



Fairfield Ludlowe High School Ventilation Study Issues Resolution

for
Fairfield Public Schools
Fairfield, CT

Prepared for:

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van Zelm Project #: 2020073.01



EXECUTIVE SUMMARY

As part of a previous phase of work, van Zelm provided Engineering Services to review and analyze the existing ventilation systems at the Fairfield Ludlowe High School, evaluate existing conditions regarding ventilation and filtration, and make recommendations for improvements; particularly regarding the prevention of the transmission of airborne viruses, including the COVID-19 (SARS-CoV-2) virus, via the building HVAC systems.

van Zelm initially visited the school on August 13 and 14, 2020 and based on that visit a report dated August 31, 2020 was developed and distributed to the District. The report included both the referenced Indoor Air Quality (IAQ) improvements and general maintenance items discovered as part of a thorough investigation process. These issues were included in an appendix of the report.

Following the release of the report, members of the Fairfield Ludlowe High School community had additional questions about the issues we had identified in the report. A list of questions was submitted to the district on January 11, 2021 regarding IAQ and general maintenance items.

van Zelm was asked to assist the District by reinspecting the items identified in our previous report and directly addressing the questions raised by the community. The following pages serve to document the current disposition of each item based on our site inspection on February 24, 2021.

We believe that the District has made a good faith effort to make and maintain a safe and healthy indoor air environment for the students and teachers at Fairfield Ludlowe High School.



Below is a summary of the types of issues and their current status:

- There was a total of 90 addressable items from the questions submitted on January 11, 2021.
- There were forty-eight (48) IAQ items and thirty-seven (37) Maintenance items. 5 items were related to AHU-15 which was mistakenly referenced (see Item ID #3).
- Of the IAQ items, all forty-eight (48) concerns were corrected.
- Of the Maintenance items, thirty-one (31) have been corrected and the remaining six (6) are on a maintenance punchlist. Some items require the cooling coils operating so these will need to be addressed in the summer. These include Item ID#s 34, 45, 49, 65, 67, & 89.



Respectfully submitted,




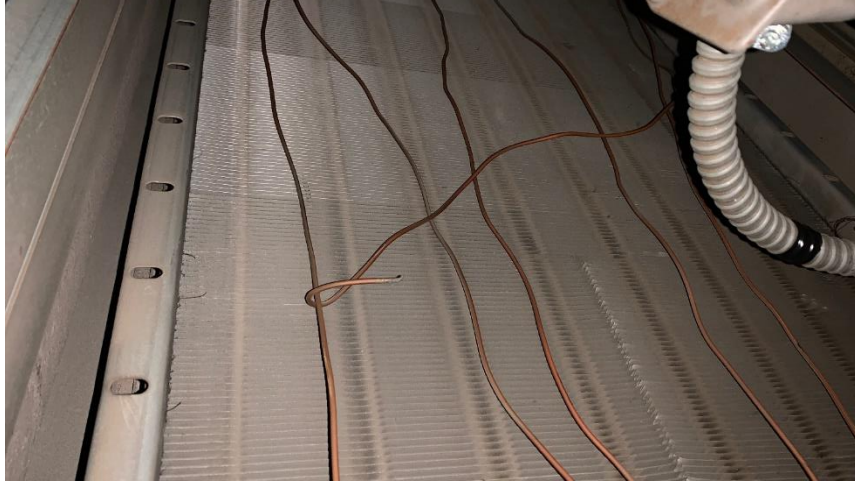
Joshua R. Klein, PE, CCP, LEED AP BD+C
VAN ZELM HEYWOOD & SHADFORD, INC.


