO. DU MODELE YCD151C4HABB
NO. DU SERIE 620101108D
DATE OF MFG. 5/2006
TENSION NOMINALE 460/60/3
TENS. MIN/MAX DE FONCT. 414/506
AMP MIN DU CIRC. 31
CNMF/+CNMD 40
CNMP5 N/A
TENSION DU CIRC. DE COMM. 24 VAC

COMBINATION COOLING AND HEATING UNIT
UNITE DE REFRIGERISSEMENT CHAUFFAGE COMBINES

VERIFIED Energy Performance Rendement Energetique

CIRCULATION FORCEE AVEC UNITE DE REFRIGERISSEMENT POUR INSTALLATION A L'EXTERIEUR SEULEMENT

PRESSION MIN D'ESSAI: HAUTE 278 BASSE 144

COMP	QTE	PH	HZ	A.C.P. - VOLTS	CH A.R.B. - CHARGES EN USINE
# 1	1	3	60	10.0-460	75 CIRC# 1 15.0
# 2	1	3	60	10.0-460	75 CIRC# 2 13.8

VENTIL QTE HZ PH A.P.C. - VOLTS CH HP LBS. DE REFRIG. - COND 2 60 1 1.6-460 .5 22 CH
EVAP STANDARD 1 60 3 4.8-460 3
EVAP SURDIM 1 60 3 7.6-460 5

GRATTER L'ENCRE A L'INTERIEUR DU CARDE SI LE MOTEUR SURDIMEST INSTALLE

CONSUMATION CALORIFIQUE BTU/H	250,000	POUR NATURAL
CHALEUR DE SORTIE BTU/H	203,000	GAZ TEMP.
MIN CONSUMATION CALORIQUE	175,000	AMBIENT MIN 40
P.S. EXT. MAX-PO. C.E.	0.7	
ELEV. DE TEMP.	25 TO 55	DEG F
TEMP. MAX DE SORTIE D'AIRE	175	DEG F
PRESS. MAX DE SERV. DU GAZ	14	
PRESS. MIN D'ALIM	2.5	

ALTITUDES 0 - 4500 FT.
CALIBRE FORBT DES ORIFICES P-.323
PRESS AU COLLECTEUR 0.30
DEBIT MAX CAL. BTU/H 250,000

CETTE UNITE DOIT ETRE INSTALLEE ET ENTRETENUE REGULIEREMENT SURVANT LES RECOMMANDATIONS DU GUIDE D'ENTRETIEN
DEGAGEMENT DES MATERIAUX COMBUSTIBLES (POUCHES):
DESSUS PAS D'OBSTRUCTIONS; COTE GAUCHE 24; COTE DROIT 24;
AVANT 24; ARRIERE 18. POUR INSTALLATION SUR SOL COMBUSTIBLE OU MATERIAU DE TOITURE DE CLASSE A, B, OV, C.
+DISJONCTEUR DE TYPE HACR EXIGE PAR LE NEC

ASSEMBLED IN U.S.A. X38620085-01

THE TRANE COMPANY
A DIVISION OF AMERICAN STANDARD INC.
CLARKSVILLE, TN 37040-1008

MODEL NO. YCD151C4HABB
SERIAL NO. 620101108D
DATE OF MFG. 5/2006
ELECTRICAL RATING 460/60/3
MIN/MAX OPER. VOLT 414/506
MIN CKT AMP 31
REF5/+M5B 40
MOP N/A
CONTROL CKT. VOLT 24 VAC

LISTED COOLING PORTION OF HEATING AND COOLING UNIT
GAS HEATING PORTION CLASSIFIED BY UNDERWRITERS LABORATORIES INC. IN ACCORDANCE WITH ANSI Z21.47a - 1999

FORCED AIR FURNACE WITH COOLING UNIT. FOR OUTDOOR INSTALLATION ONLY.

THIS UNIT SHOULD BE INSTALLED AND REGULARLY MAINTAINED IN ACCORDANCE WITH THE SERVICE LITERATURE MANUAL(S).

MIN TEST PRESSURE HIGH 278 LOW 144 PSIG

COMP	QTY	PH	HZ	RLA-VOLTS	LRA	YC-UM-1G R-YC-10M-12
# 1	1	3	60	10.0-460	75	
# 2	1	3	60	10.0-460	75	

FAN	QTY	HZ	PH	FLA-VOLTS	HP	FACTORY CHARGED
COND	2	60	1	1.6-460	.5	CKT#1 15.00 LBS R22
EVAP STANDARD	1	60	3	4.8-460	3	CKT#2 13.80 LBS R22
EVAP OVERSIZE	1	60	3	7.6-460	5	

SCRATCH INK OFF SQUARE WHEN OVERSIZE MOTOR IS INSTALLED

HEATING INPUT BTUH	250,000	FOR NATURAL GAS
HEATING OUTPUT BTUH	203,000	MIN AMBIENT TEMP -40
MIN INPUT BTU PER HOUR	175,000	
MAX EXT S.P. INCHES W.C.	0.7	
TEMP. RISE	25 TO 55	DEG F
DESIGNED MAX OUTLET AIR TEMP	175	DEG F
MAX GAS SUPPLY PRESS IN W.C.	14	
MIN GAS SUPPLY PRESS FOR PURPOSE OF INPUT ADJ IN W.C.	2.5	

FOR USE AT ALTITUDES OF 0 - 4500 FT.
ORIFICE DRILL SIZE P-.323
MANIFOLD PRESS INCHES W.C. 0.30
HEATING INPUT BTU PER HOUR 250,000

CLEARANCE TO COMBUSTIBLE MATERIAL W/WO ELECTRIC HEAT (INCHES):
TOP 72; L.SIDE 24; R.SIDE 24; FRONT 24; BACK 18; DUCT 0.

+HACR TYPE REQUIRED PER NEC

ASSEMBLED IN U.S.A. X38620085-01

SURVANT LES RECOMMANDATIONS ET ENTRETENU REGULIEREMENT
DEGAGEMENT DES MATERIAUX COMBUSTIBLES (POUCHES):
DESSUS PAS D'OBSTRUCTIONS; COTE GAUCHE 24; COTE DROIT 24;
AVANT 24; ARRIERE 18. POUR INSTALLATION SUR SOL COMBUSTIBLE OU MATERIAU DE TOITURE DE CLASSE A, B, OV, C.
+DISJONCTEUR DE TYPE HACR EXIGE PAR LE NEC

ASSEMBLED IN U.S.A. X38620085-01

Filter Rack Photo



Make	Trane
Model	YCD151C4HABB
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	60
Filter Width (Inches)	40
Filter Depth (Inches)	2
Filter MERV Rating	8
Supply Width (Inches)	32
Supply Height (Inches)	45
Return Width (Inches)	16

Return Height (Inches)	8
Outside Air Width (Inches)	45
Outside Air Height (Inches)	18
Rooms / Areas Served	5- community room 1- 1,2,3rd floor offices 3-library
Condition Assessment	Good
Window Notes	7 windows open-library

