Stanwood High School
Stanwood-Camano School District

Commissioning Report
October 2023

Performance Validation Inc. (PV)
formerly Welsh Commissioning Group

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PERFORMANCE VALIDATION

Commissioning Report for

Stanwood-Camano School District

Stanwood High School

Submitted by:

Performance Validation, Inc.

(formerly Welsh Commissioning Group)

October 2023

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Executive Summary

Welsh Commissioning Group Inc. (WCG) was hired under contract with Stanwood-Camano School District to provide third party commissioning authority (CxA) services for the Stanwood Highschool project. The WCG commissioning authority team was led by commissioning project manager Byron Holmstead, with project support provided by Matt White and Stuart Greenwood who provided significant level of help. Bryan Welsh served as managing principal and Tim O'Neill was the commissioning operations manager.

The project consists of new construction of a three story, high school facility with approximately 227,310 square feet, a pre-engineered metal building of approximately 13,958 square feet, relocation of two existing greenhouses, renovations/additions to the existing fieldhouse and batting cages. The systems included in the Commissioning Scope of Work are HVAC, Building Automation System, lighting controls, meter monitoring, power distribution, plumbing systems and domestic hot water. The project is to be built using the Washington State Sustainable Schools Protocol (WSSP) standards.

A commissioning plan was developed and executed by the CxA and project team as detailed in the attached executed commissioning plan. Section 1 of the executed commissioning plan contains an overview of the process utilized on this project. Sections 2 through 5 contain step-by-step descriptions of the commissioning process along with a brief summary of results for each process step. The specific work products of the commissioning effort are located in Appendices 1 - 15 as referenced in the executed commissioning plan.

All phases of the commissioning plan were successfully executed. Based on the observations and testing conducted during the commissioning process, the systems appear to be performing satisfactorily.

All phases of the commissioning plan were successfully executed. There were a total of 148 issues discovered during the commissioning process and as of the issuance of this report, all of the issues are resolved.

Based on the observations and testing conducted during the commissioning process, the commissioned systems appear to be performing satisfactorily.

Limitations of Commissioning:

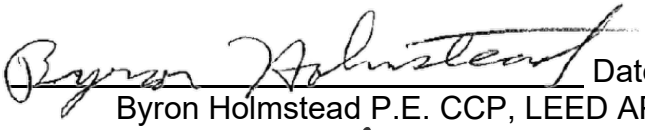
The commissioning process as implemented by this contract is intended to help assure the building systems operate efficiently, effectively and according to the design intent. This includes developing and executing a commissioning plan that incorporates a defined level of inspections and testing based on information made available to the commissioning consultant at the time of testing. This process generates a list of issues that are turned over to the owner or owner's representative for communication to the responsible contractor for response or correction.

The commissioning plan and associated tests were executed as contained herein and represent the efforts made by the commissioning authority to assure proper operation of the facility. Welsh Commissioning Group, Inc. makes no claims or warranties that the systems are entirely without defects. The architect and engineer of record along with the contractor are ultimately responsible for all aspects of the design and construction of the facility.

The commissioning process is not intended to verify compliance with any federal, state or local codes unless specifically stated herein. Code enforcement is the sole responsibility of the code official having jurisdiction for any code related issues that are applicable for this project. Welsh Commissioning Group, Inc. makes no claims or warranties that the facility meets any applicable codes.

All test results for this project are based on the system configuration and programming at the time of testing. As of the completion of the functional performance testing, the system operated according to the specified sequence of operations, subject to modifications by the engineer/contractor, with any possible exceptions noted herein. Subsequent activities by others such as a control system program overwrite, system parameter changes, or operator errors may cause the system to deviate from the original sequence as tested.

The commissioning process enhances system efficiency and operation at the time of commissioning but does not assure that the system will continue to operate correctly in the future. To gain the maximum benefit from commissioning, the facility must be operated in such a fashion as to assure that systems are adequately maintained and reviewed for proper operation on a regular basis.

Principal Cx Engineer:  Date: 9/29/23

Byron Holmstead P.E. CCP, LEED AP

Cx Services Manager:  Date: 9/29/23

Jake Huang PE, CCP, CxA

Executed Commissioning Plan

1.0 Commissioning Plan Overview

1.1 Project Description

The project consists of new construction of a three story, high school facility with approximately 227,310 square feet, a pre-engineered metal building of approximately 13,958 square feet, relocation of two existing greenhouses, renovations/additions to the existing fieldhouse and batting cages. The systems included in the Commissioning Scope of Work are HVAC, Building Automation System, lighting controls, meter monitoring, power distribution, plumbing systems and domestic hot water. The project is to be built using the Washington State Sustainable Schools Protocol (WSSP) standards.

The project site is in Stanwood, Washington.

1.2 Project Team

Owner:	Stanwood-Camano School District
Project Manager:	Gary Platt
Architect:	McGranahan Architects
Mechanical Engineer:	BCE Engineers
Electrical Engineer:	BCE Engineers
General Contractor:	Cornerstone
Commissioning Authority:	Welsh Commissioning Group, Inc.
Mechanical Contractor:	Ramsett
Electrical Contractor:	Milne
Control Contractor:	ATS
TAB Contractor:	Airtest

1.3 Commissioning Objectives

Primary objectives of the commissioning effort include:

- Verify the installation and performance of commissioned systems meet requirements of the project documents.
- Ensure commissioned systems operate according to the approved sequence of operations; this action helps maximize the energy efficiencies of the installed systems.
- Verify environmental control strategies maintain desired set points.
- Reduce number of maintenance issues and warranty claims.
- Meet the requirements for WSSP E4.0 Fundamental Commissioning
- Meet the requirements for WSSP E4.1 Enhanced Commissioning

1.4 Roles and Responsibilities

Contractor:

The contractor is responsible to conduct testing and adjusting as required by the specifications and local codes, regulations and authorities having jurisdiction. Start-up and testing of equipment is to be performed by the contractor per manufacturer's recommendations and any associated checklists. The contractor shall notify the commissioning authority (CxA) for startups and testing that require witnessing. See sections on installation and startup, testing and project closeout for a summary listing of requirements. The contractor shall complete, assemble and provide the required documentation in a timely fashion and deliver it to the CxA.

Contractor Commissioning Coordinator (CCC):

1. Works with the CxA as a single point of contact to manage and coordinate the commissioning work performed by the contractor and subcontractors including responsibilities identified as the CCC's responsibility in each section on commissioned systems. The CCC does not assume any of the responsibilities of the CxA.
2. Coordinate owner and CxA participation in scheduled commissioning activities. Notify owner and CxA a minimum of 5 working days in advance of commissioning activities.
3. Collect from subcontractors, review and submit commissioning material and documentation to the CxA for approval prior to proceeding with commissioning activities including, but not limited to, the following:
    a. Manufacturer's O&M manuals for commissioned systems.
    b. Proposed manufacturer's installation and start-up documents
    c. Proposed cleaning, flushing, testing, disinfection forms
    d. Proposed static tests and calibration forms
    e. Start-up plan
    f. Proposed functional performance test forms
    g. Completed manufacturer's installation and start-up documents
    h. Completed cleaning, flushing, pressure testing, disinfection forms
    i. Completed static tests and calibration forms
    j. Completed system readiness checklists
    k. Completed functional performance test forms
    l. TAB agenda
    m. TAB preliminary and final report
    n. Signed off issues lists
    o. Proposed O&M manuals
    p. Training plans and agenda
    q. Final O&M manuals

4. Review and comment on preliminary functional tests provided by CxA. The review shall include subcontractor responsible for system to be commissioned.
5. Develop, manage and update commissioning schedule. Integrate commissioning activities into master schedule. Provide a 2-week look-ahead schedule of commissioning activities, updated weekly or as scheduled commissioning activities change during 2-week period.
6. Distribute issues lists to subcontractors.
7. Assemble, manage and update the start-up plan.
8. Attend regularly scheduled construction and owner's meetings and review commissioning activities with subcontractors and design team. Include commissioning activity items in construction meeting minutes.
9. Participate in commissioning meetings.
10. Provide material for, participate in the development of, and review the commissioning report.
11. Coordinate and participate in seasonal testing.

Commissioning Authority (CxA):

Fundamental Commissioning

1. The CxA shall develop and provide to the project architect the project specification sections related to commissioning procedures. The specifications will be prepared based on the near 100% complete project bid documents as provided by the design team to the CxA.
2. The CxA shall attend the pre-bid meeting to answer commissioning-related questions.
3. The CxA shall provide a complete commissioning plan to the commissioning team to include all checklists, startup documents, verification forms, procedures and test forms.
4. The CxA shall schedule, organize and coordinate an initial on-site commissioning coordination meeting. The initial meeting shall be with the owner, design team and contractors to present the commissioning plan, and discuss issues related to the proposed commissioning process. Meeting agenda and minutes shall be provided by the CxA.
5. The CxA shall schedule, organize and coordinate a construction-phase controls integration meeting. The controls integration meeting shall be with the HVAC control contractor, lighting control contractor and design team to review control strategies and testing; to be held after receipt of submittals and prior to programming. Meeting agenda and minutes shall be provided by the CxA.

6. The CxA shall schedule, organize and coordinate on-site commissioning meetings and site observations. Commissioning meetings will be for the purpose of coordinating commissioning tasks with the contractor and discussing unresolved issues. Meeting agenda and minutes shall be provided by the CxA. Coincident with meetings, site observations shall be conducted by the CxA during the construction process. The purpose of these observations will be to evaluate compliance to contractual obligations such as cleanliness, capping ductwork, access to equipment, maintainability and so forth to identify concerns before they are repeated throughout the project. A site observation report will be provided. On-site meetings will be augmented as necessary with conference call meetings.
7. The CxA shall witness selected equipment start-ups and shall collect start-up documents as provided by the installing contractor and review them for conformance to contract documents and manufacturer's recommendations.
8. The CxA shall witness HVAC piping pressure tests and flushing sufficient to be confident that proper procedures were followed.
9. The CxA shall witness ductwork testing and cleaning sufficient to be confident that proper procedures were followed.
10. The CxA shall audit completed contactor checklists on a sample basis to verify that the equipment and systems designated for commissioning are installed, started and ready for functional test verification. Issues discovered during this audit will be documented by the CxA in a commissioning issues log and communicated to the commissioning team. The completed verification forms will be provided by the CxA in the final report.
11. The CxA shall review the testing, adjusting and balancing (TAB) report and provide written comments to the commissioning team. The CxA shall verify TAB work (10% sample basis). Issues discovered during the TAB review will be documented by the CxA in the commissioning issues log and communicated to the commissioning team.
12. The CxA shall be responsible for scheduling, coordinating and witnessing selected functional performance testing as detailed in the commissioning plan. This work includes the completion of all data entry forms for inclusion in the commissioning report. Issues discovered during functional test will be documented by the CxA in a commissioning issues log and communicated to the commissioning team. The completed functional test forms will be provided by the CxA in the final report.
13. The CxA shall witness retests or otherwise verify reported corrections on a one-time per issue basis. The CxA shall provide an updated commissioning issues list to the commissioning team. Additional retesting and verification of corrections beyond the one-time per issue shall constitute work beyond the commissioning scope of work.
14. The CxA shall review contractor provided O&M manuals for the commissioned systems to verify compliance with project documents.

15. The CxA shall prepare a preliminary commissioning report for submittal to the client and building official for review and approval.

At the completion of all commissioning related procedures, the CxA shall be responsible for assembling and producing a commissioning report for submission to the client.

Enhanced Commissioning

1. During the design phase, the CxA shall attend up to two design phase project team meetings.
2. As it relates to the commissioned systems, the CxA shall review the owner project requirements (OPR) and design team basis of design (BOD). The OPR is provided by the owner and design team. The BOD is provided by the design team. CxA review comments will be provided in a written report to the project team through the project manager.
3. As it relates to the commissioned systems, the CxA shall review design documents twice; once near the end of design development and once at the mid-construction documents phase. The CxA shall back-check the review comments in the subsequent design submission.
4. The CxA shall review contractor submittals applicable to systems being commissioned for compliance with OPR and BOD. This review shall be concurrent with A/E reviews and submitted to the design team and the client.
5. The CxA shall verify functional and maintenance related training of O&M staff and verify that such training is completed in the commissioning report.
6. The CxA shall verify that training of building occupants regarding optimal operation of commissioned systems they interface with has been completed.
7. The CxA shall review the creation of a classroom “owner’s manual” that is to be kept in the classroom.
8. The CxA shall conduct seasonal testing as required.
9. The CxA shall verify warranty documentation from equipment suppliers and sub-contractors, including extended warranty requirements, if any.
10. The CxA shall review building operation after one academic year of building use with O&M staff and occupants. Include a plan for resolving outstanding commissioning related issues.
11. The CxA shall develop a systems manual to provide operations personnel with a tool that describes how the systems were developed, installed and tested. The manual shall be prepared in accordance with ASHRAE Standard 202 Appendix L. The intent of the manual is to allow operations personnel to maintain the peak performance of the commissioned system.

1.5 Commissioned Systems Description

The commissioned equipment list defines the equipment and systems commissioned and provides an outline of the various modes of operation. Appendix - 1 contains the commissioned equipment list. Below is a brief narrative description of the commissioned systems.

Domestic Hot Water and Plumbing Systems:

Domestic hot water is generated by either gas or electric water heaters with circulating pumps. Small standalone buildings will use the electric water heaters. The commissioned plumbing fixtures include water closet, urinals, lavatory, shower, floor drains, trap primers, and eyewash stations.

HVAC and Building Automation System:

The commissioned HVAC systems for the main occupied areas consist of VAV supply and exhaust terminal units that are supplied by DOAS VAV air handling units for ventilation. Fan coil ceiling cassette units provide heating and some provide both heating and cooling.
Single zone 4-pipe heating and cooling VAV air handling units for ventilation and temperature control in common areas.
Heating and cooling water is provided by hydronic systems generated by gas fired boilers and air-cooled chiller.
Electrical, MDF & IDF rooms are served by split-system AC.
Control of the split system AC units is via stand-alone thermostats.
Control of all other systems is by a centralized building control system.

Lighting Control System:

Interior lighting consists of dual-zone daylight-harvesting controls in perimeter zones and occupancy sensors in areas with variable occupancy. General area lighting is controlled via a low-voltage network system. Exterior lighting control via the BMS system.

Power Distribution:

The commissioned power distribution system includes startup test document review for transformers, conductors, circuit panels and switch gears.

Meter Monitoring System:

Power metering information is collected by the BMS system and displayed via dashboard.

1.6 Commonly Used Acronyms

The following acronyms may be used throughout this report:

AC = Air Conditioner / Air Conditioning
A/E = Architect / Engineer
AHU = Air Handling Unit
ASHRAE = American Society of Heating, Refrigerating, and AC Engineers
BAS / BCS = Building Automation System / Building Control System
BMS / EMS = Building Management System / Energy Management System
BOD = Basis of Design
CCC = Contractor's Commissioning Coordinator
CCL = Contractor's Checklists
CCTV = Closed Circuit Television
CFM = Cubic Feet per Minute
CxA = Commissioning Authority
DDC = Direct Digital Controls
DOAS = Dedicated Outside Air System
DX = Direct Expansion
EOR = Engineer of Record
FA = Fire Alarm
FPT = Functional Performance Test
HRU = Heat Recovery Unit
HVAC = Heating, Ventilating, and Air Conditioning
IDF = Intermediate Distribution Frame
IVA = Installation Verification Audit
kW = Kilowatts
kWh = Kilowatt-hours
MDF = Main Distribution Frame
O&M / M&O = Operation and Maintenance
OPR = Owner Project Requirements
OSA = Outside Air
PPM = Parts Per Million
RTU = Rooftop Unit
SRC = System Readiness Checklist
TAB = Testing, Adjusting, and Balancing
VAV = Variable Air Volume
WCG = Welsh Commissioning Group
WSEC = Washington State Energy Code (Commercial Provisions)
WSSP = Washington Sustainable Schools Protocol

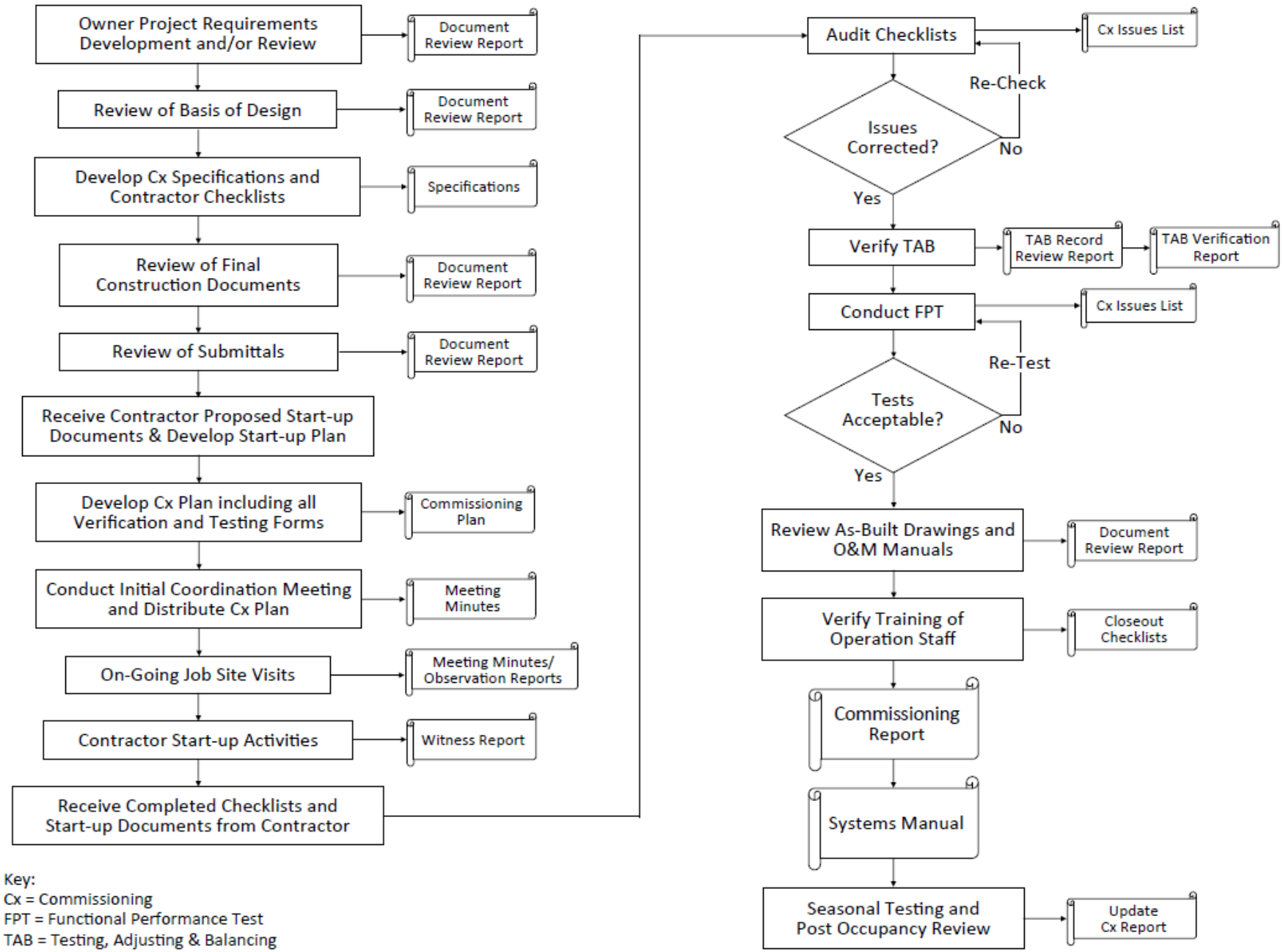
1.7 Commissioning Approach

The commissioning process is divided into the following four phases:

- Pre-Design Phase
- Design Phase
- Construction Phase
- Occupancy and Operations Phase

The approach to each of these phases is outlined in sections 2 through 5. A flow chart outlining a typical full-scope commissioning approach is included on the following sheet for information. Also see CxA responsibilities under Section 1.4 for further information on scope and approach.

Full Scope Commissioning Project Approach



Key:
Cx = Commissioning
FPT = Functional Performance Test
TAB = Testing, Adjusting & Balancing

2.0 Pre-Design Phase

2.1 Owner's Program, Project Requirements and Basis of Design

The CxA conducted a review of the owner's project requirements document (OPR) and the basis of design (BOD) document. The OPR was prepared by the owner with assistance from the CxA and design team. The BOD was prepared by the design team.

Appendix – 2 contains the OPR/BOD document and review reports as provided by the CxA for this project.

3.0 Design Phase

3.1 Project Document Review

The CxA conducted a commissioning design review of the design documents prior to the mid-construction documents phase and back-checked the review comments in the subsequent design submission. All design review comments were resolved.

Appendix – 3 contains the document review reports provided by the CxA for this project.

3.2 Commissioning Specifications

The CxA developed the commissioning specifications for inclusion in the project documents. The specifications included roles and responsibilities of the contractor, commissioning procedures, sample systems readiness checklists, functional test outlines, sample functional tests and project closeout checklists.

Specification sections provided by the CxA (i.e. sections 019113, 220800, 230800, and 260800) were successfully incorporated into the project documents.

4.0 Construction Phase

4.1 Submittal Review

The commissioning authority reviewed contractor submittals applicable to systems being commissioned for compliance with the OPR and BOD. The review was done concurrent with A/E reviews and was submitted to the design team and the owner. The review comments were back-checked against subsequent submittal versions. All comments were resolved.

Appendix – 4 contains the submittal review reports for this project.

4.2 Commissioning Meetings

The CxA scheduled, organized and coordinated on-site commissioning meetings including an initial on-site commissioning coordination meeting, a controls integration meeting and regular commissioning meetings. The initial meeting was with the owner, design team and contractors to present the commissioning plan, and discuss issues related to the proposed commissioning process.

The controls integration meeting was with the control contractor and design team to review control strategies and testing.

Subsequent meetings were for coordinating commissioning tasks with the contractor and discussing unresolved issues. Meeting agenda and minutes were provided by the CxA. Coincident with meetings, site observations were conducted by the CxA when appropriate (see 4.3).

Appendix – 5 contains commissioning agendas and commissioning meeting minutes for the project.

4.3 Site Observations

The CxA performed on-site observations during the construction process. The purpose of these observations was to evaluate compliance to contractual obligations such as cleanliness, capping ductwork, access to equipment, maintainability and so forth to identify concerns before they are repeated throughout the project. The CxA utilized a site observation checklist as a guide during the on-site work. A site observation report (SOR) was provided to the owner and contractor. Issues discovered during the site observations were resolved.

Appendix – 6 contains the completed SORs.

4.4 Installation and Start-up

Installation and Start-up activities included procedures outlined by the manufacturer and required by the contract documents, including static testing, calibration and cleaning activities. The CxA provided the contractor with a tabbed binder with index for guidance and assembly of the start-up plan. The contractor populated the start-up plan with proposed installation and start-up procedures/forms for submittal to the CxA for approval. The CxA-approved startup checklists were completed by the contractor and returned to the CCC prior to the functional performance testing process.

The system readiness checklists (SRC) are a summary of installation, start-up and static testing activities required by the contract documents. The contractor was responsible for verifying and documenting that the activities on these checklists were completed. Some subcontractors did not complete the required CCL's. Also, no completed startup forms were provided for the Gas Furnaces, Exhaust/booster Fans, AC units, Sawdust collector, and lighting controls.

Appendix – 7 contains the indexed start-up plan including CCLs and completed manufacturer's start-up documents as received from the contractor.

4.5 Installation Verification

Installation verification (IV) consisted of the on-site review of related system components for conformance to the project documents. The CxA conducted this review using CxA provided checklists in conjunction with the CCLs and verified system readiness for functional testing procedures prior to the start of functional performance testing. The CxA documented discrepancies identified using the commissioning issues list and assigned them to the appropriate party for resolution. All issues discovered during the installation verifications were resolved.

Appendix – 7 contains the completed installation verification checklists as developed by the CxA for this project.

4.6 TAB Verification

The verification process consisted of first reviewing the testing, adjusting and balancing (TAB) report as provided by the TAB contractor for completeness, accuracy, and conformance to the project documents. Once the report appeared substantially complete and accurate, the CxA witnessed the TAB contractor demonstrating field measurements on approximately 10% of the balanced systems.

Appendix – 8 contains the TAB verification report which includes summary findings, the TAB record review report and TAB verification field measurements.

4.7 Functional Performance Testing

Functional performance testing (FPT) consisted of the documented testing of system parameters, under actual or simulated operating conditions. FPT's were successfully executed and issues discovered during the testing were resolved. . One test could not be finalized due to site conditions. Appendix 12 contains information of testing that could not be accomplished.

Appendix – 9 contains the completed functional performance testing forms for the project.

4.8 Trend Logging

The commissioning authority reviewed trend logs as provided by the control contractor to confirm overall performance of the systems.

Appendix – 10 contains the trend log plan as developed by the CxA, a trend log analysis report, and graphical copies of the reviewed data.

4.9 Commissioning Issues List

This list, generated and maintained by the CxA, included the description of potential issues discovered as a result of the commissioning process. The list included the current status updates on issues, assignment to the responsible party and the date of final resolution as confirmed by the CxA.

Appendix – 11 contains the full commissioning issues list.

4.10 M&O Manual and Warranty Review

The CxA reviewed maintenance and operations (M&O) manuals for the commissioned systems for completeness and conformance with the project documents. All comments were resolved by the contractor and verified by the CxA.

Appendix – 12 contains the Warranty review in the M&O report provided by the CxA.

4.11 M&O Training

The CxA verified that the requirements for training operating personnel and building occupants were completed.

Appendix – 13 contains training sign in sheets.

5.0 Occupancy and Operations Phase

5.1 Post Occupancy Review

Near the end of warranty period, the commissioning authority conducted an on-site review with the owner, design team and contractor to review operation of the commissioned systems.

Appendix – 14 contains a copy of the post occupancy review report generated from the on-site review.

Appendix 1 – Commissioned Equipment List

Welsh Commissioning Group, Inc.

Commissioned Equipment List / Process Tracking

Project: Stanwood High School

Unit No.	Equipment Description	Submittal Received	Submittal Reviewed	Completed SU Form	Completed Contractor Checklist (CCL)	CxA CCL Verification	CxA TAB Verification	FPT Complete	Trends Complete	O&M Submitted	Training Complete
	Division 22										
WH-1	Gas Water Heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
WH-2	Gas Water Heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
WH-3	Gas Water Heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
WH-4	Gas Water Heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
CP-1	Hot water circ pump	Y	Y	NA	NA	Y	NA	Y	NA	Y	Y
CP-2	Hot water circ pump	Y	Y	NA	NA	Y	NA	Y	NA	Y	Y
CP-3	Hot water circ pump	Y	Y	NA	NA	Y	NA	Y	NA	Y	Y
CP-4	Hot water circ pump	Y	Y	NA	NA	Y	NA	Y	NA	Y	Y
HWT-1	CTE Gas water heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
CP-1	CTE Hot water circ pump	Y	Y	NA	NA	Y	NA	Y	NA	Y	Y
HWT-1	Field house Electric Water Heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
CP-1	Field house EWH Pump	Y	Y	NA	NA	Y	NA	Y	NA	Y	Y
HWT-1	Batting Cage Electric Water Heater	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
	Plumbing fixtures (Sample basis)	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
	Division 23						NA		NA		
CH-1	Air cooled chiller	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
CCP-1	Chilled water pump	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
CCP-2	Chilled water pump	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
							NA		NA		
B-1	Gas Boiler	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
B-2	Gas Boiler	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
B-3	Gas Boiler	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
BCP-1	Boiler circ pump	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
BCP-2	Boiler circ pump	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
BCP-3	Boiler circ pump	Y	Y	Y	Y	Y	NA	Y	NA	Y	Y
HCP-1	Secondary loop pump	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y
HCP-2	Secondary loop pump	Y	Y	Y	Y	Y	Y	Y	NA	Y	Y
									NA		
AHU-1	Air Handling Unit, Gym	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
AHU-2	Aux Gym	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
AHU-3	Aux Gym	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
AHU-4	Commons	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AHU-5	Theater	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
AHU-6	Stage	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
AHU-7	Lobby	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
							NA				
DOAU-1	Dedicated OA unit, 1st Flr W	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
DOAU-2	2nd & 3rd Flrs West	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
DOAU-3	1st Flr East	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
DOAU-4	Gym offices	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Unit No.	Equipment Description	Submittal Received	Submittal Reviewed	Completed SU Form	Completed Contractor Checklist (CCL)	CxA CCL Verification	CxA TAB Verification	FPT Complete	Trends Complete	O&M Submitted	Training Complete
DOAU-5	2nd & 3rd East	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
DOAU-6	2nd Flr Admin	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
							NA				
FCU-101 to FCU-169	Fan Coil unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
FCU-201 to FCU-238, 261 to 277	Fan Coil unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
FCU-239 to FCU-260	Fan Coil unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
FCU-301 to FCU-377	Fan Coil unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
VAV-101 to VAV-118	VAV supply terminal unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
VAV-201 to VAV-225	VAV supply terminal unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
VAV-301 to VAV-337	VAV supply terminal unit	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
AFD-101 to ADF-112	Exhaust VAV	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
AFD-201 to ADF-215	Exhaust VAV	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
AFD-301 to ADF-305	Exhaust VAV	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y
DOAU-1	CTE Classrooms	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y
VAV-1	CTE Supply VAV box	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
VAV-2	CTE Supply VAV box	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
VAV-3	CTE Supply VAV box	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
VAV-4	CTE Supply VAV box	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
VAV-5	CTE Supply VAV box	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
EVAV-1	CTE Exhaust VAV	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
EVAV-2	CTE Exhaust VAV	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
EVAV-3	CTE Exhaust VAV	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
EVAV-4	CTE Exhaust VAV	Y	Y	NA	Y	Y	NA	Y	Y	Y	Y
F-1	CTE Gas Furnace	Y	Y	N	N	Y	NA	Y	Y	Y	Y
F-2	CTE Gas Furnace	Y	Y	N	N	Y	NA	Y	Y	Y	Y
F-3	CTE Gas Furnace	Y	Y	N	N	Y	NA	Y	Y	Y	Y
F-4	CTE Gas Furnace	Y	Y	N	N	Y	NA	Y	Y	Y	Y
HRU-1	Field house HRU	Y	Y	Y	N	Y	NA	Y	NA	Y	Y
EF-101	Kiln Exhaust	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-102	Mech 176 Ventilation	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-103	Culinary arts hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-104	Kitchen hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-105	Kitchen hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-106	Kitchen hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-107	Drying room	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-111	Field House Pump Room	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-201	Lab Hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y

Unit No.	Equipment Description	Submittal Received	Submittal Reviewed	Completed SU Form	Completed Contractor Checklist (CCL)	CxA CCL Verification	CxA TAB Verification	FPT Complete	Trends Complete	O&M Submitted	Training Complete
EF-202	Lab Hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-203	Lab Hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-204	Lab Hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-205	Lab Hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-206	Lab Hood	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-207	Kennels	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-208	Electrical 255 ventilation	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-209	Triage, Treatment	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-210	Mech 209 ventilation	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-211	Electrical 208 ventilation	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-301	Electrical 333 ventilation	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-1	CTE Welding South	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-2	CTE Welding North	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-3	CTE Welding South	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-4	CTE Welding North	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-5	CTE Welding Cutter	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-6	MECH 408	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EF-1	CONCESSIONS	Y	Y	N	N	Y	NA	Y	NA	Y	Y
BF-101	Dryer booster fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
BF-102	Dryer booster fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
BF-103	Dryer booster fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
DF-1	Destratification fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
DF-2	Destratification fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
DF-3	Destratification fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
DF-4	Destratification fan	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-101	Split AC, Elev Mach	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-102	Elev Mach	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-103	MECH 176	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-201	MDF 213	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-202	Kennels	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-301	IDF 334	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-302	IDF P2	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-303	Dimmer Room	Y	Y	N	N	Y	NA	Y	NA	Y	Y
ICU-1	Split AC, CTE IDF	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-101	Electric wall heater, Fire riser	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-102	Mech 176	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-103	Storage 119	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-104	Stair 9	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-105	Field House Pump Room	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-201	Mech 209	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EWH-1	CTE Mech 409	Y	Y	N	N	Y	NA	Y	NA	Y	Y

Unit No.	Equipment Description	Submittal Received	Submittal Reviewed	Completed SU Form	Completed Contractor Checklist (CCL)	CxA CCL Verification	CxA TAB Verification	FPT Complete	Trends Complete	O&M Submitted	Training Complete
EH-1	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-2	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-3	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-4	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-5	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-6	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-7	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-8	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-9	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-10	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-11	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-12	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-13	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-14	Field house Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-1	Batting Cage Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-2	Batting Cage Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
EH-3	Batting Cage Electric heater	Y	Y	N	N	Y	NA	Y	NA	Y	Y
SDCU-1	Saw Dust Collector	Y	Y	N	N	Y	NA	Y	NA	Y	Y
UH-1	GAS FIRED UNIT HEATER	Y	Y	N	N	Y	NA	Y	NA	Y	Y
UH-2	GAS FIRED UNIT HEATER	Y	Y	N	N	Y	NA	Y	NA	Y	Y
UH-3	GAS FIRED UNIT HEATER	Y	Y	N	N	Y	NA	Y	NA	Y	Y
UH-4	GAS FIRED UNIT HEATER	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Division 26										
	Lighting Occupancy Sensors	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Lighting Dimming PC	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Lighting Control Panels	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Water Meters	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Gas Meters	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Power Meters	Y	Y	N	N	Y	NA	Y	NA	Y	Y
	Dashboard	Y	Y	N	N	Y	NA	NA	NA	Y	Y
	Power distribution	Y	Y	N	N	Y	NA	NA	NA	Y	Y
	Conductors	Y	Y	N	N	Y	NA	NA	NA	Y	Y
	Transformers	Y	Y	N	N	Y	NA	NA	NA	Y	Y
	Panels	Y	Y	N	N	Y	NA	NA	NA	Y	Y

Appendix 2 – Owner Project Requirements/Basis of Design Review Documentation

Document Review Report
LEED™ Owner's Project Requirements and Basis of Design Focused Review

Project: **Stanwood HS**
Report Date: **3/21/18 Response: 6/26/18**
Reviewers: **Byron Holmstead**
OPR Version: **June 2017**
BOD Version: **2017**

Commissioned Systems:

- Plumbing Fixtures & Domestic hot water systems
- Heating, ventilating, air conditioning (HVAC) systems and associated controls
- Lighting controls
- Utility metering

The purpose of this review is to satisfy the requirements of the WSSP certification program in regards to the Energy E4.0 and E4.1, Fundamental & Enhanced Commissioning. This requires a focused review of the Owner's Project Requirements (OPR) and Basis of Design (BOD) for the systems to be commissioned (as required by WSSP).

Issues identified and provided in this review are intended to assist the Owner in providing a fully developed OPR to the design team and to ensure the design team is meeting the requirements of the Owner. The OPR shall provide guidance to the design team so that a functional and maintainable facility will ultimately be provided to the Owner. The BOD provides additional focus to the design and provides the Owner with confidence that the OPR is being met.

The systems to be commissioned as required are listed above. The document review was limited to these areas.

Please see attached review comments and provide a return response on each issue under the column "Resolution" to assist the commissioning team. WSSP requires the Owner and design team to be responsible for updates to their respective documents.

If there are any questions regarding these review comments, please call Byron Holmstead.

LEED™ Owner's Project Requirements Focused Review – Stanwood HS					
Item	***Document OPR/BOD***	***Review Comment***	***By:***	***Resolution***	***Check***
1.	OPR Section 3 Pg. 12	Is LED light fixtures a desired installation? LED fixtures are becoming quite common.	BH	(BCE): Yes LED on Drawings.	Ok
2.	OPR Section 4 Pg. 16-18	The low NC levels (sound levels) seem a little unreasonable. If construction budget allows this may be realistic. The WAC 246-366-110 allows NC-35 to 45 in classrooms. In my opinion if spaces are too quiet, any adjacent noise becomes a huge distraction. Back ground noise can wash out small distractions.	BH	(McG): Agreed, we will meet the WAC requirements since this requirement is cost prohibitive.	Ok
3.	OPR Section 4 Pg. 16-18	Un-occupied adjustability calls for a "1 Hour override" We just want to verify if this is actually desired. This can potentially use more energy than anticipated. This can be modified in the future if desired to keep or disable.	BH	(McG): Owner to provide direction to design team.	Ok
4.	OPR Section 5 pg. 20	Want to verify that the plumbing fixture flush valves are all manual and not automatic allowed?	BH	(BCE): Manual valves shown on schedule	Ok
5.	OPR Section 5 pg. 21	Want to verify that the operable windows will have sensors to shut down the HVAC when open. Also suggest an alarm or notification be sent if window is left open and especially after ours.	BH	(BCE): There does not appear to be any operable windows.	Ok
6.	OPR Section 6 pg. 25	Is there a standard HVAC controls standard or preferred DDC system?	BH	(BCE): District indicated local representation is important. NCS has been identified as a preferred vendor. Will indicate at least (3) approved bidders in alternate bid type configuration.	Ok
7.	OPR Section 6 .4 pg. 25	Equipment access: Recommend adding that the piping is also accessible for replacement as well as equipment.	BH	(BCE): Will achieve to the greatest extent possible.	Ok
8.	OPR	Does the district have an equipment naming convention to	BH	(BCE): none were presented to BCE, we are using industry	Ok

LEED™ Owner's Project Requirements Focused Review – Stanwood HS					
Item	***Document OPR/BOD***	***Review Comment***	***By:***	***Resolution***	***Check***
	Section 6.8 pg. 25	follow that we can verify?		standard naming conventions.	
9.	OPR Section 6.5 pg. 27	Recommend adding to mechanical rooms "Ease of access for transporting replacement parts such as filters etc". If this is not a requirement equipment maintenance may suffer.	BH	(BCE): Equipment layouts in mechanical spaces takes into consideration the ability to move and maintain all the equipment, including access to mezzanine areas (stairs, etc…).	Ok
10.	OPR Section 9.1A, B & C pg. 33	Suggest updating: Part A) OPR development was done by owner/consultant and reviewed by CxA, B) Energy and Operational performance Modeling is performed by the mechanical engineer. CxA can review if requested. C) The LCA is performed by the mechanical engineer and evaluated by the owner. CxA can review if requested.	BH	District to review and respond. No Requested.	Ok
	High School				
11.	Design Narrative. Pg 18	The General Mechanical Requirements appear to be missing.	BH	(BCE): General mechanical requirements will be included in the division 22-23 specification during CD's.	Ok
12.	Design Narrative. Pg 19	There appears to be a conflict between the urinal fixture flush rate of 0.125 gpf compared to the OPR of 0.25 gpf.	BH	(BCE): Design exceeds minimum flush requirements of the OPR.	Ok
13.	Design Narrative. Pg 20	There is no mention of location of Fan Coil Units.	BH	(BCE): Generally located in ceiling of space served.	Ok
14.	Design Narrative. Pg 21	There appears to be a conflict between the night set back of 95°F compared to the OPR of 85°F.	BH	(BCE): Will revise to 85° to match OPR.	Ok
15.	Design Narrative.	The OPR also states for the receptacles to be metered as well.	BH	(BCE): Metering of receptacles will be added.	Ok

LEED™ Owner's Project Requirements Focused Review – Stanwood HS					
Item	***Document OPR/BOD***	***Review Comment***	***By:***	***Resolution***	***Check***
	Pg 23				
16.	Design Narrative. Pg 23	The OPR states that the occupancy sensors to be set up for "Vacancy" type operation. This operation should only be designed where appropriate like classrooms and offices.	BH	(BCE): Concur, will incorporate.	Ok
17.	Design Narrative. Pg 24	There is no mention of lighting controls for stand-alone zones or networked system.	BH	(BCE): Lighting controls to be included per WSEC requirements.	Ok
	Alternative Learning Center				
18.	Design Narrative. Pg 10	There appears to be a conflict between the urinal fixture flush rate of 0.125 gpf compared to the OPR of 0.25 gpf.	BH	(BCE): the district agreed to 0.125 gpf urinals, which will need to be incorporated into the OPR documentation.	Ok
19.	Design Narrative. Pg 12	There is no mention of location of Fan Coil Units.	BH	(BCE): No gas furnaces in scope. Fan coil units serving classrooms are located in classrooms (per discussion with owner). Will include location in future narrative updates.	Ok
20.	Design Narrative. Pg 12	There appears to be a conflict between the night set back of 95°F compared to the OPR of 85°F.	BH	Concur – will incorporate 85°F setback.	Ok
21.	Design Narrative. Pg 14	The OPR also states for the receptacles to be metered as well.	BH	(BCE): Metering of receptacles will be added.	Ok
22.	Design Narrative. Pg 15	The OPR states that the occupancy sensors to be set up for "Vacancy" type operation. This operation should only be designed where appropriate like classrooms and offices.	BH	(BCE): Concur, will incorporate.	Ok
23.	Design Narrative. Pg 16	There is no mention of lighting controls for stand-alone zones or networked system.	BH	(BCE): Lighting controls to be included per WSEC requirements	Ok

Stanwood-Camano SD

Stanwood High School

Owner's Project Requirements

STANWOOD, WA
JUNE, 2017

FOR THE LIFE OF YOUR BUILDING

Contents

1 Overview

McKinstry
For The Life Of Your Building

1. Overview

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Overview and Definition

The Owner's Project Requirements (OPR) provide an explanation of the ideas, concepts and criteria that are important to the owner, and should be tracked throughout the design and construction phases of the project. This document embodies the criteria by which the success of the project will be judged relative to meeting the Owner's needs. The OPR is to be developed by the owner, Commissioning Agent (CxA) and project team ideally, prior to the start of design documents and furnished to the design team. It must be completed prior to the approval of contractor submittals of any commissioned equipment or systems to meet LEED requirements. The OPR is a living document - updates during the design and construction process are the primary responsibility of the owner. The OPR does not list items that are already required by code. The OPR generally is not a description of what specifically will be included in the project design, but is more of a general overview with specific performance criteria to be met by the design. This OPR does not supersede or replace any code or regulatory requirements.

The OPR will be followed by the basis of design (BOD) developed by the design team and included with all design package submissions. The Basis of Design Documentation is an opportunity for the design team to verify their understanding of the OPR and describe how they intend to achieve its goals with the design. The BOD Document records the concepts, design assumptions, important calculations, decisions, product selections, and rationale used to satisfy the Owner's Project Requirements (OPR), regulatory requirements, and industry standards and guidelines. It also describes basic operating concepts and principals, and the interaction between systems. The document, which consists of narrative descriptions, schematic diagrams

1. Overview

and data, evolves throughout the design process, cross-referencing the OPR, and documenting and explaining the reasons for changes as they occur. Updated editions of the Basis of Design Document are required as a part of each design submittal.

List of Acronyms and Abbreviations

Below is a list of common terminology and abbreviations used throughout this document.

- A/C – Air Conditioning
- A/E – Architect/Engineer
- AHJ – Authority Having Jurisdiction (Plans Examiners, County Inspectors, Fire Marshall, etc.)
- AHU – Air Handling Unit
- BAS – Building Automation System Contractor (controls & alarms)
- BECx – Building Enclosure Commissioning
- BOD – Basis of Design
- CET – Critical Environment Team, DCOPs Facilities Mgmt. Team
- CFM – Cubic Feet per Minute
- CDW – Condenser Water
- CHW – Chilled Water
- CRAC – Computer Room Air Conditioning unit
- Cx – Commissioning
- CxP – Commissioning Provider
- CCP – Certified Commissioning Professional (BCA)
- Cx-MIL – Cx Master Issues Log
- DCV – Demand Control Ventilation
- DB – Design Build
- DDC – Direct Digital Controls
- EC – Electrical Contractor
- EF – Exhaust Fan
- EOR – Engineer of Record

1. Overview

- FCU – Fan Coil Unit
- FPT – Functional Performance Test(s)
- FWT – Factory Witness Test(s)
- HHW – Heating Hot Water
- HVAC – Heating Ventilation & Air Conditioning
- IR - Infrared
- IST – Integrated Systems Test
- ITP-Cx – Independent Third-Party Commissioning
- IVC – Installation Verification Checklist
- MAU – Makeup Air Unit
- MC – Mechanical Contractor
- MEP Subs – DB's Mechanical/Electrical/Plumbing subcontractors
- OEM – Original Equipment Manufacturer
- OPR – Owner's Project Requirements
- OSA – Outside Air
- PPM – Parts Per Million
- QA/QC – Quality Assurance/Quality Control
- RA – Return Air
- RTU – Rooftop Unit
- SA – Supply Air
- TAB – Testing, Adjusting, and Balancing
- TU – Terminal Unit
- VAV – Variable Air Volume
- VFD – Variable Frequency Drive
- VRF – Variable Refrigerant Flow
- VTR – Vent Through Roof

1. Overview

Scope

The OPR document focuses on the mechanical, energy and comfort related systems and on the sustainability requirements of the project. Other areas impacted by commissioning or commissioned systems are covered more broadly. This document shall be used in conjunction with the Educational Specifications dated 07 April 2017.

Format, Process and Tracking

In each section, there is a list of questions and data required to be answered in order to develop a comprehensive OPR document.

The following table lists various issues pertinent to the design process. Track changes shall be utilized after the initial version (v1.1) is

OPR Issues	Status of Input (Not Started/In Progress/Completed)
Owner and User Requirements	Completed
Energy and Sustainability Goals	Completed
Indoor Environmental Quality Requirements	Completed
Equipment and System Expectations	Completed
Building Occupant and O&M Personnel Requirements	Completed
Developer Strategy/Flexibility Requirements	Completed
Civil and Landscaping Requirements	Completed

Considerations

As in other quality management systems, achieving or increasing the level of quality is accomplished by every worker on the project. This means that when anyone on the job identifies opportunities for improvement, or a potential problem, it should be brought to the attention of the project manager or a member of the commissioning team. It may not be possible to incorporate every good idea on this project, but the knowledge gained will be beneficial to future projects. Potential problems that can be avoided are to everyone's benefit.

2 Owner and User Requirements

2. Owner and User Requirements

Project Description

The existing facilities at Stanwood High School limit or do not to meet the current or future needs. Current facilities are outdated, undersized and do not convey a sense of collaborative learning.

Construction of a new 241,449 square foot Stanwood High School serving a 1,200-student body will help the district and the community resolve the said deficiencies.

The new facility will include new safety and security features including (1) limited points of entry; (2) campus-wide building lock-down capabilities and communications systems; (3) ADA compliant building and site.

21st Century learning spaces will include career and technical education programs spaces including but not limited to agriculture, American sign language, business education, culinary arts, technology education and visual communications. The new facility will also include a dedicated arts, drama, physical education and special education spaces. All classrooms will support a strong STEM program.

Site work includes the creation of two new baseball, two new softball and two new soccer fields (all grass); four new tennis courts; re-surfacing of existing football grass with artificial turf. Creating pedestrian pathways, two greenhouses, exterior gathering areas as well as student drop off (separate bus and private vehicles); bus holding areas and student, staff and visitor parking.

A Performing Arts Center will also be included in the new campus providing a venue for 600-seat productions. In support of the Performing Arts Center there will also be drama, band and choir spaces.

Sustainable features will include abundant natural lighting and the use of durable materials intended to last at least 50 years. The project will feature integrated sustainable features in both the building and site work. The project is currently targeted to meet or exceed the Washington Sustainable Schools Protocol. The project will balance long-term energy use, occupant comfort and maintenance requirements with short term costs.

2. Owner and User Requirements

Central Goals

There are several key goals that Stanwood-Camano School District wishes to achieve during this project.

- *Learning Environment* – The High School's Mission is to provide educational opportunities in the areas of professional and technical, basic skills, and continuing education. The School also contributes to the cultural and economic enrichment of the community. This new School will facilitate improved educational practices and student-teacher interaction as well as reduce educational barriers by consolidating areas of study.
- *Developer strategy* – As identified in the Educational Specifications, aging facilities should be replaced with ones that support the future. The school is expected to have a minimum life expectancy of 50 years. The major mechanical system components are expected to last at least 30 years without replacement assuming routine and preventative maintenance is accomplished. The new School (including systems and infrastructure) will need to support space flexibility and growth. Individual components shall not require replacement for at least 15 years.
- *Environmental strategy* – As a public school district, the requirements of the Washington Sustainable Schools Protocol apply to all indoor and outdoor spaces.
- *Operation and Maintenance* – All aspects of the School should strive for energy efficiency. The landscaping and systems should be designed with durability and ease of maintenance in mind. There are several instructional areas that require reduced sound volumes. The maintenance personnel trained on the system by manufacturers shall be able to train their peers. Training will include accessibility, maintainability, and efficiency. Training will be conducted within a timely manner (within 14 days of turnover). There shall be no need for contractor callbacks due to inadequate training, system fine-tuning, poor quality workmanship, improperly operating equipment, or uncomfortable conditions once occupancy has occurred. The systems shall be consistent with other systems in the district and easily maintainable with identifiable access to all components. All manuals are delivered in their final form (both electronically and printed copies) at substantial completion. Accurate valve charts and graphics shall be provided in paper form for the O&M manuals. Valve charts shall be framed and mounted in mechanical rooms, and in electronic format to facilitate future changes.
- *Cost* – Budget constraints exist on all projects. The project shall be completed within budget and on schedule. For this project, the benefits of improvements must be weighed against their cost. Stanwood-Camano School District wants to achieve the highest quality system at the lowest possible investment. Any cost effective opportunity to improve the quality of the system will be welcomed for review. Recommendations for changes are invited and will be considered from any involved party provided that they benefit the overall quality, operating efficiency, or enhance the built environment.

3 Energy and Sustainability Goals

3. Energy and Sustainability Goals

Environmental and Sustainability

As a part of the School District's commitment and the Governor's Executive Order, the materials, systems and construction methods chosen for this project shall have the least possible environmental impact. The project is planning to comply with WSSP certification requirements.

Description	Performance Metric	Measurement Method	Responsible / Verifying Party	Priority
1. WSSP	Building certified	Certification of performance (At the end of the first year of occupancy)	Architect	Required by state
2. Snohomish County PUD	10%> Code	Meet/Achieve SnoPUD incentive program/rebate	Architect, Mechanical Engineer, Electrical Engineer	Medium

Energy efficiency

The design will include all applicable codes and standards that will affect energy use including (local code, ASHRAE standard, WSSP, Energy Star, building orientation, landscaping, façade, high performance envelope, architectural shading, and roof features). System attributes required to increase energy efficiency are minimal mechanical cooling, geo-exchange heat pumps, and VRF systems. Condensing units shall meet or exceed the minimum equipment efficiencies of the WSEC. Mixed mode, demand control ventilation (CO2 sensors) may be used in order to save energy on only heating or cooling as much ventilation air as is required. Daylighting and occupancy lighting controls are required. Resets will be utilized where possible (supply air, static pressure, and heating water, etc.).

Description	Performance Metric	Measurement Method	Responsible Party	Priority
1. EUI below design target (better than WSEC)	Building EUI < 58.2 kBTU/sq. ft. (58.2 site EUI)	Annual utility energy use, based on source EUI	Mech Design Engr	High
2. Energy costs maintained below target	Annual energy Cost <$0.80/sq. ft.	Annual utility energy use with stipulated assumed rate of $0.065/kWh, $4.20/kW, and $0.90/Therm	Mech Design Engr	High
3. End use sub-metering provided for energy analysis and optimization	Major end uses sub-metered with data available through DDC system	Verification of data availability and accuracy	Elec Design Engr / General Contractor	Low
4. Renewable	Install photovoltaic	Verify output of the	Mech Design Engr	Low

3. Energy and Sustainability Goals

	energy sources	systems to reduce the energy demand of the facility (or install infrastructure to be PV ready)	renewable system(s)		
5.	Façade, fenestration, envelope, roof, etc.	No bat insulation on roof panels; Awnings may be used on the southern exposure	Review of designed equipment and component specs	Architect	High

4 Indoor Environmental Quality Requirements

4. Indoor Environmental Quality Requirements

Indoor environmental quality (IEQ)

IEQ will be maximized for lighting, acoustics, air quality, and ventilation. It is imperative that the IEQ be maintained at a high level to provide the safest, most efficient working environment for the building users. The specific requirements to maintain good IEQ include the following.

Description	***Performance Metric***	***Measurement Method***	***Responsible Party***	***Priority***
1. Indoor Air Quality verified to promote comfort and well-being of occupants	Demonstrate compliance less than contaminant maximum levels	Air testing per WSSP	General Contractor / Architect	High
2. Building envelope is be properly insulated and sealed	The completed building shall be tested, and the air leakage rate of the building envelope shall not exceed 0.40 cfm/SF at a pressure differential of 0.3 inches water gauge.	Blower door testing, thermal infrared photography and site inspection and documentation review	General Contractor	High
3. Indoor acoustic performance maintained to minimize impact on instructional environment	Comply with ANSI S12.60-2002 (35 dBA, with a maximum reverberation time of 0.6 to 0.7 seconds depending on room size)	Sound measurements	Mech Design Engr / General Contractor	High
4. Lighting design should incorporate natural and artificial sources to provide good visibility	Lighting controls is required (vacancy sensors and day light dimming). Maximize natural lighting. Lighting should be between 30-80 FC. LEDs are preferred.	Light level measurements. Review of LPD calculations done by lighting engineer.	Elec Design Engr	High
5. Carpet not preferred, no waxing/stripping of floors	"Marmoleum" or similar (Mondo Contract Flooring being explored)	Review of designed equipment and component specs	Architect	High
6. Humidity control	There will be no rooms with specific humidity requirements	Review of designed equipment and component specs	Mech Design Engr	Low

4. Indoor Environmental Quality Requirements

SPACE	USE/ ACTIVITY	OCCUPANCY SCHEDULE & OPERATING MONTHS	AFTER HOURS USE	HVAC	PRESSURE RQMT	ACOUSTICS *1	LIGHTING	APPROX. NUMBER OF OCCS.	OCCUPANT ADJUSTABILITY (UNOCCUPIED)
Admin	Office work	M-F 0700-1700 9 months a year		Some rooms controlled by stat in other areas	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces			Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Offices	Office work	M-F 0700-1700 9 months a year		Some rooms controlled by stat in other areas	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces		1	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Resource Rooms	Teaching / Monitoring	M-F 0700-1500 Sept-July		No additional requirements	0.02-04" ± 0.05 To outside	NC 25 – expect quieter than above	Dimmable (by zone)	20	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
General Classroom	Teaching	M-F 0700-1500 Sept-July		No additional requirements.	0.02-04" ± 0.05 To outside	NC 35 - No conversation heard between spaces	Dimmable (by zone)	30	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Lab (Chemistry, Biology, Physics, Geology, Astronomy)	Teaching w/ chemicals	M-F 0700-1500 Sept-July		Critical environment HVAC	0.02-04" ± 0.05 To outside	NC 35 - No conversation heard between spaces	Dimmable (by zone) and Grow lights	30-32	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Lab (Science Prep)	Teaching w/ chemicals	M-F 0700-1500 Sept-July		Vented Acid Cabinets. Critical Enviroment	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between	No additional requirements	2	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour

4. Indoor Environmental Quality Requirements

Science Lab, Vet Services AG Science Horticulture.	Teaching / Monitoring	M-F 0700-1500 Sept-July		Independent Ventilation. Humidity Control	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Dimmable (by zone).	28	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Fitness Center, Weight Room.	Teaching / Monitoring	M-F 0700-1500 Sept-July		Ventilation for physical activities.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Controllable (by zone).	40	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Gymnasium, 2x Aux Gymnasium.	Teaching/ Special Events.	M-F 0700-1500 Sept-July			0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Instant ON/OFF/ON Sports lighting.	Bleachers, 1600 Aux Bleachers, 700 Norm: 40-80	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Studios (Graphic design, multi-media etc.)	Teaching / Monitoring	M-F 0700-1500 Sept-July		No additional requirements.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Dimmable (by zone).	28	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Engineering/ CAD/CAM and Fabrication Room	Teaching / Monitoring	M-F 0700-1500 Sept-July		Sawdust Collection Ventilation for Spray booth. Independent Ventilation.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between space	Dimmable (by zone).	28	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Shop Classrooms (Mechanical & Wood)	Teaching / Monitoring	M-F 0700-1500 Sept-July		Sawdust Collection.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Dimmable (by zone).	28	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Woodworking Shop. Mechanical Technology Shop	Class	M-F 0700-1500 Sept-July		Sawdust Collection Ventilation for Spray booth. Independent Ventilation.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	High lighting levels	28	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour

4. Indoor Environmental Quality Requirements

Assist Program.	Teaching/ Monitoring	M-F 0700-1500 Sept-July		High Volume Ventilation, due to student hygiene.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between	Dimmable (by zone).	15	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Speech Therapy.	Teaching/ Therapy	M-F 0700-1500 Sept-July		No additional requirements.	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between	Dimmable (by zone)	1-5	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Occupational & Physical Therapy.	Teaching/ Therapy	M-F 0700-1500 Sept-July		No additional requirements	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Dimmable (by zone)	1-2	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Independent Learning Center	Teaching/ Monitoring	M-F 0700-1500 Sept-July		No additional requirements	0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces	Dimmable (by zone)	1-2	Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour
Corridors	Circulation	M-F 0700-1500 Sept-July			0.02-04" ± 0.05 To outside	NC 30 - No conversation heard between spaces			Htg: 66-70 ± 2.0 (55) Clg: 74-76 ± 1.0 (85) Override 1 hour

*1 Acoustical measurement to be taken in unoccupied rooms with mechanical systems and any other noise-producing equipment running.

5 Equipment and System Expectations

5. Equipment and System Expectations

Equipment and system

Due to the expected use and longevity of the high school prior to any remodel, the materials used must be of the highest quality, be durable and have low maintenance requirements. Emphasis is placed on receiving the highest quality, most cost effective materials possible to ensure the longevity of the systems and provide years of reliable, simple operations. Reliability is of utmost importance and should be given the highest priority. Remote monitoring of building performance (temperature, lighting etc.) is desired. Energy efficiency and full spectrum lighting is also desired. Units of similar size and function should have the same size filters. Use of exhaust air filters prior to heat recovery coils is required.

Acceptable heating and cooling systems include water-source heat pump (with boiler and cooling tower), variable refrigerant flow and hydronic heating (larger boilers and pumping system). Attention to accessibility of systems during class time should be a priority. Up front and long term costs (maintenance, replacement, system training and certification, outside contractors, etc.) as well as occupant comfort, will drive the discussion and decision on the type of system the district will ultimately accept.

Description	***Performance Metric***	***Measurement Method***	***Responsible Party***	***Priority***
1. Minimize initial cost	The optimal price point that results in the lowest 30 year net present value cost taking into account operational (utility, maintenance, repair, and replacement) costs in the year that they occur using prescribed discount and inflation rates.	Verified by TCO and ELCCA analysis	Architect	High
2. Water efficiency	Utilize WaterSense standards at a minimum (1.28 gpf water closets and 0.25 gpf urinals). Combination water fountain/bottle filler	Review of design, submittals and installation	Mech Design Engr / Architect	High
3. Water fixture durability and reliability	Manual flushing only (automatic not preferred)	Review of design, submittals and installation	Mech Design Engr / Architect	High
4. Ancillary building heat loads coordinated with exhaust (including hoods) and makeup air systems	Heat loads coordinated in design	Review of designed equipment and component specs	Mech Design Engr	High

5. Equipment and System Expectations

5. Natural ventilation/operable windows	Occupants have immediate control of their environment through operable windows; interface with DDC and Security system	Review of design and component design. Confirm that window sensors are properly commissioned to turn off HVAC when windows are open.	Mech Design Engr	High
6. Familiar/uniform systems	Avoid installation of untested equipment/systems For VRF system, LG is NOT preferred.	Review of designed equipment and component specs	Mech Design Engr	High
7. Audio-visual system	System should be high performance and upgradable	Review of designed equipment and component specs	Elec Design Engr	Medium
8. Pilot lights in kitchen equipment	Not preferred	Review of designed equipment and component specs	Mech Design Engr	High
9. Electrical Panels	Organized logically and consistently. Group loads as much as practical (HVAC, lighting, receptacles, etc.)	Review of designed equipment and component specs	Elec Design Engr	High
10. Preferred Manufactures	Pumps: Prefer Bell and Gossett Valves: Sloan or Zurn	Review of designed equipment and component specs	Mech Design Engr	High
11. Heat recovery	Prefer oversize (100% load at 75% capacity)	Review of designed equipment and component specs	Mech Design Engr	Medium
12. Equipment Maintenance	Keep filter sizes standard and minimize different types and sizes. Equipment access panels shall be bolted on, NO sheet-metal screws. Proper drainage for cleaning all coils.	Review of designed equipment and component specs	Mech Design Engr	High
13. Science Labs	Should have flexibility, not 100% OA all the time	Review of designed equipment and component specs	Mech Design Engr	High
14. Workmanship	QA, VRF certified installer (each trade person); individual licenses verified per WA	Contained in each Subcontractor Daily Report; monthly spot check report by GC verifying 1-	GC	High

5. Equipment and System Expectations

	State and worn on sleeves per WAL&I recommendation	to-1 Journeyman to apprentice		
15. Window Glazing	Drawing details should be provided to prevent water intrusion into the window or façade	Review of details in drawings	Architect	High
16. Siding	No Dryvit siding (explore CMU or similar)	Submittal data	Architect	High
17. Fire Suppression and Fire Monitoring	Non-proprietary software (Silent Night or District approved alternate)	Submittal Data	E.C. / Owner	High
	Suppression system interface with heat or smoke detection prior to sprinklers activating	Submittal Data	M.C.	Med

6 Building Occupant and O&M Personnel Requirements

6. Building Occupant and O&M Personnel Requirements

Building occupant and O&M personnel

The heating, ventilation, and air conditioning system must provide comfortable temperatures at all times. The new building systems must be easily maintainable by the district staff, with reasonable access to systems for routine maintenance. Training is of great importance – A complete training program will be developed by the Contractor for systems and equipment installed at the project. Training will be conducted in a classroom environment and include actual hands-on using the equipment installed.

Description	***Performance Metric***	***Measurement Method***	***Responsible Party***	***Priority***
1. Training provided for effective transition to stable operations	Satisfactory evaluation of training by maintenance staff; walk-throughs during construction	Evaluation of training agenda, schedule, and materials; training survey results from maintenance staff	General Contractor	High
2. Building controls system	Maintenance staff shall be able to operate the building efficiently, and the operating values displayed on the screen, by system gauges, or printed in report shall be accurate and easy to utilize. Graphics will conform with screen-shots in Appendix (?). 1) provide global over-rides; 2) provide over-rides, visible on graphics, for every output; 3) provide setpoints adjustable depending on access level; 4) ensure daisy-chained units are visible from the DDC interface	Building is operable with <5 calls to the controls contractor during the first month of operation after turnover.	Mech Contractor	High
3. Security	The facility should be secure from external threats and provide for ease of egress in emergency situations; minimal access points;	Evaluation of design drawings. Fewer than 3 security calls during the first year of operation.	Elec Contractor / Architect	High

6. Building Occupant and O&M Personnel Requirements

	Admin office visibility of doors open; Perimeter door access compatible with Corbin-Russwin class locks			
	Card or fob access, coordinate with IT dept. for requirements		Electrical Engineer / Architect	Med
4. Equipment access provided for efficient maintenance and future replacement	All system motorized components accessible without disruption of learning environment (in corridors)	Evaluation of design drawings; maintenance staff evaluation of as-built systems	Mech Design Engr	High
	Balancing dampers, isolation/control valves, and service test & vent ports accessible and labeled for maintenance	Evaluation of as-built access; maintenance staff evaluation of as-built systems	Mech Design Engr	Medium
5. Community use spaces	Spaces used by the community (after hours and weekends) will be individually controlled	Review of design. Functional testing of zone (ensuring that it does not influence the rest of the building)	Mech Design Engr	High
6. Maintenance labor minimized	Hours per year of required filter changes < X hours	Mechanical contractor tracking of hours for the post-construction first filter change.	Mech Contractor	High
7. Equipment inventories	Limit the different types of disposable/frequently replaced equipment (sensors, filters, lamps, motors, etc.)	Verification of design and as-built systems	General Contractor	High
8. CMMS Interface	Follow school district naming convention for equipment	Review of designed equipment and component	Mech/Elec Design Engrs and Contractors	Medium
9. Energy dashboard	Provide energy dashboard for learning	Minimum required by code	Mech/Elec Design Engrs	Low

6. Building Occupant and O&M Personnel Requirements

General occupancy requirements

The Building is regularly occupied from 6 am to 6 pm, Monday through Friday. Depending on the activities of individual groups, the occupancy is occasionally extended late into the evenings and throughout the weekend. The peak occupancy requirements for the Building are:

- 1,700 faculty and students
- 10 Support staff (maintenance, custodial, etc.)
- 25 Visitors per day, average
- 600 special event visitor population

The occupancy schedule to be used to setup the control system is detailed below.

Day of Week	State	Morning Warm-up	Occupied	Unoccupied	Special Event
Monday to Friday	On	6:00 a.m.	7:00 a.m.	5:00 p.m.	3:00 p.m.
	Off	7:00 a.m.	3:00 p.m.	6:00 a.m.	10:00 p.m.
Saturday	On	N/A	N/A	N/A	N/A
	Off	N/A	N/A	N/A	N/A
Sunday	Off	N/A	N/A	N/A	N/A
Holidays	Off	N/A	N/A	N/A	N/A

Functional Uses

The functional uses of the Stanwood High School include those of an advanced high school building, plus several specific uses defined by the individual user groups housed within the building. The functional uses common to most user groups include:

1. *Conference rooms* – Adequate meeting space for the various groups is required for efficiency of activities and to simplify scheduling issues. Should be individually zoned.
2. *Offices* – All user groups within the building require office space for their staff (faculty and division leads). The needs are a combination of private offices, open cubicle-style workstations, staff/faculty resource areas, and small meeting spaces. Offices are stacked (level to level). Interior offices can be zoned at 3-4 officers per zone. Perimeter offices should be individually zoned.
3. *Storage space* – Secure storage space is a necessity for program faculty, administration, staff, and general facilities operations. If sufficient elevator size does not allow for effective movement of fixtures and equipment to all floors, then space needs to be provided on all floors of the building. Hazmat storage will be such that loading and unloading can be done without a danger to people, building, or the environment.
4. *Classrooms, (non-lab)* – Dedicated space for student instruction. Space will include equipment specific to the subject matter. Required to be directly adjacent to applicable laboratory. Should be individually zoned.
5. *Laboratories* – Student instruction – simultaneous experiments. High demand labs are stacked (level

to level). Required to be directly adjacent to classroom and applicable storage room. Will include fume/ventilation hoods to remove noxious gases. Spaces should be negative to adjacent spaces to prevent smell migration. Should be individually zoned.

6. *Computer Lab* – Lab for science and math department use. Will be open to general students during non-scheduled hours. Should be individually zoned.
7. *Health* – Student instruction – simulation and skills instruction. Required to be directly adjacent to applicable laboratory. Should be individually zoned.

In addition to the functional areas defined above, the building as a whole requires a variety of support areas to allow each group to operate efficiently. These support areas include:

1. *Corridors* – Corridors on each floor provide efficient movement throughout the building and between the building user areas. The corridors should be designed to prevent blind corners and collisions, and be wide enough to allow fluid student movement.
2. *Stairways and elevators* – The stairways and elevators provide efficient movement between the floors in the building. These features should be conveniently located for building egress and accessibility requirements. Elevator access to the boiler room is also provided. The size and access of the elevator will impact the need for adequate fixture & equipment storage in the building.
3. *Restrooms* – Restrooms are needed for use by any building occupant or visitor. The restrooms must be conveniently located, clearly marked, and accessible. Unisex restrooms are required by code and are to be located on each floor.
4. *Custodial space* – Closets or other designated custodial areas are needed on each floor to allow the janitorial staff to efficiently perform their duties without interruptions or inconveniences to other building staff. Room for cleaning equipment near high volume areas is required.
5. *Mechanical rooms* – Space must be designated within the building to allow for installation of mechanical equipment. This space should be optimally located to allow for the simplest and most efficient mechanical design.
6. *Electrical/Communications space* – Each floor of the building must contain adequate space for installation of electrical and communications equipment. These spaces must be located in coordination with the Communications department to ensure that all user technology and utility needs are achievable. Breakers will be properly labeled so that facility staff can isolate an area(s) quickly without having to go back to drawings.
7. *Parking* – Adequate parking for students, employees, and visitors is needed that is safe and accessible during normal operating hours and after-hours activities. There will be on-campus and off-campus parking.

7

Developer Strategy/Flexibility Requirements

7. Developer Strategy/Flexibility Requirements

Developer Strategy/Flexibility

The design must be able to respond to the changing needs of the occupants. This includes flexibility in the space layouts, heating, and cooling systems, lighting, and utilities (phone, electric, data, etc.). The building will have a projected lifespan of 50 years, minimum.

Description	***Performance Metric***	***Measurement Method***	***Responsible Party***	***Priority***
1. Infrastructure established so that main systems are centralized/grouped and upgradable. Building services and utilities organized with a central line with branch circuits	Electrical and Mechanical infrastructure supports changes in design and load.	Evaluation of design drawings	Mech Design Engr / Architect	High
2. Systems selected based on life cycle costs	Breakeven period < 30 years	Verified by TCO and ELCCA analysis	Mech Design Engr / Architect	High
3. Mechanical equipment and components selected for long term life cycle	ASHRAE rated life of >25years for all HVAC equipment and components	Review of designed equipment and component specs	Mech Design Engr	High
4. Envelope and interior components selected for long term life cycle	Expected life >50years	Review of designed equipment and component specs	General Contractor / Architect	High
5. Equipment is installed with consideration given to future replacement	Sufficient access to maintain and replace equipment (isolation valves)	Review of designed equipment and component specs. Drawings shall note the path in and out for replacement of equipment.	Architect	High

8 Civil and Landscaping Requirements

8. Civil and Landscaping Requirements

Civil and Landscape

Where possible, maximize infiltration to reduce flooding issues without impacting the wetlands. Vegetation should be native and adhere to the principles of sustainable landscapes.

Description	***Performance Metric***	***Measurement Method***	***Responsible Party***	***Priority***
1. Take advantage of and reduce impact on adjacent wetlands	Wetlands remain intact during and after construction	Review of drawings	Landscape Contractor / Architect	High
2. Utilize water treatment and/or rainwater reclaim system (catch basin or rain garden)		Review of drawings	Landscape Contractor / Architect	
3. Improve pedestrian walkways and incorporate between buildings into the landscaping	Ease of access to all sections of the facility	Review of drawings	Landscape Contractor / Architect	High
4. Support long term health of the vegetation, including fire retardant	Vegetation is selected for climate and location	Review of drawings	Landscape Contractor / Architect	High
5. Irrigation with deduct meter	Provide a deduct meter. Verify with City of Stanwood that deduct meters are acceptable	Review of drawings	Landscape Contractor / Architect	High
6. Parking lot paint	DOT Approved for longevity	Review of drawings	Landscape Contractor / Architect	High

9

Commissioning Expectations

9. Commissioning Expectations

Stanwood-Camano School District, architect, engineer, contractors and CxA shall be pleased with the results of using the commissioning process. An evaluation will be written that will include lessons learned, features that were especially effective, and recommendations for improving the process on the next process.