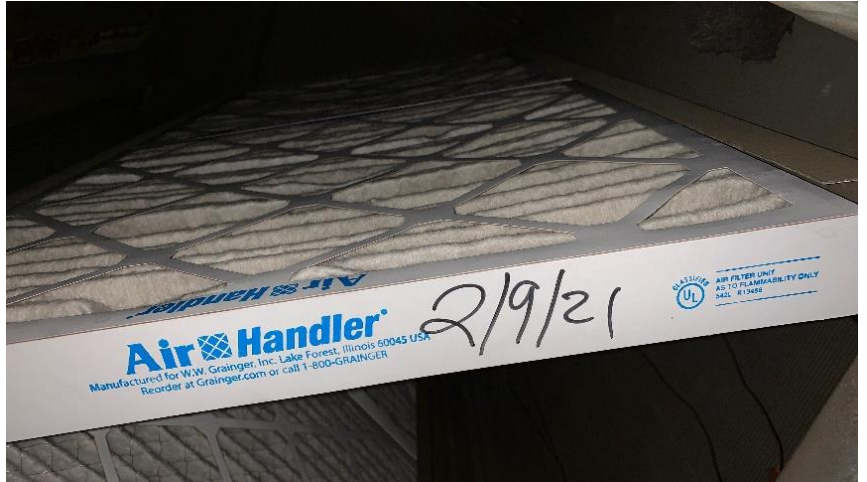
Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
1	AC-4	1	What about concern about lack of air recirculation?	IAQ	Lack of air recirculation is not bad in and of itself, in fact 100% outside air is beneficial during the pandemic <i>if</i> the unit is capable of handling 100% outside air during given outside conditions. This remark was concerning that the unit was operating in 100% outside air when it was questionable since it was so humid, and unnecessary humidity could cause discomfort or other unideal space conditions. Seen in the photo, the mixing damper does operate.	
2	AC-4	2	Does this unit have filter(s)? If so, has/have then been changed? When & what type was/were installed?	IAQ	2" MERV 13 filters were installed 2/17/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
3	AHU-15	1	Was the ductwork insulation repaired?	N/A	<p>This unit is actually AHU-16 and was mistakenly looked at twice. The identification was incorrectly noted as "AHU-15" during the second inspection. The confusion was caused by old documentation that indicated the existence of an AHU-15 and an associated model number (which matched AHU-16, 17, and 18).</p> <p>As such, these issues refer to AHU-16, all of which were found to be corrected as can be seen in the accompanying AHU-16 photos.</p>	N/A
4	AHU-15	2	Was the missing OA ductwork replaced?	N/A	See item ID #3	N/A
5	AHU-15	3	Were the dirt and debris up against the coil cleaned?	N/A	See item ID #3	N/A
6	AHU-15	4	What about the filter?	N/A	See item ID #3	N/A
7	AHU-15	5	Was/Were any new filter(s) installed? If so, when and what type? If not, why not?	N/A	See item ID #3	N/A



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
8	AHU-16	1	Was the coil cleaned?	IAQ	Yes, the coil was cleaned.	
9	AHU-16	2	Insulation was replaced at appropriate locations (ductwork)?	Maint.	Yes, insulation was repaired or replaced.	

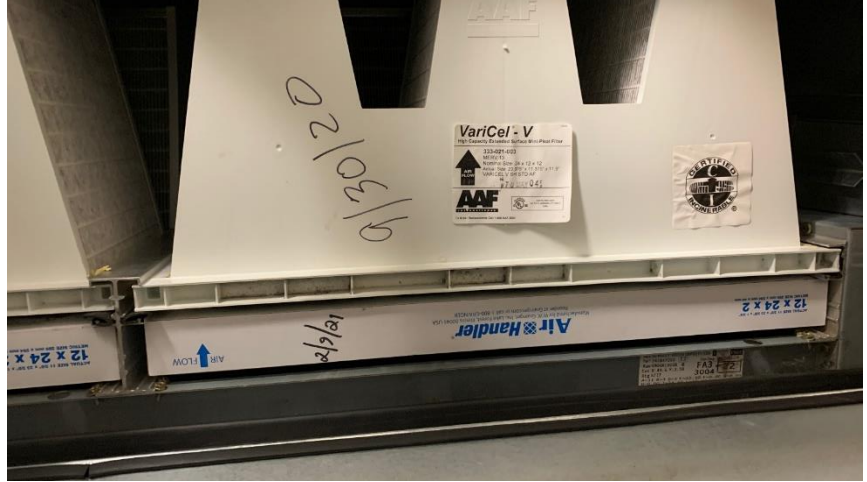

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
10	AHU-16	3	Is there more than one filter? If so, were all of them changed?	IAQ	4x 2" MERV 13 filters were installed 2/9/21.	
11	AHU-16	4	Was/were any new filter(s) installed? If so, what type was/were installed on 9/11/20?	IAQ	Yes, and they were replaced again on 2/9/21, see above.	