Window Photos



Note | RTU 5, 1, 3

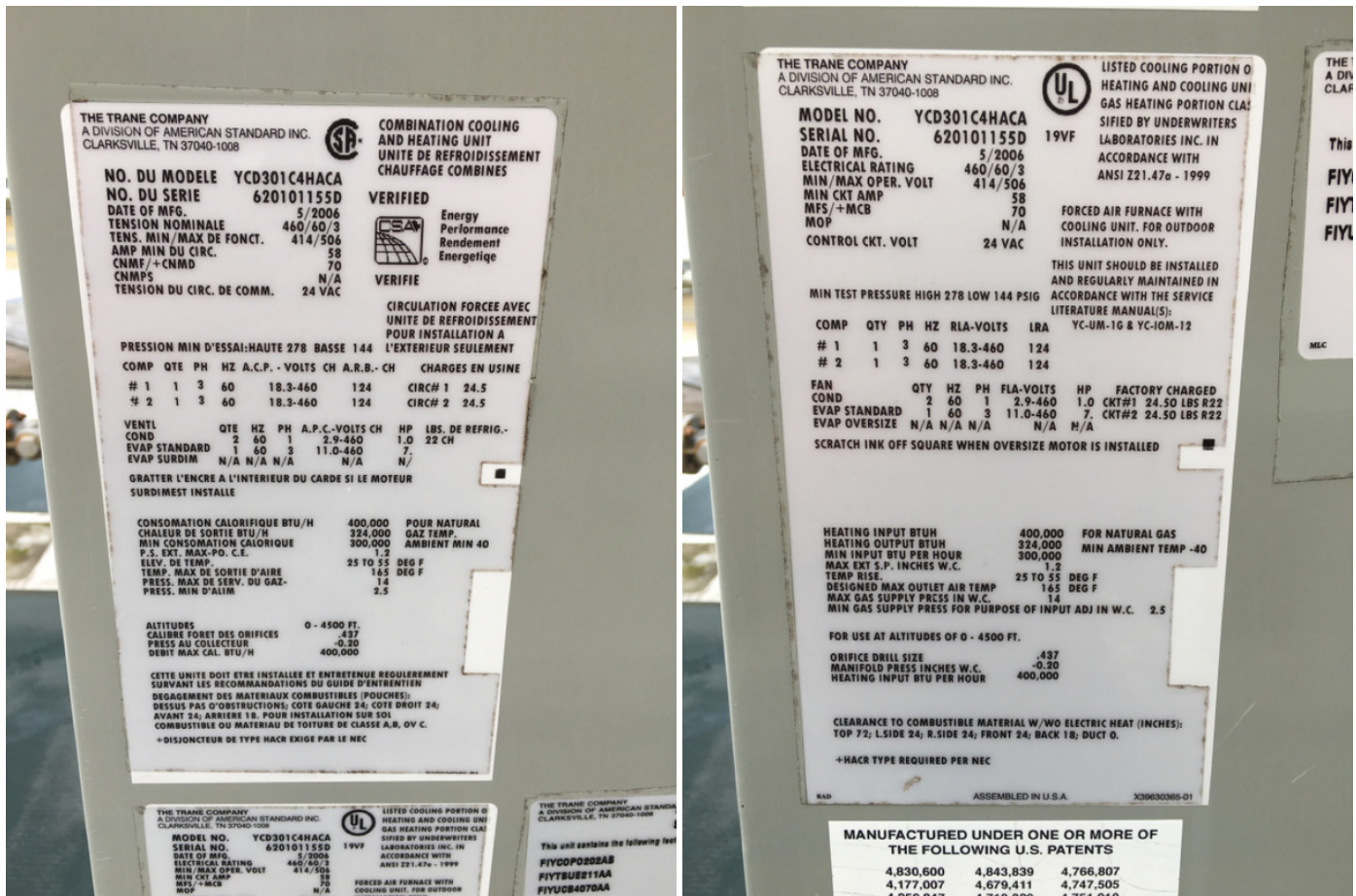
Equipment - 6. Trane, Roof Top Unit

Equipment Type Note | Roof Top Unit

Equipment Photo



Nameplate Photo



Filter Rack Photo



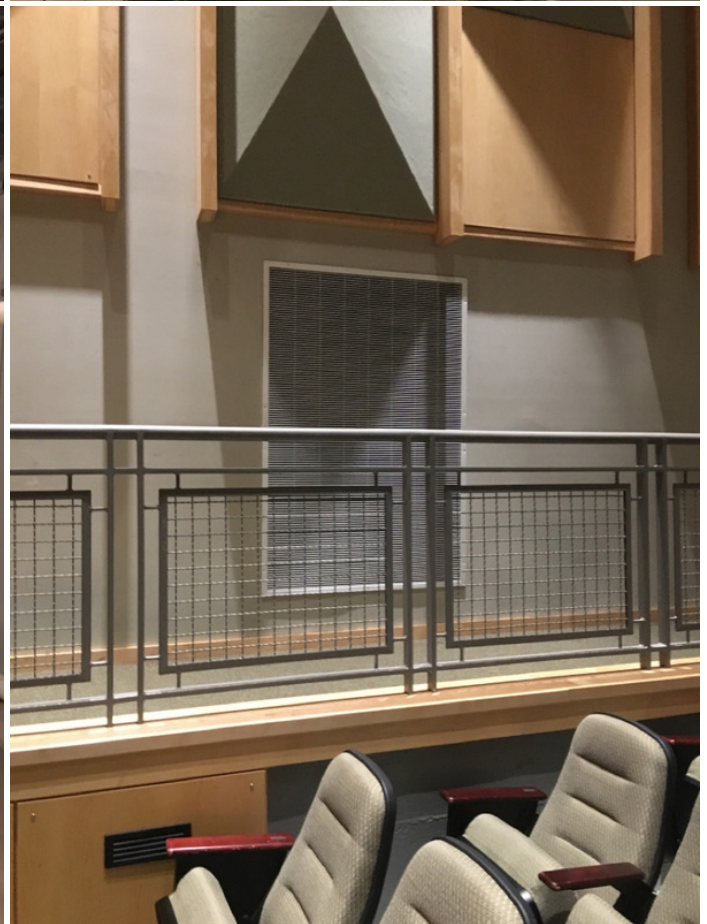
Make	Trane
Model	YCD211C4HACA
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	60
Filter Width (Inches)	40
Filter Depth (Inches)	2
Filter MERV Rating	8
Supply Width (Inches)	36

Supply Height (Inches)	61
Return Width (Inches)	24
Return Height (Inches)	24
Outside Air Width (Inches)	60
Outside Air Height (Inches)	20
Rooms / Areas Served	Auditorium stage
Condition Assessment	Good
Window Notes	No windows
Window Photos	
Note	RTU 2

Equipment - 7. McQuay, Air Handling Unit

Equipment Type Note	Air Handling Unit
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Equipment Photo





Nameplate Photo

Filter Rack Photo

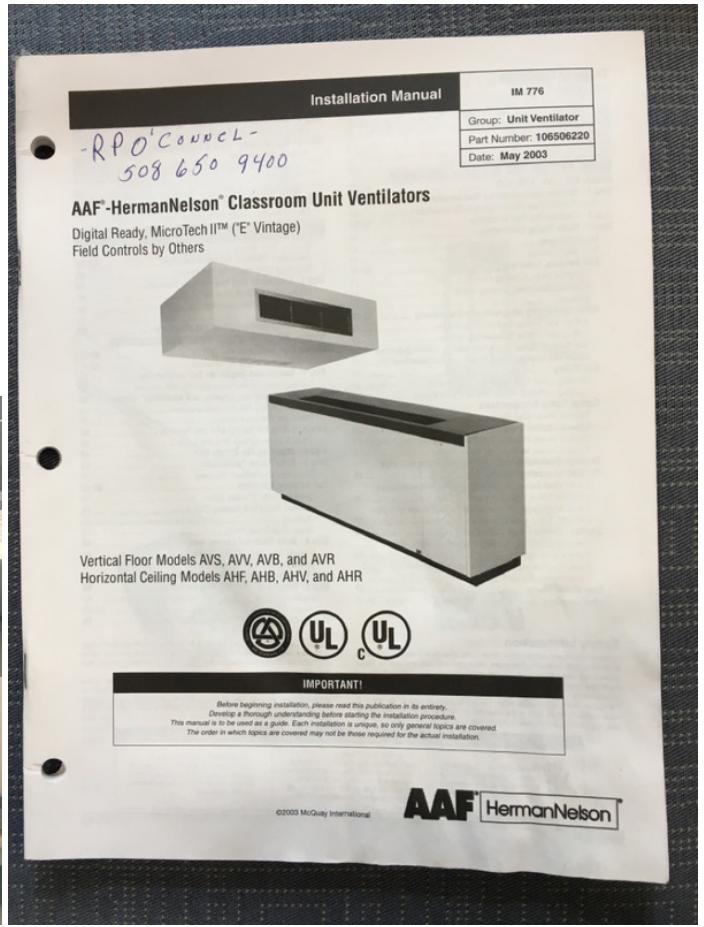


Make	McQuay
Model	CAH025GDAC
Mounting Type	Floor
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	60
Filter Width (Inches)	75
Filter Depth (Inches)	2
Filter MERV Rating	8
Supply Width (Inches)	46
Supply Height (Inches)	68
Return Width (Inches)	24
Return Height (Inches)	24
Outside Air Width (Inches)	
Outside Air Height (Inches)	
Rooms / Areas Served	Auditorium
Condition Assessment	Good
Window Notes	No windows
Window Photos	
Note	AHU 1 and 2

Equipment - 8. AAF, Unit Ventilator

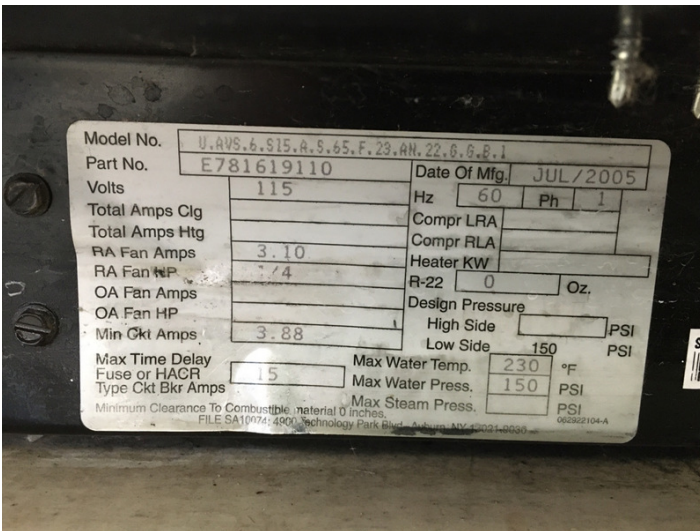
Equipment Type Note	Unit Ventilator
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Equipment Photo





Nameplate Photo



Filter Rack Photo



Make	AAF
Model	U.AVS.6.515.A.S.65.F.23.AN.22.G.G.B.1
Mounting Type	Floor
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	72
Filter Width (Inches)	10
Filter Depth (Inches)	1
Filter MERV Rating	8
Supply Width (Inches)	64
Supply Height (Inches)	7
Outside Air Width (Inches)	64
Outside Air Height (Inches)	13
Rooms / Areas Served	Classrooms 167-175, 161-165, 153, 125-133, 117-121, 211-217, 221-227,232-233, 241-253, 261-264, 268-276, 311-316, 321-327, 356, 363-366, 370-377
Condition Assessment	Good
Window Notes	6 windows open per classroom

Window Photos



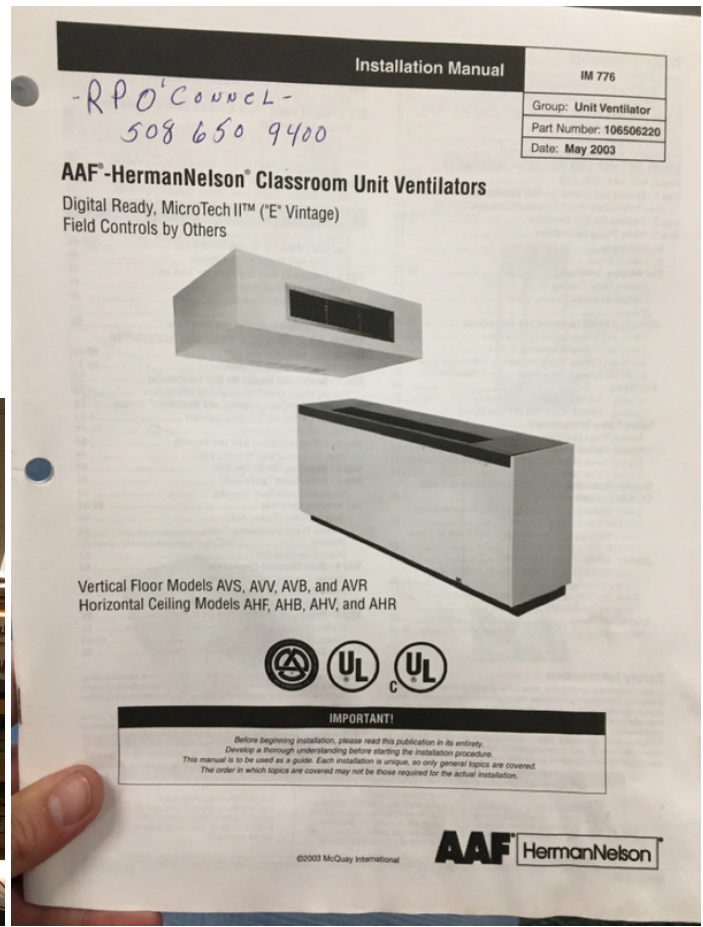
Note

Equipment - 9. AAF, Unit Ventilator

Equipment Type Note

Unit Ventilator

Equipment Photo



Nameplate Photo



Filter Rack Photo



Make	AAF
Model	U.AVS.6.513.A.S.65.E.23.AN.22.G.G..B.1
Mounting Type	Floor
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	

Filter Length (Inches)	48
Filter Width (Inches)	10
Filter Depth (Inches)	1
Filter MERV Rating	8
Supply Width (Inches)	54
Supply Height (Inches)	7
Outside Air Width (Inches)	64
Outside Air Height (Inches)	13
Rooms / Areas Served	213, 267
Condition Assessment	Good
Window Notes	6 windows open

