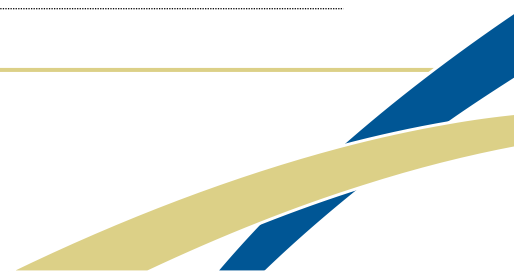


Client #	MRV Architects/Craig School District	Date	March 26, 2021
PDC #	21028JN	Prepared by	Doug Murray, PE
Project Name	Craig Schools – High School Ventilation Systems		
Subject	Assessment Report		

Topic	Discussion
<i>Introduction</i>	The Craig School District is interested in an assessment of the ventilation systems at the Craig High School. The following report describes the existing mechanical ventilation conditions with their respective system service life left and will provide recommendations for upgrade with potential rough order of magnitude cost estimates.
<i>Executive Summary</i>	The air handling units are in good condition and should have a service lives left of 15-20 years with regular maintenance. The exhaust fans are in fair condition with an estimated service lives left of 10-15 years. Automatic Control systems are the original Johnson Controls manufacturer. The ventilation systems are supplying adequate ventilation and with minor modifications can meet modern standards and recommendations for a healthy ventilation environment.
<i>Background</i>	<p>The high school ventilation systems consist of five large air handling units that are in two interior fan rooms and one exterior make-up air roof top fan unit. These ventilation systems units provide conditioned air to all occupied areas of the building. There are also 15 exhaust fans located throughout the building that exhaust air from the toilet and janitor rooms, kitchen functions, fume hoods, and generally improve building air quality.</p> <p>Automatic controls are the original the Johnson Controls Metasys direct digital controls. A site visit was done by two Johnson Controls technicians in early 2018 for checking and calibrating the controls. A field report of the controls was produced.</p>
<i>Analysis</i>	The air handling units are in good condition with service lives left of 15-20 years with regular maintenance. The exhaust fans are generally in fair



Topic	Discussion
	<p>condition with a service life left of 10-15 years. The exhaust fan systems are unfiltered, and the fans are starting to accumulate considerable dust and dirt on their inner parts including fan wheel. Part of annual maintenance should be to thoroughly clean a portion or all the exhaust fans regularly for proper and efficient operation. Once cleaned, the fans can probably go 2-3 years between cleanings.</p>
	<p>The Johnson Metasys controls are over 20 years old but are still functioning. However, DDC type controls typically will last 10-15 years and then major upgrades or complete replacement is generally experienced. The 2018 Field Report identified many sensors that were either not functioning or were in continual error/alarm. During the field trip the technicians were able to do some calibrating, but they reported that the controls were outdated and time for a major upgrade.</p>
	<p>It appears that the mechanical systems have not been commissioned. It was noted in the 2011 Craig High School Energy Report¹ the automatic controls operating the mechanical systems and the building air handling units did not appear to have been properly commissioned. Properly operating controls and mechanical systems will provide maximum comfort and</p>
	<p>The 2011 Energy Report² went on further to indicate that the ventilation systems appear to be oversized (50-70%) and should be corrected by decreasing air flows and rebalancing the air systems to better optimized air volumes. Additional energy efficiency measures (EEM's) are described in the 2011 report.</p>
	<p>According to the ASHRAE – Recommendations for Reducing Airborne Infectious Aerosol Exposure is to provide filters and air cleaners that achieve MERV 13 or better levels of performance.</p>
	<p>Additional measures could include HEPA filtration, ultraviolet germicidal irradiation (UVGI), and to a lesser extent Bipolar Ionization as supplemental treatments, but modern ventilation and good filtration (MERV 13 filters or better) would be a minimum start for an adequate ventilation systems environment with protection against viruses. See Research Section referral below for information.</p>
	<p>¹ <i>Energy Audit, Craig High School, Alaska Energy Engineering, October 2011.</i> ² <i>Ibid.</i> ³ <i>ASHRAE Epidemic Task Force, Core Recommendations for Reducing Airborne Infectious Aerosol Exposure, Jan 6, 2021.</i></p>



Topic	Discussion
<i>Recommendations</i>	<p>Recommend utilizing the two-stage filter system for ventilation AHU's that have it (AHU-1, AHU-2, and AHU-4) and to provide better filters for the ventilation AHU's systems that do not have the two stage filters (AHU-3, AHU-5, and MAU-1) to provide a minimum level of MERV 13 air filtration. Replace filters frequently but assumed quarterly. <i>Estimated Additional Filter Cost (Annually): \$4000.</i></p> <p>Recommend updating the 2018 field controls report and then upgrading the current Johnson Controls direct digital controls systems for modern equipment and software. Recommend doing this task in conjunction with the Ventilation System TAB and Commissioning recommendations below. <i>Estimated Controls Upgrade Cost: \$70,000.</i></p> <p>Recommend that the ventilation systems be reviewed for correct ventilation rates then readjust and balance the entire air systems to corrected values. <i>Estimated Design and TAB Cost: \$35,000.</i></p> <p>Recommend, after the above recommendations have been achieved, to commission the mechanical systems to maximize energy efficiency, environmental health, and occupant safety. <i>Estimated Commissioning Cost: \$25,000.</i></p> <p>Recommend cleaning all exhaust fans. <i>Estimated Cleaning Cost: \$10,000 or done by maintenance gradually.</i></p>

End of Report