1. DESIGN PHASE

A. *OPR development* – Create a detailed and comprehensive document that captures the owners' expectations
B. *Energy and Operational Performance Modeling* – Review the engineered whole facility and system specific performance expectations
C. *Total Cost of Ownership and Educational Life Cycle Analysis* – Evaluate system selection and other design criteria options for cost analysis
D. *Design Review* – Evaluate design submittals to project performance indicators and other project requirements
E. *Specifications Review and Cx Authorship* – Assure that expectations toward training, O&M, and warranty deliverables are clearly defined for all divisions within specifications
F. *Develop a Commissioning Plan* – Create a Commissioning Program Master Plan, along with the specifications, that define the obligations of each member of a complete program
G. *Review Submittals* – Review for completeness of sequences, conformance to OPR and BOD, opportunities for simplification, and opportunities for efficiency in operations and energy
H. *Commissioning Kick*-off *Meeting* – Invite all participants involved in commissioning process to Commissioning Meeting #1
I. *Documentation Creation* - Provide the pre-start and startup checkout procedures for implementation and population by the contracting team

2. CONSTRUCTION PHASE

A. *Support and host MEP and commissioning meetings, respectively* – The CxA is available during MEP coordination meetings to add clarity, drive problem resolution, assist in decision making, and represent project commissioning
B. *Pre-start, Start-up, Point to Point, and TAB Verification* – It is the contractor's responsibilities to ensure that complete pre-start and startup activities are performed and recorded. However, we found it helpful to be involved in this process for coaching and assistance, and validate that all steps identified are taken and logged
C. *Functional Performance Testing* – The validation of system and building operations is the contractor's responsibility and Functional Performance Testing should not take place until after the contracting team has run and provided independent tests to gain confidence of completeness
D. *Contractor Training Oversight* - Assistance and approval of specific commissioning training agendas, assurance that training is prepared and delivered properly, and making sure that training covers not just individual pieces of equipment and technology, but systems and the building as a whole
E. *Final Commissioning Report and System Manual* – The final Commissioning Program report is the best historical record of design, construction, and initial operations activities, decisions, and systems available

9. Commissioning Expectations

3. POST CONSTRUCTION
   A. *Commissioning Close-out Meeting* – Evaluate performance to OPR and other project requirements
   B. *Change of Season and 10 month end of warranty testing* – Systems are designed to operate differently in the winter than in the summer. Validation that systems adjust per design, and that design is adequate is necessary. Other anomalies or opportunities may be found after a period of run time that further improves efficiency.
   C. *One year of operational review and training* - Verify building operations and assist facility staff with the operation of the building over the first year of operations. Assistance with resolving issues identified during the post-construction period. Troubleshooting assistance and ongoing operational staff training. And assistance in identifying and resolving warranty issues.

10 Acceptance and Change Log

10. Acceptance and Change Log

Sign off

REVIEWED BY:

Name	Owner's Representative	Date
Name	Architect	Date
Name	Mechanical Engineer	Date
Name	Electrical Engineer	Date
Name	Acoustical Engineer	Date
Name	GCCM	Date

APPROVED BY:

Name	Owner's Representative	Date
Name	Commissioning Authority	Date
Name	Architect	Date

10. Acceptance and Change Log

Track changes

Date	System	Change – description	Reason for change

MATERIALS AND SYSTEMS DESCRIPTION

Civil

Temporary Sedimentation and Erosion Control (TESC)

- The TESC system will be designed in accordance with the Department of Ecology's 2014 Stormwater Management Manual for Western Washington and local regulations.
- A Storm Water Pollution Prevention Plan (SWPPP) will be provided to obtain coverage for the construction storm water discharge under the National Pollutant Discharge Elimination Systems (NPDES) permit. The Owner will be required to apply for this permit, and then it will be transferred over to the contractor after they are selected and under contract. The contractor will be required to implement and modify the temporary erosion control plan throughout the duration of construction.
- The TESC plan will consist of (but not be limited to) temporary construction fencing, silt fence, truck wash station, temporary drainage swales, pump stations for temporary construction runoff, catch basin filters, straw wattles, crushed rock (rip rap) construction road and lay down surfaces, high visibility plastic fencing for tree protections, slope protection polyethylene plastic covering, hydro-seeding ground cover, straw ground cover, water for dust control, and temporary sediment ponds and\or tanks and filter system to settle out sediment from construction runoff, and potentially dry ice or other methods to treat for pH if soil cement treatment is utilized. A detailed TESC plan will be provided for the permit and construction documents.
- Work should be scheduled to restrict significant earthwork to dry periods. All disturbed periods will be covered with temporary cover during wet weather periods or if left un-worked for a period of two days.
- All construction equipment shall be cleaned prior to leaving the site. Regular street sweeping to keep the right-of-way areas clear of construction sediment will be required.

Site Demolition and Preparation

- All of the existing buildings onsite will be demolished. The baseball and softball fields will be removed to make way for the new High School building. Construction will be phased in such a way as to allow the existing school to remain operational until the new school is occupiable to the maximum extent feasible. The proposed High School building footprint does not overlap with any existing buildings, however existing portable classrooms are very close to the proposed construction efforts and there will likely need to be the removal or relocation of some of the portables by the School District prior to construction. Although there will be specific areas of focus in each construction phase, the entire site will need to be coordinated to accommodate temporary school parking, construction staging and lay down areas, and necessary utility reroutes.
- The existing asphalt parking areas are recommended to be maintained as long as practical and as phasing allows, but will ultimately be removed to accommodate the new construction.

Site Earthwork

- The existing parking areas will be stripped of landscaping and topsoil. The subgrade will be compacted to 95% maximum density. The contractor will then be required to proof roll the subgrade to check for unsuitable soil. All unsuitable will be exported off site and replaced with free draining imported structural fill.
- The existing site material consists of fill materials from previous grading activity and native till material which will be sensitive to wet weather. Earthwork should be completed during periods of dry weather to minimize importing clean free draining structural fill.
- Soil cement treatment is also being explored to minimize the amount of truck traffic and material that needs to leave the site. If this method is selected, additional construction runoff treatment will be required.
- Any new fill material arriving on the site will be required to meet the specification requirements of Imported Structural Fill, and will need to be obtained from an approved site.

Site and Off-site Paving

- Light-duty asphalt paving is anticipated for the parking areas, and Heavy-Duty Asphalt Paving will be denoted for heavily traveled roadways and the roadways with anticipated heavier loads (loading dock and bus lanes). There will also be a 15' x 15' concrete pad in the northeast corner for the dumpsters.

Domestic Water/Fire Service

- Domestic water and fire services will connect to the municipal system via a looped onsite connection that will have connections to water mains in 272nd Street NW and in 78th Avenue SW (Lindstrom Road).

Sanitary Sewer

- A new offsite sanitary sewer connection is proposed as part of the project. This offsite sewer work includes trenchless boring under State highway 532 south of the school, followed by additional pipe installation (via trenching in the 72nd Avenue NW roadway) to make the connection to the existing sanitary sewer system at the intersection of 72nd Avenue Northwest and 267th Street NW.

Storm Drainage

- The storm water management design will comply with the 205 Department of Ecology's Storm Water Management for Western Washington.
- Surface runoff will be collected in catch basins and piped underground to modular wetland systems for water quality treatment prior to discharge to wetland areas. Treatment systems for the stormwater runoff from pollution generating areas will likely be provided via Modular Wetland System(s) that will be installed for treating all pollution generating impervious surface runoff prior to discharge offsite. The water quality facility is approved by DOE under a General Use Level Designation for enhanced water quality

Landscape

Hardscape

- Plazas, courtyards and other outdoor areas will be designed to be long lasting and serve both functional and aesthetic needs.
- New site paving, walls, ramps and stairs will be cast in place concrete in high use areas.
- Specialty paving such as textured concrete or pavers may be proposed to break up larger expanses of paving or define specific areas.

Site Improvements

- Seating will be provided by a combination of raised planters, concrete seat walls or premanufactured benches.
- Litter receptacles with anchor bolts will be provided at prominent entrances and site locations.
- Bicycle racks with no-scratch surfacing will be provided near building entrances and the athletic fields. Racks will be provided in a quantity sufficient to accommodate the number of expected bike commuters.
- All premanufactured products designed to be placed in a permanent location will be installed rigid, plumb and true with anchor bolts or cast in place footings.

Irrigation

- All new landscape areas will be watered with an automatic, water efficient irrigation system. Use of the system is intended to be needed only temporarily until plants have become established. After establishment of plants, irrigation demands should be needed only for prolonged drought periods or future replacement, expansion, or reworking of landscape areas.
- Irrigation sprinklers will be specified as Rainbird 1800 spray heads or Rainbird / Hunter Stream Rotors for small areas. Irrigation of larger areas will be with either Rainbird or Hunter rotors. All irrigation areas will be controlled with an automatic time clock to be located inside the building. A moisture sensing device will also be installed to monitor rain fall and reduce water usage.

Chain Link Fence & Gates

- The site will include galvanized chain link fencing with top and bottom rails. Mid rails will be added to fencing over 6’ in height.
- The chain link fabric will be composed of 8,000 PSI tensile strength 9 gauge wire with 2” mesh and knuckled selvedge.
- All chain link fencing will be designed and installed in accordance with the Chain Link Fence Manufacturers Institute, ASTM A120 and ASTM A153.
- Post sizes will be based on fence height and location, with a minimum diameter of 2-7/8”. Rails will be 1-5/8” diameter, and gate frames will be 1-7/8” diameter.

Planting

- The landscape for this school will be designed to achieve low water use and low maintenance requirements. An emphasis will be placed on using native plants and / or drought resistant ornamentals that have proven to be adapted and successful in the Puget Sound climate.
- Landscape elements such as trees shrubs and groundcovers will be arranged to emphasize building entrances and focal points. Rows of trees will lead toward the building entrance plazas, and shrubs areas will be concentrated within the plazas.
- Berms with gentle slopes will be created to add visual interest to the largest lawn areas and reduce the need to export material from the site.
- Trees will be strategically located to screen undesirable site views and provide unobstructed visual connections to the surrounding landscape where appropriate.
- The saving of existing mature trees will be studied and incorporated were preserving them fits within program needs.
- New lawn areas will be aggregated into large areas with paving or mow strips clearly defining outer edges to ease maintenance. Slopes on lawn areas will not exceed 5:1 wherever possible. An eco-turf meadow seed mix is proposed for the large perimeter lawn areas throughout the site. If desired from a maintenance standpoint, this mix can be left un-mowed for longer periods of time than a traditional lawn, which will result in a meadow-like appearance.
- An 8" depth of sandy loam import topsoil tilled into subgrade soils will be used to promote healthy plant growth and reduce watering and maintenance demands. A 3" depth of Arborist wood chip mulch will be used in planting areas to suppress weed growth and retain soil moisture.
- Trees, shrubs, and groundcovers will be specified at sizes optimal for establishment and for preventing damage by foot traffic or vandalism.
- Street trees will be planted along ROW frontages where required.

Additional Site Improvements

Athletic Fields & Courts

Athletic Fields & Courts cost estimate assumptions include rough subgrade 1.0' below designed finished grade is included in the Site Civil Engineering estimate, stormwater detention and water quality, if needed, are calculated into and provided in the Site Civil / Site Utilities estimate, a storm water conveyance point-of-connection is provided by the Site Civil estimate, a backflow protected water source / point-of-connection for synthetic turf field washwater is provided in the Landscape estimate, and surrounding hardscape, pedestrian / emergency / service circulation surfaces are provided in the Landscape estimate as well.

Baseball

Surface all-synthetic turf, fully under-drained, with perimeter manual washwater system. Outfield fencing 300' left field, 375' centerfield, 315' right field, 30' infield backstop and wing fences including adequate ball control (180lf allowance), 10' outfield fence with batters-eye screen and continuous cap. All fencing includes a perimeter concrete curb. Covered dugouts, 8'x40', estimate includes metal roof and chain link enclosure (possible upgrade to sunken and/or architectural masonry etc.).

Enclosed bullpens, 3 at home and 2 at visitor sides. Portable aluminum bleachers, total capacity 200. Concrete Perimeter paving within the total footprint included elsewhere (see Landscape).

- Site Stormwater Detention is likely to be undertaken below the designed subgrade for this field. If and exactly how that occurs could result in savings to the field project of $1.00 – $1.50/sf as a result of a potentially relaxed subgrade tolerance preparation and elimination of field subsurface drainage.
- 50fc Infield/30fc Outfield plus Pedestrian Egress/Security Lighting included elsewhere (see Electrical/Lighting).
- Estimated Cost Range $15.50 - $17.50/sf
- Area Shown 107,415 sf
- Total Estimate $1,665,000 - $1,900,000

Varsity Fast Pitch / Softball

Surface all-synthetic turf, fully under-drained, with perimeter manual washwater system. 200' outfield fence, 30' infield backstop and wing fences including adequate ball control (120lf allowance), 4' outfield fence with cap. All fencing includes a perimeter concrete curb. Covered dugouts, 8'x40', estimate includes metal roof and chain link enclosure (upgrade to sunken and/or architectural masonry etc.). Enclosed bullpens, 3 at home and 2 at visitor sides. Portable aluminum bleachers, total capacity 200. Concrete Perimeter paving within the total footprint included elsewhere (see Landscape). 50fc Infield/30fc Outfield plus Pedestrian Egress/Security Lighting included elsewhere (see Electrical/Lighting).

- Cost Range $15.50 - $17.50/sf
- Area Shown 41,515 sf
- Total Estimate $650,000 - $725,000

Soccer/Multipurpose Practice

Surface all-synthetic turf, fully under-drained, with perimeter manual washwater system. Limited crowd control and ball control fencing and netting systems, with perimeter concrete curb. Field illustrated on the current plan includes a marked soccer field dimension of 210'x330' minimum with 15-20' clear, with football markings easily accommodated.

- Cost Range $12.50 - $15.25/sf
- Area Shown 97,500 sf
- Total Estimate $1,225,000 - $1,500,000

Tennis

Eight new courts shown, each assumed to occupy a typical 7,200 sf footprint (60'x120'). Includes standard "tennis court grade" asphalt base and competition acrylic surfacing with trench or slot-type drainage inlets, 10' perimeter fencing with appropriate fabric weave and weight and an allowance for players-eye wind-screens, player benches, limited portable teaching/spectator bleachers and one "Match" bleacher (capacity 100).

- 30fc Lighting with Pedestrian Egress/Security Lighting included elsewhere (see Electrical/Lighting).
- Cost Range $85,000 - $100,000 per court
- Area Shown 56,690 sf / 8 Courts
- Total Estimate $680,000 - $800,000

Stadium Athletic Field

- The Stadium Field estimate is configured to potentially stand-alone, however water quality and stormwater detention, if required by the local jurisdiction, will be calculated and engineered into work being performed elsewhere on site.
- Stadium Field Improvements
- Improvements to the stadium facilities inside the track ("track infield") include a conversion to vertically draining synthetic turf with complete markings for competition Varsity Football and Soccer, and various Track & Field Events (D-Areas), as well as "off-site" throwing event facilities to the west.
- Track and Field Throwing Events "Offsite" Area Total Cost $110,000
  - Discus cage and throwing pad = $25,0000
  - Javelin runway = $35,000
  - Landing sector grading improvements and grass = $25,000
  - Misc. pedestrian improvements and portable athletic bleachers = $25,000
- Estimated Cost Range for Overall Improvements $22.50 - $24.00/sf
- Area Shown (combined field and field events) 99,960 sf
- Total Estimate $2,250,000 - $2,400,000

Structural Building Systems

Scope and Design Criteria

- Stanwood High School is a 3-story steel framed structure with masonry wall construction at the gymnasiums, performing arts center and wrestling area. All other areas are structural steel columns and beams framing each floor. The roof of the entire building is steel bar joists supported on masonry walls or steel framing. The building spans down and over an approximately 30 foot slope and is supported on the uphill side by a soldier pile wall to which a 10" shotcrete wall is constructed at below grade areas. Conventional concrete foundations will be used which bear on soil improved with rammed aggregate piers.
- Code: 2015 International Building Code (IBC)
- Roof Loads:
  - Dead Load – 20psf
  - Snow Load – 25psf
- Floor Loads:
  - Dead Load – 100psf
  - Live Load – 80psf at Classrooms, 100psf at assembly areas
- Mechanical Mezzanine Load:
  - Dead Load – 100psf
  - Live Load – 40 psf + mechanical equipment weight

- Site/Soil Properties (Draft Report dated 6/28/17 by Associated Earth Sciences, Inc.):
  - Soil Bearing Pressure – 5,000psf (via rammed aggregate pier soil improvement)
  - Site Class "E"
- Retaining Walls:
  - Active Pressure: 35 PCF + 5H
  - Restrained Pressure: 50 PCF + 10H
  - Passive Pressure: 250 PCF
  - Coefficient of Friction: 0.30
- Seismic Design:
  - SDS = 0.80, SD1 = 0.50,
  - Importance Factor, I=1.25
  - Response Modification Coefficient, R=6 (Wood shear walls).
- Wind Design:
  - Basic Wind Speed (for Risk Category III): 115 mph
  - Exposure Category: "B"

Foundations

- Conventional concrete continuous and spread footings supported on soil improved by rammed aggregate piers. Typically, the top of footing elevation is located 18" below finish floor except where deeper excavation may be necessary to mitigate fill soils as discussed in the geotechnical report. Minimum continuous footing sizes are 18" wide by 10" deep. Minimum spread footing sizes are 2'-0" square by 12" deep. Footings are stepped down at the top of and adjacent to sloped areas.
- Stem wall widths typically match the nominal width of the stud walls they support, 6" minimum width concrete at the exterior walls.
- Braced frames are supported on concrete grade beams
- Floors at the ground level are 4" concrete slab on grade construction with welded wire reinforcement.
- The north side of the sight is retained by a soldier pile wall with 10" concrete wall attached to the soldier piles at areas below grade.

Wall Framing

- Wall framing at the exterior walls is light gauge metal framing.
- Wall framing at the interior walls is non-structural light gauge metal framing

Floors and Mezzanines

- All elevated levels are composite steel floor systems utilizing steel beams spaced between 7'-10' O.C. and steel girders with 3" metal decking and concrete topping totaling 7½" in thickness (including metal deck). Steel HSS columns will be used to support the framing.

Roof Framing

- The roof framing is steel bar joist spaced approximately 7'-8' O.C. with structural steel framing at joist bearings and at the perimeter. 1½" deep metal decking spans between steel framing members, and steel HSS columns are used to carry loads to the floors below.

Lateral Force Resisting System

- Lateral wind and seismic forces is carried through the structure via steel Buckling Restrained Braced Frames (BRBF) in all of the building areas with the exception of the gymnasiums, performing arts center and wresting area, which is special reinforced masonry shear walls. The center core space will have locations of mixed braced frames and masonry shear walls.
- Braced frames are supported at the foundation by grade beams running continuously between columns and extending approximately 8'-0" past each end. CMU shear walls are supported at the foundation by conventional continuous concrete footings. The metal decking at the roof levels acts as a diaphragm to transfer lateral loads to the frame/shear wall elements, while the concrete filled metal deck floors will serve the same purpose at the floor levels.

Architectural Building Systems

Exterior Enclosure – Walls

- Typical wall construction to be cold-formed 8" metal stud framing @ 16" on center with 5/8" fiber reinforced gypsum wallboard sheathing, liquid applied weather barrier (Prosoco Cat 5 or equal), 2" rigid insulation (EPS at brick and 2-1/2" rockwool at all other cladding).
- Primary exterior wall finishes will be brick veneer 3.5x2.1x11.5 Norman face brick. The majority (80%) of the coursing pattern will be in a running bond pattern with the remaining (20%) consisting of stack bond. Masonry ties to be spaced at 16"oc each way. Minimum 1" air space will be provided between brick veneer and rigid insulation.
- Metal wall panels shall consist of a flat profiled aluminum sandwich panel with a Kynar finish, North Clad AL or ACM, or equivalent.
- The primary structural frame of the building will be required to carry a 2 Hr. Fire Resistance Rating; primary structural steel framing members within the exterior wall construction will need to be wrapped in fire rated gypsum board enclosure and sealed or have spray-on fire proofing applied.

Exterior Enclosure – Roof

- Shed Roof framing slope per plan. Roofing to be prefinished standing seam metal.
- Low-Slope Roof membranes will be a fully adhered single ply PVC white membrane roofing system.
- Roof insulation to be R-38 minimum plus tapered crickets, two layers min of rigid board polyisocyanurite.
- Typical flashings to be pre-finished (Kynar 500) 20-gauge sheet metal.
- Gutters shall be minimum 20 gauge, and downspouts to be galvanized steel pipe, powder coated.
- Roof fascia to be 20 gauge prefinished sheet metal.

- Fall protection will be provided at all roofs where required.
- The roof assembly is required to carry a 1 Hr. Fire Resistance Rating. The underside of the roof deck will need to have spray-on fire proofing applied. Note that this requirement does not apply for the Gymnasium or Auxiliary Gyms because the ceiling height is located 20'+ above the floor level (per exception noted in 2015 IBC)

Exterior Enclosure – Doors, Windows and Skylights

- Typical exterior doors will be hollow-metal doors and frames.
- Hollow-metal exterior door frames will be galvanized steel, 2" wide by 14 gauge. Hollow-metal doors and frames will be limited to exterior service doors. Fill in frames with rockwool insulation.
- Metal doors and frames to be factory primed and field painted
- Exterior windows will be glazed aluminum storefront/curtainwall, clear anodized.
- Windows to be bronze anodized aluminum storefront/curtainwall frames, thermally broken, fixed. Provide clear, low-e, 1" insulating glass (Solarban 60 or equal), typical. Provide high performance glazing (Solarban 70XL or equal) at west facing curtainwall.
- Sunshades shall be custom fabricated painted aluminum or steel blades as shown on drawings.
- Skylights to be 21" dia. Tubular skylights, consisting of skylight dome, reflective tube, and diffuser assembly.
- Operable windows will be integrated into storefront and curtainwall system. Each Classroom and science classroom and teacher planning space shall receive two 1'w x 4'h operable panels at opposite sides of the room to provide cross ventilation.
- Aluminum framed curtain wall system will be used at main entrances, commons, gym entry and other glazing conditions over 12' in height.
- Door hardware--mortise locks, closers and panic devices to be provided per SCSD standards.
- Auto door operators to be provided at all main exterior doors and interior vestibule doors.
- Card access to be provided at all exterior doors, main office doors, teacher planning offices.

Interior Systems and Finishes – Walls

- Typical interior wall construction to be cold-formed metal stud framing with standard 5/8", type X GWB except where water resistant type X is required for wet areas.
- The primary structural frame of the building will be required to carry a 2 Hr. Fire Resistance Rating; primary structural steel framing members within the wall construction will need to be wrapped in fire rated gypsum board enclosure and sealed or have spray-on fire proofing applied.
- Typical interior walls to have two layers of GWB (one per side) and acoustical batts to meet acoustical requirements.
- GWB finish level shall be level 4, typical. Level 5 finish is required for walls and ceilings exposed to daylight, for any walls to receive semi-gloss sheen and for interior side of all exterior walls. All utility areas and rooms shall be finish level 3.
- Glazed ceramic tile will be used for all restrooms walls, full height.
- Painted interior walls will typically utilize "premium" coating systems with (2) finish coats of alkyd enamel with eggshell sheen; walls in wet areas will utilize alkyd enamel with semi-gloss sheen.
- Provide custom display cases where indicated.

Assembly Spaces – Public Areas

- Theater
  - Proscenium and shaping walls to be pre-finished acoustical plywood veneer panels. Panels will consist of various reflective, absorptive, and diffusion acoustical configuration.
  - House acoustical enclosure walls to be painted GWB and fabric acoustical panels as required to meet acoustical performance.
  - Back Aisle and sound light lock entries to be painted GWB and fabric acoustical panels as required to meet acoustical performance.

- Theater Lobby
  - All walls typical except north and east walls below clearstory glass to be custom display wall for show and company image display. West wall to be plywood veneer panels to match house proscenium and shaping walls.

- Library
  - All walls typical except with 50% of wall area below 10' AFF to be writable and/or tackable surface.

- Shared Activity
  - All walls typical except with 100% of end wall (typically west end) area to be writable and/or tackable surface.

- Commons
  - All walls typical except with 100% of east wall area to be writable/projection/tackable surface. NE walls enclosing restrooms to be an extension of exterior brick material to wrap entire area of restrooms and storage including Theater Lobby side. Walls below and associated with social stair (see vertical circulation) to match social stair.

- Main/Auxiliary Gym
  - All walls painted CMU, unless noted otherwise

- Gym Lobby
  - All walls typical except east wall (both L1 and L2) to be painted CMU with the full width of the wall associated with the main gym to be exposed ground face CMU. West wall (L2) between Health Room and Training Room doors to be full height built in trophy display cases.

Interior Systems and Finishes – Doors & Relites

- Typical interior doors to be certified quarter sawn wood ash or oak veneer of uniform color and solid core wood, fire rated and labeled where required.
- Typical interior steel doors to be 16 gauge, full flush seamless construction. Utility rooms only as noted.

- Steel doors and frames shall be factory primed and field painted.
- Interior door and glazing frames to be 1" hollow metal.
- Provide ¼" float glass at interior lites, tempered, typical.
- Provide safety glass and tempered glass as required by code at all fire-rated assemblies.
- Provide factory primed sheet metal access doors and panels to be field painted.
- Roll up doors or sidefolding doors: Roll – up counter door will be used at theater and gym concessions, full height rolling doors will be used at the servery, between scene shop and stage. Sectional garage doors are proposed as follows: (2) commons south façade, (1) Ext. Scene Shop Delivery, (1) Int. Scene Shop, (2) ea. Wood and Metal Shops, (1) ea. Horticulture, Vet Sci, and Animal Sci, and at the athletic utility room. At least one shared activity classroom the large CTE space, Band room and each end of the Commons. Nana walls are proposed at one classroom for each shared activity area and two in the library group activity room.

Interior Systems and Finishes – Ceilings

- Standard 2' x 4' tegular smooth (non-fissured) white ceiling tile, Ultima high NRC or equivalent, and pre-finished reveal type metal grid for typical suspended acoustical ceiling.
- Hard ceilings in wet areas or (moisture resistant ACT as shown on drawings), soffits and other areas as shown on drawings to be suspended GWB or metal stud framing with GWB, painted per wall finish.
- Exposed miscellaneous steel shall be painted.

Assembly – Public Areas

- Theater
  - Proscenium and stage reflectors to be pre-finished acoustical plywood veneer panels. Ceiling in the shaping wall zone to be acoustical plywood veneer panels.
  - House acoustical enclosure ceiling to be painted act ceiling system with reflective, diffusion, absorption panels to meet acoustical performance.
  - Back Aisle and sound light lock entries to be painted GWB.

- Theater Lobby
  - Standard 2'x4' tegular smooth (non-fissured) white ceiling tile with suspended metal ceiling system clouds covering 40% of ceiling area.

- Library
  - Lower Ceiling: Unfinished A grade plywood panels to follow roof slope.
  - Upper Ceiling: Painted GWB to match adjacent Shared Activity Ceiling.

- Commons
  - Lower Ceiling below Admin: 2'x2' Prefinished accessible wood ceiling system.
  - Upper Ceiling: Standard 2'x4' tegular smooth (non-fissured) white ceiling tile with 30" stretched fabric ceiling panels.

- Shared Activity
  - Lower Ceiling: Unfinished A grade plywood panels to follow roof slope.
  - Upper Ceiling: Painted GWB to match adjacent Shared Activity Ceiling.
  - 4' wide section of ceiling along south side and all small areas adjacent to main SA area to be typical 2'x4' ceiling system.

- Main/Auxiliary Gym
  - Panelized acoustical ceiling panels will be used between exposed roof joist.

- Gym Lobby
  - Standard 2' x 4' tegular smooth (non-fissured) white ceiling tile, Ultima high NRC or equivalent, and pre-finished reveal type metal grid for typical suspended acoustical ceiling.

Interior Systems and Finishes – Flooring

- At mechanical/electrical and storage room floors, provide natural gray concrete with clear sealer.
- At classrooms and office areas provide commercial grade carpet broadloom with backer.
- Resilient sheet flooring with heat welded seams will be used at hallways, science rooms, servery and as shown on the drawings.
- At restrooms, provide nonslip ceramic tile.
- At main entry corridors and commons provide sheet flooring as shown.
- Entry walk-off mats are recessed. Provide at all lobby/corridor exterior entry vestibules.
- Typical wall base throughout the project shall be 4" rubber base unless noted otherwise. Use 1x6 ash base at commons and entry hallways.
- Gym floor to be maple wood sports floor by Action Floor System, Action Crush I or equal.

Specialty Systems and Finishes

- Whiteboards to be three ply construction with laminated porcelain enamel markerboard surface. Sheet whiteboard ("Walltalkers") utilized in some locations.
- Tackboards to be synthetic cork by Forbo.
- Toilet partitions to be solid phenolic, floor mounted and overhead braced.
- Provide ADA compliant interior panel signs, identifying room names and numbers.

- Provide dimensional letters at both interior and exterior applications. Provide 18" laser cut dimensional letters at exterior delineating building address.
- Provide allowance for exterior signage: Wall or canopy signs at entry, gymnasium, theater, and commons as well as two monument signs one along 272nd and another along Lindstrom Rd.
- Provide Class 2A / 10 B & C fire extinguishers and cabinets. Recessed and semi-recessed type cabinets shall be used in public areas.
- Provide brushed stainless steel toilet room accessories.
- Provide 3 built in glass display cases per floor and, one in each art classroom, one at school entry, two at gym entry, two at entry hallway.
- Guardrails to be custom fabricated painted steel: approximately 5/8-3/4 thick x 3"w vertical pickets with ¾-1" thick x 3"w perimeter frame with hardwood cap.

Equipment, Furnishings and Miscellaneous

- Provide manufactured cabinets. All exposed faces to be finished with plastic laminate or wood veneer, with chrome wire pulls and standard self- edging; unless noted otherwise.
- Typical plastic laminate countertops are to be self-edged, with 4" backsplashes; provide plywood substrate at wet areas. Epoxy counters in science rooms.
- Window coverings: provide horizontal blinds with 1" metal slats at exterior windows and interior relites at all classrooms, labs and offices. Provide roller shade at feature classrooms, digital media, Art and commons curtainwall conditions.
- Provide 50 corridor lockers in a combination of single, double and triple tier, typical size 15"x15" x 30"h
- Provide Electronic message board at front entry.
- Gym equipment includes, retractable basketball backstops and hoop, inserts for volleyball poles.
- Wood bench metal framed retractable bleachers at main gym to seat 900. Additional retractable bleachers with seating for another 1,000 spectators will be installed in the aux. gyms.
- A total of 240 half-height vented athletic lockers will be installed throughout the Health, Fitness and Athletics area.
- Science Rooms are to have the following equipment: fume hoods at classrooms and prep room, countertops are to be of chemical resistant solid surface material.
- Music storage cabinets
- Stage curtains
- A loading dock will be installed at the Receiving Area adjacent to the Kitchen to accommodate deliveries.

Vertical Circulation

- Elevator to be Otis Gen2 2500, three stop.
- Stair one (entry and theater lobby) shall be painted steel frame with hardwood treads.
- Stair two (social stair) shall be concealed structure with pre-finished wood floor and wall panel enclosure. Normative rise and run stair area to have inset rubber treads.

- General Circulation stair (Shared Activity, Gym Lobby) Shall be painted steel frame with precast stair treads with inset rubber treads.
- Theater BOH technical stairs to be shop primed steel frame and rails with precast stair treads.

Food Service Design

Design Goals

The Food Service Program will support the Stanwood High School population as well as prepare/deliver meals to the Lincoln Hill Alternative Learning Center and Lincoln Academy. The Kitchen will function as a full service operation and will receive and have storage for daily deliveries to support the Food Service Program. Design goals for the project include:

Design Overview

- The new kitchen will support a breakfast and lunch program.
- The menu will focus on healthy choice entrees accompanied with fresh fruits, vegetables, and milk.
- Deliveries will be brought directly into the kitchen via the Receiving corridor.
- Dry storage room will be located to have a direct route from the Kitchen receiving door. Dry storage shelving shall be an adjustable open wire type. Room shall include a can rack and parking space for a vendor supplied bread rack.
- Cold storage will consist of a walk-in refrigerator and freezer. Mobile milk coolers will also be on site to store and serve milk from. Doors shall be locking. A blast chiller will be located near the cooking line.
- On-site prep will be supported by work tables with sinks to an indirect waste.
- Work stations will maximize under and over storage for pots, pans, utensils, and small wares.
- Hand washing sink shall be centrally located to serve all areas.
- Cooking equipment shall consist of two double stack combi-oven/steamers, tilting skillet, tilting kettle, and open burners covered by a Type I grease hood.
- The serving line will include hot wells, refrigerated cold wells, pass-thru heated slider, and heated pizza platform. Mobile refrigerated milk coolers will be located on the main serving line. Two double-sided pay points will be at the end. Two mobile double-sided iced condiment bars shall be positioned just past the pay points.
- Students will be served on single-use ware.
- A cube ice machine with bin shall be provided.
- Waste drop-off areas will aid students with self-bussing and will occur at egress points in the Commons. Students will deposit any waste and recycles at these stations.
- Warewashing will consist of dish tables, sink with waste disposer and spray rinse, an automated door-type warewasher with 180 degree hot water rinse cycle, and a 3-compartment potwashing sink table. An eye wash will be located in the space.
- Whenever possible equipment shall be made portable. Those items with closed bodies shall be set on raised bases. Open base equipment shall be made with tubular stainless steel legs having sanitary gussets and bullet-shaped feet or casters.

- Equipment shall conform to all local and national codes. All items shall be designed to National Sanitation Foundation Standards. Working surfaces and cabinet bases shall be stainless steel, polyethylene, or plastic laminate.
- Natural gas is available and preferred for the cooking equipment. A Type I grease exhaust hood will cover the line-up.

Support

- A manager's desk/file cabinet will be located in the Kitchen Office with provisions for phone and data lines.
- A mop sink and chemical storage will be located within the Kitchen.
- The Kitchen will require a grease removal device sized per code by the plumbing engineer.
- Space for a dumpster will be provided in the loading dock area.
- A unisex staff toilet and staff break area will be located within the kitchen.

Finishes

- Kitchen finishes are to be smooth, washable, and light in color. Recommended flooring material is Altro Stronghold 30 seamless commercial vinyl with abrasive. If the ceiling is suspended the tiles used shall be mylar coated for cleaning. Recommended wall finish is a washable wall board wainscot material, i.e.: stainless steel or FRP minimum up to 6 feet with a semi-gloss painted wall surface continuing up to the ceiling.
- Stainless steel wall flashing will cover the cooking wall surfaces.

Theater Design – Overview

Assembly Space

- 600 seat facility (fixed + wheelchairs), with Orchestra Level seating and Rear Tiered seating.
- A primary cross aisle separates the two seating areas.
- Primary entrance/exit is by vestibule on the house left side (via the PAC lobby) at the main cross aisle between Orchestra and Read Tiered seating. Secondary entrance/exit on house right side at the cross aisle.
- One upper rear exit for ambulatory and non-ambulatory audience members are included.
- Seating layout and relationship to stage is a modified thrust/proscenium format. This is intended to satisfy the traditional shape that is friendly to music while supporting a basic level of immersive theater ("thrust") for intimate relationship between actors and audience. Seating rake at the rear of house is sharply stepped to enhance the perception of intimacy.
- Direct ambulatory & non-ambulatory access from the auditorium to the stage is provided.
- Catwalks for lighting systems, accessible from control booth and connected to onstage galleries provide technical circulation separate from and unseen by patrons.
- Side Box Boom lighting positions shall be accessible from galleries and catwalks.
- An Orchestra Demi-Pit with pit filler deck panels shall be provided for music flexibility.

Main Stage

- Not less than 40’ deep x 86’ wide, with a proscenium opening of up to 40’ (max) wide x 20’ (max) high.
- A permanent stage apron extending 3’-6”’ beyond the arch line and an 8’-0” long (at centerline) orchestra pit filler extension (above orchestra demi-pit).
- Side stage areas with connections to the auditorium and main stage
- Sprung stage floor, with sleepers, neoprene pads, plywood subfloor, tempered hardboard top and expansion joint covers.
- (3) Onstage Fly and Loading Galleries for Rigging and Lighting and Set access.

Backstage Support Spaces

- Shall include makeup, dressing, storage, shared Green room, Stage Set Prep and backstage circulation corridors. These support areas shall be severable from the Commons/PAC lobby during performances and events to allow for proper separation between patrons and performers during events.

Lighting Systems

- General Lighting in Main Auditorium shall be a combination of dimmable LED downlights and switched LED work lights. General lighting shall be controlled by a central dimmer/relay/data system which will be part of an overall lighting control network in the auditorium-theater venue.
- For maintenance purposes, the design will attempt to locate the maximum practical amount of house and work light fixtures where they may be serviced from catwalks or other stable platforms. LED general lighting in open ceiling high areas shall be rated for ultra-long service life in excess of 20 years under standard usage.
- Work lighting shall be provided at all catwalks and galleries and technical access corridors. Work lighting shall be provided in two modes: white general lighting and blue safety lighting (low near floor level).
- Convenience push-button stations shall be located at selected doorways to allow activation of basic room lighting. A master control station shall be located in the control booth and at a Stage Manager’s Panel onstage to allow a higher level of basic lighting control. Work lighting shall have local access stations at key points along catwalks and galleries and backstage doors, and shall have mimic control at the master lighting station in the control Booth and Stage Manager’s Panel.
- Basic minimum occupancy lighting shall be activated by occupancy detectors such that a code-minimum complement of lighting shall always be on when the theater is occupied for any reason, and shall not shut off until 15 minutes after the occupancy detectors no longer are activated.
- A digital data network (Ethernet-based) shall be distributed throughout the venue, using conventional IEEE standards and equipment, although the network shall not be connected to the general building network(s). The network shall distribute ACN-RDM/DMX.
- A modern, solid-state dimming and control system consisting of a wall-mounted cabinet with modular dimmers/relays shall be provided for house and work-lighting control. Stage Lighting shall be controlled by means of distributed digital dimmer bars and packs at the locations where the stage lighting fixtures are hung at catwalks and side boom positions. For stage lighting on the main stage, traditional dimmer banks providing multiple branch circuits to flown connector strips, attached to selected stage rigging sets shall be provided.

- Stage Lighting shall consist of conventional instruments with standard and intelligent accessories, along with LED units. Modern variable parameter intelligent color changers and automated lighting shall be contemplated and listed a part of the design solution for stage lighting, even if initial construction funding does not presently permit complete inclusion.
- A stage lighting console shall be included which shall allow for control of conventional/distributed dimmers as well as control of intelligent lighting accessories and automated instruments.

Stage Rigging and Draperies

- Stage shall have a manual counterweight system using weighted arbors on steel T-tracks. Selected rigging sets, such as onstage electrics and orchestra Concert Shells shall be motor-driven due to weight and safety concerns.
- Rigging system shall include sets for electrics, Masking Borders, Masking Side Legs, General Purpose Scenery, Scrim, Cyclorama, Grand Drape, Upstage Drape, Paintable Drop, Concert Shell, Side Masking Tabs and Side Lighting sets.
- Drapes shall be professional grade fabrics with professional fabrication requirements.
- Tracks shall be professional grade, smooth, quiet and durable.
- 37 Counterweight rigging with limited motorization (total of 7 sets shall be hoists)

Orchestra Shell

- Acoustic Reflector Panels, known as Orchestra Shells, shall be rigged to deploy for use, raise up into storage or lower for adjustment. Each of (3) units shall be heavy duty and shall be sized and located to provide acoustic projection and onstage ensemble for music performers. Shells shall have integral LED lighting.
- Portable acoustic towers, matching the fabrication and appearance of the Orchestra Shell, shall provide lateral reflection and diffusion of music among performers and toward audience. Towers shall have counterweighted bases, be storable in a nested and folded fashion and shall have a special transport device to move them into position and back into their storage area.
- Selected acoustic tower members shall have concealed musician entrance doors to allow performers to enter the concert area when the shells and towers are in place on the stage.

Orchestra Demi-Pit Decking System

- Heavy-duty stage deck panels shall be fitted into the opening for the Orchestra Demi-pit. Decks shall be sturdy and rigid, yet be easily removed.
- A safety net system shall be included to limit the risk of injury from falling when the pit is open.

Fixed Upholstered Seating

- Durable and attractive seating units, permanently attached to the floor, shall be included in the design. Aisles and spacing between rows shall meet or exceed code requirements for egress.
- Seating units shall have gravity/spring-assist lift upholstered seats, solid armrests and abuse resistant upholstered seat backs. Color selection of materials and finishes shall be by Architect.
- Selected seating units shall have transfer arms for partially ambulatory persons.
- Selected seating units at aisle ends shall have integral safety lighting for aisles.

Drama Classroom / Black Box

- Flexible teaching and performance space, capable of seating approximately 100 audience members and including a small performance area.
- Flat sprung wood floor, black walls, black ceiling.
- Includes steel pipe grid, for lighting and drapes.
- Separate control room/booth (can double as Drama Teacher Office)
- Limited lighting control for training purposes
- Basic control of lighting in room
- Small scale stage lighting fixtures for teaching
- Separate actor and patron entrances
- Accessible from PAC Lobby, for audience entrance
- Configured to serve as teaching space, rehearsal space and small recital/performance space.
- Fitted with stage lighting, house lighting, work-lighting, dimming and controls and other technical systems for teaching and performance.
- Tie-on Masking Drapes and spanner pipes provided to allow for multiple configurations of the space.

Music Rooms (Band & Choir)

- Fitted with one-wall, single walk-draw curtain tracks and drapery panels as required by acoustic consultant, to provide variable sound dampening.

Mechanical Systems

Fire Protection

- The new Stanwood High School project will be provided with a complete fire protection system in compliance with the most recent edition of N.F.P.A. #13 and local Authority Having Jurisdiction.
- A double detector check valve assembly will be provided that will utilize OS&Y gate valves with externally mounted tamper switches.
- Mechanical Room will contain seven (7) wet pipe automatic fire protection sprinkler systems to protect all areas within the building's envelope and any exterior overhangs that are required to be protected will be protected with dry sidewall sprinklers and at least one (1) auxiliary dry pipe automatic fire protection sprinkler system to protect all areas outside of the building's envelope that cannot be protected by the wet pipe sprinkler system.
- The design density, remote area size, and hose stream allowance requirements shall be taken from N.F.P.A. #13 for Ordinary Hazard Group II, Ordinary Hazard Group I, and Light Hazard Occupancies.
- All hydraulic calculation procedures, seismic bracing procedures, sprinkler head location requirements, and system component requirements outlined in N.F.P.A. #13 will be followed.

Waste and Vent

- Cast iron no-hub piping for waste/vent piping with heavy duty 4-band couplings underground.
- Grease interceptor provided for kitchen and culinary arts exterior to building.
- Solids interceptor provided for art room spaces.

Acid Waste and Vent

- Acid waste and vent will be Schedule 40 polypropylene for science rooms with acid neutralization tank(s) on site in a vault.

Domestic Water

- The domestic water service enters the building at the main mechanical room with the backflow preventer, strainer, PRV and isolation valves fully accessible within the room.
- Above ground domestic water piping to be soldered or brazed Type "L" copper.
- Non-potable water system for science rooms.
- All piping shall be flushed and chlorinated to remove all dirt and bacteria.
- Ample isolation valves for ease of maintenance.

Domestic Hot Water

- Storage type high efficiency gas hot water heaters.
- Hot water generators to be located throughout building to minimize piping.
- Domestic hot water circulation will be provided.

Natural Gas Systems

- Gas service will be coordinated with Cascade Natural Gas. The gas meter will be located outside the main mechanical room.

Utility Monitoring

- Gas, water, and electrical usage monitored through the DDC controls system.

Plumbing Fixtures

- Vitreous china and heavy gauge stainless steel.
- Low flow fixtures include 1.28 gpf toilets, 0.125 gpf urinals, and 0.5 gpm faucets.
- Manual lavatory metered faucets for lavatories.
- Manual flush valves for urinal and water closets.
- All wall-hung fixtures to include heavy duty carriers.

Compressed Air Systems

- Air compressors serving the shop areas will be located outdoors under the adjacent covered storage.
- Compressed air piping will be threaded steel pipe or copper tubing.

Hydronic Heating

- High efficiency gas fired boilers with sealed combustion will generate hot water for space heating purposes.
- Variable/primary with variable volume pumping for energy savings during low load conditions.
- Three boilers sized at 50% building load for partial redundancy.
- Piping will be Aquatherm (or equal) for mains with PEX for runouts. No grooved fittings will be allowed.

Chilled Water Central Plant

- Air cooled packaged chiller with high efficiency compressors for quiet and reliable operation.
- Variable primary pumping arrangement for energy savings during low load conditions.
- 2 chillers sized at 50% of building load.
- Piping will be Aquatherm (or equal) for mains with PEX for runouts where possible. No grooved fittings will be allowed. Exterior piping will be routed underground using pre-insulated pipe.
- 20% propylene glycol for freeze protection.

Ventilation (Dedicated Outdoor Air Handling Units)

- Dedicated outdoor air units (DOAU) will provide tempered ventilation air to each occupied space.
- DOAUs will be double wall, variable volume four pipe air handling units with heat recovery and variable/ECM supply and exhaust fans (where possible). Heat recovery will be sized at 125% of design airflow.
- Internally lined ductwork for quiet, efficient operation.
- Demand control ventilation for all classrooms and high or intermittent occupancy zones.
- MERV 13 filters and MERV 8 pre-filters on all outside air intakes.
- Ventilation rates shall be based on standards set forth in ASHRAE guidelines and Washington State Ventilation and Indoor Air Quality Codes.

Space Heating and Cooling

- Constant volume four pipe fan coil units will condition gym and commons areas.
- Four pipe ceiling mounted fan coil cassettes for space conditioning in classrooms, offices, and common areas. Classrooms shall contain 2 or more fan coils for partial redundancy.

Design Temperatures

- Winter/Summer outdoor: 23°F / 79°F db/66°F wb
- Winter/Summer indoor: 70°F / 75°F

- Winter/Summer indoor (utility/unoccupied): 55°F / 95°F
- Winter/Summer indoor (MDF/IDF): 70°F – 78 °F

Exhaust

- Exhaust provided for toilet rooms, custodial, storage areas, and other spaces where heat, odors, or fumes are present.
- Roof mounted exhaust for kitchen and dishwasher hoods in the main kitchen and culinary arts classroom.
- Specialty exhaust provided as required for kilns, fume hoods, welding hoods, etc.
- Dedicated sawdust collection system provided for wood working areas.

Miscellaneous Cooling

- Split system air conditioning units will provide cooling in each MDF/IDF space.

Miscellaneous Heating

- Electric unit heaters will provide freeze protection in mechanical rooms and other unoccupied spaces.

Controls

- A fully direct digital control (DDC) system will be provided.
- System shall include all necessary devices, hardware, software and instrumentation for complete control of all building HVAC, plumbing, and exterior lighting systems.
- System to include web-based platform to match current systems in the District.
- System shall be designed to meet all requirements described in the Sequence of Operations.
- ASI controls by NCS, with Alerton controls by ATS will be listed as permissible alternate bidders.

Electrical Systems

The electrical contractor shall conform to the General Conditions, Supplementary Conditions, and related work in other Divisions for all work in Division 26, 27 and 28.

Codes, Standards, and References

- The work shall comply with the latest edition of the applicable Standards and Codes of the following: ASTM, NBFU, NEC, WAC, NESC, NEMA, NFPA, U.L., IPCEA, CBM, ETL.
- The contractor shall obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work.

Energy Code Requirements

- The 2015 Washington State Nonresidential Energy Code.

Power – Site Utility Service

- The primary power for the new High School will be connected to the existing overhead lines along the south side of the site (72nd). All connection requirements will be coordinated with Snohomish PUD. The anticipated location of the utility transformer is on the east side of the building in the chiller enclosure. The secondary voltage of the transformer will be 480Y/277V.

Power Distribution

- The power distribution consists of 480Y/277V and 208Y/120V in the building.

Wiring Methods

- All raceways shall be GRS, IMC, or EMT unless noted otherwise.
- Flexible conduits shall be permitted in 6 foot lengths to motors and lay-in light fixtures.
- PVC conduit may be used for underground raceways.
- All wiring shall be copper THW or THHN.
- Conductors shall be tested with a “Megger” type tester. Feeders shall be checked to ensure phase rotations for motors and equipment.

Wiring Devices

- Outlet and pull boxes shall be pressed steel, zinc coated, 4” size minimum.
- Surface metal raceway boxes shall be of same manufacturer of raceway.
- Exterior outlet and junction boxes shall be cast iron or corrosion resistant alloy compatible with raceway.
- Exterior boxes below grade shall be constructed of pre-cast concrete with size as required by application.
- All work in this section shall be coordinated with other trades to prevent conflicts.
- Device mounting heights shall be as follows: Switches – 4 feet; Receptacles – 18 inches; other devices as noted on plans or in other sections of the specifications.
- Switches shall be specification grade, quiet type, and white color with stainless steel plates.
- "Industrial Specification Grade", Duplex NEMA 5-20R configuration (20-Amp, 120-Volt) unless shown otherwise. Must have “rivetless ground” contact manufactured as an integral component of the external ground screw terminal. Meets Fed Spec. WC-596 Hubbell HBL5362, Cooper 5362, P&S 5362A, and Leviton 5362.
- Ground-Fault Circuit-Interrupter Duplex Receptacles: NEMA 5-20R. Hubbell GF20ILA, and Cooper VGF20, for 20 Amp, 125-Volt AC. Provide GFI receptacles where required by code.
- Weather Resistant (WR) / Ground Fault Circuit-Interrupter (GFCI) Outdoor Duplex Receptacles: NEMA 5-20R. Hubbell GFTR201 or equal, for 20 Amp, 125-Volt AC.

- Special Purpose Receptacles: For special purpose receptacles, see drawings for voltage, amperage, and phase. Provide with matching plug delivered to the Owner.

Power Monitoring

- A revenue grade meter will be installed integral to the main distribution board for owner's use.
- CT's will be provided and connected to the EMCS to monitor the energy consumption of mechanical equipment and lighting.

Surge Protection Devices

- SPD devices shall be tested per ANSI C62.41-41-1991 and C62.45 standards.
- Suppressors shall have a warranty of 20 years.
- Suppressors shall provide suppression elements between each phase conductor and neutral and between neutral and ground.
- Suppressors shall have a single impulse current rating of 50,000 amperes per phase.
- Suppressors shall be installed on a main distribution boards and all branch panels serving computer equipment.

Emergency and Standby Power

- The district has decided that an emergency and standby generator is not desired at the High School.

Grounding System

- Grounding conductors shall be Copper, code size, with physical protection where subject to damage. Bare or green insulated.
- Ground Rods shall be 3/4" x 10'-0" copper clad steel.

Lighting System

General

- Interior fixtures shall be steel or aluminum with 300 degrees F., baked enamel finish or brushed finish.
- Exterior fixtures shall be corrosion resisting metal and suitable for outdoor service without tarnishing or other damage due to exposure.
- LED lighting fixtures shall provide lighting with a minimum Correlated Color temperature (CCT) of 3500K and shall have a Color Rendering Index of (CRI) of 80 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.
- Occupancy sensors shall be dual technology ceiling or wall switch type.

- Daylight Harvesting Control System shall consist of ceiling mounted Photo Sensor for each daylight zone capable of 0-10V dimming output. Each daylight zone shall have override capability.

Classrooms

- Lighting system will consist of 2'x2' recessed LED fixtures with automatic Daylight Harvesting and dimming controls. Lighting level will be designed to provide a maintained average of 45-50 footcandles. Science classroom and labs shall have a minimum of 50 footcandles on the working plane.

Offices

- Lighting system will consist of 2'x2' recessed LED fixtures. Automatic Daylight harvesting controls shall be provided in areas required by Code. Dimming controls will be provided to give the occupant additional control over their lighting. Lighting level will be designed to provide a maintained average footcandle level of 30-40.

Lobby

- Lighting system will consist of decorative pendants and recessed downlight LED fixtures. Automatic Daylight harvesting controls shall be provided in areas required by Code. Dimming controls will be provided to give the occupant additional control over their lighting. Lighting level will be designed to provide a maintained average footcandle level of 15-20.

Exterior

- All exterior lighting will be LED type. Exterior lighting will be provided around the building perimeter and for exterior pathways. A combination of building mounted light fixtures, pedestrian scale, and pole mounted light fixtures.
- A low voltage lighting control system will be used for exterior lighting control. Provisions will be included in the lighting control system to allow the owner to reduce lighting levels at designated times for energy savings.

Emergency Lighting

- Exits are marked by readily visible signs in all cases where the exit or way to reach it is not readily apparent to the occupants. Signs are located not more than 10 feet from exits, are internally illuminated, and of the type consuming less than 5 watts each.
- Egress lighting is accomplished by selective illumination of normal lighting fixtures. Distributed lighting inverters will provide emergency lighting during outages.

Illumination Levels

- The lighting system will be designed to provide illumination levels recommended by the Illuminating Engineering Society of North America (IESNA) and will be in compliance with the Washington State Energy Code.

Lighting Control Systems

- The lighting control system will be a digital system.

Overall Site and Athletic Fields Lighting Systems

General Site

- All exterior lighting will be LED type. Exterior lighting will be provided around the general site. A combination of pedestrian scale, bollards, and pole mounted light fixtures will be utilized for lighting the site.

Athletic Fields

- The lighting system in the athletic fields will be pole mounted LED flood lights. Paths will be lit from area light fixtures on specified field lighting poles.
- The basis of design will be based on MUSCO lighting.

Illumination Levels

- The average maintained footcandle levels for the baseball and softball fields will be 50fc for the infield and 30fc for the outfield.
- The average maintained footcandle levels for the tennis courts will be 50fc.

Lighting Control Systems

- The general site lighting control system will be controlled by a low voltage lighting control system. Provisions will be included with the lighting control system to allow the owner to reduce lighting levels at designated times for energy savings.
- The athletic fields will be controlled by a lighting control system designed by the sports field lighting manufacturer.
- The lighting control for the football field will need to be relocated prior to the removal of the existing District Maintenance Building. The lighting control will need to be re-installed in a new location within the renovated stadium field house.

Telecommunications System

General

- The LAN infrastructure will be based on District standards. This system, when installed in its entirety, provides the District with a 25-year warranty on the material and installation. Outlet locations will be provided in each classroom for two client workstations, network printer, projector, and teacher's workstation. Category 6 cables will be routed from the local IDF or MDF to each outlet. All other occupied rooms will receive at least two data outlets.
- MDF and IDF's will be interconnected with Multi-mode Fiber Optic Cable and 25-pair copper.

Telecommunications Rooms and Spaces

- The data outlets for the new building will be served from a MDF and IDFs on the second floor.

Communications Pathways

- Racks with cable management, cable tray, all cables, raceway, device plates, patch panels, cable terminations and grounding will provide a complete LAN infrastructure.
- MDF and IDF's will be interconnected with Multi-mode Fiber Optic Cable and 25-pair copper.

Wireless LAN (WLAN)

- Ceiling mounted outlets will be provided throughout the building, including one in each instructional space for Wireless Access Points, which will be provided by the School District.

Intercom and Clock

- The intercom/clock system will be IP based and specified around the School District's preferred intercom system.
- The intercom system will provide for 2-way loudspeaker communication, paging announcements, class change bell tones and master clock/slave clock synchronization functionality. Access to functions and communication features will be provided through the telephone system. Each classroom and occupied space will be equipped with an IP digital clock/speaker assembly with call switch.

Telephone

- The telephone system is currently designed to be IP based and the exact vendor will be coordinated with the District in the next phase of work.
- The system will be integrated with the LAN infrastructure to allow simple cross connecting for telephone relocations.
- Each teacher handset will be able to make calls directly within the facility and to exterior numbers.
- The system will be integrated with the intercom system to allow for paging within the facility.

Audio Visual Systems

Classroom Audio Visual System

- The Audio Visual (AV) System shall distribute audio and video signaling within each classroom.
- The system shall consist of wall mounted AV input plate(s), ceiling mounted speakers, an amplifier/mixer, wall mounted controller, wireless microphone and ceiling IR sensor, and cabling.
- The video signals shall be displayed on a marker board using an owner furnished contractor installed video projector.
- The system shall be designed for compatibility with Apple TV products.
- The classroom audio visual system will be specified around the School District's preferred manufacturer.

Music Room Sound System

- The music room sound system will be a high quality, multi-channel wide frequency sound reinforcement and production system.
- The system will provide microphone pick-up and pre-recorded program playback capabilities.
- The system will utilize a digital mixing console for any audio recording functions.

Gymnasium Audio Visual System

- The new sound system will be a high quality, multi-channel wide frequency sound reinforcement and production system.
- The system will provide microphone pick-up and pre-recorded program playback capabilities.
- The system will use solid-state dual-channel amplification with distribution to a full-range loudspeaker system.
- The system will support direct-wired production intercom, assisted listening for the hearing impaired, and will include a portable cart rack.
- The system will provide fixed audio and video inputs will be located throughout the gymnasium for convenient source distribution.
- The system shall be compatible with wireless Apple TV products.
- A touch screen control system will be provided for complete end user operation of the audio visual system.

Multipurpose Room Audio Visual System

- The system will be a high quality, multi-channel wide frequency sound reinforcement
- The system will provide microphone pick-up and pre-recorded program playback capabilities.
- The system will use solid-state dual-channel amplification with distribution to a full-range loudspeaker system.
- The system will provide fixed and lockable audio and video inputs located through the Multipurpose Room for convenient source distribution.
- The system shall be compatible with wireless Apple TV products.
- The system will support direct-wired production intercom, assisted listening for the hearing impaired, and will include a portable cart rack.
- The system will use a large format projector and drop down screen for video display.

Performing Arts Center Audio Visual System

- The new sound system will be a high quality, multi-channel wide frequency sound reinforcement and production system.
- The system will provide microphone pick-up and pre-recorded program playback capabilities.
- The system will use solid-state dual-channel amplification with distribution to a full-range loudspeaker system.
- The system will support direct-wired production intercom, assisted listening for the hearing impaired, and will include a portable cart rack.

- The system will provide fixed audio and video inputs will be located throughout the Performing Arts Center for convenient source distribution.
  - Audio inputs will be provided throughout the Performing Arts Center to a level which will accommodate full musical production performances.
- The system shall be compatible with wireless Apple TV products.
- The system will utilize a digital mixing console for performance audio control and recording.
- The system will use a large format projector for video display within the space.
- A touch screen control system will be provided for complete end user operation of the audio visual system.

CATV

- The district has decided that CATV is not desired.

Electronic Security Systems

Intrusion Detection

- The Intrusion Alarm System will be per district standards and will utilize addressable technology similar to that of the fire alarm system where the location of every door position switch and motion detector can be displayed on the LCD Keypad and reported to the monitoring agency. Door position switches will be located at each exterior door. Motion Sensors will be provided at preferred locations as coordinated with the school district.

Access Control

- Access control system rough-in shall be included to provide pathway for owner provided access control system.
- The Access Control System type will be coordinated with the School District standards. This system will grant access to the user when a valid card is read at the reader. Access can be restricted to each user group to certain times of day and days of the week, if desired. This system will allow operation of the existing cards that are currently being used throughout the district. Locations of card readers will be as determined by the district during the construction document phase of the project.

Video Surveillance

- Video Surveillance system rough-in shall be in locations of cameras will be as determined by the district during the construction document phase of the project.
- Axis is the preferred manufacturer.

Distributed Antenna System

- The required pathway infrastructure for a Distributed Antenna System (DAS) shall be provided. Infrastructure will include 2" conduit runs with intermittent junction boxes distributed throughout the building. A 2-hour fire rated pathway will be provided from the DAS head end location to the roof for antenna cabling.
- The local AHJ will determine if a full DAS system is required near the end of the construction process.

Fire Alarm System

- The fire alarm system will be an addressable system. This system will be a microprocessor-based system that will monitor and report the alarm and operating status including individual component locations of all initiating devices connected to the system. This aids significantly in identifying problems with the system and pinpointing a location of the device that is in alarm. The system will monitor fire sprinkler activity and report all information to the monitoring station.
- Automatic smoke detectors will be provided throughout all egress corridors and rooms where occupant levels exceed 50 people in accordance with current codes and as coordinated and required by the local Authority Having Jurisdiction (AHJ).
- Audio/visual devices will be provided throughout the facility and shall conform to current ADA requirements. A manual pull station will be provided at a location that will be staffed during normal operating hours, and at other locations as coordinated and required by the local AHJ.
- Fire Alarm conductors shall be permitted to be run open, not in conduit, in accessible ceiling or attic space.
- The system sub-contractor for the fire alarm system shall be approved by U.L.
- The system shall be of a single supplier.
- A graphic map shall be installed at the remote annunciator.
- The fire alarm system shall be monitored by an offsite monitoring service.

Appendix 3 – Construction Document Review Report

Document Review Report
Constructability Set
Washington Sustainable Schools Protocol - 2015 Edition

Project:	**Stanwood HS**
Report Date:	**DD review, 5/17/18, response 6/27/18, DD back check and Constructability 10/12/18, Bid back check 11/12/18**
Reviewers:	**Byron Holmstead, Jake Huang**
Drawings:	**3/30/2018, 10/1/18**
Specifications:	**3/15/2018, 10/1/18**

Commissioned Systems:

Division 22 - Domestic Hot Water Systems
Division 23 - HVAC and Control Systems
Division 26 - Lighting Control and Utility Metering Systems

The purpose of this review is to satisfy the requirements of the Washington Sustainable Schools Protocol (WSSP) in regards to the Energy Credit E4.1.1 point. This credit requires a focused review of the systems to be commissioned in late DD phase and midway through the construction document phase.

Issues identified and provided in this review are intended to assist the design team in providing final project documents that are complete, accurate, enhance the commissioning process and ultimately provide the Owner with a functional and maintainable facility.

The systems to be commissioned as required are listed above. The document review was limited to these areas.

In general, the drawings seem to be at a level consistent with the Design Development document phase with the exception of equipment selections. The design appears to be capable of achieving the design intent.

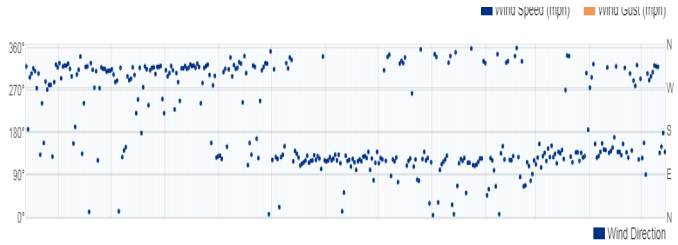
Please see attached review comments and provide a return response on each issue under the column “Resolution” to assist the commissioning team. The comments include a priority column to assist the design team in prioritizing their response. WSSP Credit E4.1.1 requires that all review comments be addressed by the design team, and then back checked by the Commissioning Authority.

If there are any questions regarding these review comments, please call Byron Holmstead.

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
			GENERAL COMMENTS:			
1.	1	Mech rooms	Access to the large 4th floor fan room is not obvious. Highly recommended for easy maintenance access. It is recommended to provide double doors to the boiler room for maintenance and repair access.	BH	There is a stair from level 3 that provides access to the 4th floor mechanical. We have added double doors into the mechanical room.	Ok
2.	1	Mech design	Why is there an ADF to each space? An ADF for science rooms makes sense but to each space seems excessive. This seems like a lot of extra cost on equipment and control loops. A right sized exhaust duct system should compensate well.	BH	Revised in DD set. See sheets M2.11 to M2.36 of DD set. ADFs reduced to science and restrooms etc.	Ok
			SPECIFICATIONS:			
3.	2	019100	Commissioning section is not complete. The CxA will provide during the CD phase the Cx specifications for 019100, 220800, 230800 & 260800 including cross specification coordination.	BH	Noted, will include Cx specifications when provided. WCG Provided updated specs for the constructability review set 9/28/18	Ok
4.	1	General	The OPR in section 2 states for the specifications to include "Training to be done with-in 14 days of turn-over including O&Ms, Valve charts , reports etc.	BH	Will incorporate.	Ok
5.	1	224000.3.03	Energy conservation: The OPR state to use 1.28 GPF flush valves on toilets and 0.25 GPF on Urinals.	BH	Design is based on 1.28 GPF WCs and 0.125 GPF Urinals. OPR requirements were changed to 0.125 GPF urinals on July 12th meeting with district maintenance team.	Ok
6.	1	23 05 53	Mechanical Identification: Recommend that labels are mechanically fastened and not adhesive tape.	BH	Recommendation noted. Added at paragraph 2.04.	Ok
7.	1	23 11 19	HVAC Piping Specialties: Do not see specifications on "Control" valves. Do not see where there is direction for the	BH	Valve pressure drop of 2-4 PSI will be noted in future submittal.	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
			valve supplier to make valve selections. What Cv or pressure drop to use?		Found 230523.2.08.C	
8.	1	262726.2.04	Will the specified OS perform as a VS?	BH	Yes, the sensor will have both a occupancy sensor and vacancy sensor setting. Verified.	Ok
			DRAWINGS:			
9.	2	G0.04C	Section C402.5.1 Air Barriers are listed twice.	BH	Will remove duplicate reference. Updated G0.20	Ok
10.	1	Science Rooms	The OPR Section 5 page 21 states for the Science rooms HVAC design to NOT have 100% OA all of the time. It appears that the design is using OA 100%. Confirm with owner that this is acceptable or change design. Also the 2nd floor science rooms supply ductwork does not extend to the floor above. Where is the supply main for the second floor science rooms?	BH	There will be transfer air to make-up for additional exhaust over outside in space. See DD drawing set. DOAU with FCU as primary AC.	Ok
11.	1	M General Ductwork	Many of the duct risers do not match the architect's chase locations.	BH	Duct risers to be coordinated in future submittals. Appears corrected.	Ok
12.	1	M General Piping	Consider reverse return hydronic loops. Pros are simpler to balance and easier to troubleshoot. Direct return tends to have an issue where the zones closet to the source are always satisfied and on extreme design days the zones furthest from the source takes a long time to get satisfied if at all.	BH	Reverse return is expensive and not necessary. Consideration not taken.	Ok
13.	1	M General Piping	Do not see where there is direction for the valve supplier to make valve selections. What Cv or pressure drop to use?	BH	Valve pressure drop of 2-4 PSI will be noted in future submittal. Found 230523.2.08.C	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
14.	1	M General Piping	Consider deleting all 3-way valves and just placing a 2-way bypass valve for minimum pump/boiler flow at a sizable main halfway between end of a run and the boiler room.	BH	Will consider recommendation. Consideration not taken.	Ok
15.	1	M General Controls	Did not see any Thermostat or CO2 sensors on the drawings. Make careful practical and logical locations of the thermostats.	BH	Will locate CO2 and thermostats logically and practically.	Ok
16.	1	M0.02	Plumbing Fixtures: The OPR state to use 1.28 GPF flush valves on toilets and 0.25 GPF on Urinals.	BH	Design is based on 1.28 GPF WCs and 0.125 GPF Urinals. OPR requirements were changed to 0.125 GPF urinals on July 12th meeting with district maintenance team.	Ok
17.	2	M0.04	Air-to-Air Energy recovery unit schedule: Note 2 references to a different school district.	BH	Will be revised.	Ok
18.	1	M0.04	AHU Schedules: The OPR states that the filters for all the air handlers are to be a standard and a consistent size across the AHUs. Suggest adding a note to communicate as such.	BH	Will add note. Not seem to be indicated. See schedule note 3 Note says "Standard Size" , would "Consistent Standard Size for all units" may have been a better words for this? Consistent filter size in all units is not practical. Will require customization and potential upsizing of multiple units, which would equate to large first cost expenses to the owner. BCE recommends keeping "standard filter sizes" verbiage.	Ok
19.	1	M2.32	The Main Gym, South Aux. Commons, Auditorium & Stage supply and return mains are not evident. Large ducts should be carefully coordinated. A low return should be coordinated as well for floor level comfort.	BH	Concur. Will be coordinated.	OK

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
20.	2	M2.37	The key plan does not associate with the portion of floor plan shown.	BH	Concur. Will be coordinated.	Ok
	1	M2.37	Can either the supply louvers or the exhaust louvers move to the opposite (south) side of the mechanical room? This layout even though complies with code the intent to short circuit return air back into the building is not being abided here. This layout could render the DOA units less efficient and ventilation might be compromised. Below is a histogram of past year of Stanwood prevailing winds. It appears that the wind comes from SE most of the year. 	BH	The louvers cannot be placed on the south side of the building due to height constraints between the platform and the roof eave on that side. The south side of the roof is the low and slopes up to the north.	Ok
21.						
22.	1	M6.03	Miscellaneous Control Items note 4. This note is in conflict with the OPR states that the HVAC schedule to be 7:00 AM to 3:00 PM. Verify with owner for actual schedule.	BH	Concur. Will be coordinated. Not updated.	OK
23.	1	M6.03	Miscellaneous note 9 refers to sheet M-803. M-803 cannot be found.	BH	Fixed in DD set. Still an issue.	OK
24.	1	M6.04	Dryer Booster Fan control: Recommend to add a phrase to Note 1: “Install duct mounted pressure switch with-in 10 feet of dryer outlet”. This does not seem to function otherwise.	BH	Concur. Will revise. Did not see a detail. Pressure switch shown on sequence on sheet M6.05.	

