Oakland Elementary School

Humidity Overview and Recommendations

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Agenda

1) Background
2) Site Assessment Overview
3) Solution Considerations
4) Recommendations
5) Next Steps

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Background

- Significant and ongoing humidity issues following completion of the new addition in 2019.
- Humidity is most prevalent in the NW corner of the building and travels throughout the building during warmer months.
- Dehumidifiers have been installed in closets venting to hallways and portable dehumidifiers purchased for individual classrooms.

Site Assessment Overview

- Conducted 2 site assessments
  - Surveyed HVAC Equipment in NW corner of the school (2-pipe heating and cooling system)
  - Thermography Camera: inspected for potential building envelope issues
  - Assessed and discussed drainage for potential foundational issues
- Determined humidity issues stem from the (16) Airedale Vertical Unit Ventilators that were installed with 2019 addition.

Vertical Unit Ventilators	
Unit Tag	**Classroom**
UV-127	127 (3rd)
UV-128	128 (3rd)
UV-129	129 (3rd)
UV-132	132 (4th)
UV-133	133 (4th)
UV-136	136 (4th)
UV-137	137 (4th)
UV-138	138 (5th)
UV-139	139 (5th)
UV-140	140 (5th)
UV-141	141 (5th)
UV-142	142 (LOP 4-5)
UV-143	143 (Music)
UV-157	157 (ELL)
UV.C6.1	Corridor C-6
UV.C6.2	Corridor C-6

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Site Assessment Overview

- Dehumidification option on the installed vertical unit ventilators is only available for valve-controlled units with a 4-pipe heating and cooling system.
- Existing units have single coil (2-pipe CW/HW changeover)
- Face and bypass dampers are not installed on existing units.

Vertical Unit Ventilators	
Unit Tag	**Classroom**
UV-127	127 (3rd)
UV-128	128 (3rd)
UV-129	129 (3rd)
UV-132	132 (4th)
UV-133	133 (4th)
UV-136	136 (4th)
UV-137	137 (4th)
UV-138	138 (5th)
UV-139	139 (5th)
UV-140	140 (5th)
UV-141	141 (5th)
UV-142	142 (LOP 4-5)
UV-143	143 (Music)
UV-157	157 (ELL)
UV.C6.1	Corridor C-6
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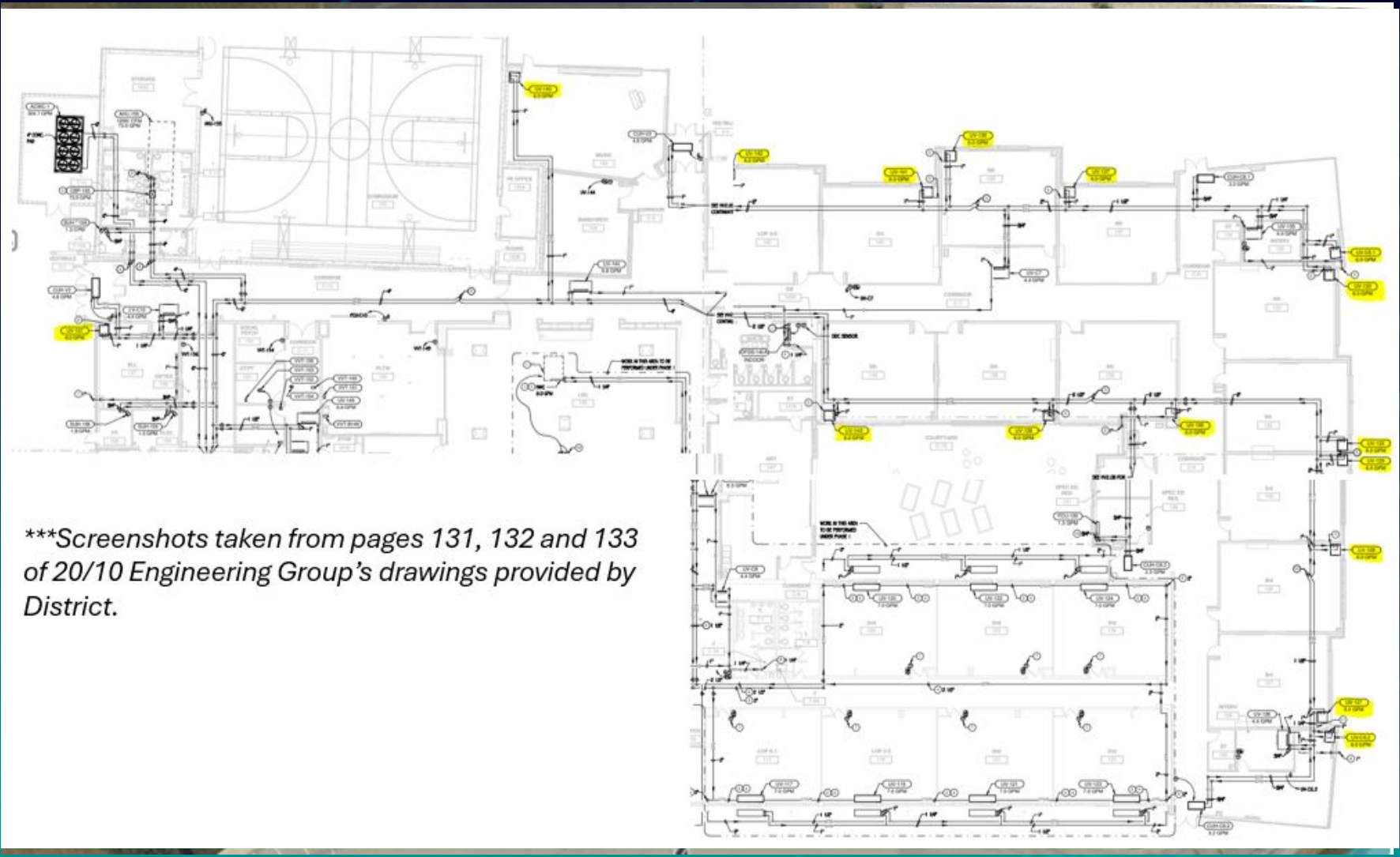
Site Assessment Overview