Window Photos

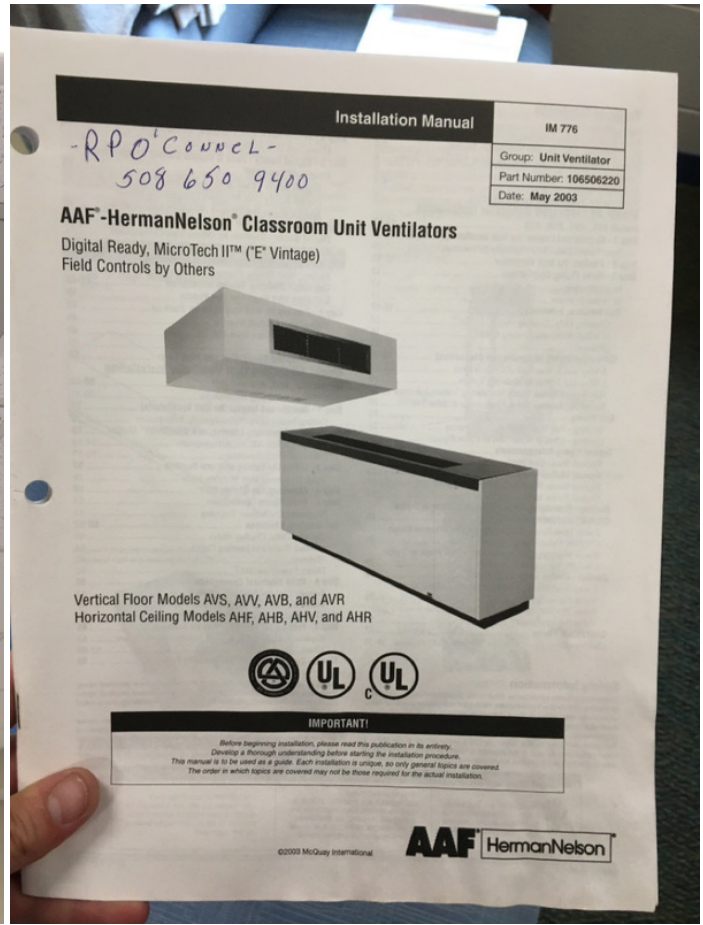


Note

Equipment - 10. AAF, Unit Ventilator

Equipment Type Note	Unit Ventilator
----------------------------	-----------------

Equipment Photo



Nameplate Photo

Filter Rack Photo

Make	AAF
Model	I.AVS.6.515.A.S.65.F.23.AN.22.G.G.B.1
Mounting Type	Ceiling
Manufacture Date	
Supply Fan Capacity (CFM)	

Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	72
Filter Width (Inches)	10
Filter Depth (Inches)	1
Filter MERV Rating	8
Supply Width (Inches)	72
Supply Height (Inches)	7
Outside Air Width (Inches)	64
Outside Air Height (Inches)	13
Rooms / Areas Served	1st, 2nd, 3rd floor hallway next to Stairway 3(main stairs), classroom 245, 248, 251, 255, 150, 148, 142, 141, 139, 067
Condition Assessment	Good
Window Notes	4-6 windows open per classroom

Window Photos



Note | Same as floor mounted unit.

Equipment - 11. Rittling, Fan Coil Unit

Equipment Type Note | Fan Coil Unit

Equipment Photo



Nameplate Photo

Filter Rack Photo



Make	Rittling
Model	FFRC ceiling mounted
Mounting Type	Ceiling
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	

Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	28
Filter Width (Inches)	10
Filter Depth (Inches)	1
Filter MERV Rating	8
Supply Width (Inches)	21
Supply Height (Inches)	7
Outside Air Width (Inches)	
Outside Air Height (Inches)	
Rooms / Areas Served	1st, 2nd, 3rd floor floor hallways and storage closets
Condition Assessment	Good
Window Notes	No windows
Window Photos	
Note	

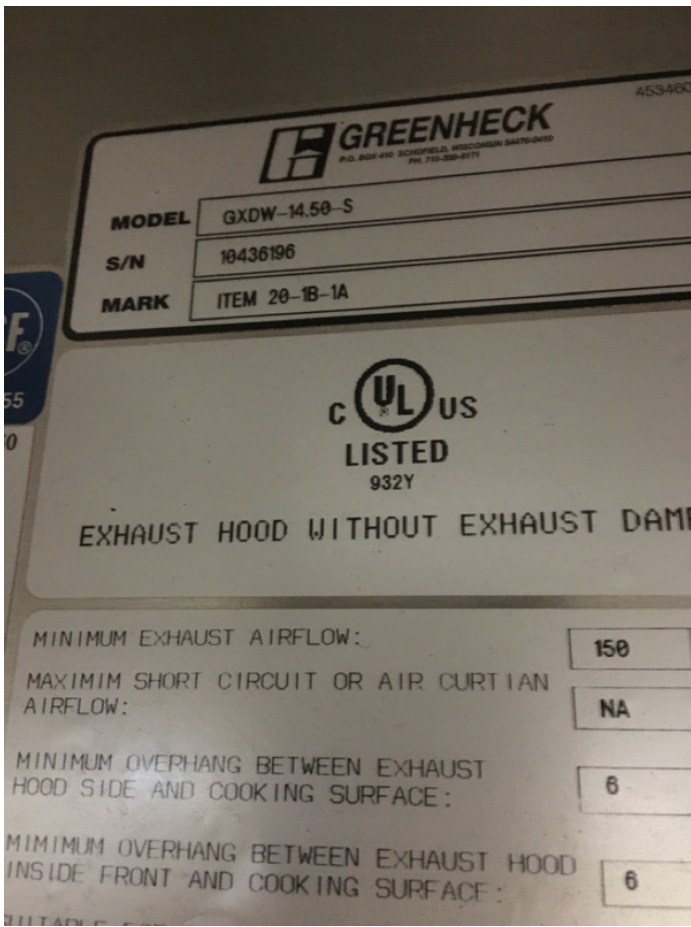
Equipment - 12. Greenheck, Exhaust Fan

Equipment Type Note | Exhaust Fan

Equipment Photo



Nameplate Photo



Make	Greenheck
Model	GXDW-14.30-S
Mounting Type	Ceiling
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	16
Rooms / Areas Served	Kitchen
Condition Assessment	Good
Window Notes	No windows
Window Photos	
Note	

Equipment - 13. Greenheck, Exhaust Fan

Equipment Type Note

Exhaust Fan

Equipment Photo



Nameplate Photo



Make | Greenheck

Model | 68-121-4-x

Mounting Type | Roof

Manufacture Date

Supply Fan Capacity (CFM)	
Filter Quantity	1
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 14. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
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Equipment Photo



Nameplate Photo



Make	Greenheck
Model	FHI-8x8-A-BS
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	1
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 15. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
----------------------------	-------------

Equipment Photo



Nameplate Photo



Make | Greenheck

Model | 6-095-D-X

Mounting Type | Roof

Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 16. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
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Equipment Photo



Nameplate Photo



Make	Greenheck
Model	SB-161HP-4-X
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 17. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
----------------------------	-------------

Equipment Photo



Nameplate Photo



Make | Greenheck

Model | 05X16005

Mounting Type	
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 18. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
---------------------	-------------

Equipment Photo



Nameplate Photo



Make	Greenheck
Model	Cube-360XP-30-6
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 19. Greenheck, Exhaust Fan

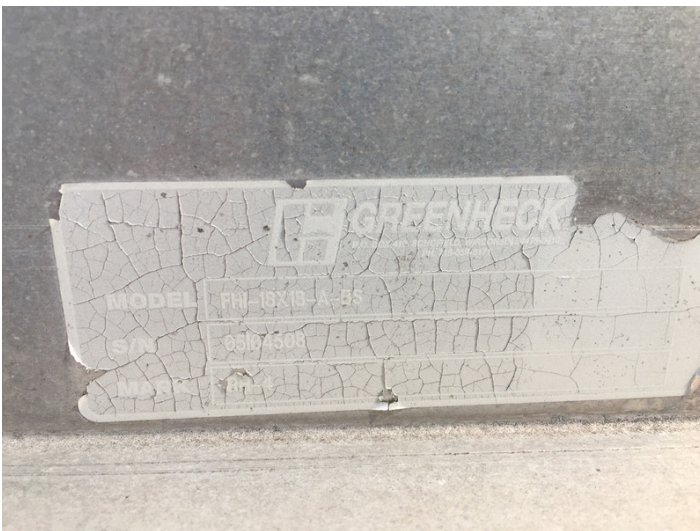
Equipment Type Note

Exhaust Fan

Equipment Photo



Nameplate Photo



Make | Greenheck

Model | FHI-18X18-A-BS

Mounting Type | Roof

Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 20. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
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Equipment Photo



Nameplate Photo



Make	Greenheck
Model	Cube-161xp-5-x
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

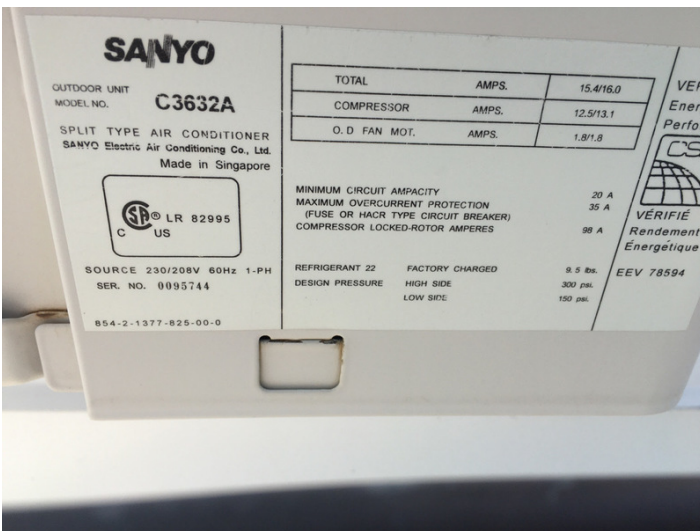
Equipment - 21. Sanyo, Mini-Split

Equipment Type Note	Mini-Split
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Equipment Photo



Nameplate Photo



Filter Rack Photo

Make	Sanyo
Model	C3632a
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Outside Air Rate (CFM / Damper Setting)	
Heating Coil / Burner Capacity (BTU/hour)	
Cooling Coil Capacity (BTU/Hour)	
Filter Length (Inches)	
Filter Width (Inches)	
Filter Depth (Inches)	
Filter MERV Rating	
Supply Width (Inches)	
Supply Height (Inches)	
Outside Air Width (Inches)	20
Outside Air Height (Inches)	20
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 22. Greenheck, Exhaust Fan

Equipment Type Note	Exhaust Fan
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Equipment Photo



Nameplate Photo



Make	Greenheck
Model	68-240-4-X
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

