CITY OF NEW PORT RICHEY CITY HALL HVAC ANALYSIS

NEW PORT RICHEY, FL

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Overview

VoltAir Consulting Engineers was requested to evaluate the existing HVAC systems located at the New Port Richey City Hall Building. There have been a number of issues with the chillers repeatedly being in alarm and needing to be cleared.

The facility is served by a 76-ton air-cooled chiller located on the roof and provides chilled water to three (3) chilled water handler units serving various spaces within the facility. Based on the information that was able to be gathered these three units were installed during the original construction of the facility. The chiller was replaced in approximately 2007. The constant volume chilled water pumps circulating the water throughout the facility are located in the mechanical room and appear to be original to the building which was built in approximately 1989.

There are two redundant direct expansion split systems that were installed in 2014 to serve the IT spaces. These units are in good condition and should remain.

The majority of the HVAC systems are approaching the end of their useful life as defined by ASHRAE and manufacturers' literature for the anticipated life of the equipment. The condition of the equipment is in average to poor condition for its age and should be considered for replacement. Refer to the detailed description of the equipment for specific observations.

We would recommend that all of the equipment with the exception of the two redundant split systems be replaced. During the replacement of these systems there is the chance to implement other strategies to provide a more efficient system to provide space heating and cooling.

Prior to the replacement of the equipment VoltAir Consulting Engineers 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.

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

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Controls

There are a variety of different controls manufacturers and types located throughout the facility. We would recommend that the control system be replaced and a new Direct Digital Control (DDC) control system be installed to operate the systems in an efficient manner. ABC controls is recommended to be installed in an effort to match the rest of the existing controls commonly installed in the city's facilities.

Photo 1 – Chiller Controls

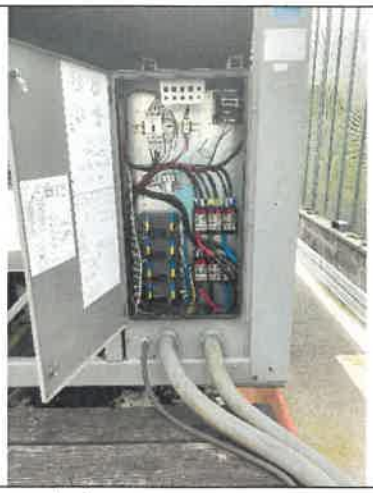


Photo 2 – Chiller Controls

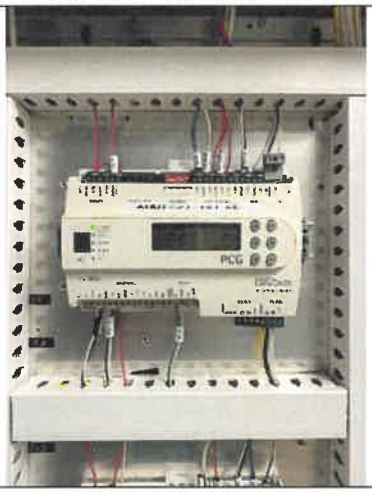


Photo 3 – AHU-1 Controls

Photo 4 – AHU-2 Controls

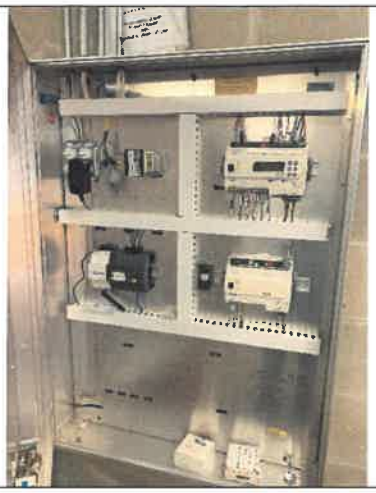


Photo 5 – Controls

Photo 6 – AHU-3 Controls

Photo 7 - Controls

Photo 8 – Controls

Photo 9 – Pneumatic Controls

Chiller

It appears that the original air-cooled chiller was replaced with a new 76-ton air-cooled chiller in 2007. This unit is now fourteen (14) years old and rapidly approaching the end of its anticipated life span. We do understand that two compressors were replaced in early 2019 which may allow the unit to last a little longer, but that additional added lifespan cannot be determined.