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
25.	2	M2.27C	There are (2) GF-2s and no GF-3 tagged.	BH	Concur. Will revise.	Ok
26.	1	E General Lighting	Daylight zones are not apparent. Any dimming sequences or fc levels?	BH	Daylighting zones are added after DD submittal.	Ok
27.	1	E General Lighting	Are there going to be any lighting zones on a schedule such as in common areas? Are all classrooms on stand alone zones?	BH	Classrooms, storage, offices will be standalone. Common areas will be on schedule.	Ok
28.	1	General E	Coordinate with M6.03 Miscellaneous note 9.b for phase loss detection and shut down.	BH	Direction to provide this item will be added to the drawings.	Ok
29.	1	General E	Coordinate with M6.03 Miscellaneous note 9.c for OS auxiliary connections.	BH	Direction to provide this item will be added to the drawings.	Ok
30.	2	E1.01	Electrical Legend under "Switches" – OS & VS notes to refer to E5.01 Lighting Control Schedule. The lighting control schedule is not on this sheet.	BH	Lighting control schedule will be added.	Ok
31.	1	E1.01	General Notes: Notes 9 & 26 seem redundant.	BH	Note 26 will be deleted.	Ok
32.	1	E1.01	General Notes: Notes 32 does not seem like it applies to this project.	BH	Note 32 will be deleted.	Ok
33.	1	E6.01 & 2 Panels	The OPR states to organize sub panels in groups: HVAC, Lights, and Receptacles etc. No sub-meters are shown as well. This should be coordinated with the DDC "Energy Dashboard" on Sheet M6.04 and Energy metering on Sheet M6.03.	BH	This will be coordinated as the design progresses.	Ok
			CONSTRUCTABILITY COMMENTS:			
			GENERAL COMMENTS:			
34.	1	Lighting	Lighting control sequence of operation indicates there are 2 daylight harvesting zones. Drawing does not indicate any	JH	Lighting zones are not defined on the drawings.	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
			lighting zones at all. Suggest indicating which lighting fixtures are in the daylight harvesting zones.		Lighting zones are shown on permit drawings. Will be represented on final addendum.	
			SPECIFICATIONS:			
35.	1	22 11 19	Trap primers: My experience is that pressure activated trap primers do not function very well if at all. Mainly because they do not get installed correctly. Consider using electric timer type primers.	BH	Not considered.	Ok
36.	1	Div 22.	Did not see a specification for electric water heater for the concessions and batting.	BH	Added	Ok
37.	1	Div 23	Did not see a specification for the following equipment: • De-stratification fan; • Dryer booster fan; • Glycol feed tank/ collection barrel; • Chemical pot feeder	BH	Added except for glycol feed tank but that does not show up on plans.	Ok
38.	1	Div 26.	Did not see a specification for lighting controls.	BH	Will be added via addendum.	Ok
			DRAWINGS:			
39.	2	M3.11	Many VAV diffusers and exhaust grilles do not have CFM labels. It's not clear on what CFM values for those diffusers and exhaust grilles. - Weight room 107: VAV-118 diffusers - Weight room 107: AFD: 112 exhaust grilles - Corridor 105C, 106E: VAV-117 diffusers - Servery 101: VAV-116 diffuser Locker 105, Locker 016: AFD:111 exhaust grilles	JH	Added	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
40.	2	M3.12	Many VAV diffusers and exhaust grilles do not have CFM labels. It's not clear on what CFM values for those diffusers and exhaust grilles. Locker 114, Locker 113: AFD: 108 exhaust grilles	JH	Added	Ok
41.	1	M3.15	VAV-107 schedule is sized for 740 CFM. Total diffuser CFM is 830. Unit might be undersized.	JH	VAV-107 has 1,200 CFM of supply grilles connected to it. Schedule shows only 745 CFM Scheduled 745 CFM is correct	Ok
42.	1	M3.16	EF-101 schedule is sized for 500 CFM. Drawing sum of diffusers indicates 800 CFM. Unit might be undersized.	JH	Corrected.	Ok
43.	1	M2.23	AFD-212 located on grid FFx4.2 does not appear to be controlling records 237 based on the ductwork layout. The VAV schedule indicates that this unit shall also controls records 237 exhaust airflow.	JH	Corrected.	Ok
44.	2	M2.33	Grid EE.5x3 shows VAV-327 in business lab 314. This unit should be labeled as VAV-326 instead.	JH	Corrected.	Ok
45.	1	M3.21	AHU-3 serves aux gym 202 with 8 diffusers (1200 CFM each) in a total of 9600 CFM. AHU-3 schedule indicates that the unit is 8600 CFM. The unit appears to be undersized.	JH	Corrected.	Ok
46.	1	M3.24	Stage 160 served by AHU-6 diffusers are missing CFM values.	JH	Corrected.	Ok
47.	1	M3.25	VAV-214 schedule is sized for 1200 CFM. Drawing sum of diffusers indicates 1365 CFM. Unit might be undersized.	JH	Corrected.	Ok
48.	1	M3.26	VAV-202 & VAV-203 labels in scheduled appears to be switched. The drawing shows: VAV-202 serves engineering classroom 266 w/ 420CFM. VAV-203 serves Fab Lab 266B w/ 190 CFM.	JH	Corrected.	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
49.	1	M3.33	VAV-337 schedule indicates unit is serving office 302C with 435 CFM. Looking at sheet M2.37, the unit is located on grid FFx25. It serves workroom 302A on sheet M2.33. Based on M3.33, the diffuser value is 55CFM. In summary, the VAV-337 schedule should indicate area serve is workroom 302A, with 55 CFM.	JH	Corrected.	Ok
50.	1	M3.35	VAV schedule indicates VAV-316 is serving undesignated office 333A. The drawing appears to be missing this unit.	JH	Corrected.	Ok
51.	2	M3.35	Grid L.2x7.5 shows VAV-302. This unit should be AFD-302 instead. It's serving toilet 332 and custodial 333C.	JH	Corrected.	Ok
52.	2	M3.35	Custodial 333C shows 0CFM exhaust. It should be 100 CFM instead based on the VAV schedule.	JH	Corrected.	Ok
53.	2	M2.36	EF-201 located on grid Px7 should be labeled as EF-203 instead.	JH	Corrected.	Ok
54.	1	M5.01 & M5.02	Details 11 & 12, 1 & 2: The pump head design is for 97 ft hd. Or 42 psi. Typical auto flow valves are 2-32 psi spring ranges. Will the units closest to the pump discharge (such as DOAH-3, FCU-271 & 272 etc.) have spring ranges to accommodate the higher pressures?	BH	230523 does not address this 5 to 60 psi autoflow valves to be used. Should add this to the spec or details. Will add spec verbiage in addendum 2	Ok
55.	1	M4.02C	The sections do not indicate the location of the equipment.	BH	Pages apparently deleted	Ok
56.	1	M6.01	Shouldn't there be a buffer tank for the chilled water system? Experience has shown that a chiller will often trip on low temperature if there is not enough volume for a 3 minute loop. Recommended volume is 376 Gal/ min x 3 minutes = 1,128 Gallons. I am estimating about 650 gallons volume	BH	No response Chilled water system is variable primary. Entire system volume is roughly 1500 gallons.	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
			minus the chiller. Should a buffer tank be included? Or maybe even upsize the pipes from the chiller to the pumps?			
57.	2	M6.02	Hydronic heating sequence: In paragraph B.2 states "duct " pressure. This should be water pressure.	BH	Corrected.	Ok
58.	1	M6.03 & Electrical	There is a requirement for power metering and an energy use dash board. I do not see any meters on the electrical drawings other than the main power meter.	BH	Corrected	Ok
59.	1	M6.03	Did not see a dryer booster fan sequence or detail.	BH	Corrected.	Ok
60.	1	M6.03 & E7.01	Occupancy sensors: There is an aux contact on the lighting occupancy sensors. Who is making the connection and installing the conductors from the DDC controllers to the occupancy sensors? EC, CC?	BH	Corrected.	Ok
61.	1	M6.05	DOAS sequence: Should a freeze stat be incorporated here?	BH	Not indicated Not required because of heat recovery Sorry for not clarifying: Will the humid exhaust air not freeze on the heat exchanger on the exhaust side? I have seen the freeze stat there on some units. Equipment calculations and selections do not foresee issues with exhaust side freezing conditions	Ok
62.	1	E3.21	Note 3: Detail 2 for emergency boiler shut down diagram is actually on sheet 7.03.	BH	Corrected.	Ok
63.	1	E6.21	Corridors / Vestibules lighting sequence of operation: 2. Master override switch in main office. The drawing does appear to indicate the master override switch in the main office on sheet E2.23.	JH	Corrected.	Ok

WSSP Mid Construction Document Phase Focused Review –Stanwood HS Priority: 1 - Design Intent, Energy, Maintainability, Commissioning 2 - Drafting/Spelling & Miscellaneous						
Item	***Prio.***	***Sheet/Page***	***Review Comment***	***By:***	***Resolution***	***Check***
64.	1	E6.21	Aux Gyms lighting sequence of operation: The sequence is missing 1. Automatic daylight harvesting control like the sequence for Gym. The drawing shows there are photocells in the Aux Gym on sheet E2.21	JH	Corrected.	Ok

Appendix 4 – Submittal Review Reports

Submittal Review Report
Washington Sustainable Schools Protocol - 2015 Edition

Project: **Stanwood High School**
Submittals: **Mech & Elec**
Report Date: **3/14/19**
Reviewers: **Byron Holmstead**

Commissioned Systems Submittals:

Division 22 - Domestic Hot Water Systems
Division 23 - HVAC Systems
Division 26 - Lighting Control and Metering Systems

The purpose of this review is to satisfy the requirements of the Washington Sustainable Schools Protocol (WSSP) regarding the Energy Credit E4.1.1 point. This credit requires a focused review of submittals for the systems to be commissioned (as required by WSSP).

The commissioned systems submittals are listed above. This submittal review was limited to these areas. Issues identified and provided in this review are intended to assist the project team in providing the owner with materials and services that meet the requirements of the project documents.

Please see attached review comments (provided as an MS Excel spreadsheet) and provide a return response on each issue under the column “Issue Resolution” indicating how the issue was resolved in the next submission. Also indicate via initial who on the project team resolved the issue in the “By” column.

If there are any questions regarding these review comments, please contact Byron Holmstead.

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Submittal Review Issues Log
Stanwood High School

Item	*Status*	*Spec Section*	*Page or Reference*	*CxA Review Comment*	*By*	*Issue Resolution*	*By*
1	Corrected	Controls	NA	Please provide DDC for review	BH	When available.	KD
2	Corrected	Lighting Controls	NA	Please provide lighting controls for review	BH	By lighting supplier.	KD
3	Corrected	General Plumbing	NA	The submittals do not seem to distinguish which equipment goes with which project. Will the installers get confused?	BH	In general submittals are divided by building. Responses are provided per building when submittals are bundled, to avoid confusion.	ME
4	Corrected	223436 GWH	#38	Did not see a gas regulator included. Are gas regulators submitted elsewhere?	BH	Correct. Gas regulators submitted under section 231100.	ME
5	Corrected	230000 GUH	#82	Did not see a gas regulator included. Are gas regulators submitted elsewhere?	BH	Correct. Gas regulators submitted under section 231100.	ME
6	Corrected	231100	#54	The NG regulator submittal has no tag or description for which regulator to go with which equipment. Should each regulator have an equipment tag?	BH	The regulator submittal is generic and will be sized by the manufacturer based on the required gas pressure and quantity. Individual tags for regulators is not required.	ME
7	Corrected	232000	#77	Expansion tanks ET-5 & 6 do not seem to match the equipment schedule.	BH	Acceptance volume is exceeded for both ET-5 & ET-6. Tank total volume is not critical. Selections are acceptable.	ME
8	Corrected	232500	#49	Chemical Treatment: Did not see any information about glycol in this submittal. Should glycol be included here?	BH	Agreed. Freeze protection solution is a required submittal. Still awaiting freeze protection submittal.	ME
9	Corrected	236400	#52 Controls	The submitted chiller states that the "Contractor shall provide flow switch and wiring per chiller manufacturer requirements." Is this planned per the design documents? Is the contractor aware of this?	BH	Contractor responsible for substituted equipment requirements. Per discussion with manufacturer rep contractor has installed these chillers before and is familiar with manufacturer requirements.	ME
10	Corrected	235533	#79	The CTE DOAU-1 Fan curves do not appear that it will meet design capacity.	BH	There are two exhaust and two supply fans in the unit. Unit can meet design capacity.	ME

Item	Status	Spec Section	Page or Reference	CxA Review Comment	By	Issue Resolution	By
11	Corrected	233600	#78	The VAV submittal shows performance based on 1.0" Inlet pressure. However this conflicts with the supply pressure in the AHU sequence. Is this going to be a problem with air flow capacity or control?	BH	Inlet pressure will not make an issue for flow capacity or control. Value is for sound data purposes.	ME
12	Corrected	237200	#56.1	DOAU-2 supply fan selection looks like it is selected at a surge point. The fan is likely to surge at the two air flow point. It appears that the exhaust fan is close to the surge points as well. Recommend a different fan selection.	BH	Manufactrer has stated selection is at a satisfactory point on curve and no surging will occur.	ME
13	Corrected	237200	#56.1	DOAU-5 exhaust fan selection looks like it is selected too close a surge point. The fan is likely to surge at the two air flow point. Recommend a different fan selection.	BH	Manufactrer has stated selection is at a satisfactory point on curve and no surging will occur.	ME
14	Corrected	237300	#57	AHU-4 supply fan selection looks like it is selected too close to a surge point. The fan may surge at the two air flow point. Recommend a different fan selection.	BH	Manufactrer has stated selection is at a satisfactory point on curve and no surging will occur.	ME
15	Corrected	237300	#57	AHU-6 states that the access is only through the top or bottom of the unit. Is this acceptable and is there enough clearance for this? Looking at section 4/M4.06 it appears that the ductwork need to be raised for the access.	BH	Manufactrer has stated selection is at a satisfactory point on curve and no surging will occur.	ME
16	Corrected	237200 237300	#56.1 & 57	Who is providing damper actuators? MC or CC?	BH	Damper actuators will be by CC	ME
17	Corrected	237200 237300	#56.1 & 57	There is no indication of filter dimensions. The OPR states that the dimensions of the filters across the unit to be standardized.	BH	During design this was discussed and a standardized filter size across all AHUs and DOAUs would increase some of the unit sizes and would lead to a large first cost to owner.	ME

Item	Status	Spec Section	Page or Reference	CxA Review Comment	By	Issue Resolution	By
18	Corrected	238219	#89	FCU-276: should this one be a PCG-08, 2-pipe? FCU-250 & 256 Seems to be a different size than the rest. Should another unit be added here? FCU-145 & 146 seem to be mis selected?	BH	Concur FCU-276 should be 2-pipe model. FCU-250 & 256 are just toggled to a higher fan setting to get increased CFM, no need for different model. FCU-145 & 146 are just toggled to a higher fan setting to get increased CFM, no need for different model.	ME
Controls Submittal Review							
19	Corrected	Control Drawings	General	Program and setpoint changes history	BH	The Compass software tracks and records all setpoint changes. Programming changes can be documented in the programming file.	KD
20	Corrected	Control Drawings	General	Electric peak demand shedding programmed	BH	Not included in project.	KD
21	Corrected	Control Drawings	General	Program and setpoint changes history	BH	The Compass software tracks and records all setpoint changes. Programming changes can be documented in the programming file.	KD
22	Corrected	Control Drawings	General	Do you have any sort of plan on how to do the dashboard?	BH	In design now. To be discussed in the 10/23/19 graphics meeting with the dristict. School district wants samples to view to make decision.	KD
23	Corrected	Control Drawings	General	What kind of alarms does the school district want? If too many then they ignore them all. Screen color vs. Flashing light vs. pop-up.	BH	Defining alarms will require input from the school district. This is performed at the end of the project. The alarms will be indicated on the graphics as design ed on our company standard graphics. Alarms can also be sent to email addresses, if desired. To be discussed in the 10/23/19 graphics meeting with the dristict. More discussion to be done regarding alarms.	KD

Item	Status	Spec Section	Page or Reference	CxA Review Comment	By	Issue Resolution	By
24	Corrected	Control Drawings	General	Any building pressure control with the AHUs	BH	No. AFD's perform the BSP control. Some setpoint adjustment may need to happen after TAB if building is negative pressure. Cornerstone asked if changes such as building static pressure control needs to be added and response is not at this time.	KD
25	Corrected	Control Drawings	3.201 - 3.206	On the mechanical drawings M6.05 Fan Coil Unit details under the hydronic heating coil. The actuator is to spring open and power closed. Do the actuators need to be spring open?	BH	No. The FCU valves fail in the last position.	KD
26	Corrected	Control Drawings	7.22, 7.511	Power Phase Failure Connected and Programmed. Is it on page	BH	A phase failure will cause all HVAC equipment to shutdown. See 2.002, Item 9B	KD
27	Corrected	Control Drawings	7.290	Any manual override on the destratification fans	BH	No. To be discussed in the 10/23/19 graphics meeting with the dristict. RFI will be sent if needed.	KD
28	Corrected	Control Drawings	General	What should happen to the ADFs if doors are all left open. Will there be a return imbalance?	BH	Design question. Address during functional testing.	KD
29	Corrected	Control Drawings	7.210	Are there any dishwashers that have an interlock?	BH	Yes, Shown on 7.200	KD
30	Corrected	Control Drawings	7.220	note 4 referencing outside LCP seems confusing.	BH	Exterior light status is connected to the controller serving EF-202.	KD
31	Corrected	Control Drawings	7.240	who provides the fume hood switch?	BH	ATS will provide if not included with fume hood.	KD
32	Corrected	Control Drawings	7.350, 7.360	Shouldn't AHU6 & 7 have CO2 monitoring and control?	BH	They do. The room sensor monitors room temperature, room humidity and room CO2.	KD
33	Corrected	Control Drawings	7.410, 7.420, 7.430, 7.440	Do the DOAS units actually have recirc dampers? The recirc dampers do not seem to show up on the control points if so. Is it more like the CTE?	BH	The Aaon submittal shows the dampers. They will be permanently locked closed.	KD

Item	Status	Spec Section	Page or Reference	CxA Review Comment	By	Issue Resolution	By
34	Corrected	Control Drawings	7.600	Who is installing the remote chiller flow switch. Page 7.600 Chiller flow switch does on appear on diagram.	BH	Ramsett will install the chiller flow switches. ATS will wire the flow switches back to the chiller, if needed.	KD
35	Corrected	nLight Controls	General	Can the receptacles operate on a schedule separate from occupancy sensors?	BH	No. The classrooms are on stand alone systems for each classroom. Delay to be set to 30 minutes to minimize complaints.	Milne
36	Corrected	nLight Controls	LC0.1	The first paragraph on SSI controls states not to have more than 14 sensors. However, the gym and the gym lobby have more than that.	BH	Milne to investigate. Also look for booster packs that allow for more sensors.	Milne

Abbreviations:

BMS	Building Management System	ME	Mechanical Engineer
DHW	Domestic Hot Water	OPR	Owner's Project Requirements
DP	Differential Pressure	OS	Occupancy Sensor
EE	Electrical Engineer	SOO	Sequence of Operations
MBCx	Monitoring-Based Commissioning	VS	Vacancy Sensor

Appendix 5 – Commissioning Meeting Minutes

Commissioning Meeting Minutes #1

Project: Stanwood High School
Date: 09/11/19
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
Y	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
Y	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
Y	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
Y	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
Y	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	GC:				
Y	Dave Seger	CGC		206-890-4935	davids@cornerstonegci.com
Y	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
Y	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Mechanical:				
Y	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
Y	Ken Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
Y	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				

New Business

Item	*Topic*	*Action*
1.	WCG reviewed their scope of work and the commissioning process: 1. CA performs OPR, Design and Submittal Review. Complete. 2. CA Develops Cx Plan. In progress 3. CA develops start-up plan using contractor submitted start-up forms and CA provided CCLs. 4. Contractor completes start-ups and CCL (Contractor Check Lists) 5. CA performs Installation Verification 6. CA verifies TAB 7. CA witnesses functional test and trending by contractor 8. CA provides report 9. Post occupancy activities	None
2.	CxA went through the list of equipment involved. Lighting controls are also involved.	Cx equipment list to be updated in the plan.
3.	Commissioning to be included on construction meeting minutes.	CCC to add Cx to meeting agenda and meeting minutes topics. Meeting minutes on Procore.
4.	Dave Seger will be the Contractor's Commissioning Coordinator. All commissioning documents will pass through him.	Cx communications to be found on Procore and Dave to notify appropriate contractors for updates
5.	CA will assemble a start-up binder from material provided by contractors.	Contractors to submit proposed start-up documents, then execute start-up per plan.
6.	During site observations, CA keys in on maintainability and access issues, cleanliness, labeling and following manufacturer's (or approved alternate) procedures.	CA will provide Site Observation Reports.
7.	The batting cage heaters are to be on a schedule to allow heating.	To be coordinated with controls and electrician.
8.	The Cx activity schedule was generated in the meeting.	Updated schedule in the plan on Procore

Schedule Review

Activity	*Dates*
Start-ups	9/1/20
TAB	9/30/20
Testing	10/7/20
O&M and Training	10/1/20, 12/20/20
Final Completion	1/2/21

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*
1.	Site observations – begin 3/15/20	
2.	Witness start-up 9/20	
3.	TAB verification – 10/20	
Next Meeting:	TBD – 8/15/20	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #2 (Controls integration meeting)

Project: Stanwood High School
Date: 10/16/19 Updated 10/24/19
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
x	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
X	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	GC:				
	Dave Seger	CGC		206-890-4935	davids@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Ken Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Ken Duncan	ATS		360-661-7772	kend@atsinc.org
X	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
X	Carson Fisco	ATS		206-459-0598	carsonf@atsinc.org
X	John Arwine	ATS		206-276-0602	johna@atsinc.org

Old Business

Item	*Topic*	*Action*
1.2	CxA went through the list of equipment involved. Lighting controls are also involved.	Cx equipment list to be updated in the plan. To be uploaded to Procore in late 10/19.
1.5	CA will assemble a start-up binder from material provided by contractors.	Contractors to submit proposed start-up documents, then execute start-up per plan.
1.7	The batting cage heaters are to be on a schedule to allow heating.	To be coordinated with controls and electrician.
1.8	The Cx activity schedule was generated in the meeting.	Updated schedule in the plan on Procore. To be uploaded to Procore in late 10/19.

New Business

Item	*Topic*	*Action*
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table.
2.2	Discussed packaged equipment interface. Only packaged equipment are boilers and chillers.	None.
2.3	Discussed the approach to verifying point to point of equipment. 2 options- spot check ATS documentation or use WCG test forms.	If ATS P-t-P documents are complete then use their docs to spot check.
2.4	Discussed the approach to functional testing.	ATS would prefer test together so that issues can be resolved on the fly.
2.5	Discussed trend points and reviewing. CxA likes to see many points.	Trends can be set up once server is installed.
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19
2.7	Discussed lighting and receptacle controls. Classrooms are stand alone and not be scheduled.	None
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD

2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness.
2.13	Location of onsite DDC server.	In the mechanical Mezzanine.
2.14	ATS network architecture:	Can the school district access individual buildings on site if network goes down? ATS to investigate access.
2.15	Database back up;	ATS to train district on process
2.16	Dashboards:	School district wants samples to look at to decide on what to display.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up.
2.18	Alerton training	The owner would like some technical training on Alerton controls.
2.19	The district asked which if any actuators have feed back.	ATS to review.

Schedule Review

Activity	***Dates***
Start-ups	9/1/20
TAB	9/30/20
Testing	10/7/20
O&M and Training	10/1/20, 12/20/20
Final Completion	1/2/21

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Site observations – begin 3/15/20	
2.	Witness start-up 9/20	
3.	TAB verification – 10/20	

Next Meeting:	TBD – 8/15/20	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #3

Project: Stanwood High School
Date: 7/16/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
X	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
	Dave Seger	CGC		206-890-4935	davids@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
X	Austin Blake	ATS		206.459.2644	austinb@atsinc.org

Old Business

Item	*Topic*	*Action*
1.2	CxA went through the list of equipment involved. Lighting controls are also involved.	Cx equipment list to be updated in the plan. To be uploaded to Procore in late 10/19.
1.5	CxA will assemble a start-up binder from material provided by contractors.	Contractors to submit proposed start-up documents, then execute start-up per plan.
1.7	The batting cage heaters are to be on a schedule to allow heating.	To be coordinated with controls and electrician.
1.8	The Cx activity schedule was generated in the meeting.	Updated schedule in the plan on Procore. To be uploaded to Procore in late 10/19.
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table.
2.2	Discussed packaged equipment interface. Only packaged equipment are boilers and chillers.	None.
2.3	Discussed the approach to verifying point to point of equipment. 2 options- spot check ATS documentation or use WCG test forms.	If ATS P-t-P documents are complete then use their docs to spot check.
2.4	Discussed the approach to functional testing.	ATS would prefer test together so that issues can be resolved on the fly.
2.5	Discussed trend points and reviewing. CxA likes to see many points.	Trends can be set up once server is installed.
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress
2.7	Discussed lighting and receptacle controls. Classrooms are stand alone and not be scheduled.	None
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column.

2.13	Location of onsite DDC server.	In the mechanical Mezzanine.
2.14	ATS network architecture:	Can the school district access individual buildings on site if network goes down? ATS to investigate access. ATS response: YES
2.15	Database back up;	ATS to train district on process
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training.
2.19	The district asked which if any actuators have feed back.	ATS to review. Will show up on graphics.

New Business

Item	***Topic***	***Action***
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Peter to keep Ramsett and Delta notified of cleaning schedule.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder.

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers 8/17, Chillers 8/25	Start 8/17
Start-up lighting	7/27/20 site visit
TAB	8/30/20
Testing	9/15/20
O&M and Training	10/1/20, 12/20/20
Final Completion	1/2/21
CTE	
Start-ups	10/1/20
TAB	10/15/20
Testing	10/30/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	

Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Site observations – begin 3/15/20	
2.	Witness start-up 7/20	
3.	TAB verification – 9/15	
Next Meeting:	TBD – 8/13/20	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #4

Project: Stanwood High School
Date: 8/13/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
x	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
X	Austin Blake	ATS		206.459.2644	austinb@atsinc.org

Old Business

Item	*Topic*	*Action*
1.7	The batting cage heaters are to be on a schedule to allow heating.	To be coordinated with controls and electrician. ATS to investigate.
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.5	Discussed trend points and reviewing. CxA likes to see many points.	Trends can be set up once server is installed. In possession but waiting for building to be ready
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.13	Location of onsite DDC server.	In the mechanical Mezzanine. WCG to coordinated once functional testing starts.
2.14	ATS network architecture:	Can the school district access individual buildings on site if network goes down? ATS to investigate access. ATS response: YES WCG to coordinated once functional testing starts.
2.15	Database back up;	ATS to train district on process WCG to coordinated once functional testing starts.

2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
2.19	The district asked which if any actuators have feed back.	ATS to review. Will show up on graphics. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder.

New Business

Item	***Topic***	***Action***
4.1	Milne will be turning on permanent power at the end of August.	Only Milne on site that day (8/29?)
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers 9/15, Chillers 9/25	Start 9/15
Start-up lighting	9/1/20?
TAB	9/30/20
Testing	10/15/20
O&M and Training	11/1/20, 12/20/20
Final Completion	1/2/21
CTE	
Start-ups	11/1/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Site observations – begin 3/15/20	
2.	Witness start-up 9/17	
3.	TAB verification – 10/15	
Next Meeting:	TBD – 8/27/20	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #5

Project: Stanwood High School
Date: 8/27/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
x	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
X	Austin Blake	ATS		206.459.2644	austinb@atsinc.org
x	Brent Wyman	AirTest		425-890-4386	BWyman@airtest.us

Old Business

Item	*Topic*	*Action*
1.7	The batting cage heaters are to be on a schedule to allow heating.	To be coordinated with controls and electrician. ATS to investigate.
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.5	Discussed trend points and reviewing. CxA likes to see many points.	Trends can be set up once server is installed. In possession but waiting for building to be ready
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.13	Location of onsite DDC server.	In the mechanical Mezzanine. WCG to coordinated once functional testing starts.
2.14	ATS network architecture:	Can the school district access individual buildings on site if network goes down? ATS to investigate access. ATS response: YES WCG to coordinated once functional testing starts.
2.15	Database back up;	ATS to train district on process

		WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
2.19	The district asked which if any actuators have feed back.	ATS to review. Will show up on graphics. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder.
4.1	Milne will be turning on permanent power at the end of August.	Only Milne on site that day (8/29?)
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up

New Business

Item	***Topic***	***Action***
5.1	CGC would like detailed cleaning and flushing report.	Ramsett

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers – AHUs- 9/15, Chillers 9/25	Start 9/15
Start-up lighting	9/1/2020?
TAB	9/28/20
Testing	10/15/20

O&M and Training	11/1/20, 12/20/20
Final Completion	1/2/21
CTE	
Start-ups	11/1/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Site observations – begin 3/15/20	
2.	Witness start-up 9/17	
3.	TAB verification – 10/15	
Next Meeting:	TBD – 9/10/20	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #6

Project: Stanwood High School
Date: 9/17/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
X	Cory	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
X	Austin Blake	ATS		206.459.2644	austinb@atsinc.org
	Brent Wyman	AirTest		425-890-4386	BWyman@airtest.us

Old Business

Item	*Topic*	*Action*
1.7	The batting cage heaters are to be on a schedule to allow heating.	To be coordinated with controls and electrician. ATS to investigate. No DDC at batting cages.
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.5	Discussed trend points and reviewing. CxA likes to see many points.	Trends can be set up once server is installed. In possession but waiting for building to be ready
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.13	Location of onsite DDC server.	In the mechanical Mezzanine. WCG to coordinated once functional testing starts.
2.14	ATS network architecture:	Can the school district access individual buildings on site if network goes down? ATS to investigate access. ATS response: YES

		WCG to coordinated once functional testing starts.
2.15	Database back up;	ATS to train district on process WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
2.19	The district asked which if any actuators have feed back.	ATS to review. Will show up on graphics. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.1	Milne will be turning on permanent power at the end of August.	Only Milne on site that day (8/29?) On target. Need to coordinate with ATS for house power.
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing.

New Business

Item	***Topic***	***Action***
6.1	Is building flush required?	Need to get the time calculation from the design team.
6.2	When is the air barrier test.	Need coordination and notification ahead of time.

6.3	Ramsett asked CxA to witness temperature of the heating water flush.	

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25?	Start 9/15 – in progress
Start-up lighting – second and third floors done.	9/5/2020 October for rest.
TAB	9/28/20
Testing	10/15/20
O&M and Training	Cody making a training log.
Final Completion	1/2/21
CTE	
Start-ups	10/26/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Site observations – begin 3/15/20	
2.	Witness start-up 9/17	
3.	TAB verification – 10/15	
Next Meeting:	TBD – 9/24/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #7

Project: Stanwood High School
Date: 9/24/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
X	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us

Old Business

Item	*Topic*	*Action*
1.7	~~The batting cage heaters are to be on a schedule to allow heating.~~	~~To be coordinated with controls and electrician. ATS to investigate.~~ ~~No DDC at batting cages.~~
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.5	Discussed trend points and reviewing. CxA likes to see many points.	Trends can be set up once server is installed. In possession but waiting for building to be ready
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.13	Location of onsite DDC server.	In the mechanical Mezzanine. WCG to coordinated once functional testing starts.
2.14	ATS network architecture:	Can the school district access individual buildings on site if network goes down? ATS to investigate access. ATS response: YES

		WCG to coordinated once functional testing starts.
2.15	Database back up;	ATS to train district on process WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
2.19	~~The district asked which if any actuators have feed back.~~	~~ATS to review.~~ ~~Will show up on graphics.~~ ~~WCG to coordinated once functional testing starts.~~
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.1	~~Milne will be turning on permanent power at the end of August.~~	~~Only Milne on site that day (8/29?)~~ ~~On target.~~ ~~Need to coordinate with ATS for house power.~~
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing.
6.1	Is building air flush required?	Need to get the time calculation from the design team. Inquire the architect.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule.

6.3	Ramsett asked CxA to witness temperature of the heating water flush.	WCG observed hydronic heat in flush and ok.

New Business

Item	*Topic*	*Action*
7.1	No new topics	
7.2		
7.3		

Schedule Review

Activity	*Dates*
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25?	Start 9/15 – AHS, Pumps, Boilers & VFD complete Chiller is Thursday
Start-up lighting – second and third floors done.	9/5/2020 October for rest.
TAB	10/5/20 TAB verification start 10/15?
HVAC systems functional testing	10/19/20 start HVAC Lighting 10/12
O&M and Training	Cody making a training log.
Final Completion	1/2/21
CTE	
Start-ups	10/26/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*

1.	Start lighting testing – 10/12	
2.	TAB verification – 10/15 Start	
3.	Start HVAC testing – 10/15 Start	
Next Meeting:	TBD – 10/1/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #8

Project: Stanwood High School
Date: 10/1/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Steve Hendrickson	SCSD	360-985-9878		shendrickson@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Ben Hazari	ATS		206-818-9856	benh@atsinc.org
	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us

Old Business

Item	*Topic*	*Action*
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule.

		Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required?	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule.

New Business

Item	***Topic***	***Action***
8.1		

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25?	Start 9/15 – AHS, Pumps, Boilers & VFD complete Chiller is Thursday Exhaust fans mostly complete FCUs – In progress.
Start-up lighting – second and third floors done.	9/5/2020 2nd week in October for rest. -
TAB	10/5/20 TAB verification starts 10/5
HVAC systems functional testing	10/19/20 start HVAC Lighting 10/12
O&M and Training	Cody making a training log.

	District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	10/26/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 10/5 Start	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	TBD – 10/1/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #9

Project: Stanwood High School

Date: 10/8/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
X	Chris	Ramsett			
	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			

Old Business

Item	*Topic*	*Action*
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule.

		Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week. Tile in level 3 & ½ of level 2, Finishing floors in level.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Target date for end of October.

New Business

Item	***Topic***	***Action***
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow.
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25	Start 9/15 – AHS, Pumps, Boilers & VFD complete Chiller is Thursday Exhaust fans mostly complete – Sub coordination FCUs – In progress.
Start-up lighting – second and third floors done.	9/5/2020

	2nd week in October for rest. – Milne to verify for WCG.
TAB	10/5/20 TAB verification Coordination 10/12
HVAC systems functional testing	10/19/20 start HVAC – 2nd & 3rd floors are good to go. Lighting 10/12
O&M and Training	Cody making a training log. District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	10/26/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 10/12 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	TBD – 10/15/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #10

Project: Stanwood High School
Date: 10/15/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			

Old Business

Item	*Topic*	*Action*
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power.

		Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week. Tile in level 3 & ½ of level 2, Finishing floors in level 1. Ceiling tiles done in CR this week. Corridors next week. 1st floor the following week. Start-up of FCUs on 3rd level for TAB to buy time for level 1. Theater clean for Monday to start up theater unit and Commons units.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.2	Reviewed Cx Issue list	Milne & ATS to follow up.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent.
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Target date for end of October.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow - Mllne.
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.

New Business

Item	***Topic***	***Action***
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints.	Brian to follow up with SU techs.

Schedule Review

Activity	*Dates*
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25	Start 9/15 – AHS, Pumps, Boilers & VFD complete Chiller is Thursday Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – In progress.
Start-up lighting – second and third floors done.	9/5/2020 2nd week in October for rest. – Milne to verify for WCG.
TAB	10/5/20 TAB verification Coordination 10/12
HVAC systems functional testing	10/19/20 start HVAC – 2nd & 3rd floors are good to go. Lighting 10/12
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	10/26/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/1 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	TBD – 10/22/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #11

Project: Stanwood High School
Date: 10/22/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
X	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us

Old Business

Item	*Topic*	*Action*
2.1	Discussed the CxA controls submittal review comments.	Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.10	Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.	TBD WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power.

		Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week. Tile in level 3 & ½ of level 2, Finishing floors in level 1. Ceiling tiles done in CR this week. Corridors next week. 1st floor the following week. Start-up of FCUs on 3rd level for TAB to buy time for level 1. Theater clean for ~~Monday~~ Wednesday to start up theater unit and Commons units. Final cleaning through next week.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. Delta – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Nov 3 & 4. All dampers to be check for closure.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems.
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs.

New Business

Item	*Topic*	*Action*
11.1	When will the smoke dampers be tested?	CxA needs to witness this test. FA testing 10-29 & 30
11.2	Review HS issues list.	

Schedule Review

Activity	*Dates*
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25	Start 9/15 – AHS, Pumps, Boilers & VFD complete Chiller is Thursday Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – In progress.
Start-up lighting – second and third floors done.	9/5/2020 2nd week in October for rest. – Milne to verify for WCG.
TAB	10/5/20 TAB verification Coordination 10/12 Auditorium start 10/23 -1st floor – end of Oct.
HVAC systems functional testing	10/19/20 start HVAC – 2nd & 3rd floors are good to go. Lighting 10/12
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	10/30/20
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/1 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	TBD – 10/28/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #12

Project: Stanwood High School
Date: 10/28/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
X	Derek Welsh	WCG			Derek.e.welsh@gmail.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
X	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
X	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
X	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
~~2.1~~	~~Discussed the CxA controls submittal review comments.~~	~~Some questions to be addressed in the graphics on 10/23/19 at district office. Also see attached comments table. Discuss as testing commences.~~
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
~~2.10~~	~~Schedules: Discussed separate Heating / cooling unit schedule from ventilation schedule.~~	~~TBD~~ ~~WCG to coordinated once functional testing starts.~~
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power.

		Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week. Tile in level 3 & ½ of level 2, Finishing floors in level 1. Ceiling tiles done in CR this week. Corridors next week. 1st floor the following week. Start-up of FCUs on 3rd level for TAB to buy time for level 1. Theater clean for ~~Monday~~ Wednesday to start up theater unit and Commons units. Final cleaning through next week.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. In progress. Delta – submit digital.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. TBD All dampers to be check for closure.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems.
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20

11.1	When will the smoke dampers be tested?	CxA needs to witness this test. FA testing TBD – know more Monday
11.2	Review HS issues list.	

New Business

Item	***Topic***	***Action***
12.1	Geotest discuss the schedule building envelope test:	Reschedule when less people on site

Schedule Review

Activity	***Dates***
High School	
Start-ups Boilers – AHUs- in progress, Chillers 9/25	Start 9/15 – AHS, Pumps, Boilers & VFD complete Chiller is Thursday Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – In progress. Split AC units – have 3 of 7 done
Start-up lighting – second and third floors done.	9/5/2020 2nd week in October for rest. – Milne to verify for WCG.
TAB	10/5/20 TAB verification Coordination 10/12 Auditorium start 10/23 – done Auditorium lobby – Week of 11/2 Floor polishing done Oct. 1st floor – beginning Nov. West 1st floor AHUs start week Nov 2
HVAC systems functional testing	10/19/20 start HVAC – 2nd & 3rd floors are good to go. Lighting 10/12
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	Target Week of 11/9/20 Milne to notify Delta
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress

Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	TBD – 11/5/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #13

Project: Stanwood High School

Date: 11/5/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
X	Derek Welsh	WCG			Derek.e.welsh@gmail.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
X	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020. Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week.

		Tile in level 3 & ½ of level 2, Finishing floors in level 1. Ceiling tiles done in CR this week. Corridors next week. 1st floor the following week. Start-up of FCUs on 3rd level for TAB to buy time for level 1. Theater clean for ~~Monday~~ Wednesday to start up theater unit and Commons units. Final cleaning through next week. Gym sanding the week of 11/9
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb. Plates are installed. Cornerstone to investigate the RTU curb.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Dec.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues.
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20
11.1	When will the smoke dampers be tested?	CxA needs to witness this test.

		FA testing Smoke dampers after other device pre-testing. End of week 11/9
11.2	Review HS issues list.	
12.1	Geotest discuss the schedule building envelope test:	Reschedule when less people on site

New Business

Item	***Topic***	***Action***
13.1	RFI needs to be written up for the split system AC units	Cody to follow up.
13.2	Concessions sinks have too long of handles that hit each other	BCE to review – Possible solution is shorter handles.
13.3	Domestic water chlorination complete.	NA
13.4	Electric wall heaters – what is needed to start up?	Line voltage standalone thermostats. RFI to be written what type of thermostat. Delta to talk to unit supplier for integral thermostat.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – In progress. Split AC units – have 3 of 7 done Electric wall heaters -
Start-up lighting –	Wattstopper to come back for first floor & corrections
TAB	10/5/20 TAB verification Coordination 10/12 Auditorium start 10/23 – done Floor polishing done Oct. 1st floor – beginning Nov. West 1st floor AHUs start week Nov 2 Finish FCUs on 2nd & 3rd this week. AHU-4 & DOAU -2 work on this week
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. Lighting first floor and Outside left to do. Smoke damper testing week of 11/16
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	

Start-ups	Target Week of 11/9/20 Milne to notify Delta
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	11/12/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #14

Project: Stanwood High School

Date: 11/5/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
X	Derek Welsh	WCG			Derek.e.welsh@gmail.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
X	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to "Occupancy Sensor" Mode. N-light to coordinate with ATS for outside lights points.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020.

		Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week. Tile in level 3 & ½ of level 2, Finishing floors in level 1. Ceiling tiles done in CR this week. Corridors next week. 1st floor the following week. Start-up of FCUs on 3rd level for TAB to buy time for level 1. Theater clean for ~~Monday~~ Wednesday to start up theater unit and Commons units. Final cleaning through next week. Gym sanding the week of 11/9 Target date for cleaning Mech rooms week of 11/16.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb. Plates are installed. Cornerstone to investigate the RTU curb.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order 11/19
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Dec.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/13
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.

10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20
11.1	When will the smoke dampers be tested?	CxA needs to witness this test. FA testing Smoke dampers after other device pre-testing. End of week 11/16
12.1	Geotest discuss the schedule building envelope test:	Reschedule when less people on site In Dec.
13.1	RFI needs to be written up for the split system AC units	Cody to follow up. ATS to review controls for AC units
~~13.2~~	~~Concessions sinks have too long of handles that hit each other~~	~~BCE to review – Possible solution is shorter handles. BCE specified new handle.~~
~~13.3~~	~~Domestic water chlorination complete.~~	~~NA~~
13.4	Electric wall heaters – what is needed to start up?	Line voltage standalone thermostats. RFI to be written what type of thermostat. Delta to talk to unit supplier for integral thermostat. Integral dial thermostat. Milne to install.

New Business

Item	***Topic***	***Action***
14.1	Review HS issues list.	
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – In progress. Split AC units – have 3 of 7 done Electric wall heaters -
Start-up lighting –	Wattstopper to come back for first floor & corrections
TAB	10/5/20 TAB verification Coordination 10/12 Auditorium start 10/23 – done Floor polishing done Oct. 1st floor – beginning Nov.

	West 1st floor AHUs start week Nov 2 Finish FCUs on 2nd & 3rd this week. AHU-4 & DOAU -2 work on this week
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. Lighting first floor and Outside left to do. Smoke damper testing week of 11/16
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	Target Week of 11/9/20 Milne to notify Delta
TAB	11/15/20
Testing	11/21/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	11/19/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #15

Project: Stanwood High School
Date: 11/19/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to "Occupancy Sensor" Mode. N-light to coordinate with ATS for outside lights points.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.1	Concerned about clean up and input schedule to meet the start-up Schedule.	Pieter to keep Ramsett and Delta notified of cleaning schedule. Cornerstone to clean up right before permanent power. Permanent power on Friday – 8/28/2020.

		Cleaning on Monday 8/31. Cleaning today 9/17/2020. DOAU-6, then 5 then 3 3rd floor is clean, 2nd floor done next week, 1st the following week. Tile in level 3 & ½ of level 2, Finishing floors in level 1. Ceiling tiles done in CR this week. Corridors next week. 1st floor the following week. Start-up of FCUs on 3rd level for TAB to buy time for level 1. Theater clean for ~~Monday~~ Wednesday to start up theater unit and Commons units. Final cleaning through next week. Gym sanding the week of 11/9 **Target date for cleaning Mech rooms week of 11/16.**
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb. Plates are installed. Cornerstone to investigate the RTU curb.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order 11/19
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Dec.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.

10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20
11.1	When will the smoke dampers be tested?	CxA needs to witness this test. FA testing Smoke dampers after other device pre-testing. End of week 11/16
12.1	Geotest discuss the schedule building envelope test:	Reschedule when less people on site In Dec.
13.1	RFI needs to be written up for the split system AC units	Cody to follow up. ATS to review controls for AC units
13.4	Electric wall heaters – what is needed to start up?	Line voltage standalone thermostats. RFI to be written what type of thermostat. Delta to talk to unit supplier for integral thermostat. Integral dial thermostat. Milne to install.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access.

New Business

Item	***Topic***	***Action***
15.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – In progress. Split AC units – have 3 of 7 done Electric wall heaters -
Start-up lighting –	Wattstopper to come back for first floor & corrections
TAB	10/5/20 TAB verification Coordination 10/12 Auditorium start 10/23 – done Floor polishing done Oct. 1st floor – beginning Nov. West 1st floor AHUs start week Nov 2 Finish FCUs on 2nd & 3rd this week. AHU-4 & DOAU -2 work on this week 2nd & 3rd floors complete by end on Nov.

HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Smoke damper testing 11/20 2nd & 3rd floor start 11/30
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	Target Week of 11/23/20 Milne to notify Delta
TAB	12/1/20
Testing	12/15/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	11/19/20 - Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #16

Project: Stanwood High School

Date: 12/3/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to "Occupancy Sensor" Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.9	Schedules:	Water heater on separate schedule NA WCG to coordinated once functional testing starts.
2.11	Schedules: Unoccupied override? Can the Heat / cool only be done for override? Then just enable the ventilation with CO2 demand?	TBD WCG to coordinated once functional testing starts.
2.12	Equipment check out:	Can a CxA column be added for spot check verification? School district welcome to witness. ATS can add a column. WCG to coordinated once functional testing starts.
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy.

		In progress. Delta – submit digital.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb. Plates are installed. Cornerstone to investigate the RTU curb.
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order 11/19
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder.
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Dec.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. End of DEC.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20
9.2	Domestic water cleaning. Water faucet temperatures set below 120F.	Ramsett to set up.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron.
11.1	When will the smoke dampers be tested?	CxA needs to witness this test. FA testing Smoke dampers after other device pre-testing. End of week 11/16. Occurred week of Thanksgiving. CTE & HS signed off by FM. WCG wants copy of inspection report.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access. 3rd floor after 12/10. CTE tile 12/11
15.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.

New Business

Item	***Topic***	***Action***

16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans FCUs – done Split AC units – have 3 of 7 done – need Comm by ATS Electric wall heaters – done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	10/5/20 Finish FCUs on 1st & 2nd this week. DOAU -1 work on this week DOAU – 3 next week TAB verification 12/9 PM
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. 2nd & 3rd floor start 11/30
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	AHU equipment is done, Not dust collector. Need to start up Gas UHs
TAB	12/15/20
Testing	12/22/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	12/1020 – 1:30 Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #17

Project: Stanwood High School

Date: 12/10/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to “Occupancy Sensor” Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Official light is vacancy on. Delta to check for missing plates on RTU curb. Plates are installed. Cornerstone to investigate the RTU curb. Target Week 12/14
4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order 11/19 **WCG to back check**

5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. February – Mid winter break. CGC to contact Liz.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access. 3rd floor after 12/10. CTE tile 12/11 Drop tiles but leave flags out 1st floor and CTE. AirTest to coordinate.
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat.

New Business

Item	***Topic***	***Action***
17.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
17.2	CTE schedule	Power is buttoning things up.
17.3	Electrical engineer to schedule electrical punch	Power is buttoning things up and will let CGC know what spaces are ready for punch.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – Week Dec/14

	FCUs – done Split AC units – All but dimmer and CTE – need Comm by ATS Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner.
Start-up lighting –	Wattstopper to come back for Network programming
TAB	10/5/20 TAB verification Ver 2.0 1st week Jan.
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	AHU equipment is done, Not dust collector. Need to start up Gas UHs Need to have clean by 12/21
TAB	Start - 12/21/20
Testing	12/22/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	
Next Meeting:	12/17/20 – 1:30 Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #18

Project: Stanwood High School

Date: 12/17/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest			leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to “Occupancy Sensor” Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. Brian to call lighting contractor. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Make 120 volt? Cody to write RFI. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb. Plates are installed.~~ Cornerstone to investigate the RTU curb. Target Week 12/14
4.3	Reviewed site observation report	Ramsett to follow up

		AHU-7 Access door Bent. – On order 11/19 **WCG to back check**
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. February – Mid winter break. CGC to contact Liz.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access. 3rd floor after 12/10. CTE tile 12/11 Drop tiles but leave flags out 1st floor and CTE. AirTest to coordinate.
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat.

New Business

Item	***Topic***	***Action***
18.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done

	Exhaust fans mostly complete – Sub coordination – kitchen fans – Week Dec/14 FCUs – done Split AC units – All but dimmer and CTE – need Comm by ATS Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner.
Start-up lighting –	Wattstopper to come back for Network programming
TAB	10/5/20 TAB verification Ver 2.0 1st week Jan.
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	AHU equipment is done, Not dust collector. Need to start up Gas UHs Need to have clean by 12/21 Lights in progress
TAB	Start - 12/21/20 Cleaning on Saturday.
Testing	12/22/20

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	
Completed functional tests	
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – 10/12	
2.	TAB verification – 11/10 coordination	
3.	Start HVAC testing – 10/19 Start	

Next Meeting:	12/28/20 – 1:30 Zoom new concerns meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #19

Project: Stanwood High School

Date: 12/28/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest		425-301-8759	leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to “Occupancy Sensor” Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. Brian to call lighting contractor. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs. Cody has binder on his desk in new trailer.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Make 120 volt? Cody to write RFI. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb. Plates are installed.~~ Cornerstone to investigate the RTU curb. Target Week 12/14

4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order 11/19 **WCG to back check**
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 014500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. January – Presidents day.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access. 3rd floor after 12/10. CTE tile 12/11 Drop tiles but leave flags out 1st floor and CTE. AirTest to coordinate.
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat.

New Business

Item	***Topic***	***Action***
19.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
19.2	Heat trace controls	Chilled water has glycol in it so safe to not need to run.
19.3	AHU-4 ductwork repair	In progress.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete

	Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – Week Dec/14 FCUs – done Split AC units – All but dimmer and CTE – need Comm by ATS Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner. Done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	10/5/20 TAB verification Ver 2.0 week Jan 7th.
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started AHUs
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/2/21
CTE	
Start-ups	AHU equipment is done, Not dust collector. Need to start up Gas UHs Need to have clean by 12/21 Lights in progress
TAB	Start - 12/29/20 Cleaning on Saturday.
Testing	2nd week in January

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	50%
Completed functional tests	30%
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – Back check	
2.	TAB verification – Jan 2021 resume	
3.	HVAC testing	

Next Meeting:	1/7/21 – 1:30 Zoom Cx meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #20

Project: Stanwood High School

Date: 1/7/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
X	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
X	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest		425-301-8759	leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to “Occupancy Sensor” Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. Brian to call lighting contractor. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs. Cody has binder on his desk in new trailer.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Make 120 volt. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb. Plates are installed.~~ Cornerstone to investigate the RTU curb. Target Week 1/11?

4.3	Reviewed site observation report	Ramsett to follow up AHU-7 Access door Bent. – On order 11/19 **WCG to back check**
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air.**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 14500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. January – Presidents day. 1/18
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete. Owner has some blowing to much air. Have to address case by case basis.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list. Chris was onsite and back on 1/13 for more corrections.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access. 3rd floor after 12/10. CTE tile 12/11 Drop tiles but leave flags out 1st floor and CTE. AirTest to coordinate.
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat. Needs a different heater with correct voltage.
19.3	AHU-4 ductwork repair	In progress.

New Business

Item	***Topic***	***Action***
20.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
20.2	Start-up for the science room fume hoods need to be finished.	Sub-contractors to coordinate start-up with ATS.

20.3	Kitchen hood fan does not shut off.	Thermometer is not wired yet and should correct the issue once wired up.
20.4	There is a EVAV box in the locker rooms that have excessive air flow.	
20.5	Officials 118 has some odor issues	Ramset and AirTest to investigate.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – and fume hood fans yet to do. Culinary Arts fan needs a VFD start-up. FCUs – done Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner. Done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	10/5/20 TAB verification Ver 2.0 1/14/21
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started AHUs
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/19/21 Students will be in the building.
CTE	
Start-ups	AHU equipment is done Lights next week
TAB	In Progress
Testing	3rd week in January

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	85%
Completed functional tests	40%
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*
1.	Start lighting testing – Back check	
2.	TAB verification – Jan 2021 resume	
3.	HVAC testing	
Next Meeting:	1/14/21 – 1:30 Zoom Cx meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #21

Project: Stanwood High School
Date: 1/14/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
X	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
X	Shane Andrew	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest		425-301-8759	leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to “Occupancy Sensor” Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. Brian to call lighting contractor. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts.
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs. Cody has binder on his desk in new trailer.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Milne to make damper 120 volt. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb. Plates are installed.~~ Cornerstone to investigate the RTU curb. Target Week 1/18?

5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air. Week of 1/18**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 14500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. January – Presidents day. 1/18 Details to be shared 9:00 1/15.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete. Owner has some blowing to much air. Have to address case by case basis. Admin has some cold rooms. CGC to coord with ATS and share the list of rooms with issues.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list. Chris was onsite and back on 1/13 for more corrections.
14.2	CGC asked if there are any places that the ceiling tiles can be completed.	Coordinate with AirTest. CxA does not anticipate third floor access. 3rd floor after 12/10. CTE tile 12/11 Drop tiles but leave flags out 1st floor and CTE. AirTest to coordinate. Kitchen and Culinary and exhaust fans still need access.
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat. Needs a different heater with correct voltage.
20.2	Start-up for the science room fume hoods need to be finished.	Sub-contractors to coordinate start-up with ATS. CGC to schedule start-up for hoods.
20.3	Kitchen hood fan does not shut off.	Thermometer is not wired yet and should correct the issue once wired up.

New Business

Item	*Topic*	*Action*
21.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
21.2	EFs are not working correctly	Will be added to Issues log.
22.3	Airtest would like a status on Batting cage fans.	Start up in late Feb.

Schedule Review

Activity	*Dates*
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – and fume hood fans yet to do. Culinary Arts fan needs a VFD start-up. FCUs – done Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner. Done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	Status – EFs AHUs profiles & Pumps - TAB verification Ver 2.0 1/14/21
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started AHUs
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/19/21 Students will be in the building.
CTE	
Start-ups	AHU equipment is done Lights next week
TAB	In Progress, EFs and Dust collector need to be started up.
Testing	4th week in January

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	85%
Completed functional tests	40%

O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – Back check	
2.	TAB verification – Jan 2021 resume	
3.	HVAC testing	
Next Meeting:	1/21/21 – 1:30 Zoom Cx meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #22

Project: Stanwood High School
Date: 1/21/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
X	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
X	Shane Andrews	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
X	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest		425-301-8759	leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
2.8	Discussed exterior lights tie-in to the DDC.	Reviewing the controls SOO states that 5 exterior zones to be controlled by DDC schedule. Coordination TBD. Cat 5 will have access to the whole system. Will coordinate when lights are on. N-light starting on 9/8. Week of 11/9 – N-Light asked what to program storage rooms, CxA & EC agreed to set to “Occupancy Sensor” Mode. N-light to coordinate with ATS for outside lights points. Lighting controls is done except for network. Brian to call lighting contractor. WCG would like a response to Cx issues.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts. After the Dashboards are compete
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs. Cody has binder on his desk in new trailer.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Milne to make damper 120 volt. CGC to look into what RFI to investigate more. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb. Plates are installed.~~

		Cornerstone to investigate the RTU curb. Target Week 1/18?
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air. Week of 1/18**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 14500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan.
6.2	When is the air barrier test.	Need coordination and notification ahead of time. Geotest to schedule. Before Furniture. All dampers to be check for closure. January – Presidents day. 1/18 Details to be shared 9:00 1/15. CTE week of 1/25 afternoon.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete. Owner has some blowing to much air. Have to address case by case basis. Admin has some cold rooms. CGC to coord with ATS and share the list of rooms with issues. Scene shop unit is not working.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list. Chris was onsite and back on 1/13 for more corrections.
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat. Needs a different heater with correct voltage. In progress
20.3	Kitchen hood fan does not shut off.	Thermometer is not wired yet and should correct the issue once wired up. Captive air needs to do something with the controller.
21.2	EFs are not working correctly	Will be added to Issues log. EF-211 & 212 still need to be wired.
22.3	Airtest would like a status on Batting cage fans.	Start up in late Feb.

New Business

Item	*Topic*	*Action*
22.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
22.2	Comfort issues in the Admin areas. The boiler was overridden to a lower temperature but setting back to auto did not seem to correct the issue.	The CxA is experimenting with raising the minimum fan speed on the fan coil units on several of the rooms with the issues.

Schedule Review

Activity	*Dates*
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – and fume hood fans yet to do. Culinary Arts fan needs a VFD start-up. FCUs – done Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner. Done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	Status – EFs AHUs profiles & Pumps - TAB verification Ver 2.0 1/14/21
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started AHUs
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/19/21 Students will be in the building.
CTE	
Start-ups	EF needs to be landed. Lights next week on site
TAB	In Progress, EFs and Dust collector need to be started up.
Testing	4th week in January

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress

Preliminary TAB Report	85%
Completed functional tests	40%
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – Back check	
2.	TAB verification – Jan 2021 resume	
3.	HVAC testing	
Next Meeting:	1/28/21 – 1:30 Zoom Cx meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #23

Project: Stanwood High School
Date: 1/28/20
Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
X	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrews	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta	253-255-5664		kennyc@hvacdelta.com
	Electrical:				
X	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
X	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest		425-301-8759	leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.6	Discussed remote access. ATS already has IP addresses to connect to district.	To be discussed on 10/23/19 In Progress, WIFI will be ready in Nov. IP addresses are wrong.
	10/23/19 Graphics meeting	
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts. After the Dashboards are compete
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs. Cody has binder on his desk in new trailer.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Milne to make damper 120 volt. CGC to look into what RFI to investigate more. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb.~~ ~~Plates are installed.~~ Cornerstone to investigate the RTU curb. CGC to investigate. Target Week 1/18?
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air. Week of 1/18** **WCG to back check.**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 14500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer.

		Furniture starts first of Jan. Flush has started. Preliminary report 2/29.
9.1	The FCUs need to be checked out for proper operation; power, water and noise ETC. Also set to the proper speed.	Ramsett – Johnson Barrow – Milne. Two units on third floor have problems. Ramsett resolving issues. All should be done by 11/20 Almost complete. Owner has some blowing to much air. Have to address case by case basis. Admin has some cold rooms. CGC to coord with ATS and share the list of rooms with issues. Scene shop unit is not working. In progress.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC guidelines there seems to be no complaints. WAC 246-366-120	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list. Chris was onsite and back on 1/13 for more corrections. Returning 1/29
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat. Needs a different heater with correct voltage. In progress. New heater being sent to Delta.
20.3	Kitchen hood fan does not shut off.	Thermometer is not wired yet and should correct the issue once wired up. Captive air needs to do something with the controller. WCG to investigate with ATS
21.2	EFs are not working correctly	Will be added to Issues log. EF-211 & 212 still need to be wired. In progress
21.3	Airtest would like a status on Batting cage fans.	Start up in late Feb.
22.2	Comfort issues in the Admin areas. The boiler was overridden to a lower temperature but setting back to auto did not seem to correct the issue.	The CxA is experimenting with raising the minimum fan speed on the fan coil units on several of the rooms with the issues. Admin areas seem to be doing better. It is hard to tell if first floor is doing better with outside doors open so much and letting in so much cold air.

New Business

Item	***Topic***	***Action***
23.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
23.2	EF-5 in CTE is rotating backwards	Milne to correct
	EF-6 needs a switch from Delta	Delta is supplying.

Schedule Review

Activity	*Dates*
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – and fume hood fans yet to do. Culinary Arts fan needs a VFD start-up. FCUs – done Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner. Done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	Status – EFs AHUs profiles & Pumps - TAB verification Ver 2.0 1/14/21
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started AHUs
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control.
Final Completion	1/19/21 Students will be in the building.
CTE	
Start-ups	EF needs to be landed. Lights next week on site
TAB	In Progress, EFs and Dust collector need to be started up.
Testing	4th week in January

Commissioning Document Tracking

Document	*Status*
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	In Progress
Signed off CCLs and Start-up documents	In Progress
Preliminary TAB Report	85%
Completed functional tests	40%
O&M Manuals	
Training Agenda	
Project Closeout Checklists	
Systems Manual material	

Next Commissioning Activities

Item	*Task*	*Status*
1.	Start lighting testing – Back check	
2.	TAB verification – Jan 2021 resume	

3.	HVAC testing	
Next Meeting:	2/4/21 – 1:30 Zoom Cx meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Commissioning Meeting Minutes #24

Project: Stanwood High School

Date: 2/25/20

Submitted By: Byron Holmstead, PM

Attendance:

A	Name	Co.	Phone	Cell	E-mail
	Owner/Design Team:				
	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
	Chris Overland	SCSD			coverland@stanwood.wednet.edu
	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
	Matt White	WCG			Matt@wcxg.com
X	Stuart Greenwood	WCG			Stuart@wcxg.com
	Nicole Kahasha	WCG	253-856-3322		Nicolek@wcxg.com
	GC:				
	Pieter VanDamme	CGC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrews	CGC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	CGC		425-269-8351	kelsey@cornerstonegci.com
X	Cody Richards	CGC			codyr@cornerstonegci.com
	Mechanical:				
	Tom Haag	Ramsett	206-288-9318		tomh@ramsett.com
	Cory	Ramsett			
	Chris	Ramsett			
X	Kenny Cook	Delta		253-255-5664	kennyc@hvacdelta.com
	Electrical:				
	Brian Berndahl	Milne		206-391-5228	brian.berndahl@milneelectric.com
	Other:				
X	Austin Blake	ATS		206-459-2644	austinb@atsinc.org
	Dustin Polly	AirTest		425-890-4389	dustin@airtest.us
	Kamo	AirTest			kwessel@airtest.us
	Levi Wollen-Danner	Geotest		425-301-8759	leviw@geotest-inc.com

Old Business

Item	*Topic*	*Action*
2.16	Dashboards:	School district wants samples to look at to decide on what to display. ATS to submit examples. WCG to coordinated once functional testing starts.
2.17	Dashboards: The ALC does not have any screens specified.	An RFI will need to be written up. WCG to coordinated once functional testing starts. ATS to reach out to school district for what they are expecting.
2.18	Alerton training	The owner would like some technical training on Alerton controls. ATS can offer Alerton training. WCG to coordinated once functional testing starts. After the Dashboards are compete
3.2	Delta asked where the CCLs are to be kept. In the SU binder above the drawings in the trailer.	CGC to keep track of the binder. The binder was sent around to subs in meeting. Delta & Ramsett to submit digital copy. In progress. Delta – submit digital. WCG will send tracking table to keep track of docs. Cody has binder on his desk in new trailer. 70% complete.
4.2	Reviewed Fieldhouse Cx Issue list	Milne & ATS to follow up. ATS – Kitchen damper Not in ATS scope – Milne to make damper 120 volt. CGC to look into what RFI to investigate more. ~~Official light is vacancy on.~~ ~~Delta to check for missing plates on RTU curb.~~ ~~Plates are installed.~~ Cornerstone to investigate the RTU curb. CGC to investigate. Target Week 1/18?
5.1	CGC would like detailed cleaning and flushing report.	Ramsett report include instruction and strategy for owner. (SOP) for draining and flushing. To be included in start-up binder. **Procedure for filling and bleeding air. Week of 1/18** **WCG to back check.**
6.1	Is building air flush required? Yes	Need to get the time calculation from the design team. Inquire the architect. 14500 states calculation. CxA to help Kelsey with calculation after TAB report. Getting area sqft from engineer. Furniture starts first of Jan. Flush has started. Preliminary report 2/29.
10.1	Many of the classrooms seem to be too dark. Measured around 10 fc when sun is out. Sheet E6.21 gives no direction. Following the WAC	Brian to follow up with SU techs. Cameron back 10/30/20 WCG to back check after response from Cameron. All complete. Milne to respond to issues list.

	guidelines there seems to be no complaints. WAC 246-366-120	Chris was onsite and back on 1/13 for more corrections. Returning 1/29
16.1	Electric unit heater that needs to be controlled	Milne to investigate who controls it. All but one are complete. CTE has integral T-stat. Milne has t-stat. Needs a different heater with correct voltage. In progress. New heater being sent to Delta. Delta to investigate.
20.3	Kitchen hood fan does not shut off.	Thermometer is not wired yet and should correct the issue once wired up. Captive air needs to do something with the controller. WCG to investigate with ATS WCG to test? CGC to schedule with Hood rep and SU tech and coordinate with ATS time to correct issues.
21.2	EFs are not working correctly	Will be added to Issues log. EF-211 & 212 still need to be wired. In progress Ready to test.
21.3	Airtest would like a status on Batting cage fans.	Start up in late Feb.
22.2	Comfort issues in the Admin areas. The boiler was overridden to a lower temperature but setting back to auto did not seem to correct the issue.	The CxA is experimenting with raising the minimum fan speed on the fan coil units on several of the rooms with the issues. Admin areas seem to be doing better. It is hard to tell if first floor is doing better with outside doors open so much and letting in so much cold air. Investigation with GCG for building leaks.
23.2	EF-5 in CTE is rotating backwards	Milne to correct
23.3	EF-6 needs a wiring plug harness from Delta	Delta is supplying. Delta gave to ATS

New Business

Item	***Topic***	***Action***
24.1	Reviewed issues Cx lists.	Contractors to continue to address issues and WCG to back check resolved issues.
24.2	EF-2 needs a new relay contactor	ATS to fix next week.
24.3	RFI for floor sink in east end of boiler room.	Cody to look for RFI
14.4	Some of the FCUs or heating valves are making noise when open and are obnoxious.	ATS is coordinating with AirTest to investigate to try and resolve the noise problem.

Schedule Review

Activity	***Dates***
High School	
Start-ups	AHS, Pumps, Boilers & VFD complete Chiller is Done Exhaust fans mostly complete – Sub coordination – kitchen fans – and fume hood fans yet to do. Culinary Arts fan needs a VFD start-up. FCUs – done

	Electric wall heaters – all but one Culinary Arts MAU started up. Needs to have a booster fan for the burner. Done
Start-up lighting –	Wattstopper to come back for Network programming
TAB	Status – EFs AHUs profiles & Pumps - TAB verification Ver 2.0 1/14/21
HVAC systems functional testing	Continuing with plumbing – thermostats on first floor. – back check issues Lighting first floor and Outside left to do. Started AHUs
O&M and Training	Cody making a training log. Done District wants training/coordination on Access control. CGC is coordinating with the owner about schedule.
Final Completion	1/19/21 Students will be in the building.
CTE	
Start-ups	EF needs to be landed. Lights next week on site
TAB	In Progress, EFs and Dust collector need to be started up.
Testing	4th week in January

Commissioning Document Tracking

Document	***Status***
Mechanical submittals	Done
Electrical submittals	Done
Control submittals	Done
Start-up plan including cleaning and flushing plan	100%
Signed off CCLs and Start-up documents	75%
Preliminary TAB Report	100%
Completed functional tests	70%
O&M Manuals	In Progress
Training Agenda	In Progress
Systems Manual material	

Next Commissioning Activities

Item	***Task***	***Status***
1.	Start lighting testing – Back check	Need response from tech
2.	TAB verification –	Water flow meters
3.	HVAC testing	
Next Meeting:	TBD Zoom Cx meeting.	

To the best of our knowledge, this is an accurate summary of the discussions, decisions, etc., which occurred during this meeting. Notification of exceptions to this summary should be submitted to Welsh Commissioning Group, Inc. within 5 days of distribution.

Appendix 6 – Site Observations

Commissioning Site Observation Report #01

12/12/19

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 12:00 PM
Weather: Rainy 48°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents.

Progress is moving from East to West starting at area West of gym. Ceiling grids to soon go in. Less progress on commons area. Most of the ductwork and piping from gym to auditorium except the mechanical mezzanine.

Issues:

1.1 There appears to be branch piping missing for FCU-236.

1.2 In meeting room 238, it appears that the exhaust duct for ADF-212 is supposed to go up through to the 3rd floor. There is no chase.

1.3 FCUs 262, 264 & 266 do not line up with the paired FCU in the room. Ramsett is aware of the issue and will correct when ceiling grid is placed for coordination.

1.4 Don't see refrigerant piping to ICU - 201.

1.5 At grids BB.3 & 7 the wall access door does not line up with the smoke damper duct access door. 3rd floor.

1.6 The access to the smoke dampers on 3rd floor grids 7 and bb, cc do not seem adequate for maintenance and repair. Can a walk in door for be added to the whole chase?

1.7 Duct and pipe insulation conflict in classroom 310.

1.8 Room 314 seems to be missing return air duct.

Documents Required:

1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

Commissioning Site Observation Report #02

1/14/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority
	Delta

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 7:00 AM
Weather: Snowy & Icey 30°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents.

Progress is moving from East to West starting at area West of gym. Ceiling grids going in. Less progress on commons area. Most of the ductwork and piping from gym to auditorium except the mechanical mezzanine.

Issues:
1.1 There appears to be branch piping missing for FCU-236. Being added.

1.2 In meeting room 238, it appears that the exhaust duct for ADF-212 is supposed to go up through to the 3rd floor. Correction being done.

1.3 FCUs 262, 264 & 266 do not line up with the paired FCU in the room. Ramsett is aware of the issue and will correct when ceiling grid is placed for coordination.

1.4 Don't see refrigerant piping to ICU - 201.

1.5 At grids BB.3 & 7 the wall access door does not line up with the smoke damper duct access door. 3rd floor.

1.6 The access to the smoke dampers on 3rd floor grids 7 and bb, cc do not seem adequate for maintenance and repair. Can a walk in door for be added to the whole chase?

1.7 Duct and pipe insulation conflict in classroom 310.

1.8 Room 314 seems to be missing return air duct.

2.1 WCG witnessed a duct pressure test and it appears that the pressure test passes with nearly 0 CFM leakage. However, the orifice number does not seem to match the calculation chart number. Delta needs to verify that the chart being used matches the orifice or provide the correct chart for the leakage calculation. See photos below.

Documents Required:

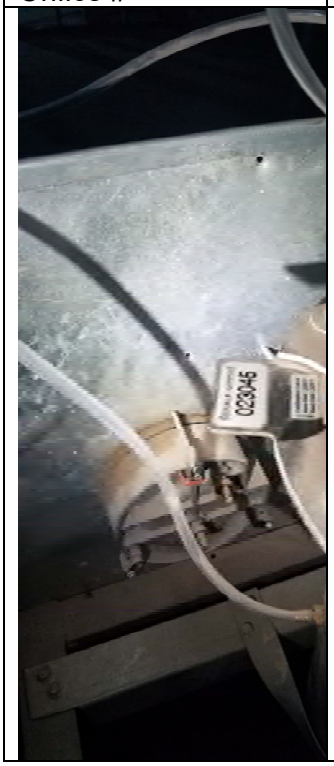
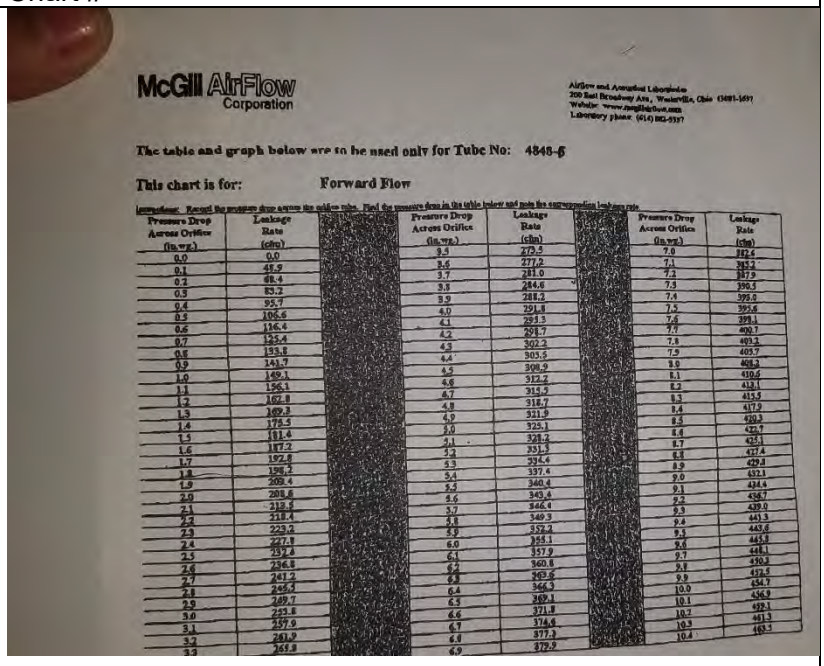
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

Orifice #	Chart #
	

McGill AirFlow Corporation

Airflow and Acoustical Laboratories
200 East Broadway Ave., Westerville, Ohio (3081-1697)
Website: www.mcgillairflow.com
Laboratory phone: (614) 882-5337

The table and graph below are to be used only for Tube No: 4848-6

This chart is for: Forward Flow

Instructions: Record the pressure drop across the orifice tube. Find the pressure drop in the table below and note the corresponding leakage rate.

Pressure Drop Across Orifice (in.wg.)	Leakage Rate (cfm)	Pressure Drop Across Orifice (in.wg.)	Leakage Rate (cfm)	Pressure Drop Across Orifice (in.wg.)	Leakage Rate (cfm)
0.0	0.0	3.5	270.5	7.0	382.6
0.1	41.9	3.6	277.2	7.1	385.2
0.2	68.4	3.7	281.0	7.2	387.9
0.3	85.2	3.8	284.6	7.3	390.5
0.4	95.7	3.9	288.2	7.4	393.0
0.5	106.6	4.0	291.8	7.5	395.6
0.6	116.4	4.1	295.3	7.6	398.1
0.7	125.4	4.2	298.7	7.7	400.7
0.8	133.8	4.3	302.2	7.8	403.2
0.9	141.7	4.4	305.5	7.9	405.7
1.0	149.1	4.5	308.9	8.0	408.2
1.1	156.1	4.6	312.2	8.1	410.6
1.2	162.8	4.7	315.5	8.2	413.1
1.3	169.3	4.8	318.7	8.3	415.5
1.4	175.5	4.9	321.9	8.4	417.9
1.5	181.4	5.0	325.1	8.5	420.3
1.6	187.2	5.1	328.2	8.6	422.7
1.7	192.8	5.2	331.3	8.7	425.1
1.8	198.2	5.3	334.4	8.8	427.4
1.9	203.4	5.4	337.4	8.9	429.8
2.0	208.5	5.5	340.4	9.0	432.1
2.1	213.5	5.6	343.4	9.1	434.4
2.2	218.4	5.7	346.4	9.2	436.7
2.3	223.0	5.8	349.3	9.3	439.0
2.4	227.8	5.9	352.2	9.4	441.3
2.5	232.3	6.0	355.1	9.5	443.6
2.6	236.8	6.1	357.9	9.6	445.8
2.7	241.2	6.2	360.8	9.7	448.1
2.8	245.5	6.3	363.6	9.8	450.3
2.9	249.7	6.4	366.3	9.9	452.6
3.0	253.8	6.5	369.1	10.0	454.7
3.1	257.9	6.6	371.8	10.1	456.9
3.2	261.9	6.7	374.6	10.2	459.1
3.3	265.9	6.8	377.3	10.3	461.3
		6.9	379.9	10.4	463.5

Commissioning Site Observation Report #03

1/22/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority
	Delta
Brian	Ramset

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 10:00 AM
Weather: Rain 45°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents.

