CITY OF NEW PORT RICHEY PUBLIC WORKS AHU-2 HVAC ANALYSIS

NEW PORT RICHEY, FL

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July 14th, 2023

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Overview

VoltAir Consulting Engineers (VACE) was requested to evaluate an existing HVAC DX Split system known as an air handling unit (AHU-2) located in Mechanical Room 127 at the City of New Port Richey (NPR) Public Works Building. This analysis involves a deficiency report based on the information gathered at the site visit conducted on Monday, June 26th, 2023.

AHU-2 is a 25-ton split system installed at the time the City of NPR Public Works Building was constructed back in 2008. VACE also obtained and reviewed a number of images, as-builts drawings, and specification data for AHU-2.

The condensing unit (CU-2) located outside of Storage Room 125 and the electrical panel located in Electrical Room 114 also were observed.

AHU-2 and corresponding condensing unit are approaching the end of their useful life as defined by ASHRAE's Handbook and manufacturers' literature for the anticipated life of the equipment. In this environment, the useful life expectancy is between 10-15 years for the condensing unit and between 15-20 years for the indoor unit. Both the AHU-2 and condensing unit are in poor condition for their age and should be considered for replacement. VACE would recommend that all of the equipment be replaced. (Refer to the detailed description of the equipment for specific observations.)

Prior to replacing the equipment, VACE recommends that the cooling and heating loads be run for the spaces to ensure that the units are sized correctly and that proper ventilation rates are being maintained for the spaces as they are currently being used.

VACE would recommend that the ductwork (both medium pressure and low-pressure) be tested to ensure that there is no issue with the construction of the ductwork, dirt and debris within the ductwork, and also to verify the overall condition.

Controls

AHU-2 has a series of controls from KMC (Shown in Figure 1) with the inclusion of ABB VFD'S (Shown in Figure 2). The control panel and the VFD'S are located inside of Mechanical Room 127 (Shown in Figure 1). The controls were installed in 2009 and appear to be in good condition and functional. VACE would recommend that the control system be replaced and tied to the existing KMC Direct Digital Control (DDC) control system.

Figure 1 – Controls Panel (KMC Niagara and BACnet)

Figure 2 – ABB AHU-2 VFD

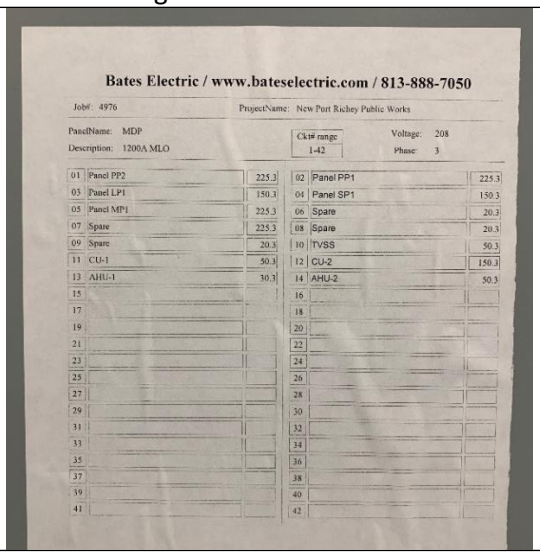
Electrical

The CU-2 (Breaker #12) and AHU-2 (Breaker #14) are receiving power from an Eaton PRL4B 208-volt 3 phase electrical panel (Shown in Figures 1-3). The manufacturing date shows as installed in 2008 when the building was originally constructed (Shown in Figure 4). It's located in Electrical Room 114 and it appears to be in good condition. At the time of the visit, there were no known signs of burning smell, flickering, nor frequent breaker trips.

It is recommended the breakers are replaced as required for the new equipment.