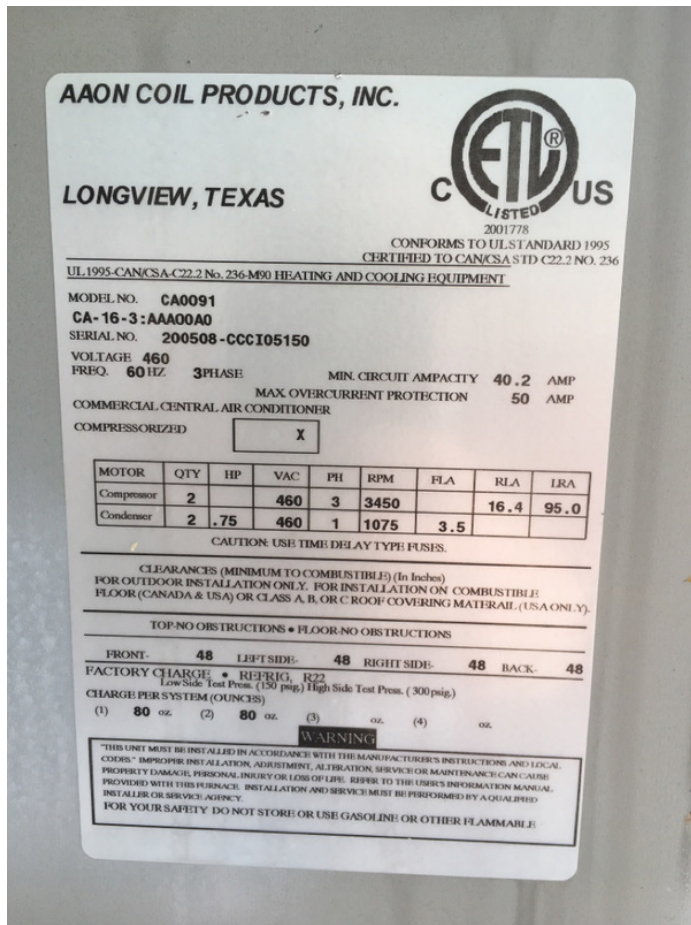
Equipment - 23. Aeon, Exhaust Fan

Equipment Type Note	Exhaust Fan
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Equipment Photo



Nameplate Photo



Make	Aaon
Model	CA0091
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 24. Greenheck, Exhaust Fan

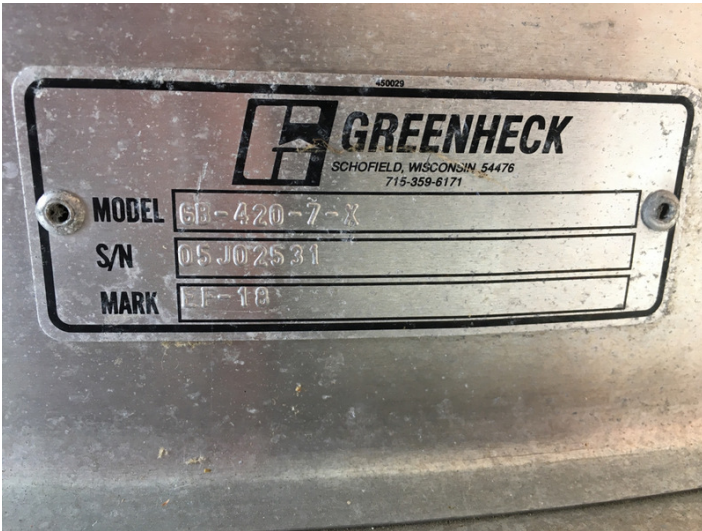


Equipment Type Note | Exhaust Fan

Equipment Photo



Nameplate Photo



Make	Greenheck
Model	GB-420-7-X
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	
Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	

Equipment - 25. Greenheck, Exhaust Fan

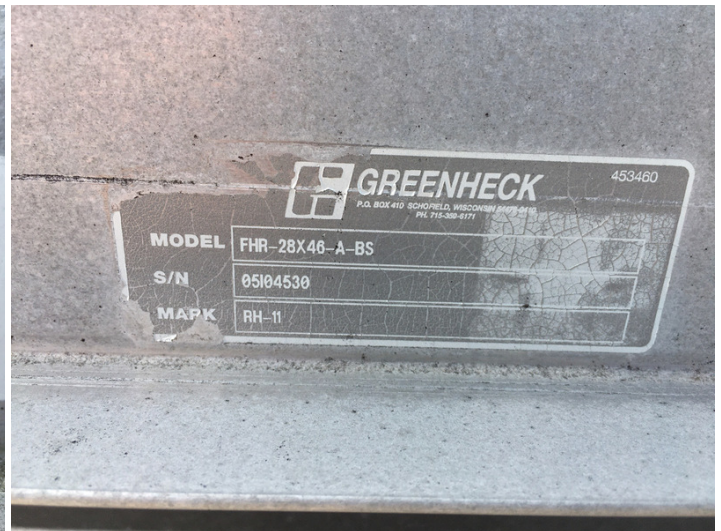
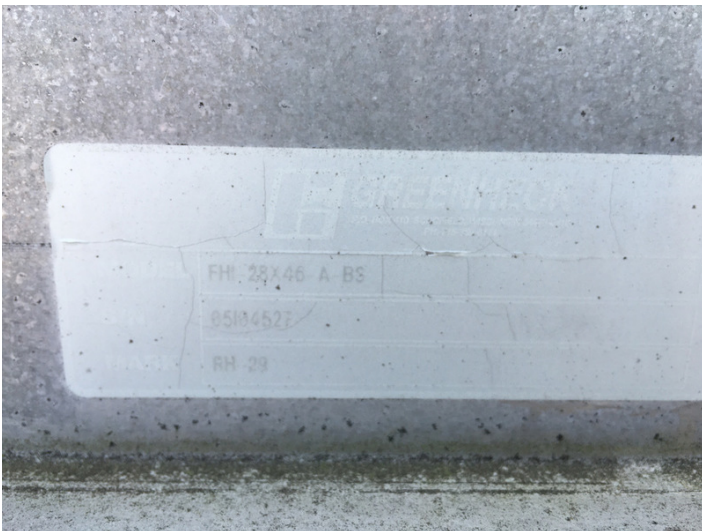
Equipment Type Note

Exhaust Fan

Equipment Photo



Nameplate Photo



Make	Greenheck
Model	FHR-28x46-A-BS
Mounting Type	Roof
Manufacture Date	
Supply Fan Capacity (CFM)	

Filter Quantity	
Rooms / Areas Served	
Condition Assessment	Good
Window Notes	
Window Photos	
Note	
Inspections Findings	

SAFETY, TRAINING AND REFERENCE SECTION

BSI HASP and JSA

9"	* 1
9"	* 4
9"	* 9
9"	* 12
9"	* 20
12"	* 1
12"	* 4
12"	* 9
12"	* 12
12"	* 20
12"	3-0624
6"	T547
42"	T547
12"	T547
5"	* 20

BASED
&
C" SERIES

20005.00

PROJECT NUMBER
**KEITH MIDDLE
SCHOOL**
New Bedford, MA
PHASE III

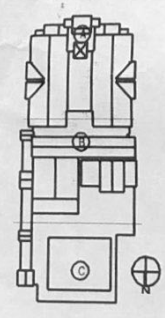
DRAWING TITLE
**SCHEDULE
SHEET HVAC**



Mount Vernon Group Architects, Inc.
20 Cabot Road
Woburn, Massachusetts 01801

781 937 9720 T
781 937 9728 F
info@mvgarchitects.com E

SEAL



SCALE AS NOTED

DRAWN BY LV

CHECKED EJG

DATE October 6, 2004

DRAWING NUMBER

M2.3

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL C.F.M.	O.A. C.F.M.	MAX. COIL VEL. F.P.M.	HEATING DATA						COOLING DATA				
						ENT. AIR/F	LVG. AIR/F	GAS PRESS	INPUT C.F.H.	OUTPUT M.B.H.	MIN M.B.H.	ENT. COND. D.B.F	LVG. COND. D.B.F	W.B.F	SENS.	M.B.
RTU-1	YCD241	PART - A	7920	2425												
RTU-2	YCD301	PART - B	8630	2730	500	53	83	7"	400	324.0	258.8	82	70	60	59	149.8
RTU-3	YCD211	PART - B	6400	2250	500	52	79	7"	400	324.0	250.8	82	70	59	58	211.0
RTU-4	YHC120	PART - B	3820	1650	500	49	96	7"	350	254.0	272.4	82	71	61	60	142.2
RTU-5	YCD151	PART - C	4100	1980	500	43	94	7"	250	202.5	197.7	83	71	61	60	85.6
RTU-6	YHC102	PART - C	3300	1605	500	42	87	7"	250	203.0	198.1	83	71	60	60	99.1
					500	41	81	7"	200	162.0	141.0	83	71	61	60	78.4

SELECTION BASED ON TRANE
NOTE #1 : UNIT TO BE PROVIDED W/ CONTROLS (CO2 SENSOR) TO DECREASE OUTSIDE AIR AT TIMES OF DECREASED POPULATION

AIR HANDLING UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL C.F.M.	O.A. C.F.M.	HEATING COILS						FACE & BYPASS	COOLING COILS				
					ENT. AIR	LVG. AIR	AIR P.D.	WAT. P.D.	HW GPM	HTG. M.B.H.		ENT. COND. D.B.	LVG. COND. D.B.	W.B.	W.B.	SEN.
AHU-1	MCCB-25	PART-B	11,250	5625	41	78	0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152
AHU-2	MCCB-25	PART-B	11,250	5625	41	78	0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152

SELECTION BASED ON "TRANE", 200' E.W.T.
NOTE #1: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN SPACE IS UNOCCUPIED
NOTE #2: PROVIDE CONDENSATE PUMP CP-3 AS SCHEDULED

HEATING AND VENTILATING UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	E.D.B.	L.D.B.	OUTPUT MBH	MIN MBH	GAS PRESS	CFH	EXT. IN W.G.	MOTOR			MIN EER	RPM	REMARKS
												HP	V	PH			
HV-1	IGX-HV-118-H32	PART-B	7,600	3,800	41.0	81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NO
HV-2	IGX-HV-118-H32	PART-B	7,600	3,800	41.0	81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NO
HV-3	IGX-HV-109-H12	PART-B	2,400	2,400	9	134	197	194	7"	250	1.25"	1-1/2	460	3	10	1397	SEE NO
HV-4	IGX-HV-118-H32	PART-B	10,000	4,900	41.0	75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NO
HV-5	IGX-HV-118-H32	PART-C	10,000	4,900	41.0	75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NO
HV-6	IGX-HV-118-H32	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO
HV-7	IGX-HV-109-H12	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO
HV-8	IGX-HV-109-H12	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO
HV-8	IGX-HV-110-H12	PART-B	2,340	2,340	9	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO