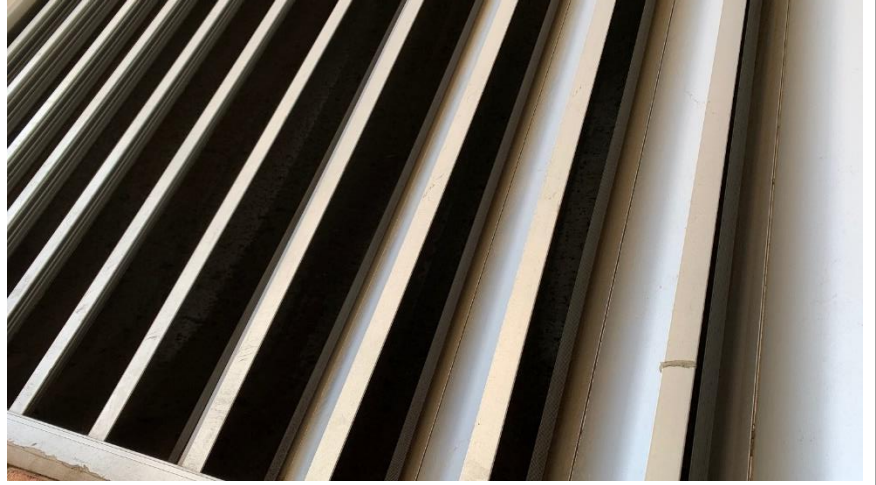
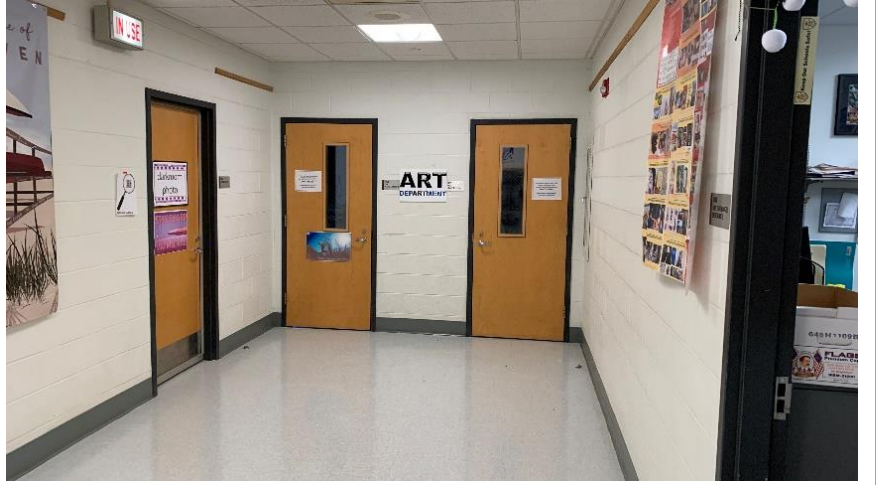
Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
12	AHU-17	1	Insulation was replaced at appropriate locations (ductwork)?	Maint.	Yes, insulation was repaired or replaced.	
13	AHU-17	2	Coil was cleaned?	IAQ	Yes, the coil was cleaned.	