****Screenshots taken from pages 131, 132 and 133 of 20/10 Engineering Group's drawings provided by District.*

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Solution Considerations

1) Demo existing vertical unit ventilators, modify piping system and install new unit ventilators with appropriate application options.*
2) Modify existing vertical unit ventilators and install 2-3 dedicated outdoor air system (DOAS) units to serve impacted classrooms.*
3) Utilize IAQP design to manage indoor air quality and reduce dependance on outside air.*

Options to be verified by MEP engineering firm

Example: VRP vs. IAQP for Decentralized VRF/Heat Pump Design in a Small Office

Baseline VRP Design

(3) 26-Ton Outdoor VRF Heat-pump

(4) VRF DOAS Units

(24) Indoor VRF FCU

Proposed IAQP Design

(2) 28-ton Outdoor VRF Heat-pump

(6) Air-Cleaners

(24) Indoor VRF FCU

(1) VRF DOAS Units

Parameter	VRP Design	IAQP Design	Change	% Change
Gas Phase Air Cleaners	-	6 units 350 ECAg each	6 units 350 ECAg each	-
Clean Airflow (ECAg)	-	2,100 CFM	2,100 CFM	-
Supply Airflow	40,000 CFM	36,400 CFM	(3,600 CFM)	9% reduced
Outside Airflow	4,500 CFM	900 CFM	(3,600 CFM)	80% reduced
Electric Pre-Heat Power	20 kW	5 kW	(15 kW)	75% reduced
VRF Cooling Load	76.8 tons	55.4 tons	(21.4 tons)	28% reduced
VRF Heating Load	1,128 MBH	839 MBH	(289 MBH)	26% reduced
VRF HP MOCP	660A	440A	(220A)	33% reduced
Refrigerant Charge	138 lbs	92 lbs	(46 lbs)	33% reduced
VRF HP Weight	4,155 lbs	2,956	(1,199 lbs)	29% reduced
DOAS Cost	High	Low	Savings	50-75% cost savings
Air Cleaner Cost	n/a	10-15% of IAQP package	Cost add	10-15% cost add
VRF Unit Cost	High	Low	Savings	20-30% cost savings
Total System Cost	High	Low	Savings	30-40% cost savings
Energy Use	High	Low	Savings	-
IAQ	Std 62.1 compliant	Std 62.1 compliant	-	-

Recommendations

Project is sole-sourced through Siemens from investigation install. Siemens to GC project and oversee all applicable trades upon District approval.

1) Engage MEP engineer (investigation + MEP design drawings and CA (submittal review + RFI support)).

2) Install air monitoring devices to continuously monitor indoor air quality, including humidity levels.
   a) Base line and post-implementation data to verify solution efficacy.

3) Deliver preliminary mechanical and electrical design developed for budgeting (60% mechanical/electrical design).

4) Present final project proposal for infrastructure upgrades. Upon receipt of project proposal from Siemens, CCSD 34 shall either:

Recommendations (Con't)

4) Present final project proposal for infrastructure upgrades. Upon receipt of project proposal from Siemens, CCSD 34 shall either:

   a) Commence good faith negotiations with Siemens to enter into, within thirty (30) days, a contracting agreement for the proposed project(s). All costs incurred to date with respect to the preliminary engineered solution and development of the proposal will be the first payment due upon execution of the final agreement; or

   b) Elect not to enter into a contracting agreement with Siemens and agree to pay Siemens the amount of **$42,874** within thirty (30) days of receipt of the proposal for the time and expense incurred during the facilities infrastructure preliminary design.

Next Steps

1) Signed Proposal for preliminary engineered solution and development of the proposal.
2) Siemens to engage MEP engineer to begin investigation and design.
3) Siemens to deliver preliminary mechanical and electrical design developed for budgeting *(6 weeks from signed proposal).*
4) Siemens to deliver final project proposal for infrastructure upgrades *(10 weeks from signed proposal).*

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