SELECTION BASED ON GREENHECK
NOTE #1: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN SPACE IS UNOCCUPIED
NOTE #2: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN HOOD STARTS UNIT TO GO TO 480 CFM OUTSIDE AIR, WHEN HOOD STARTS UNIT TO GO TO 480 CFM

CLASSROOM UNIT VENTILATORS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	HEATING											COOLING					REMARKS				
					ENT. AIR	LVG. AIR	MBH	GPM	EDB	EWB	LDB	LWB	SEN	TOT.	GPM	HP	VOLT	PH.							
UV-1	VUV125	PART-A	750	225	53																				
UV-2	VUV150	PART-A	1000	405	46	85.1	26.0	1.4	82.2	71.4	61.2	60.7	14.0	19.1	4.2	1/4	115	1							
UV-3	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.9	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-4	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	84.0	71.9	62.0	61.4	18.0	26.9	5.9	1/4	115	1							
UV-5	VUV150	PART-A	1000	405	46	83.5	52.0	2.9	84.0	71.9	62.0	61.4	18.0	26.9	5.9	1/4	115	1							
UV-6	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-7	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-8	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-9	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-10	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-11	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-12	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-13	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-14	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-15	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-16	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	83.5	71.5	61.7	61.2	19.2	28.4	6.2	1/4	115	1							
UV-17	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	83.5	71.5	61.7	61.2	19.2	28.4	6.2	1/4	115	1							
UV-18	VUV125	PART-A	750	225	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.1	25.3	5.5	1/4	115	1							
UV-19	VUV150	PART-B	1000	405	53	85.1	26.0	1.4	82.1	69.9	61.5	61.0	15.1	20.2	4.4	1/4	115	1							
UV-20	HUV150	PART-B	1250	465	46	81.6	38.4	2.1	82.2	70.0	61.2	60.7	14.0	18.1	4.2	1/4	115	1							
UV-21	HUV150	PART-B	1250	465	46	81.6	38.4	2.1	82.2	70.0	61.2	60.7	14.0	18.1	4.2	1/4	115	1							
UV-22	VUV150	PART-B	1000	405	48	81.6	45.4	2.5	82.3	70.0	61.2	60.7	25.6	36.1	10.5	1/2	115	1						SEE NOTE #1	
UV-23	VUV150	PART-B	1250	555	44	84.7	55.0	3.0	83.1	71.5	62.0	61.5	22.9	34.1	7.5	1/4	115	1						SEE NOTE #1	
UV-24	HUV150	PART-B	1250	430	53	74.3	28.7	1.6	83.4	71.3	61.6	61.0	25.6	36.1	10.8	1/2	115	1						SEE NOTE #1	
UV-25	HUV150	PART-B	750	90	50	79.6	40.0	2.2	81.1	65.7	62.6	59.3	31.9	31.9	7.0	1/2	115	1						SEE NOTE #1	
UV-26	HUV150	PART-B	1000	375	64	75.1	9.0	1.0	81.8	69.5	62.6	62.0	11.3	13.5	3.0	1/2	115	1						SEE NOTE #1	
UV-27	HUV150	PART-B	1250	480	47	78.3	28.4	1.6	82.9	71.6	62.1	61.6	15.9	24.2	5.3	1/2	115	1						SEE NOTE #1	
UV-28	HUV150	PART-C	1250	555	47	78.3	28.4	1.6	82.9	71.6	62.1	61.6	15.9	24.2	5.3	1/2	115	1						SEE NOTE #1	
UV-29	HUV150	PART-B	750	300	44	77.8	42.3	2.3	84.2	72.4	62.1	61.6	18.1	28.3	6.2	1/4	115	1						SEE NOTE #1	
UV-30	VUV125	PART-A	750	225	46	83.3	30.2	1.7	81.0	68.7	63.0	62.4	7.1	36.1	9.2	1/2	115	1						SEE NOTE #1	
UV-31	VUV150	PART-A	1000	405	46	83.3	30.2	1.7	81.0	68.7	63.0	62.4	7.1	36.1	9.2	1/2	115	1						SEE NOTE #1	
UV-32	VUV150	PART-A	1250	520	45	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-33	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	84.0	71.9	62.0	61.4	18.0	26.9	5.9	1/4	115	1							
UV-34	VUV150	PART-A	1000	405	46	83.5	52.0	2.9	84.0	71.9	62.0	61.4	18.0	26.9	5.9	1/4	115	1							
UV-35	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-36	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.0	25.1	5.5	1/4	115	1							
UV-37	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.1	25.3	5.5	1/4	115	1							
UV-38	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.1	25.3	5.5	1/4	115	1							
UV-39	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.1	25.3	5.5	1/4	115	1							
UV-40	VUV150	PART-A	1250	495	47	79.0	43.2	2.4	84.0	72.2	61.2	61.0	17.1	25.3	5.5	1/4	115	1							
UV-41	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.2	60.7	15.9	24.0	5.3	1/4	115	1							
UV-42	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-43	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-44	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-45	VUV125	PART-A	750	225	53	85.1	26.0	1.4	82.1	69.9	61.5	61.0	15.1	20.2	4.4	1/4	115	1							
UV-46	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.4	61.3	60.7	16.1	24.2	5.3	1/4	115	1							
UV-47	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	83.5	71.5	61.7	61.2	19.2	28.4	6.2	1/4	115	1							
UV-48	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	83.5	71.5	61.7	61.2	19.2	28.4	6.2	1/4	115	1							
UV-49	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.1	25.3	5.5	1/4	115	1							
UV-50	VUV150	PART-B	1000	405	46	81.6	38.4	2.1	83.2	71.2	61.6	61.0	17.1	25.3	5.5	1/4	115	1							
UV-51	VUV150	PART-B	1000	375	48	79.9	34.5	1.9	83.3	71.4	61.5	61.0	14.9	19.0	4.2	1/4	115	1							
UV-52	HUV125	PART-B	750	220	53	78.2	20.4	1.1	81.2	65.7	63.2	59.5	22.4	22.4	4.9	1/2	115	1							
UV-53	HUV150	PART-B	1000	375	48	81.7	36.4	2.0	82.5	70.9	61.6	61.1	16.9	24.7	5.4	1/2	115	1						SEE NOTE #1	
UV-54	HUV150	PART-B	1250	495	47	78.4	42.4	2.3	83.7	71.7	61.9	61.3	15.3	23.0	5.0	1/2	115	1						SEE NOTE #1	
UV-55	HUV150	PART-B	1250	465	48	79.3	42.2	2.3	84.1	72.4	62.4	61.9	17.6	27.2	6.0	1/2	115	1						SEE NOTE #1	
UV-56	VUV150	PART-B	1000	405	46	81.6	38.4	2.1	82.1	69.9	61.5	61.0	15.1	20.2	4.4	1/4	115	1						SEE NOTE #1	
UV-57	VUV150	PART-B	1250	555	44	83.1	52.8	2.9	83.2	71.5	62.0	61.5	22.9	34.1	7.5	1/4	115	1							
UV-58	HUV150	PART-B	1250	405	51	74.3	31.4	1.7	83.4	71.3	61.6	61.1	25.6	36.1	10.5	1/2	115	1						SEE NOTE #1	
UV-59	VUV150	PART-A	1250	480	47	86.0	52.6	2.9	84.0	71.9	61.8	61.3	21.5	32.6	7.1	1/4	115	1							
UV-60	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.1	71.1	61.7	61.2	17.8	25.9	5.7	1/4	115	1							
UV-61	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.2	61.6	61.0	17.6	25.7	5.7	1/4	115	1							
UV-62	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	83.4	71.3	61.8	61.2	20.0	29.3	6.4	1/4	115	1							
UV-63	VUV150	PART-A	1250	520	45	83.5	52.0	2.9	83.4	71.3	61.8	61.2	20.0	29.3	6.4	1/4	115	1							
UV-64	VUV150	PART-A	1000	405	46	81.6	38.4	2.1	83.4	71.2	61.6	61.0	17.6	25.7	5.7	1/4	115	1							
UV-65	VUV150	PART-A	1000																						