The existing insulation at the chiller is compromised. (Photos 9-11) This has an impact on the efficiency of the systems. In addition, this has led to condensation which has had an adverse impact on the chillers support system. (Photo 13). Existing valves at the chiller appear to be in poor condition and may not function properly (Photo 12). The coil fins are dirty and there is minor damage at the fins which can cause a degradation to the efficiency of the system (Photos 7-8). There is the ability to comb the fins and clean the coils to remedy these issues. These items are normal wear and tear and are expected. There is an existing annual maintenance period which focuses on coil cleaning. This annual maintenance period is due to happen shortly after the survey of the equipment.

It was described to the VoltAir that the existing system usually operates at a five (5) to seven (7) degree Fahrenheit delta between the chilled water supply and return temperatures. We would anticipate that this delta should be more in the ten (10) degree range. However, this cannot be verified as there are no record documents that have been made available that indicate the actual design delta

Based on the limited life expectancy left with the system and the other issues detailed above we would recommend that the chiller be replaced. This includes all piping, valves, and support systems within the chiller enclosure.

Photo 1 – Existing Chiller

Photo 2 – Existing Chiller Controls

Photo 3 – Existing Chiller Controls

Photo 4 – Compressor Bank and Piping

Photo 5 – Original Compressor A1 & A2

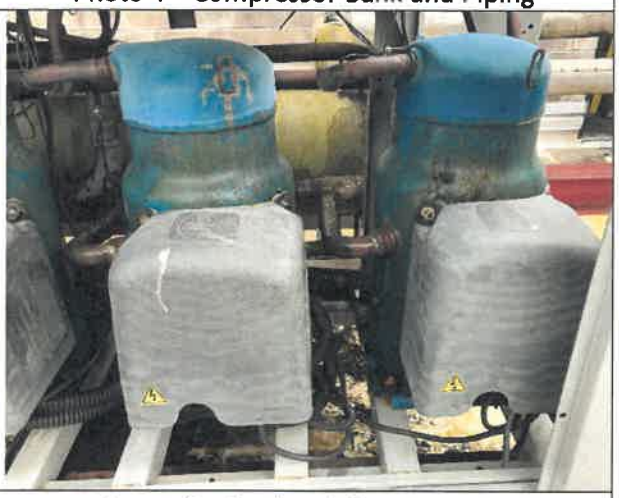


Photo 6 – Replaced Compressors

Photo 7 – Existing Chiller Fins

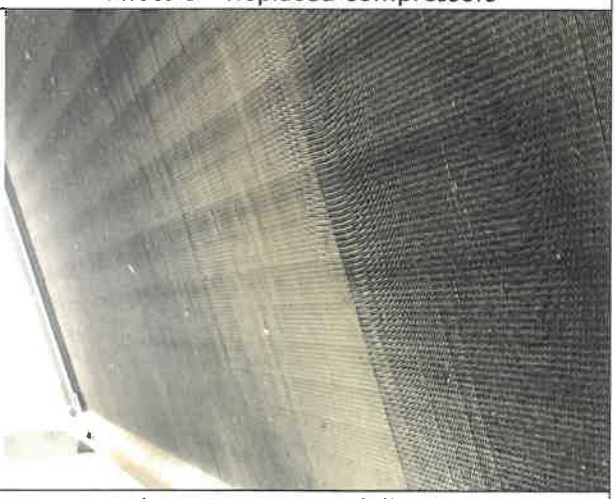


Photo 8 – Existing Chiller Fins

Photo 9 – Existing Chiller Insulation

Photo 10 – Existing Chiller Insulation

Photo 11 – Missing CHWP Jacketing

Photo 12 – Isolation Valve Condition

Photo 13 – Deteriorated Chiller Support

Photo 14 – Existing Roof Drain Condition

Chilled Water Pumps

Chilled water is circulated around the facility by two (2) three (3) horsepower pumps located in the mechanical room. These pumps are constant volume with one of the pumps being redundant and appears to be original to the building making them approximately 33 years old.