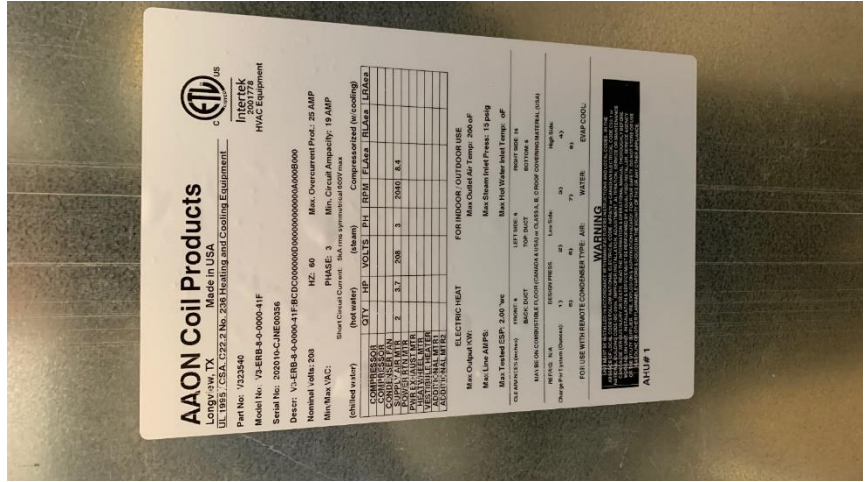
Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
14	AHU-17	3	Was unit and squirrel cage cleaned of debris, dirt, and insulation?	IAQ	Yes, the cage and unit were cleaned.	
15	AHU-17	4	Is there more than one filter? If so, were all of them changed? What type was/were installed on 9/11/20?	IAQ	4x 2" MERV 13 filters were installed 2/9/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
16	AHU-18	1	Coil was cleaned?	IAQ	Yes, the coil was cleaned.	
17	AHU-18	2	The interior unit was cleaned?	IAQ	Yes, the unit interior was cleaned.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
18	AHU-18	3	Insulation was replaced at appropriate locations (ductwork)?	Maint.	Yes, insulation was repaired or replaced.	
19	AHU-18	4	Is there more than one filter? If so, were all of them changed, when & what type?	IAQ	4x 2" MERV 13 filters were installed 2/9/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
20	DOA-1	1	What is MERV rating for these replaced filters please?	IAQ	The filter rating is MERV 13 (for both the VariCel V and 2" pleated).	
21	DOA-1	2	Have the repairs been completed on this Unit?	Maint.	Yes, the repairs were completed.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
22	DOA-1	3	Bird screen installed?	Maint.	The bird screen is installed and was cleaned as best as possible with the permanently installed louver in the way.	
23	HV-1	1	Are OA & 007 still exhausted through 006?	Maint.	It is, as designed, but the repaired exhaust damper actuators have alleviated the issue. The excess exhaust is likely due to be used when the kiln is firing.	


Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
24	HV-1	2	Does 006 receive fresh air or is it still a "stiff negative"?	IAQ	Yes, fresh air is bring delivered by HV-1, which was completely replaced with a new unit including fresh new 4" MERV 13 filters and the damper repairs to the exhaust side.	 



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
25	HV-2	1	Has the HVAC technician verified a clean energy wheel, metal debris removed and made secure?	IAQ	Yes, the wheel is cleaned and secured.	
26	HV-2	2	What filter has been installed in this unit & when?	IAQ	4" MERV 13 filters were installed on 9/29/20 and 2" MERV 13 filters were installed on 2/10/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
27	HV-3	1	Was/were any new filter(s) installed. If so, when & what type? If not, why not?	IAQ	4" MERV 13 filters were installed on 9/29/20 and 2" MERV 13 filters were installed on 2/10/21.	
28	HV-4	1	How many filters were changed on 9/14/20? van Zelm report mentions "filters"; your note mentions "filter." When and what type was/were installed?	IAQ	Non-plural was a typo. The filter quantities are 12-24x24x2, 7-24x12x2, 12-24x24x4, 7-24x12x4. 4" MERV 13 filters were installed 9/29/20 and 2" MERV 13 filters were installed 2/10/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
29	HV-4	2	How was the condensate pan addressed? Was its height adjusted?	IAQ	The condensate pan was thoroughly cleaned as well as the supply air louver section. The condensate trap was adjusted and appears to now be an acceptable height.	
30	HV-5	1	Notes indicate that a filter was changed. van Zelm references more than one filter needed changing. Please advise.	IAQ	These were changed over holiday break periods because they are difficult to access while school is in session. They will need another change soon and it has been added to the maintenance list. Please note that the gym units can become dirty quicker than other units because of the activity within this space.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
31	HV-5	2	What type of filter(s) were installed on 11/10/20?	Maint.	The new filters are MERV 13.	
32	HV-6	1	Was the condensate trap addressed? How so?	IAQ	The condensate trap was replaced with new PVC piping.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
33	HV-6	2	Was/were any new filter(s) installed? If so, when and what type? If not, why not?	IAQ	New 4" MERV 13 filters were installed 10/1/20.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
34	HV-7	1	Were the parts received to reseal air section and repair external duct work? If so, did FPS do these repairs? If not, when?	Maint.	These items have been added to the maintenance punchlist but do not affect IAQ since the air is still filtered properly.	 