EXHAUST FANS

UNIT NO.	MANUF. NO.	DRIVE TYPE	TIP SPEED	SP	CFM	RPM	SONES	MOTOR			CONTROL		REMARKS
								HP	V	PH	TYPE	SYST.	
EF-1	CUBE-360XP-30	BELT	9472	1.50	5800	1005	15.9	3	480	3	3	HOOD	SEE NOTE #2
EF-2	GB-121-4	BELT	2613	.25	625	764	4.4	1/4	115	1	5	BLDG	
EF-3	GB-141-4	BELT	2845	.25	1005	743	5.6	1/4	115	1	5	BLDG	
EF-4	G-070-D	DIRECT	2782	.25	175	1308	2.6	1/30	115	1	-	CONST	
EF-5	GB-121-4	BELT	2705	.25	675	791	4.7	1/4	115	1	5	BLDG	
EF-6	GB-101-4	BELT	2726	.25	580	936	3.9	1/4	115	1	5	BLDG	
EF-7	GB-200-4	BELT	2686	.25	1600	480	4.9	1/4	115	1	5	BLDG	
EF-8	G-095-D	DIRECT	2924	.25	360	1027	4.2	1/8	115	1	2	ELEC	
EF-9	GB-121-4	BELT	2568	.25	600	751	4.3	1/4	115	1	5	BLDG	
EF-10	GB-121-4	BELT	2613	.25	625	764	4.4	1/4	115	1	5	BLDG	
EF-11	GB-121-4	BELT	2613	.25	625	764	4.4	1/4	115	1	5	BLDG	
EF-12	GB-101-4	BELT	2680	.25	560	920	3.7	1/4	115	1	5	BLDG	
EF-13	G-095-D	DIRECT	2736	.25	275	961	3.4	1/8	115	1	5	BLDG	
EF-14	G-095-D	DIRECT	2958	.25	375	1039	4.4	1/8	115	1	5	BLDG	
EF-15	CUBE-161XP-5	BELT	5906	1.0	1200	1671	11.3	1/2	480	3	3	DISH	SEE NOTE #1
EF-16	GB-101-4	BELT	2680	.25	560	920	3.7	1/4	115	1	5	BLDG	
EF-17	GB-141-4	BELT	2650	.25	850	692	5.0	1/4	115	1	5	BLDG	
EF-18	GB-420-7	BELT	2843	.25	7600	257	5.0	3/4	480	3	5	BLDG	
EF-19	GB-121-4	BELT	2705	.25	675	791	4.7	1/4	115	1	5	BLDG	
EF-20	GB-240-4	BELT	2976	.30	2930	464	5.5	1/4	115	1	5	BLDG	
EF-21	GB-240-4	BELT	2777	.25	2820	433	5.0	1/4	115	1	5	BLDG	
EF-22	GB-240-4	BELT	2976	.30	2930	464	5.5	1/4	115	1	5	BLDG	
EF-23	GB-240-4	BELT	2829	.25	2930	441	5.2	1/4	115	1	5	BLDG	
EF-24	SFD-9-4C	DIRECT	1766	.25	540	710	5.2	1/4	115	1	3	FUME	SEE NOTE #3
EF-25	SFD-6-6B	DIRECT	1884	.25	300	1140	5.3	1/6	115	1	3	FUME	SEE NOTE #3
EF-26	GB-300-4	BELT	2827	.30	3490	354	5.5	1/3	115	1	5	BLDG	
EF-27	GB-240-4	BELT	2566	.25	2555	400	4.0	1/4	115	1	5	BLDG	
EF-28	GB-240-4	BELT	2540	.25	2210	396	3.9	1/4	115	1	5	BLDG	
EF-29	SFD-6-6B	DIRECT	1884	.25	300	1140	5.3	1/6	115	1	3	FUME	SEE NOTE #3
EF-30	SFD-9-4C	DIRECT	1766	.25	540	710	5.2	1/4	115	1	3	FUME	SEE NOTE #3
EF-31	GB-300-4	BELT	2827	.30	3490	354	5.5	1/3	115	1	5	BLDG	
EF-32	GB-240-4	BELT	2726	.25	2960	425	4.7	1/4	115	1	5	BLDG	
EF-33	GB-141-4	BELT	2944	.25	1080	769	5.9	1/4	115	1	2	ELEC	
EF-34	GB-141-4	BELT	2944	.25	1080	769	5.9	1/4	115	1	2	ELEC	
EF-35	GB-300-4	BELT	2779	.30	3240	348	5.4	1/3	115	1	5	BLDG	
EF-36	GB-240-4	BELT	2822	.25	2825	440	5.2	1/4	115	1	5	BLDG	
EF-37	GB-200-4	BELT	2748	.25	1725	491	5.2	1/4	115	1	2	ELEC	
EF-38	GB-161-4	BELT	3900	.50	935	896	7.1	1/4	115	1	2	ELEC	
EF-39	SBE-1L36-10	BELT	4797	.25	9600	509	14.6	1	480	3	2	ELEC	
EF-40	GB-200-4	BELT	2759	.25	1750	493	5.3	1/4	115	1	5	BLDG	
EF-41	GB-240-4	BELT	2938	.25	3170	458	5.7	1/4	115	1	5	BLDG	
EF-42	G-095-D	DIRECT	2924	.25	360	1027	4.2	1/8	115	1	2	ELEC	
EF-43	G-121-D	DIRECT	2872	.25	500	882	5.4	1/6	115	1	2	-	
EF-44	GB-240-4	BELT	2681	.25	2600	418	4.6	1/4	115	1	5	BLDG	
EF-45	GB-121-4	BELT	2968	.25	810	868	5.3	1/4	115	1	5	BLDG	
EF-46	GB-300-3	BELT	2779	.30	3240	348	5.4	1/3	115	1	5	BLDG	
EF-47	G-121-D	DIRECT	2872	.25	500	882	5.4	1/6	115	1	2	-	
EF-48	GB-240-4	BELT	2688	.30	2100	419	3.9	1/4	115	1	5	BLDG	
EF-49	GB-200-4	BELT	2994	.30	1850	535	5.5	1/4	115	1	5	BLDG	
EF-50	GB-180-4	BELT	2678	.30	1355	553	4.9	1/4	115	1	5	BLDG	
EF-51	GB-240-4	BELT	2963	.30	2895	462	5.4	1/4	115	1	5	BLDG	
EF-52	GB-240-4	BELT	2662	.30	1970	415	3.6	1/4	115	1	5	BLDG	
EF-53	GB-101-4	BELT	2779	.25	600	954	4.0	1/4	115	1	3	BLDG	
EF-54	GB-121-4	BELT	3912	.50	1000	1144	8.0	1/4	115	1	2	ELEC	

SELECTION BASED ON "GREENHECK"

NOTE #1: INTERLOCK EF #15 w/ DISHWASHER

NOTE #2: INTERLOCK EF #1 w/ HOOD AND MAU #1.

NOTE #3: PROVIDE EXPLOSION PROOF MOTOR, SPARK PROOF CONSTRUCTION w/ELECTROSTATICALLY APPLIED POLYESTER COATING

FAN COILS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	HEATING					COOLING					FAN			REMARKS		
					ENT. AIR	LVG. AIR	AIR P.D.	MBH	GPM	EDB	EWB	LDB	LWB	SEN.	TOT.	GPM	HP		VOLT	PH.
FC-1	FCEB-06	PART - A	200	75																SEE NOTE #1
FC-2	FCBB-08	PART - A	500	150	48	91	-	9.3	0.9	81.8	68.8	61.2	60.6	4.1	4.9	1.1	1/8	120	1	SEE NOTE #2
FC-3	FCBB-08	PART - A	500	150	53	82	-	15.6	1.6	83.1	71.1	61.8	61.2	6.6	9.6	2.1	1/8	120	1	SEE NOTE #2
FC-4	FCEB-06	PART - A	200	75	48	91	-	15.6	1.6	83.3	71.4	61.8	61.3	6.1	9.1	2.0	1/8	120	1	SEE NOTE #1
FC-5	FCEB-08	PART - C	300	120	47	103	-	9.3	0.9	81.6	68.8	61.5	60.9	4.4	5.3	1.2	1/8	120	1	SEE NOTE #1
FC-6	FCEB-06	PART - C	200	80	47	96	-	18.0	1.8	82.2	70.1	62.6	62.1	9.2	11.9	2.6	1/8	120	1	SEE NOTE #1
FC-7	FCEB-06	PART - A	200	75	48	89	-	10.6	1.1	81.9	69.4	61.7	61.1	5.7	7.1	1.6	1/8	120	1	SEE NOTE #1
FC-8	FCBB-08	PART - A	500	150	53	81	-	14.9	1.5	81.8	68.8	61.2	60.6	4.1	4.9	1.1	1/8	120	1	SEE NOTE #2
FC-9	FCBB-08	PART - A	200	75	48	89	-	14.9	1.5	83.1	71.1	61.8	61.2	6.6	9.6	2.1	1/8	120	1	SEE NOTE #2
FC-10	FCEB-06	PART - A	200	75	48	89	-	8.8	0.9	83.3	71.4	61.8	61.3	6.1	9.1	2.0	1/8	120	1	SEE NOTE #1
FC-11	FCBB-08	PART - B	500	195	47	85	-	20.5	2.1	81.6	68.8	61.5	60.9	4.4	5.3	1.2	1/8	120	1	SEE NOTE #1
FC-12	FCBB-08	PART - B	300	120	47	94	-	15.1	1.5	82.3	70.6	62.1	61.6	9.8	13.8	3.0	1/8	120	1	SEE NOTE #1&2
FC-13	FCEB-06	PART - A	200	75	48	93	-	9.7	1.0	81.9	69.4	61.8	61.2	11.2	14.0	3.1	1/8	120	1	
FC-14	FCBB-08	PART - A	500	150	53	82	-	15.8	1.6	81.7	68.8	61.5	60.9	4.5	5.4	1.2	1/8	120	1	SEE NOTE #1
FC-15	FCBB-08	PART - A	500	150	53	82	-	15.8	1.6	82.8	70.8	61.8	61.2	7.3	10.4	2.3	1/8	120	1	SEE NOTE #2
FC-16	FCEB-06	PART - A	200	75	48	93	-	9.7	1.0	83.3	71.1	61.7	61.1	6.7	9.8	2.1	1/8	120	1	SEE NOTE #2
FC-17	FCBB-08	PART - B	500	195	47	86	-	21.4	2.1	81.7	68.9	62.0	61.4	5.1	5.9	1.3	1/8	120	1	SEE NOTE #1
FC-18	FCBB-08	PART - B	500	150	53	86	-	17.8	1.8	82.9	70.5	61.4	60.9	10.9	15.0	3.3	1/8	120	1	SEE NOTE #2
FC-19	FCEB-08	PART - B	300	100	51	82	-	9.9	1.0	82.1	69.5	61.9	61.3	11.7	14.5	3.2	1/8	120	1	SEE NOTE #2
FC-20	FCEB-08	PART - B	500	180	49	104	-	29.9	3.0	81.9	69.6	62.7	62.2	5.9	7.1	1.6	1/8	120	1	SEE NOTE #2
FC-21	FCEB-08	PART - B	500	200	47	80	-	17.6	1.8	83.7	72.0	62.1	61.6	6.9	10.6	2.3	1/8	120	1	SEE NOTE #2

SELECTION BASED ON "TRANE" W/ CFM BASED ON LOW SPEED 200 EWT, 20 WTD WINTER, 44EWT, 10 WTD SUMMER
 ALSO PROVIDE MIXING DAMPER AND ACTUATORS BY THIS MANUF.

- NOTE #1: PROVIDE CONDENSATE PUMP CP-2 AS SCHEDULED
- NOTE #2: SELECTION BASED ON "TRANE" W/ CFM BASED ON MEDIUM SPEED

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL C.F.M.	O.A. C.F.M.	MAX. COIL VEL. F.P.M.	HEATING DATA						COOLING DATA				
						ENT. AIRF	LVG. AIRF	GAS PRESS	INPUT C.F.H.	OUTPUT M.B.H.	MIN M.B.H.	ENT. COND. D.B.F	ENT. COND. W.B.F	LVG. COND. D.B.F	LVG. COND. W.B.F	SENS. M.B.
RTU-1	YCD241	PART - A	7920	2425												
RTU-2	YCD301	PART - B	8630	2730	500	53	83	7"	400	324.0	258.8	82	70	60	59	149.8
RTU-3	YCD211	PART - B	6400	2250	500	52	79	7"	400	324.0	250.8	82	70	59	58	211.0
RTU-4	YHC120	PART - B	3820	1650	500	49	96	7"	350	254.0	272.4	82	71	61	60	142.2
RTU-5	YCD151	PART - C	4100	1980	500	43	94	7"	250	202.5	197.7	83	71	61	60	85.6
RTU-6	YHC102	PART - C	3300	1605	500	42	87	7"	250	203.0	198.1	83	71	60	60	99.1
					500	41	81	7"	200	162.0	141.0	83	71	61	60	78.4

SELECTION BASED ON TRANE
 NOTE #1: UNIT TO BE PROVIDED W/ CONTROLS (CO2 SENSOR) TO DECREASE OUTSIDE AIR AT TIMES OF DECREASED POPULATION