Progress is moving from East to West starting at area West of gym. Ceiling grids going in in East spaces next to gym. Less progress on commons area. Most of the ductwork and piping from gym to west end except the mechanical mezzanine and gym areas.

Issues:
1.3 FCUs 262, 264 & 266 do not line up with the paired FCU in the room. Ramsett is aware of the issue and will correct when ceiling grid is placed for coordination.

1.5 At grids BB.3 & 7 the wall access door does not line up with the smoke damper duct access door. 3rd floor.

1.6 The access to the smoke dampers on 3rd floor grids 7 and bb, cc do not seem adequate for maintenance and repair. Can a walk in door for be added to the whole chase? Crawl access door added.

1.7 Duct and pipe insulation conflict in classroom 310.

1.8 Room 314 seems to be missing return air duct.

2.1 WCG witnessed a duct pressure test and it appears that the pressure test passes with nearly 0 CFM leakage. However, the orifice number does not seem to match the calculation chart number. Delta needs to verify that the chart being used matches the orifice or provide the correct chart for the leakage calculation. Delta sent the correct chart and new calculations were reported as complete without any leakage problems but not received yet.

3.1 WCG walked the hydronic system to observe installation and maintenance access. See screen shots below for observation and recommendations. Found some DP sensor location that looked like was in conflict with ductwork but Ramset had installed in another location.

Documents Required:

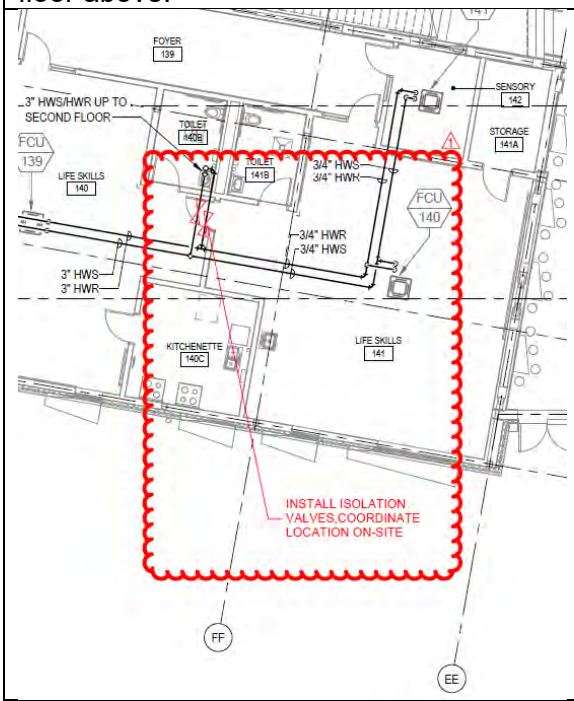
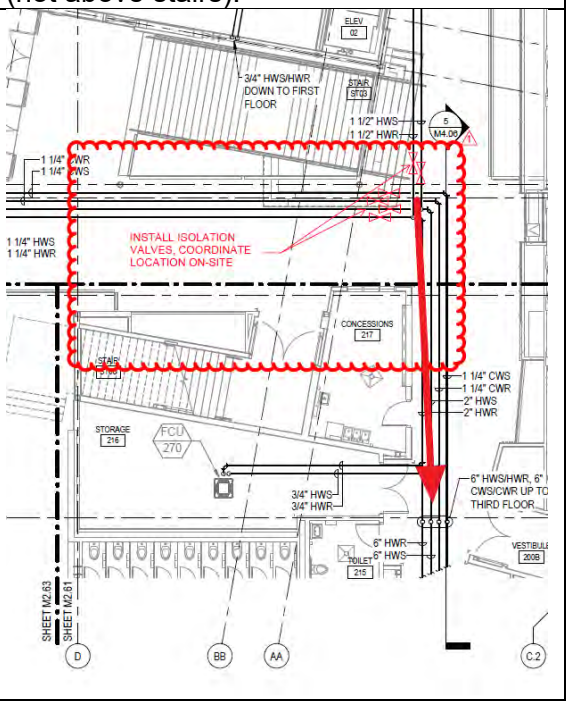
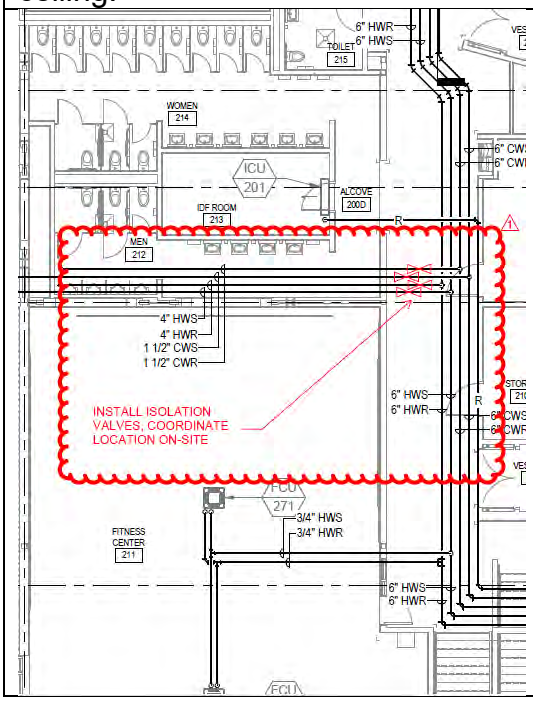
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

Isolation valves are already installed here but very high near the floor above. It may be more maintenance friendly to install on floor above.	Recommend moving these proposed isolation valves to the south as shown below. Save money and better access (not above stairs).
	
This location for isolation valves below may be too confining. May need to move to restroom ceiling or Admin ceiling.	
	

Commissioning Site Observation Report #04

3/5/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority
	Delta
Brian	Ramset

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 10:00 AM
Weather: Cloudy 45°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents.

Progress is moving from East to West starting at area West of gym. Ceiling grids going in in East spaces next to gym. Less progress on commons area. Most of the ductwork and piping from gym to west end gym areas. Mechanical mezzanine ductwork mostly complete and branch piping started. Boiler room has equipment and material but nothing installed.
CTE – ductwork began today with much progress.

Issues:
1.5 At grids BB.3 & 7 the wall access door does not line up with the smoke damper duct access door. 3rd floor.

1.8 Room 314 seems to be missing return air duct.

2.1 WCG witnessed a duct pressure test and it appears that the pressure test passes with nearly 0 CFM leakage. However, the orifice number does not seem to match the calculation chart number. Delta needs to verify that the chart being used matches the orifice or provide the correct chart for the leakage calculation. Delta sent the correct chart and new calculations were reported as complete without any leakage problems but

not received yet. – New calculations show that the ductwork installed meets minimum leakage rates.

3.1 WCG walked the hydronic system to observe installation and maintenance access. See screen shots below for observation and recommendations.

4.1 The domestic hot water piping (PEX) appears to be connected directly to the support brackets on the steel studs with insulation cut away. The details (13 / M5.01) show that the supports are to be around the insulation. Recommend that the engineer review and advise. The concern is that the walls will conduct too much heat and the downstream fixtures would not get the hot water needed.

4.2 The motorized dampers in the mechanical mezzanine are missing. Contractor stated that they know that they are missing and will install when delivered.

Documents Required:

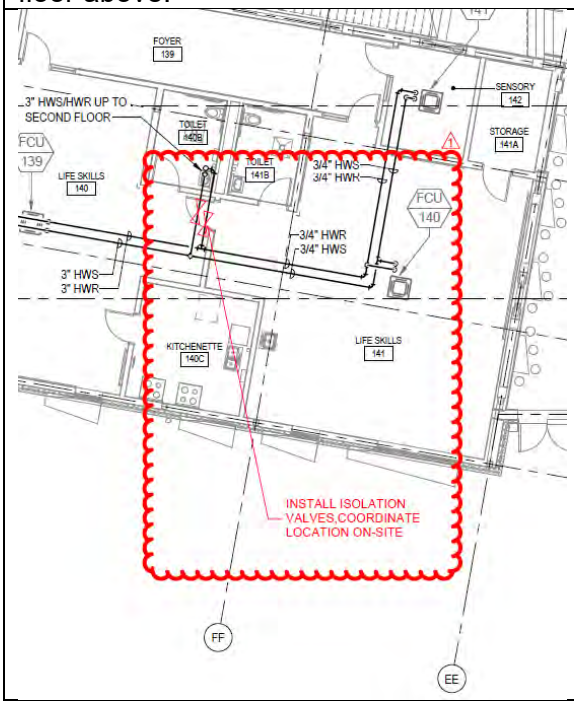
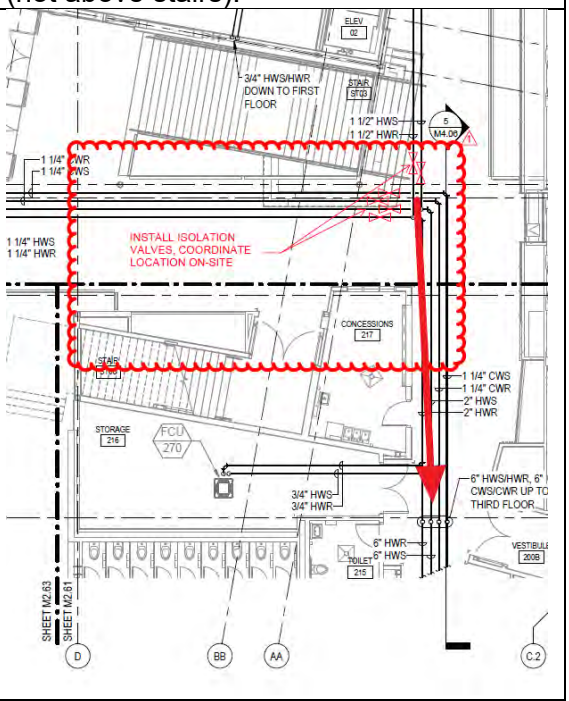
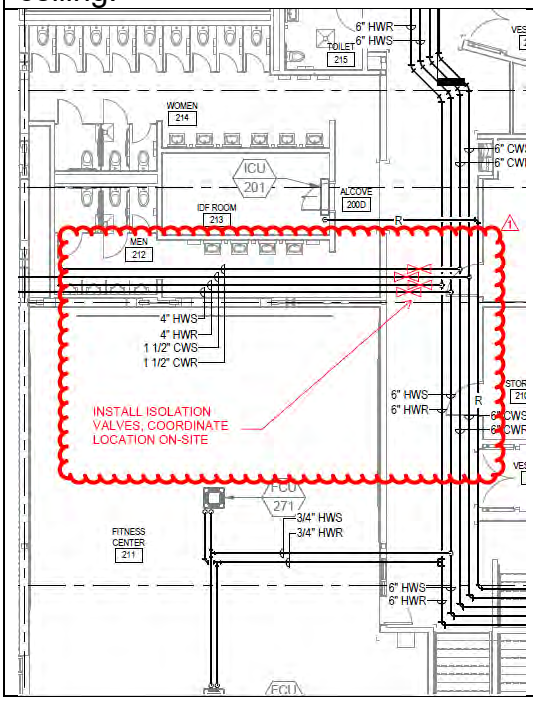
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

Isolation valves are already installed here but very high near the floor above. It may be more maintenance friendly to install on floor above.	Recommend moving these proposed isolation valves to the south as shown below. Save money and better access (not above stairs).
	
This location for isolation valves below may be too confining. May need to move to restroom ceiling or Admin ceiling.	
	

Commissioning Site Observation Report #05

4/14/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Pieter VanDamme	Cornerstone
Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 4:00 PM
Weather: Mostly Sunny 60°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents.

Progress is moving from East to West starting at area West of gym. Ceiling grids going in in East spaces next to gym. Less progress on commons area. Most of the ductwork and piping from gym to west end gym areas. Mechanical mezzanine ductwork mostly complete and branch piping started. Boiler room has equipment and material but nothing installed.
CTE – ductwork began today with much progress.

Issues:
1.5 At grids BB.3 & 7 the wall access door does not line up with the smoke damper duct access door. 3rd floor. Access from west access door.

3.1 WCG walked the hydronic system to observe installation and maintenance access. See screen shots below for observation and recommendations.

4.2 The motorized dampers in the mechanical mezzanine are missing. Contractor stated that they know that they are missing and will install when delivered.

5.1 The drawings for the ductwork connected to BF-103 near the men's locker room shows a 4" duct but is looks like 12" is installed. Is there a change here?

5.2 DOAU-01 heat wheel motor seems inaccessible. See photo.

5.3 DOAU-01: it appears that there is no exhaust air filters for the heat wheel. See photo.

Documents Required:

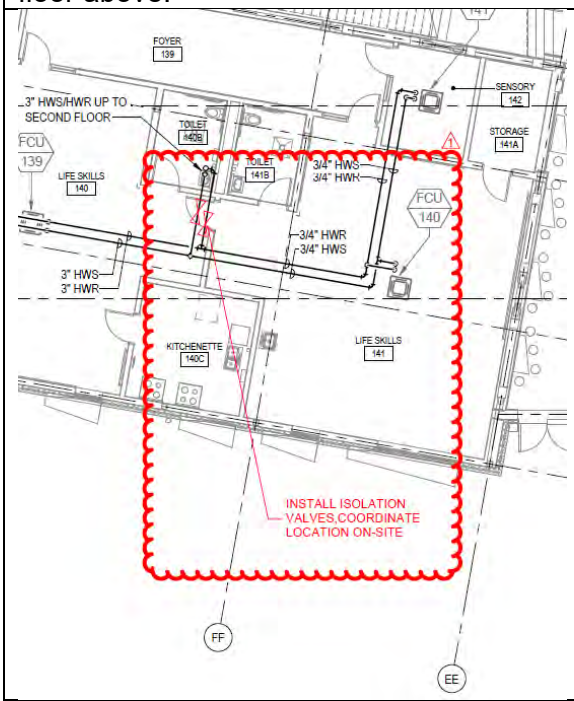
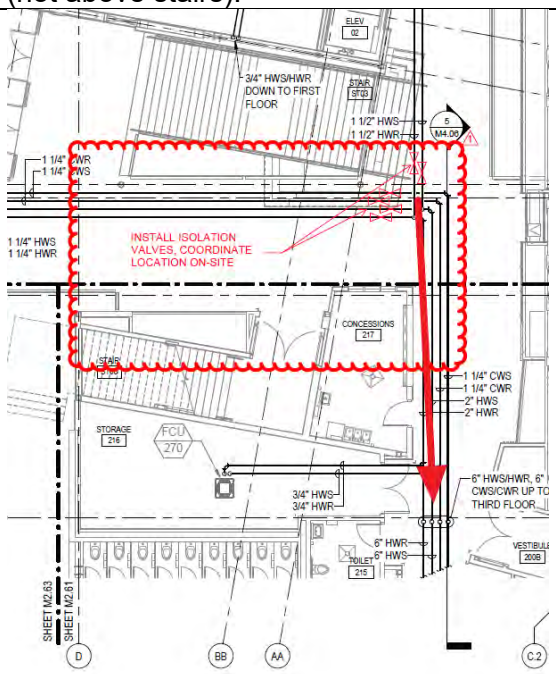
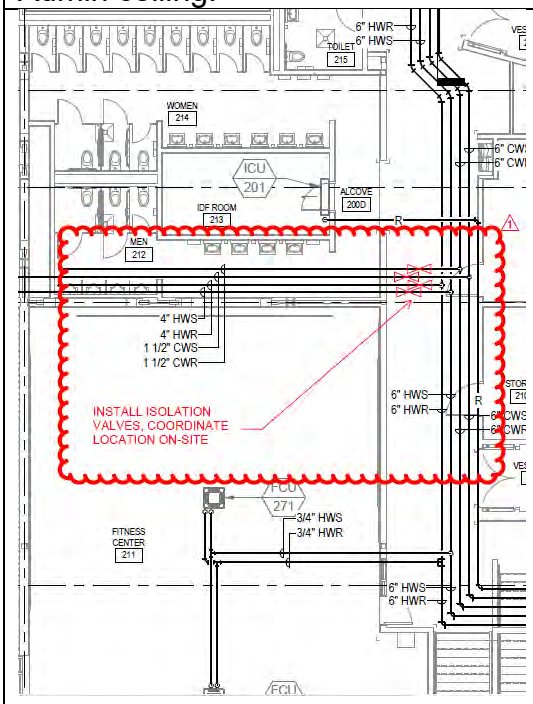
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

Isolation valves are already installed here but very high near the floor above. It may be more maintenance friendly to install on floor above.	Recommend moving these proposed isolation valves to the south as shown below. Save money and better access (not above stairs).
	
This location for isolation valves below may be too confining. May need to move to restroom ceiling or Admin ceiling.	DOAU-01 Motor access and missing filter.
	

Commissioning Site Observation Report #06

4/17/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Pieter VanDamme	Cornerstone
Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 4:00 PM
Weather: Mostly Sunny 65°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents.

Progress is moving from East to West starting at area West of gym. Ceiling grids going in East spaces next to gym and some ceiling tilers are in. Less progress on commons area. Most of the ductwork and piping from gym to west end gym areas. Mechanical mezzanine ductwork and piping mostly complete. Boiler room has equipment and most of the piping and duct connection complete.
CTE – equipment and ductwork about 80% compete.

Issues:
3.1 WCG walked the hydronic system to observe installation and maintenance access. See screen shots below for observation and recommendations.

4.2 The motorized dampers in the mechanical mezzanine are missing. Contractor stated that they know that they are missing and will install when delivered.

5.1 The drawings for the ductwork connected to BF-103 near the men's locker room shows a 4" duct but is looks like 12" is installed. Is there a change here?

5.2 DOAU-01 heat wheel motor seems inaccessible. See photo.

5.3 **DOAU-01 & 6**: it appears that there is no exhaust air filters for the heat wheel. See photo.

6.1 It appears that the DAOU-1 in the CTE building has the exhaust filters in the incorrect location. See photo below.

Documents Required:

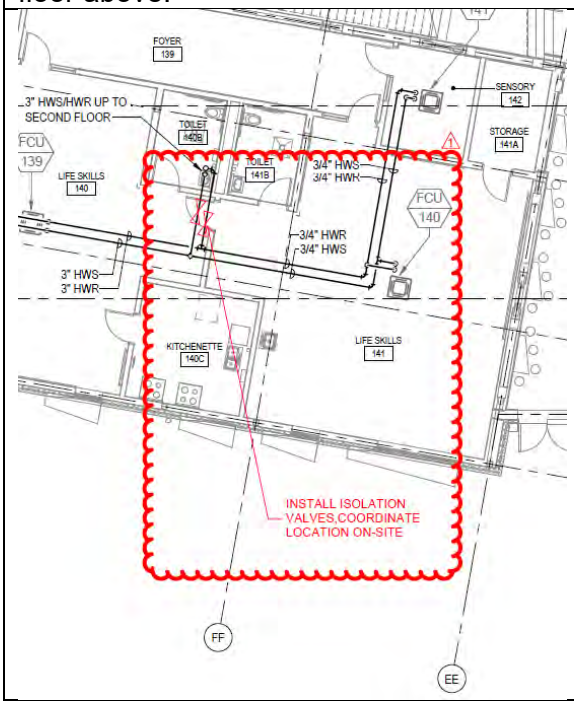
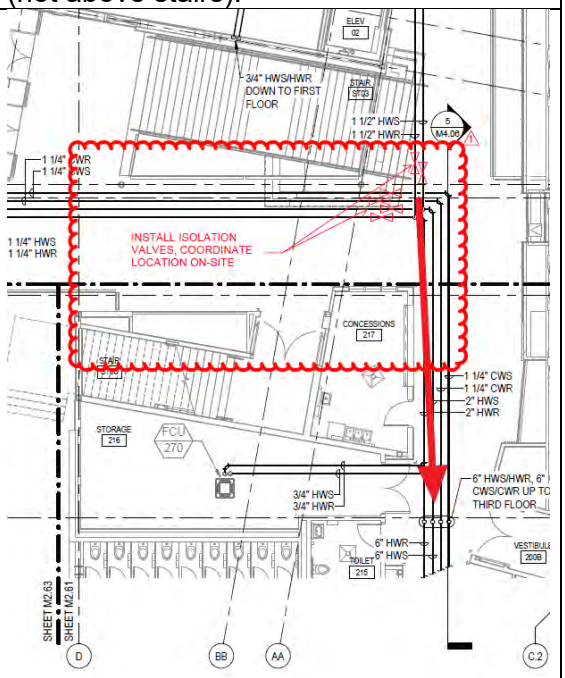
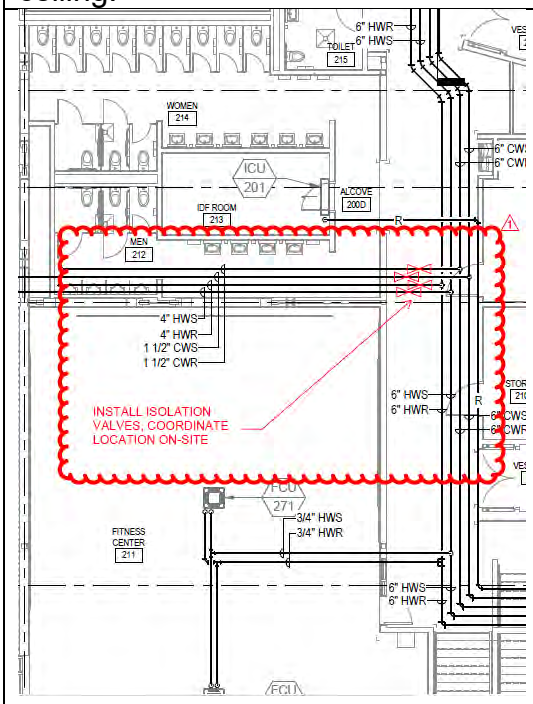
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

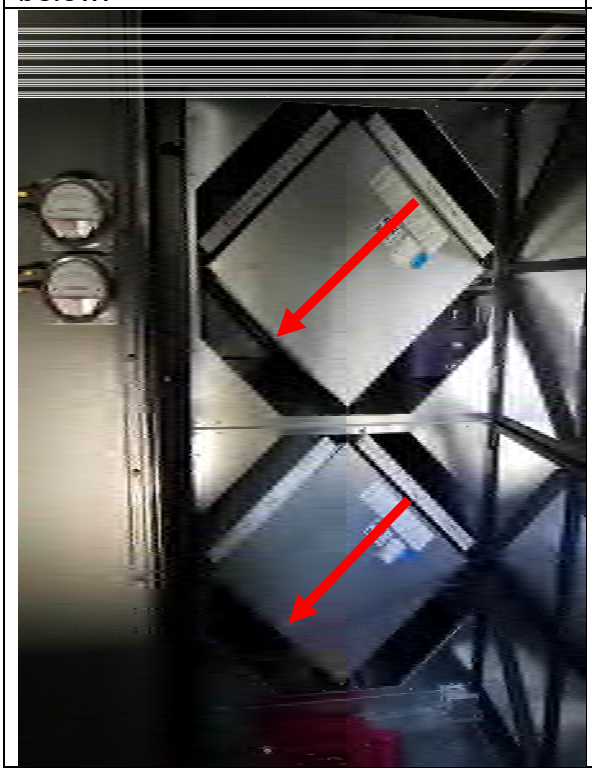
Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

Isolation valves are already installed here but very high near the floor above. It may be more maintenance friendly to install on floor above.	Recommend moving these proposed isolation valves to the south as shown below. Save money and better access (not above stairs).
	
This location for isolation valves below may be too confining. May need to move to restroom ceiling or Admin ceiling.	DOAU-01 Motor access and missing filter.
	

It appears that the exhaust filters are not located in correct location for DOAU-1 at the CTE builing. The filters should be moved to location shown below.	
	

Commissioning Site Observation Report #07

6/5/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Pieter VanDamme	Cornerstone
Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 11:00 AM
Weather: Mostly Sunny 69°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents. Also, WCG was invited to a scheduling meeting with the sub-contractors for commissioning input. A Cx meeting is planned on 7/7/2020 near the start-up of equipment for more coordination.

Progress is moving from East to West starting at area West of gym. Ceiling grids are nearly complete and some ceiling tiles are in. Most of the ductwork and piping is complete. Some piping left on first floor mechanical room to do and the theater ductwork has just begun. Plumbing piping appears complete but no fixtures yet.
CTE – equipment and ductwork about 90% compete.
There are no louvers installed yet.

Issues:

3.1 WCG walked the hydronic system to observe installation and maintenance access. Maintenance isolation valves are installed.

4.2 The motorized dampers in the mechanical mezzanine are missing. Contractor stated that they know that they are missing and will install when delivered.

5.2 DOAU-01 heat wheel motor seems inaccessible. See photo.

5.3 **DOAU-01 & 6**: it appears that there is no exhaust air filters for the heat wheel. See photo.

6.1 It appears that the DAOU-1 in the CTE building has the exhaust filters in the incorrect location. See photo below.

7.1 Missing some insulation at new isolation valve on return piping. 2nd floor grids 6 & H.5

7.2 Missing insulation at new isolation valve on return piping. 3rd floor grids 8.1 & C2.3

7.3 The isolation valves in the mezzanine is accessible by crawling over ductwork. Some sort of platform should be made to prevent damage to ductwork.

Documents Required:

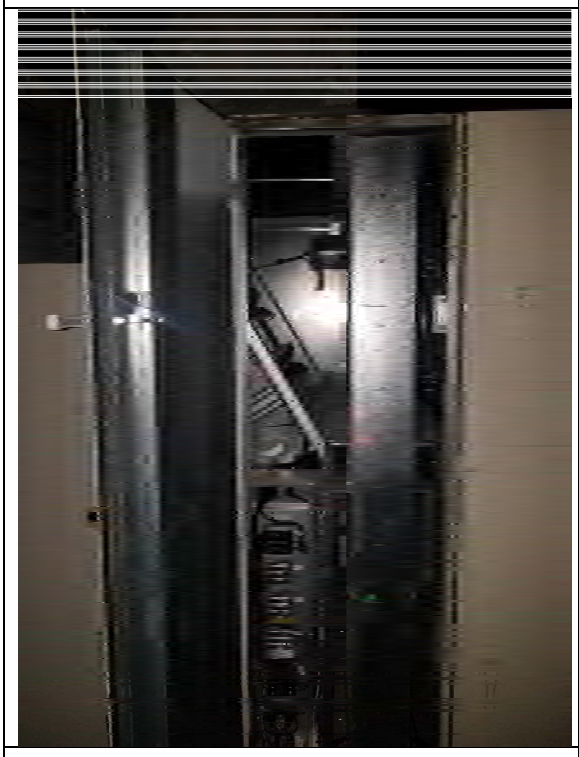
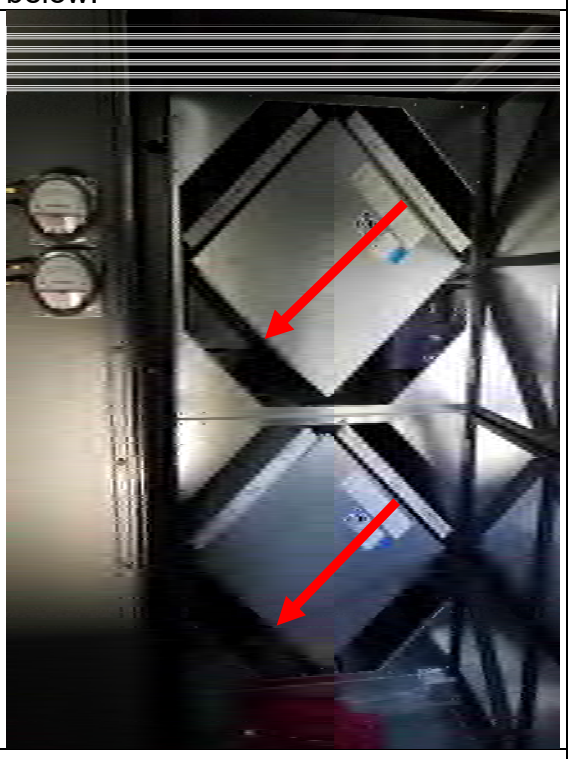
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

DOAU-01 Motor access and missing filter.	It appears that the exhaust filters are not located in correct location for DOAU-1 at the CTE builing. The filters should be moved to location shown below.
	

Commissioning Site Observation Report #08

7/16/2020

Stanwood High School

Attendees:

Byron Holmstead	WCG, Commissioning Authority

Submitted To:

Liz Jamieson	Stanwood SD

CC:

Pieter VanDamme	Cornerstone
Shane Andrew	Cornerstone
Kelsey Lewis	Cornerstone

Time: 11:00 AM
Weather: Mostly Sunny 75°F

General Comments:

WCG was on-site to conduct a site observation for the purpose of verifying work progress and to verify selected commissioned systems are being installed and started-up per project documents. Also, WCG was invited to a scheduling meeting with the sub-contractors for commissioning input. A Cx meeting is planned on 8/13/2020 near the start-up of equipment for more coordination.

Progress is moving from East to West starting at area West of gym. Ceiling grids are nearly complete, and some ceiling tiles are in. 95% of the ductwork and piping is complete. The south louvers are not yet installed, and the theater ductwork is mostly complete. Plumbing piping appears complete and most fixtures complete.
CTE – equipment and ductwork about 90% compete.
There are no louvers installed yet.

Issues:

5.3 **DOAU-01 & 6**: it appears that there is no exhaust air filters for the heat wheel. See photo.

6.1 It appears that the DAOU-1 in the CTE building has the exhaust filters in the incorrect location. See photo below.

7.1 Missing some insulation at new isolation valve on return piping. 2nd floor grids 6 & H.5

7.2 Missing insulation at new isolation valve on return piping. 3rd floor grids 8.1 & C2.3

7.3 The isolation valves in the mezzanine is accessible by crawling over ductwork. Some sort of platform should be made to prevent damage to ductwork. Reported that access platform is ordered.

8.1 An access door on AHU-7 is bent. Should be repaired.

8.2 It does not appear that any piping in the mezzanine is insulated.

8.3 It does not appear that the MDF room 176 does not have a condensate drain line to the plumbing waste.

Documents Required:

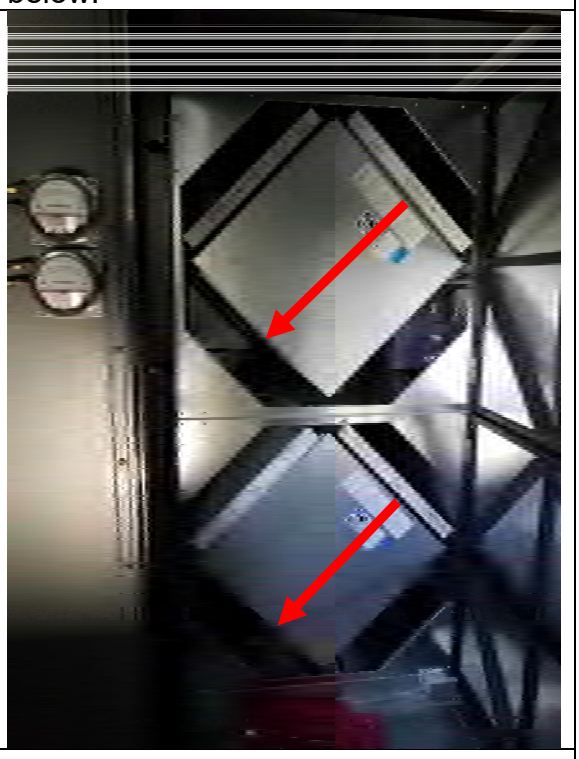
1. Proposed start-up documents for each piece of commissioned equipment. Reference Section 019113, paragraphs 1.6A and 2.3 and reference Schedule-A, Table-A in Sections 220800, 230800 and 260800 for a listing of required start-up documents.

Next Steps for Commissioning:

Ongoing site observations

Commissioning Authority: Byron Holmstead, WCG Project Manager

Above are the observations and opinions of the Commissioning Authority based on the information available at the time. These observations are correct and factual to the best of our knowledge. Any proposed changes to these observations must be submitted to the Commissioning Authority within 5 days of distribution.

	It appears that the exhaust filters are not located in correct location for DOAU-1 at the CTE builing. The filters should be moved to location shown below.
	

Appendix 7 – Installation Verification Checklists and Start-up

SCHEDULE A – Start-up Plan, Contractor Checklists and Document Tracking

A Startup Plan shall be developed as outlined in Section 01 91 13. The Startup Plan shall include manufacturer's startup procedures and Contractor Checklists (CCL) as provided by the CxA.

Sample CCLs are included in this Schedule. The Contractor responsible for delivery of each of the systems listed in Table – A shall be responsible for completion of the CCL for each system listed. The CCLs included within this Schedule are sample versions and are representative of what will be included in the final Commissioning Plan.

The Contractor is responsible to demonstrate the proper operation of all installed systems and the final CCLs shall contain the requirements to document these demonstrations. In no case shall the checklists require performance criteria more stringent than specified by the Project Documents.

The CCC is responsible for collecting the completed CCLs and start-up documents and maintaining the Startup Plan during installation and startup activities. The CCC shall review the material for completeness, then sign off on the CCLs as an indication that documents are complete. Once all CCLs and start-up documents are received, they shall be turned over to the CxA.

The following Table - A identifies the CCLs and related documents that will be included in the final Startup Plan. Listed as subcategories below each system are the documents that will be required to be submitted as part of the system startup activities. This documentation includes installation, startup, static tests, pressure tests, cleaning, flushing, disinfecting, certifications and other miscellaneous checklists. This table shall be used as a document tracking mechanism by the CxA, CCC and Contractor for the process of submittal, review and approval of installation and startup documents and CCLs. The table shall be included in the Startup Plan, which is a subset of the Commissioning Plan.

Table-A Key:

A. System description for each system commissioned. A Contractor Checklist is included for each commissioned system. The subcategories include required documentation to be submitted with the CCL.
B. Contractor responsible for installation, startup, testing and submittal of documents for commissioned system. To be filled in after contract award.
C. Date the proposed documents are received by the CxA from the responsible Contractor. NOTE: These documents shall include, but are not limited to, procedures and forms to include such activities as: manufacturer's installation and start-up, pressure testing, TAB, cleaning, flushing and disinfection. The CCL is provided by the CxA.
D. Indicates that CxA has received and approved proposed installation and start-up documentation.
E. Date the completed documents are received by the CxA from the responsible Contractor.
F. Indicates that CxA has received and approved completed documentation.
G. Notes on status of forms, irregularities and rework needed

Table - A: System Summary and Documentation Tracking

A	B	C	D	E	F	G
System Description / Documents Required	**Responsible Contractor**	**Proposed Document Received**	**OK**	**Completed Document Received**	**OK**	**Notes**
Plumbing Systems						
Contractor Checklist	Ramset	CxA Provided		[2]		[2] Not received. See issue 138.
Gas Water Heater						
Manufacturer Start-up Documentation	Ramset			12/16/2020	Y	
Contractor Checklist		CxA Provided		12/16/2020	Y	
Hot Water Circulation Pump						
Contractor Checklist		CxA Provided		12/16/2020	Y	
Air Cooled Water Chiller						
Manufacturer Start-up Documentation	Ramset			12/16/2020	Y	
Contractor Checklist		CxA Provided		12/16/2020	Y	
Gas Boiler						
Manufacturer Start-up Documentation	Ramset			12/16/2020	Y	
Contractor Checklist		CxA Provided		12/16/2020	Y	
Hydronic HVAC Pumps						
Manufacturer Start-up Documentation	Ramset			12/16/2020	Y	
Contractor Checklist		CxA Provided		12/16/2020	Y	
Hydronic Piping Systems						
Cleaning Plan	Ramset			12/16/2020	Y	
Hydronic Piping (Heating and Cooling) Cleaning Certificate		CA Provided		12/16/2020	Y	
Hydronic Piping (Heating and Cooling)		CA Provided		12/16/2020	Y	

A	B	C	D	E	F	G
System Description / Documents Required	**Responsible Contractor**	**Proposed Document Received**	**OK**	**Completed Document Received**	**OK**	**Notes**
Charged with Inhibitor						
Contractor Checklist		CA Provided		12/16/2020	Y	
Air Handling Units						
Manufacturer Start-up Documentation	Ramset			11/17/2020	Y	
Contractor Checklist		CxA Provided		11/17/2020	Y	
DOAS Units						
Manufacturer Start-up Documentation	Ramset			11/17/2020	Y	
Contractor Checklist		CxA Provided		11/17/2020	Y	
Gas Furnaces						
Manufacturer Start-up Documentation	Ramset			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
HRU – Fieldhouse						
Manufacturer Start-up Documentation	Ramset			4/21/2020	Y	
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Fan Coil Units						
Manufacturer Start-up Documentation	Ramset			NA	Y	Johnson Barrow: For the Sonkor FCU's there isn't a start-up report. This is confirmed from the factory. There is no start up process by JB on these. They are installed

A	B	C	D	E	F	G
System Description / Documents Required	Responsible Contractor	Proposed Document Received	OK	Completed Document Received	OK	Notes
						and then you just switch them on.
Contractor Checklist		CxA Provided		11/17/2020	Y	
VAV Terminal Box						
Contractor Checklist	Ramset	CxA Provided		[2]		[2] Not received. See issue 138.
Exhaust Fans						
Manufacturer Start-up Documentation	Delta			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Booster Fans						
Manufacturer Start-up Documentation	Delta			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Destratification Fans						
Manufacturer Start-up Documentation	Delta			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Ductless Split System AC Units						
Manufacturer Start-up Documentation	Delta			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.

A	B	C	D	E	F	G
System Description / Documents Required	Responsible Contractor	Proposed Document Received	OK	Completed Document Received	OK	Notes
Unit Heaters						
Manufacturer Start-up Documentation	Delta			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Ductwork Systems						
Pressure Testing	Delta			8/26/19	Y	
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Saw Dust Collector (CTE)						
Manufacturer Start-up Documentation	Ramset			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Testing, Adjusting & Balancing						
Preliminary TAB Report	AirTest			5/12/21	Y	
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Direct Digital Control System						
Point-to-Point Checkout Documentation	ATS			[1]		[1] Not received. See issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Monitoring and Verification Meters						
Point-to-Point Checkout Documentation	Ewing Elec.			[1]		[1] Not received. See

A	B	C	D	E	F	G
System Description / Documents Required	Responsible Contractor	Proposed Document Received	OK	Completed Document Received	OK	Notes
						issue 137.
Contractor Checklist		CxA Provided		[2]		[2] Not received. See issue 138.
Lighting Control System						
Manufacturer Start-up Documentation	Ewing Elec.			[1]		[1] Not received. See issue 137.
Point to Point Verification		CA Provided		[1]		[1] Not received. See issue 137.
Calibration Data Sheet		CA Provided		[1]		[1] Not received. See issue 137.
Contractor Checklist		CA Provided		[2]		[2] Not received. See issue 138.
Power Distribution System						
Manufacturer Start-up Documentation	Ewing Elec.			[1]		[1] Not received. See issue 137.
Wires & Cable Test report				[1]		[1] Not received. See issue 137.
Metal clad cable and fittings test report				[1]		[1] Not received. See issue 137.
Switch Boards test report				[1]		[1] Not received. See issue 137.
Standby Generator & ATS test report				[1]		[1] Not received. See issue 137.
Transient Voltage and Surge protection teste report				[1]		[1] Not received. See issue 137.
Contractor Checklist		CA Provided		[2]		[2] Not received. See issue 138.

Contractor Checklist

Unit Type:	**Plumbing Systems**	Unit No:	NA
Location:	NA	Serves:	NA
Manufacturer:	NA	Model:	NA

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Trap primers are installed per project documents.		✓	
Restroom fixtures are installed per project documents.		✓	
Sinks and faucets are installed per project documents.		✓	
Thermostatic Mixing are installed per project documents.		✓	
Eyewash and showers are installed per project documents.		✓	
Units are accessible for service.		✓	
Mounting is appropriate as specified.		✓	
Kitchen connections complete.		✓	
Piping			
Piping, valves and insulation are complete.		X	
Dielectric units installed at dissimilar metal joints		X	
Temperature and pressure indicators as specified.	Not Received	X	
Waste & vent are complete.		X	
Isolation valves installed and complete.		X	
Pressure testing is complete and documented.		X	
Domestic sanitation complete and documented.		X	
Valve tags installed per project documents, list posted		X	
Control Devices			
Control wires and devices are complete.		✓	
Control wire and devices are labeled.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Overloads and/or fusing is appropriate.		✓	
Operating controls and safeties are installed.		✓	
Start-Up			
Manufacturer's installation and start-up procedures complete.		X	
Start-up documentation submitted to CxA.		NA	
Building inspection complete and copies made.		X	
Readiness			
System is ready for functional performance testing.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Gas Fired Condensing Water Heater**	Unit No:	**WH-1**
Location:		Serves:	Building Hot Water
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage.	✓	X	
Equipment phenolic plastic labels are installed per project documents.	✓	X	
Unit is accessible for service.	✓	X	
Mounting is appropriate including seismic restraints.	✓	X	
4" housekeeping pad installed.	✓	X	
Galvanized drain pan installed.	✓	X	
Piping			
Gas piping is installed including drip leg with cap.	✓	X	
Gas piping is labeled: black letters on yellow per spec 23 05 53.	✓	X	
Piping, valves, expansion tank and insulation are complete.	✓	X	
Expansion tank installed.	✓	X	
Thermostatic mixing valve installed per detail.			NA
Pressure / Temperature ports are installed on supply and return.			NA
Thermometer and pressure gauges on supply and return.		X	
Domestic water piping is insulated and labeled: white letters on green.	✓	X	
Heat trap installed on supply water piping.			NA
Circulation pump installed on the circulation water piping.	✓	X	
Valves are tagged.		X	
Flue gas vent and combustion air pipes are installed.	✓	X	
Condensate neutralization tank installed.	✓	X	
Control Devices			
Control wires and devices are complete.	✓	X	
Control wires and devices are labeled per project documents.		X	
DDC temp sensor on supply and recirculation.		X	
Water heaters provided with Hand-Off-Auto switch at relay.	✓	X	
Operating controls and safeties are installed.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	X	
Disconnect is labeled.	✓	X	
Overloads and/or fusing is appropriate.	✓	X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Gas Fired Condensing Water Heater**	Unit No:	**WH-2**
Location:		Serves:	Building Hot Water
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Unit is accessible for service.	✓	✓	
Mounting is appropriate including seismic restraints.	✓	✓	
4" housekeeping pad installed.	✓	✓	
Galvanized drain pan installed.	✓	✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: black letters on yellow per spec 23 05 53.	✓	[1]	
Piping, valves, expansion tank and insulation are complete.	✓	✓	
Expansion tank installed.	✓	✓	
Thermostatic mixing valve installed per detail.			NA
Pressure / Temperature ports are installed on supply and return.			NA
Thermometer and pressure gauges on supply and return.		✓	
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
Heat trap installed on supply water piping.			NA
Circulation pump installed on the circulation water piping.		✓	
Valves are tagged.	✓	✓	
Flue gas vent and combustion air pipes are installed.		✓	
Condensate neutralization tank installed.	✓	✓	
Control Devices	✓		
Control wires and devices are complete.	✓	✓	
Control wires and devices are labeled per project documents.		X	
DDC temp sensor on supply and recirculation.		X	
Water heaters provided with Hand-Off-Auto switch at relay.	✓	✓	
Operating controls and safeties are installed.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled.	✓	✓	
Overloads and/or fusing is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] Could not locate labeling

Contractor Checklist

Unit Type:	**Gas Fired Condensing Water Heater**	Unit No:	**WH-3**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Unit is accessible for service.	✓	✓	
Mounting is appropriate including seismic restraints.	✓	✓	
4" housekeeping pad installed.	✓	✓	
Galvanized drain pan installed.	✓	✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: black letters on yellow per spec 23 05 53.	✓	[1]	
Piping, valves, expansion tank and insulation are complete.	✓	✓	
Expansion tank installed.	✓	✓	
Thermostatic mixing valve installed per detail.			NA
Pressure / Temperature ports are installed on supply and return.			NA
Thermometer and pressure gauges on supply and return.		✓	
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
Heat trap installed on supply water piping.			NA
Circulation pump installed on the circulation water piping.		✓	
Valves are tagged.	✓	✓	
Flue gas vent and combustion air pipes are installed.		✓	
Condensate neutralization tank installed.	✓	✓	
Control Devices	✓		
Control wires and devices are complete.	✓	✓	
Control wires and devices are labeled per project documents.		X	
DDC temp sensor on supply and recirculation.		X	
Water heaters provided with Hand-Off-Auto switch at relay.	✓	✓	
Operating controls and safeties are installed.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.	SG	✓	
Disconnect is labeled.	SG	✓	
Overloads and/or fusing is appropriate.	SG	✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] Could not locate labeling

Contractor Checklist

Unit Type:	**Gas Fired Condensing Water Heater**	Unit No:	**WH-4**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Unit is accessible for service.	✓	✓	
Mounting is appropriate including seismic restraints.	✓	X	
4" housekeeping pad installed.	✓	✓	
Galvanized drain pan installed.	✓	✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: black letters on yellow per spec 23 05 53.	✓	X	
Piping, valves, expansion tank and insulation are complete.	✓	X	
Expansion tank installed.	✓	✓	
Thermostatic mixing valve installed per detail.			NA
Pressure / Temperature ports are installed on supply and return.			NA
Thermometer and pressure gauges on supply and return.		X	
Domestic water piping is insulated and labeled: white letters on green.	✓	X	
Heat trap installed on supply water piping.			NA
Circulation pump installed on the circulation water piping.	X	X	
Valves are tagged.	✓	X	
Flue gas vent and combustion air pipes are installed.		X	
Condensate neutralization tank installed.	✓	X	
Control Devices	✓	X	
Control wires and devices are complete.	✓	X	
Control wires and devices are labeled per project documents.		X	
DDC temp sensor on supply and recirculation.		X	
Water heaters provided with Hand-Off-Auto switch at relay.	✓	X	
Operating controls and safeties are installed.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	N/A	✓	
Disconnect is labeled.		✓	
Overloads and/or fusing is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Water Heater**	Unit No:	**HWT-1**
Location:	Batting cages	Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Equipment phenolic plastic labels are installed per project documents.		Y	
Unit is accessible for service.		Y	
Mounting is appropriate including seismic restraints.		Y	
4" housekeeping pad installed.		Y	
Galvanized drain pan installed.		Y	
Piping			
Piping, valves, expansion tank and insulation are complete.		Y	
Expansion tank installed.		Y	
Thermostatic mixing valve installed per detail.		Y	
Pressure / Temperature ports are installed on supply and return.		Y	
Thermometer and pressure gauges on supply and return.		Y	
Domestic water piping is insulated and labeled: white letters on green.		Y	
Heat trap installed on supply water piping.	Not Received	Y	
Circulation pump installed on the circulation water piping.		Y	
Valves are tagged.		Y	
Control Devices			
Control wires and devices are complete.		Y	
Control wires and devices are labeled per project documents.		Y	
DDC temp sensor on supply and recirculation.		Y	
Water heaters provided with Hand-Off-Auto switch at relay.		Y	
Operating controls and safeties are installed.		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Disconnect is labeled.		Y	
Overloads and/or fusing is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	5/26/21

Notes:

EXECUTED DOCUMENT NOT RECEIVED

Ramsett Mechanical
2913 142ND AVE EAST, SUITE 106
SUMNER, WA 98390

GAS WATER HEATER
PRE-START UP CHECK LIST

A.O.SMITH
WATER PRODUCTS COMPANY
A DIVISION OF A. O. SMITH CORPORATION

INSTALLATION ADDRESS: STANWOOD HS

MODEL NO. WH-1 BTH-300A 300

SERIAL NO. 1949117298796

1.	GAS PRESSURE TEST (AHEAD OF PRESSURE REGULATOR) NEEDS TO BE AT LEAST 4.5" WC AND NOT EXCEEDING 14" WC	✓
2.	UNIT IS VENTED ACCORDING TO INSTALLATION MANUAL	✓
3.	POWER SUPPLY TO BURNER UNIT IS 120V W/CORRECT POLARITY	✓
4.	TANK FILLED, WATER SUPPLY READY.	✓
5.	T&P INSTALLED.	✓
6.	CHECK FOR LEAKS	✓
7.	REMOVE COMBUSTIBLES	✓

Ramsett Mechanical
2913 142ND AVE EAST, SUITE 106
SUMNER, WA 98390

GAS WATER HEATER
PRE-START UP CHECK LIST

A.O.SMITH
WATER PRODUCTS COMPANY
A DIVISION OF A. O. SMITH CORPORATION

INSTALLATION ADDRESS: STANWOOD HS

MODEL NO. WH-2 BTH-250A 300

SERIAL NO. 1946117092759

1.	GAS PRESSURE TEST (AHEAD OF PRESSURE REGULATOR) NEEDS TO BE AT LEAST 4.5" WC AND NOT EXCEEDING 14" WC	✓
2.	UNIT IS VENTED ACCORDING TO INSTALLATION MANUAL	✓
3.	POWER SUPPLY TO BURNER UNIT IS 120V W/CORRECT POLARITY	✓
4.	TANK FILLED, WATER SUPPLY READY.	✓
5.	T&P INSTALLED.	✓
6.	CHECK FOR LEAKS	✓
7.	REMOVE COMBUSTIBLES	✓

Ramsett Mechanical
2913 142ND AVE EAST, SUITE 106
SUMNER, WA 98390

GAS WATER HEATER
PRE-START UP CHECK LIST

A.O.SMITH
WATER PRODUCTS COMPANY
A DIVISION OF A. O. SMITH CORPORATION

INSTALLATION ADDRESS: STANWOOD HS

MODEL NO. WH-3 BTH-300A 300

SERIAL NO. 1920114905812

1.	GAS PRESSURE TEST (AHEAD OF PRESSURE REGULATOR) NEEDS TO BE AT LEAST 4.5" WC AND NOT EXCEEDING 14" WC	✓
2.	UNIT IS VENTED ACCORDING TO INSTALLATION MANUAL	✓
3.	POWER SUPPLY TO BURNER UNIT IS 120V W/CORRECT POLARITY	✓
4.	TANK FILLED, WATER SUPPLY READY.	✓
5.	T&P INSTALLED.	✓
6.	CHECK FOR LEAKS	✓
7.	REMOVE COMBUSTIBLES	✓

Ramsett Mechanical
2913 142ND AVE EAST, SUITE 106
SUMNER, WA 98390

GAS WATER HEATER
PRE-START UP CHECK LIST

A.O.SMITH
WATER PRODUCTS COMPANY
A DIVISION OF A. O. SMITH CORPORATION

INSTALLATION ADDRESS: STANWOOD HS

MODEL NO. WH-4 BTH-500A 300

SERIAL NO. 1929115638041

1.	GAS PRESSURE TEST (AHEAD OF PRESSURE REGULATOR) NEEDS TO BE AT LEAST 4.5" WC AND NOT EXCEEDING 14" WC	✓
2.	UNIT IS VENTED ACCORDING TO INSTALLATION MANUAL	✓
3.	POWER SUPPLY TO BURNER UNIT IS 120V W/CORRECT POLARITY	✓
4.	TANK FILLED, WATER SUPPLY READY.	✓
5.	T&P INSTALLED.	✓
6.	CHECK FOR LEAKS	✓
7.	REMOVE COMBUSTIBLES	✓

Ramsett Mechanical

2913 142ND AVE EAST, SUITE 108
SUMNER, WA 98390

GAS WATER HEATER
PRE-START UP CHECK LIST

A.O. SMITH
WATER PRODUCTS COMPANY

A DIVISION OF A. O. SMITH CORPORATION

INSTALLATION ADDRESS: STANWOOD HS CTE

MODEL NO. HWT-1 BTH-120A 300

SERIAL NO. 193011574176 8

1.	GAS PRESSURE TEST (AHEAD OF PRESSURE REGULATOR) NEEDS TO BE AT LEAST 4.5" WC AND NOT EXCEEDING 14" WC	✓
2.	UNIT IS VENTED ACCORDING TO INSTALLATION MANUAL	✓
3.	POWER SUPPLY TO BURNER UNIT IS 120V W/CORRECT POLARITY	✓
4.	TANK FILLED, WATER SUPPLY READY.	✓
5.	T&P INSTALLED.	✓
6.	CHECK FOR LEAKS	✓
7.	REMOVE COMBUSTIBLES	✓

FIELD HOUSE

Electric Water Heater Installation Checklist

Model No. DRE-80A 100 **Serial No.** 1930115774987

A. Water Heater Location

- ☑ Close to area of heated water demand.
- ☑ Indoors and protected from freezing temperatures.
- ☑ Area free of flammable vapors.
- ☐ Provisions made to protect area from water damage.
- ☑ Sufficient room to service heater.

B. Water Supply

- ☑ Water heater completely filled with water.
- ☑ Air purged from water heater and piping.
- ☑ Water connections tight and free of leaks.

C. Relief Valve

- ☑ Temperature and Pressure Relief Valve properly installed and discharge line run to open drain.
- ☑ Discharge line protected from freezing.

D. Wiring

- ☑ Power Supply voltage agrees with water heater rating plate.
- ☑ Branch circuit wire and fusing or circuit breaker of proper size.
- ☑ Electrical connections tight and unit properly grounded.

Contractor Checklist

Unit Type:	**Domestic Hot Water Pump**	Unit No:	**CP-1**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	X	
Unit is clean and has no visible physical damage.	✓	X	
Mounting is appropriate.	✓	X	
The motor shaft is horizontal (check manufacturer's requirements).	✓	X	
Equipment phenolic plastic labels are installed per project documents.	✓	X	
Piping			
Piping, valves and insulation are complete.	✓	X	
Pressure / Temperature ports are installed on supply and return.			NA
Domestic water piping is insulated and labeled: white letters on green.	✓	X	
External check valve installed at pump discharge is installed.	✓	X	
Shutoff valves installed before and after circulation pump.	✓	X	
Control Devices			
Control wires and devices are complete.	✓	X	
Control wires and devices are labeled per project documents.	✓	X	
Operating controls and safeties are installed.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	X	
Disconnect is labeled.	✓	X	
Overloads and/or fusing is appropriate.	✓	X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Domestic Hot Water Pump**	Unit No:	**CP-2**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Mounting is appropriate.	✓	✓	
The motor shaft is horizontal (check manufacturer's requirements).	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Pressure / Temperature ports are installed on supply and return.			NA
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
External check valve installed at pump discharge is installed.	✓	✓	
Shutoff valves installed before and after circulation pump.	✓	✓	
Control Devices			
Control wires and devices are complete.	✓	✓	
Control wires and devices are labeled per project documents.	✓	✓	
Operating controls and safeties are installed.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled.	✓	✓	
Overloads and/or fusing is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Domestic Hot Water Pump**	Unit No:	**CP-3**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Mounting is appropriate.	✓	✓	
The motor shaft is horizontal (check manufacturer's requirements).	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Pressure / Temperature ports are installed on supply and return.			NA
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
External check valve installed at pump discharge is installed.	✓	✓	
Shutoff valves installed before and after circulation pump.	✓	✓	
Control Devices			
Control wires and devices are complete.	✓	✓	
Control wires and devices are labeled per project documents.	✓	✓	
Operating controls and safeties are installed.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled.	✓	✓	
Overloads and/or fusing is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Domestic Hot Water Pump**	Unit No:	**CP-4**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Mounting is appropriate.	✓	✓	
The motor shaft is horizontal (check manufacturer's requirements).	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Pressure / Temperature ports are installed on supply and return.			NA
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
External check valve installed at pump discharge is installed.	✓	✓	
Shutoff valves installed before and after circulation pump.	✓	✓	
Control Devices			
Control wires and devices are complete.	✓	✓	
Control wires and devices are labeled per project documents.	✓	✓	
Operating controls and safeties are installed.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Overloads and/or fusing is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Gas Fired Condensing Water Heater**	Unit No:	**HWT-1**
Location:	CTE	Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓		
Unit is clean and has no visible physical damage.	✓	✓	
Equipment phenolic plastic labels are installed per project documents.		✓	
Unit is accessible for service.	✓	✓	
Mounting is appropriate including seismic restraints.	✓	✓	
4" housekeeping pad installed.	✓	✓	
Galvanized drain pan installed.	✓	✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: black letters on yellow per spec 23 05 53.	✓	✓	
Piping, valves, expansion tank and insulation are complete.	✓	✓	
Expansion tank installed.	✓	✓	
Thermostatic mixing valve installed per detail.			N/A
Pressure / Temperature ports are installed on supply and return.			N/A
Thermometer and pressure gauges on supply and return.		✓	
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
Heat trap installed on supply water piping.			N/A
Circulation pump installed on the circulation water piping.	✓	✓	
Valves are tagged.			
Flue gas vent and combustion air pipes are installed.	✓	✓	
Condensate neutralization tank installed.	✓	✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
DDC temp sensor on supply and recirculation.		✓	
Water heaters provided with Hand-Off-Auto switch at relay.		✓	
Operating controls and safeties are installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled.	✓	✓	
Overloads and/or fusing is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Domestic Hot Water Pump**	Unit No:	**CP-1**
Location:	CTE	Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Mounting is appropriate.	✓	✓	
The motor shaft is horizontal (check manufacturer's requirements).	✓	✓	
Equipment phenolic plastic labels are installed per project documents.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Pressure / Temperature ports are installed on supply and return.			N/A
Domestic water piping is insulated and labeled: white letters on green.	✓	✓	
External check valve installed at pump discharge is installed.	✓	✓	
Shutoff valves installed before and after circulation pump.	✓	✓	
Control Devices			
Control wires and devices are complete.	✓	✓	
Control wires and devices are labeled per project documents.	✓	✓	
Operating controls and safeties are installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Overloads and/or fusing is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Gas Fired Condensing Water Heater**	Unit No:	**HWT-1**
Location:	Fieldhouse	Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage.	✓	X	
Equipment phenolic plastic labels are installed per project documents.		X	
Unit is accessible for service.	✓	X	
Mounting is appropriate including seismic restraints.	✓	X	
4" housekeeping pad installed.	✓	X	
Galvanized drain pan installed.		X	
Piping			
Gas piping is installed including drip leg with cap.			NA
Gas piping is labeled: black letters on yellow per spec 23 05 53.			NA
Piping, valves, expansion tank and insulation are complete.	✓	X	
Expansion tank installed.	✓	X	
Thermostatic mixing valve installed per detail.	✓	X	
Pressure / Temperature ports are installed on supply and return.			NA
Thermometer and pressure gauges on supply and return.			NA
Domestic water piping is insulated and labeled: white letters on green.	✓	X	
Heat trap installed on supply water piping.	✓	X	
Circulation pump installed on the circulation water piping.	✓	X	
Valves are tagged.		X	
Flue gas vent and combustion air pipes are installed.			NA
Condensate neutralization tank installed.			NA
Control Devices			
Control wires and devices are complete.		X	
Control wires and devices are labeled per project documents.		X	
DDC temp sensor on supply and recirculation.		X	
Water heaters provided with Hand-Off-Auto switch at relay.		X	
Operating controls and safeties are installed.		X	
Electrical			
Supply power is installed and disconnect is accessible.		X	
Disconnect is labeled.		X	
Overloads and/or fusing is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Domestic Hot Water Pump**	Unit No:	**CP-1**
Location:	Fieldhouse	Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	X	
Unit is clean and has no visible physical damage.	✓	X	
Mounting is appropriate.	✓	X	
The motor shaft is horizontal (check manufacturer's requirements).	✓	X	
Equipment phenolic plastic labels are installed per project documents.		X	
Piping			
Piping, valves and insulation are complete.	✓	X	
Pressure / Temperature ports are installed on supply and return.			NA
Domestic water piping is insulated and labeled: white letters on green.	✓	X	
External check valve installed at pump discharge is installed.	✓	X	
Shutoff valves installed before and after circulation pump.	✓	X	
Control Devices			
Control wires and devices are complete.		X	
Control wires and devices are labeled per project documents.		X	
Operating controls and safeties are installed.		X	
Electrical			
Supply power is installed and disconnect is accessible.		X	
Disconnect is labeled.		X	
Overloads and/or fusing is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Chiller – Air Cooled**	Unit No:	**CH-1**
Location:	Service Yard	Serves:	HVAC Chilled Water
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment labels are installed per specifications.	✓	✓	
Vibration isolation devices installed and adjusted.	✓	✓	
House keeping pad provided for the unit.	✓	✓	
Shipping blocks removed.	✓	✓	
Inspection and access doors are operable.	✓	✓	
Coil fins have been combed out if necessary.	✓	✓	
Chiller insulation is complete.		✓	
Chiller manual air vent installed.	✓	✓	
Piping			
Piping, valves and insulation are complete.		✓	
Temperature and pressure indicators as specified.	✓	✓	
Flow switches installed and wired.	✓	✓	
Automatic isolation valves installed and complete.		✓	
Chilled water piping is labeled (white letters on green).		✓	
Flexible connection provided on supply and return pipe.	✓	✓	
Minimum flow bypass valve installed- located for minimum of 3 minute loop		X	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Temperature sensor installed.		✓	
Flow meter is installed and accessible.		✓	
Operating controls and safeties are installed.		✓	
DP sensors installed		✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	X	
Disconnect is labeled.	✓	X	
Overloads and/or fusing is appropriate.	✓	X	
Convenience outlet within 50' of equipment.		X	
Heat Trace			
Manufacturer's required clearances provided, and equipment is accessible for service.		X	
Equipment and systems are labeled per project documents.		X	
Pipeline Sensing Thermostat: Include under insulation.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

YORK

MODEL YVAA

EQUIPMENT PRE-STARTUP AND STARTUP CHECKLIST

CUSTOMER: Ramsett Mechanical

LOCATION: Stanwood High School

ADDRESS: 7200 272nd St NW Stanwood, WA 98292

CUSTOMER ORDER NO: 9N590222 - 001

PHONE: 206-288-9318

JCI CONTRACT NO: 9N590222 - 001

JOB NAME: Stanwood High School

CHILLER MODEL NO: YVAA0178CNV46BAVS

UNIT SERIAL NO: 11552A08122891

The work (as checked below) is in process and will be completed by: 10 / 01 / 2020 (MM / DD / YYYY)

The following work must be completed in accordance with the installation instructions:

PRE-STARTUP UNIT CHECKS (NO POWER)

The following basic checks should be made with the customer power to the unit switched OFF.

WARNING: Proper electrical lock out and tag procedures must be followed.

Check the system 24 hours prior to initial start:

1. Inspect the unit for shipping or installation damage. Repair as needed..... ☒
2. Has all piping been completed?..... ☒
3. Are there refrigerant or water piping leaks? Repair as needed..... ☒
4. Open each system liquid shut off valve, economizer shut off valve, discharge shut off valve and oil line ball valve ..... ☒
5. Adjust spring isolators (if installed) and ensure they are not bottomed out..... ☒
6. Is the pump controlled by chiller controller? In sub-freezing regions, failure to use a chiller controller to control chilled water pump will void warranty..... ☒
7. Are water pumps on? Check and adjust water pump flow rate, preferably using an ultrasonic flow meter. Otherwise adjust pressure drop across the evaporator ..... ☒

   CAUTION: Excessive flow may cause catastrophic damage to the evaporator.
8. Check the control panel to ensure it is free of foreign material (wires, metal chips, tools, documents, etc.). Also check for signs of water or moisture. Ensure door gasket seals are sealing properly and incoming power wiring conduit is caulked ..... ☒
9. Visually inspect wiring (power and control). Wiring MUST meet N.E.C., CE, and local codes. ☒
10. Check tightness of the incoming power wiring..... ☒
11. Does the field wiring match the 3-phase power requirements of the chiller (refer to the chiller nameplate)? ..... ☒
12. Is a flow switch connected between Terminals 2 and 13 on the User Terminal Block 1TB in the panel? It is recommended that the auxiliary pump contacts be placed in series with the flow switch for additional protection, if the pump is turned OFF during chiller operation. Whenever the pump contacts are used, the coil of the pump starter should be suppressed with an RC suppressor (031-00808-000)..... ☒
13. Ensure the power supply connection to water box heater kit is correctly made, if applicable. If the water box heater option is selected, YVAA and YVFA open loops are needed to make the power supply connection in customer sites..... ☒
14. Is all control wiring connected correctly to the user input terminals?..... ☒

15. Apply power to the chiller and ensure the compressor heaters are turned on 24 hours prior to system startup ☒

EQUIPMENT STARTUP CHECKLIST

NOTE: Before proceeding with the following unit checks, verify the heaters have been run for 24 hours prior to starting the unit.

A. UNIT CHECKS (NO POWER)

The following basic checks should be made with the customer power to the unit switched OFF.

WARNING: Proper electrical lock out and tag procedures must be followed.

1. Open each system liquid shut off valve, economizer shut off valve, discharge shut off valve and oil line ball valve. If optional eductor and suction valves are installed, be sure to open them. Failure to open the eductor valve will result in "Eductor Clog" faults. ☒
2. Is the oil separator oil level(s) maintained so that an oil level is visible in the sight glass when a compressor is running at full speed for 15 to 30 minutes? An oil level may not be visible in the sight glass when the compressor is OFF or running below full speed; and it may be necessary to run the compressor at full speed to obtain a level. In shutdown situations and at some load points, much of the oil may be in the evaporator and the level in the separator may fall below the bottom sight glass ☒

   Sight glasses will vary in type depending upon the manufacturer. One type will have balls that float in the sight glasses to indicate level. Another type will have a bulls' eye glass. The bulls' eye glass will tend to appear to lose the lines in the bulls' eye when the level is above the glass. Be careful when viewing the sight glass not to confuse a full sight glass with an empty sight glass. Oil level should be visible, but not above the top of the sight glass after operating at full speed for 15 to 30 minutes. In the rare situation where oil levels are high, drain the oil to lower the level until it is visible in the sight glass. This should be done while operating at full speed.

   Oil levels in the oil separator above the top of the sight glass should be avoided and may cause excessive oil carryover in the system. High oil concentration in the system may cause nuisance trips resulting from low discharge superheat, low solution pressure and incorrect readings from temperature sensors. Temperature sensor errors may result in poor refrigerant control and liquid overfeed to the compressor. Excessive oil will also reduce evaporator performance.

   In the unlikely event it is necessary to add oil, connect a YORK oil pump to the charging valve on the oil separator, but do not tighten the flare nut on the delivery tubing. With the bottom (suction end) of the pump submerged in oil to avoid entrance of air, operate the pump until oil drips from the flare nut joint, allowing the air to be expelled, and tighten the flare nut. Open the compressor oil charging valve and pump in oil until it reaches the proper level as described above.
3. Are water pumps are ON? Check and adjust water pump flow rate preferably using an ultra sonic flow meter. Otherwise adjust pressure drop across the evaporator ☒

   CAUTION: Excessive flow may cause catastrophic damage to the evaporator.
4. Check status of condenser fans. Blades should rotate freely and not hit shield. Refer to Fan information in *Section 6 - Commissioning* of the *Form 201.28-NM1.1* ☒
5. Check tightness of the incoming power wiring inside the power panel and inside the motor terminal boxes ☒
6. Check the tightness of power supply connection to the water box heater kit, if applicable. Make sure the waterproofing level of connection can meet IP65 ☒
7. Check for proper size fuses in control circuits ☒
8. Does the field wiring match the 3-phase power requirements of the chiller? (Refer to chiller nameplate) ☒
9. Are all water temperature sensors inserted completely in their respective wells and coated with heat conductive compound? ☒
10. Is the liquid line temperature sensor tightly strapped on the liquid line and insulated? ☒
11. Is the glycol level in the VSD cooling system 9 to 15 inches (23 to 28 cm) from the top of the fill tube? This check should be performed prior to running the pump ☒

CAUTION: Never run the glycol pump without coolant! Running the glycol pump without coolant may damage the pump seals.

Always fill the system with approved YORK coolant (P/N 013-03344-000) to avoid damage to the pump, cooling system heat sinks and the chiller. Overheating of the heat sinks and power panel will also occur.

12. Are the remote start/stop for Sys #1 on Terminals 2 to 15 and Sys #2 on Terminals 2 to 16 closed on the User Terminal Block 1TB to allow the systems to run? If remote cycling devices are not utilized, place a wire jumper between these terminals ☒

13. Is a flow switch connected between Terminals 2 and 13 on the User Terminal Block 1TB in the panel? Throttle back flow to ensure the flow switch opens with a loss of flow at the minimum recommended flow. It is recommended that auxiliary pump contacts be placed in series with the flow switch for additional protection, if the pump is turned OFF during chiller operation. Whenever the pump contacts are used, the coil of the pump starter must be suppressed with an RC suppressor (031-00808-000) ..... ☒

B. STARTUP

PANEL CHECKS (POWER ON – BOTH SYSTEM SWITCHES OFF)

WARNING: You are about to turn power on to this machine. SAFETY IS NUMBER ONE! Only qualified individuals are permitted to service this product. The qualified individual furthermore is to be knowledgeable of, and adhere to, all safe work practices as required by NEC, OSHA, and NFPA 70E. Proper personal protection is to be utilized where and when required.

1. Is the chiller OFF/ON UNIT switch at the bottom of the keypad OFF? ..... ☒

   CAUTION: DO NOT apply power to the chiller unless the system is filled with water or glycol. If the chiller is equipped with the -20°F option, applying power to an empty chilled liquid system will cause the evaporator immersion heaters to fail.

2. Apply 3-phase power to the chiller. Turn ON the optional panel circuit breaker if supplied..... ☒
3. Is the control panel display illuminated? ..... ☒
4. Are the system switches under the SYSTEM SWITCHES key in the OFF position? This ensures the compressors from starting..... ☒
5. Does the voltage supply correspond to the unit requirement and is it within the limits given in Section 5 - Technical Data in *Form 201.28-NM1.1*? ..... ☐
6. Confirm the power supply to water box heater kit is either 115V/60Hz or 220V/50Hz. Turn on the 2-pole-breaker inside of water box heater kit, if evaporator is filled with water in waterside ..... ☒
7. Confirm all the heaters on evaporator can function normally, including the shell heater and water box heaters ..... ☒
8. Confirm the chilled water pump can be automatically started by chiller controller, especially in the subfreezing region ..... ☒
9. Are the heaters on each compressor ON using a clamp-on ammeter? Heater current draw is approximately 3A ..... ☒
10. Are the “Factory Set” overload potentiometers on the VSD Logic Board set correctly? Press the VSD DATA key and use the arrow keys, to scroll to the compressor overload settings. In the unlikely event that they are not set correctly, adjust the potentiometers until the desired values are achieved ..... ☒

    WARNING: The VSD is powered up and live. High voltage exists in the area of the circuit board on the bus bars, VSD Pole Assemblies, and wiring to the input inductor.

    Adjust the potentiometers, if needed, using *Table 20 Compressor Motor Overload Settings* in the IOM *(Form 201.28-NM1.1)* The potentiometers are System 1=R19 and System 2=R64.

    Record the Overload Potentiometer settings below:
    R19 = System 1 = 175 Amps
    R64 = System 2 = 175 Amps

    CAUTION: Incorrect swettings of the potentiometers may cause damage to the equipment.