Figure 1 – PRL4B Panel

Figure 2 – Breakers



Bates Electric / www.bateselectric.com / 813-888-7050

Job#: 4976 ProjectName: New Port Richey Public Works

PanelName: MDP Ckt# range 1-42 Voltage: 208

Description: 1200A MLO Phase: 3

01	Panel PP2	225.3	02	Panel PP1	225.3
03	Panel LP1	150.3	04	Panel SP1	150.3
05	Panel MP1	225.3	06	Spare	20.3
07	Spare	225.3	08	Spare	20.3
09	Spare	20.3	10	TVSS	50.3
11	CU-1	50.3	12	CU-2	150.3
13	AHU-1	30.3	14	AHU-2	50.3
15			16		
17			18		
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41			42		

Figure 3 – Legend

Figure 4 – Manufacturer's specification

AHU-2

AHU-2 and ductwork located in Mechanical Room 127 was installed during original construction in 2008. AHU-2 and the ductwork were found to be in poor condition during the site visit and is approaching the end of its useful life. Additionally, maintenance personnel informed history of service and replacements in the last 5 years including everything but actuators.

The DX split system has two (2) liquid and two (2) suction lines coming from CU-2, with refrigerant type 22, going under grade up to Mechanical Room 127 to connect with AHU-2 (Shown in Figures 1-2). Refrigerant type 22 is being phased out and is no longer available or expensive to purchase. Notably, there is a louver (Shown in Figure 9) that is open to the exterior next to the OA louver. This allows unconditioned outside air to freely enter the mechanical room and is a significant source of corrosion on the AHU and ductwork.

Key observations from site visit go as follows:

- **Liquid line insulation deteriorating (Shown in Figures 1-2)**
- **Current unit refrigerant uses type 22 (Shown in Figure 3) which is being phased out**
- **Exterior sheet metal bubbling rust (Shown in Figure 5)**
- **Rust at structural base of AHU-2 (Shown in Figure 6)**
- **Limited allowable clearance to service/replace coil**
- **Limited allowable clearance to service/replace filters (Shown in Figure 8)**
- **Open louver to the exterior next to OA louver (Shown in Figure 9)**
- **OA damper seized in place and cannot be actuated (Shown in Figure 10)**

Based on observations VACE recommends AHU-2 and ductwork within the mechanical room be replaced. In addition, VACE recommends that the louver opened to the exterior be entirely sealed and the room be conditioned.