AIR HANDLING UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL C.F.M.	O.A. C.F.M.	HEATING COILS						FACE & BYPASS	COOLING COILS				
					ENT. AIR	LVG. AIR	AIR P.D.	WAT. P.D.	HW GPM	HTG. M.B.H.		ENT. COND. D.B.	ENT. COND. W.B.	LVG. COND. D.B.	LVG. COND. W.B.	SEN. M.B.
AHU-1	MCCB-25	PART-B	11,250	5625	41	78	0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152
AHU-2	MCCB-25	PART-B	11,250	5625	41	78	0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152

SELECTION BASED ON "TRANE", 200' E.W.T.
 NOTE #1: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN SPACE IS UNOCCUPIED
 NOTE #2: PROVIDE CONDENSATE PUMP CP-3 AS SCHEDULED

HEATING AND VENTILATING UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	E.D.B.	L.D.B.	OUTPUT MBH	MIN MBH	GAS PRESS	CFH	EXT. IN W.G.	MOTOR			MIN EER	RPM	REMARKS
												HP	V	PH			
HV-1	IGX-HV-118-H32	PART-B	7,600	3,800	41.0	81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NO
HV-2	IGX-HV-118-H32	PART-B	7,600	3,800	41.0	81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NO
HV-3	IGX-HV-109-H12	PART-B	2,400	2,400	9	134	197	194	7"	250	1.25"	1-1/2	460	3	10	1397	SEE NO
HV-4	IGX-HV-118-H32	PART-B	10,000	4,900	41.0	75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NO
HV-5	IGX-HV-118-H32	PART-C	10,000	4,900	41.0	75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NO
HV-6	IGX-HV-118-H32	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO
HV-7	IGX-HV-109-H12	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO
HV-8	IGX-HV-109-H12	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO
HV-8	IGX-HV-110-H12	PART-B	2,340	2,340	9	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NO

SELECTION BASED ON GREENHECK
 NOTE #1: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN SPACE IS UNOCCUPIED
 NOTE #2: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN HOOD STARTS UNIT TO GO TO 480 CFM OUTSIDE AIR, WHEN HOOD STARTS UNIT TO GO TO 480 CFM

NOTE #1: UNIT TO BE PROVIDED W/ CONTROLS (CO2 SENSOR) TO DECREASE OUTSIDE AIR AT TIMES OF DECREASED POPULATION

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL C.F.M.	O.A. C.F.M.	HEATING COILS										COOLING COILS				VAV CONTR	
					ENT. AIR	LVG AIR	AIR P.D.	WAT. P.D.	HW GPM	HTG. M.B.H.	FACE & BYPASS	ENT. COND. D.B.	LVG COND. W.B.	COND. D.B.	COND. W.B.	MBH SEN.	MBH TOT.	INLET VANES	DRY	
AHU-1	MCCB-25	PART-B	11,250	5625	41	78	0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152.5	179.0	----	----	
AHU-2	MCCB-25	PART-B	11,250	5625	41	78	0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152.5	179.0	----	----	

SELECTION BASED ON "TRANE", 200' E.W.T.
 NOTE #1: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN SPACE IS UNOCCUPIED
 NOTE #2: PROVIDE CONDENSATE PUMP CP-3 AS SCHEDULED

HEATING AND VENTILATING UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	E.D.B.	L.D.B.	OUTPUT MBH	MIN MBH	GAS PRESS	CFH	EXT. IN W.G.	MOTOR			MIN EER	RPM	REMARKS
												HP	V	PH			
HV-1	IGX-HV-118-H32	PART-B	7,600	3,800	41.0	81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NOTE #1
HV-2	IGX-HV-118-H32	PART-B	7,600	3,800	41.0	81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NOTE #1
HV-3	IGX-HV-109-H12	PART-B	2,400	2,400	9	134	197	194	7"	250	1.25"	1-1/2	460	3	10	1397	SEE NOTE #1&2
HV-4	IGX-HV-118-H32	PART-C	10,000	4,900	41.0	75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NOTE #1
HV-5	IGX-HV-118-H32	PART-C	10,000	4,900	41.0	75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NOTE #1
HV-6	IGX-HV-109-H12	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1
HV-7	IGX-HV-109-H12	PART-C	2,600	560	58.0	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1
HV-8	IGX-HV-110-H12	PART-B	2,340	2,340	9	81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1&3

SELECTION BASED ON GREENHECK
 NOTE #1: PROVIDE CO2 SENSOR TO REDUCE OUTSIDE AIR WHEN SPACE IS UNOCCUPIED
 NOTE #2: UNDER NORMAL OPERATING CONDITIONS UNIT TO BE AT 480 CFM OUTSIDE AIR, WHEN HOOD STARTS UNIT TO GO TO 100% OUTSIDE AIR WHICH REPRESENTS THE CONDITIONS ABOVE.
 NOTE #3: WHEN ALL BOILERS ARE FIRING, UNIT TO GO TO 100% OUTSIDE AIR, WHICH REPRESENT THE CONDITIONS ABOVE. REFER TO SEQUENCE OF OPERATIONS, FOR NORMAL OPERATING CONDITIONS.

DUCTLESS COOLING UNITS

UNIT NO.	MANUF. NO.	COND. LOCATION	CFM	COND. PUMP	EVAP. FAN		EVAP. LOCATION	COND. SECTION		REMARKS
					V	PH		TOTAL	MAX. FUSE	
DCU-1	36KLS32	PART - C	590	CP-1	220	1	RM-B112	34000	35	

SELECTION BASED ON SANYO, PROVIDE REMOTE T'STAT, LOW AMBIENT CONTROL.

MAKE UP AIR UNITS

UNIT NO.	MANUF. NO.	BUILDING LOCATION	TOTAL CFM	O.A. CFM	E.D.B.	L.D.B.	OUTPUT MBH	GAS PRESS	INPUT CFH	EXT. IN W.G.	MOTOR			RPM	REMARKS
											HP	V	PH		
MAU-1	IGX-115-H22	PART - B	4640	4640	9	59	251	7"	400	0.50	2	480	3	701	

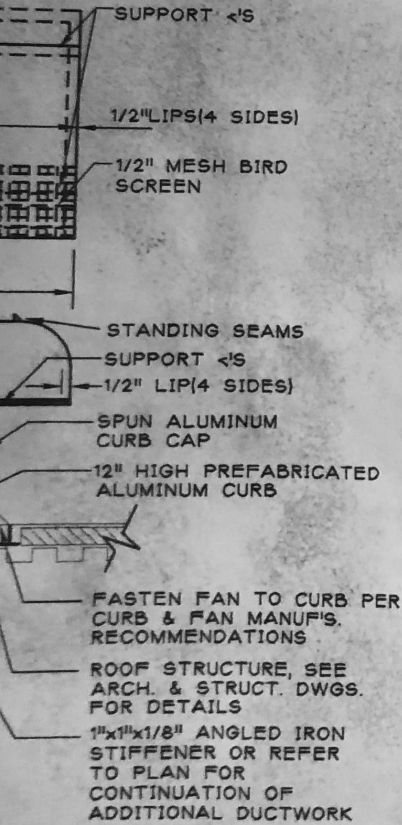
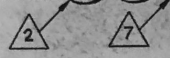
INLET DAMPER

15"x15"/FC	NO	7/8	480	3	1075	-	SEE NOTE #1
15"x15"/FC	NO	3/4	480	3	1040	-	SEE NOTE #1
15"x15"/FC	NO	7/8	480	3	1075	-	SEE NOTE #1

HOT WATER BOILER

UNIT NO.	MANUF. NO.	NET I.B.R. OUTPUT	BOILER HP.	FLUE SIZE	GAS INPUT C.F.H.	GAS PRESSURE	BURNER FAN			REMARKS
							HP	V	PH.	
B-1	RMT-910	3105	111	18"	3696	7"	5.0	480	3	
B-2	RMT-910	3105	111	18"	3696	7"	5.0	480	3	

SELECTION BASED ON VISSMANN
PROVIDE PROPYLENE GLYCOL FREEZE PROTECTION @ 35% BY WEIGHT. APPROX. 1,385 GALLONS
PROVIDE REGULATED GAS TRAIN FOR PRESSURE LISTED



RETURN AIR FANS

UNIT NO.	INTERLOCK	MANUF. NO.	FAN TYPE	NOM. C.F.M.	dBA	R.P.M.	S.P.IN. H2O	MOTOR			REMARKS
								H.P.	V	PH.	
RAF-1	AHU #1	VADS-30F17	DIRECT	11250	70	1170	1.0	5	480	3	
RAF-2	AHU #1	VADS-30F17	DIRECT	11250	70	1170	1.0	5	480	3	

SELECTION BASED ON GREENHECK, PROVIDE INLET VANES ON EACH RETURN AIR FAN THAT WILL TRACK THE ASSOCIATED AIR HANDLING UNIT

AIR COOLED CONDENSING UNITS

UNIT NO.	MANUF. NO.	SERVICE	ENT. D.B.	NOMINAL TONS	FANS NO./HP.	VOLT/PH.	REFRIG CIRCUITS	REMARKS
ACC-1	TTA180B	AHU-1	105	15	2/0.50	460/3	2	SEE NOTE #1, #2
ACC-2	TTA180B	AHU-2	105	15	2/0.50	460/3	2	SEE NOTE #1, #2

SELECTION BASED ON TRANE TO MATCH AHU
NOTE #1: SELECTION BASED ON TRANE
NOTE #2: PROVIDE HOT GAS BYPASS AND CYLINDER UNLOADING

VAV BOXES

UNIT NO.	MANUF. NO.	BUILDING LOCATION	CFM			HW COIL				NC @ 1.5" PD	APD	DIA	REMARKS
			MAX	C. MIN	H. MIN	MBH	GPM	TD	WPD				
VAV-1	SDV-5	PART - A	240	85	180	8.9	0.9	20	0.38	38	0.04	5"	
VAV-2	SDV-5	PART - A	270	95	205	9.0	0.9	20	0.38	38	0.05	5"	
VAV-3	SDV-4	PART - A	200	70	150	3.8	0.4	20	0.11	38	0.03	4"	
VAV-4	SDV-4	PART - A	145	50	110	2.7	0.3	20	0.11	38	0.02	4"	
VAV-5	SDV-5	PART - A	220	80	165	7.1	0.7	20	0.38	38	0.03	5"	
VAV-6	SDV-6	PART - A	360	125	270	6.6	0.7	20	0.23	38	0.08	6"	
VAV-7	SDV-5	PART - A	255	90	190	9.5	1.0	20	0.38	38	0.04	5"	
VAV-8	SDV-5	PART - A	255	90	190	4.9	0.5	20	0.23	38	0.04	5"	
VAV-9	SDV-5	PART - A	225	80	170	4.3	0.4	20	0.23	38	0.03	5"	

E	AREA
8"	0.44 S.F.
12"	1.00 S.F.
12"	1.00 S.F.
18"	2.25 S.F.