11. Press the STATUS key. If the following message appears, immediately contact Johnson Controls Product Technical Support. The appearance of this message may mean the chiller has lost important factory programmed information. The serial number and other important data may need to be reprogrammed. ..... ☒

UNIT WARNING: INVALID SERIAL NUMBER
ENTER UNIT SERIAL NUMBER

NOTE: Changing the programming of this feature requires the date and time to be set on the chiller prior to programming. Additional information regarding this message and how to enter the serial number with the factory provided password is outlined in the Serial Number Programming.

12. Program the required options into the Panel for the desired operating requirements (Refer to Section 8 in *Form 201.28-NM1.1*). Record the values below. ..... ☒

    Display Language = English
    Chilled Liquid Mode = N/A
    Local/Remote Mode = Remote
    Display Units = Imperial
    Lead/Lag Control = Automatic
    Remote Temperature Reset = Disabled

Remote Current Reset = Disabled

Remote Sound Limit = Disabled

Low Ambient Cutout = Enabled

CAUTION: Damage to the chiller could result if the options are improperly programmed.

C. PROGRAMMED VALUES

1. Program the required operating values into the microprocessor for cutouts, safeties, etc., and record them below (Refer to Section 8 in *Form 201.28-NM1.1*)..... ☒

   Suction Pressure Cutout = 26.1 PSIG (kPa)

   Low Ambient Cutout = -2 °F

   Leaving Chilled Liquid Temperature Cutout = 36 °F

   Motor Current Limit = 103 % FLA

   Pulldown Current Limit = 100 % FLA

   Pulldown Current Limit Time = 0 MIN

   Subcooling Setpoint = 10 °F

   Remote Unit ID # = 0

   Sound Limit Setpoint = N/A %

   Eductor Differential = 15 °F

   Eductor Safety Time = 30 MIN

   Motor Temp Unload = 240 °F

D. CHILLED LIQUID SETPOINT

Program the Chilled Liquid Setpoint/Range and record: ..... ☒

1. Local Cooling Setpoint = 44 °F
2. Local Cooling Range = 42 to 46 °F
3. Maximum Remote Temperature Reset = 44 to 54 °F

E. DATE/TIME, DAILY SCHEDULE, AND CLOCK JUMPER

1. Set the date and time..... ☒
2. Program the Daily Schedule start and stop times. ..... ☒
3. Place the panel in Service Mode and turn on each fan stage one by one. Ensure the fans rotate in the correct direction, so air flow exits the top of the chiller..... ☒
4. Ensure the Data Logging feature is enabled..... ☒
5. To ensure the glycol level in the VSD cooling system is 9 to 15 inches (23 to 28 cm) from the top of the fill tube while running, remove the fill tube cap, place the chiller in the Service Mode and start the pump. Be sure to re-install the cap before stopping the glycol pump to avoid overflow as the glycol pump is turned OFF. The glycol system holds about 3.5 to 5.5 gallons of coolant (P/N 013-03344-000)..... ☒
6. Check the optional fan VSD programming (if equipped) ..... ☒

F. INITIAL STARTUP

After the control panel has been programmed and the compressor heaters have been energized for at least 8 hours (ambient temperature more than 96ºF or 24 hours (ambient temperature less than 86ºF, the chiller may be placed into operation.

1. Turn on the UNIT switch and program the system switches on the keypad to the ON position ..... ☒
2. If cooling demand permits, the compressor(s) will start and a flow of refrigerant will be noted in the sight glass, after the anti recycle timer times out and the precharge of the DC Bus is completed. After several minutes of operation, the bubbles in the liquid line sight glass will disappear and there will be a solid column of liquid when the Condenser Drain (Flash Tank Feed) Valves stabilize ..... ☒
3. Allow the compressor to run a short time, being ready to stop it immediately if any unusual noise or adverse conditions develop. Immediately at startup, the compressor may make sounds different from its normal high-pitched sound. This is due to the compressor coming up to speed and the initial lack of an oil film sealing the clearances in the rotors. This should be of no concern and lasts for only a short time ..... ☒
4. Check the system operating parameters ..... ☒

G. REFRIGERANT CHARGE

1. Record the level of refrigerant in the evaporator sight glass with each system operating at full speed for 15 to 30 minutes. A refrigerant level should be visible in each evaporator sight glass..... ☒

System #1 System #2

LD15053

2. Remove charge if the level is above the sight glass and add charge if the level is below the sight glass ..... ☒

H. OIL LEVELS

Record the oil level in the oil separator sight glass with each system operating at full speed for 15 to 30 minutes. An oil level should be visible in the sight glass, but not above the sight glass.

LD15054

I. LIQUID LINE SUBCOOLING

Record the liquid Line Subcooling from the panel display after operating at full speed for 15 to 30 minutes.

Sys 1 Liquid Subcooling 5 °F

Sys 2 Liquid Subcooling 5 °F

J. LOG READINGS

Record the following temperatures and pressures from the panel display:

Chilled Liquid Temperature: 47.3 °F

VSD Frequency: 206 Hz

Sys 1 Oil Pressure: 125 PSIG

Sys 1 Discharge Pressure: 126 PSIG

Sys 1 Suction Pressure: 35 PSIG

Sys 1 Condenser Liquid Pressure: 94 PSIG

Sys 1 Oil Temperature: N/A °F

Sys 1 Eductor Temperature: 41 °F

Sys 1 Condenser Liquid Temp: 77 °F

Sys 1 Subcooling: 5 °F

Sys 1 Saturated Liquid Temp: 82 °F

Sys 1 Discharge Temp: 122 °F

Sys 1 Discharge Superheat: 27 °F

Sys 1 SAT Discharge Temp: 95 °F

Sys 1 Flash Tank Level: Low %

Sys 1 Economizer Valve: 100 %

Sys 1 Condenser Subcooling: 5 °F

Sys 1 Condenser Drain Valve: 46 %
(Flash Tank Feed Valve)

Sys 1 Condenser Fans # ON: 6

SYS 1 VSD Fan Speed: 61 %

Sys 1 VI Step Solenoid 1: On

Sys 1 VI Step Solenoid 2: Off

Sys 1 Run Time: ___D___HR 21 MIN 40 SEC

Sys 2 Oil Pressure: 82 PSIG

Sys 2 Discharge Pressure: 84 PSIG

Sys 2 Suction Pressure: 33 PSIG

Sys 2 Condenser Liquid Pressure: 71 PSIG

Sys 2 Oil Temperature: N/A °F

Sys 2 Eductor Temperature: 40 °F

Sys 2 Condenser Liquid Temp: 65 °F

Sys 2 Subcooling: 5 °F

Sys 2 Saturated Liquid Temp: 70 °F

Sys 2 Discharge Temp: 98 °F

Sys 2 Discharge Superheat: 23 °F

Sys 2 SAT Discharge Temp: 75 °F

Sys 2 Superheat: N/A °F

Sys 2 SAT Discharge Temp: 75 °F

Sys 2 Flash Tank Level: Low %

Sys 2 Economizer Valve: 0 %

Sys 2 Condenser Subcooling: 5 °F

Sys 2 Condenser Drain Valve: 35 %
(Flash Tank Feed Valve)

Sys 2 Condenser Fans # ON: 6

SYS 2 VSD Fan Speed: 34 %

Sys 2 VI Step Solenoid 1: On

Sys 2 VI Step Solenoid 2: On

Sys 2 Run Time: ___D___HR 23 MIN 43 SEC

K. LEAK CHECKING

1. Leak check compressors, fittings, and piping to ensure there are not any leaks. ..... ☒

   If the chiller is functioning satisfactorily during the initial operating period with no safety trips; and the chiller controls chilled liquid temperature; the chiller is now ready to be placed into service.

5000 Renaissance Drive, New Freedom, Pennsylvania USA 17349
800-861-1001
www.johnsoncontrols.com

Form 201.28-CL2 (119)
Issue Date: January 25, 2019
Supersedes: 201.28-CL2 (318)

Contractor Checklist

Unit Type:	**Boiler – Gas Fired**	Unit No:	**B-1**
Location:		Serves:	HVAC Hot Water
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
4" concrete housekeeping pad w/ chamfered edges provided.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Unit is accessible for service and has proper service clearance.	✓	✓	
Mounting and housekeeping pads are appropriate.	✓	✓	
Verify wet fire sprinkler pipes or any similar freshwater pipes are not routed in front of the combustion air intake.	✓	NA	
Combustion dampers and actuators installed per project documents.	✓	NA	
Piping			
Associated piping is complete.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	✓	
Proper location and access for all piping strainers.	✓	✓	
Boiler and pipe insulation are complete.		✓	
Pressure relief valve installed and set correctly (75 PSI).	✓	✓	
Gauges and thermometers are installed.	✓	✓	
Verify all associated valves are installed per project documents.	✓	✓	
Heating water piping is labeled (white letters on green).			
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: (black letters on yellow) per spec 23 05 53.			
Flue gas vent and combustion air ducts are installed.	✓	✓	
Condensate neutralization tank installed.	✓	✓	
Condensate pipe including trap route to the nearest drain.	✓	✓	
Control Devices			
Valves and valve actuators installed and accessible.	✓	X	
Supply and return water sensors installed and in proper location.	✓	X	
Flow meter is installed and accessible.	✓	X	
Boiler emergency shutdown switches installed near each room exit.	✓	X	
Control wires installed and complete to all controlled elements.	✓	X	
Control wires and devices are complete and labeled.	✓	X	
Operating and safety controls installed and complete.	✓	X	
DP sensors installed			
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Contractor Checklist

Notes:

Unit Type:	**Boiler – Gas Fired**	Unit No:	**B-2**
Location:		Serves:	HVAC Hot Water
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
4" concrete housekeeping pad w/ chamfered edges provided.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Unit is accessible for service and has proper service clearance.	✓	✓	
Mounting and housekeeping pads are appropriate.	✓	✓	
Verify wet fire sprinkler pipes or any similar freshwater pipes are not routed in front of the combustion air intake.	✓	N/A	
Combustion dampers and actuators installed per project documents.	✓	N/A	
Piping			
Associated piping is complete.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	✓	
Proper location and access for all piping strainers.	✓	✓	
Boiler and pipe insulation are complete.		✓	
Pressure relief valve installed and set correctly (75 PSI).	✓	✓	
Gauges and thermometers are installed.	✓	✓	
Verify all associated valves are installed per project documents.	✓	✓	
Heating water piping is labeled (white letters on green).			
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: (black letters on yellow) per spec 23 05 53.			
Flue gas vent and combustion air ducts are installed.	✓	✓	
Condensate neutralization tank installed.	✓	✓	
Condensate pipe including trap route to the nearest drain.	✓	✓	
Control Devices			
Valves and valve actuators installed and accessible.	✓	X	
Supply and return water sensors installed and in proper location.	✓	X	
Flow meter is installed and accessible.	✓	X	
Boiler emergency shutdown switches installed near each room exit.	✓	X	
Control wires installed and complete to all controlled elements.	✓	X	
Control wires and devices are complete and labeled.	✓	X	
Operating and safety controls installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	RB	✓	
Disconnect is labeled or next to unit within sight.	RB	✓	
Over-current protection is appropriate.	RB	✓	
Convenience outlet within 50' of equipment.	RB	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Boiler – Gas Fired**	Unit No:	**B-3**
Location:		Serves:	HVAC Hot Water
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
4" concrete housekeeping pad w/ chamfered edges provided.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Unit is accessible for service and has proper service clearance.	✓	✓	
Mounting and housekeeping pads are appropriate.	✓	✓	
Verify wet fire sprinkler pipes or any similar freshwater pipes are not routed in front of the combustion air intake.	✓	✓	
Combustion dampers and actuators installed per project documents.	✓	✓	
Piping			
Associated piping is complete.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	✓	
Proper location and access for all piping strainers.	✓	✓	
Boiler and pipe insulation are complete.		✓	
Pressure relief valve installed and set correctly (75 PSI).	✓	✓	
Gauges and thermometers are installed.	✓	✓	
Verify all associated valves are installed per project documents.	✓	✓	
Heating water piping is labeled (white letters on green).		X	
Gas piping is installed including drip leg with cap.	✓	✓	
Gas piping is labeled: (black letters on yellow) per spec 23 05 53.		X	
Flue gas vent and combustion air ducts are installed.	✓	✓	
Condensate neutralization tank installed.	✓	✓	
Condensate pipe including trap route to the nearest drain.	✓	✓	
Control Devices			
Valves and valve actuators installed and accessible.	✓	✓	
Supply and return water sensors installed and in proper location.	✓	✓	
Flow meter is installed and accessible.	✓	✓	
Boiler emergency shutdown switches installed near each room exit.	✓	✓	
Control wires installed and complete to all controlled elements.	✓	✓	
Control wires and devices are complete and labeled.	✓	✓	
Operating and safety controls installed and complete.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.	RB	✓	
Disconnect is labeled or next to unit within sight.	RB	✓	
Over-current protection is appropriate.	RB	✓	
Convenience outlet within 50' of equipment.	RB	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

MAIN BLDG.

START-UP REPORT

B-1

DATE: 9/15/20	JOB NAME: Stanwood High School
TECHNICIAN: Matt Kickbard	LOCATION: Stanwood
COMPANY: Johnson Barrow	MODEL: KN-16
PHONE NUMBER: 425-200-8536	SERIAL #: 9196084

PRE-STARTUP CHECK LIST

- [x] NO VISIBLE DAMAGE TO UNIT
- [x] PIPING PROPERLY CONNECTED
- [x] BOILER CIRCULATOR WIRED
- [x] VENT/STACK CONNECTED
- [x] INLET AIR FILTER INSTALLED AND CLEAN
- [x] PROPER SERVICE CLEARANCES PROVIDED
- [x] PUMP RUNNING, HEAT EXCHANGER FULL
- [x] GAS LINES PURGED, NO LEAKS, NO MISSING TEST PLUGS

BOILER STARTUP SEQUENCE

Note: Locate the AA terminals and minimum hold switch in the bottom-right of the electrical panel on the main HeatNet board. Also locate the manometer test manifold in the bottom of the electrical panel.

1. Disable any external call for heat and toggle the remote/local switch to REMOTE.
2. Toggle the LOW FIRE switch to cycle the boiler then hold at trial for pilot ignition.
3. Set pilot pressure (follow section "Checking, Adjustment & Operation") (flame signal should read 5.0 VDC).
4. Release boiler to main flame trial for ignition.
5. Check for stable flame.
6. Record combustion and Delta P at minimum firing rate.
7. Jumper the AA terminals to force 100% input.
8. Record combustion and Delta P at high firing rate.
9. Remove the AA jumper to place the boiler at minimum rate.
10. Make any final adjustments on low fire.
11. Check all combustion results using a calibrated flue gas analyzer.
12. Release the LOW FIRE switch to place boiler in standby.

NOTICE In addition to completing the KN-Series start-up report, complete the control set-up information in the rear of the HeatNet manual.

COMBUSTION ANALYSIS	MINIMUM FIRING RATE	100% FIRING RATE
GAS INLET PRESSURE (WC) 12.7	11.6 INCHES WC	9.9 INCHES WC
CO_2	8.3 %	9.1 %
O_2	6.2 %	4.8 %
CO (PPM)	7 PPM	39 PPM
NET STACK TEMPERATURE	99 °F	214 °F
AIR BOX DIFFERENTIAL (DELTA P - WC)	1.10 INCHES WC	12.00 INCHES WC
	20%	90%

SAFETY TEST CHECKLIST

- ☒ FLOW SWITCHES (By Others)
- ☒ LOW WATER CUT-OFF
- ☒ AIR SWITCH
- ☒ HIGH LIMITS
- ☒ FLAME SAFEGUARD

COMMISSIONING THE BOILER

- ☐ UNIT CYCLED MINIMUM OF 15 TIMES
- ☐ CUSTOMER INSTRUCTED
- ☒ ALL COVERS REPLACED
- ☐ CUSTOMER GIVEN MANUAL
- ☐ TARGET TEMPERATURE SET PER CUSTOMER

COMMISSIONED BY: _____ (SIGNATURE)

DATE: _____

THE DELTA T BETWEEN THE HEATER INLET AND OUTLET IS CRITICAL TO PROPER FLOW. BEFORE YOU LEAVE THE JOBSITE, YOU MUST RECORD THE DELTA T. THIS READING SHOULD NOT EXCEED 100°F, 55°C, NOR BE LOWER THAN 20°F, 11.1°C.

DELTA T = 22

ADDITIONAL NOTES AND COMMENTS

156731

ADVANCED THERMAL HYDRONICS
260 NORTH ELM STREET
WESTFIELD, MA. 01085

ANS Z21.13-2014 CSA 4.9-2014
LOW PRES. BOILER

	MODEL NO./MODÈLE No.	CONFIG	SERIAL NO./SÉRIE No
DIRECT VENT BOILER/ CHAUDIERE A EVACUATION DIRECTE	KN-16	KN-16	9196084
EQUIPPED FOR/PREVU POUR	NAT	GAS/GAZ	CRN M8410.5C

INLET GAS PRESSURE/ PRESSION DE GAZ A L'ENTREE	NAT. GAS/ GAZ. NAT.	LP GAS/ GAZ. B.P.	MANIFOLD GAS PRESSURE/ PRESSION DE GAZ AU COLLECTEUR	
MIN. (IN.W.C.)/ MINI. (mBars)	3 4.98		N/A	N/A
MAX. (IN.W.C.)/ MAXI. (mBars)	14 34.84			

0 - 6000 FEET

SCAN HERE FOR DOCUMENTS

MAX. INPUT/ ALIMENTATION:	1,600,000 BTU / 489 kW	BTU/HR kW
MIN. INPUT/ LIMENTATION MINI:	320,000 BTU / 94 kW	BTU/HR kW
MAX. OUTPUT/ PUISSANCE UTILE:	1,440,000 BTU / 422 kW	BTU/HR kW
MIN. OUTPUT/ PUISSANCE UTILE:	288,000 BTU / 84 kW	BTU/HR kW
ORIFICE/ ORIFICES:	0.555 DMS / 14.1	DMS/ mm

CATEGORY II OR IV
CATÉGORIE II OU IV
SHORT CIRCUIT CURRENT RATING: 5 Ka
COURTE NOTE ACTUELLE DE CIRCUIT

ELECTRICAL RATING/PUISSANCE ELECTRIQUE NOMINALE: 208/230/1PH/60HZ MAXIMUM AMPS./AMP. MAXI: 13.1 A

FOR EITHER DIRECT VENT INSTALLATION OR FOR INSTALLATION USING INDOOR COMBUSTION AIR
POUR OU L'INSTALLATION DES ORIFICES DIRECTES OU POUR L'INSTALLATION
EN UTILISANT L'AIR COMBUSTION A L'INTERIEUR.
FOR INSTALLATION ON COMBUSTIBLE FLOORING
INSTALLER SEULEMENT SUR ON PLANCHER COMBUSTIBLE

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS:
ECARTEMENT MINIMAL DE MATIERES COMBUSTIBLES:

RIGHT SIDE: COTE DROIT:	6 IN. 153 mm	FRONT: DEVANT:	6 IN. 153 mm	TOP: DESSUS:	6 IN. 153 mm	VENT: EVENT:	6 IN. 153 mm
LEFT SIDE: ET GAUCHE:	6 IN. 153 mm	REAR: ARRIERE:	6 IN. 153 mm				

CERTIFIED BY BFC / CERTIFIE PAR BTF

MAWP 100 PSI / 689 kPa

MAX. WATER TEMP./TEMP. MAX. DE L'EAU 250°F/ 121°C

MINIMUM RELIEF VALVE CAPACITY 1,440 LBS/HR. 422 KW
CAPACITE MIN. DECHARGE
DU ROBINET DE DECHARGE

DATE GLUE APPLIED: 09/25/19

82-00004 REV. F

MAIN BLDG.

START-UP REPORT

B-2

DATE: 9/15/20	JOB NAME: Stanwood High Sch-1
TECHNICIAN: Matt	LOCATION: STANWOOD
COMPANY: Johnson Barrow	MODEL: KN-16
PHONE NUMBER: 425-200-8536	SERIAL #: 9196083

PRE-STARTUP CHECK LIST

- ☑ NO VISIBLE DAMAGE TO UNIT
- ☑ PIPING PROPERLY CONNECTED
- ☑ BOILER CIRCULATOR WIRED
- ☑ VENT/STACK CONNECTED
- ☑ INLET AIR FILTER INSTALLED AND CLEAN
- ☑ PROPER SERVICE CLEARANCES PROVIDED
- ☑ PUMP RUNNING, HEAT EXCHANGER FULL
- ☑ GAS LINES PURGED, NO LEAKS, NO MISSING TEST PLUGS

BOILER STARTUP SEQUENCE

Note: Locate the AA terminals and minimum hold switch in the bottom-right of the electrical panel on the main HeatNet board. Also locate the manometer test manifold in the bottom of the electrical panel.

1. Disable any external call for heat and toggle the remote/local switch to REMOTE.
2. Toggle the LOW FIRE switch to cycle the boiler then hold at trial for pilot ignition.
3. Set pilot pressure (follow section "Checking, Adjustment & Operation") (flame signal should read 5.0 VDC).
4. Release boiler to main flame trial for ignition.
5. Check for stable flame.
6. Record combustion and Delta P at minimum firing rate.
7. Jumper the AA terminals to force 100% input.
8. Record combustion and Delta P at high firing rate.
9. Remove the AA jumper to place the boiler at minimum rate.
10. Make any final adjustments on low fire.
11. Check all combustion results using a calibrated flue gas analyzer.
12. Release the LOW FIRE switch to place boiler in standby.

NOTICE In addition to completing the KN-Series start-up report, complete the control set-up information in the rear of the HeatNet manual.

COMBUSTION ANALYSIS	MINIMUM FIRING RATE	100% FIRING RATE
GAS INLET PRESSURE (WC) 12.4	11.57 INCHES WC	10.02 INCHES WC
CO_2	8.31 %	9.15 %
O_2	6.1 %	4.7 %
CO (PPM)	8 PPM	38 PPM
NET STACK TEMPERATURE	120.1 °F	229 °F
AIR BOX DIFFERENTIAL (DELTA P - WC)	1.05 INCHES WC	11.50 INCHES WC
	20%	90%

SAFETY TEST CHECKLIST

- ☑ FLOW SWITCHES (By Others)
- ☑ LOW WATER CUT-OFF
- ☑ AIR SWITCH
- ☑ HIGH LIMITS
- ☑ FLAME SAFEGUARD

COMMISSIONING THE BOILER

- ☐ UNIT CYCLED MINIMUM OF 15 TIMES
- ☐ CUSTOMER INSTRUCTED
- ☑ ALL COVERS REPLACED
- ☐ CUSTOMER GIVEN MANUAL
- ☐ TARGET TEMPERATURE SET PER CUSTOMER

COMMISSIONED BY: _____ (SIGNATURE)

DATE: _____

THE DELTA T BETWEEN THE HEATER INLET AND OUTLET IS CRITICAL TO PROPER FLOW. BEFORE YOU LEAVE THE JOBSITE, YOU MUST RECORD THE DELTA T. THIS READING SHOULD NOT EXCEED 100°F, 55°C, NOR BE LOWER THAN 20°F, 11.1°C.

DELTA T = 22

ADDITIONAL NOTES AND COMMENTS

Honeywell control seen it had NO purge card. Adjusted card and controller, started working.

156731

DESIGN CERTIFIED

ATH

ADVANCED THERMAL HYDRONICS
260 NORTH ELM STREET
WESTFIELD, MA. 01085

AHRI CERTIFIED

ANS Z21.13-2014 CSA 4.9-2014
LOW PRES. BOILER

	MODEL NO./MODÈLE NO.	CONFIG	SERIAL NO./SÉRIE NO
DIRECT VENT BOILER/ CHAUDIERE A EVACUATION DIRECTE	KN-16	KN-16	9196083
EQUIPPED FOR/PREVU POUR	NAT	GAS/GAZ	CRN 0B410.5C

INLET GAS PRESSURE/ PRESSION DE GAZ A L'ENTREE	NAT. GAS/ GAZ. NAT.	LP GAS/ GAZ. B.P.	MANIFOLD GAS PRESSURE/ PRESSION DE GAZ AU COLLECTEUR	
MIN. (IN W.C.)/ MINI. (mBars)	3 / 4.98		N/A	N/A
MAX. (IN W.C.)/ MAXI. (mBars)	14 / 34.84			

0 - 5000 FEET

SCAN HERE FOR DOCUMENTS

MAX. INPUT/ ALIMENTATION:	1,500,000 BTU / 439 KW	BTU/HR / KW
MIN. INPUT/ ALIMENTATION MINI:	320,000 BTU / 94 KW	BTU/HR / KW
MAX. OUTPUT/ PUISSANCE UTILE:	1,440,000 BTU / 422 KW	BTU/HR / KW
MIN. OUTPUT/ PUISSANCE UTILE:	288,000 BTU / 84 KW	BTU/HR / KW
ORIFICE/ ORIFICES:	0.355 DMS / 14.1	DMS/ mm

CATEGORY II OR IV
CATÉGORIE II OU IV
SHORT CIRCUIT CURRENT RATING: 5 KA
COURTE NOTE ACTUELLE DE CIRCUIT

ELECTRICAL RATING/PUISSANCE ELECTRIQUE NOMINALE: 208/230/240V/60Hz MAXIMUM AMPS./AMP. MAXI: 13.1 A

FOR EITHER DIRECT VENT INSTALLATION OR FOR INSTALLATION USING INDOOR COMBUSTION AIR
POUR OU L'INSTALLATION DES ORIFICES DIRECTES OU POUR L'INSTALLATION
EN UTILISANT L'AIR COMBUSTION A L'INTERIEUR.
FOR INSTALLATION ON COMBUSTIBLE FLOORING
INSTALLER SEULEMENT SUR ON PLANCHER COMBUSTIBLE

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS:
ECARTEMENT MINIMAL DE MATIERES COMBUSTIBLES:

RIGHT SIDE: COTE DROIT:	6 IN. 153 mm	FRONT: DEVANT:	6 IN. 153 mm	TOP: DESSUS:	6 IN. 153 mm	VENT: EVENT:	6 IN. 153 mm
LEFT SIDE: ET GAUCHE:	6 IN. 153 mm	REAR: ARRIERE:	6 IN. 153 mm				

CERTIFIED BY BFC / CERTIFIE PAR BTF

MAWP 100 PSI / 689 kPa

MAX. WATER TEMP./TEMP. MAX. DE L'EAU 250°F/ 121°C

MINIMUM RELIEF VALVE CAPACITY 1,440 BTU/HR. 422 KW
CAPACITE MIN. DECHARGE
DU ROBINET DE DECHARGE

DATE GLUE APPLIED: 09/25/19

82-00004 REV. F

START-UP REPORT

MAIN BLDG

DATE: 9/16/20	JOB NAME: [redacted] STANWood Hanger
TECHNICIAN: MATT	LOCATION: STANWood
COMPANY: Johnson Barrow	MODEL: KN-16
PHONE NUMBER: 425-200-8536	SERIAL #: 9196085

PRE-STARTUP CHECK LIST

- ☑ NO VISIBLE DAMAGE TO UNIT
- ☑ PIPING PROPERLY CONNECTED
- ☑ BOILER CIRCULATOR WIRED
- ☑ VENT/STACK CONNECTED
- ☑ INLET AIR FILTER INSTALLED AND CLEAN
- ☑ PROPER SERVICE CLEARANCES PROVIDED
- ☑ PUMP RUNNING, HEAT EXCHANGER FULL
- ☑ GAS LINES PURGED, NO LEAKS, NO MISSING TEST PLUGS

BOILER STARTUP SEQUENCE

Note: Locate the AA terminals and minimum hold switch in the bottom-right of the electrical panel on the main HeatNet board. Also locate the manometer test manifold in the bottom of the electrical panel.

1. Disable any external call for heat and toggle the remote/local switch to REMOTE.
2. Toggle the LOW FIRE switch to cycle the boiler then hold at trial for pilot ignition.
3. Set pilot pressure (follow section "Checking, Adjustment & Operation") (flame signal should read 5.0 VDC).
4. Release boiler to main flame trial for ignition.
5. Check for stable flame.
6. Record combustion and Delta P at minimum firing rate.
7. Jumper the AA terminals to force 100% input.
8. Record combustion and Delta P at high firing rate.
9. Remove the AA jumper to place the boiler at minimum rate.
10. Make any final adjustments on low fire.
11. Check all combustion results using a calibrated flue gas analyzer.
12. Release the LOW FIRE switch to place boiler in standby.

NOTICE In addition to completing the KN-Series start-up report, complete the control set-up information in the rear of the HeatNet manual.

COMBUSTION ANALYSIS	MINIMUM FIRING RATE	100% FIRING RATE
GAS INLET PRESSURE (WC) 13.4"	11.75 INCHES WC	9.95 INCHES WC
CO_2	8.19 %	9.03 %
O_2	6.4 %	4.9 %
CO (PPM)	7 PPM	40 PPM
NET STACK TEMPERATURE	132 °F	232 °F
AIR BOX DIFFERENTIAL (DELTA P - WC)	1.3 INCHES WC	12.00 INCHES WC
	20%	96%

SAFETY TEST CHECKLIST

- [x] FLOW SWITCHES (By Others)
- [x] LOW WATER CUT-OFF
  - Differential Pressure
- [x] AIR SWITCH
- [x] HIGH LIMITS
- [x] FLAME SAFEGUARD

COMMISSIONING THE BOILER

- [ ] UNIT CYCLED MINIMUM OF 15 TIMES
- [ ] CUSTOMER INSTRUCTED
- [x] ALL COVERS REPLACED
- [ ] CUSTOMER GIVEN MANUAL
- [ ] TARGET TEMPERATURE SET PER CUSTOMER

COMMISSIONED BY: _____ (SIGNATURE)

DATE: _____

THE DELTA T BETWEEN THE HEATER INLET AND OUTLET IS CRITICAL TO PROPER FLOW. BEFORE YOU LEAVE THE JOBSITE, YOU MUST RECORD THE DELTA T. THIS READING SHOULD NOT EXCEED 100°F, 55°C, NOR BE LOWER THAN 20°F, 11.1°C.

DELTA T = 22

ADDITIONAL NOTES AND COMMENTS

156731

ADVANCED THERMAL HYDRONICS
260 NORTH ELM STREET
WESTFIELD, MA. 01085

ANS Z21.13-2014 CSA 4.9-2014
LOW PRES. BOILER

AHRI CERTIFIED
Ask About Our Certified Products

AHRI CERTIFIED
Ask About Our Certified Products

	MODEL NO./MODÉLE NO.	CONFIG	SERIAL NO./SÉRIE NO
DIRECT VENT BOILER/ CHAUDIERE A EVACUATION DIRECTE	KN-16	KN-16	9196085
EQUIPPED FOR/PREVU POUR	NAT	GAS/GAZ	CRN M8410.5C

INLET GAS PRESSURE/ PRESSION DE GAZ A L'ENTREE	NAT. GAS/ GAZ. NAT.	LP GAS/ GAZ. B.P.	MANIFOLD GAS PRESSURE/ PRESSION DE GAZ AU COLLECTEUR	
MIN. (IN.W.C.)/ MINI. (mBars)	3 / 4.98		N/A	N/A
MAX. (IN.W.C.)/ MAXI. (mBars)	14 / 34.84			

0 - 6000 FEET

SCAN HERE FOR DOCUMENTS

MAX. INPUT/ ALIMENTATION:	1,600,000 BTU / 489 kw	BTU/HR kw
MIN. INPUT/ ALIMENTATION MINI:	320,000 BTU / 94 kw	BTU/HR kw
MAX. OUTPUT/ PUISSANCE UTILE:	1,440,000 BTU / 422 kw	BTU/HR kw
MIN. OUTPUT/ PUISSANCE UTILE:	288,000 BTU / 84 kw	BTU/HR kw
ORIFICE/ ORIFICES:	0.555 DMS / 14.1	DMS/ mm

CATEGORY II OR IV
CATÉGORIE II OU IV
SHORT CIRCUIT CURRENT RATING: 5 Ka
COURTE NOTE ACTUELLE DE CIRCUIT

ELECTRICAL RATING/PUISSANCE ELECTRIQUE NOMINALE: 208/230/1PH/60HZ MAXIMUM AMPS./AMP. MAXI: 13.1 A

FOR EITHER DIRECT VENT INSTALLATION OR FOR INSTALLATION USING INDOOR COMBUSTION AIR
POUR OU L'INSTALLATION DES ORIFICES DIRECTES OU POUR L'INSTALLATION
EN UTILISANT L'AIR COMBUSTION A L'INTERIEUR.
FOR INSTALLATION ON COMBUSTIBLE FLOORING
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LEFT SIDE: ET GAUCHE:	6 IN. 153 mm	REAR: ARRIERE:	6 IN. 153 mm				

ASME H

CERTIFIED BY BFC / CERTIFIE PAR BTF

MAWP 100 PSI / 689 kPa

MAX. WATER TEMP./TEMP. MAX. DE L'EAU 250°F/ 121°C

MINIMUM RELIEF VALVE CAPACITY / CAPACITE MIN. DECHARGE DU ROBINET DE DECHARGE 1,440 LBS/HR. 422 KW

DATE GLUE APPLIED:

09/25/19

82-00004 REV. F

Contractor Checklist

Unit Type:	**Hydronic Pumps**	Unit No:	**CCP-1 & 2**
Location:		Serves:	Chilled Water Loop
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Housekeeping pad provided. Vibration Isolation	✓	[1]	
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment labels are installed per project documents.	✓	✓	
Mounting is appropriate.	✓	[1]	
Verify pump / motor alignment and free rotation.	✓	✓	
Lubrication has been applied.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Temperature and pressure indicators as specified.	✓	✓	
Flex connection provided before and after the pump.	✓	✓	
P/T test ports installed as specified.	✓	✓	
Isolation valves provided before and after the pump.	✓	✓	
Control Devices			
Control wires and devices are complete.		X	
Control wires and devices are labeled per project documents.		X	
VFD installed for the unit.		✓	
(2) DP sensors installed		X	
Electrical			
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect / VFD is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.	AB	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] ~~No flex connection seen~~
No vibration isolation

Contractor Checklist

Unit Type:	**Hydronic Pumps**	Unit No:	**HCP-1 & 2**
Location:		Serves:	Heating Water Loop
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment		X	
Housekeeping pad provided. Vibration Isolation	✓	[1]	
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment labels are installed per project documents.	✓	✓	
Mounting is appropriate.	✓	[1]	
Verify pump / motor alignment and free rotation.	✓	✓	
Lubrication has been applied.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Temperature and pressure indicators as specified.	✓	✓	
Flex connection provided before and after the pump.	✓	~~[1]~~	
P/T test ports installed as specified.	✓	✓	
Isolation valves provided before and after the pump.	✓	✓	
Control Devices			
Control wires and devices are complete.		X	
Control wires and devices are labeled per project documents.		X	
VFD installed for the unit.		✓	
(2) DP sensors installed		X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect / VFD is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] ~~No flex connection seen~~
No vibration isolation NA

Contractor Checklist

Unit Type:	**Boiler Circulation Pumps**	Unit No:	**BCP-1, 2 & 3**
Location:		Serves:	Boilers
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Unit is accessible for service.	✓	✓	
Unit is clean and has no visible physical damage.	✓	✓	
Equipment labels are installed per project documents.	✓	✓	
Mounting is appropriate.	✓	✓	
Verify pump / motor alignment and free rotation.	✓	✓	
Lubrication has been applied.	✓	✓	
Piping			
Piping, valves and insulation are complete.	✓	✓	
Temperature and pressure indicators as specified.	✓	✓	
Flex connection provided before and after the pump.			NA
P/T test ports installed as specified.	✓	✓	
Isolation valves provided before and after the pump.	✓	✓	
Control Devices			
Control wires and devices are complete.	✓	X	
Control wires and devices are labeled per project documents.	✓	X	
VFD installed for the unit.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect / VFD is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.	AB	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

CHWP-1

Taco Comfort Solutions

VARIABLE SPEED PUMPING SYSTEM START UP CHECK LIST

LOCATION: Mechanical Rm

Is the Pre- Start Checklist complete? _____

Is System operating or is this initial start up? X

Start up date: 9/16/20	Project : Stanwood High	Serial #:	
Discharge Pressure Reading: 50 PSI	Suction Pressure Reading: 27 PSI	Boost Pressure: X PSI	Total GPM: 4/4 GPM
Phase: 3 Hz: 60 Volts: 460		Started by: MAM	
Pump Model: E1301164HAJ14	Motor : ODP / TEFC HP: 15 RPM: 1765	Smartdrive S/N#: N/A	

ODB1743D

N/A	1	Check overload settings against motor nameplate. (Parameters 1-20 to 1-29)
X	2	Check inside the drives. Ensure all wiring and components are present & firmly installed. Re-tighten all control wires
20	3	Record pressure at the suction side before running any pumps.
X	4	Check the system for any leaks and correct now
	5	Check the incoming voltage with a voltmeter. L1- L2 491 V L1- L3 492 V L2- L3 492 V
X	6	Confirm that all pump switches are in the OFF position. Turn on the main power.
X	7	Bump all motors individually and confirm rotation as indicated on the pumps. Close coupled pumps should rotate clockwise when viewed from the 'top' of the motor
X	8	Check amperage on all three legs with each pump running individually. The discharge valves should still be closed and the amperaged quite low but balanced P#1 L1 13.3 A, L2 13.7 A, L3 13.7 A P#2 L1 _____ A, L2 _____ A, L3 _____ A P#3 L1 _____ A, L2 _____ A, L3 _____ A
✓	9	Program setpoint on the controller. Desired Set point: _____ PSI / C (Parameter 20-21)
X	10	Calibrate VFD parameters to match actual system pressure
N/A	11	Check for pump alternation. (Turn off lead pump and check if lag pump switches to lead pump)
N/A	12	Record: Ramp UP Time _____ S Ramp DOWN Time _____ S (Parameters 3-41/42 and 3-51/52)
N/A	13	Record Frequency of Motor: Min Frequency: _____ Hz Max Frequency: _____ Hz
N/A	14	Is a hydro-tank piped & connected to the booster system?
N/A	15	Is the hydro- tank (if applicable) charged to the correct pressure? If the tank is located next to the booster, it should be charged 5 psi below the system pressure If the tank is located at the top of the building, it should be charged to 35-40PSI. Start up cannot be completed unless the tank is properly installed and charged.
N/A	16	Press "AUTO" button on all drives for booster package to run in Auto mode. Refer to drive manual for further inquires.

Sign when completed

Name _____ Date 9/16/20

CHWP-2

Taco Comfort Solutions

VARIABLE SPEED PUMPING SYSTEM START UP CHECK LIST

LOCATION: Mechanical Rm

Is the Pre- Start Checklist complete? _____

Is System operating or is this initial start up? X

Start up date: 9/16/20	**Project :** Stanwood High	**Serial #:**	
Discharge Pressure Reading 50 PSI	**Suction Pressure Reading** 22 PSI	**Boost Pressure** _____ PSI	**Total GPM** 4/6 GPM
Phase 3 **Hz** 60 **Volts** 460		**Started by:** MKM	
Pump Model: FI30IIF41+AJIL0DB	**Motor :** (ODP) / TEFC HP: 15 RPM: 1765	~~**Smartdrive S/N#:**~~	

1943D

N/A	1	Check overload settings against motor nameplate. (Parameters 1-20 to 1-29)
X	2	Check inside the drives. Ensure all wiring and components are present & firmly installed. Re-tighten all control wires.
20	3	Record pressure at the suction side before running any pumps.
X	4	Check the system for any leaks and correct now
	5	Check the incoming voltage with a voltmeter. L1- L2 489 V L1- L3 489 V L2- L3 490 V
X	6	Confirm that all pump switches are in the OFF position. Turn on the main power.
X	7	Bump all motors individually and confirm rotation as indicated on the pumps. Close coupled pumps should rotate clockwise when viewed from the 'top' of the motor
X	8	Check amperage on all three legs with each pump running individually. The discharge valves should still be closed and the amperaged quite low but balanced P#1 L1 13.6 A, L2 13.9 A, L3 13.9 A P#2 L1 _____ A, L2 _____ A, L3 _____ A P#3 L1 _____ A, L2 _____ A, L3 _____ A
X	9	Program setpoint on the controller. Desired Set point: _____ PSI / C (Parameter 20-21)
X	10	Calibrate VFD parameters to match actual system pressure
N/A	11	Check for pump alternation. (Turn off lead pump and check if lag pump switches to lead pump)
N/A	12	Record: Ramp UP Time _____ S Ramp DOWN Time _____ S (Parameters 3-41/42 and 3-51/52)
N/A	13	Record Frequency of Motor: Min Frequency: _____ Hz Max Frequency: _____ Hz
N/A	14	Is a hydro-tank piped & connected to the booster system?
N/A	15	Is the hydro- tank (if applicable) charged to the correct pressure? If the tank is located next to the booster, it should be charged 5 psi below the system pressure If the tank is located at the top of the building, it should be charged to 35-40PSI. Start up cannot be completed unless the tank is properly installed and charged.
N/A	16	Press "AUTO" button on all drives for booster package to run in Auto mode. Refer to drive manual for further inquires.

Sign when completed

Name Mark McMahon Date 9/16/20

HWP-1

Taco Comfort Solutions

VARIABLE SPEED PUMPING SYSTEM START UP CHECK LIST

LOCATION: Mechanical Rm

Is the Pre- Start Checklist complete? _____

Is System operating or is this initial start up? X

Start up date: 9/16/20	**Project :** Stanwood High	**Serial #:**	
Discharge Pressure Reading 70 PSI	**Suction Pressure Reading** 28 PSI	**Boost Pressure** PSI	**Total GPM** 667 GPM
Phase 3 **Hz** 60 **Volts** 460		**Started by:** MKM	
Pump Model: E1401E4KAT110 (B)745D	**Motor :** (ODP) / TEFC HP: 25 RPM: 1770	**Smartdrive S/N#:**	

X	1	Check overload settings against motor nameplate. (Parameters 1-20 to 1-29)
X	2	Check inside the drives. Ensure all wiring and components are present & firmly installed. Re-tighten all control wires
25	3	Record pressure at the suction side before running any pumps.
	4	Check the system for any leaks and correct now
X	5	Check the incoming voltage with a voltmeter. L1- L2 490 V L1- L3 490 V L2- L3 491 V
X	6	Confirm that all pump switches are in the OFF position. Turn on the main power.
	7	Bump all motors individually and confirm rotation as indicated on the pumps. Close coupled pumps should rotate clockwise when viewed from the 'top' of the motor
X	8	Check amperage on all three legs with each pump running individually. The discharge valves should still be closed and the amperaged quite low but balanced P#1 L1 23.7 A, L2 24 A, L3 24 A P#2 L1 _____ A, L2 _____ A, L3 _____ A P#3 L1 _____ A, L2 _____ A, L3 _____ A
X	9	Program setpoint on the controller. Desired Set point: _____ PSI / C (Parameter 20-21)
X	10	Calibrate VFD parameters to match actual system pressure
N/A	11	Check for pump alternation. (Turn off lead pump and check if lag pump switches to lead pump)
N/A	12	Record: Ramp UP Time _____ S Ramp DOWN Time _____ S (Parameters 3-41/42 and 3-51/52)
N/A	13	Record Frequency of Motor: Min Frequency: _____ Hz Max Frequency: _____ Hz
N/A	14	Is a hydro-tank piped & connected to the booster system?
N/A	15	Is the hydro- tank (if applicable) charged to the correct pressure? If the tank is located next to the booster, it should be charged 5 psi below the system pressure If the tank is located at the top of the building, it should be charged to 35-40PSI. Start up cannot be completed unless the tank is properly installed and charged.
N/A	16	Press "AUTO" button on all drives for booster package to run in Auto mode. Refer to drive manual for further inquires.

Sign when completed

Name _____ Date 9/16/20

HWP-2

Taco Comfort Solutions

VARIABLE SPEED PUMPING SYSTEM START UP CHECK LIST

LOCATION: Mech. Rm

Is the Pre- Start Checklist complete? _____

Is System operating or is this initial start up? X

Start up date: 9/16/20	**Project :** Seymour Math	**Serial #:**	
Discharge Pressure Reading 70 PSI	**Suction Pressure Reading** 28 PSI	**Boost Pressure** PSI	**Total GPM** 667 GPM
Phase 3 **Hz** 60 **Volts** 460		**Started by:** MKM	
Pump Model: F1401E4KAJ2LB	**Motor:** ODP / TEFC HP: 30 RPM: 1770	**Smartdrive S/N#:**	

		CB 1145 D [redacted]
N/A	1	Check overload settings against motor nameplate. (Parameters 1-20 to 1-29)
X	2	Check inside the drives. Ensure all wiring and components are present & firmly installed. Re-tighten all control wires.
25	3	Record pressure at the suction side before running any pumps.
X	4	Check the system for any leaks and correct how
X	5	Check the incoming voltage with a voltmeter. L1- L2 489 V L1- L3 489 V L2- L3 490 V
X	6	Confirm that all pump switches are in the OFF position. Turn on the main power.
X	7	Bump all motors individually and confirm rotation as indicated on the pumps. Close coupled pumps should rotate clockwise when viewed from the 'top' of the motor
X	8	Check amperage on all three legs with each pump running individually. The discharge valves should still be closed and the amperaged quite low but balanced P#1 L1 25 A, L2 25.3 A, L3 25.3 A P#2 L1 _____ A, L2 _____ A, L3 _____ A P#3 L1 _____ A, L2 _____ A, L3 _____ A
X	9	Program setpoint on the controller. Desired Set point: _____ PSI / C (Parameter 20-21)
X	10	Calibrate VFD parameters to match actual system pressure
N/A	11	Check for pump alternation. (Turn off lead pump and check if lag pump switches to lead pump)
N/A	12	Record: Ramp UP Time _____ S Ramp DOWN Time _____ S (Parameters 3-41/42 and 3-51/52)
N/A	13	Record Frequency of Motor: Min Frequency: _____ Hz Max Frequency: _____ Hz
N/A	14	Is a hydro-tank piped & connected to the booster system?
N/A	15	Is the hydro- tank (if applicable) charged to the correct pressure? If the tank is located next to the booster, it should be charged 5 psi below the system pressure. If the tank is located at the top of the building, it should be charged to 35-40PSI. Start up cannot be completed unless the tank is properly installed and charged.
N/A	16	Press "AUTO" button on all drives for booster package to run in Auto mode. Refer to drive manual for further inquires

Sign when completed

Name Max Kuhlman Date 9/16/20

Contractor Checklist

Unit Type:	**Hydronic Piping and Accessories**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Makeup Water Lines			
Y-strainer w/ blowdown valve and hose tread end cap provided.	✓	✓	
Reduced pressure backflow assembly installed and accessible.	✓	✓	
Makeup water meters installed ~~with bypass lines~~.	✓	✓	
Pressure reducing valve assembly installed ~~with bypass lines~~.	✓	✓	
Heating water makeup water pressure reducing valve setting (PSI):	✓	✓	
Chilled water makeup water pressure reducing valve setting (PSI):	✓	✓	
Expansion Tanks			
4" concrete housekeeping pad provided for expansion tank.	✓	✓	
Drain valve and P/T relief valve installed (P/T relief valve set at 60 PSI).	✓	✓	
Pressure gauge installed.	✓		
Isolation valve installed.	✓	✓	
Automatic air vent installed.	✓	✓	
Heating water loop expansion tank pre-charged pressure setting (PSI):	✓	✓	
Chilled water loop expansion tank pre-charged pressure setting (PSI):	✓	✓	
Chemical Pot Feeders			
4" concrete housekeeping pad provided.	✓	X	
Unit is accessible for service.	✓	X	
Unit is clean and has no visible physical damage.	✓	X	
Associated isolation valves, unions and drain valve installed.	✓	X	
Coupon rack installed.		X	
1" site flow indicator installed in the correct vertical direction with water flow direction pointing upward.			N/A
Differential pressure gage installed with needle valves in between.			N/A
Air Separator			
Unit is accessible for service.	✓	✓	
Unit is hanged properly per contract documents.	✓	✓	
Blowdown for air separator installed with hose thread fitting on outlet.	✓	✓	
Isolation valves provided before and after air separator.			
Automatic air vent provided with bypass pipe.	✓	✓	
Orientation of the inlet and outlet match design drawing.	✓	✓	
Building Loop Piping			
Boiler differential pressure sensors installed	✓	✓	
Chiller differential pressure sensors installed	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Chemical Products CO.

29516 82nd Ave Ct. S.
Roy, WA 98580
Phone: 253-215-0095 Fax: 253-215-0082

SERVICE REPORT

COMPANY: Ramsett Mechanical FROM: Thomas DowLearn

Attention: Tom Haag DATE: October 1, 2020

FAX #: TOTAL NUMBER OF PAGES INCLUDING COVER: 1

RE: Certification of work completed on the Stanwood High School PH2
Work completed on September 28, 2020

Report:

Hydrochem 281L (A Chemical Cleaner) was introduced into the hot water heating system and circulated. A running flush was then started and ran until the water was tested and found to be clear and clean of all Hydrochem 281L (A Chemical Cleaner). We then put Hydrochem 436K (A Corrosion Inhibitor) along with a Broad range Microbiocide in the system. After letting the Hydrochem 436K (A Corrosion Inhibitor) circulate, it was tested at 1100ppm, which falls into the acceptable range of 800ppm to 1500ppm.

This system is within proper chemical ranges at this time. Chemical Products will supply small amounts of chemicals to keep these systems within these ranges until our current contract expires. Chemical Products will not be responsible for large system losses.

Hydrochem 281L (A Chemical Cleaner) was introduced into the chilled water system and circulated. A running flush was then started and ran until the water was tested and found to be clear and clean of all Hydrochem 281L (A Chemical Cleaner). We then pumped 440 gallons of Protherm 720 (A Propylene Glycol with Inhibitor) into the system. After letting the system circulate, it was then tested at +15 deg, which is 20%.

Please advise Chemical Products if and when the operator training session will be scheduled so that, if we are needed, we can put it on our scheduling as well.

Your service call schedule will be two visits

Your service call schedule will be March 2021 & September 2021

Note: these are projected service months and we will try to adhere to this schedule however service calls may be adjusted to allow for work being completed. This will prevent any unnecessary additional service calls. If work is delayed and completed the first part of the following month, we will get back on schedule by completing the next service visit during it's scheduled month.

Please contact Chemical Products if you wish to continue with this service contract and to avoid any lack of coverage for your system.

Thank You

Thomas DowLearn

TIMELINE OF THE FLUSH AND FILL FOR HEATING AND CHILLED WATER SYSTEMS

09-02-20
Introduced 1700 gallons of water to the chilled system, set make up water PRV to 25 PSI.
Introduced 2700 gallons of water to the heating water system, set make up water PRV to 25 PSI.
09-10-20
Introduced Hydrochem 281L into the heating and chilled water systems and began circulating.
09-21-20
Began flush of the Hydrochem from the heating and chilled systems.
After flushing 21600 gallons through the systems, both systems were tested and found no evidence of the Hydrochem.
Inserted 440 gallons of Protherm 720 to the chilled water system.
Inserted corrosion inhibitor to the heating water system.
09-28-20
Tested the Chilled water system for acceptable level of glycol, 20%, (see service report)
Tested the heating water system for acceptable levels of inhibitor, (see service report)

Set pressure at expansion tanks to 23 PSI

HEATING AND CHILLED WATER SYSTEMS:

DRAIN / FILL / BLEED AIR

1) There are drains located at the chiller, boilers, air handlers and fan coils. These can be used for the individual equipment or to drain the system.
2) To fill each system, use the make-up water station located in the boiler room.
3) CCD 62 added isolation valves to the heating system. (See included drawings for valve locations.)
4) There is an air vent located on the return line at each of the added isolation valve locations.
5) When filling each branch, leave return valve closed open the air vent, and fill through the supply line.
6) When water is to air vent, open return valve to the system.

Contractor Checklist

Unit Type:	**Air Handling Units**	Unit No:	**AHU-1**
Location:		Serves:	Gym
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	NA	
Hydronic Piping			
Control valves installed (3-way)	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Coil freeze-stat installed and complete.		X	
Electrical			
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.		X	
Room Served			
Diffuser locations are appropriate.		X	
Location of room sensor is appropriate.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct/pipe connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shutoff valve Corrected

Contractor Checklist

Unit Type:	Air Handling Units	Unit No:	AHU-2
Location:		Serves:	Aux Gym
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	[3]	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	NA	
Hydronic Piping			
Control valves installed (2-way)	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Coil freeze-stat installed and complete.		X	
Electrical			
Supply power is installed and disconnect is accessible.	RB	✓	
Disconnect is labeled or next to unit within sight.	RB	✓	
Over-current protection is appropriate.	RB	✓	
Convenience outlet within 50' of equipment.		X	
Room Served			
Diffuser locations are appropriate.		✓	
Location of room sensor is appropriate.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shut-off valve Corrected
[3] No vibration isolation is provided per Section 23 05 48.3.01.A
Internal fan vibration isolation.

Contractor Checklist

Unit Type:	Air Handling Units	Unit No:	AHU-3
Location:		Serves:	Aux Gym
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	[3]	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	NA	
Hydronic Piping			
Control valves installed (2-way)	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Coil freeze-stat installed and complete.		X	
Electrical			
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.		X	
Room Served			
Diffuser locations are appropriate.		✓	
Location of room sensor is appropriate.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shutoff valve corrected
[3] Section 230548.3.01.A No vibration isolation is provided per this section Internal fan vibration isolation.

Contractor Checklist

Unit Type:	Air Handling Units	Unit No:	AHU-4
Location:		Serves:	Commons
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
Hydronic Piping			
Control valves installed (2-way)	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Coil freeze-stat installed and complete.		X	
Air flow station installed		X	
Electrical			
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.		X	
Room Served			
Diffuser locations are appropriate.		✓	
Location of room sensor is appropriate.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No Flexible duct/pipe connection. Internal fan vibration isolation.
[2] Strainer not replaceable with location of shutoff valve corrected

Contractor Checklist

Unit Type:	Air Handling Units	Unit No:	AHU-5
Location:		Serves:	Theater
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	✓	
Mechanical dampers installed and accessible.	✓	✓	
Hydronic Piping			
Control valves installed ~~(2-way)~~ 3-way	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	[1]	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Coil freeze-stat installed and complete.		X	
Air flow station installed		X	
Electrical		X	
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.		✓	
Room Served			
Diffuser locations are appropriate.		✓	
Location of room sensor is appropriate.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct/pipe connection. Internal fan vibration isolation.
[2] No Unions per detail. corrected

Contractor Checklist

Unit Type:	Air Handling Units	Unit No:	AHU-6
Location:		Serves:	Stage
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	X	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	[3]	
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
Hydronic Piping			
Control valves installed (2-way)	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Air flow station installed		X	
Coil freeze-stat installed and complete.		X	
Electrical			
Supply power is installed and disconnect is accessible.	AB	✓	
Disconnect is labeled or next to unit within sight.	AB	✓	
Over-current protection is appropriate.	AB	✓	
Convenience outlet within 50' of equipment.		X	
Room Served			
Diffuser locations are appropriate.		X	
Location of room sensor is appropriate.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No Flexible duct connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shutoff valve corrected
[3] Fan is not accessable via handle. Bolted door is blocked by conduit corected

Contractor Checklist

Unit Type:	**Air Handling Units**	Unit No:	**AHU-7**
Location:		Serves:	Lobby
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	[2]	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	X	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	[4]
Condensate pan and drain installed with P-trap and clean out.	✓	✓	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
Hydronic Piping			
Control valves installed ~~(3-way)~~ 2-Way	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[3]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Fan status DP switch or CT installed and complete.		X	
Filter status DP switch installed and complete.		X	
Control wiring and devices are installed.		X	
Control wiring and devices are labeled per project documents.		X	
Air flow station installed		X	
Coil freeze-stat installed and complete.		X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.		✓	
Room Served			
Diffuser locations are appropriate.		X	
Location of room sensor is appropriate.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct connection Internal fan vibration isolation.
[2] Unit appears to be buckled at the Outside/return air intake section
[3] Strainer not replaceable with location of shutoff value corected
[4] Fan is not accesable via handle. Bolted door access corected

Johnson Barrow
2203 23rd Ave S. Seattle WA 98144
Phone: 206.284.1476 Fax: 206.284.7836

Stanwood HS Base Line Damage Report

While on site at Stanwood HS on Friday (12/18) I was tasked with inspecting damage to the Base Rails on DOAU-2 and DOAU-5. During my inspection I found the corners of the Base Rails on both DOAU-2 and DOAU-5 to be bent in a U-Shape fashion. This damage appears to be from the straps being placed around the base of each unit in order to pick and set them into place. The damage appears to be solely cosmetic and I do not believe it will have any affect on the integrity of the frames on either DOAU-2 or DOAU-5. This cosmetic damage should not have any affect on the warranty of the unit.

-Matt Harron

MAIN BLDG

M2 Series Startup Form

Job Name: Stanwood HS Date: 9/17/2020

Address:

Model Number: M2H036L3ABACX

Serial Number: 201909-CGDS03396 Tag: AHU-1

Startup Contractor: Johnson Barrow

Address: Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked? NA	☐ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected?	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? NA	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly (unit move alot of air)

Alignment ☑ Check Rotation ☑ Nameplate Amps 40A

Number	hp	L1	L2	L3
1	30Hp	20.1	20.2	20.3
2				

Band Size _____ VAV Controls by others

VFD Frequency 30Hz Springs Operating Correctly ☑

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐ Check Rotation ☐ FLA _____

Number	hp	L1	L2	L3
1				
2				

Power Exhaust Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Outside Air/Economizer Dampers

By others

OA Operation Check ☑ Damper Wiring Check ☐ Gears Check ☐

RA Operation Check ☑ Damper Wiring Check ☐ Gears Check ☐

EA Operation Check ☒ Damper Wiring Check ☐ Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

Unit Configuration

Water-Cooled Condenser ☐ Air-Cooled Condenser ☐

No Water Leaks ☐ Condenser Safety Check ☐

Water Flow _____ gpm

Water Inlet Temperature _____ °F Water Outlet Temperature _____ °F

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Electric Preheating

Limit Lockout ☐	Aux. Limit Lockout ☐
Outside Air Temperature Setpoint_____°F	
Preheat Leaving Air Temperature Setpoint_____°F	

Stage	Amps	Stage	Amps
1		3	
2		4	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐Yes ☐No
2. Is there adequate combustion air?	☐Yes ☐No
3. Have condensate drain lines been installed if needed?	☐Yes ☐No
4. Has air been purged from the lines?	☐Yes ☐No
5. Has pilot spark been verified?	☐Yes ☐No

Staged Gas Heat

Type of Gas	Natural Gas ☐		Propane ☐
Stage	Manifold Pressure ("w.c.)	Stage	Manifold Pressure ("w.c.)
1		3	
2		4	

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper startup, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

Entry Date	Action Taken	Name/Tel.
9/17/2020	Factory Startup - saw UV3 error at 1st powerup - but goes away when power cycled - may need new drive if problem persists - have case # to get new one.	JB - BK

AAON Coil Products

Longview, TX Made in USA

UL 1995 / CSA. C22.2 No. 236 Heating and Cooling Equipment

Intertek
2001778
HVAC Equipment

Part No: M120309

Model No: M2H036L3ABACX

Serial No: 201909-CGDS03396

Descr: M2H036L3ABACX:MBB101000000000000000X~FTH102PA000000CD000A0

Nominal Volts: 460 HZ: 60 Max. Overcurrent Prot.: 90 AMP

Min/Max VAC: PHASE: 3 Min. Circuit Ampacity: 50.0 AMP

Short Circuit Current: 5kA rms symmetrical 600V max

(chilled water) (hot water) (steam) Compressorized (w/cooling)

	QTY	HP	VOLTS	PH	RPM	FLAea	RLAea	LRAea
COMPRESSOR								
COMPRESSOR								
CONDENSER FAN								
SUPPLY AIR MTR	1	30.0	460	3	1760	40.0		
POWER RTN MTR								
PWR EXHAUST MTR								
HEATWHEEL MTR								
\ ESTIBULE HEATER								
ADDITIONAL MTR1								
ADDITIONAL MTR2								

ELECTRIC HEAT **FOR INDOOR / OUTDOOR USE**

Max Output KW: Max Outlet Air Temp: 200 oF

Max Line AMPS: Max Steam Inlet Press: psig

Max Tested ESP: 1.25 "wc Max Hot Water Inlet Temp: 200 oF

CLEARANCES (inches) FRONT: DUCT LEFT SIDE: 96 RIGHT SIDE: 6

BACK: 6 TOP: DUCT BOTTOM: 6

MAY BE ON COMBUSTIBLE FLOOR (CANADA & USA) or CLASS A, B, C ROOF COVERING MATERIAL (USA)

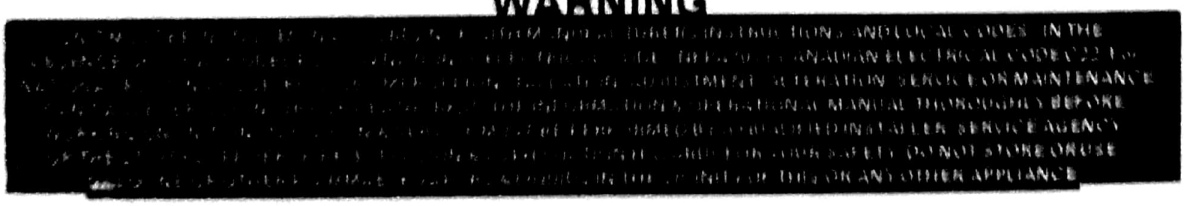
REFRIG: N/A DESIGN PRESS. Low Side: High Side:

Charge Per System (Ounces): 1) 2) 3) 4)

5) 6) 7) 8)

FOR USE WITH REMOTE CONDENSER TYPE: AIR: WATER: EVAP COOL:

WARNING



AHU-1

MAIN BLDG

H3 Series Startup Form

Job Name: Stanwood H5 Date: 9/17/2020

Address:

Model Number: H3-ERB-3-0-28FA-1/H

Serial Number: 201908-CJWE03824 Tag: AHU-2

Startup Contractor: Johnson Barrow

Address: Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked?	N/A
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☐ Yes ☐ No
16. Have condensate drain and p-trap been connected?	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location?	N/A
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F	Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑	Check Rotation ☐	Nameplate Amps _____		
Number	hp	L1	L2	L3
1	7.2	3.0	2.9	3.0
2	7.2	2.9	3.1	3.0
VFD Frequency 40Hz		VAV Controls _____		

Power Exhaust Fan Assembly

Alignment ☐	Check Rotation ☐	Nameplate Amps _____		
Number	hp	L1	L2	L3
1				
2				
VFD Frequency _____		VAV Controls _____		

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐	Check Rotation ☐	FLA _____		
Number	hp	L1	L2	L3
1				
2				

Dampers By Others none on unit

OA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
RA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
EA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
Damper Actuator Type: _____		
Economizer Changeover Type and Operation: _____		

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Air-Cooled Condenser Fans

Alignment ☐ Check Rotation ☐ Nameplate Amps

Number	hp	L1	L2	L3
1				
2				
3				
4				

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☐ Yes ☐ No
2. Has the entire system been filled with fluid?	☐ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☐ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☐ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☐ Yes ☐ No
6. Has the water piping been insulated?	☐ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐ Yes ☐ No
2. Is there adequate combustion air?	☐ Yes ☐ No
3. Have condensate drain lines been installed?	☐ Yes ☐ No
4. Has air been purged from the lines?	☐ Yes ☐ No
5. Has pilot spark been verified?	☐ Yes ☐ No

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper startup, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

Entry Date	Action Taken	Name/Tel.
9/17/2020	Factory Startup	JB-BK

H3 Series Startup Form

MAIN BLDG

Job Name: Stanwood 145 Date:

Address:

Model Number: H3-ELB-3-0-28FA-11H

Serial Number: 20108-CJWE03827 Tag: AHU-3

Startup Contractor: Johnson Barrow

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked? N/A	☑ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected?	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F	Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑	Check Rotation ☑	Nameplate Amps 8.3A		
Number	hp	L1	L2	L3
1	7.2	5.5	5.6	5.7
2	7.2	5.4	5.3	5.5
VFD Frequency ECM motor 60Hz		VAV Controls by others		

Power Exhaust Fan Assembly

Alignment ☐	Check Rotation ☐	Nameplate Amps _____		
Number	hp	L1	L2	L3
1				
2				
VFD Frequency _____		VAV Controls _____		

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐	Check Rotation ☐	FLA _____		
Number	hp	L1	L2	L3
1				
2				

Dampers

By others no dampers in unit

OA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
RA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
EA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
Damper Actuator Type: _____		
Economizer Changeover Type and Operation: By others		

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Air-Cooled Condenser Fans

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? N/A	

Electric Heating

Stages _____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐ Yes ☐ No
2. Is there adequate combustion air?	☐ Yes ☐ No
3. Have condensate drain lines been installed?	☐ Yes ☐ No
4. Has air been purged from the lines?	☐ Yes ☐ No
5. Has pilot spark been verified?	☐ Yes ☐ No

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper startup, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

Entry Date	Action Taken	Name/Tel.
9/17/2020	Factory Startup	JB/BC

MAIN BLDG

M2 Series Startup Form

Job Name: Stanwood HS

Date: 9/17/2020

Address:

Model Number: M2H022L3ABACO

Serial Number: 201908-L6DF03397

Tag: AHU-2

Startup Contractor: Johnson Barrow

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.

1. Is there any visible shipping damage?		☐ Yes ☑ No
2. Is the unit level?		☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?		☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?		☑ Yes ☐ No
5. Have all shipping braces been removed?		☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?		☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?		☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked?	NA	☐ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?		☑ Yes ☐ No
10. Have all set screws on the fans been tightened?		☑ Yes ☐ No
11. Do all fans rotate freely?		☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?		☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?		☑ Yes ☐ No
14. Have the damper assemblies been inspected?		☑ Yes ☐ No
15. Are air filters installed with proper orientation?		☑ Yes ☐ No
16. Have condensate drain and p-trap been connected?	NA	☑ [illegible] ☐ No
17. Is the TXV sensing bulb in the correct location?		[illegible]
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	NA	[illegible] ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 21A

Number	hp	L1	L2	L3
1	15	11.2	11.1	11.0
2				

Band Size — VAV Controls — By Ats

VFD Frequency 40,44/60Hz Springs Operating Correctly ☑

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐ Check Rotation ☐ FLA _____

Number	hp	L1	L2	L3
1				
2				

Power Exhaust Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Outside Air/Economizer Dampers

OA Operation Check ☑ Damper Wiring Check ☐ N/A Gears Check ☑

RA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

EA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

Damper Actuator Type: By others

Economizer Changeover Type and Operation: By others

Unit Configuration

Water-Cooled Condenser ☐ Air-Cooled Condenser ☐

No Water Leaks ☐ Condenser Safety Check ☐

Water Flow _____ gpm

Water Inlet Temperature _____ °F Hot water coil Water Outlet Temperature _____ °F

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Electric Preheating

Limit Lockout ☐		Aux. Limit Lockout ☐	
Outside Air Temperature Setpoint_____°F			
Preheat Leaving Air Temperature Setpoint_____°F			
Stage	Amps	Stage	Amps
1		3	
2		4	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐Yes ☐No
2. Is there adequate combustion air?	☐Yes ☐No
3. Have condensate drain lines been installed if needed?	☐Yes ☐No
4. Has air been purged from the lines?	☐Yes ☐No
5. Has pilot spark been verified?	☐Yes ☐No

Staged Gas Heat

Type of Gas	Natural Gas ☐		Propane ☐
Stage	Manifold Pressure ("w.c.)	Stage	Manifold Pressure ("w.c.)
1		3	
2		4	

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper startup, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

Entry Date	Action Taken	Name/Tel.
9/17/2020	Factory Start-up	BK/JB

M2 Series Startup Form

MAIN BLDG

Job Name: Stanwood H.S. Date: 9-16-20

Address:

Model Number: M2H022L3ABACO

Serial Number: 201908-CGDF03398 Tag: AHU-5

Startup Contractor: J.B.

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked? N/A	☐ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
3. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
4. Have the damper assemblies been inspected?	☑ Yes ☐ No
5. Are air filters installed with proper orientation?	☑ Yes ☐ No
. Have condensate drain and p-trap been connected?	☑ Yes ☐ No
. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
Does the TXV sensing bulb have proper thermal contact and is properly insulated? N/A	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps 21

Number	hp	L1	L2	L3
1	15	6.6	6.7	6.7
2				

Band Size _____ VAV Controls _____

VFD Frequency 20 Springs Operating Correctly ☐

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐ Check Rotation ☐ FLA _____

Number	hp	L1	L2	L3
1				
2				

Power Exhaust Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

*By other's

Outside Air/Economizer Dampers

OA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
RA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
EA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

Unit Configuration

Water-Cooled Condenser ☐ Air-Cooled Condenser ☐

No Water Leaks ☐ Condenser Safety Check ☐

Water Flow _____ gpm

Water Inlet Temperature _____ °F Water Outlet Temperature _____ °F

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	
Suction				N/A	N/A
Liquid					
					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	
Suction				N/A	N/A
Liquid					
					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	
Suction				N/A	N/A
Liquid					
					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	
Suction				N/A	N/A
Liquid					
					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	
Suction				N/A	N/A
Liquid					
					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	
Suction				N/A	N/A
Liquid					
					N/A

Air-Cooled Condenser

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Electric Preheating

Limit Lockout ☐	Aux. Limit Lockout ☐
Outside Air Temperature Setpoint_____ °F	
Preheat Leaving Air Temperature Setpoint_____ °F	

Stage	Amps	Stage	Amps
1		3	
2		4	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐Yes ☐No
2. Is there adequate combustion air?	☐Yes ☐No
3. Have condensate drain lines been installed if needed?	☐Yes ☐No
4. Has air been purged from the lines?	☐Yes ☐No
5. Has pilot spark been verified?	☐Yes ☐No

Staged Gas Heat

Type of Gas	Natural Gas ☐		Propane ☐
Stage	Manifold Pressure ("w.c.)	Stage	Manifold Pressure ("w.c.)
1		3	
2		4	

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

H3 Series Startup Form

MAIN BLDG

Job Name: Stanwood H.S. Date: 9-16-20

Address:

Model Number: H3-BRB-3-0-28FA-12K

Serial Number: 201908-C5WB03825 Tag: AHU-6

Startup Contractor: J.B.

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked?	☑ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected?	☑ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated? N/A	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☐ Nameplate Amps 2.6

Number	hp	L1	L2	L3
1	2.3	1.3	1.7	1.3
2				

VFD Frequency Rheostat VAV Controls _____

Power Exhaust Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

VFD Frequency _____ VAV Controls _____

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐ Check Rotation ☐ FLA _____

Number	hp	L1	L2	L3
1				
2				

Dampers

OA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

RA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

EA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Air-Cooled Condenser Fans

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐ Yes ☐ No
2. Is there adequate combustion air?	☐ Yes ☐ No
3. Have condensate drain lines been installed?	☐ Yes ☐ No
4. Has air been purged from the lines?	☐ Yes ☐ No
5. Has pilot spark been verified?	☐ Yes ☐ No

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

MAIN BLDG

H3 Series Startup Form

Job Name: Stanwood H.S. Date: 9/16/20

Address:

Model Number: H3-CRB-3-0-28FA-12K

Serial Number: 201908-CJWC03826 Tag: AHU-7

Startup Contractor: J.B.

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☐ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked?	☑ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected?	☑ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated? N/A	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 8.3

Number	hp	L1	L2	L3
1	7.2	5.6	5.7	5.2
2				

VFD Frequency N/A → Rheostat VAV Controls _____

Power Exhaust Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

VFD Frequency _____ VAV Controls _____

Energy Recovery Wheel Assembly

Wheels Spin Freely ☐ Check Rotation ☐ FLA _____

Number	hp	L1	L2	L3
1				
2				

Dampers

OA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

RA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

EA Operation Check ☐ Damper Wiring Check ☐ Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

* Controls is modifying the damper actuators!!!