Some of the controls located at the pump are pneumatic and should be considered to be replaced. The motor on Pump 2 appears to be a newer motor than the motor on pump 1. There appears to be some rust that is forming on the unit but they are still operational.

Based on the limited life expectancy left with the system and the other issues detailed above we would recommend that the pumps be replaced. The pumps are also constant volume and not on a variable speed control. VFD's should be added to the new pumps.

Photo 1 – Existing Chilled Water Pump #1

Photo 2 – Existing Chilled Water Pump #1

Photo 3 – Existing Chilled Water Pump #2

Photo 4 – Existing Chilled Water Pump #2

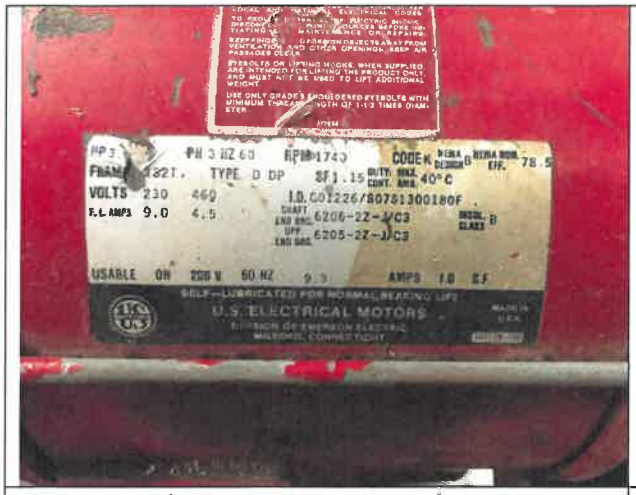


Photo 5 – Pump Nameplate

Photo 6 – Pump Nameplate

Photo 7 – Existing Chilled Water Piping

Photo 8 – Existing Chilled Water Component

AHU-1

Based on the data that was able to be garnered from the unit these appear to have been installed during the original construction of the facility in 1989. This draw through chilled water air handling unit has a three-way valve at the chilled water piping and a newer variable frequency drive with an electric duct heater installed on the outside air intake of the unit. The exterior of the unit is in average condition for its age.

The existing chilled water coil located within the air handling appears to be in average condition, while the belt driven fan is beginning to show signs of rust and deterioration.

The supply and return air ductwork within the mechanical room is internally insulated and is showing some signs of age. Without testing it is impossible to know, but there appears to be microbial growth within the internal ductwork lining. This hazard level of the growth cannot be known until testing is conducted. It is recommended that testing be immediately performed to determine the exact nature of the growth. Turning vanes in the ductwork are limited to the supply air ductwork within the airside system that was observed. There is 12"x12" outside air ductwork connected to the system within the mechanical room.

The electric duct heater located in the outside air ductwork is fed from an electrical disconnect that is located in the off position. This observation likely does not impact the building operations in a negative fashion. The facilities team has stated they are aware of this condition and regularly exercise the equipment during the winter season to maintain operation for emergency conditions.

Refer to Photos 1 through Photo 9 in this section for the conditions of Air Handling Unit 1.

Based on our observations we would recommend that the unit and ductwork within the mechanical room be replaced.