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
35	HV-7	2	Was/were any new filter(s) installed? If so, when and what type? If not, why not?	IAQ	4" MERV 13 filters were installed 10/1/20.	
36	MUA-1	1	Was piping insulation repaired? If not, when?	Maint.	The piping insulation was repaired.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
37	MUA-1	2	Was copper piping corrosion repaired?	Maint.	Yes, and new insulation will prevent it from developing	
38	MUA-1	3	Was/were any new filter(s) installed? If so, when and what type? If not, why not?	IAQ	2" MERV 13 filters were installed on 2/10/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
39	MUA-2	1	Is the corrosion interfering with the operation of this unit? (How much corrosion is considered to be "normal wear and tear"?)	Maint.	This will not have any effect as long as the insulation is maintained. Sustained corrosion can eventually cause leaks, but those leaks typically take years of no maintenance to fully develop. Facilities has provided extra insulation for future patching as seen in the photo.	
40	MUA-2	2	Was/were any new filter(s) installed? If so, when and what type? If not, why not?	IAQ	2" MERV 13 filters were installed on 2/10/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
41	MUA-3	1	Was the new piping insulation installed?	Maint.	Yes, new piping insulation was installed.	
42	MUA-3	2	Is the corrosion interfering with the operation of this unit? (How much corrosion is considered to be "normal wear and tear"?)	Maint.	This will not have any effect as long as the insulation is maintained. Sustained corrosion can eventually cause leaks, but those leaks typically take years of no maintenance to fully develop. Facilities has provided extra insulation for future patching as seen in the photo.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
43	MUA-3	3	Was/were any new filter(s) installed? If so, when and what type? If not, why not?	IAQ	New 2" MERV 13 filters were installed on 2/10/21.	
44	RTU-1	1	Was the condensate trap addressed? How so?	IAQ	The condensate trap was replaced with new PVC piping and was extended down to the roof to prevent drip damage.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
45	RTU-1	2	Was the condensate pan section repaired, including leaking/pooling?	Maint.	There possibly remains a small leak due to pan corrosion in the bottom under the coil. This will need to be reviewed by maintenance in the summer when condensate can form in order to pinpoint the location.	
46	RTU-1	3	What about filter(s) changed? If so, when & what type? If not, why not?	IAQ	4" MERV 13 filters were installed on 9/29/20 and 2" MERV 13 filters were installed on 2/10/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
47	RTU-2	1	Was the coil combed to straighten out the fins?	Maint.	The coil was combed to straighten the fins.	
48	RTU-2	2	Or does this coil need to be replaced? If so, what are the plans for this?	Maint.	This coil does not need replacement at this time.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
49	RTU-2	3	Has the return air duct been resealed?	Maint.	This has been added to the maintenance punch list but does not affect IAQ since the air is still filtered.	
50	RTU-2	4	van Zelm references "filters." Your note referenced "filter" changed on 9/14/20. How many filter(s) are there? Have they all been changed? What type installed?	IAQ	Non-plural was a typo. The unit has 6-16x20x4. All of these were changed on 9/29/20 to 4" MERV 13 filters.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
51	RTU-3	1	Was the condensate pan cleaned?	IAQ	Yes, the condensate pan was cleaned.	
52	RTU-3	2	Why were these filters clean at the time of the van Zelm review since the filters had been installed on 5/21/20?	IAQ	This unit was down partially before COVID and did not accumulate dust like other similar units. Then all units were off while School was cancelled. The nature of the clean filters was coincidental, and the unit was observed running normally during this recent visit.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
53	RTU-3	3	Were these filters changed? When and what type installed?	IAQ	4" MERV 13 filters were installed on 10/1/20 and 2" MERV 13 filters were installed on 2/17/21.	
54	RTU-4	1	These notes are confusing. Was a new unit installed during the summer? If so, then why were there so many problems when van Zelm did its review?	Maint.	At the time of our initial visit, this unit was not new. Upon reinspection it is still the same unit, but it is running this time and the noted issues were corrected, as indicated in the following items.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
55	RTU-4	2	Does the condensate pan still have standing water?	Maint.	No. Facilities will review during the summer to confirm it does not refill.	