Figure 1 – AHU-2 Liquid and Suction Lines, and Condensate Outlet

Figure 2 – AHU-2 Liquid and Suction Lines, and Coil Access

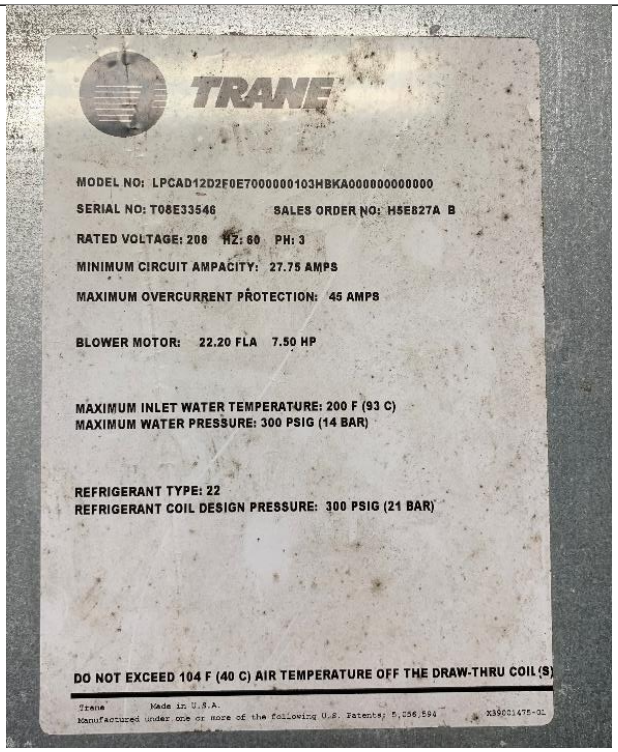


Figure 3 – Trane Equipment Label

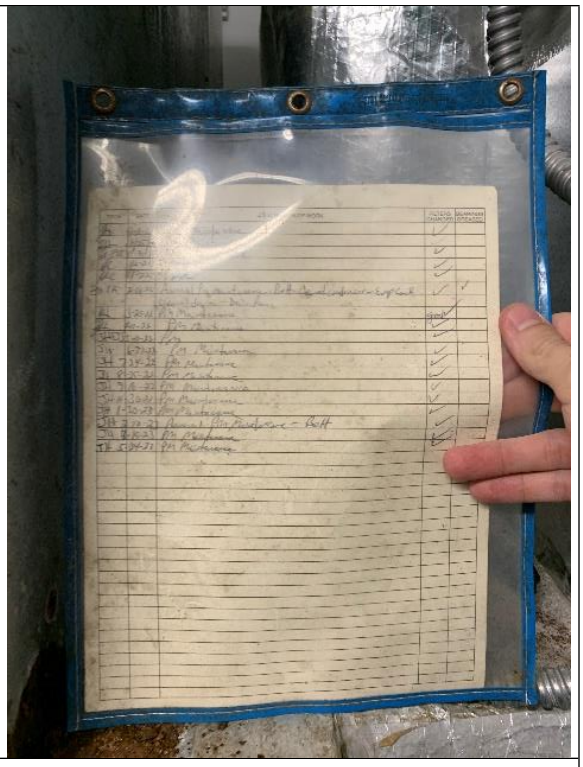
Figure 4 – AHU-2 Bubbling Rust

Figure 5 – AHU-2 Structural Base

Figure 6 – AHU-2

Figure 7– Filter Access

Figure 8 – OA Duct

	
Figure 9 – Damper Inside OA Duct	Figure 10 – AHU-2 Maintenance Log

CU-2

CU-2 (Shown in Figures 1-3) located outside of Storage Room 125 was installed during original construction in 2008. During the site inspection, VACE observed that CU-2 was in poor condition and is getting close to the end of its useful life as specified in the ASHRAE Handbook. Maintenance personnel informed history of replacement in the last 5 years including compressors, relays and condenser fan motors. AHU-2 is a direct expansion (DX) split system requiring a refrigerant system coming from CU-2.

Key observations from site visit go as follows:

- **Liquid line insulation deteriorating (Shown in Figures 3-6 and QR Code)**
- **During the site visit, the unit shut down completely (about 1:45pm, 90°F outside) and start back on about 6 minutes after (Shown in QR Code)**
- **Continuous rattling sound when operating (Shown in QR Code)**

Based on our observations VACE recommends that CU-2 be replaced.