Photo 1 – Existing AHU-1

Photo 2 – Existing AHU-1

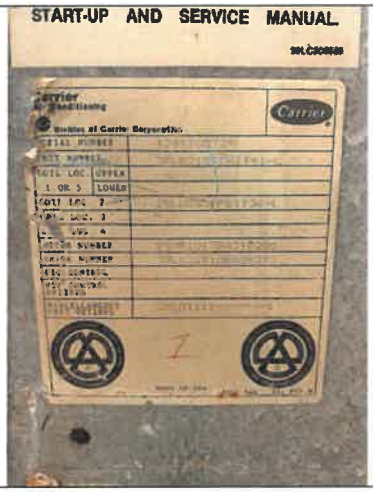


Photo 3 – AHU-1 Information

Photo 4 – AHU-1 VFD

Photo 5 – Supply Fan

Photo 6 - Filter

Photo 7 – Internally Lined Ductwork

Photo 8 – Supply Ductwork

	
Photo 9 – Electric Duct Heater	

AHU-2

The observations of AHU-2 show the unit to be in a similar condition to AHU-1. Based on the data that was able to be garnered from the unit, it appears to have been installed during the original construction of the facility in 1989. This draw through chilled water air handling unit has a three-way valve at the chilled water piping and a newer variable frequency drive with an electric duct heater installed on the outside air intake of the unit. The exterior of the unit is in average condition for its age.

The existing chilled water coil located within the air handling appears to be in average and condition but it is dirty and the belt driven fan is beginning to show signs of rust and deterioration. During the time of the site visit there was over an inch of standing water in the drain pan.

The supply and return air ductwork within the mechanical room is internally insulated and is showing some signs of age. Without testing it is impossible to know, but there appears to be microbial growth within the internal ductwork lining. This hazard level of the growth cannot be known until testing is conducted. It is recommended that testing be immediately performed to determine the exact nature of the growth. Turning vanes in the ductwork are limited to the supply air ductwork within the airside system that was observed. There is 12"x12" outside air ductwork connected to the system within the mechanical room.

The electric duct heater located in the outside air ductwork is fed from an electrical disconnect that is located in the off position. This observation likely does not impact the building operations in a negative fashion. The facilities team has stated they are aware of this condition and regularly exercise the equipment during the winter season to maintain operation for emergency conditions.

Refer to Photos 1 through Photo 11 in this section for the conditions of Air Handling Unit 2

Based on our observations we would recommend that the unit and ductwork within the mechanical room be replaced.

Photo 1 – Existing AHU-2

Photo 2 – Existing AHU-2

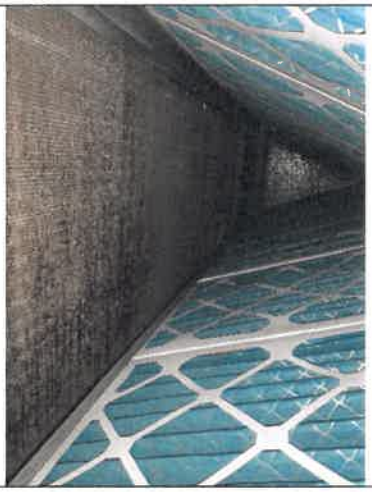
	
Photo 3 – AHU-2 Information	Photo 4 – AHU-2 VFD
	
Photo 5 – Supply Fan Condition	Photo 6 – Insulation Condition
	
Photo 7 – Insulation Condition	Photo 8 – Coil Condition

Photo 9 – Leaking Ductwork Seams

Photo 10 – Leaking Ductwork Seam

Photo 11 – Electric Duct Heater

AHU-3

Based on the data that was able to be garnered from the unit these appear to have been installed during the original construction of the facility in 1989. This draw through chilled water air handling unit has a three-way valve at the chilled water piping and a newer variable frequency drive with an electric duct heater installed on the outside air intake of the unit. The exterior of the unit is in poor condition for its age.

The existing chilled water coil located within the air handling appears to be in average condition and the belt driven fan is showing increased signs of rust and deterioration. There was some visible microbial growth within the unit, the exact substance was not tested to determine the specific type of growth. This hazard level of the growth cannot be known until testing is conducted. It is recommended that testing be immediately performed to determine the exact nature of the growth.

The supply and return air ductwork within the mechanical room is internally insulated and is showing signs of age. Without testing it is impossible to know, but there appears to be microbial growth within the internal ductwork lining. It is recommended that testing be immediately performed to determine the exact nature of the growth. Turning vanes in the ductwork is limited to the supply air ductwork within the airside system that was observed.

Refer to Photos 1 through Photo 14 in this section for the conditions of Air Handling Unit 3

Based on our observations we would recommend that the unit and ductwork within the mechanical room be replaced.