REVISIONS

PROJECT NUMBER

KEITH I
SCHOOL
New Bedford
PHASE

ROOFTOP UNITS

HEATING DATA						COOLING DATA							VAV CONTROL			EXTERNAL S.P. IN.WAT.	SUPPLY AIR					BARO RELIEF			
ENT. AIRF	LVG. AIRF	GAS PRESS	INPUT C.F.H.	OUTPUT M.B.H.	MIN M.B.H.	ENT. COND.		LVG. COND.		M.B.H.		NO. OF COMP.	STEPS/COMP.	HOT GAS BYPASS	CYL. UNLOAD		INLET VANES	BYPASS DAMPER	VF DRIVE	H.P.	VOLT		PH.	R.P.M.	WHEEL DIA./TYPE
53	83	7"	400	324.0	258.8	82	70	60	59	149.8	218.4	2	-	YES	YES	NO	NO	YES	1.5"	7.5	480	3	985	18"x18"/FC	NO
52	79	7"	400	324.0	250.8	82	70	59	58	211.0	303.6	2	-	YES	YES	NO	NO	NO	1.5"	7.5	480	3	975	18"x18"/FC	NO
49	96	7"	350	254.0	272.4	82	71	61	60	142.2	207.1	2	-	YES	YES	NO	NO	NO	1.5"	5.0	480	3	653	18"x18"/FC	NO
43	94	7"	250	202.5	197.7	83	71	61	60	85.6	129.9	2	-	YES	YES	NO	NO	NO	1.0"	5.0	480	3	1019	15"x15"/FC	NO
42	87	7"	250	203.0	198.1	83	71	60	60	99.1	155.7	2	-	YES	YES	NO	NO	NO	1.0"	3.0	480	3	959	15"x15"/FC	NO
41	81	7"	200	162.0	141.0	83	71	61	60	78.4	119.2	2	-	YES	YES	NO	NO	NO	1.0"	3.0	480	3	1115	15"x15"/FC	NO

TO DECREASE OUTSIDE AIR AT TIMES OF

3

AIR HANDLING UNITS

HEATING COILS					FACE & BYPASS	COOLING COILS					VAV CONTROL		EXT. S.P.	MOTOR			FAN		REMARKS
AIR P.D.	WAT. P.D.	HW GPM	HTG. M.B.H.	ENT. COND. D.B.		ENT. COND. W.B.	LVG. COND. D.B.	LVG. COND. W.B.	MBH SENS.	MBH TOT.	INLET VANES	VF DRIVE		H.P.	V	PH.	R.P.M.	WHEEL DIA	
0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152.5	179.0	----	----	1.5"	10	480	3	738	22.4"	SEE NOTE #1&2
0.18"	0.66'	45.1	451.4	YES	82.3	73.6	69.8	69.3	152.5	179.0	----	----	1.5"	10	480	3	738	22.4"	SEE NOTE #1&2

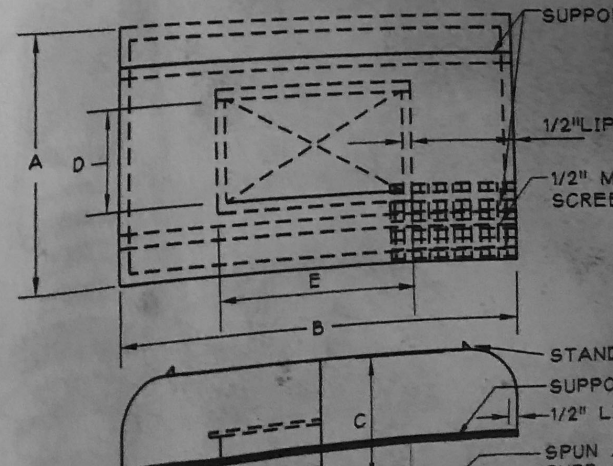
SPACE IS UNOCCUPIED

FAN AND VENTILATING UNITS

L.D.B.	OUTPUT MBH	MIN MBH	GAS PRESS	CFH	EXT. IN W.G.	MOTOR			MIN EER	RPM	REMARKS
						HP	V	PH			
81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	
81.0	418	327	7"	600	1.5"	5.0	460	3	10	790	SEE NOTE #1
134	197	194	7"	250	1.25"	1-1/2	460	3	10	1397	SEE NOTE #1
75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NOTE #1&2
75.0	381	369	7"	500	1.5"	10.0	460	3	10	1006	SEE NOTE #1
81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1
81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1
81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1
81.0	106	64	7"	150	1.0"	2.0	460	3	10	1474	SEE NOTE #1

SPACE IS UNOCCUPIED

480 CFM OUTSIDE AIR, WHEN HOOD STARTS UNIT TO GO TO 100% OUTSIDE AIR WHICH REPRESENT THE CONDITIONS ABOVE



UNIT HEATERS (HEATING HOT WATER)

UNIT NO.	MANUF. NO.	C.F.M.	M.B.H.	G.P.M.	W.P.D.	MOTOR			E.D.B.	L.D.B.	REMARKS
						HP.	V	PH.			
UH-1	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-2	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-3	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-4	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-5	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-6	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-7	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-8	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-9	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-10	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-11	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-12	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-13	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-14	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-15	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-16	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-17	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-18	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-19	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-20	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-21	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-22	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-23	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-24	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-25	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-26	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-27	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-28	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-29	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-30	FFEB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-31	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-32	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-33	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	
UH-34	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-35	FFBB-04	340	31.8	3.2	9.7	1/20	120	1	60	140	
UH-36	38-S	540	19.1	1.9	0.1	1/20	120	1	60	92	

SELECTION BASED ON TRANE, 200 EWT, 20 WTD.

PORT <S
 LIP(4 SIDES)
 N ALUMINUM
 B CAP
 HIGH PREFABRICATED
 MINUM CURB

TEN FAN TO CURB PER
 B & FAN MANUF'S.
 COMMENDATIONS
 F STRUCTURE, SEE
 H. & STRUCT. DWGS.
 DETAILS
 1/8" ANGLED IRON
 FENER OR REFER
 PLAN FOR
 CONTINUATION OF
 ITIONAL DUCTWORK

A
 S.F.
 S.F.
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AIR COOLED CONDENSING UNITS								
UNIT NO.	MANUF. NO.	SERVICE	ENT. D.B.	NOMINAL TONS	FANS NO./HP.	VOLT/PH.	REFRIG CIRCUITS	REMARKS
ACC-1	TTA180B	AHU-1	105	15	2/0.50	460/3	2	SEE NOTE #1, #2
ACC-2	TTA180B	AHU-2	105	15	2/0.50	460/3	2	SEE NOTE #1, #2

SELECTION BASED ON TRANE TO MATCH AHU
 NOTE #1: SELECTION BASED ON TRANE
 NOTE #2: PROVIDE HOT GAS BYPASS AND CYLINDER UNLOADING

VAV BOXES													
UNIT NO.	MANUF. NO.	BUILDING LOCATION	CFM			HW COIL				NC @ 1.5" PD	APD	DIA	REMARKS
			MAX	C. MIN	H. MIN	MBH	GPM	TD	WPD				
VAV-1	SDV-5	PART - A	240	85	180	8.9	0.9	20	0.38	38	0.04	5"	
VAV-2	SDV-5	PART - A	270	95	205	9.0	0.9	20	0.38	38	0.05	5"	
VAV-3	SDV-4	PART - A	200	70	150	3.8	0.4	20	0.11	38	0.03	4"	
VAV-4	SDV-4	PART - A	145	50	110	2.7	0.3	20	0.11	38	0.02	4"	
VAV-5	SDV-5	PART - A	220	80	165	7.1	0.7	20	0.38	38	0.03	5"	
VAV-6	SDV-6	PART - A	360	125	270	6.6	0.7	20	0.23	38	0.08	6"	
VAV-7	SDV-5	PART - A	255	90	190	9.5	1.0	20	0.38	38	0.04	5"	
VAV-8	SDV-5	PART - A	255	90	190	4.9	0.5	20	0.23	38	0.04	5"	
VAV-9	SDV-5	PART - A	225	80	170	4.3	0.4	20	0.23	38	0.03	5"	
VAV-10	SDV-4	PART - A	135	50	100	5.1	0.5	20	0.23	38	0.01	4"	
VAV-11	SDV-5	PART - A	210	75	160	8.2	0.8	20	0.23	38	0.03	5"	
VAV-12	SDV-5	PART - A	240	85	180	7.9	0.8	20	0.38	38	0.04	5"	
VAV-13	SDV-5	PART - A	235	85	180	6.6	0.7	20	0.23	38	0.04	5"	
VAV-14	SDV-6	PART - A	315	110	240	6.5	0.7	20	0.23	38	0.06	6"	
VAV-15	SDV-7	PART - A	640	225	480	12.3	1.2	20	1.43	38	0.16	7"	
VAV-16	SDV-6	PART - A	390	140	295	10.2	1.0	20	0.38	38	0.10	6"	
VAV-17	SDV-5	PART - A	235	85	180	6.6	0.7	20	0.23	38	0.04	5"	
VAV-18	SDV-5	PART - A	290	105	220	5.8	0.6	20	0.23	38	0.06	5"	
VAV-19	SDV-5	PART - A	240	85	180	7.9	0.8	20	0.38	38	0.04	5"	
VAV-20	SDV-5	PART - A	260	90	195	8.7	0.9	20	0.38	38	0.05	5"	
VAV-21	SDV-4	PART - A	190	70	145	6.0	0.6	20	0.23	38	0.03	4"	
VAV-22	SDV-5	PART - A	240	85	180	5.8	0.6	20	0.23	38	0.04	5"	
VAV-23	SDV-6	PART - A	320	115	240	9.1	0.9	20	0.38	38	0.07	6"	
VAV-24	SDV-4	PART - A	190	70	145	5.8	0.6	20	0.23	38	0.03	4"	
VAV-25	SDV-4	PART - A	140	50	105	4.1	0.4	20	0.11	38	0.02	4"	
VAV-26	SDV-4	PART - A	150	55	115	5.0	0.5	20	0.11	38	0.02	4"	
VAV-27	SDV-5	PART - A	300	105	225	7.4	0.7	20	0.23	38	0.06	5"	
VAV-28	SDV-7	PART - A	540	190	405	13.1	1.3	20	1.43	38	0.14	7"	
VAV-29	SDV-5	PART - A	300	105	225	17.5	1.8	20	0.38	38	0.06	5"	2 ROW COIL
VAV-30	SDV-5	PART - A	300	105	225	17.5	1.8	20	0.38	38	0.06	5"	2 ROW COIL

SELECTION BASED ON "TUTTLE & BAILEY"

2

AUTO AIR VENT
 CHILLED WATER

PROJECT
 KE
 SC
 New
 PH

DRAWING
 SC
 SHE

Mount