Figure 1 – CU-2

Figure 2 – CU-2

Figure 3 – CU-2

Figure 4 – Liquid Line out from CU-2

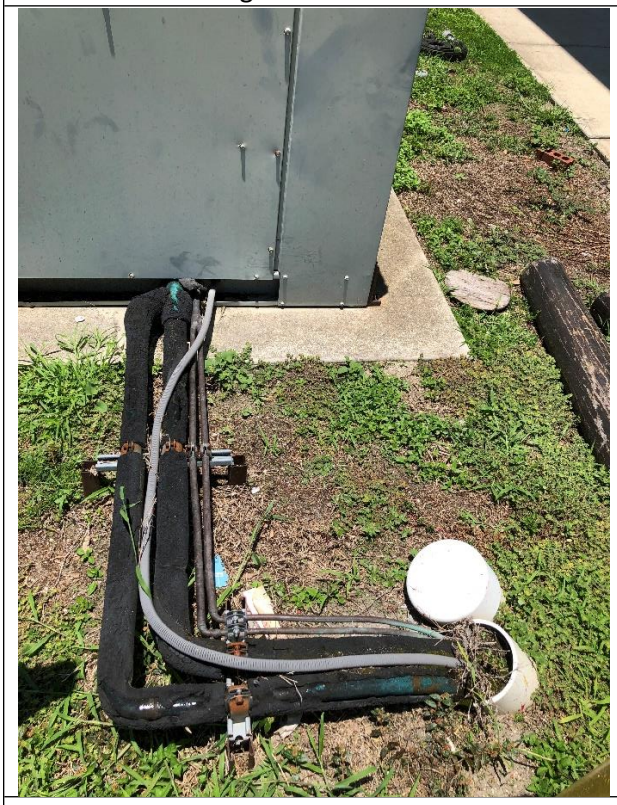


Figure 5 – CU-2 Liquid Line Deteriorating

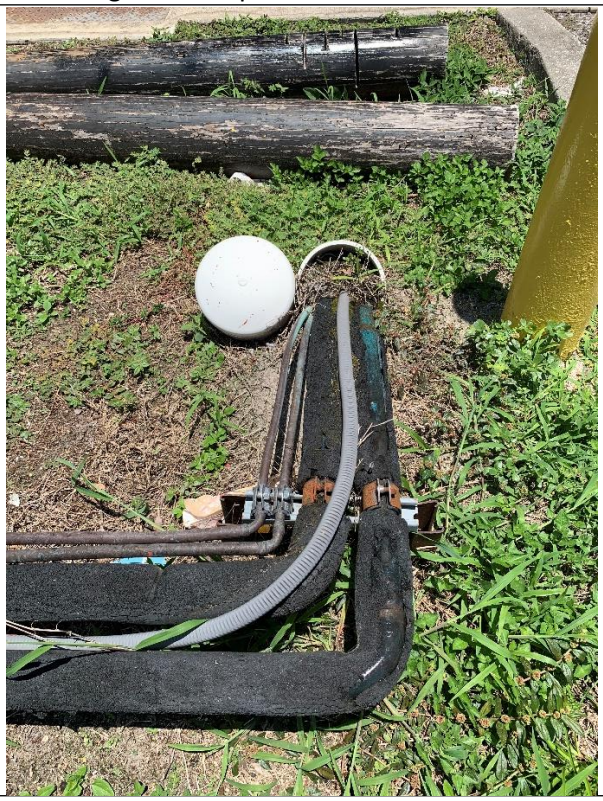
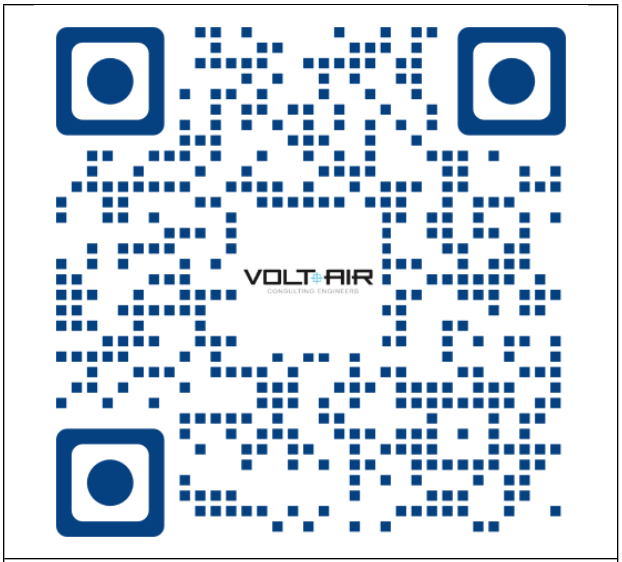


Figure 6 - CU-2 Liquid Line to AHU-2



QR Code – CU-2 Video

Conclusion

The AHU-2 and CU-2 systems are approaching the end of their useful life as defined by ASHRAE and manufacturers' literature for the anticipated life of the equipment. The equipment is in poor condition and should be considered for replacement. Executive summary of recommendations by category can be referenced below:

Controls:
Recommend Control System for replacement. Replacement to include the same manufacturer as currently found in other. In an effort to match the other existing controls commonly used in the City of NPR Public Works Building, KMC controls are advised to be installed.

Electrical:
Recommend electrical new breakers for CU-2 (Breaker #12) and AHU-2 (Breaker #14) for replacement as needed.

AHU-2 and Ductwork:
Recommend AHU-2 for replacement. VACE recommends replacing AHU-2 and ductwork in the mechanical room.

CU-2:
Recommend CU-2 for replacement. Replacement to include new liquid and suction lines from CU-2 to AHU-2.

As summarized above it is recommended that AHU-2/CU-2 and all the associated components be replaced. During the replacement of the systems there could be opportunities to implement additional strategies to provide a more efficient heating and cooling system.