Photo 1 – Existing AHU-3

Photo 2 – Existing AHU-3

	
Photo 3 – AHU-3 VFD	Photo 4 – Insulation Condition
	
Photo 5 – Supply Fan Condition	Photo 6 – Insulation Condition
	
Photo 7 – Leaking Duct Seams	Photo 8 – Leaking Duck Seams

Photo 9 – Internal AHU-3

Photo 10 – Internal AHU-3

Photo 11 – Leaking Duct Seams

Photo 12 – Existing Pneumatic Controls

Photo 13 – Leaking Duct Seams

Photo 14 – Leaking Duct Seam

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AHU-4 & 5

Based on the data provided these redundant direct expansion air handling units were installed in 2014 to serve Information and Technology spaces within the facility. It should be noted that these newly installed units are not integrated into the existing BMS. These units are in good condition and should remain in their current configuration.

Photo 1 – AHU-4

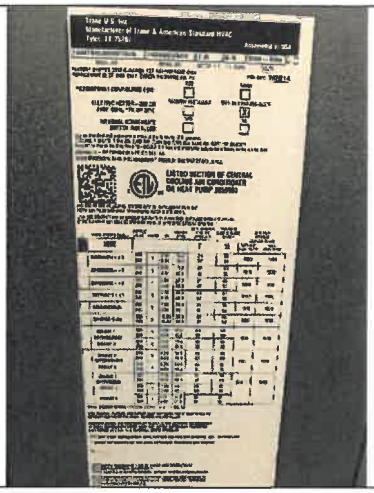

Photo 2 – AHU-4 Information

Photo 3 – AHU-5

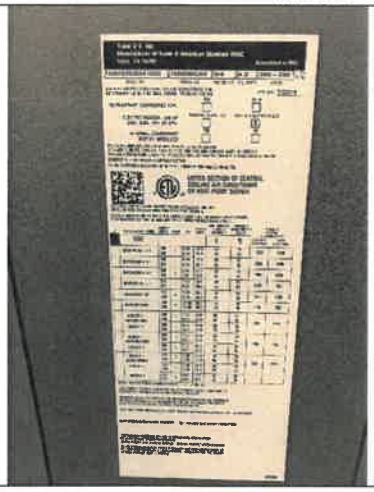

Photo 4 – AHU-5 Information

Conclusion

The majority of the HVAC systems are approaching the end of their useful life as defined by ASHRAE and manufacturers' literature for the anticipated life of the equipment. The condition of the equipment is in average to poor condition for its age 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 a new Direct Digital Control (DDC) control system of the same manufacturer as currently found in other existing city facilities.
Construction Cost Estimate: $100,000

Chiller:
Recommend Chiller for replacement. Replacement of chiller to include all piping, valves, and support systems within the chiller enclosure.
Construction Cost Estimate: $75,000

Pumps:
Recommend Pumps for replacement. Recommend replacement of constant volume pumps with variable speed pumps with the addition of VFDs added to the new pumps.
Construction Cost Estimate: $15,000

AHU-1:
Recommend AHU-1 for replacement. Replacement to include ductwork within the mechanical room.
Construction Cost Estimate: $50,000

AHU-2:
Recommend AHU-2 for replacement. Replacement to include ductwork within the mechanical room.
Construction Cost Estimate: $50,000

AHU-3:
Recommend AHU-3 for replacement. Replacement to include ductwork within the mechanical room.
Construction Cost Estimate: $40,000

AHU-4/5:
Do not recommend AHU-4 or AHU-5 for replacement. Integration of AHU-4 and AHU-5 into new BMS system would be recommended.

At the time of writing this report it is anticipated that in addition to the approximate $330,000 in equipment costs addressed above, there will be an additional $100,000 in costs necessary to cover design and architecture fees for a complete HVAC replacement. Due to the current economic conditions present in the industry in the uncertainty of pricing, it is suggested that the city includes a significant contingency in all pricing estimates.

As summarized above it is recommended that all of the equipment with the exception of the two redundant split systems 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.

Prior to the replacement of the equipment VoltAir Consulting Engineers 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.

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