56	RTU-4	3	Is the refrigerant coil piping still resting in the condensate pan?	Maint.	No, and piping has been lifted out of the pan.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
57	RTU-4	4	Has the trap height been assessed regarding whether it's at the proper height?	Maint.	The condensate trap has been repaired and adjusted. The height is acceptable for the unit configuration.	
58	RTU-4	5	Was the piping insulation in the control unit repaired?	Maint.	The insulation was repaired.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
59	RTU-4	6	What about filter(s) changed? If so, when & what type? If not, why not?	IAQ	4" MERV 13 filters were installed 9/29/20.	
60	RTU-5	1	Has the nametag changed to reflect the proper unit?	Maint.	The unit was mislabeled from the factory, but RTU-6 and RTU-5 are different sizes. Facilities knows this and has them labeled correctly through the control system. The tags on the exterior of these units indicate the correct numbering, not the manufacturer tag with the motor data.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
61	RTU-5	2	Were all filters changed? If so, how many, when and what type filters were installed?	IAQ	12" MERV 13 box filters were installed 10/1/20 and 2" MERV 13 filters were installed 2/17/21.	
62	RTU-5	3	Were the filter rack clips replaced and repaired?	IAQ	The filter rack clips were adjusted and hold the filters in place now. The filter in the image was removed to show the cleanliness of the newer filters.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
63	RTU-5	4	Is the corrosion interfering with unit operation?	Maint.	No, the corrosion will not interfere with unit operation and will not affect IAQ.	
64	RTU-6	1	Has the refrigerant coil been cleaned & combed?	IAQ	Yes, the refrigerant coil has been cleaned and combed.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
65	RTU-6	2	Has the condensate problem been addressed? If so, how?	Maint.	Note: The unit was not producing condensate as expected given the weather and operating conditions, but this does not necessarily mean it is not cooling properly. Facilities will continue to monitor this, but it is not an IAQ item.	
66	RTU-6	3	Were filters replaced? If so, how many, when and what type filters were installed? If not, why not?	IAQ	4" MERV 13 filters were installed 9/30/20.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
67	RTU-7	1	Has the piping in the control section been insulated?	Maint.	The piping in the control section has not yet been insulated. The coil was recently replaced, and facilities is working to complete insulation. This will not affect IAQ.	
68	RTU-7	2	Was the plastic bag removed containing the piping insulation?	IAQ	The plastic bag was removed from the fan section and put into the control section, which does not block or affect the air. This will be used to insulate the coil and has been added to the maintenance punchlist (see the above item).	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
69	RTU-7	3	Is this unit operable? If so, what about the filters? If so, how many, when and what type filters were installed? If not, why not?	IAQ	The unit is now operating. 6-16x24x4" MERV 13 filters were installed 9/30/20.	
70	RTU-8	1	When were the filters on this unit last changed? If so, how many, when and what type filters were installed? If not, why not?	IAQ	4" MERV 13 filters were installed on 10/1/20 and 2" MERV 13 filters were installed on 2/17/21.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
71	RTU-9	1	Have you verified that filters were changed? When did this occur? If filters were changed, how many and what type were installed? If not, why not?	IAQ	2" MERV 13 filters were installed 2/10/21 and 12" MERV 13 box filters were installed 9/30/20.	
72	RTU-9	2	Have you verified that the fan belt is on properly?	Maint.	The fan belt was replaced and is properly sized for the unit.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
73	RTU-9	3	Has the coil been cleaned?	IAQ	The coil has been fully cleaned and combed.	
74	RTU-9	4	Have you verified that the drain pan was cleaned?	IAQ	The drain pan was cleaned.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
75	RTU-10	1	van Zelm references "filters." Your note referenced "filter" changed. How many filter(s) are there? Have they all been changed? If so, how many and what type changed on 9/14/20?	IAQ	Non-plural is a typo. 4-12x24x2 & 4-24x24x2" MERV 13 filters were installed 2/10/21 and 4-12x24x12, 4-24x24x12" MERV 13 box filters were installed 9/30/20.	
76	RTU-11	1	Were the condenser coils combed?	Maint.	Enough of the condenser coil is unblocked and will continue to operate. Because of the age of the unit, combing the coils out too much could cause them to break. Maintenance will continue to do what they can, but this will not affect IAQ.	


Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
77	RTU-11	2	Has the charge been checked on this unit? What is this follow up?	Maint.	Mechanical technicians reviewed the unit last summer. There haven't been any complaints from occupants about rooms being too hot in the area served by this unit. However, facilities will continue to monitor this unit.	
78	RTU-11	3	What is the status on the condensate trap?	Maint.	The condensate trap was repaired.	



Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
79	RTU-11	4	How is the structural rust impacting the operation of this unit?	Maint.	Structural rust will not impact performance but will be monitored by Facilities.	
80	RTU-11	5	Were the filter(s) replaced? If so, when? What does it mean no date? What is the follow up here? What type of filter is in place?	IAQ	2" MERV 13 filters were installed 2/10/21. Typically, when a filter change is completed, the company or personnel responsible for the change will use a permanent marker or pen to indicate the date of the filter change. This is often written on one of the filters, preferably an outward-facing one. Sometimes they forget to write the date. The date was written on all filters observed during this visit, though.	

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
81	RTU-12	1	Has the hinge cap been repaired?	Maint.	Yes, the hinge cap was repaired.	
82	RTU-12	2	What about the blade that fell off due to the hinge bap being broken?	Maint.	The blade was reattached to the hinge after the cap was repaired.	

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
83	RTU-12	3	Saw your note about not combing out the coil. With this damage, what percent of it is operating?	Maint.	The coil has been combed and cleaned. The improvement of this one in particular is significant, with >95% unblocked now.	
84	RTU-12	4	van Zelm report mentions "filters"; your note states "filter" changed on 9/14/20? How many filter(s) are there? Have they all been changed? When& what type?	IAQ	Non-plural was a typo. 6-20x20x2" MERV 13 filters were installed 2/10/21.	

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
85	RTU-13	1	van Zelm references "filters." Your note referenced "filter" changed. How many filter(s) are there? Were they all changed on 9/14/20? What type of filter was installed?	IAQ	Non-plural was a typo. 16-16x20x2" MERV 13 filters were installed 2/17/21.	
86	RTU-13	2	How does the rust/corrosion affect the operation of this unit?	Maint.	The unit is running well, and the rust was cleaned up. The remaining rust is mostly cosmetic and will not affect unit performance. It's worth noting that this and its sibling units 11, 12, & 14 are ~ 25 years old and still operating. This also does not affect IAQ.	

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
87	RTU-14	1	How does the inability to change the drain impact the fact that it isn't at a sufficient height for operation in this unit?	Maint.	New drain is installed and does comply with height requirements, using a low clearance style.	

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
88	RTU-14	2	Have the filter(s) on this unit been changed? If so, when & what type was/were installed?	IAQ	2" MERV 13 filters were installed 2/10/21.	
89	RTU-1R1	1	Was the mixed air sensor reattached?	Maint.	The Mixed Air (MA) sensor still needs to be replaced but this does not affect IAQ. This has been added to the maintenance punchlist.	

Item ID	Unit	#	Comment	IAQ or Maint.?	vZ Response	Picture
90	RTU-1R1	2	Were all filters changed on 9/15/20? If so, what type were installed?	IAQ	4" MERV 13 filters were installed on 10/1/20 and 2" MERV 13 filters were installed on 2/17/21.	