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Air-Cooled Condenser Fans

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)? N/A	☐ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? N/A	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐ Yes ☐ No
2. Is there adequate combustion air?	☐ Yes ☐ No
3. Have condensate drain lines been installed?	☐ Yes ☐ No
4. Has air been purged from the lines?	☐ Yes ☐ No
5. Has pilot spark been verified?	☐ Yes ☐ No

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

Contractor Checklist

Unit Type:	**Dedicated Outside Air Units**	Unit No:	**DOAU-1**
Location:		Serves:	1st floor west
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓ [2]	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	NA	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
HW Piping			
2-way valves installed on HW pipe.	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves.	✓	[3]	
Replaceable components equipped with unions or flanges.	✓	✓	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.	✓	X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
Duct static pressure sensor (VAV) installed and complete.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓ *	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct / pipe connection
[2] Unit appears buckled at OA intake section
[3] STRAINER NOT REPLACABLE WITH LOCATION OF SHUTOFF VALVE

Contractor Checklist

Unit Type:	**Dedicated Outside Air Units**	Unit No:	**DOAU-2**
Location:		Serves:	2nd & 3rd West
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	[3]	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	NA	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
HW Piping			
3-way valves installed on HW pipe.	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves.	✓	✓	
Replaceable components equipped with unions or flanges.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.	✓	X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
Duct static pressure sensor (VAV) installed and complete.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	AG	✓	
Disconnect is labeled or next to unit within sight.	AG	✓	
Over-current protection is appropriate.	RG	✓	
Convenience outlet within 50' of equipment.	AG	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct/pipe connection Internal fan vibration isolation.
[2] strainer not replacable with location of shutoff valve corrected
[3] Air is leaking out of the supply corner of unit corrected

Contractor Checklist

Unit Type:	**Dedicated Outside Air Units**	Unit No:	**DOAU-3**
Location:		Serves:	1st floor east
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	✓ [1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	NA	
Ductwork			
Associated duct work and insulation is complete.	✓	✓ [1]	
Mechanical dampers installed and accessible.	✓	✓	
HW Piping			
2-way valves installed on HW pipe.	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves.	✓	✓ [2]	
Replaceable components equipped with unions or flanges.	✓	✓	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).		X	
Control Devices			
Smoke detector installed and complete.	✓	X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓	X	
High duct static pressure shutdown switch installed & complete.	✓	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shutoff valve.

Contractor Checklist

Unit Type:	**Dedicated Outside Air Units**	Unit No:	**DOAU-4**
Location:		Serves:	Gym Offices
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	NA	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
HW Piping			
2-way valves installed on HW pipe.	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).	✓	X	
Control Devices			
Smoke detector installed and complete.	✓	X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
Duct static pressure sensor (VAV) installed and complete.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No flexible duct/pipe connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shutoff valve. corrected

Contractor Checklist

Unit Type:	Dedicated Outside Air Units	Unit No:	DOAU-5
Location:		Serves:	2nd & 3rd East
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	[3]	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.	✓	NA	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
HW Piping			
2-way valves installed on HW pipe.	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).	✓	X	
Control Devices			
Smoke detector installed and complete.	✓	X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
Duct static pressure sensor (VAV) installed and complete.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No Flexible pipe/duct connection Internal fan vibration isolation.
[2] Strainer Not replaceable with location of shutoff valve corrected
[3] Unit appears buckled at OA intake section corrected

Contractor Checklist

Unit Type:	Dedicated Outside Air Units	Unit No:	DOAU-6
Location:		Serves:	2nd floor Admin
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	X	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	[1]	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)	✓	✓	
Accessibility and condition of supply/return DC fan motor.	✓	✓	[3]
Condensate pan and drain installed with P-trap and clean out.	✓	NA	
Ductwork			
Associated duct work and insulation is complete.	✓	[1]	
Mechanical dampers installed and accessible.	✓	✓	
HW Piping			
2-way valves installed on HW pipe.	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	[2]	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).	✓	X	
Control Devices			
Smoke detector installed and complete.	✓	X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
Duct static pressure sensor (VAV) installed and complete.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.	RS	✓	
Disconnect is labeled or next to unit within sight.	RS	✓	
Over-current protection is appropriate.	RS	✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No Flexible duct connection Internal fan vibration isolation.
[2] Strainer not replacable with location of shutoff valve corrected

[3] One fan is only accesible via bolted door corrected
[4] NA

Contractor Checklist

Unit Type:	**Dedicated Outside Air Units**	Unit No:	**DOAU-1**
Location:	CTE	Serves:	CTE
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage and accessible.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Flexible connections on duct, pipe and conduit		✓	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)		X	
Accessibility and condition of supply/return DC fan motor.		X	
Condensate pan and drain installed with P-trap and clean out.		X	
Ductwork			
Associated duct work and insulation is complete.		X	
Mechanical dampers installed and accessible.		X	
Gas Piping			
Gas piping is installed including drip leg with cap.		X	
Gas piping is labeled: (black letters on yellow) per spec 23 05 53.		X	
Flue gas vent and combustion air ducts are installed.		X	
Condensate neutralization tank installed.		X	
Condensate pipe including trap route to the nearest drain.		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.	✓	X	
Heat wheel control	✓	X	
Filter DP sensors (Supply and exhaust)	✓	X	
Supply, return, heat wheel exhaust & mixed air sensors installed & in proper location.	✓	X	
Duct static pressure sensor (VAV) installed and complete.	✓	X	
High duct static pressure shutdown switch installed & complete. (Supply & Exhaust)	✓	X	
Fan status DP switch or CT installed and complete.	✓	X	
Control wiring and devices are installed and labeled.	✓	X	
Accessibility and condition of heat exchanger or wheel.	✓	X	
HX freeze protection device and controller installed	✓	X	
Coil freeze-stat installed and complete.	✓	X	
Electrical			
Supply power is installed and disconnect is accessible.		X	
Disconnect is labeled or next to unit within sight.		X	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

H3/V3 Series Startup Form

Job Name: Stanwood H.S. Date: 9-21-20(ish)

Address:

Model Number: V3-ELB-3-0-0000-12P

Serial Number: 201911-CJWE03907 Tag: DOAU-1

Startup Contractor: J.B.

Address: Phone:

Pre Startup Checklist

Installing contractor should verify the following items.		
1. Is there any visible shipping damage?	Yes ☐	No ☐
2. Is the unit level?	Yes ☑	No ☐
3. Are the unit clearances adequate for service and operation?	Yes ☑	No ☐
4. Do all access doors open freely and are the handles operational?	Yes ☑	No ☐
5. Have all shipping braces been removed?	Yes ☑	No ☐
6. Have all electrical connections been tested for tightness?	Yes ☑	No ☐
7. Does the electrical service correspond to the unit nameplate?	Yes ☑	No ☐
8. On 208/230V units, has transformer tap been checked? N/A	Yes ☐	No ☐
9. Has overcurrent protection been installed to match the unit nameplate requirement?	Yes ☑	No ☐
10. Have all set screws on the fans been tightened?	Yes ☑	No ☐
11. Do all fans rotate freely?	Yes ☑	No ☐
12. Is all copper tubing isolated so that it does not rub? N/A	Yes ☐	No ☐
13. Have the damper assemblies been inspected?	Yes ☑	No ☐
14. Are the air filters installed with proper orientation?	Yes ☑	No ☐
15. Have condensate drain and p-trap been connected? N/A	Yes ☐	No ☐

Ambient Temperature

Ambient Dry Bulb Temperature _____°F Ambient Wet Bulb Temperature _____°F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 8.3

Number	hp	L1	L2	L3
1	7.2	3.3	3.6	3.4
2	7.2	2.3	2.6	2.5

Band Size _____ VAV Controls _____

VFD Frequency Variable Potentiometer

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Unit Configuration

Water-Cooled Condenser ☐	Air-Cooled Condenser ☐
No Water Leaks ☐	
Condenser Safety Check ☐	
Water Flow _____GPM Water Inlet Temperature _____°F Water Outlet Temperature _____°F	

Mixing Box Dampers

Operation Check ☑	Damper Wiring Check ☑	Gears Check ☑
Damper Actuator Type: modulating		
Economizer Changeover Type and Operations: _____		

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	Yes ☑	No ☐
2. Has the entire system been filled with fluid?	Yes ☑	No ☐
3. Has air been bled from the heat exchangers and piping?	Yes ☑	No ☐
4. Is the glycol the proper type and concentration (N/A if water)? N/A	Yes ☐	No ☐
5. Is there a minimum load of 50% of the design load?	Yes ☑	No ☐
6. Has the water piping been insulated?	Yes ☑	No ☐
7. What is the freeze point of the glycol (N/A if water)? N/A		

Exhaust Fan

Alignment ☐		Check Rotation ☐		Nameplate Amps 8.3
Number	hp	L1	L2	L3
1	7.2	5.6	6.0	5.7
2	7.2	5.4	5.8	5.5
3				
4				
5				
6				

Electric Heating

Stages_____		Limit Lockout ☐		Aux. Limit Lockout ☐
Stage	Amps		Stage	Amps
1			5	
2			6	
3			7	
4			8	

Comments:

Heat wheel 1.3A

HP	L1	L2	L3
.25	1.3	1.3	1.3

MAIN BLDG

M3 Series Startup Form

Job Name: Stanwood H.S. Date: 9/23/20

Address:

Model Number: M30045092X0893BA0000

Serial Number: 202002-BRDA00232 Tag: DOAV-2 REV1

Startup Contractor: S.B.

Address: Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐Yes ☑No
2. Is the unit level?	☑Yes ☐No
3. Are the unit clearances adequate for service and operation?	☑Yes ☐No
4. Do all access doors open freely and are the handles operational?	☑Yes ☐No
5. Have all shipping braces been removed?	☑Yes ☐No
6. Have all electrical connections been tested for tightness?	☑Yes ☐No
7. Does the electrical service correspond to the unit nameplate?	☑Yes ☐No
8. On 208/230V units, has transformer tap been checked? N/A	☐Yes ☐No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑Yes ☐No
10. Have all set screws on the fans been tightened?	☑Yes ☐No
11. Do all fans rotate freely?	☑Yes ☐No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑Yes ☐No
13. Is all copper tubing isolated so that it does not rub? N/A	☐Yes ☐No
14. Have the damper assemblies been inspected?	☑Yes ☐No
15. Are air filters installed with proper orientation?	☑Yes ☐No
16. Have condensate drain and p-trap been connected? N/A	☐Yes ☐No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F / Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 21

Number	hp	L1	L2	L3
1	15	18.7	18.5	18.7
2	15	18.5	18.4	18.5
3				
4				

Band Size _____ VAV Controls _____

VFD Frequency 57 Springs Operating Correctly ☐

Energy Recovery Wheel Assembly

Wheels Spin Freely ☑ Check Rotation ☑ FLA 1.2

Number	hp	L1	L2	L3
1	.25	1.2	1.2	1.2
2	.25	1.2	1.2	1.2

Power Exhaust Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps 21

Number	hp	L1	L2	L3
1	15	18.5	18.6	18.5
2	15	18.1	17.8	18.1

Band Size _____

VFD Frequency 48 Springs Operating Correctly ☐

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Outside Air/Economizer Dampers * by others

OA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
RA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
EA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

Electric Heating

Stages _____ Limit Lockout ☐ Aux. Limit Lockout ☐ Door Interlock ☐

Stage	Amps	Stage	Amps
1		7	
2		8	
3		9	
4		10	
5		11	
6		12	

M2 Series Startup Form

MAIN BLDG

Job Name: Stanwood ~~Camano~~ H.S. Date: 09/15/20

Address:

Model Number: M2H022L3ABOCO

Serial Number: 202001-CGDF03409 Tag: DOAU-3

Startup Contractor: J.B.

Address: Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked?	☑ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☐ Yes ☑ No
16. Have condensate drain and p-trap been connected?	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated? N/A	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature N/A °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 27

Number	hp	L1	L2	L3
1	20	17.3	17.3	17.2
2				

Band Size _____ VAV Controls _____

VFD Frequency 46 Springs Operating Correctly ☑

Energy Recovery Wheel Assembly

Wheels Spin Freely ☑ Check Rotation ☑ FLA 1.1

Number	hp	L1	L2	L3
1	.25	1.1	1.2	1.2
2				

Power Exhaust Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 27

Number	hp	L1	L2	L3
1	20	15	15.1	14.9
2				

Band Size _____

VFD Frequency 43 Springs Operating Correctly ☑

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

N/A

Outside Air/Economizer Dampers

OA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
RA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
EA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

Unit Configuration

Water-Cooled Condenser ☐ Air-Cooled Condenser ☐

No Water Leaks ☐ Condenser Safety Check ☐

Water Flow _____ gpm

Water Inlet Temperature _____ °F Water Outlet Temperature _____ °F

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser

Alignment ☐		Check Rotation ☐		Nameplate Amps_____
Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)? N/A	☐ Yes ☐ No
5. Is there a minimum load of 50% of the design load? N/	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____		Limit Lockout ☐	Aux. Limit Lockout ☐
Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	

Electric Preheating

Limit Lockout ☐		Aux. Limit Lockout ☐	
Outside Air Temperature Setpoint_____ °F			
Preheat Leaving Air Temperature Setpoint_____ °F			
Stage	Amps	Stage	Amps
1		3	
2		4	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐Yes ☐No
2. Is there adequate combustion air?	☐Yes ☐No
3. Have condensate drain lines been installed if needed?	☐Yes ☐No
4. Has air been purged from the lines?	☐Yes ☐No
5. Has pilot spark been verified?	☐Yes ☐No

Staged Gas Heat

Type of Gas	Natural Gas ☐		Propane ☐
Stage	Manifold Pressure ("w.c.)	Stage	Manifold Pressure ("w.c.)
1		3	
2		4	

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

M2 Series Startup Form

MAIN BLDG

Job Name: Stanwood H.S. Date: 9-22-20

Address:

Model Number: M2H026R3ABACO

Serial Number: 201908-CGDG03399 Tag: DOAU-4

Startup Contractor: J.B.

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked? N/A	☐ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected? N/A	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated? N/A	☐ Yes ☐ No

Ambient Temperature N/A

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 21

Number	hp	L1	L2	L3
1	15	9.2	9.0	9.1
2				

Band Size _____ VAV Controls _____

VFD Frequency 58 Springs Operating Correctly ☑

Energy Recovery Wheel Assembly

Wheels Spin Freely ☑ Check Rotation ☑ FLA 1.3

Number	hp	L1	L2	L3
1	.33	1.2	1.2	1.1
2				

Power Exhaust Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 21

Number	hp	L1	L2	L3
1	15	7.9	7.9	7.9
2				

Band Size _____

VFD Frequency 48 Springs Operating Correctly ☑

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Outside Air/Economizer Dampers * by others

OA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
RA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐
EA Operation Check ☐	Damper Wiring Check ☐	Gears Check ☐

Damper Actuator Type: _____

Economizer Changeover Type and Operation: _____

Unit Configuration

Water-Cooled Condenser ☐	Air-Cooled Condenser ☐
No Water Leaks ☐	Condenser Safety Check ☐
Water Flow _____ gpm	
Water Inlet Temperature _____ °F	Water Outlet Temperature _____ °F

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Electric Preheating

Limit Lockout ☐		Aux. Limit Lockout ☐
Outside Air Temperature Setpoint_____°F		
Preheat Leaving Air Temperature Setpoint_____°F		

Stage	Amps	Stage	Amps
1		3	
2		4	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐Yes ☐No
2. Is there adequate combustion air?	☐Yes ☐No
3. Have condensate drain lines been installed if needed?	☐Yes ☐No
4. Has air been purged from the lines?	☐Yes ☐No
5. Has pilot spark been verified?	☐Yes ☐No

Staged Gas Heat

Type of Gas	Natural Gas ☐		Propane ☐
Stage	Manifold Pressure ("w.c.)	Stage	Manifold Pressure ("w.c.)
1		3	
2		4	

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

M2 Series Startup Form

MAIN BLDG

Job Name: Stanwood #5 Date: 9/17/20

Address:

Model Number: M2H022L3ABACO

Serial Number: 201909-G6DF03400 Tag: DOAU-5

Startup Contractor: Johnson Barrow

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked? NA	☐ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected?	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? NA	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated?	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 21A

Number	hp	L1	L2	L3
1	15hp	19.7	19.6	19.5
2				

Band Size — VAV Controls — by others

VFD Frequency 55 Springs Operating Correctly ☑

Energy Recovery Wheel Assembly

Wheels Spin Freely ☑ Check Rotation ☑ FLA 1.1A

Number	hp	L1	L2	L3
1	1/4	1.1	1.0	1.1
2				

Power Exhaust Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 21A

Number	hp	L1	L2	L3
1	15A	9.1	9.2	9.3
2				

Band Size _____

VFD Frequency 42Hz Springs Operating Correctly ☐

Power Return Fan Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps _____

Number	hp	L1	L2	L3
1				
2				

Band Size _____

VFD Frequency _____ Springs Operating Correctly ☐

Outside Air/Economizer Dampers By others

OA Operation Check ☑	Damper Wiring Check ☐	Gears Check ☑
RA Operation Check ☑	Damper Wiring Check ☐	Gears Check ☑
EA Operation Check ☑	Damper Wiring Check ☐	Gears Check ☑

Damper Actuator Type: others

Economizer Changeover Type and Operation: By others

Unit Configuration

Water-Cooled Condenser ☐	Air-Cooled Condenser ☐
No Water Leaks ☐	Condenser Safety Check ☐
Water Flow _____ gpm	
Water Inlet Temperature _____ °F	Water Outlet Temperature _____ °F

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
				N/A	N/A
Discharge				N/A	
Suction					N/A
Liquid					

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
				N/A	N/A
Discharge				N/A	
Suction					N/A
Liquid					

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Electric Preheating

Limit Lockout ☐		Aux. Limit Lockout ☐	
Outside Air Temperature Setpoint_____°F			
Preheat Leaving Air Temperature Setpoint_____°F			
Stage	Amps	Stage	Amps
1		3	
2		4	

Gas Heating

1. Have all gas lines & connections been checked for leaks?	☐Yes ☐No
2. Is there adequate combustion air?	☐Yes ☐No
3. Have condensate drain lines been installed if needed?	☐Yes ☐No
4. Has air been purged from the lines?	☐Yes ☐No
5. Has pilot spark been verified?	☐Yes ☐No

Staged Gas Heat

Type of Gas	Natural Gas ☐		Propane ☐
Stage	Manifold Pressure ("w.c.)	Stage	Manifold Pressure ("w.c.)
1		3	
2		4	

Modulating Gas Heat

Type of Gas		Natural Gas (5:1) ☐	Propane (3:1) ☐
Analog Input	VDC	Low Fire @ 0 VDC	High Fire @ 10 VDC
Gas Pressure @ Train Inlet	"w.c.		
Gas Pressure @ Burner Manifold	"w.c.		
CO2 in Flue Gas %	%		
CO2 in Flue Gas ppm	ppm		
Flue Gas Temp @ Discharge	°F		
Temperature Rise	°F		

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper startup, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

Entry Date	Action Taken	Name/Tel.
9/17/2020	Factory Startup	BK JB

V3 Series Startup Form

MAIN BLDG

Job Name: Stanwood H.S. Date: 9/22/20

Address:

Model Number: V3-BLB-3-0-0000-12H

Serial Number: 201908-CJWB03823 Tag: DOAV-6

Startup Contractor: J.B.

Address:

Phone:

Pre Startup Checklist

Installing contractor should verify the following items.	
1. Is there any visible shipping damage?	☐ Yes ☑ No
2. Is the unit level?	☑ Yes ☐ No
3. Are the unit clearances adequate for service and operation?	☑ Yes ☐ No
4. Do all access doors open freely and are the handles operational?	☑ Yes ☐ No
5. Have all shipping braces been removed?	☑ Yes ☐ No
6. Have all electrical connections been tested for tightness?	☑ Yes ☐ No
7. Does the electrical service correspond to the unit nameplate?	☑ Yes ☐ No
8. On 208/230V units, has transformer tap been checked? N/A	☐ Yes ☐ No
9. Has overcurrent protection been installed to match the unit nameplate requirement?	☑ Yes ☐ No
10. Have all set screws on the fans been tightened?	☑ Yes ☐ No
11. Do all fans rotate freely?	☑ Yes ☐ No
12. Does the field water piping to the unit appear to be correct per design parameters?	☑ Yes ☐ No
13. Is all copper tubing isolated so that it does not rub?	☑ Yes ☐ No
14. Have the damper assemblies been inspected?	☑ Yes ☐ No
15. Are air filters installed with proper orientation?	☑ Yes ☐ No
16. Have condensate drain and p-trap been connected? N/A	☐ Yes ☐ No
17. Is the TXV sensing bulb in the correct location? N/A	☐ Yes ☐ No
18. Does the TXV sensing bulb have proper thermal contact and is properly insulated? N/A	☐ Yes ☐ No

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 2.6

Number	hp	L1	L2	L3
1	2.3	1.8	1.9	1.8
2				

VFD Frequency Rheostat 100% VAV Controls _____

Power Exhaust Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 2.6

Number	hp	L1	L2	L3
1	2.3	1.1	1.2	1.1
2				

VFD Frequency 100 VAV Controls _____

Energy Recovery Wheel Assembly

Wheels Spin Freely ☑ Check Rotation ☑ FLA .3

Number	hp	L1	L2	L3
1	1/6	0.2	0.2	
2				

Dampers

OA Operation Check ☑ Damper Wiring Check ☑ Gears Check ☑

RA Operation Check ☑ Damper Wiring Check ☑ Gears Check ☑

EA Operation Check ☑ Damper Wiring Check ☑ Gears Check ☑

Damper Actuator Type: Gaon / Belimo

Economizer Changeover Type and Operation: Modulating

Refrigeration System 1 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Cooling Mode

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Compressors/DX Cooling

Check Rotation ☐

Number	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Air-Cooled Condenser Fans

Alignment ☐		Check Rotation ☐		Nameplate Amps_____
Number	hp	L1	L2	L3
1				
2				
3				
4				

Refrigeration System 1 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 - Heating Mode (Heat Pump Only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	☑ Yes ☐ No
2. Has the entire system been filled with fluid?	☑ Yes ☐ No
3. Has air been bled from the heat exchangers and piping?	☑ Yes ☐ No
4. Is the glycol the proper type and concentration (N/A if water)?	☑ Yes ☐ No
5. Is there a minimum load of 50% of the design load?	☑ Yes ☐ No
6. Has the water piping been insulated?	☑ Yes ☐ No
7. What is the freeze point of the glycol (N/A if water)? _____	

Electric Heating

Stages_____ Limit Lockout ☐ Aux. Limit Lockout ☐

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Gas Heating

Natural Gas ☐ Propane ☐ Purge Air from Lines ☐ Verify Pilot Spark ☐

Stage	Manifold Pressure ("wc)	Stage	Manifold Pressure ("wc)
1		3	
2		4	

Contractor Checklist

Unit Type:	Furnace	Unit No:	F-1
Location:		Serves:	CTE
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage and accessible.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Flexible connections on duct, pipe and conduit		✓	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)		✓	[1]
Accessibility and condition of supply/return DC fan motor.		✓	
Condensate pan and drain installed with P-trap and clean out.		✓	
Ductwork			
Associated duct work and insulation is complete.		✓	
Mechanical dampers installed and accessible.		✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	X	[2]
Gas piping is labeled: black letters on yellow per spec 23 05 53.		✓	
Control Devices			
Damper and valve actuators installed and accessible.		✓	
Supply, return & mixed air sensors installed & in proper location.		✓	
Fan status DP switch or CT installed and complete.		✓	
Control wiring and devices are installed and labeled.		✓	
Accessibility and condition of heat exchanger or wheel.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled or next to unit within sight.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No pre-filter MERV 8 Pre-filter added
[2] Could not locate drip leg corrected

Contractor Checklist

Unit Type:	Furnace	Unit No:	F-2
Location:		Serves:	CTE
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage and accessible.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Flexible connections on duct, pipe and conduit		✓	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)		✓	← [1]
Accessibility and condition of supply/return DC fan motor.		✓	
Condensate pan and drain installed with P-trap and clean out.		✓	
Ductwork			
Associated duct work and insulation is complete.		✓	
Mechanical dampers installed and accessible.		✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	X	[2]
Gas piping is labeled: black letters on yellow per spec 23 05 53.		✓	
Control Devices			
Damper and valve actuators installed and accessible.		✓	
Supply, return & mixed air sensors installed & in proper location.		✓	
Fan status DP switch or CT installed and complete.		✓	
Control wiring and devices are installed and labeled.		✓	
Accessibility and condition of heat exchanger or wheel.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled or next to unit within sight.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Furnace**	Unit No:	**F-3**
Location:		Serves:	CTE
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage and accessible.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Flexible connections on duct, pipe and conduit		✓	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)		✓	[1]
Accessibility and condition of supply/return DC fan motor.		✓	
Condensate pan and drain installed with P-trap and clean out.		✓	
Ductwork			
Associated duct work and insulation is complete.		✓	
Mechanical dampers installed and accessible.		✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	✓	[2]
Gas piping is labeled: black letters on yellow per spec 23 05 53.		✓	
Control Devices			
Damper and valve actuators installed and accessible.		✓	
Supply, return & mixed air sensors installed & in proper location.		✓	
Fan status DP switch or CT installed and complete.		✓	
Control wiring and devices are installed and labeled.		✓	
Accessibility and condition of heat exchanger or wheel.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled or next to unit within sight.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Furnace**	Unit No:	**F-4**
Location:		Serves:	CTE
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage and accessible.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Flexible connections on duct, pipe and conduit		✓	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)		✓	[1]
Accessibility and condition of supply/return DC fan motor.		✓	
Condensate pan and drain installed with P-trap and clean out.		✓	
Ductwork			
Associated duct work and insulation is complete.		✓	
Mechanical dampers installed and accessible.		✓	
Piping			
Gas piping is installed including drip leg with cap.	✓	X	[2]
Gas piping is labeled: black letters on yellow per spec 23 05 53.		✓	
Control Devices			
Damper and valve actuators installed and accessible.		✓	
Supply, return & mixed air sensors installed & in proper location.		✓	
Fan status DP switch or CT installed and complete.		✓	
Control wiring and devices are installed and labeled.		✓	
Accessibility and condition of heat exchanger or wheel.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled or next to unit within sight.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Heat Recovery Unit**	Unit No:	**HRU-1**
Location:	Fieldhouse	Serves:	Fieldhouse
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage and accessible.		X	
Unit is labeled per project documents.		X	
Mounting is appropriate with vibration isolation as specified.		X	
Flexible connections on duct, pipe and conduit		X	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)		X	
Accessibility and condition of supply/return DC fan motor.		X	
Condensate pan and drain installed with P-trap and clean out.		X	
Ductwork			
Associated duct work and insulation is complete.		X	
Mechanical dampers installed and accessible.		X	
Control Devices			
Smoke detector installed and complete.		X	
Damper and valve actuators installed and accessible.		X	
Supply, return & mixed air sensors installed & in proper location.		X	
Duct static pressure sensor (VAV) installed and complete.		X	
High duct static pressure shutdown switch installed & complete.		X	
Fan status DP switch or CT installed and complete.		X	
Control wiring and devices are installed and labeled.		X	
Accessibility and condition of heat exchanger or wheel.		X	
HX freeze protection device and controller installed		X	
Electrical			
Supply power is installed and disconnect is accessible.	RB	X	
Disconnect is labeled or next to unit within sight.	RB	X	
Over-current protection is appropriate.	RB	X	
Convenience outlet within 50' of equipment.	RB	X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

RN Series Startup Form

Date: 11/5/19
Job Name: Shanwood HS
Address:

Model Number: RN-009-8-0-0000-12A
Serial Number: 201910-ANEQ19318
Tag: HRU-1
Startup Contractor: Johnson Barrow
Address: 2203 23rd Ave. S.
Seattle, W.A. 98144
Phone:

Pre Startup Checklist Installing contractor should verify the following items.		
1. Is there any visible shipping damage?	Yes ☐	No ☑
2. Is the unit level?	Yes ☑	No ☐
3. Are the unit clearances adequate for service and operation?	Yes ☑	No ☐
4. Do all access doors open freely and are the handles operational?	Yes ☑	No ☐
5. Have all electrical connections been tested for tightness?	Yes ☑	No ☐
6. Does the electrical service correspond to the unit nameplate?	Yes ☑	No ☐
7. On 208/230V units, has transformer tap been checked?	Yes ☑	No ☐
8. Has overcurrent protection been installed to match the unit nameplate requirement?	Yes ☑	No ☐
9. Have all set screws on the fans been tightened?	Yes ☑	No ☐
10. Do all fans rotate freely?	Yes ☑	No ☐
11. Is all copper tubing isolated so that it does not rub? N/A	Yes ☐	No ☐
12. Has outside air rain hood been opened?	Yes ☑	No ☐
13. Have the damper assemblies been inspected?	Yes ☑	No ☐
14. Are the air filters installed with proper orientation?	Yes ☑	No ☐
15. Have condensate drain and p-trap been connected? N/A	Yes ☐	No ☐

Supply Fan Assembly

Alignment ☑ Check Rotation ☑ Nameplate Amps 10.6 A

Number	hp	L1	L2	L3
1		7.6	7.7	7.8
2				

Band Size
VAV Controls
VFD Frequency 43 Hz

4 ea. 20 x 25 x 2
2 ea. 16 x 20 x 2
122
4 ea. 12 x 20 x 2

Energy Recovery Wheel Assembly

Wheel(s) Spin Freely ☐ Check Rotation ☐ FLA 0.64

Number	hp	L1	L2	L3
1		0.3	0.3	
2				

Power Return/Exhaust Assembly

Alignment ☐ Check Rotation ☐ Nameplate Amps 7.5A 5/Hz

Number	hp	L1	L2	L3
1		5.7	5.6	5.8
2				

Outside Air/Economizer Dampers

Operation Check ☐

Damper Actuator Type: Belimo added

Economizer Changeover Type and Operations: Modulating w/ Bypass damper

Damper Wiring Check ☐

Gears Check ☐

Ambient Temperature

Ambient Dry Bulb Temperature _____ °F Ambient Wet Bulb Temperature _____ °F

Unit Configuration

Water-Cooled Condenser ☐ Air-Cooled Condenser ☐

No Water Leaks ☐

Condenser Safety Check ☐

Water Flow _____ GPM

Water Inlet Temperature _____ °F

Water Outlet Temperature _____ °F

Compressors / DX Cooling

Number/stage	L1	L2	L3	Head Pressure PSIG	Suction Pressure PSIG	Crankcase Heater Amps
1						
2						
3						
4						

Refrigeration System 1 – Cooling Mode					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 – Cooling Mode					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 – Cooling Mode					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 – Cooling Mode					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 1 – Heating Mode (Heat Pump only)					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 2 – Heating Mode (Heat Pump only)					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 3 – Heating Mode (Heat Pump only)					
	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Refrigeration System 4 – Heating Mode (Heat Pump only)

	Pressure	Saturated Temperature	Line Temperature	Sub-cooling	Superheat
Discharge				N/A	N/A
Suction				N/A	
Liquid					N/A

Air-Cooled Condenser

Alignment ☐ Check Rotation ☐ Nameplate Amps_____

Number	hp	L1	L2	L3
1				
2				
3				
4				
5				
6				

Water/Glycol System

1. Has the entire system been flushed and pressure checked?	Yes ☐	No ☐
2. Has the entire system been filled with fluid?	Yes ☐	No ☐
3. Has air been bled from the heat exchangers and piping?	Yes ☐	No ☐
4. Is the glycol the proper type and concentration (N/A if water)?	Yes ☐	No ☐
5. Is there a minimum load of 50% of the design load?	Yes ☐	No ☐
6. Has the water piping been insulated?	Yes ☐	No ☐
7. What is the freeze point of the glycol (N/A if water)?		

Gas Heating

Natural Gas ☐ Propane ☐ Purge Air from Lines ☐ Verify Pilot Spark ☐

Stage	Manifold Pressure (w.c.)	Stage	Manifold Pressure (w.c.)
1		3	
2		4	

Electric Heating

Stages ~~2~~ 1

Limit Lockout ☑ Aux. Limit Lockout ☑

Stage	Amps	Stage	Amps
1	43.2 A	5	
2		6	
3		7	
4		8	

10 VDC signal

Electric Preheating	
Limit Lockout ☐	Aux. Limit Lockout ☐
Outside Air Temperature Setpoint ______ °F	
Preheat Leaving Air Temperature Setpoint ______ °F	

Stage	Amps	Stage	Amps
1		5	
2		6	
3		7	
4		8	

Maintenance Log

This log must be kept with the unit. It is the responsibility of the owner and/or maintenance/service contractor to document any service, repair or adjustments. AAON Service and Warranty Departments are available to advise and provide phone help for proper operation and replacement parts. The responsibility for proper start-up, maintenance and servicing of the equipment falls to the owner and qualified licensed technician.

Entry Date	Action Taken	Name/Tel.
11/5/19	Factory Startup	JB

Contractor Checklist

Unit Type:	**Fan Coil Units**	Unit No:	**FCU-**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.	✓	✓	
Unit is clean and has no visible physical damage and accessible.	✓	✓	
Unit is labeled per project documents.	✓	✓	
Mounting is appropriate with vibration isolation as specified.	✓	✓	
Flexible connections on duct, pipe and conduit	✓	✓	
Accessibility and condition of air filters. (pre MERV 8, final MERV 13)			
Accessibility and condition of supply/return DC fan motor.	✓	✓	
Condensate pan and drain installed with P-trap and clean out.			
Ductwork			
Associated duct work and insulation is complete.		✓	N/A
Mechanical dampers installed and accessible.		✓	N/A
Hydronic Piping			
Control valves installed (2-way, 3-way)	✓	✓	
Associated piping is complete with drain valves on all coils.	✓	✓	
Replaceable components equipped with shut-off valves and unions.	✓	✓	
Proper location and access for all piping strainers.	✓	✓	
Pipe insulation is complete with labels (white letters on green).	✓	✓	
Control Devices			
Damper and valve actuators installed and accessible.		✓	
Supply, return & mixed air sensors installed & in proper location.		✓	
Fan status DP switch or CT installed and complete.		✓	
Control wiring and devices are installed.		✓	
Control wiring and devices are labeled per project documents.		✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Disconnect is labeled or next to unit within sight.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	
Room Served			
Diffuser locations are appropriate.		✓	
Location of room sensor is appropriate.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	Fan Coil Units	Unit No:	Summary

FCU -	Location / Serves RM #	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
101	170	X		X		
102	169	X		X		
103	168	X		X		
104	167	X		X		
105	166	X		X		
106	164	X		X		
107	164	X		X		
108	181	X		X		
109	181	X		X	3-way	
110	175	X		X	3-way	
111	180	X		X		
112	179	X		X		
113	179	X		X		
114	178	X		X		
115	178	X		X		
116	177	X		X		
117	177	X		X		
118	175	X		X		
119	174	X		X		
120	174	X		X		
121	165	X		X		
122	165	X		X		
123	165 A	X		X		
124	163 A	X		X		
125	163	X		X		
126	163	X		X		
127	154	X		X		
128	154	X		X		
129	151	✓		✓		
130	150	✓		✓		
131	146	✓		✓		
132	148	✓		✓		
133	149	✓		✓		
134	147	✓		✓	3-way	
135	145	X		X		
136	145	X		X		
137	145 A	X		X		
138	137	X		X		
139	140	X		X		
140	141	X		X		
141	142	X		X	3-way	
142	157	X		X		
143	133	X		X		
144	123	X		X		

Contractor Checklist

FCU -	Location / Serves RM#	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
145	119	X		X	3-way	
146	119	X		X		
147	102	X		X	3-way	
148	101	X		X		
149	103	✓		✓		
150	103	✓		✓		
151	103 D					
152	103 A	✓		✓		
153	103 B	✓		✓		
154	118	X		X		
155	117	X		X		
156	114 B	X		X		
157	114	X		X		
158	114 A	X		X		
159	113	X		X	3-way	
160	113 A	X		X		
161	105 A	X		X		
162	105	X		X		
163	108 A	X		X		
164	108	X		X		
165	106	X		X		
166	106 A	X		X		
167	107	X		X		
168	107	X		X		
169	131 A	X		X		
101		X		X		
102		X		X		
103		X		X		
104		X		X		
105		X		X		
106		X		X		
107		X		X		
108		X		X		
109		X		X		
110		X		X		
111		X		X		
112		X		X		
113		X		X		
114		X		X		
115		X		X		
116		X		X		
117		X		X		
118		X		X		
119		X		X		
120		X		X		
121		X		X		

Contractor Checklist

FCU -	Location / Serves	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
122		X		X		
123		X		X		
124		X		X		
125		X		X		
126		X		X		
127		X		X		
128		X		X		
129		X		X		
130		X		X		
131		X		X		
132		X		X		
133		X		X		
134		X		X		
135		X		X		
136		X		X		
137		X		X		
138		X		X		
139		X		X		
140		X		X		
141		X		X		
142		X		X		
143		X		X		
144		X		X		
145		X		X		
146		X		X		
147		X		X		
148		X		X		
149		X		X		
150		X		X		
151		X		X		
152		X		X		
153		X		X		
154		X		X		
155		X		X		
156		X		X		
157		X		X		
158		X		X		
159		X		X		
160		X		X		
161		X		X		
162		X		X		
163		X		X		
164		X		X		
165		X		X		
166		X		X		
167		X		X		

Contractor Checklist

FCU -	Location / Serves Rm #	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
168		X		X	3-way	
169		X		X		
201	277	X		X	3-way	
202	277	X		X		
203	266	X		X		
204	266	X		X		
205	266 B	X		X		
206	266 A	X		X		
207	262	X		X		
208	262	X		X		
209	262 A	X		X		
210	258	X		X		
211	258	X		X		
212	254 B	X		X		
213	254 A	X		X		
214	254	X		X		
215	254	X		X		
216	281	X		X		
217	281	X		X	3-way	
218	270	X		X		
219	265	X		X		
220	265	X		X		
221	264 A	X		X		
222	264	X		X		
223	264	X		X		
224	263	X		X		
225	261	X		X		
226	261	X		X		
227	261 A	X		X		
228	257	X		X		
229	257	X		X		
230	256	X		X		
231	253	X		X		
232	253	X		X		
233	252	X		X		
234	251	X		X		
235	251	X		X		
236	241 A	X		X		
237	241	X		X		
238	241	X		X		
239	231 A	X		X	3-way	
240	240 A	X		X	3-way	
241	240	X		X		
242	240 B	X		X		
243	232	X		X		
244	233	X		X		

Contractor Checklist

FCU -	Location / Serves RM:#	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
245	234	X		X		
246	235	X		X		
247	236	X		X		
248	238	X		X		
249	237	X		X		
250	226A	X		X	3-way	
251	228	X		X		
252	226	X		X		
253	224	X		X		
254	222	X		X		
255	218	X		X		
256	227	X		X	3-way	
257	225	X		X		
258	223	X		X		
259	221	X		X		
260	220	X		X		
261	207	✓		✓		
262	207	✓		✓		
263	206	✓		✓		
264	206	✓		✓		
265	205	✓		✓		
266	205	✓		✓		
267	205A	X		X		
268	203	X		X		
269	204	✓		✓	3-way	
270	216	✓		✓		
271	211	✓		✓		
272	211	✓		✓		
273	250A	X		X		
274	245	X		X		
275	230A	X		X	3-way	
276	230B	X		X		
277	242	X		X		
301	345	X		X		
302	345	X		X		
303	343	X		X		
304	343	X		X		
305	341	X		X		
306	341	X		X		
307	339	X		X		
308	339	X		X		
309	337	X		X		
310	337	X		X		
311	335	X		X		
312	335	X		X		
313	331	X		X		

Contractor Checklist

FCU -	Location / Serves RM #	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
314	331	X		X		
315	329	X		X		
316	329	X		X		
317	327	X		X		
318	327	X		X		
319	325	X		X		
320	325	X		X		
321	349	X		X		
322	349	X		X	3-way	
323	348	X		X		
324	344	X		X		
325	344	X		X		
326	342	X		X		
327	342	X		X		
328	340	X		X		
329	340	X		X		
330	321 B	X		X		
331	336	X		X		
332	336	X		X		
333	333 A	X		X		
334	330	X		X		
335	330	X		X		
336	328	X		X		
337	328	X		X		
338	326 A	X		X		
339	326 B	X		X		
340	324	X		X		
341	324	X		X		
342	322	X		X		
343	323	X		X		
344	323	X		X		
345	318	X		X		
346	317	X		X		
347	317	X		X		
348	316	X		X		
349	316	X		X		
350	315	X		X		
351	315	X		X		
352	314	✓		✓		
353	314	✓		✓		
354	313					
355	312	✓		✓		
356	312	✓		✓		
357	311	✓		✓		
358	311	✓		✓		
359	310	X		X		

Contractor Checklist

FCU -	Location / Serves RM#	All Items Checked	RC	CxA	Valve 2-way UNO	Notes
360	310	X		X		
361	309	X		X		
362	309	X		X		
363	301	X		X	3-way	
364	302C	✓		✓		
365	302	✓		✓		
366	302	✓		✓	3-way	
367	302	✓		✓		
368	302	✓		✓		
369	303	X		X		
370	303	X		X		
371	304	X		X		
372	304	X		X		
373	305	X		X		
374	305	X		X		
375	306	X		X		
376	306	X		X		
377	302A	X		X		

Contractor Checklist

Unit Type:	**VAV Terminal Units – Heatless**	Unit No:	**VAVs Checklist**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
VAV inlet size as indicated on the unit nameplate:		X	
Installed size is as submitted.		X	
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per project documents.		✓	
Ductwork			
All ductwork is installed including access to dampers.		✓	
Primary air duct run straight for 3X duct diameter or per manufacturer.		✓	
Primary and supply ductwork is insulated per project requirements.		X	
Control Devices			
Discharge air temperature and velocity sensor is installed.		NA	
Control wiring and devices are installed.		✓	
Control wiring and devices are labeled.		✓	
Electrical			
Convenience outlet within 50' of equipment.		X	
Room Served			
Diffuser locations are appropriate.		✓	
Location of room sensor is appropriate.		NA	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	VAV Terminal Units	Unit No:	DOAU-1 Summary

Unit	Location / Serves	All Items Checked	RC	CxA	Note
VAV-101	3D Art Lab 181	X		X	
VAV-102	SHARED LEARNING 180	X		X	
VAV-103	CLASSROOM 179	X		X	
VAV-104	CLASSROOM 178	X		X	
VAV-105	CLASSROOM 177	X		X	
VAV-106	CULINARY ARTS 174	X		X	
VAV-107	PRACTICE 169, 167, 168 & SCENE SHOP 164	X		X	
VAV-108	BAND 165	X		X	
VAV-109	OFFICE 165A, 163A, CORRIDOR 162	X		X	
VAV-110	CHOIR 163	X		X	
VAV-111	DRAMA 154	X		X	
VAV-112	SPEECH THERAPY 151, PSYCH 150, 149, 146	X		X	
VAV-113	ASSIST LIFE SKILLS 140 & 141	X		X	
AFD-101	3D ART LAB 181 & PROJECT STORAGE 181B	X		X	
AFD-102	PLENUM	X		X	
AFD-103	WOMEN 173, MEN 171, TOILET 172, PANTRY 174B	X		X	
AFD-104	INSTRUMENT STORAGE 165B,	X		X	
AFD-105	TOILET 152/153, STORAGE 144, STORAGE 104A,	X		X	
VAV-101	3D Art Lab 181	X		X	
VAV-102	SHARED LEARNING 180	X		X	
VAV-103	CLASSROOM 179	X		X	
VAV-104	CLASSROOM 178	X		X	
VAV-105	CLASSROOM 177	X		X	
		X		X	
		X		X	

Contractor Checklist

Unit Type:	VAV Terminal Units	Unit No:	DOAU-2 Summary

Unit	Location / Serves	All Items Checked	RC	CxA	Note
VAV-201	CLASSROOM 267	X		X	
VAV-202	FABRICATION LAB 266B	X		X	
VAV-203	ENGINEERING CLASSROOM 266	X		X	
VAV-204	AG SCIENCE LAB 262	X		X	
VAV-205	AQUAPONICS 262A & KENNELS 258A	X		X	
VAV-206	ANIMAL VET SCIENCE LAB 258	X		X	
VAV-207	PREP 254A & HORTICULTURE LAB 254	X		X	
VAV-208	CLASSROOM 271	X		X	
VAV-209	CLASSROOM 265	X		X	
VAV-210	SCIENCE LAB 264 & PREP 264A	X		X	
VAV-211	SCIENCE LAB 261	X		X	
VAV-212	SHARED LEARNING 263	X		X	
VAV-213	PREP 261A & SCIENCE LAB 257	X		X	
VAV-214	PREP 257 & SCIENCE LAB 253	X		X	
VAV-215	SCIENCE LAB 251	X		X	
VAV -301	CLASSROOM 345	X		X	
VAV -302	CLASSROOM 343	X		X	
VAV -303	CLASSROOM 341	X		X	
VAV -304	CLASSROOM 339	X		X	
VAV -305	CLASSROOM 337	X		X	
VAV -306	CLASSROOM 335	X		X	
VAV -307	CLASSROOM 331	X		X	
VAV -308	CLASSROOM 329	X		X	
VAV -309	CLASSROOM 327	X		X	
VAV -310	CLASSROOM 325	X		X	
VAV -311	CLASSROOM 349	X		X	
VAV -312	CLASSROOM 344	X		X	
VAV -313	CLASSROOM 342	X		X	
VAV -314	CLASSROOM 340	X		X	
VAV -315	CLASSROOM 336	X		X	
VAV -316	UNDESIGNATED OFFICE 333A	X		X	
VAV -317	PHOTO JOURNALISM 330	X		X	
VAV -318	MULTI-MEDIA 328	X		X	
VAV -319	CONTROL ROOM 326A & GREEN ROOM 326B	X		X	
VAV -320	PHOTOGRAPH YEARBOOK 324	X		X	
VAV -321	CLASSROOM 323	X		X	
AFD-201	WOMEN 268, MEN 269, FABRICATION LAB 266A	X		X	
AFD-202	AG SCIENCE LAB 262	X		X	
AFD-203	AQUAPONICS 262A, KENNELS 258A,	X		X	
AFD-204	ANIMAL VET SCIENCE LAB 258	X		X	
AFD-205	HORTICULTURE LAB 254	X		X	
AFD-206	SCIENCE LAB 264	X		X	
AFD-207	SCIENCE LAB 261	X		X	

Contractor Checklist

Unit	Location / Serves	All Items Checked	RC	CxA	Note
AFD-208	SCIENCE LAB 257	X		X	
AFD-209	SCIENCE LAB 253	X		X	
AFD-210	SCIENCE LAB 251	X		X	
AFD-211	SCIENCE LAB 241	X		X	
AFD-301	WOMEN 346 & MEN 347	X		X	
AFD-302	CUSTODIAL 333C & STAFF TOILET 332	X		X	
AFD-304	RESTROOMS	X		X	
AFD-304	RESTROOMS	X		X	

Contractor Checklist

Unit Type:	VAV Terminal Units	Unit No:	DOAU-3 Summary

Unit	Location / Serves	All Items Checked	RC	CxA	Note
VAV-114	WRESTLING 120	X		X	
VAV-115	OFFICIALS 118, AV 115, CORRIDOR 111,	X		X	
VAV-116	STAFF 103A, C-STORE 102	X		X	
VAV-117	CUST. 108A, 108, LOCKER 106, 105	X		X	
VAV-118	WEIGHT ROOM 107	X		X	
AFD-108	ATHLETIC STORAGE 117, MENS ATHLETIC 114	X		X	
AFD-109	KITCHEN 103	X		X	
AFD-110	TOILET 103D, CUSTODIAL 103C, DRY STORAGE 103B	X		X	
AFD-111	WOMENS ATHLETC LOCKER ROOM 105,COACH 105A	X		X	
AFD-112	WEIGHT ROOM 107	X		X	
VAV-114	WRESTLING 120	X		X	
VAV-115	OFFICIALS 118, AV 115, CORRIDOR 111,	X		X	
VAV-116	STAFF 103A, C-STORE 102	X		X	
VAV-117	CUST. 108A, 108, LOCKER 106, 105	X		X	
VAV-118	WEIGHT ROOM 107	X		X	
AFD-108	ATHLETIC STORAGE 117, MENS ATHLETIC 114	X		X	
AFD-109	KITCHEN 103	X		X	
AFD-110	TOILET 103D, CUSTODIAL 103C, DRY STORAGE 103B	X		X	
AFD-111	WOMENS ATHLETC LOCKER ROOM 105,COACH 105A	X		X	
AFD-112	WEIGHT ROOM 107	X		X	

Contractor Checklist

Unit Type:	VAV Terminal Units	Unit No:	DOAU-5 Summary

Unit	Location / Serves	All Items Checked	RC	CxA	Note
VAV-216	PREP 241A & SCIENCE LAB 241	X		X	
VAV-219	CLASSROOM 207	X		X	
VAV-220	CLASSROOM 206	X		X	
VAV-221	CLASSROOM 205	X		X	
VAV-222	OFFICE 205A	X		X	
VAV-223	TRAINING ROOM 203	X		X	
VAV-224	CORRIDOR 210 & 220	X		X	
VAV-225	FITNESS CENTER 211	X		X	
VAV-322	ASB 318	X		X	
VAV-323	CLASSROOM 317	X		X	
VAV-324	CLASSROOM 316	X		X	
VAV-325	BUSINESS LAB 315	X		X	
VAV-326	BUSINESS LAB 314	X		X	
VAV-327	CORRIDOR 300 & GROUP ROOM 302C	X		X	
VAV-328	CLASSROOM 312	X		X	
VAV-329	CLASSROOM 311	X		X	
VAV-330	CLASSROOM 310	X		X	
VAV-331	CLASSROOM 309	X		X	
VAV-332	LIBRARY 302	X		X	
VAV-333	STAFF LOUNGE 303	X		X	
VAV-334	CLASSROOM 304	X		X	
VAV-335	CLASSROOM 305	X		X	
VAV-336	CLASSROOM 306	X		X	
VAV-337	OFFICE 302C	✓		✓	
AFD-214	STORAGE 205B, UTILITY 204	X		X	
AFD-106	TABLE STORAGE 133, WOMEN 136, TOILET 134,	X		X	
AFD-107	WOMEN 123, MEN 122, CUSTODIAL 124A	X		X	
AFD-215	WOMEN 214, MEN 212, PE STORAGE 216	✓		✓	
AFD-303	PLENUM	X		X	
AFD-305	TOILET 302B, STAFF LOUNGE 303	X		X	

Contractor Checklist

Unit Type:	VAV Terminal Units	Unit No:	DOAU-6 Summary

Unit	Location / Serves	All Items Checked	RC	CxA	Note
VAV-217	TREATMENT 240A, 240B, 238, RECEPTION 231A	X		X	
VAV-218	HALLWAY 229C, MEETING 227, PRIN. 225, STUD. 223	X		X	
AFD-212	TOILET 239, SHOWER 240C, RECORDS 237	X		X	
AFD-213	TOILET 219	X		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	VAV Terminal Units	Unit No:	DOAU-1 CTE Summary

Unit	Location / Serves	All Items Checked	RC	CxA	Note
VAV-1	CTE Supply VAV box	X		X	
VAV-2		X		X	
VAV-3		X		X	
VAV-4		X		X	
VAV-5		X		X	
EVAV-1	CTE Exhaust VAV	X		X	
EVAV-2		X		X	
EVAV-3		X		X	
EVAV-4		X		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-101**
Location:		Serves:	Kiln
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.	✓	✓	
Speed controller installed and wired.	✓	✓	
Motorized damper actuator installed.	✓	✓	
Associated control devices are installed. (Thermostat)	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-102**
Location:		Serves:	Mech 176 Ventilation
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.	✓	✓	
Speed controller installed and wired.	✓	✓	
Motorized damper actuator installed.	✓	✓	
Associated control devices are installed. (Thermostat)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-103**
Location:		Serves:	Culinary Hoods
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		X	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		X	
Accessibility and condition of exhaust fan motor.		X	
Ductwork			
Associated duct work is complete.		X	
Duct insulation complete.		X	
Motorized damper is installed.		X	
Exhaust grille locations are appropriate.		X	
Control Devices			
Control wiring and devices are installed and labeled.		X	
Speed controller installed and wired.		X	
Motorized damper actuator installed.		X	
Associated control devices are installed.		X	
Equipment interlock complete. (Dishwasher)		X	
Electrical			
Supply power is installed and disconnect is accessible.		X	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	Exhaust Fan	Unit No:	EF-104
Location:		Serves:	Kitchen Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Ductwork			
Associated duct work is complete.		Y	
Duct insulation complete.		Y	
Motorized damper is installed.		Y	
Exhaust grille locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Associated control devices are installed. (including room & hood temperature sensors)		Y	
Equipment interlock complete. (hood)		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/17/20

Notes:

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Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-105**
Location:		Serves:	Kitchen Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Roof curb installed per spec for exhaust fan.		Y	
Grease trap installed.			
Ductwork		Y	
Associated duct work is complete.		Y	
Duct insulation complete.		Y	
Exhaust grille locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Motorized damper actuator installed.		Y	
Associated control devices are installed. (including room & hood temperature sensors)		Y	
Equipment interlock complete. (Hood)		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/17/20

Notes:

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Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-106**
Location:		Serves:	Kitchen Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Roof curb installed per spec for exhaust fan.		Y	
Grease trap installed.			
Ductwork			
Associated duct work is complete.		Y	
Duct insulation complete.		Y	
Motorized damper is installed.		Y	
Exhaust grille locations are appropriate.			
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Motorized damper actuator installed.		Y	
Associated control devices are installed.			
Equipment interlock complete. (Dishwasher)		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/17/20

Notes:

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Contractor Checklist

Unit Type:	Exhaust Fan	Unit No:	EF-107
Location:		Serves:	Drying Room
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.		X	
Grease trap installed.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.	✓	✓	
Speed controller installed and wired.	✓	✓	
Motorized damper actuator installed.	✓	✓	
Associated control devices are installed.(Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-108**
Location:		Serves:	Kitchen Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Roof curb installed per spec for exhaust fan.		Y	
Grease trap installed.		Y	
Ductwork			
Associated duct work is complete.		Y	
Duct insulation complete.		Y	
Motorized damper is installed.		Y	
Exhaust grille locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Motorized damper actuator installed.		Y	
Associated control devices are installed. (including room & hood temperature sensors)		Y	
Equipment interlock complete. (Hood)		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/17/20

Notes:

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Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-109**
Location:		Serves:	Kitchen Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Roof curb installed per spec for exhaust fan.		Y	
Grease trap installed.			
Ductwork		Y	
Associated duct work is complete.		Y	
Duct insulation complete.		Y	
Motorized damper is installed.		Y	
Exhaust grille locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Motorized damper actuator installed.		Y	
Associated control devices are installed. (including room & hood temperature sensors)		Y	
Equipment interlock complete. (Hood)		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/17/21

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Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-110**
Location:		Serves:	Storage Room
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.	✓	✓	
Speed controller installed and wired.	✓	✓	
Motorized damper actuator installed.	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-201**
Location:		Serves:	Lab Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.	✓	✓	
Speed controller installed and wired.	✓	✓	
Motorized damper actuator installed.	✓	✓	
Equipment interlock complete. (Hood)	✓	✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	[1]
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No disconnect switch, RIB has HOA capabilities

Contractor Checklist

Unit Type:	Exhaust Fan	Unit No:	EF-202
Location:		Serves:	Elec room 206
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[1]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Equipment interlock complete.		✓	
Associated control devices are installed. (Thermostat)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No external vibration isolation Internal fan vibration isolation.

Contractor Checklist

Unit Type:	Exhaust Fan	Unit No:	EF-203
Location:		Serves:	Lab Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[2]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Equipment interlock complete. (Hood)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	[1]
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] Cover is removed from disconnect switch corrected
[2] No external vibration isolation Fan has internal vibration isolation

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-204**
Location:		Serves:	Lab Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Equipment interlock complete. (Hood)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-205**
Location:		Serves:	Lab Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[1]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Equipment interlock complete. (Hood)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No ~~data~~ external vibration isolation

Fan has internal vibration isolation

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-206**
Location:		Serves:	Lab Hood
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[i]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Equipment interlock complete. (Hood)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [i] No external vibration isolation Fan has internal vibration isolation

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-207**
Location:		Serves:	Kennels
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[i]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [i] No external vibration isolation Fan has internal vibration isolation

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-208**
Location:		Serves:	Elec. 255 Ventilation
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[1]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Thermostat)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No external vibration isolation Fan has internal vibration isolation

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-209**
Location:		Serves:	Triage, Treatment
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-210**
Location:		Serves:	Mech. 209 Ventilation
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed.(Thermostat)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-211**
Location:		Serves:	Fab Lab
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage.		X	
Unit is labeled per project documents.		X	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		X	
Accessibility and condition of exhaust fan motor.		X	
Roof curb installed per spec for exhaust fan.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Equipment interlock complete. (Laser engraver)		✓	[i]
Motorized damper actuator installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [i] Wall switch

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-212**
Location:		Serves:	Fab Lab
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage.		X	
Unit is labeled per project documents.		X	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		X	
Accessibility and condition of exhaust fan motor.		X	
Roof curb installed per spec for exhaust fan.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Equipment interlock complete. (Laser engraver)		✓	[1]
Motorized damper actuator installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] Wall Switch

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-301**
Location:		Serves:	Elec. 333 Ventilation
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		[1]	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Equipment interlock complete. (Thermostat)		✓	
Motorized damper actuator installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] No external vibration isolation Fan has internal vibration isolation

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-1**
Location:		Serves:	CTE Welding
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] All EF's in CTE have been FPT'd but physical access to them is limited. NA

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-2**
Location:		Serves:	CTE Welding
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-3**
Location:		Serves:	CTE Welding
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.			
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-4**
Location:		Serves:	CTE Welding
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-5**
Location:		Serves:	CTE Welding
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.		X	
Ductwork		✓	
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed. (Switch)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-6**
Location:		Serves:	Mech 408
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Roof curb installed per spec for exhaust fan.		X	
Ductwork			
Associated duct work is complete.		✓	
Duct insulation complete.		✓	
Motorized damper is installed.		✓	
Exhaust grille locations are appropriate.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Motorized damper actuator installed.		✓	
Associated control devices are installed.(Thermostat)		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exhaust Fan**	Unit No:	**EF-1**
Location:		Serves:	Fieldhouse
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Roof curb installed per spec for exhaust fan.		Y	
Ductwork			
Associated duct work is complete.		Y	
Duct insulation complete.		Y	
Motorized damper is installed.		Y	
Exhaust grille locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Motorized damper actuator installed.		Y	
Associated control devices are installed. (Switch)		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	7/20/20

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Dryer Booster Fan**	Unit No:	**BF-101**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Ductwork			
Associated duct work is complete.		Y	
Motorized damper is installed.		Y	
Exhaust discharge locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Equipment interlock complete.		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Dryer Booster Fan**	Unit No:	**BF-102**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Unit is accessible for service.		Y	
Accessibility and condition of exhaust fan motor.		Y	
Ductwork			
Associated duct work is complete.		Y	
Motorized damper is installed.		Y	
Exhaust discharge locations are appropriate.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Speed controller installed and wired.		Y	
Equipment interlock complete.		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Dryer Booster Fan**	Unit No:	**BF-103**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		X	
Unit is clean and has no visible physical damage.		X	
Unit is labeled per project documents.		X	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		X	
Accessibility and condition of exhaust fan motor.		X	
Ductwork			
Associated duct work is complete.		X	
Motorized damper is installed.		X	
Exhaust discharge locations are appropriate.		X	
Control Devices			
Control wiring and devices are installed and labeled.		X	
Speed controller installed and wired.		X	
Equipment interlock complete.		X	
Electrical			
Supply power is installed and disconnect is accessible.	RS	X	
Over-current protection is appropriate.	RS	X	
Convenience outlet within 50' of equipment.	RS	X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Destratification Fan**	Unit No:	**DF-1 to 4**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		X	
Mounting is appropriate with vibration isolation as specified.		X	
Unit is accessible for service.		✓	
Accessibility and condition of exhaust fan motor.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Speed controller installed and wired.		✓	
Equipment interlock complete.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes: [1] Physical access to units is limited.

Contractor Checklist

Unit Type:	**Split System AC Units**	Unit No:	**ICU-101**
Location:		Serves:	Elev. Machine room
Manufacturer:		Model:	

Unit Type:	**Split System AC Outdoor Unit**	Unit No:	**OCU-101**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment (Indoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per specifications.		✓	
Filters are installed and accessible.		✓	
Equipment (Outdoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		X	
Equipment labels are installed per specifications.		X	
Piping			
Refrigerant piping insulation is complete.		✓	
Piping is labeled per project documents.		✓	
Unit equipped with condensate pump.		✓	
Condensate piping insulated and labeled.		✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Room controller installed.		✓	
BAS room temp sensor installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Split System AC Units**	Unit No:	**ICU-102**
Location:		Serves:	Elev. Machine room
Manufacturer:		Model:	

Unit Type:	**Split System AC Outdoor Unit**	Unit No:	**OCU-102**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment (Indoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per specifications.		✓	
Filters are installed and accessible.		✓	
Equipment (Outdoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		X	
Mounting is appropriate.		X	
Equipment labels are installed per specifications.		X	
Piping			
Refrigerant piping insulation is complete.		✓	
Piping is labeled per project documents.		✓	
Unit equipped with condensate pump.		✓	
Condensate piping insulated and labeled.		✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Room controller installed.		✓	
BAS room temp sensor installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.	✓	✓	
Over-current protection is appropriate.	✓	✓	
Convenience outlet within 50' of equipment.	✓	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Split System AC Units**	Unit No:	**ICU-201**
Location:		Serves:	MDF 213
Manufacturer:		Model:	

Unit Type:	**Split System AC Outdoor Unit**	Unit No:	**OCU-201**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment (Indoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per specifications.		✓	
Filters are installed and accessible.		✓	
Equipment (Outdoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		X	
Equipment labels are installed per specifications.		X	
Piping			
Refrigerant piping insulation is complete.		✓	
Piping is labeled per project documents.		✓	
Unit equipped with condensate pump.		✓	
Condensate piping insulated and labeled.		✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Room controller installed.		✓	
BAS room temp sensor installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.	MS	✓	
Over-current protection is appropriate.	MS	✓	
Convenience outlet within 50' of equipment.	MS	✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Split System AC Units**	Unit No:	**ICU-202**
Location:		Serves:	Kennels
Manufacturer:		Model:	

Unit Type:	**Split System AC Outdoor Unit**	Unit No:	**OCU-202**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment (Indoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per specifications.		✓	
Filters are installed and accessible.		✓	
Equipment (Outdoor Unit)			
Unit is accessible for service.		X	
Unit is clean and has no visible physical damage.		X	
Mounting is appropriate.		X	
Equipment labels are installed per specifications.		X	
Piping			
Refrigerant piping insulation is complete.		✓	
Piping is labeled per project documents.		✓	
Unit equipped with condensate pump.		✓	
Condensate piping insulated and labeled.		✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Room controller installed.		✓	
BAS room temp sensor installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Split System AC Units**	Unit No:	**ICU-301**
Location:		Serves:	IDF 334
Manufacturer:		Model:	

Unit Type:	**Split System AC Outdoor Unit**	Unit No:	**OCU-301**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment (Indoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per specifications.		✓	
Filters are installed and accessible.		✓	
Equipment (Outdoor Unit)			
Unit is accessible for service.		X	
Unit is clean and has no visible physical damage.		X	
Mounting is appropriate.		X	
Equipment labels are installed per specifications.		X	
Piping			
Refrigerant piping insulation is complete.		✓	
Piping is labeled per project documents.		✓	
Unit equipped with condensate pump.		✓	
Condensate piping insulated and labeled.		✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Room controller installed.		✓	
BAS room temp sensor installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Split System AC Units**	Unit No:	**ICU-302**
Location:		Serves:	IDF P2
Manufacturer:		Model:	

Unit Type:	**Split System AC Outdoor Unit**	Unit No:	**OCU-302**
Location:		Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment (Indoor Unit)			
Unit is accessible for service.		✓	
Unit is clean and has no visible physical damage.		✓	
Mounting is appropriate.		✓	
Equipment labels are installed per specifications.		✓	
Filters are installed and accessible.		X	
Equipment (Outdoor Unit)			
Unit is accessible for service.		X	
Unit is clean and has no visible physical damage.		X	
Mounting is appropriate.		X	
Equipment labels are installed per specifications.		X	
Piping			
Refrigerant piping insulation is complete.		✓	
Piping is labeled per project documents.		✓	
Unit equipped with condensate pump.		✓	
Condensate piping insulated and labeled.		✓	
Control Devices			
Control wires and devices are complete.		✓	
Control wires and devices are labeled per project documents.		✓	
Room controller installed.		✓	
BAS room temp sensor installed.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Wall Heater**	Unit No:	**EWH-101**
Location:		Serves:	Fire Riser
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Unit is accessible for service.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Accessibility and condition of fan motor.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Low voltage remote mounted thermostat is provided.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Wall Heater**	Unit No:	**EWH-102**
Location:		Serves:	Mech 176
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Unit is accessible for service.		✓	
Mounting is appropriate with vibration isolation as specified.			
Accessibility and condition of fan motor.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		X	
Low voltage remote mounted thermostat is provided.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		X	
Disconnect is labeled.		X	
Over-current protection is appropriate.		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Wall Heater**	Unit No:	**EWH-103**
Location:		Serves:	Storage 119
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Unit is accessible for service.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Accessibility and condition of fan motor.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Low voltage remote mounted thermostat is provided.		✓	
Electrical		✓	
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Wall Heater**	Unit No:	**EWH-104**
Location:		Serves:	Stair 9
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Unit is accessible for service.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Accessibility and condition of fan motor.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Low voltage remote mounted thermostat is provided.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Wall Heater**	Unit No:	**EWH-201**
Location:		Serves:	Mech 209
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Unit is accessible for service.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Accessibility and condition of fan motor.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Low voltage remote mounted thermostat is provided.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Electric Heater**	Unit No:	**EH-1 through 14**
Location:		Serves:	Field House
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Unit is accessible for service.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Accessibility and condition of fan motor.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Low voltage remote mounted thermostat is provided.		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Disconnect is labeled.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Electric Unit Heater**	Unit No:	**EH-1 Through 3**
Location:		Serves:	Batting Cages
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		Y	
Unit is clean and has no visible physical damage.		Y	
Unit is labeled per project documents.		Y	
Unit is accessible for service.		Y	
Mounting is appropriate with vibration isolation as specified.		Y	
Accessibility and condition of fan motor.		Y	
Control Devices			
Control wiring and devices are installed and labeled.		Y	
Low voltage remote mounted thermostat is provided.		Y	
Electrical			
Supply power is installed and disconnect is accessible.		Y	
Disconnect is labeled.		Y	
Over-current protection is appropriate.		Y	
Convenience outlet within 50' of equipment.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Gas Unit Heater**	Unit No:	**EH-1 Through 4**
Location:	CTE	Serves:	
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Area is cleaned and clear of construction debris.		✓	
Unit is clean and has no visible physical damage.		✓	
Unit is labeled per project documents.		✓	
Unit is accessible for service.		✓	
Mounting is appropriate with vibration isolation as specified.		✓	
Accessibility and condition of fan motor.		✓	
Piping			
Gas piping is installed including drip leg with cap.		✓	
Gas piping is labeled: black letters on yellow per spec 23 05 53.		✓	
Control Devices			
Control wiring and devices are installed and labeled.		✓	
Low voltage remote mounted thermostat is provided.		✓	
Electrical			
Supply power is installed and disconnect is accessible.		✓	
Disconnect is labeled.		✓	
Over-current protection is appropriate.		✓	
Convenience outlet within 50' of equipment.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Ductwork System**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

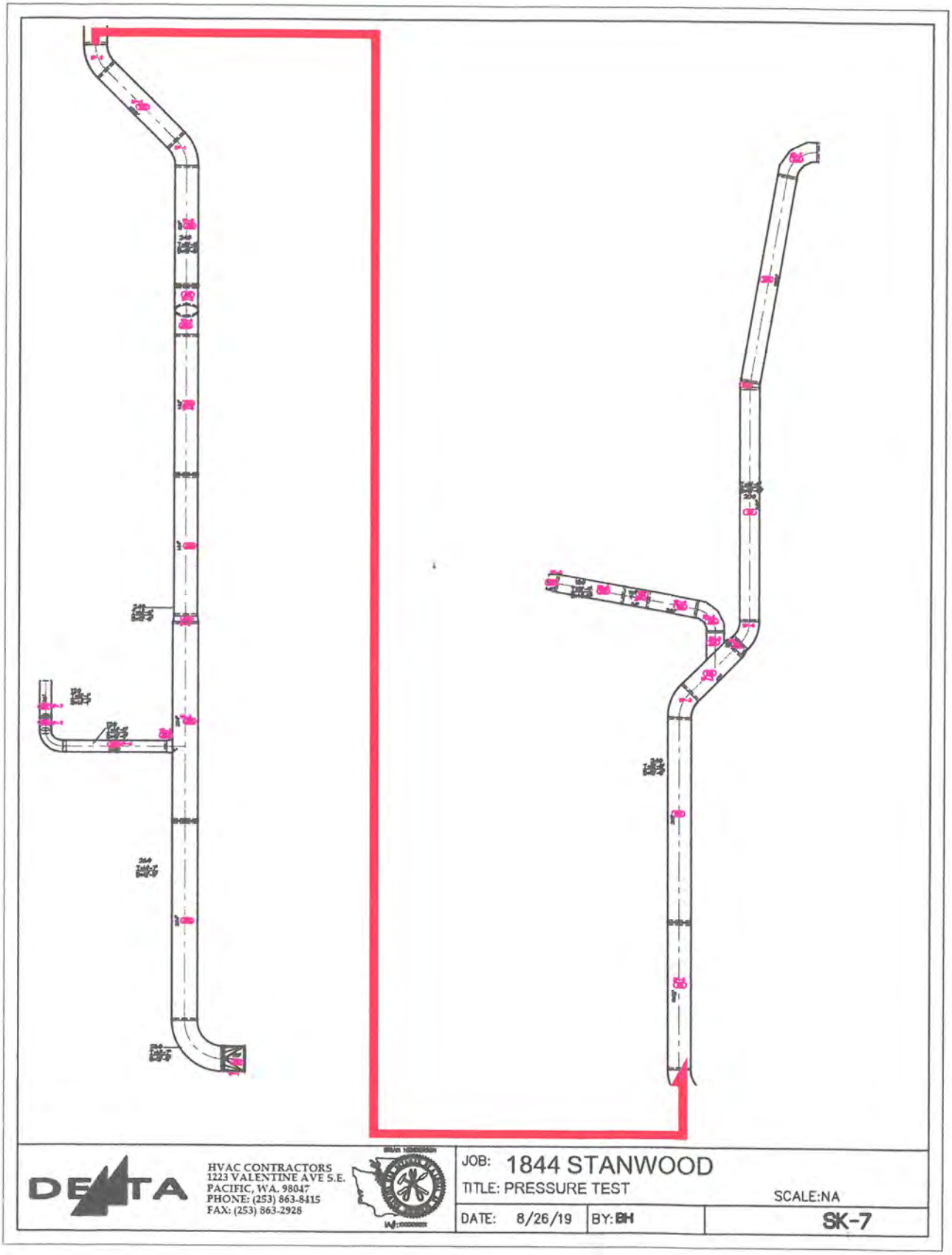
Check	RC	CxA	Note
Equipment			
Equipment and systems are labeled per project documents.		Y	
Ductwork is complete including access to all serviceable components.		Y	
Duct access doors provided per the project requirements.		Y	
All ductwork installed per required SMACNA standards.		Y	
Duct leakage testing complete.		Y	
Plenum and casings have been cleaned per the project requirements.		Y	
Balancing dampers provided at all duct take-offs to diffusers, grilles, and registers.		Y	
Balancing dampers are flagged.		Y	
All ductwork is sealed as specified.		Y	
All backdraft dampers, motorized dampers, fire smoke dampers have damper access doors installed.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED



DELTA

HVAC CONTRACTORS
1223 VALENTINE AVE S.E.
PACIFIC, WA. 98047
PHONE: (253) 863-8415
FAX: (253) 863-2928

JOB: 1844 STANWOOD

TITLE: PRESSURE TEST

SCALE:NA

DATE: 8/26/19 | BY: BH | SK-7

DELTA

Pressure Testing

Job: 1844-7_R | 8/26/2019

Shop Drawing: 7 | **List: R** | Const:

Service Type: Round Duct

Item No	Description	Area	Area (Sq Ft)
0	20" CLAM 45	13.08	13.0818
0	12"COUPLER	0	
0	12" SPIRAL 90	9.35	9.3493
0	24"COUPLER	0	
0	24" CLAM 45	18.32	18.3225
0	24" CLAM 45	18.32	18.3225
0	24" CLAM 45	18.32	18.3225
0	24"COUPLER	0	
0	24"COUPLER	0	
0	26"COUPLER	0	
0	26" CLAM 90	40.4	40.4044
150	Full Spiral Pipe	57.23	57.2288
151	Full Spiral Pipe	83.29	83.2904
152	Full Spiral Pipe	116.26	116.2606
153	Full Spiral Pipe	35.97	35.9726
154	St. Tee no Pipe	9.83	9.8268
155	4 Gore Ell	15.25	15.2513
156	Spiral Pipe	21.43	21.4321
157	Mitred Offset	12.03	12.029
158	Spiral Pipe	29.55	29.5459
159	Reducer CL	2.38	2.3759
160	Reducer CL	3.19	3.1877
161	Spiral Pipe	110.83	110.8307
162	4 Gore Ell	4.39	4.3865
163	Spiral Pipe	99.55	99.5504
164	4 Gore Ell	21.74	21.7357
482	Square-Round	16.57	16.5654
483	Spiral Pipe	122.24	122.2448
483	Spiral Pipe	122.24	122.2448
484	Conical Tee no Pipe	2.15	2.1524

DELTA

Pressure Testing

Job: 1844-7_R | 8/26/2019

Shop Drawing: 7 | **List: R** | Const:

Service Type: Round Duct

Item No	Description	Area	Area (Sq Ft)
485	Spiral Pipe	29.66	29.6595
486	4 Gore Ell	4.46	4.4583
487	Spiral Pipe	10.03	10.0273
488	Reducer CL	3.48	3.4848
489	Spiral Pipe	79.69	79.6931
489	Spiral Pipe	79.69	79.6931
490	4 Gore Ell	16.26	16.2574
491	4 Gore Ell	15.32	15.3177
492	Spiral Pipe	68.09	68.0907
			1310.5968

PROJECT NAME Stanwood High School PROJECT NO. 1844 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM High pressure duct zone 1+2

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	1311	9.6	125.85	2"	6"	6	.6	8/29 2019	Kenny Cook	[illegible]	46

PROJECT NAME Stanwood High School PROJECT NO. 1824 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM DOAU 5

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	1556	9,6	149.38	2"	6"	6"	.4	10/2 2019	Kenny Cook	[illegible]	37.6

PROJECT NAME Stanwood High School PROJECT NO. 1844 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM DOAS 2 North Level 3

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	936.5	9.6	89.9	2"	6"	6"	.05	1/14 2020	Kenny Cook		9.4

PROJECT NAME Stanwood High School PROJECT NO. 1844 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM DOAU 2

FAN CFM (Q) North System Level 3

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)											
	936.5	9.6	89.9	3.25	6	6	.05	1/14 2020	Kenny Cook	BH	24

PROJECT NAME Stanwood High School PROJECT NO. 1844 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM DOAU3 South Level 3

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	1041.5	9.6	99.98	2"	6"	6"	.1	1/14 2020	Kenny Cook	[illegible]	18.8

DELTA

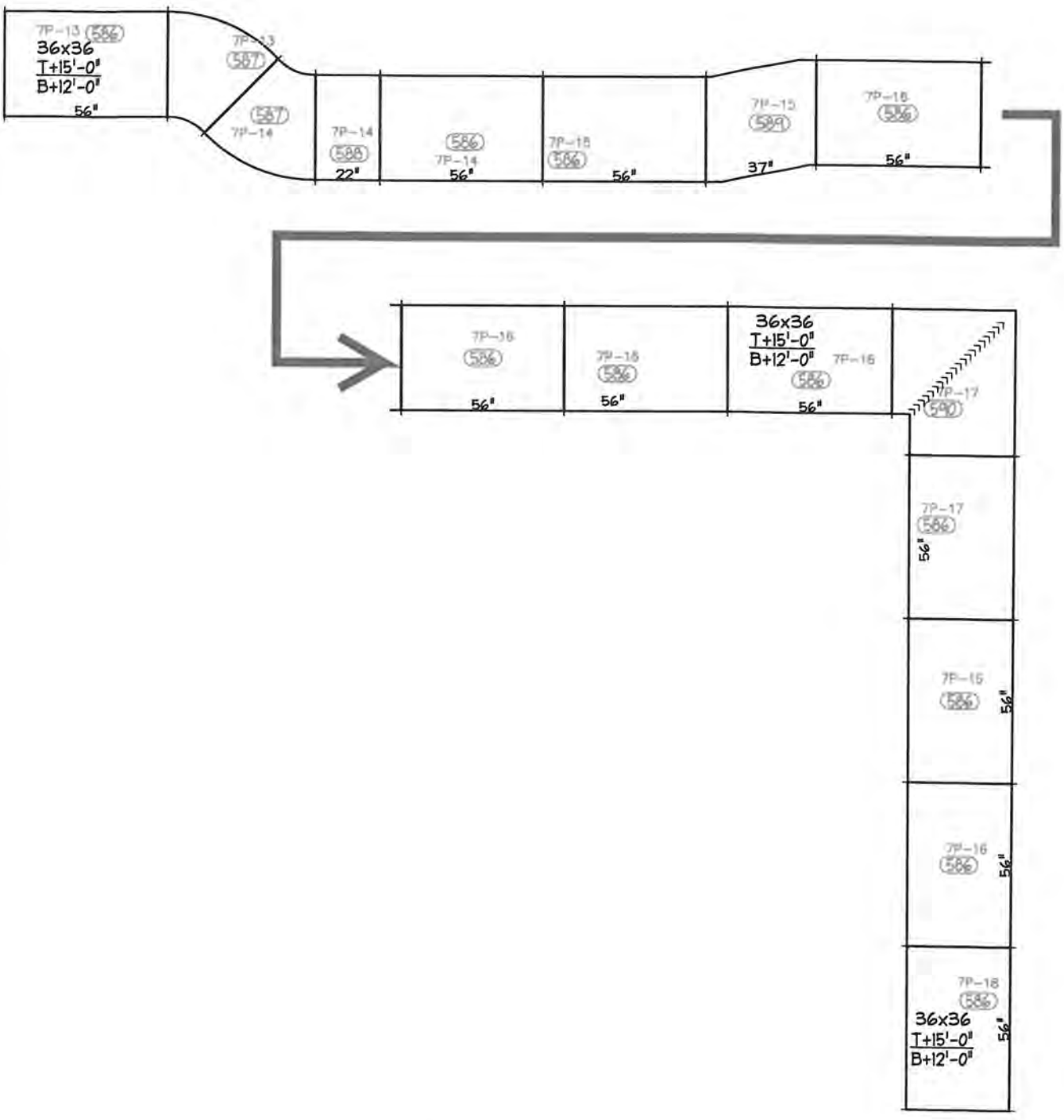
Pressure Testing

Job: 1844-HPS Pressure Test | 12/16/2019

Shop Drawing: 8 | List: Q | Const:

Service Type: Rectangular Duct

Item No	Description	Area	Area (Sq Ft)
586	Straight	63.96	63.9559
586	Straight	63.96	63.9559
586	Straight	63.96	63.9559
586	Straight	63.96	63.9559
586	Straight	63.96	383.7352
586	Straight	63.96	63.9559
587	45 Radius Elbow	34.86	34.8577
587	45 Radius Elbow	34.86	34.8577
588	Straight	27.64	27.6373
589	Mitred Offset	45.15	45.1538
590	Square Elbow	64.95	64.9475
			910.9685



DELTA
HVAC CONTRACTORS
1223 VALENTINE AVE S.E.
PACIFIC, WA. 98047
PHONE: (253) 863-8415
FAX: (253) 863-2928

JOB: 1844 STANWOOD

TITLE: PRESSURE TEST

SCALE:NA

DATE: 12/16/19 | BY: BH

SK-13

PROJECT NAME Stanwood High School PROJECT NO. 1814 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM DOAU 2 High pressure level 1

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 6

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	910.9	19.2	174.89	2"	6"	6"	1.3	1/21 2020	Kenny Cook	M	67.7

PROJECT NAME Stanwood High School PROJECT NO. 1844 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM DOAS 2 Level 2 South

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM LOSS
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	1123	9.6	107.8	2"	6"	6"	.05	1/17 2020	Kenny Cook	[illegible]	9.4

PROJECT NAME Stanwood High School PROJECT NO. 1844 PAGE ___ OF ___

AIR DUCT LEAKAGE TEST SUMMARY

AIR SYSTEM Doas 2 Level 2 North

FAN CFM (Q) _____

LEAKAGE CLASS (C_L) 3

SPECIFIED TEST PRESSURE (P_t) 6

DUCT CONSTRUCTION PRESSURE CLASS (P_c) 6

DESIGN DATA				FIELD TEST DATA RECORD							
		ALLOWABLE LEAKAGE		DIAMETER		PRESSURE "W.G.					
SUBJECT DUCT	SURFACE AREA IN FT²	FACTOR CFM/100 FT²	CFM (TEST SECTION)	ORIFICE	TUBE	DUCT	ACROSS ORIFICE	DATE	PERFORMED BY	WITNESSED BY	ACTUAL CFM Loss
TOTAL SYSTEM				****	***	**	*****	****	****	****	
TEST SECTION(S)	9,13	9,6	87,6	2"	6"	6"	.1	1/17 2020	Kenny Cook	[illegible]	18,8

Contractor Checklist

Unit Type:	**Saw Dust Collector**	Unit No:	**SDCU-1**
Location:		Serves:	CTE wood shop
Manufacturer:		Model:	

Check	RC	CxA	Note
Equipment			
Manufacturer's required clearances provided and equipment is accessible for service.		✓	
Manufacturer's installation and start-up procedures complete, documentation provided.		✓	
Vibration isolation devices installed, adjusted and free to float, shipping blocks removed.		✓	
Inspection and access doors are operable and free from obstruction.		✓	
Abort dampers and actuators installed and verified operational.		✓	
Temporary filters have been removed, new installed, spares provided.		\	
Ductwork is complete including access to all serviceable components.		✓	
Plenum and casings have been cleaned.		X	
Unit has been lubricated.		X	
Belts and/or couplings have been properly adjusted.		X	
Control Devices			
External controls installed.		✓	
Internal controls and safeties installed.		✓	
Spark detection system and fire alarm interface complete.		✓	
Internal controls and safeties verified operational.		✓	
External controls verified operational		✓	
Electrical			
All motors meet or exceed the specified Minimum Nominal Full-Load Efficiency		X	
Disconnect within sight of unit and labeled, power active, overload protection appropriate		✓	
Motor operation and rotation verified.		✓	
Spark detection and abort system verified operational		X	
Convenience outlet within 50' of equipment.		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Testing, Adjusting and Balancing**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Start-up			
HVAC equipment operation verified.		✓	
Construction filters removed, clean filters installed, damper position and operation checked prior to balancing.		X	
Readiness			
Bathrooms are negative relative to other areas.		X	
Noise and vibration has been checked and adjusted as necessary.		X	
Final damper and speed controller permanently marked for final balancing positions.		✓	
All systems balanced to specified design criteria except as approved by mechanical engineer.		✓	
Preliminary report has been provided on approved forms with data specified.		✓	
List of control minimum OA damper positions in report and provided to controls contractor.		✓	
All defects/ deficiencies have been noted to CxA/ engineer during testing, included in report.		✓	
All TAB procedures are complete and ready for the system balance demonstration. The TAB contractor will demonstrate proper balance by measuring and verifying a percentage of the systems as selected and witnessed by the Commissioning Authority.		✓	
System is ready for functional performance testing.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Building Control System**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Equipment / Control Devices / Communication			
Panels are accessible for service.		✓	
Panels and controls are clean and have no visible physical damage.		✓	
Panel labels are installed per specifications.		✓	
Field mounted equipment and devices permanently labeled.		✓	
Control wires shall be permanently secured to the conductor or cable.		X	
Control wires have computer printed labels.		X	
Outdoor air temperature sensor installed in suitable location.		✓	
Fire alarm system integration completed.		X	
Duct smoke detectors hardwired to safety circuit.		X	
Freezer and cooler temperature sensor in place and monitored and alarmed.		✓	
Phase monitoring device in place and monitored.		X	
Communication with utility metering is in place and functional.		X	
Communication with lighting control system is in place and functional.		X	
Communication with lighting control panel is in place and functional.		X	
BACnet interface with equipment (boilers, Chillers, MAU, Meters etc.)		✓	
Graphics			
DDC graphic includes floor plan showing space temperatures & units		✓	
DDC graphic includes unit summary page		✓	
DDC graphic includes unit graphic page		✓	
DDC graphic includes domestic hot water heater system page		✓	
DDC graphic includes heating water system page		✓	
DDC graphic includes chilled water system page		✓	
DDC graphic includes lighting control		✓	
DDC graphic includes VAV balancing page		✓	
Sequence of Operations			
Building schedules provided		X	
Domestic hot water heater system control logic provided and tested		X	
Chilled water system control logic provided and tested		X	
Heating water system control logic provided and tested		X	
Dedicated outside air system control logic provided and tested		X	
VAV control logic provided and tested		X	
TU control logic provided and tested		X	
Single zone AHU and FCU control logic provided and tested.		X	
Exhaust fan control logic provided and tested		X	
Lighting controls and receptacle controls logic provided and tested		X	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Meters**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Equipment			
All required power meters installed:			
1) Meters for Lighting		Y	
2) Total HVAC electrical usage		Y	
3) Receptacles and Misc.		Y	
All required gas meters installed: (10)			
1) Total Building		Y	
2) Kitchen		Y	
3) Boilers		Y	
4) Domestic hot water heaters		Y	
All required water meters installed: (7)			
1) Domestic water meter		Y	
2) Irrigation water meter		Y	
3) Hot water makeup water meter		Y	
4) Chilled water makeup water meter		Y	
Meters labeled with nameplates that identify monitored load.		Y	
Meter operational.		Y	
Communication wiring connected.		Y	
Communication interface with campus network system complete.		Y	
Dashboard installed and meters displaying.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	5/26/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Interior Lighting Control**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Lighting Fixtures			
Lighting control relay panels labeled with nameplates if applicable.		X	
All lamps and fixtures installed.		✓	
Emergency lighting fixtures are installed and located per drawing.		✓	
Occupancy Sensors			
Occupancy sensors installed and activated.		✓	
Occupancy sensors installed in appropriate location		✓	
Occupancy sensors are accessible for maintenance.		✓	
Photocells			
Photocell installed in appropriate location to sense affected area.		✓	
Photocell installed so will not easily be tampered with or damaged.		✓	
Photocell will not be affected by direct sunlight.		✓	
Photocell location will not be affected by dirt accumulation.		✓	
Photocell is accessible for maintenance.		✓	
Light Switches			
Correct light switch types installed at designed locations.		✓	
Light switch labels are provided if required.		✓	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	SG	5/26/2021

Notes:

Contractor Checklist

Unit Type:	**Exterior Lighting Control**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Lighting Fixtures			
All lamps and fixtures installed.		Y	
Lighting fixtures, diffusers and lamps are clean.		Y	
Photocells			
Photocell installed in appropriate location.		Y	
Photocell installed so will not easily be tampered with or damaged.		Y	
Photocell will not be affected by direct sunlight.		Y	
Photocell location will not be affected by dirt accumulation.		Y	
Lighting Control Panels			
Lighting control relays are installed and labeled.		Y	
Associated communication to DDC system is completed.		Y	
Correct lighting zones have been verified to match with design.		Y	
Location setting is verified at LCP setting for astronomical clock setting.		Y	
Controller date and time is verified to match with current date and time.		Y	
Controller schedule is programmed per design.		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Receptacle Control**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Equipment			
All receptacles are installed in the correct location per drawing		Y	
Control receptacles are labeled per design		Y	
Control receptacles zoning verified		Y	
DDC connection with receptacle control relays completed		Y	

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes:

EXECUTED DOCUMENT NOT RECEIEVED

Contractor Checklist

Unit Type:	**Power Distribution Systems**	Unit No:	**n/a**
Location:	n/a	Serves:	n/a
Manufacturer:	n/a	Model:	n/a

Check	RC	CxA	Note
Physical Checks:			
Inspect the equipment for any shipping damage. Remove any foreign material such as tags or packing.		Y	
Unit is free from physical damage		Y	
All adjustable settings accessible		Y	
Installation and startup manual provided and secured for OM manual		Y	
Installation:			
Panel mounted per project documents and is accessible for service.		Y	
Panels are labeled per project documents.		Y	
Arc flash and hazard labels are installed.		Y	
All wiring, terminations, patch panels, cross-blocks have been labeled per the project requirements.		Y	
All low voltage wiring in Raceway with Junction Boxes and Fittings where routed through inaccessible areas.		Y	
All grounding and bonding procedures completed per the project requirements. (Ground resistance report included).		?	
All fusing has been installed as required.		Y	
Circuit Breakers are correctly sized for application.		Y	
All wiring installed in conduit per the project requirements.		Y	
All branch circuit wiring installed in raceway with junction boxes and fittings.		Y	
Emergency power circuit in proper panel to maintain system operation during power outages.		Y	
Polarity, phase rotation, continuity and grounding verified and documented.		Y	
Bolts and Lugs torqued per specifications		?	
UPS connected to equipment.		Y	
Transformers connected to distribution system.		Y	
Remote monitoring device programmed to monitoring service.		Y	
As-built drawings have been updated and submitted.		Y	
Damaged factory finishes have been replaced, repaired or touched up.		Y	
All known issues have been corrected and the systems are ready for the functional performance test phase of commissioning.		Y	
Verify enclosure / panel doors are accessible and can be open safely without obstructions meeting NEC clearances.		Y	
Cables and conductors, both line voltage and low voltage, routed underground or underslab are U.L. listed for installation in wet locations per NEC and WAC codes.		Y	[1]
Tests:			
"Wires and Cables" tests have been performed, documented and submitted		Y	[1]

"Metal clad cable and fittings" tests have been performed, documented and submitted		Y	[1]
"Theater equipment" tests have been performed, documented and submitted		Y	[1]
"Switch Boards" tests have been performed, documented and submitted		Y	[1]
"Standby Generator" tests have been performed, documented and submitted		Y	[1]
"ATS" tests have been performed, documented and submitted		Y	[1]
"Transient Voltage and Surge protection" tests have been performed, documented and submitted		Y	[1]

Sign-Off:

Team Member	Name	Date
Responsible Contractor (RC):		
Commissioning Authority (CxA):	BH / WCG	11/14/21

Notes: [1] THE STUDY IS IN THE O&M MANUAL

EXECUTED DOCUMENT NOT RECEIEVED

Table 2.1 – Low-Voltage Equipment Evaluation

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Rating %
ATS-E	ASCO	Passed	LV ATS	480	22.90	65.00	35.23
ATS-S	ASCO	Passed	LV ATS	480	24.77	65.00	38.10
TSDB3 DISC	Eaton	Passed	LV Disconnect	480	7.06	10.00	70.63
ELEVATOR-01 DISC	Eaton	Passed	LV ECS	480	4.13	200.00	2.06
ELEVATOR-02 DISC	Eaton	Passed	LV ECS	480	3.16	200.00	1.58
ATS FIRE PUMP	Eaton	Passed	LV FP Controller	480	32.41	100.00	32.41
30A DISC	Eaton	Passed	LV Fused Disconnect	120	0.41	200.00	0.20
CH-1 DISC	Eaton	Passed	LV Fused Disconnect	480	24.57	200.00	12.29
TBC DISC	Eaton	Passed	LV Fused Disconnect	480	5.33	200.00	2.67
TSDB2 DISC	Eaton	Passed	LV Fused Disconnect	480	10.98	200.00	5.49
E1	Eaton	Passed	LV Fusible Panelboard	480	20.42	50.00	40.84
E2	Eaton	Passed	LV Fusible Panelboard	480	1.63	50.00	3.26
E3	Eaton	Passed	LV Fusible Panelboard	480	1.33	50.00	2.67
E4	Eaton	Passed	LV Fusible Panelboard	208	0.88	50.00	1.77
GEN BUS	Cummins	Passed	LV Generator	480	2.95	18.00	16.37
MTS-E	Foxfab Power Solutions	Unknown	LV MTS	480	*2.94	Minimum Required = 10 kA	
(E) GH1	Unknown		LV Panelboard	480	*5.56	Minimum Required = 10 kA	
(E) GH2	Unknown		LV Panelboard	208	*3.10	Minimum Required = 10 kA	

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Rating %
1C	Eaton	Passed	LV Panelboard	208	26.80	42.00	63.81
1CA	Eaton	Passed	LV Panelboard	208	8.72	18.00	48.45
1CB	Eaton	Passed	LV Panelboard	208	15.63	22.00	71.04
1CC	Eaton	Passed	LV Panelboard	208	9.04	18.00	50.21
1CD	Eaton	Passed	LV Panelboard	208	15.48	22.00	70.34
1CE	Eaton	Passed	LV Panelboard	208	20.81	65.00	32.02
1CF	Eaton	Passed	LV Panelboard	208	11.31	22.00	51.39
1H	Eaton	Passed	LV Panelboard	208	21.76	42.00	51.82
1LA	Eaton	Passed	LV Panelboard	480	26.60	65.00	40.92
1LB	Eaton	Passed	LV Panelboard	480	1.71	14.00	12.23
1LC	Eaton	Passed	LV Panelboard	480	1.39	14.00	9.92
1PA	Eaton	Passed	LV Panelboard	208	16.12	22.00	73.26
1PB	Eaton	Passed	LV Panelboard	208	15.14	22.00	68.80
1PC	Eaton	Passed	LV Panelboard	208	15.61	22.00	70.97
1PD	Eaton	Passed	LV Panelboard	208	14.68	22.00	66.74
1PE	Eaton	Passed	LV Panelboard	208	1.28	10.00	12.80
1PF	Eaton	Passed	LV Panelboard	208	1.28	10.00	12.80
1PG	Eaton	Passed	LV Panelboard	208	8.74	22.00	39.74
2PA	Eaton	Passed	LV Panelboard	208	8.64	10.00	86.41
2PB	Eaton	Passed	LV Panelboard	208	9.87	10.00	98.73

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Rating %
2PC	Eaton	Passed	LV Panelboard	208	9.87	10.00	98.73
2PD	Eaton	Passed	LV Panelboard	208	7.76	10.00	77.59
2PE	Eaton	Passed	LV Panelboard	208	7.76	10.00	77.59
2PF	Eaton	Passed	LV Panelboard	208	7.63	10.00	76.26
2PG	Eaton	Passed	LV Panelboard	208	9.56	10.00	95.64
3PA	Eaton	Passed	LV Panelboard	208	6.16	10.00	61.57
3PB	Eaton	Passed	LV Panelboard	208	6.00	10.00	60.00
3PC	Eaton	Passed	LV Panelboard	208	5.85	10.00	58.48
4PA	Eaton	Passed	LV Panelboard	208	2.88	10.00	28.76
4PB	Eaton	Passed	LV Panelboard	208	2.82	10.00	28.20
4PC	Eaton	Passed	LV Panelboard	208	1.23	10.00	12.31
A1	Eaton	Passed	LV Panelboard	208	4.11	10.00	41.05
BC	Eaton	Passed	LV Panelboard	208	2.56	10.00	25.56
CT	Eaton	Passed	LV Panelboard	208	4.36	10.00	43.60
CTE MDP	Eaton	Passed	LV Panelboard	208	27.84	42.00	66.28
EL1	Eaton	Passed	LV Panelboard	208	1.75	10.00	17.46
EL2	Eaton	Passed	LV Panelboard	208	1.33	10.00	13.35
F	Eaton	Passed	LV Panelboard	480	12.05 (*N1)	14.00	86.09
FH	Eaton	Passed	LV Panelboard	208	9.33 (*N1)	10.00	93.29
FM	Eaton	Passed	LV Panelboard	208	9.15 (*N1)	10.00	91.45

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Rating %
K1	Eaton	Passed	LV Panelboard	208	8.11	10.00	81.09
K2	Eaton	Passed	LV Panelboard	208	7.38	10.00	73.82
KH	Eaton	Passed	LV Panelboard	480	7.21	14.00	51.47
MH1	Eaton	Passed	LV Panelboard	480	8.66	14.00	61.87
MH2	Eaton	Passed	LV Panelboard	480	24.34	35.00	69.55
MH3	Eaton	Passed	LV Panelboard	480	14.57	35.00	41.62
ML1	Eaton	Passed	LV Panelboard	208	4.44	10.00	44.40
ML2	Eaton	Passed	LV Panelboard	208	11.84	22.00	53.81
ML3	Eaton	Passed	LV Panelboard	208	2.66	10.00	26.64
ML4	Eaton	Passed	LV Panelboard	208	4.59	10.00	45.93
MLC	Eaton	Passed	LV Panelboard	208	16.34	65.00	25.14
SDB1	Eaton	Passed	LV Panelboard	208	22.88	35.00	65.37
SDB2	Eaton	Passed	LV Panelboard	208	12.11	22.00	55.07
SDB3	Eaton	Passed	LV Panelboard	208	8.54	22.00	38.80
SH1	Eaton	Passed	LV Panelboard	480	21.43	35.00	61.24
SP1	Eaton	Passed	LV Panelboard	208	8.74	10.00	87.44
SPORTS FIELD		Unknown	LV Panelboard	480	*8.56	Minimum Required = 10 kA	
T1	Eaton	Passed	LV Panelboard	208	2.11	10.00	21.13
T2	Eaton	Passed	LV Panelboard	208	0.56	10.00	5.60
T3	Eaton	Passed	LV Panelboard	208	1.19	10.00	11.88

Bus I.D.	Manufacturer	Status	Type	Bus Voltage (V)	Calc Isc (kA)	Equip Isc (kA)	Rating %
T4	Eaton	Passed	LV Panelboard	208	0.64	10.00	6.41
TB	Eaton	Passed	LV Panelboard	208	2.73	10.00	27.29
TP1	Eaton	Passed	LV Panelboard	208	2.65	10.00	26.50
TP2	Eaton	Passed	LV Panelboard	208	2.65	10.00	26.50
TP3	Eaton	Passed	LV Panelboard	208	2.65	10.00	26.50
CTE CT	Eaton	Passed	LV Switchboard	208	41.24	65.00	63.45
MDB	Eaton	Passed	LV Switchboard	480	37.76 (*N1)	50.00	75.51
MDB CT	Eaton	Passed	LV Switchboard	480	40.57 (*N1)	65.00	62.41

(*N1) System X/R higher than Test X/R, Calc Isc (kA) modified based on low voltage factor.

Appendix 8 – TAB Verification

Testing, Adjusting and Balancing (TAB) Report (Preliminary) Review

Project:	**Stanwood High School**
TAB Report Date:	**02/12/2021, 5/11/21**
Review Report Date:	**02/15/2021, Back check 5/12/21**
Reviewers:	**Stuart Greenwood**
	Byron Holmstead

The Test and Balance (TAB) Report was reviewed as part of the commissioning process for compliance with contract documents. This review is supplemental to any other reviews provided by the contractor or design team.

Issues identified and provided in this review are intended to assist the design and contractor team in providing the Owner with a TAB Report that reflects actual conditions and meets the requirements of the contract documents.

Please see attached review comments and provide a return response on each issue under the column “Resolution” to assist the commissioning team.

If there are any questions regarding these review comments, please call Stuart Greenwood or Byron Holmstead.

Test and Balance Report Review

Project: Stanwood High School Document Versions: TAB Report Review Review Team: Stuart Greenwood, Byron Holmstead

Item	*Sheet/Page*	*Review Comment*	*By*:	*Resolution*	*Check*
1.	n/a	"Stanwood HS Miscellaneous Renovation" report has been received on January 8, 2020 and previously reviewed.	BH	TAB report notes that EF-01 damper is not wired. Milne / ATS to resolve.	
2.	n/a	There does not appear to be any water side data in the preliminary report to review.	BH	Now included.	Ok
3.	n/a	Per 23 05 93, Part 1.05 C5, unable to locate any fan curves or charts for each fan in the system.	SG	NA	
4.	n/a	Per 23 05 95, Part 1.07 C5, unable to locate any pump curves or charts for each pump in the system.	SG	Not included but shut off values are included	Ok
5.	n/a	Per 23 05 93, Part 1.05 C6, will need to provide final approved test report in PDF format on CD and provide one more CD than hard copies of test report.	SG	Now included.	Ok
6.	n/a	Final report should include an introduction including certifications and equipment calibrations.	SG	Now included.	Ok
7.	n/a	Aside from traverse sheets, could not find method of measurement for each type of flow (hood, venturi flow meter, etc.).	SG	Now included.	Ok
8.	PG 14, PG 20, PG 23, PG 28	Differential Pressure across filters is a little high maybe indicating filters are dirty or loaded up. (ie.: 1.05 in. WC for AHU 4, where we typically like to see around 0.75 in. WC).	BH	Final report the filters are less than 0.75"	Ok
9.	PG 74, PG 75, PG 76	Some of the VAV units are labeled with an asterisk, some have "low" and some have both. Unable to find any comments explaining the labels. Maybe low % Final?	SG	All notes are accounted for.	Ok

Testing, Adjusting and Balancing (TAB) Verification Report

Project: Stanwood High School
Report Date: 3/15/2021

The TAB Report was reviewed by the commissioning authority (CxA) as part of the commissioning process for compliance with contract documents. A review report was generated and provided to the project team for response to issues noted. The review report along with the TAB contractor's response is issued in separate report.

The CxA performed field verification on 10% of the balanced systems per the TAB verification plan developed by the CxA. The following is a description of the systems field verified and a general summary of the results.

System	Qty.	10%	Check	Comment
Flow meter	2	1	Water flow calibration**	
Flow meter	4	1	Air flow calibration**	
AHU	7	1	Total air flow – rough traverse	
DOAU	8	1	Total air flow – Static pressure Profile	
FCU	220	23	Air flow	
FCU	220	22	Water side flow	
VAV	85	9	VAV box calibration / Air flow	
AFD	30	3	VAV box calibration / Air flow	
Furnace	5	1	Air flow Traverse	
Exhaust Fan	25	3	Air flow	
Domestic water	4	1	Water flow	

The purpose of the field verifications is to confirm that the balancing was performed per project documents and measurements were accurate. It is not expected that the field verification values will read out exactly as balanced due to time passage and inherent issues with repeatability in measurements of this type. The field verification tolerance is 5% more than the specified TAB tolerance.

With the support of the balancing contractor, WCG field verified the systems as described above; the results are documented in the attached TAB verification forms.

Conclusions/Exceptions:

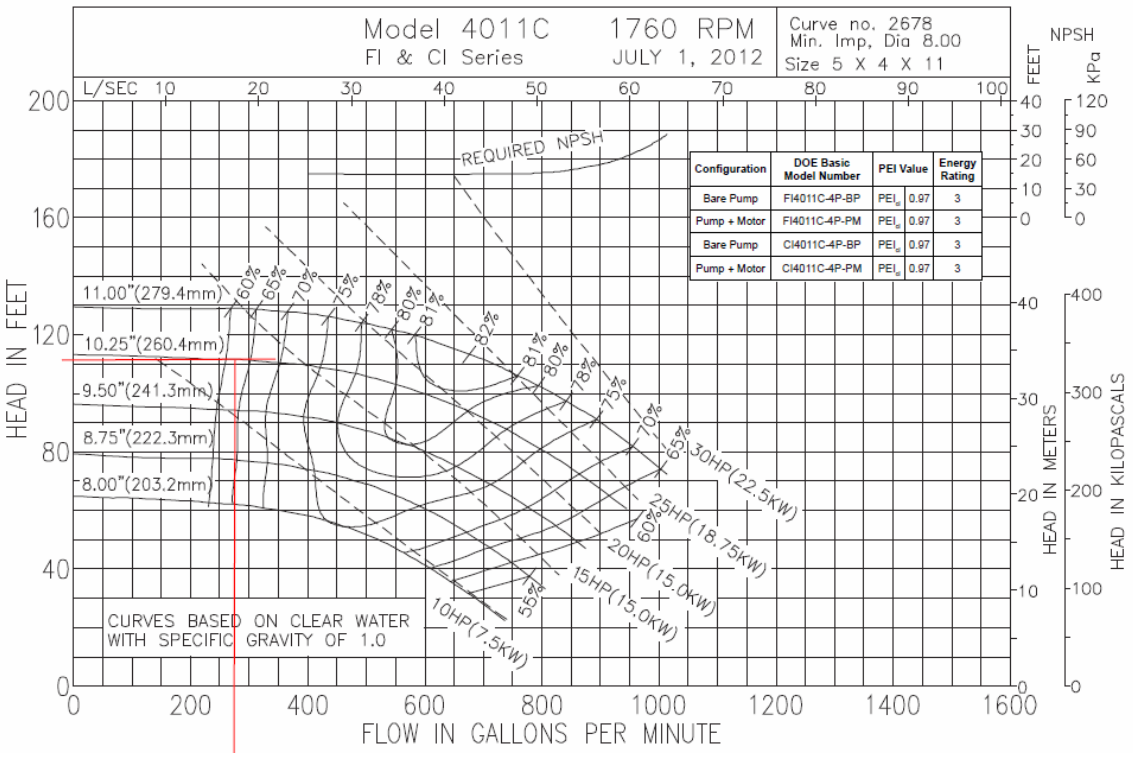
1. The field verified values were found to be consistent with the TAB report.
2. FCU-201 shares a speed signal with FCU-202. FCU-202 is in design tolerance but FCU-201 falls within a higher range.
3. As noted in the Air and Water Balance Field Verification form, verification on some units was performed while the TAB contractor performed the testing, adjusting and balancing.
4. ** WCG was informed that the TAB contractor did not perform any calibration on the Flow Meters, so verification was done through the DDC with the TAB contractor on site. Flow measurements are consistent with flow meter.
5. Traverses were not done on the DOAU's by the TAB contractor, so a static pressure test was done to verify each static pressure point on the given profile.

Water flow meter calibration: Heating hot water. The TACO pump curve (shown below) was used to estimate the flow meter. The VFD was put in manual for 60 Hz and read the suction and discharge pressures.

83psi – 35 psi = 48 psi, => 48psi x 2.31ft. hd./psi = 111 ft. hd. Pressure.

Graphics shows that the Onicon meter flowing ~274 GPM.

The meter appears to be calibrated accurately.



Airflow meter calibration: The OA damper for AHU-4 was manually set at 16% as the minimum OA setpoint for the minimum ventilation. The Ebtron measurement dispay (and graphics) shows ~3,190 cfm and the velgrid measured 3,240 CFM. The Ebtron air flow meter appears to be calibrated accurately.

Air flow verification data

Location (Unit)	Outlet	Air Flow - CFM			CFM as % of Design		Comment
		Design	TAB	Verified	TAB	Verified	
FCU-108	Cassette	118	115	115	97%	97%	
FCU-109	Cassette	118	115	115	97%	97%	
FCU-110	Cassette	118	110	115	93%	97%	
FCU-114	Cassette	118	115	115	97%	97%	
FCU-115	Cassette	118	115	115	97%	97%	
FCU-201	Cassette	118	155	155	131%	131%	Shares speed signal with FCU-202. FCU-202 in tolerance, this one is high.
FCU-202	Cassette	118	110	110	93%	93%	
FCU-203	Cassette	118	115	115	97%	97%	
FCU-204	Cassette	118	115	115	97%	97%	
FCU-207	Cassette	118	115	115	97%	97%	
FCU-221	Cassette	118	115	116	97%	98%	
FCU-222	Cassette	118	115	115	97%	97%	
FCU-223	Cassette	118	120	125	102%	106%	
FCU-301	Cassette	118	115	115	97%	97%	
FCU-302	Cassette	118	115	115	97%	97%	
FCU-307	Cassette	118	115	115	97%	97%	
FCU-308	Cassette	118	115	115	97%	97%	
FCU-321	Cassette	118	125	20	106%	17%	
FCU-322	Cassette	118	120	120	102%	102%	
FCU-336	Cassette	118	125	120	106%	102%	
FCU-337	Cassette	118	125	120	106%	102%	
FCU-352	Cassette	118	120	120	102%	102%	
FCU-353	Cassette	118	120	115	102%	97%	
AHU-5		10640	10733	11083	101%	104%	Traverse
Furnace-4		2500	2529	2590	101%	104%	Traverse
EF-101	Ceiling Grill	1375	1440	1430	105%	104%	
EF-207	Ceiling Grill	360	360	360	100%	100%	
EF-102	Ceiling Grill	265	280	273	106%	103%	
AFD-212	Ceiling Grill 1	270	285	285	106%	106%	[1]
	Ceiling Grill 2	100	90	90	90%	90%	[1]
	Ceiling Grill 3	100	95	95	95%	95%	[1]
AFD for 307/308	Ceiling Grill 1	100	90	90	90%	90%	[1], Served by DOAU 5
	Ceiling Grill 2	100	95	95	95%	95%	[1]
AFD-101	Ceiling Grill 1	875	905	905	103%	103%	[1]
	Ceiling Grill 2	50	55	55	110%	110%	[1]
	Ceiling Grill 3	50	55	55	110%	110%	[1]

Notes: [1] Verification performed while the TAB contractor performed the testing, adjusting and balancing.

VAV Terminal Unit Calibration and Air Balance Verification

VAV	Room	Mode	EMS		Supply (Verified)				Supply (TAB Report)				Total	EMS	%	EMS VAV Box Setpoints						Design cfm			
Num.	Num.	H/C	cfm1	cfm2	S1	S2	S3	S4	S1	S2	S3	S4	cfm	cfm*	EMS	Size	CF	Hmin	Hmax	Cmin	Cmax	Hmin	Hmax	Cmin	Cmax
201	267	H	410	409	410				410				410	409.5	100%	6"		110	420	NA	NA	110	420	NA	NA
202	266	H	408	406	400				410				400	407	98%	6"		110	420	NA	NA	110	420	NA	NA
204	262	H	998	994	475	490			500	520			965	996	97%	10"		1000	1000	NA	NA	1000	1000	NA	NA
210	264	H	1173	1175	520	490	205		510	490	200		1215	1174	103%	10"		1200	1200	NA	NA	1200	1200	NA	NA
301	345	H	424	421	410				420				410	422.5	97%	6"		110	420	NA	NA	110	420	NA	NA
304	339	H	416	413	422				425				422	414.5	102%	6"		110	420	NA	NA	110	420	NA	NA
311	349	H	411	412	430				435				430	411.5	104%	6"		110	420	NA	NA	110	420	NA	NA
318	328	H	418	418	435				420				435	418	104%	6"		110	420	NA	NA	110	420	NA	NA
326	314	H	417	414	430				435				430	415.5	103%	6"		110	420	NA	NA	110	420	NA	NA

Water flow verification data

Location	Unit	Design	TAB Report		Verified		Comment
		GPM	DP	GPM	DP	GPM*	
Art Lab 181	FCU-108	0.7	6.5	0.7	6.5	0.7	[1]
Art Lab 181	FCU-109	0.7	4.4	0.7	4.4	0.7	[1]
Storage 175	FCU-110	0.7	5.4	0.7	5.4	0.7	[1]
Classroom 178	FCU-114	0.7	3.8	0.7	3.8	0.7	[1]
Classroom 178	FCU-115	0.7	3.6	0.7	3.6	0.7	[1]
Classroom 277	FCU-201	0.7	6.3	0.7	7.1	0.7	
Classroom 277	FCU-202	0.7	10.4	0.7	11.3	0.7	
Classroom 266	FCU-203	0.7	4.9	0.7	8.3	0.7	
Classroom 266	FCU-204	0.7	9	0.7	15	0.7	
Science Lab 262	FCU-207	0.7	10.7	0.7	17.5	0.7	
Science Lab 262	FCU-208	0.7	12.4	0.7	17.7	0.7	
Science Prep 264A	FCU-221	0.7	13.8	0.7	14.6	0.7	
Science Lab 264	FCU-222	0.7	9.3	0.7	11.8	0.7	
Classroom 345	FCU-301	0.7	20.1	0.7	11.9	0.7	
Classroom 345	FCU-302	0.7	12.7	0.7	12.2	0.7	
Classroom 339	FCU-307	0.7	13.2	0.7	12.5	0.7	
Classroom 339	FCU-308	0.7	13.2	0.7	12	0.7	
Classroom 349	FCU-321	0.7	4.7	0.7	4.6	0.7	
Classroom 349	FCU-322	0.7	15.7	0.7	11.1	0.7	
Media 328	FCU-336	0.7	14.5	0.7	17.1	0.7	
Media 328	FCU-337	0.7	14.1	0.7	15.8	0.7	
Lab 314	FCU-352	0.7	25.3	0.7	24.1	0.7	
Lab 314	FCU-353	0.7	25.7	0.7	24.5	0.7	
Mech. Platform P1	DWH-4	24	n/a	15.4	0.45	15.6	[2]

Notes: [1] Verification performed while the TAB contractor performed the testing, adjusting and balancing.
[2] Per TAB Contractor, unit does not reach design GPM but does not hinder building water heat capability. Tested when unoccupied that within 10 seconds water gets hot.

Static Pressure Profile Verification

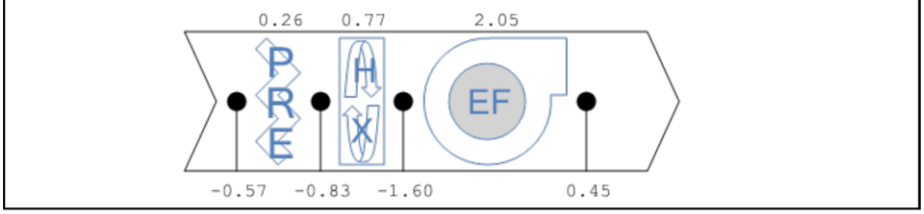
	Static Pressure	
EXHAUST SIDE	**TAB (in. w.c.)**	**Verified (in. w.c.)**
Exhaust Fan SP In	-1.6	-1.56
Exhaust Fan SP Out	0.45	0.48
Heat Exchanger SP In	-0.83	-0.75
Heat Exchanger SP Out	-1.6	-1.56
Pre Filter SP In	-0.57	-0.55
Pre Filter SP Out	-0.83	-0.75

SYSTEM/UNIT: DOAU-04/SPP-Exhaust
AREA: Mech 409

Tested By: Brandon Hyslip
Date: 12/4/2020

Test Pressures	
Exhaust Fan SP In	-1.60 in. w.c.
Exhaust Fan SP Out	0.45 in. w.c.
Heat Exchanger SP In	-0.83 in. w.c.
Heat Exchanger SP Out	-1.60 in. w.c.
Pre Filter SP In	-0.57 in. w.c.
Pre Filter SP Out	-0.83 in. w.c.

Static Pressure Profile



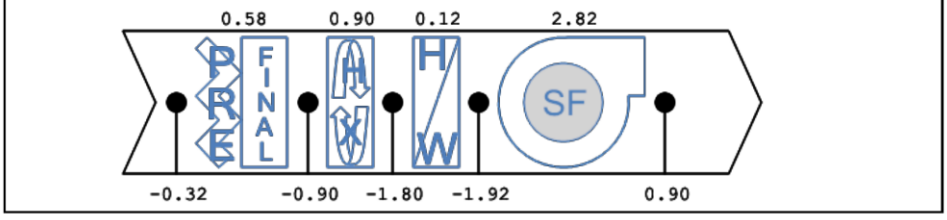
	Static Pressure	
SUPPLY SIDE	**TAB (in. w.c.)**	**Verified (in. w.c.)**
Heat Exchanger SP In	-0.9	-0.85
Heat Exchanger SP Out	-1.8	0.48
Heating Coil SP In	-1.8	-0.75
Heating Coil SP Out	-1.92	-1.56
Pre Filter/Final Filter SP In	-0.32	-0.55
Pre Filter/Final Filter SP Out	-0.9	-0.85
Supply Fan SP In	-1.92	-1.56
Supply Fan SP Out	0.9	0.88

SYSTEM/UNIT: DOAU-04/SPP-Supply
AREA: Mech 409

Tested By: Brandon Hyslip
Date: 12/4/2020

Test Pressures	
Heat Exchanger SP In	-0.90 in. w.c.
Heat Exchanger SP Out	-1.80 in. w.c.
Heating Coil SP In	-1.80 in. w.c.
Heating Coil SP Out	-1.92 in. w.c.
Pre Filter/Final Filter SP In	-0.32 in. w.c.
Pre Filter/Final Filter SP Out	-0.90 in. w.c.
Supply Fan SP In	-1.92 in. w.c.
Supply Fan SP Out	0.90 in. w.c.

Static Pressure Profile



Appendix 9 – Functional Performance Tests

Stanwood High School

Functional Performance Tests

FPT Bases

The functional tests contained herein are based on the following project documents.

Control Submittal Version: 7/15/19
RFI: If applicable
Other

Table of Contents:

Division 22 – Plumbing System

Domestic Water Heater – Gas (w/o BAS Control)

1. Start test with hot water tank satisfied.
2. Record water heater set point and verify is as specified.
3. Create a demand for hot water by running the hot water in a utility sink.
4. Verify burner is enabled and fires.
5. Measure the hot water exiting the sink faucet and verify is as specified.
6. Record the thermometer reading at tank if equipped.
7. Close hot water tap.
8. Verify tank shuts off after reheating tank.

WH-	1	2	3	Note
Pre-Test:				
Hot water tank enabled and up to temperature, not firing	Y	Y	Y	
Hot water tank set point	140	140	140	
Thermometer reading	133	133	135	
Test:				
Hot water tap opened	Y	Y	Y	
Water heater burner is enabled and firing.	Y	Y	Y	
Measured hot water temperature at tap	127.5	127.0	112.8	
Thermometer reading	142	138	137	
Hot water tap closed	Y	Y	Y	
Hot water tank shuts off after reheat	Y	Y	Y	
Hot water tank set point returned to original setting.	Y	Y	Y	
Tests are complete.	Y	Y	Y	
Performance is acceptable.	Y	Y	Y	

WH-	4	HWT-1 CTE	Notes
Pre-Test:			
Hot water tank enabled and up to temperature, not firing	Y	Y	
Hot water tank set point	140	140	
Thermometer reading	139	133	
Test:			
Hot water tap opened	Y	Y	
Water heater burner is enabled and firing.	Y		
Measured hot water temperature at tap	117.4	129.6	
Thermometer reading	141	140	
Hot water tap closed	Y	Y	
Hot water tank shuts off after reheat	Y	Y	
Hot water tank set point returned to original setting.	Y	Y	
Tests are complete.	Y	Y	
Performance is acceptable.	Y	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG SG	12/8/2020 2/4/2021

Comments:

Circulation Pump (Temperature Sensor w/BAS Control) - HS done

1. Verify system is in the occupied mode.
2. Place a temperature probe on the pipe near the Temperature Sensor or use temperature indicator if available, record Temperature Sensor set point and system temperature.
3. Turn the Temperature Sensor set point up higher than the return water temperature until the pump starts, record set point.
4. Place the system in the unoccupied mode and verify the pump turns off.
5. Place the system back into the occupied mode and verify pump is on.
6. Turn the Temperature Sensor set point down to lower than the return water temperature until the pump stops, record the set point.
7. Return set point to original setting.

CP	1	2	3	4
Temperature Sensor setting at start of test.	115	115	115	115
Return water temperature.	118	116	115	115
Pump comes on when set point is above return water temp.	Y	Y	Y	Y
Pump off when put into unoccupied	Y	Y	Y	Y
Pump on when put into occupied mode	Y	Y	Y	Y
Pump goes off when set point is below return water temp.	Y	Y	Y	Y
Temperature Sensor returned to original setting.	Y	Y	Y	Y
Tests are complete.	Y	Y	Y	Y
Performance is acceptable.	Y	Y	Y	Y

(CTE) CP	1
Temperature Sensor setting at start of test.	115
Return water temperature.	120
Pump comes on when set point is above return water temp.	Y
Pump off when put into unoccupied	Y
Pump on when put into occupied mode	Y
Pump goes off when set point is below return water temp.	Y
Temperature Sensor returned to original setting.	Y
Tests are complete.	Y
Performance is acceptable.	Y

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG SG	12/8/2020 2/5/2021

Comments:

Plumbing Fixture

Installation Verification and Test Water Closet & Urinal

Unit No.	Dwg No.	Description/Location	Observation			Test			
			D	C	I	F	S	NL	
P-1A	M1.11/M4.01-3	Women's 106C WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.11/M4.02-2	Toilet Shower 106D WC 1	Y	Y	Y	Y	Y	Y	*Calking coming apart - Corrected
P-1A	M1.11/M4.01-3	Women's 106C WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.11/M4.02-2	Toilet Shower 106D WC 1	Y	Y	Y	Y	Y	Y	*Calking coming apart - Corrected
P-1	M1.11/M4.02-2	Toilet Shower 106D WC 2	Y	Y	Y	Y	Y	Y	*Calking coming apart - Corrected
P-1	M1.11/M4.02-2	Toilet Shower 106D WC 3	Y	Y	Y	Y	Y	Y	*Calking coming apart - Corrected
P-1	M1.11/M4.02-2	Toilet Shower 106D WC 4	Y	Y	Y	Y	Y	Y	*Calking coming apart - Corrected
P-1	M1.11/M4.02-2	Toilet Shower 105B WC 1	Y	Y	Y	Y	Y	Y	
P-1	M1.11/M4.02-2	Toilet Shower 105B WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.11/M4.02-2	Toilet Shower 105B WC 3	Y	Y	Y	Y	Y	Y	
P-1A	M1.11/M4.02-2	Toilet Shower 105B WC 4	Y	Y	Y	Y	Y	Y	
P-1A	M1.12	Restroom 118B WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.12	Men 113 WC	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 1	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 4	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 5	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 6	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 7	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Women 123 WC 8	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Men 122 WC 1	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Men 122 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.01-4	Men 122 WC 3	Y	Y	Y	Y	Y	Y	
P-2	M1.12/M4.01-4	Men 122 Urinal 1	Y	Y	Y	Y	Y	Y	
P-2	M1.12/M4.01-4	Men 122 Urinal 2	Y	Y	Y	Y	Y	Y	
P-2	M1.12/M4.01-4	Men 122 Urinal 3	Y	Y	Y	Y	Y	Y	
P-2	M1.12/M4.01-4	Men 122 Urinal 4	Y	Y	Y	Y	Y	Y	
P-2A	M1.12/M4.02-1	Toilet Shower 113C Urinal West	Y	Y	Y	Y	Y	Y	
P-2	M1.12/M4.02-1	Toilet Shower 113C Urinal East	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.02-1	Toilet Shower 113C WC West	Y	Y	Y	Y	Y	Y	
P-1A	M1.12/M4.02-1	Toilet Shower 113C WC East	Y	Y	Y	Y	Y	Y	
P-1A	M1.12/M4.02-1	Toilet Shower 114C WC West	Y	Y	Y	Y	Y	Y	
P-1	M1.12/M4.02-1	Toilet Shower 114C WC East	Y	Y	Y	Y	Y	Y	

Unit No.	Dwg No.	Description/Location	Observation			Test			
			D	C	I	F	S	NL	
P-2	M1.12/M4.02-1	Toilet Shower 114C Urinal West	Y	Y	Y	Y	Y	Y	
P-2A	M1.12/M4.02-1	Toilet Shower 114C Urinal East	Y	Y	Y	Y	Y	Y	
P-1A	M1.13	Toilet 152 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.13	Toilet 153 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.13/M4.01-1	Toilet 140B WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.13/M4.01-1	Toilet 141B WC	Y	Y	Y	Y	Y	Y	
P-2A	M1.13/M4.02-3	Men 135 Urinal South	Y	Y	Y	Y	Y	Y	
P-2	M1.13/M4.02-3	Men 135 Urinal Center	Y	Y	Y	Y	Y	Y	
P-2	M1.13/M4.02-3	Men 135 Urinal North	Y	Y	Y	Y	Y	Y	
P-1A	M1.13/M4.02-3	Men 135 WC North	Y	Y	Y	Y	Y	Y	
P-1	M1.13/M4.02-3	Men 135 WC South	Y	Y	Y	Y	Y	Y	Check Caulking - Corrected
P-1A	M1.13/M4.02-3	Women 136 WC 1 (North)	Y	Y	Y	Y	Y	Y	
P-1	M1.13/M4.02-3	Women 136 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.13/M4.02-3	Women 136 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.13/M4.02-3	Women 136 WC 4	Y	Y	Y	Y	Y	Y	
P-1	M1.13/M4.02-3	Women 136 WC 5	Y	Y	Y	Y	Y	Y	
P-1	M1.13/M4.02-3	Women 136 WC 6 (South)	Y	Y	Y	Y	Y	Y	
P-1A	M1.13/M4.02-3	Toilet 134 WC	Y	Y	Y	Y	Y	Y	
P-2A	M1.15/M4.02-4	Men 171 Urinal South	Y	Y	Y	Y	Y	Y	Piping Loose on wall - corrected
P-2	M1.15/M4.02-4	Men 171 Urinal North	Y	Y	Y	Y	Y	Y	
P-1	M1.15/M4.02-4	Men 171 WC South	Y	Y	Y	Y	Y	Y	
P-1A	M1.15/M4.02-4	Men 171 WC North	Y	Y	Y	Y	Y	Y	Calking coming off - Corrected
P-1A	M1.15/M4.02-4	Women 173 WC 1 North	Y	Y	Y	Y	Y	Y	
P-1	M1.15/M4.02-4	Women 173 WC 2	Y	Y	Y	Y	Y	Y	
P-2	M1.15/M4.02-4	Women 173 WC 3	Y	Y	Y	Y	Y	Y	Calking coming off - Corrected
P-2A	M1.15/M4.02-4	Women 173 WC 4 South	Y	Y	Y	Y	Y	Y	
P-1A	M1.15/M4.02-4	Restroom 172 WC	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 1 South East	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 2	Y	Y	Y	Y	Y	Y	
P-1A	M1.21/M4.03-4	Women 214 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 4	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 5	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 6	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 7	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 8	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 9	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 10	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 11	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Women 214 WC 12 North East	Y	Y	Y	Y	Y	Y	
P-2	M1.21/M4.03-4	Men 212 Urinal 1 East	Y	Y	Y	Y	Y	Y	

Unit No.	Dwg No.	Description/Location	Observation			Test			
			D	C	I	F	S	NL	
P-2	M1.21/M4.03-4	Men 212 Urinal 2	Y	Y	Y	Y	Y	Y	
P-2	M1.21/M4.03-4	Men 212 Urinal 3	Y	Y	Y	Y	Y	Y	
P-2	M1.21/M4.03-4	Men 212 Urinal 4 West	Y	Y	Y	Y	Y	Y	
P-1A	M1.21/M4.03-4	Men 212 WC 1 West	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Men 212 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.21/M4.03-4	Men 212 WC 3 East	Y	Y	Y	Y	Y	Y	
P-1A	M1.21/M4.03-4	Toilet 215 WC	Y	Y	Y	Y	Y	Y	
P-1	M1.23	Restroom 219 WC	Y	Y	Y	Y	Y	Y	
P-1	M1.23	Restroom 240C WC	Y	Y	Y	Y	Y	Y	
P-1	M1.23	Restroom 239 WC	Y	Y	Y	Y	Y	Y	
P-1	M1.25	Staff Restroom 259 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.26/M4.03-1	Men 279 WC	Y	Y	Y	Y	Y	Y	
P-2A	M1.26/M4.03-1	Men 279 Urinal East	Y	Y	Y	Y	Y	Y	
P-2	M1.26/M4.03-1	Men 279 Urinal Center	Y	Y	Y	Y	Y	Y	
P-2	M1.26/M4.03-1	Men 279 Urinal West	Y	Y	Y	Y	Y	Y	
P-1	M1.26/M4.03-1	Women 278 WC 1 East	Y	Y	Y	Y	Y	Y	
P-1	M1.26/M4.03-1	Women 278 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.26/M4.03-1	Women 278 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.26/M4.03-1	Women 278 WC 4	Y	Y	Y	Y	Y	Y	
P-1A	M1.26/M4.03-1	Women 278 WC 5 West	Y	Y	Y	Y	Y	Y	
P-1A	M1.31	Toilet 307 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.31	Toilet 308 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.33	Restroom 302B Lavatory	Y	Y	Y	Y	Y	Y	
P-1A	M1.33/M4.04-4	Men 319 WC	Y	Y	Y	Y	Y	Y	
P-2A	M1.33/M4.04-4	Men 319 Urinal East	Y	Y	Y	Y	Y	Y	
P-2	M1.33/M4.04-4	Men 319 Urinal Center	Y	Y	Y	Y	Y	Y	
P-2	M1.33/M4.04-4	Men 319 Urinal West	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 1 East	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 4	Y	Y	Y	Y	Y	Y	
P-1A	M1.33/M4.04-4	Women 320 WC 5 West	Y	Y	Y	Y	Y	Y	
P-1A	M1.35	Staff Restroom 332 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.36/M4.04-1	Men 347 WC	Y	Y	Y	Y	Y	Y	
P-2A	M1.36/M4.04-1	Men 347 Urinal East	Y	Y	Y	Y	Y	Y	
P-2	M1.36/M4.04-1	Men 347 Urinal Center	Y	Y	Y	Y	Y	Y	
P-2	M1.36/M4.04-1	Men 347 Urinal West	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 1 East	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 3	Y	Y	Y	Y	Y	Y	

Unit No.	Dwg No.	Description/Location	Observation			Test			
			D	C	I	F	S	NL	
P-1	M1.36/M4.04-1	Women 346 WC 4	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 5 West	Y	Y	Y	Y	Y	Y	
P-2	M1.33/M4.04-4	Men 319 Urinal West	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 1 East	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.33/M4.04-4	Women 320 WC 4	Y	Y	Y	Y	Y	Y	
P-1A	M1.33/M4.04-4	Women 320 WC 5 West	Y	Y	Y	Y	Y	Y	
P-1A	M1.35	Staff Restroom 332 WC	Y	Y	Y	Y	Y	Y	
P-1A	M1.36/M4.04-1	Men 347 WC	Y	Y	Y	Y	Y	Y	
P-2A	M1.36/M4.04-1	Men 347 Urinal East	Y	Y	Y	Y	Y	Y	
P-2	M1.36/M4.04-1	Men 347 Urinal Center	Y	Y	Y	Y	Y	Y	
P-2	M1.36/M4.04-1	Men 347 Urinal West	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 1 East	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 2	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 3	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 4	Y	Y	Y	Y	Y	Y	
P-1	M1.36/M4.04-1	Women 346 WC 5 West	Y	Y	Y	Y	Y	Y	

Key:
D = Fixture installed correctly & operational.
C= Caulked to mounting surface.
I = Fixture and valve Installed with per detail
F= Flush cycle correct and does not splash out of bowl
S = Flush valve shuts off after cycle completed.
NL=No leaks between fixture and mounting surface

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Derek Welsh	11/3/2020

Plumbing Fixture IV and Test Lavatory & Shower

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-6	M1.11	B.3/5	Corridor 104 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-6	M1.11	C.2/6	Vestibule 100B Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-3A	M1.11/M4.01-3	B.7/4	Women's 106C Lavatory ADA	Y	Y	NA	Y	Y	Y	106	Y	
P-7	M1.11/M4.01-3	B.7/4	Locker 106B East Shower	Y	Y	Y	Y	Y	Y	119	NA	
P-7	M1.11/M4.01-3	B.7/4	Locker 106B West Shower	Y	Y	Y	Y	Y	Y	119	NA	
P-3A	M1.11/M4.02-2	B.5/2	Toilet Shower 106D Faucet West	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.11/M4.02-2	B.5/2	Toilet Shower 106D Faucet Center	Y	Y	NA	Y	Y	Y	108	Y	
P-3	M1.11/M4.02-2	B.5/2	Toilet Shower 106D Faucet East	Y	Y	NA	Y	Y	Y	108	Y	
P-7A	M1.11/M4.02-2	B.5/2	Toilet Shower 106D Shower South	Y	Y	Y	Y	Y	Y	129	Y	Too hot (>120) [1]
P-7	M1.11/M4.02-2	B.5/2	Toilet Shower 106D Shower Center	Y	Y	Y	Y	Y	Y	130	Y	Too hot (>120) [1]
P-7	M1.11/M4.02-2	B.5/2	Toilet Shower 106D Shower North	Y	Y	Y	Y	Y	Y	128	Y	Too hot (>120) [1]
P-3	M1.11/M4.02-2	C.1/2	Toilet Shower 105B Faucet West	Y	Y	NA	Y	Y	Y	109	Y	
P-3	M1.11/M4.02-2	C.1/2	Toilet Shower 105B Faucet Center	Y	Y	NA	Y	Y	Y	109	Y	
P-3A	M1.11/M4.02-2	C.1/2	Toilet Shower 105B Faucet East	Y	Y	NA	Y	Y	Y	109	Y	
P-7A	M1.11/M4.02-2	C.1/2	Toilet Shower 105B Shower South	Y	Y	Y	Y	Y	Y	127	Y	Too hot (>120) [1]
P-7	M1.11/M4.02-2	C.1/2	Toilet Shower 105B Shower Center	Y	Y	Y	Y	Y	Y	127	Y	Too hot (>120) [1]
P-7	M1.11/M4.02-2	C.1/2	Toilet Shower 105B Shower North	Y	Y	Y	Y	Y	Y	126	Y	Too hot (>120) [1]
P-5A	M1.11/M4.02-2	C.1/2	Custodial Storage 108 Sink South									
P-5B	M1.11/M4.02-2	C.2/1.5	Custodial Storage 108 Sink North									
PK-16	M1.11/M4.01-2		Kitchen Handwash Sinks	Y	Y	Y	Y	Y	Y	111	Y	Half of the sinks are over 120 (total qty of 6) Corrected
P-6	M1.12	B.3/13	Corridor 111 Drinking Fountain	Y	Y	Y	Y	Y	Y	NA	Y	
P-7A	M1.12	B.3/13	Men's 113C Shower East	Y	Y	Y	Y	Y	Y	109	Y	
P-7A	M1.12	B.3/13	Men's 113C Shower West	Y	Y	Y	Y	Y	Y	112	Y	
P-3A	M1.12	B.3/13.2	Men's 113C Lavatory	Y	Y	NA	Y	Y	Y	103	Y	

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-5B	M1.12	B.7/13.2	Laundry 116 Laundry Sink	Y	Y	*	Y	Y	Y	64/ 104	Y	No hot water/ Corrected
P-3A	M1.12	B.9/13.2	Restroom 118B Lavatory	Y	Y	NA	Y	Y	Y	109	Y	
P-7A	M1.12	B.9/13.2	Shower 118A	Y	Y	Y	Y	Y	Y	115	Y	
P-3	M1.12/M4.01-4	D/9	Men's Lavatory Left	Y	Y	NA	Y	Y	Y	96	Y	
P-3	M1.12/M4.01-4	D/9	Men's Lavatory Center	Y	Y	NA	Y	Y	Y	101	Y	
P-3	M1.12/M4.01-4	D/9	Men's Lavatory Right	Y	Y	NA	Y	Y	Y	105	Y	
P-3	M1.12/M4.01-4	D/9	Women's Lavatory Left	Y	Y	NA	Y	Y	Y	103	Y	
P-3	M1.12/M4.01-4	D/9	Lavatory Center	Y	Y	NA	Y	Y	Y	106	Y	
P-3	M1.12/M4.01-4	D/9	Lavatory Right	Y	Y	NA	Y	Y	Y	106	Y	
P-5	M1.12/M4.01-4	D/9	Custodial 124A Corner Service Sink	Y	Y	NA	Y	Y	Y	106	Y	
P-3A	M1.12/M4.02-1	A/14	Toilet Shower 113C Lavatory West	Y	Y	NA	Y	Y	Y	104	Y	
P-3	M1.12/M4.02-1	A/14	Toilet Shower 113C Lavatory Center	Y	Y	NA	Y	Y	Y	103	Y	
P=3	M1.12/M4.02-1	A/14	Toilet Shower 113C Lavatory East	Y	Y	NA	Y	Y	Y	103	Y	
P-7A	M1.12/M4.02-1	A/14	Toilet Shower 113C Shower North	Y	Y	Y	Y	Y	Y	110	Y	
P-7	M1.12/M4.02-1	A/14	Toilet Shower 113C Shower Center	Y	Y	Y	Y	Y	Y	110	Y	
P-7	M1.12/M4.02-1	A/14	Toilet Shower 113C Shower South	Y	Y	Y	Y	Y	Y	110	Y	
P-3	M1.12/M4.02-1	B/14	Toilet Shower 114C Lavatory West	Y	Y	NA	Y	Y	Y	109	Y	
P-3	M1.12/M4.02-1	B/14	Toilet Shower 114C Lavatory Center	Y	Y	NA	Y	Y	Y	107	Y	
P-3A	M1.12/M4.02-1	B/14	Toilet Shower 114C Lavatory East	Y	Y	NA	Y	Y	Y	109	Y	
P-7A	M1.12/M4.02-1	B/14	Toilet Shower 114C Shower North	Y	Y	Y	Y	Y	Y	109	Y	
P-7	M1.12/M4.02-1	B/14	Toilet Shower 114C Shower Center	Y	Y	Y	Y	Y	Y	111	Y	No water pressure Corrected
P-7	M1.12/M4.02-1	B/14	Toilet Shower 114C Shower South	Y	Y	Y	Y	Y	Y	109	Y	
P-4A	M1.13	E/9	Concessions 157 Sink South	Y	Y	Y	Y	Y	Y	91	Y	
P-4F	M1.13	E/9	Concessions 157 Sink Side North	Y	Y	Y	Y	Y	Y	100	Y	Handles get in the way of each other, Corrected
P-4F	M1.13	E/9	Concessions 157 Sink Side South	Y	Y	Y	Y	Y	Y	100	Y	Engineer specified a different handle, Acceptable to owner
P-6	M1.13	HH/24	ILC 145 Drinking Fountain	Y	Y	Y	Y	Y	Y	N/A	Y	
P-4A	M1.13	E/24	ILC 145 Sink	Y	Y	Y	Y	Y	Y	88	Y	
P-3A	M1.13	JJ/24.5	Toilet 152 Lavatory ADA	Y	Y	P	Y	Y	Y	106	Y	

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-3A	M1.13	JJ/24.5	Toilet 153 Lavatory ADA	Y	Y	P	Y	Y	Y	107	Y	
P-4B	M1.13	JJ/24.5	151 Sink	Y	Y	Y	Y	Y	Y	104	Y	
P-4B	M1.13	G/7	Drama 154 Sink	Y	Y	Y	Y	Y	Y	65	Y	No hot water corrected
P-6	M1.13	H/7	Drama 154 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-3A	M1.13/M4.01-1	FF.5/25	Shower 138 Lavatory									Door Locked
P-7B	M1.13/M4.01-1	FF.5/25	Shower 138 Shower									Door Locked
P-8	M1.13/M4.01-1	FF.5/25	Shower 138 Clothes Washer Wall Box									Door Locked
P-3A	M1.13/M4.01-1	FF.5/24	Toilet 140B Lavatory	Y	Y	NA	Y	Y	Y	102	Y	
P-3A	M1.13/M4.01-1	FF.5/24	Toilet 141B Lavatory	Y	Y	NA	Y	Y	Y	111	Y	
P-4B	M1.13/M4.01-1	FF.5/23	Room 141 Sink	Y	Y	Y	Y	Y	Y	97	Y	
P-4C	M1.13/M4.01-1	FF.5/23	Room 140C Kitchenette	Y	Y	Y	Y	Y	Y	98	Y	
P-3A	M1.13/M4.02-3	GG/8.25	Men 135 Lavatory South	Y	Y	Y	Y	Y	Y	103	Y	
P-3	M1.13/M4.02-3	GG/8.25	Men 135 Lavatory Center	Y	Y	Y	Y	Y	Y	104	Y	
P-3	M1.13/M4.02-3	GG/8.25	Men 135 Lavatory North	Y	Y	Y	Y	Y	Y	107	Y	
P-3A	M1.13/M4.02-3	GG/8.25	Women 136 Lavatory South	Y	Y	Y	Y	Y	Y	106	Y	
P-3	M1.13/M4.02-3	GG/8.25	Women 136 Lavatory Center	Y	Y	Y	Y	Y	Y	107	Y	
P-3	M1.13/M4.02-3	GG/8.25	Women 136 Lavatory North	Y	Y	Y	Y	Y	Y	105	Y	
P-3A	M1.13/M4.02-3	GG/8.25	Toilet 134 Lavatory	Y	Y	Y	Y	Y	Y	78	Y	
P-6	M1.13/M4.02-3	GG/8.25	Corridor 130 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-6	M1.15	KK.8/22.5	Choir 163 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-4A	M1.15	LL.3/22.2	165A Sink	Y	Y	Y	Y	Y	Y	111	Y	
P-6	M1.15	LL.6/22	Band 165 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-5A	M1.15	K23/8.2	Scene Shop 164 Sink	Y	Y	Y	Y	Y	Y	~~122~~ 113	Y	Too hot Corrected
P-6	M1.15	K.29/7	Corridor 130 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-3	M1.15/M4.02-4		Men 171 Lavatory South	Y	Y	NA	Y	Y	Y	109	Y	
P-3A	M1.15/M4.02-4		Men 171 Lavatory North	Y	Y	NA	Y	Y	Y	108	Y	
P-3A	M1.15/M4.02-4		Women 173 Lavatory North	Y	Y	NA	Y	Y	Y	108	Y	
P-3	M1.15/M4.02-4		Women 173 Lavatory South	Y	Y	NA	Y	Y	Y	109	Y	
P-3A	M1.15/M4.02-4		Restroom 172 Lavatory	Y	Y	NA	Y	Y	Y	109	Y	
PK-16	M1.15/M4.02-5		Culinary Arts 174 Hand Wash North	Y	Y	NA	Y	Y	Y	115	Y	
PK-16	M1.15/M4.02-5		Culinary Arts 174 Hand Wash South	Y	Y	NA	Y	Y	Y	115	Y	
P-18	M1.15/M4.02-5											All were adequate

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-18	M1.15/M4.02-5											One is disconnected
P-18	M1.15/M4.02-5											Plastic cover still blocking drain
P-4D	M1.16	R/5	3D Art Lab 181 Sink South	Y	Y	Y	Y	Y	Y	108	Y	
P-4D	M1.16	R/5	3D Art Lab 181 Sink Center	Y	Y	Y	Y	Y	Y	108	Y	
P-4D	M1.16	R/5	3D Art Lab 181 Sink North	Y	Y	Y	Y	Y	Y	108	Y	
P-4E	M1.16	R/6	3D Art Lab 181 Sink ADA	Y	Y	Y	Y	Y	Y	108	Y	
P-6	M1.21	C.23/1.5	Fitness Center 211 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-5	M1.21/M4.03-4		Storage 210 Sink	Y	Y	Y	Y	Y	Y	~~122~~ 113	Y	Too hot Corrected
P-4F	M1.21/M4.03-4		Concessions 217 Sink Southeast	Y	Y	Y	Y	Y	Y	110	Y	Handles get in the way of each other, Engineer specified a different handle
P-4F	M1.21/M4.03-4		Concessions 217 Sink Southwest	Y	Y	Y	Y	Y	Y	108	Y	Handles get in the way of each other, Engineer specified a different handle
P-4	M1.21/M4.03-4		Concessions 217 Sink West	Y	Y	NA	Y	Y	Y	NA	Y	
P-6	M1.21/M4.03-4		Alcove 213 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-3A	M1.21/M4.03-4		Toilet 215 Lavatory	Y	Y	NA	Y	Y	YY	109	Y	
P-3A	M1.21/M4.03-4		Women 214 Lavatory 1 East	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.21/M4.03-4		Women 214 Lavatory 2	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.21/M4.03-4		Women 214 Lavatory 3	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.21/M4.03-4		Women 214 Lavatory 4	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.21/M4.03-4		Women 214 Lavatory 5	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.21/M4.03-4		Women 214 Lavatory 6 West	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.21/M4.03-4		Men 212 Lavatory 1 West	Y	Y	NA	Y	Y	Y	107	Y	
P-3	M1.21/M4.03-4		Men 212 Lavatory 2	Y	Y	NA	Y	Y	Y	107	Y	
P-3	M1.21/M4.03-4		Men 212 Lavatory 3	Y	Y	NA	Y	Y	Y	108	Y	
P-3A	M1.21/M4.03-4		Men 212 Lavatory 4 East	Y	Y	NA	Y	Y	Y	111	Y	
P-6	M1.22	C.2/12	Hallway Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-4B	M1.22		Classroom 205 Sink West	Y	Y	Y	Y	Y	Y	112	Y	
P-4B	M1.22		Classroom 205 Sink East	Y	Y	Y	Y	Y	Y	111	Y	

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-4B	M1.22		Training 203 Sink	Y	Y	Y	Y	Y	Y	110	Y	
P-17	M1.22		Training 203 Hand Spray	Y	Y	NA	Y	Y	Y	108	Y	
P-21	M1.22		Utility 204 Laundry Sink	Y	Y	Y	Y	Y	Y	~~122~~ 113	Y	Too hot Corrected
P-3	M1.23		Restroom 219 Lavatory	Y	Y	NA	Y	Y	Y	109	Y	
P-6	M1.23		Corridor 243B Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-4B	M1.23		Student Services 231 Sink	Y	Y	Y	Y	Y	Y	109	Y	
P-3	M1.23		Restroom 239 Lavatory	Y	Y	NA	Y	Y	Y	115	Y	
P-3	M1.23		Restroom 240C Lavatory	Y	Y	NA	Y	Y	Y	114	Y	
P-7	M1.23		Restroom 240C Shower	Y	Y	Y	Y	Y	Y	115	Y	
P-4B	M1.23		Health Room 240 Sink	Y	Y	Y	Y	Y	Y	111	Y	
P-4	M1.23		Science Lab 241 Teacher	Y	Y	Y	Y	Y	Y	109	Y	
P-4	M1.23		Science Lab 241 1 North	Y	Y	Y	Y	Y	Y	111	Y	Pipe is disconnected at drain - Corrected
P-4	M1.23		Science Lab 241 2	Y	Y	Y	Y	Y	Y	116	Y	
P-4	M1.23		Science Lab 241 3	Y	Y	Y	Y	Y	Y	111	Y	
P-4	M1.23		Science Lab 241 4 South	Y	Y	Y	Y	Y	Y	111	Y	
P-4B	M1.23		Prep 241A Sink	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.23		Science Lab 251 Sink 1 South	Y	Y	Y	Y	Y	Y	109	Y	
P-4	M1.23		Science Lab 251 Sink 2	Y	Y	Y	Y	Y	Y	109	Y	
P-4	M1.23		Science Lab 251 Sink 3	Y	Y	Y	Y	Y	Y	109	Y	
P-4	M1.23		Science Lab 251 Sink 4 North	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.23		Science Lab 251 Sink 5 Teacher	Y	Y	Y	Y	Y	Y	111	Y	
P-4	M1.25		Staff Restroom 259 Lavatory	Y	Y	NA	Y	Y	Y	110	Y	
P-4B	M1.25		Storage 262A Sink	Y	Y	Y	Y	Y	Y	~~122~~ 113	Y	Too hot Corrected
P-6	M1.25		Corridor 250 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-4A	M1.25		Horticulture Lab 254 Sink 1 West	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25		Horticulture Lab 254 Sink 2	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25		Horticulture Lab 254 Sink 3	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25		Horticulture Lab 254 Sink 4	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25		Horticulture Lab 254 Sink 5 East	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25		Horticulture Lab 254 Sink Teacher	Y	Y	Y	Y	Y	Y	110	Y	
FH	M1.25		Horticulture Lab 254 Fume Hood	NA	NA	NA	NA	NA	NA	NA	NA	

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-4C	M1.25		Prep 254A Sink	Y	Y	Y	Y	Y	Y	114	Y	
P-4B	M1.25		Prep 256B Sink	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25		Animal Vet Science Lab 258 Sink Teacher	Y	Y	Y	Y	Y	Y	109	Y	
P-4A	M1.25		Animal Vet Science Lab 258 Sink 1 West	Y	Y	Y	Y	Y	Y	109	Y	
P-4B	M1.25		Animal Vet Science Lab 258 Sink 2	Y	Y	Y	Y	Y	Y	109	Y	
P-4B	M1.25		Animal Vet Science Lab 258 Sink 3	Y	Y	Y	Y	Y	Y	109	Y	
P-4B	M1.25		Animal Vet Science Lab 258 Sink 4 East	Y	Y	Y	Y	Y	Y	109	Y	
P-4B	M1.25		Animal Vet Science Lab 258 Sink 5 Side	Y	Y	Y	Y	Y	Y	109	Y	
P-4B	M1.25	L.4/8.25	Kennels 258A Sink	Y	Y	Y	Y	Y	Y	110	Y	
P-4B	M1.25	L.4/8.25	Storage 262A Sink	Y	Y	Y	Y	Y	Y	109	Y	
P-4	M1.25		Prep 261A Sink	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 1 Teacher	Y	Y	N	Y	Y	Y	~~70~~ 109	Y	Not getting heat Corrected
P-4	M1.25/M4.04-2		Science Lab 253 Sink 2 North East	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 3	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 4	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 5	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 6	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 7	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 8	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-2		Science Lab 253 Sink 9 West	Y	Y	Y	Y	Y	Y	110	Y	
FH	M1.25/M4.04-2		Science Lab 253 Fume Hood	NA	NA	NA	NA	NA	NA	NA	NA	Not to be Installed
P-4	M1.25/M4.04-3		Science Lab 261 Sink 1 North West	Y	Y	Y	Y	Y	Y	107	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 2	Y	Y	Y	Y	Y	Y	107	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 3	Y	Y	Y	Y	Y	Y	107	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 4	Y	Y	Y	Y	Y	Y	107	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 5	Y	Y	Y	Y	Y	Y	107	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 6	Y	Y	Y	Y	Y	Y	111	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 7	Y	Y	Y	Y	Y	Y	108	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 8	Y	Y	Y	Y	Y	Y	108	Y	
P-4	M1.25/M4.04-3		Science Lab 261 Sink 9 Teacher	Y	Y	Y	Y	Y	Y	106	Y	
FH	M1.25/M4.04-3		Science Lab 261 Fume Hood	NA	NA	NA	NA	NA	NA	NA	NA	Not to be Installed
P-4	M1.25/M4.04-5		Science Lab 257 Sink 1 Teacher	Y	Y	Y	Y	Y	Y	110	Y	

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 2 South East	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 3	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 4	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 5	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 6	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 7	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 8	Y	Y	Y	Y	Y	Y	110	Y	
P-4	M1.25/M4.04-5		Science Lab 257 Sink 9 North West	Y	Y	Y	Y	Y	Y	110	Y	
FH	M1.25/M4.04-5		Science Lab 257 Fume Hood	NA	NA	NA	NA	NA	NA	NA	NA	Not to be Installed
P-?	M1.25/M4.03-3		Mechanical 260 Sink	Y	Y	Y	Y	Y	Y	130	Y	
P-4A	M1.26		Ag Science Lab 262 Sink 1 West	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26		Ag Science Lab 262 Sink 2	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26		Ag Science Lab 262 Sink 3	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26		Ag Science Lab 262 Sink 4	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26		Ag Science Lab 262 Sink 5 East	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26		Ag Science Lab 262 Sink Center	Y	Y	Y	Y	Y	Y	120	Y	
FH	M1.26		Ag Science Lab 262 Fume Hood									
P-4B	M1.26		Fabrication Lab 266B	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 1	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 2	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 3	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 4	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 5	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 6	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 7	Y	Y	Y	Y	Y	Y	119	Y	
P-4	M1.26/M4.04-6		Science Lab 264 Sink 8	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26/M4.04-6		Science Lab 264 Sink 9	Y	Y	Y	Y	Y	Y	119	Y	
P-4B	M1.26/M4.04-6		Science Prep 264A Sink	Y	Y	Y	Y	Y	Y	119	Y	
FH	M1.26/M4.04-6		Science Prep 264A Fume Hood	Y	Y	NA	Y	Y	Y	NA	Y	
P-3	M1.26/M4.03-1		Men 268 Lavatory West	Y	Y	Y	Y	Y	Y	~~120+~~ ~110		Too hot - Corrected
P-3	M1.26/M4.03-1		Men 268 Lavatory East	Y	Y	Y	Y	Y	Y	~~120+~~ ~110		Too hot - Corrected
P-3	M1.26/M4.03-1		Women 269 Lavatory West	Y	Y	Y	Y	Y	Y	~~120+~~ ~110		Too hot - Corrected

Unit No.	Dwg No.	Grid Location	Description/Location	Observation				Test				Note
				D	C	I	FL	S	NL	T	P	
P-3	M1.26/M4.03-1		Women 269 Lavatory Center	Y	Y	Y	Y	Y	Y	~~120+~~ ~110		Too hot - Corrected
P-3	M1.26/M4.03-1		Women 269 Lavatory East	Y	Y	Y	Y	Y	Y	~~120+~~ ~110		Too hot - Corrected
P-6	M1.26/M4.03-1		Alcove 250B Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-3A	M1.31		Toilet 307 Lavatory	Y	Y	NA	Y	Y	Y	108	Y	
P-3A	M1.31		Toilet 308 Lavatory	Y	Y	NA	Y	Y	Y	108	Y	
P-3A	M1.33		Restroom 302B Lavatory	Y	Y	NA	Y	Y	Y	110	Y	Water doesn't get hot Corrected
P-4A	M1.33		302A Sink	Y	Y	Y	Y	Y	Y	107	Y	
P-4C	M1.33		Staff Lounge 303 Sink	Y	Y	Y	Y	Y	Y	112	Y	
P-6	M1.33	DD/6.5	Hallway Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-3	M1.33/M4.04-4		Men 319 Lavatory West	Y	Y	NA	Y	Y	Y	107	Y	
P-3A	M1.33/M4.04-4		Men 319 Lavatory East	Y	Y	NA	Y	Y	Y	110	Y	
P-3A	M1.33/M4.04-4		Women 320 Lavatory West	Y	Y	NA	Y	Y	Y	109	Y	
P-3	M1.33/M4.04-4		Women 320 Lavatory Center	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.33/M4.04-4		Women 320 Lavatory East	Y	Y	NA	Y	Y	Y	110	Y	
P-6	M1.33/M4.04-4		Alcove 321A Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-6	M1.35		Corridor 321 Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-5	M1.35		Custodial 333C Sink	Y	Y	Y	Y	Y	Y	130	Y	
P-3A	M1.35		Staff Restroom 332 Lavatory	Y	Y	NA	Y	Y	Y	110	Y	
P-3	M1.36/M4.04-1		Men 347 Lavatory West	Y	Y	NA	Y	Y	Y	107	Y	
P-3A	M1.36/M4.04-1		Men 347 Lavatory East	Y	Y	NA	Y	Y	Y	107	Y	
P-3A	M1.36/M4.04-1		Women 346 Lavatory West	Y	Y	NA	Y	Y	Y	107	Y	
P-3	M1.36/M4.04-1		Women 346 Lavatory Center	Y	Y	NA	Y	Y	Y	107	Y	
P-3	M1.36/M4.04-1		Women 346 Lavatory East	Y	Y	NA	Y	Y	Y	107	Y	
P-6	M1.36/M4.04-1		Alcove 321B	Y	Y	NA	Y	Y	Y	NA	Y	

Key:
D = Drain installed correctly & operational.
C= Caulked to mounting surface.
I = Faucet: Hot left/Cold right.
FL = No Leaks at Faucet
S= Faucet shuts off tight-no leaks or drips.
NL=No leaks in drain fitting below counter between fixture and wall.
T =Water temperature ºF.

P = Petcocks shut off water

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Derek Welsh BH	11/3/2020 6/1/21

Notes: [1] Engineer responded that temperature can be adjusted by shower valve.

Plumbing Fixture IV and Test Trap Primers

Type	Location/Serves	Observation			Test		Water in P-Trap
		I	H	A	On	Off	
Floor Drain	Men 213	Y	Y	Y	Y	Y	Dry Trap - Corrected
Floor Drain	Women 214	Y	Y	Y	Y	Y	Passed
Floor Drain	Restroom 215	Y	Y	Y	Y	Y	Passed
Floor Drain	Kitchen 103	Y	Y	Y	Y	Y	Passed/Valve was off
Floor Drain	Women 123	Y	Y	Y	Y	Y	Passed
Floor Drain	Men 125	Y	Y	Y	Y	Y	Passed
Floor Drain	Women 133	Y	Y	Y	Y	Y	Passed
Floor Drain	Restroom 134	Y	Y	Y	Y	Y	Passed
Floor Drain	Men 135	Y	Y	Y	Y	Y	Passed
Floor Drain	Staff RR 152	Y	Y	Y	Y	Y	Passed
Floor Drain	Staff RR 153	Y	Y	Y	Y	Y	Passed
Floor Drain	174	Y	Y	Y	Y	Y	Passed
Floor Drain	Women 173	Y	Y	Y	Y	Y	Passed
Floor Drain	Restroom 172	Y	Y	Y	Y	Y	Passed
Floor Drain	Men 171	Y	Y	Y	Y	Y	Passed
Floor Drain	Men 269	Y	Y	Y	Y	Y	Passed
Floor Drain	Women 268	Y	Y	Y	Y	Y	Passed
Floor Drain	Staff RR 259	Y	Y	Y	Y	Y	Passed
Floor Drain	Kennels 258A	Y	Y	Y	Y	Y	Dry Trap - Corrected
Floor Drain	Storage 254B	Y	Y	Y	Y	Y	Dry Trap - Corrected
Floor Drain	Health Bathroom	Y	Y	Y	Y	Y	Passed
Floor Drain	Restroom 219	Y	Y	Y	Y	Y	Dry Trap - Corrected
Floor Drain	Concessions 217	Y	Y	Y	Y	Y	Dry Trap - Corrected
Floor Drain	Men's PE Locker Room 113	Y	Y	Y	Y	Y	Passed
Floor Drain	Men's Athletic Locker Room 114	Y	Y	Y	Y	Y	Passed
Floor Drain	Women's 320	Y	Y	Y	Y	Y	Passed

Type	Location/Serves	Observation			Test		Water in P-Trap
		I	H	A	On	Off	
Floor Drain	Men's 319	Y	Y	Y	Y	Y	Passed
Floor Drain	Women's 346	Y	Y	Y	Y	Y	Passed
Floor Drain	Men's 347	Y	Y	Y	Y	Y	Passed
Floor Drain	Toilet room 332	Y	Y	Y	Y	Y	Dry Trap - Corrected
Floor Drain	Rest of third floor	Y	Y	Y	Y	Y	Passed

Do the floor drains of the emergency showers have trap primers on the floor drains? Added mechanical trap.
Test the Electric trap primers by pushing the button. Verify flow. Check P-trap for water with flash light.
Test pressure differential. Check P-trap for water with flash light.
Key:
I = Installed, horizontal on cold supply of frequently used fixture
H = Height is minimum of 12" above trap
A = Accessible

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Derek Welsh BH	11/3/2020 6/1/21

Emergency Shower & Eyewash Stations

Unit No.	Drwg No.	Grid Location	Description/Location	Observation		Test				Note
				I	A	PDT	F	DT	MT	
P-11	M1.15	K22/8.2	Scene Shop 164 Eye Wash Station	Y	Y	NA	Y	NA	84	
P-11	M1.23		Science Lab 241 5 Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.23		Prep 241A Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.23		Science Lab 251 Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.25		Horticulture Lab 254 Eye Wash	Y	Y	NA	N	NA	83	[1][2]
P-11	M1.25		Animal Vet Science Lab 258 Eye Wash	Y	Y	NA	Y	NA	80	
P-11	M1.25/M4.04-2		Science Lab 253 Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.25/M4.04-3		Science Lab 261 Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.25		Science Prep 261A Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.25/M4.04-5		Science Lab 257 Eye Wash	Y	Y	NA	Y	NA	85	
P-11	M1.26		Ag Science Lab 262 Eye Wash	Y	Y	NA	Y	NA	82	
P-11	M1.26/M4.04-6		Science Lab 264 Eye Wash	Y	Y	NA	Y	NA	83	
P-11	M1.26		Science Prep 264A Eye Wash	Y	Y	NA	Y	NA	82	
P-11			Science Prep 256B Eye Wash	Y	Y	NA	Y	NA	86	
P-5	M1.01C	CE/C2	Wood Shop Eye Wash	Y	Y	NA	Y	NA	81	
P-5	M1.01C	CD/C2	Mech/Tech Shop Eye Wash	Y	Y	NA	Y	NA	81	

Key:
I = Installed per Detail
A = Accessible
PDT = Pre-test Dial Temperature
F = Water flows on activation
DT = Dial temperature
MT = Measured mixed water temperature

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Derek Welsh Matt white	11/3/2020 12/22/2020

Comments: [1] No water pressure, Resolved via Cx issue 72. [2] Water does not drain properly. Resolved

Division 23 – HVAC System

DDC Interface Operational Tests

1. With system up and running in normal mode, interrupt power to the main control panel.
2. Reinstate power to the main panel controller.

Y	System starts and returns to normal operation without operator intervention.

3. Randomly choose one Zone Controller. Disconnect and reconnect power to the Zone controller.

Y	Verify system acknowledges Zone is off line, and return to normal.

4. Navigate through all screens and levels. Randomly command various control parameters.

Y	Verify all commands are accepted and system functions normally.
Y	Operator interface is logically laid out and represents actual physical installations.
Y	Campus layout is accurately represented.
Y	Floor plans and room numbers are accurately represented.
Y	Controlled equipment is accurately represented.
Y	All specified control components are included on graphics.
Y	All data boxes correctly display specified data.
Y	All graphical labels and descriptions are provided and accurate.
Y	All page links are correct.

5. Review programming information and verify it is as specified.

Y	Schedules, events and holidays programmed.
Y	Alarms programmed.
Y	OSS programmed.
Y	Building pressurization positive and under control. (Full flow mode > DCV)
Y	Summary of all zone temperatures.
Y	Summary of data for each zone.
Y	Master menu.
Y	Security levels programmed.
Y	Trend logs programmed.
Y	Electric peak demand shedding programmed.
Y	Gas meter consumption programmed.
Y	Run time totals programmed.
Y	Power Phase Failure Connected and Programmed.
Y	Program and setpoint changes history
Y	Floating point valves are reset every 24 hours with graphical indication
Y	VFDs power reports to DDC
Y	BACnet points are shown for all BACnet equipment (Chiller, Boilers, VFDs etc.)

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG SG	12/22/2020 2/25/2021

Comments:

Energy Dashboard

1. Verify the following points are presented on a display screen correctly:
2. Display location coordinated with owner.

x	UNIT GRAPHICS (Unit serving display area)
x	FAN ON/OFF POWER
x	FAN SPEED SETTING (% OF TOTAL FLOW)
x	OSA DAMPER POSITION (% OPEN)
x	CO2 LEVEL (PPM)
x	SPACE TEMPERATURE SETPOINT (°F)
x	SPACE TEMPERATURE (°F)
x	OSA TEMPERATURE (°F)
x	MIXED AIR TEMPERATURE (°F)
x	DISCHARGE AIR TEMPERATURE (°F)
x	HYDRONIC COIL VALVE POSITION (% OPEN)
x	LOCAL WEATHER CONDITIONS AND 10 DAY FORECAST WITH WEATHER GRAPHICS
x	NATURAL GAS AND ELECTRICITY USAGE
x	ELECTRICITY AND GAS USAGE TREND VS OSA TEMPERATURE WITH SELECTION ABILITY OF DAY, WEEK, MONTH OR YEAR GRAPH DISPLAYED

x	Tests are complete
x	Performance is acceptable
x	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	3/10/22

Comments:

HVAC Schedule

Zone	ON	OFF	Day	Related AHU
1st floor Classrooms	6:30 AM	3:00 PM	M-F	DOAU-1 & 3
2nd floor Classrooms	6:30 AM	3:00 PM	M-F	DOAU-4 & 5
3rd East Classrooms / Library / Lounge	6:30 AM	3:00 PM	M-F	DOAU - 5
3rd West Classrooms	6:30 AM	3:00 PM	M-F	DOAU -2
Admin	6:30 AM	4:00 PM	M-F	DOAU-6
Athletic	6:30 AM	3:00 PM	M-F	AHU – 1, 2 & 3, DOAU - 4
Commons / Kitchen	6:30 AM	3:00 PM	M-F	AHU - 4
PAC / Theater	6:30 AM	3:00 PM	M-F	AHU – 5, 6 & 7
Domestic HW	5:00 AM	11:00 PM	M-F	NA
Outside lighting	Astrological	Astrological	Daily	NA
CTE	6:30 AM	3:00 PM	M-F	Furnace & DOAU -1A

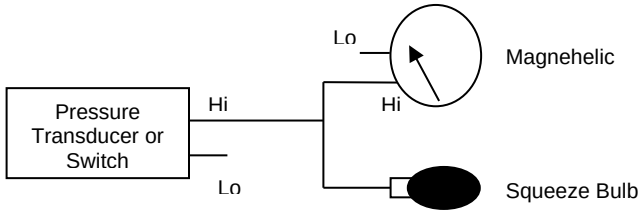
Alarm and Shutdown

Hard Wire Shutdowns

1. Run test in occupied mode, unit in AUTO.
2. Simulate an alarm condition at unit monitoring device, record method of simulation (see procedures below for specific simulation methods).
3. Record value monitoring device trips (if applicable).
4. Verify unit takes specified Action on Alarm and alarm is indicated by all specified indicators.
5. Reset monitoring device, confirm unit returns to normal operation and alarm clears.
6. Repeat tests in HAND mode if applicable.

Simulation Method for High Pressure Shut Down and Alarm

1. Remove the pressure tube from the high pressure side of the system.
2. Set up squeeze bulb and Magnehelic as shown below. Magnehelic range should be chosen based on pressure shutdown/alarm threshold.
3. Verify alarms are cleared and/or unit is operational.
4. Slowly build pressure in the squeeze bulb until alarm is received and/or unit shuts down. Record pressure that alarm or shutdown is achieved.
5. If equipped with manual reset, release pressure and verify reset operation by operating the reset button.
6. If automatic reset, release pressure and verify reset operation.



Simulation Method for Duct Smoke Detector Shut Down

Use one of the following methods as appropriate for detection device.

1. Notify alarm monitoring agency of testing in any case.
2. Using a magnet at smoke detector test point, set off detector.
3. Use canned smoke for smoke detectors and spray onto unit.

High Supply Duct Static Pressure Shutdown and Alarm

Alarm:	**High Supply Duct Static Pressure Alarm**
Action-on-Alarm:	Shutdown, close OSA/relief dampers, open return damper
Type of reset:	Manual
Shutdown specified to trigger at:	3.0”
Graphical indication of alarm method:	Not Specified
Special alarm reporting requirements:	Alarm reports to alarm container

Unit in AUTO:

DOAU:	**1**	**2**	**3**	**4**	**5**	**6**	**CTE-1**
Pre-Test:							
Unit operating normally	Y	Y	Y	Y	Y	Y	Y
Alarms clear	Y	Y	Y	Y	Y	Y	Y
Test:							
Simulate alarm condition	Y	Y	Y	Y	Y	Y	Y
Action on Alarm is executed	Y	Y	Y	Y	Y	Y	Y
Graphics indicate alarm	Y	Y	Y	Y	Y	Y	Y
Alarm pops-up	Y	Y	Y	Y	Y	Y	Y
BAS system logs alarm in report	Y	Y	Y	Y	Y	Y	Y
System resets as specified	Y	Y	Y	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y

AHU:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pre-Test:							
Unit operating normally	Y	Y	Y	Y	Y	Y	Y
Alarms clear	Y	Y	Y	Y	Y	Y	Y
Test:							
Simulate alarm condition	Y	Y	Y	Y	Y	Y	Y
Action on Alarm is executed	Y	Y	Y	Y	Y	Y	Y
Graphics indicate alarm	Y	Y	Y	Y	Y	Y	Y
Alarm pops-up	Y	Y	Y	Y	Y	Y	Y
BAS system logs alarm in report	Y	Y	Y	Y	Y	Y	Y
System resets as specified	Y	Y	Y	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y

Unit in HAND:

DOAU:	3
Pre-Test:	
Unit operating normally	Y
Alarms clear	Y
Test:	
Simulate alarm condition	Y
Action on Alarm is executed	Y
Graphics indicate alarm	Y
Alarm pops-up	Y
BAS system logs alarm in report	Y
System resets as specified	Y
Tests are complete	Y
Performance is acceptable	Y
Overrides clear, set points to original	Y

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/1/2020 1/6/2021

Comments:

Duct Smoke Detector Shutdown and Alarm

Alarm:	Duct Smoke Detector Shutdown and Alarm
Action-on-Alarm:	Shutdown, close OSA/relief dampers, open return damper
Type of reset:	Manual
Shutdown specified to trigger at:	Magnet, artificial smoke
Graphical indication of alarm method:	
Special alarm reporting requirements:	No DDC alarm, fire alarm only

Unit in AUTO:

AHU:	1	2	3	4	5	6	7
Pre-Test:							
Unit operating normally	Y	Y	Y	Y	Y	Y	Y
Alarms clear	Y	Y	Y	Y	Y	Y	Y
Test:							
Simulate alarm condition	Y	Y	Y	Y	Y	Y	Y
Action on Alarm is executed	Y	Y	Y	Y	Y	Y	Y
Graphics indicate alarm	Y	Y	Y	Y	Y	Y	Y
Alarm pops-up	Y	Y	Y	Y	Y	Y	Y
BAS system logs alarm in report	Y	Y	Y	Y	Y	Y	Y
System resets as specified	Y	Y	Y	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y

Unit in AUTO:

DOAU:	1	2	3	4	5	6	CTE-1
Pre-Test:							
Unit operating normally	Y	Y	Y	Y	Y	Y	Y
Alarms clear	Y	Y	Y	Y	Y	Y	Y
Test:							
Simulate alarm condition	Y	Y	Y	Y	Y	Y	Y
Action on Alarm is executed	Y	Y	Y	Y	Y	Y	Y
Graphics indicate alarm	Y	Y	Y	Y	Y	Y	Y
Alarm pops-up	Y	Y	Y	Y	Y	Y	Y
BAS system logs alarm in report	Y	Y	Y	Y	Y	Y	Y
System resets as specified	Y	Y	Y	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y

Unit in HAND:

DOAU:	3
Pre-Test:	[1]
Unit operating normally	Y
Alarms clear	Y
Test:	
Simulate alarm condition	NA
Action on Alarm is executed	NA
Graphics indicate alarm	NA
Alarm pops-up	NA
BAS system logs alarm in report	NA
System resets as specified	NA
Tests are complete	NA
Performance is acceptable	NA
Overrides clear, set points to original	NA

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH BH/SG	11/17/2020 1/20/2021

Comments: [1] Units do not come with HOA switch. Unit in hand test is not applicable.
[2] Witnessed by control contractor and done by fire Marshall.

Low Temperature Protection Shutdown and Alarm

Alarm:	**Freeze Protection Shutdown and Alarm**
Action-on-Alarm:	Shutdown, close OSA/relief dampers, open return damper and hot water valve
Type of reset:	Automatic
Shutdown specified to trigger at:	35 F
Graphical indication of alarm method:	Color change
Special alarm reporting requirements:	DDC logs alarm

Unit in AUTO:

AHU:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pre-Test:	[1]						
Unit operating normally	NA	Y	Y	Y	Y	Y	Y
Alarms clear	NA	Y	Y	Y	Y	Y	Y
Test:							
Simulate alarm condition	NA	Y	Y	Y	Y	Y	Y
Action on Alarm is executed	NA	Y	Y	Y	Y	Y	Y
Graphics indicate alarm	NA	Y	Y	Y	Y	Y	Y
Alarm pops-up	NA	Y	Y	Y	Y	Y	Y
BAS system logs alarm in report	NA	Y	Y	Y	Y	Y	Y
Valves and dampers posture	NA	Y	Y	Y	Y	Y	Y
System resets as specified	NA	Y	Y	Y	Y	Y	Y
Tests are complete	NA	Y	Y	Y	Y	Y	Y
Performance is acceptable	NA	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	NA	Y	Y	Y	Y	Y	Y

Unit in HAND (Sample test):

AHU:	**4**
Pre-Test:	
Unit operating normally	Y
Alarms clear	Y
Test:	
Simulate alarm condition	Y
Action on Alarm is executed	Y
Graphics indicate alarm	Y
Alarm pops-up	Y
BAS system logs alarm in report	Y
System resets as specified	Y
	Y
Tests are complete	
Performance is acceptable	Y
Overrides clear, set points to original	Y
	Y

Unit in AUTO:

DOAU:	1	2	3	4	5	6
Pre-Test:						
Unit operating normally	Y	Y	Y	Y	Y	Y
Alarms clear	Y	Y	Y	Y	Y	Y
Test:						
Simulate alarm condition	Y	Y	Y	Y	Y	Y
Action on Alarm is executed	Y	Y	Y	Y	Y	Y
Graphics indicate alarm	Y	Y	Y	Y	Y	Y
Alarm pops-up	Y	Y	Y	Y	Y	Y
BAS system logs alarm in report	Y	Y	Y	Y	Y	Y
Valves and dampers posture	Y	Y	Y	Y	Y	Y
System resets as specified	Y	Y	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y

Unit in HAND (Sample):

DOAU:	5
Pre-Test:	
Unit operating normally	Y
Alarms clear	Y
Test:	
Simulate alarm condition	Y
Action on Alarm is executed	Y
Graphics indicate alarm	Y
Alarm pops-up	Y
BAS system logs alarm in report	Y
System resets as specified	Y
Tests are complete	Y
Performance is acceptable	Y
Overrides clear, set points to original	Y

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH Matt white, WCG Stuart Greenwood, WCG	10/23/2020 12/8/2020

Comments: [1] There is no outside air damper so no freeze stat required.

Fan On/OFF and Fan Failure Alarm (SAMPLE TEST)

1. Override the system so that the fan is off.
2. Verify fan is off by direct observation and status is off.
3. Allow the system to run normally with fans on.
4. Turn off the unit at disconnect and verify fan failure alarm is generated.
5. Turn power back on and verify alarm clears.

	DOAS	DOAU	AHU	AHU	EF	EF	Expected
	1	5	1	5	210	211	
OFF Mode:							
Fan command displayed	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Fan status displayed	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Fan observed	OFF	OFF	OFF	OFF	OFF	OFF	OFF
ON Mode:							
Fan command displayed	ON	ON	ON	ON	ON	ON	ON
Fan status displayed	ON	ON	ON	ON	ON	ON	ON
Fan observed	ON	ON	ON	ON	ON	ON	ON
Failure alarm received	Y	Y	Y	Y	Y	Y	
Failure alarm cleared	Y	Y	Y	Y	Y	Y	
Fan-in-hand alarm received	Y	Y	Y	Y	NA	NA	
Fan-in-hand alarm cleared	Y	Y	Y	Y	NA	NA	
Tests are complete	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG	12/8/2020 12/9/2020

Comments:

Fire Alarm Shut Down

1. Place the system in the occupied mode and verify all air-handling devices are operating normally.
2. Cause a fire alarm signal from the fire alarm panel. Verify all air handling equipment and any interlocked fans are turned off.
3. Verify all air handling equipment restarts after fire alarm is cleared.

Unit No.	Off On Alarm	On When Cleared		Unit No.	Off On Alarm	On When Cleared
AHU-1	Y	Y		EF-101	Y	Y
AHU-2	Y	Y		EF-102	Y	Y
AHU-3	Y	Y		EF-103	Y	Y
AHU-4	Y	Y		EF-106	Y	Y
AHU-5	Y	Y		EF-107	Y	Y
AHU-6	Y	Y		EF-201	Y	Y
AHU-7	Y	Y		EF-202	Y	Y
DOAU-1	Y	Y		EF-203	Y	Y
DOAU-2	Y	Y		EF-204	Y	Y
DOAU-3	Y	Y		EF-205	Y	Y
DOAU-4	Y	Y		EF-206	Y	Y
DOAU-5	Y	Y		EF-207	Y	Y
DOAU-6	Y	Y		EF-208	Y	Y
DOAU-1 (CTE)	Y	Y		EF-209	Y	Y
FCUs	Y	Y		EF-210	Y	Y
				EF-211	Y	Y
				EF-301	Y	Y
				EF-1	Y	Y
				EF-2	Y	Y
				EF-3	Y	Y
				EF-4	Y	Y
				EF-5	Y	Y
				EF-6	Y	Y
				DF-1	Y	Y
				DF-2	Y	Y
				DF-3	Y	Y
				DF-4	Y	Y

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH/SG	6/28/2021

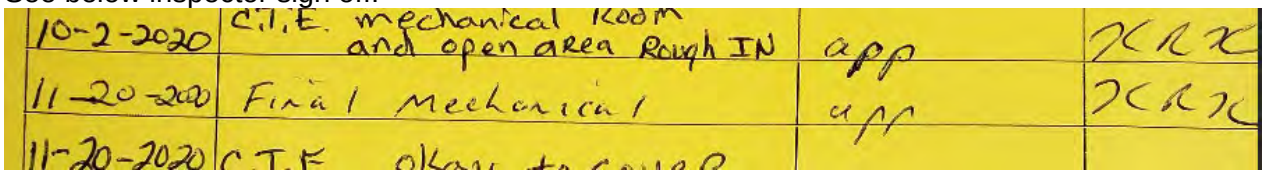
Comments:

Fire / Smoke Damper Test

~~**Use Excel Spread Sheet Fire / Smoke Damper Data Sheet**~~

1. ~~Perform these tests while the building is generally unoccupied, verify HVAC system is prepared for a long term shutdown.~~
2. ~~Notify alarm monitoring company that a fire alarm test will be conducted.~~
3. ~~Set off the fire alarm and silence the alarm, do not reset.~~
4. ~~Inspect smoke dampers to verify that they have closed fully. (Dampers should have already been verified open during individual unit inspection).~~
5. ~~Reset fire alarm.~~

The CxA was not available for the smoke damper testing with the install team and the inspectors. The building inspector and fire marshal tested every damper before sign off.
See below inspector sign off.



10-2-2020	C.I.E. mechanical Room and open area Rough IN	app	JCRC
11-20-2020	Final Mechanical	app	JCRC
11-20-2020	C.I.E. okay to cover		

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Y	Notify alarm monitoring company that all testing is complete.

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:	Delta Sheet Metal Milne Electrical	11/24/2020
	CxA:	BH	6/28/2021

Comments:

Miscellaneous Sensor Calibration

1. For each sensor listed, verify calibration using a reference standard
2. Record reference standard device

Reference Standard Devices

Parameter	Reference Standard Device	Comment:
Temperature	Fluke 52	
Bldg Static Press	Risepro Digital Manometer	

Sensor	Ref. Value	BAS Value		Sensor	Ref. Value	BAS Value
Outside Air Temp	51	50				
Building SP	0.00	0.001				

Y	Tests are complete
Y	Performance is acceptable

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Derek Welsh SG	11/3/2020 3/25/2021

Comments:

DDC Space Temperature Monitoring (SAMPLE)

1. Lower high-space-temperature alarm set point below room temperature or simulate a space temperature higher than high-temperature alarm set point. Verify a high-temperature alarm is generated at the BAS.
2. Clear override/reset set point to original value. Verify alarm clears.
3. Raise low-space-temperature alarm set point below room temperature or simulate a space temperature lower than low-temperature alarm set point. Verify a low-temperature alarm is generated at the BAS.
4. Clear override/reset set point to original value. Verify alarm clears.

FCU-	108	109	110	201	202	301	Expected
Pre-Test:							
Space temperature	63	63	66	71	66	68	
High-temp alarm set point	90	90	90	75	75	75	+3> SP
Low-temp alarm set point	65	65	65	65	65	65	
Test:							
High-temp set point	55	55	55	60	60	60	
High-temp alarm generated at BAS	Y	Y	Y	Y	Y	Y	
Alarm clears	Y	Y	Y	Y	Y	Y	
Low-temp set point [x] or simulated space temp [ ]	80	80	80	80	80	80	
Low-temp alarm generated at BAS	Y	Y	Y	Y	Y	Y	
Alarm clears	Y	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	

FCU-	302	323	Freezer	Cooler	Expected
Pre-Test:					
Space temperature	69	65	-10	34	
High-temp alarm set point	75	90	5	40	+3> SP
Low-temp alarm set point	65	65	NA	NA	
Test:					
High-temp set point	60	55	-15	30	
High-temp alarm generated at BAS	Y	Y	Y	Y	
Alarm clears	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Stuart Greenwood	12/30/2020

Comments:

Room Sensor Calibration, Point-to-Point & Manual Override Test

1. Measure room air temperature and CO2 with a reference standard and record reference and BAS indicated values.
2. Press the manual override (MO) button.
3. Verify that BAS indicates correct zone based on unit number and room number as affected by MO and unit fan starts in occupied mode.
4. Induce CO2 onto sensor and verify point to point on graphic.
5. As applicable, operate other room input devices such as switches or purge timers, record in “Other”.
6. Clear override and move to next room and repeat steps.

Reference Standard Used: TelAire CO2 and Fluke 52 Thermocouple

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
101	NA	169	64	64	NA	NA	Y	NA	Y	
102	NA	168	64	63	NA	NA	Y	NA	Y	
103	NA	170	63	63	NA	NA	Y	NA	Y	
104	NA	167	62	61	NA	NA	Y	NA	Y	
105	NA	166	64	63	NA	NA	Y	NA	Y	
106	107	164	60	60	NA	NA	Y	NA	Y	
107										
108	101	181	66	66	NA	NA	Y	NA	Y	
109										
110	NA	181B	67	67	NA	NA	Y	NA	Y	
111	102	Entry Hallway	65	64	NA	NA	Y	NA	Y	
112	103	179	66	65	424	430	Y	N/A	Y	
113										
114	104	178	65	65	440	414	Y	N/A	Y	
115										
116	105	177	66	66	421	432	Y	N/A	Y	
117										
118	NA	Hallway	63	62	NA	NA	Y	NA	Y	
119	106	174	61	61	409	428	Y	Y	Y	
120										

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
121	108	165	57	57	409	422	Y	Y	Y	
122										
123	NA	165A	65	66	NA	NA	Y	NA	Y	
124	109	163A	63	62	NA	NA	Y	NA	Y	
125	110	163	63	63	410	474	Y	Y	Y	
126										
127	111	154	63	63	491	535	Y	Y	Y	
128										
129	NA	151	69	69	NA	NA	Y	NA	Y	
130	NA	150	69	68	NA	NA	Y	NA	Y	
131	NA	146	67	67	NA	NA	Y	NA	Y	
132	NA	148	70	69	NA	NA	Y	NA	Y	
133	NA	149	70	70	NA	NA	Y	NA	Y	
134	NA	147	69	69	NA	NA	Y	NA	Y	
135	112	145	60	61	NA	NA	Y	NA	Y	
136										
137	NA	145A	63	64	NA	NA	Y	NA	Y	
138	NA	137	65	65	NA	NA	Y	NA	Y	
139	NA	140	63	63	NA	NA	Y	NA	Y	
140	113	141	66	66	410	414	Y	Y	Y	
141	NA	142	67	63	NA	NA	Y	NA	Y	
142	NA	Concessions	62	62	NA	NA	Y	NA	Y	
143	NA	133	62	62	NA	NA	Y	NA	Y	
144	NA	123	60	60	NA	NA	Y	NA	Y	
145	114	120	66	65	406	398	Y	Y	Y	
146										
147	116	102	63	63	NA	NA	Y	NA	Y	
148	116	101	64	64	NA	NA	Y	NA	Y	
149	NA	103	63	64	NA	NA	Y	NA	Y	
150										
151	NA	103D	66	65	NA	NA	Y	NA	Y	

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
152	116	103A	65	64	NA	NA	Y	NA	Y	
153	NA	103B	64	63	NA	NA	Y	NA	Y	
154	NA	118	65	64	NA	NA	Y	NA	Y	
155	NA	117	64	63	NA	NA	Y	NA	Y	
156	NA	114B	64	64	NA	NA	Y	NA	Y	
157	NA	114	64	64	NA	NA	Y	NA	Y	
158	NA	114E	65	65	NA	NA	Y	NA	Y	
159	NA	113	65	64	NA	NA	Y	NA	Y	
160	NA	113A	65	64	NA	NA	Y	NA	Y	
161	117	105A	70	69	NA	NA	Y	NA	Y	
162	117	105	70	69	NA	NA	Y	NA	Y	
163	117	108A	61	61	NA	NA	Y	NA	Y	
164	117	108	60	59	NA	NA	Y	NA	Y	
165	117	106	70	69	NA	NA	Y	NA	Y	
166	117	106A	68	69	NA	NA	Y	NA	Y	
167	118	107	65	66	NA	NA	Y	NA	Y	
168										
169	NA	Entry Vestibule 131A	53.5	58	NA	NA	Y	NA	Y	
170	NA	Storage	64	64	NA	NA	Y	NA	Y	
201	201	267	67	67	434	430	Y	Y	Y	
202										
203	202	266	67	67	469	433	Y	Y	Y	
204										
205	203	266B	65	66	NA	NA	Y	NA	Y	
206	NA	266A	67	68	NA	NA	Y	NA	Y	
207	204	Lab 262	65	66	NA	NA	Y	NA	Y	
208									Y	
209	205	Aquaponics 262A	51	51	NA	NA	Y	NA	Y	
210	206	CR 258	67	66	NA	NA	Y	NA	Y	
211									Y	
212	NA	254B	69	68	NA	NA	Y	NA	Y	

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
213	NA	254A	62	63	NA	NA	Y	NA	Y	
214	207	254	69	69	NA	NA	Y	NA	Y	
215										
216	208	271	68	68	410	643	Y	Y	Y	
217										
218	NA	Shared Learning 270	67	67	NA	NA	Y	NA	Y	
219	209	265	69	70	432	460	Y	Y	Y	
220										
221	NA	264A	71	71	NA	NA	Y	NA	Y	
222	NA	264	64	65	NA	NA	Y	NA	Y	
223										
224	NA	263	67	67	NA	NA	Y	NA	Y	
225	211	Science 261	68	68	NA	NA	Y	NA	Y	
226									Y	
227	NA	261A	70	70	NA	NA	Y	NA	Y	
228	213	257	69	68	NA	NA	Y	NA	Y	
229									Y	
230	NA	256	71	70	NA	NA	Y	NA	Y	
231	214	253	69	69	NA	NA	Y	NA	Y	
232										
233	NA	252	66	68	NA	NA	Y	NA	Y	
234	215	251	68	67	NA	NA	Y	NA	Y	
235										
236	216	241A	67	67	NA	NA	Y	NA	Y	
237	216	241	68	68	NA	NA	Y	NA	Y	
238										
239	217	231	70	71	NA	NA	Y	NA	Y	
240	217	240A	70	69	NA	NA	Y	NA	Y	
241	217	240	70	70	NA	NA	Y	NA	Y	
242	217	240B	68	69	NA	NA	Y	NA	Y	
243	217	232	71	70	NA	NA	Y	NA	Y	

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
244	217	233	70	70	NA	NA	Y	NA	Y	
245	217	234	70	71	NA	NA	Y	NA	Y	
246	217	235	71	71	NA	NA	Y	NA	Y	
247	217	236	70	70	NA	NA	Y	NA	Y	
248	217	238	68	68	NA	NA	Y	NA	Y	
249	217	237	69	69	NA	NA	Y	NA	Y	
250	218	229A	70	70	NA	NA	Y	NA	Y	
251	218	228	70	70	NA	NA	Y	NA	Y	
252	218	226	69	70	NA	NA	Y	NA	Y	
253	218	224	70	70	NA	NA	Y	NA	Y	
254	218	222	70	70	NA	NA	Y	NA	Y	
255	218	218	69	69	NA	NA	Y	NA	Y	
256	218	227	71	70	NA	NA	Y	NA	Y	
257	218	225	70	70	NA	NA	Y	NA	Y	
258	218	223	70	70	NA	NA	Y	NA	Y	
259	218	221	70	70	NA	NA	Y	NA	Y	
260	218	220	69	70	NA	NA	Y	NA	Y	
261	219	207	66	68	474	451	Y	Y	Y	
262										
263	220	206	67	68	410	428	Y	Y	Y	
264										
265	221	205	67	68	391	449	Y	Y	Y	
266										
267	222	205A	67	69	NA	NA	Y	NA	Y	
268	223	203	67	68	429	437	Y	Y	Y	
269	NA	204	68	68	NA	NA	Y	NA	Y	
270	NA	216	65	67	NA	NA	Y	NA	Y	
271	225	211	69	69	420	435	Y	Y	Y	
272										
273	NA	250A	66	65	NA	NA	Y	NA	Y	
274	NA	245	60	61	NA	NA	Y	NA	Y	

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
275	NA	230A	72	71	NA	NA	Y	NA	Y	
276	NA	230B	68	68	NA	NA	Y	NA	Y	
277	NA	242	68	68	NA	NA	Y	NA	Y	
301	301	345	68	69	445	458	Y	Y	Y	
302										
303	302	343	69	69	429	415	Y	Y	Y	
304										
305	303	341	69	69	435	438	Y	Y	Y	
306										
307	304	339	69	69	430	432	Y	Y	Y	
308										
309	305	337	69	69	422	430	Y	Y	Y	
310										
311	306	335	70	70	426	412	Y	Y	Y	
312										
313	307	331	70	70	432	551	Y	Y	Y	
314										
315	308	329	69	69	448	440	Y	Y	Y	
316										
317	309	327	69	69	440	442	Y	Y	Y	
318										
319	310	325	70	69	435	448	Y	Y	Y	
320										
321	311	349	68	69	432	425	Y	Y	Y	
322										
323	NA	348	69	69	NA	NA	Y	NA	Y	
324	312	344	70	70	405	445	Y	Y	Y	
325										
326	313	342	70	70	414	440	Y	Y	Y	
327										
328	314	340	70	70	438	438	Y	Y	Y	

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
329										
330	NA	331	69	69	NA	NA	Y	NA	Y	
331	315	336	70	70	434	450	Y	Y	Y	
332										
333	316	333A	71	71	NA	NA	Y	NA	Y	
334	317	330	70	70	425	435	Y	Y	Y	
335										
336	318	328	69	70	380	404	Y	Y	Y	
337										
338	NA	326A	69	70	NA	NA	Y	NA	Y	
339	319	326B	69	70	NA	NA	Y	NA	Y	
340	320	324	69	69	382	424	Y	Y	Y	
341										
342	NA	322	69	69	NA	NA	Y	NA	Y	
343	321	323	68	69	424	438	Y	Y	Y	
344										
345	322	318	69	68	NA	NA	Y	NA	Y	
346	323	317	68	69	408	410	Y	Y	Y	
347										
348	324	316	69	71	402	451	Y	Y	Y	
349										
350	325	315	71	72	417	482	Y	Y	Y	
351										
352	326	314	71	71	446	458	Y	Y	Y	
353										
354	338	313	69	70	NA	NA	Y	NA	Y	
355	328	312	69	70	435	442	Y	Y	Y	
356										
357	329	311	69	70	387	419	Y	Y	Y	
358										
359	330	310	69	70	393	451	Y	Y	Y	

FCU	VAV	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
360										
361	331	309	70	72	398	422	Y	Y	Y	
362										
363	NA	301	69	70	NA	NA	Y	NA	Y	
364	327	302C	71	71	NA	NA	Y	NA	Y	
365	332	302	70	70	425	443	Y	Y	Y	
366										
367										
368										
369	333	303	69	69	453	453	Y	Y	Y	
370										
371	334	304	69	69	423	441	Y	Y	Y	
372										
373	335	305	69	70	416	445	Y	Y	Y	
374										
375	336	306	68	70	405	438	Y	Y	Y	
376										
377	337	302A	69	69	NA	NA	Y	NA	Y	

Unit	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
AFD-105	144	70	70	NA	NA	Y	NA	Y	
AHU-5	Theatre 159 & 160	70	70	423	441	Y	Y	Y	
EF-102	Mechanical 176A	65	64.9	NA	NA	Y	NA	Y	
EF-101	Kiln 181A	67	66.5	NA	NA	Y	NA	Y	
EF-202	Electrical 208	66	65.4	NA	NA	Y	NA	Y	
AFD-216	Fitness Center 211	69	69	NA	NA	Y	NA	Y	
EF-210	Mechanical 209	68	69	NA	NA	Y	NA	Y	
AHU-3	Auxiliary Gym 202	70	70	NA	NA	Y	NA	Y	
AHU-2	Auxiliary Gym 201	70	70	NA	NA	Y	NA	Y	
EF-208	Electrical 255	75	75.1	NA	NA	Y	NA	Y	

Unit	Room	Ref Temp	BAS Temp	Ref CO2	BAS CO2	MO Test	CO2 P2P	Graphics Match	Issues
AFD-202	Ag Science Lab 258A	62.7	62.5	NA	NA	Y	NA	Y	
EF-301	334	72	72	NA	NA	Y	NA	Y	
	Electrical 333B	70	70	NA	NA	Y	NA	Y	
EF-209	Triage 240, Treatment 240A	72.7	72.5	NA	NA	Y	NA	Y	
AHU-1	Gymnasium 110	70	70	NA	NA	Y	NA	Y	
AHU-4	Commons 131	63	63	NA	NA	Y	NA	Y	
AHU-5	Auditorium	55	54	460	496	Y	Y	Y	
AHU-6	Stage 160	60	59	NA	NA	Y	NA	Y	
AHU-7	Upper Lobby 243 & Lower Lobby 158	60	59	NA	NA	Y	NA	Y	
EF-210	Mechanical 209	71.5	71.8	NA	NA	Y	NA	Y	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	BH	10/23/2020
	Stuart Greenwood	12/30/2020

Comments:

Central Plant Systems

Make Up Water Monitoring

1. Simulate a condition for the hydronic loop to have make up water valve open for long time.
2. Verify the make-up water alarm is activated and appeared on graphic.

Make Up Water Monitoring	HTG	CHW	Expected
Pre-Test:			
Make up water level displayed on DDC	Y	[1]	
Make up water alarm flow rate set point	1 gpm		1 gpm
Make up water alarm flow time period set point	2 min		2 min
Make up water valve position observed	CLOSED		CLOSED
Test:			
Simulate a condition for the make-up water flow	OK		
Make up water valve position observed	OPEN		OPEN
Make up water alarm is received	Y		
Tests are complete	Y		
Performance is acceptable	Y		
Overrides clear, set points to original	Y		

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	1/20/2021

Comments: [1] Did not perform test, had no way to recover glycol. Notified contractor with no response. Issue # 95.

Pump Lead/Lag and Failure/Alarm

1. Conduct test with lead pump running
2. Record lead and lag pump status.
3. At the lead pump motor control center, turn the switch from Auto to Off.
4. Verify alarm is reported and lag pump starts.
5. Turn lead pump back on, this should just require switching the MCC to Auto but also may require software reset.
6. Trip the lead/lag sequence and verify the lag pump becomes the lead.
7. Repeat 1-5 for the new lead pump.
8. Verify Lead/Lag rotation is programmed to rotate based on run hours.

Lead Pump	CCP-1	CCP -2	HCP-1	HCP -2
Lead Status ON	Y	Y	Y	Y
Lag Pump	CCP -2	CCP -1	HCP -2	HCP -1
Lag Status OFF	Y	Y	Y	Y
Lag Start on Lead Fail?	Y	Y	Y	Y
Pump Failure Alarm Reported?	Y	Y	Y	Y
Lead/Lag Switched?	Y	Y	Y	Y
Lead / Lag rotation switch on run hours	168	168	168	168
Adjust run hours setpoint	1	1	1	1
Lead / Lag rotates	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG	12/8/2020 12/21/2020

Comments:

Hydronic Loop Pressure Control Reset

1. Verify the programmed hydronic water pressure set point reset range match with design.
2. Start test with pumps off
3. Verify the set point is at minimum value.
4. Turn on the pumps.
5. Adjust the reset frequency as needed.
6. Simulate no pressure request.
7. Verify the set point stays at minimum.
8. Simulate at least one pressure request.
9. Verify the set point increase by each reset interval after every reset frequency.
10. Verify the set point reset to maximum set point and stop.

	CHW	HW	Expected
Start of test:			
Hydronic water differential pressure set point reset min	4	4	5 psi
Hydronic water differential pressure set point reset max	5	5	15 psi
Set point reset frequency	10min	10 min	5 min
Set point reset interval	.2 psi	.2 psi	.2 psi
Pressure request condition	>90	>90	Valves > 90%
Pressure decrement conditions	<75	<75	Valves < 75%
# of pressure request needed for reset	≥1	>50 [2]	≥1
Test:			
Simulate set point reset frequency	2 min	2 min	< 1 min
Pump(s) command/status	OFF	OFF	OFF
Hydronic water differential pressure set point	6 psi	4 psi	5 psi
Simulate # of pressure request	0	0	0
Pump(s) command/status	ON	ON	ON
Wait for reset frequency	Y	Y	
Hydronic water differential pressure set point	6.4 psi	5 psi	5 psi
Simulate # of pressure request	1	152 [2]	≥1
Wait for the 1st reset frequency	Y	Y	
Hydronic water differential pressure set point	7 psi [4]	4.2 [3]	6 psi
Max hydronic water differential pressure set point achieve	7 psi	5.0	15 psi
Differential pressure setpoint does not go above max	Y	Y	
Tests are complete	Y	Y	
Performance is acceptable	Y	Y	
Overrides clear, set points to original	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG	12/21/2020

Comments: See next page

[1] Four differential pressure sensors, one for each floor (including mezzanine). Controls to the lowest DP relative to setpoint. This test tracks a 4-5 PSI sensor, 4 is min, 5 is max. Pumps do not seem capable of getting 15 PSI as specified in sequence.
[2] Currently, set to >50% to help tune the system during construction. Usually, it would be any valve above 90%. ATS demonstrates capability to control this way for pressure increase.
[3] 4.2 with currently programmed/adjusted settings.
[4] set to 7 psi temporarily to test sequence.

Chiller Enable/Disable Test

1. Conduct test with building in occupied mode.
2. Simulate an outside air temperature above the Chiller lock out set point and create a call for cooling.
3. Verify chilled water system is enabled with either the Flow switch or pressure DP is met.
4. Verify Chiller bypass control
5. After system cycles off, verify pumps operate for five-minute delay.
6. Verify chiller alarms report to DDC.

	CW Plant	Expected
Chiller Enable Test:		
Building occupied status	OCC	Occ.
Simulated outside air temp [ ] or set point [Y]	40	
Create demand for cooling	Y (Valve at 100%)	Valve > 50%
Chiller system enabled	ON	ON
Flow Switch / Pressure DP Status	ON	ON
Chiller alarm	Normal	NORMAL
Chiller bypass valve position	62%	
Chiller minimum flow (All valves closed)	0	Y GPM
Override flow to higher flow (All valves open)	320	Y GPM
Does bypass valve modulate to maintain minimum flow?	Y	
Primary CHW supply temperature	43.7	44°F
Primary CHW return temperature	46.8	
Primary CHW set point	44	
Pumps operate for delay on system shut down	Y	
Simulate chiller alarm	No flow	
Alarm reports to DDC	Y	
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:	**Team Member**	**Name/Co.**	**Date**
	Testing Contractor:		
	CxA:	SG	4/7/2021

Comments:

Heating Plant Enable/Disable

Enable/Disable

1. Start test with heating plant in occupied mode.
2. Simulate outside air temperature to be below the heating lockout set point.
3. Simulate a call for heating from the system.
4. Verify lead system circulation pump and boiler and boiler pump are enabled by BAS, lead primary and secondary circulation pumps start and boiler operates.
5. On a further demand from the system, verify the lag boiler fires. Since these are condensing boilers, ensure that the lag boiler fires at a low and equal rate to the lead boiler.
6. Remove any call for heating in the system. Verify the heating water system shuts down after 10 minutes.
7. Place the outside air temperature above the lockout of 65°F and simulate a call for heat. Verify the boiler remains off. Release the override and verify the boiler fires.
8. Switch the lead/lag status on the pumps and boilers. Retest with new lead boiler.
9. Simulate a condition where the boiler isolation valve is closed and verify the boilers do not fire.
10. Verify low SWT alarm
11. Verify High SWT alarm

B-	1	2	3	Expected
Heating water system ENABLED	Y	Y	Y	
Boiler temperature set point	127	127	127	
Boiler supply temperature	129	120	116	
Boiler enabled	Y	Y	Y	Y
Boiler observed ON	Y	Y	Y	Y
Boiler supply water flow (GPM)	180 [1]	173 [1]	216	
Heating water supply temp	129	129	116	
Heating water return temp	123	123	116	
Boiler firing to control to set point	Y	Y	Y	Y
DDC HWS temperature set point changed to	180	180	180	
Boiler temperature set point changed to	180	180	180	
Boiler set points from adjustment	Y	Y	Y	
Lag boiler starts on further demand?	Y	Y	Y	Y
Lag boiler	3	3	3	
Firing rates equal on all firing boilers?	Y	Y	Y	Y
Boiler supply temperature	119	119	119	
Heating water supply temp	115	115	115	
Heating water return temp	114	114	114	
Boilers firing to control to set point	Y	Y	Y	Y
Boiler supply water flow (GPM)	180	180	180	
DDC HWS temperature set point changed to	127	127	127	
Boiler temperature set point changed to	127	127	127	
Boiler set points from adjustment	Y	Y	Y	Y
Heating water system disabled?	Y	Y	Y	Y
Outside air temperature	46	46	46	
Outside air lockout set point	65	65	65	65
Outside air lockout set point changed to	40	40	40	
Boilers do not fire on OSA lockout?	Y	Y	Y	
Boilers status when isolation valve closed: off	Y	Y	Y	Y
Low temperature alarm setpoint	160	160	160	SP-20
Adjust setpoint and confirm alarm	Y	Y	Y	
High temperature alarm setpoint	180	180	180	180°F
Adjust setpoint and confirm alarm	Y	Y	Y	
Set points returned to original values	Y	Y	Y	Y
Test complete and performance is acceptable	Y	Y	Y	Y

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
GC Cx Coordinator:	BH/SG	1/20/2021

Comments: [1] read from pump display

Boiler Primary/Standby and Failure/Alarm

1. Conduct test with primary boiler running
2. Record primary and standby boiler status.
3. At the primary boiler control panel, create a boiler failure.
4. Verify a boiler alarm is received and standby boiler starts.
5. Turn primary boiler back on and reset any alarm conditions.
6. Repeat 1-5 for the new lead boiler.
7. Verify Lead / Lag rotation.

Lead Boiler	1	2	3	Expected
Lead Status ON (Y/N)	Y	Y	Y	
Lead boiler firing rate	20%	40%	30%	
Lag Boiler	3	1	2	
Lag Status OFF (Y/N)	Y	Y	Y	
Lag Start on Lead Fail?	Y	Y	Y	
Lag boiler firing rate	30%	41%	40%	
Boiler Failure Alarm Reported?	Y	Y	Y	
Lead/lag switch on runtime?	[1]	[1]	[1]	
Adjust run hours setpoint	n/a	n/a	n/a	
Lead / Lag rotates	Y	Y	Y	
Overrides/set points to original	Y	Y	Y	

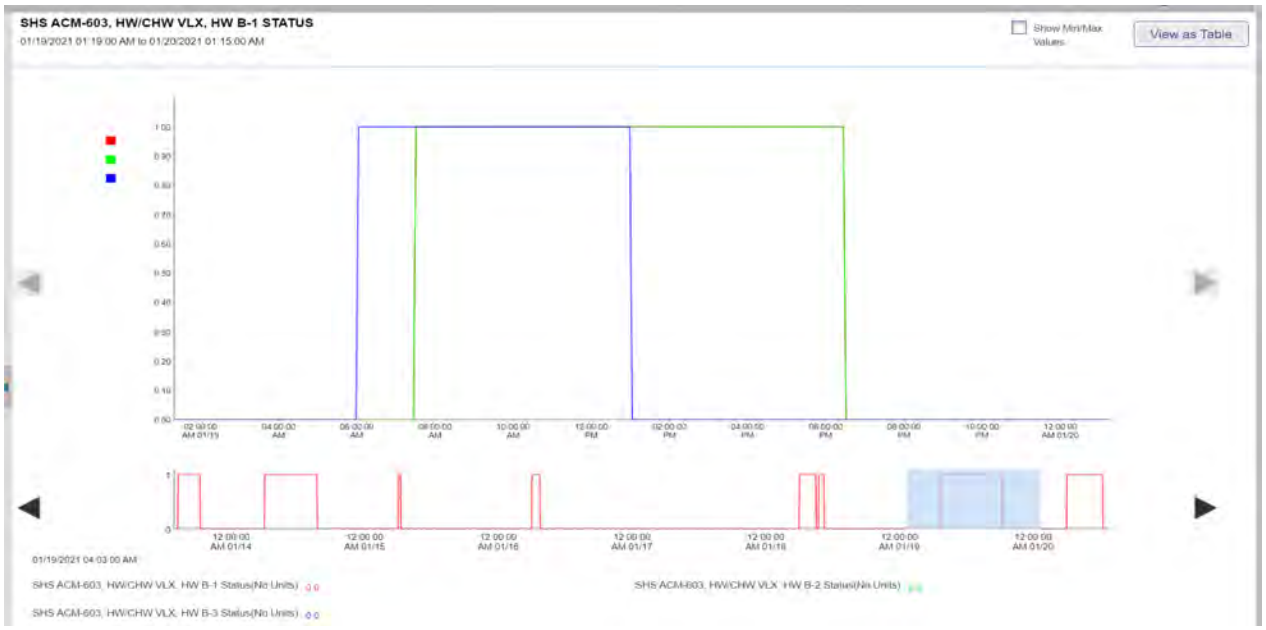
Y	Tests are complete and performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
GC Cx Coordinator:	BH/SG	1/21/2020

Comments: [1] Run time programmed by master boiler, no set schedule. See screen shot below.

- **Screen shot of boiler status showing boiler 2 (Lead) and 3 (lag 1) “on” and master (Lag2) “off”.**



Hot Water Temperature Reset

1. Record hot water reset parameters.
2. Simulate an outside air temperature through various ranges of reset.
3. Verify hot water loop set point resets per schedule.

OAT	HWS SP
30ºF	140ºF
65ºF	110ºF

OAT	Expected SP	Actual SP
30.0	140	140
39.0	132.3	132.3
48.0	124.6	124.6
56.0	117.7	117.7
65.0	110	110

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG	12/21/2020

Comments:

1. Test done by simulating OAT.

Boiler Emergency Shutdown

1. Create a condition for the boiler(s) to run and confirm all systems under test are operational and alarms are clear.
2. Activate the Emergency Shutdown.
3. Confirm boiler(s) shut down.
4. Verify alarm is reported on graphics screen and additionally as specified.
5. Clear the shutdown and confirm all units return to normal operation.
6. Repeat for all emergency buttons.

Boiler:	**1**	**2**	**3**
Pre-Test:			
Unit operating normally	Y	Y	Y
Alarms clear	Y	Y	Y
Test Switch 1:			
Unit shuts down	Y	Y	Y
Graphics indicate alarm	Y	Y	Y
System resets, unit on	Y	Y	Y
Test Switch 2:			
Unit shuts down	Y	Y	Y
Graphics indicate alarm	Y	Y	Y
System resets, unit on	Y	Y	Y
Tests are complete	Y	Y	Y
Performance is acceptable	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y

Sign-Off:

Team Member	**Name/Co.**	**Date**
Testing Contractor:		
CxA:	Matt White, WCG	12/21/2020

Comments:

AHU 4-Pipe w/ Economizer

Unoccupied Mode

1. Place the control system in the unoccupied mode by changing the schedule.
2. Verify that all controlled points listed are off, OSA dampers are closed.
3. Verify by direct observation that all controlled points are off and dampers are in the correct position.

Unit:	1	2	3	4	5	6	7	Expected
Supply fan command displayed	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Off
Supply fan status displayed	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Off
Supply fan, observed	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Off
Heating valve command displayed	0%	0%	0%	0%	0%	0%	0%	0%
Cooling valve command displayed	0%	0%	0%	0%	0%	0%	0%	0%
OSA damper position displayed	NA	NA	NA	0%	0%	0%	0%	0%
Return air damper position displayed	NA	NA	NA	100	100	100	100	100%
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood	12/8/2020 1/6/2021

Comments:

Unoccupied Limits

1. Place the system in the unoccupied mode and verify all Unit and hydronic heating/cooling systems are off and heating, economizer and cooling are not locked out.
2. Simulate a zone temperature below the unoccupied low limit.
3. Verify unit comes on in full recirculation, boilers and pumps start and heating system modulates to control zone temperature.
4. Verify unit stops when zone is satisfied.
5. Simulate a zone temperature above the unoccupied high limit
6. Verify unit comes on in cooling, chilled water system starts and the system modulates to control zone temperature.
7. Verify unit stops when zone is satisfied.

Unit:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Expected**
Pre-Test:								
Unoccupied low limit	55	55	55	55	55	55	55	55
Unoccupied high limit	85	85	85	85	85	85	85	85
Space temperature	62.5	63.0	64.0	62.5	61	66	64	
Unit, Boiler, Chiller & Pump Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
OAT	52.0	52.0	52.0	47	52.0	47	52	
Test:								
Unoccupied low limit changed to	80	80	80	80	80	80	80	
Boiler & Pump status	ON	ON	ON	ON	ON	ON	ON	ON
Supply fan command/status displayed	ON	ON	ON	ON	ON	ON	ON	ON
Heating valve command displayed	100	100	100	100	100	100	100	>0%
Cooling valve command displayed	0	0	0	0	0	0	0	0%
OSA damper position displayed	NA	NA	NA	0	0	0	0	0%
Return air damper position displayed	NA	NA	NA	100	100	100	100	100%
RAT	63.8	67.6	64.5	67.1	63.8	65.8	67.9	
MAT	NA	NA	NA	NA	63.3	66.1	67.0	
DAT	70.1	71.9	74.5	70.3	80.9	76.5	78.2	[1]
System off when satisfied	Y	Y	Y	Y	Y	Y	Y	
Unoccupied high limit changed to	72	72	72	80	85	85	85	[2]
Chiller & Pump status	On	On	On	On	On	On	On	ON
Supply fan command/ status displayed	On	On	On	On	On	On	On	ON
Cooling valve command displayed	Y	Y	Y	Y	Y	Y	Y	>0%
Heating valve command displayed	Y	Y	Y	Y	Y	Y	Y	0%
OSA damper position displayed	NA	NA	NA	0	0	0	0	
Return air damper position observed	NA	NA	NA	100	100	100	100	
Relief damper position displayed	NA	NA	NA	0	0	0	0	
RAT	80	75	76	80	85	85	85	
MAT	NA	NA	NA	80	85	85	85	
DAT	61	55	54	54	66	67	65	
System off when satisfied	Y	Y	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG Stuart Greenwood BH / PV	12/8/2020 1/6/2021 8/29/22 Trend

Comments:

[1] Hot water system temporarily manually overridden to <100°F HWS temperature setpoint by balancer to minimize scalding while balancing, test proves functionality of low limit sequence but not capacity, see AHU coil leak/capacity test.
[2] Trend review reveasl that unoccupied space temperature exceeded NSB.

Unoccupied Pushbutton Override

1. Place the system in the unoccupied mode and verify all Unit and hydronic heating/cooling systems are off.
2. Set the override period to a minimum value.
3. Simulate a call for heating or cooling as required, test a minimum of two each for heating and cooling.
4. One at a time, press the override button for each space.
5. Verify the Unit goes into the occupied mode and boiler or chiller system is enabled as appropriate.
6. Verify unit stops and boiler/chiller shuts down at end of time period.

Unit:	1	2	3	4	5	6	Expected
Pre-Test:							
Override run time	2.0	2.0	2.0	2.0	2.0	2.0	
Space temperature	63.5	63.5	63.5	62.5	60.5	66	
Space set point	62	62	62	72	62	70	[1]
Unit, Boiler, Chiller, Pumps	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Test:							
Override run time adjusted to	2.0	2.0	2.0	2.0	2.0	2.0	
Space temperature set point adjusted to	70	70	70	70	70	70	[1]
Heat Test or Cool Test	H	H	H	H	H	H	
Boiler & Pump status	ON	ON	ON	ON	ON	ON	ON
Supply fan command/status displayed	ON	ON	ON	ON	ON	ON	ON
Heating valve command displayed	89%	95%	100%	100	79%	100	
Cooling valve command displayed	0%	0%	0%	0%	0%	0%	
OSA damper position displayed	NA	NA	NA	0%	15%	0%	>=MIN
Return air damper position displayed	NA	NA	NA	100	85%	100	
Relief damper position displayed	NA	NA	NA	NA	NA	NA	
RAT	63.4	63.3	64.2	67.4	63.9	66.1	
MAT	NA	NA	NA	66.7	63.2	65.6	
DAT	67.4	69.7	75.2	75.1	77.7	76.3	[2]
System return to unoccupied at end of override period	Y	Y	Y	Y	Y	Y	
Set points returned to original values.	Y	Y	Y	Y	Y	Y	
Tests are complete.	Y	Y	Y	Y	Y	Y	
Performance is acceptable.	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood	12/8/2020 1/6/2021

Comments:

[1] Setpoint originally low to help newly installed floors seal properly. Reset to low values after test.

[2] Hot water system currently manually overridden to lower HWS temperature setpoint by balancer, test proves functionality of manual override sequence but not capacity, see AHU coil leak/capacity test.

Occupied Mode

1. Place the system in the occupied mode by changing the schedule.
2. Verify by direct observation that the supply fan starts, the air dampers modulate to normal position (minimum air or higher), heating and cooling valves are positioned to control to current set point, relief dampers open and other parameters are normal.
3. Fan speed control: Verify Variable speed control for demand.
4. Vacancy Mode: Verify dampers posture and space temperature setbacks.
5. Verify BAS displays the correct status for the units.

Unit:	1	2	3	4	5	6	7	Exp.
Space temperature	62.5	63.0	64.0	61.5	61	67.5	64.0	
Space temperature set point	62	62	62	70	65	70	70.0	[2]
Supply fan command displayed	ON	ON	ON	ON	ON	ON	ON	
Supply fan status displayed	ON	ON	ON	ON	ON	ON	ON	
Supply fan observed	ON	ON	ON	ON	ON	ON	ON	
Heating valve command displayed	0%	0%	0%	100%	100%	100%	100%	
Cooling valve command displayed	0%	0%	0%	0%	0%	0%	0%	[3]
OSA damper position displayed	NA	NA	NA	0%	16%	0%	21%	
OSA damper position observed	NA	NA	NA	0%		0%		
Return air damper position observed	NA	NA	NA	100%	84%	100%	79%	
Return air temperature	63.6	63.3	64.1	68.3	63.8	68.2	67.8	
Mixed air temperature	NA	NA	NA	66.9	61.8	68.2	64.3	
Outside air temperature	51.8	52.0	52.0	48	52.0	48	52.0	
DAT	65.5	65.9	65.9	74.7	76.4	75.6	76.7	
Create demand for Heat or Null Mode.	[1]	[1]	[1]	[1]	[1]	[1]	[1]	
Verify fan speed at 50%	[1]	[1]	[1]	[1]	[1]	[1]	[1]	
Create a demand for cooling	[1]	[1]	[1]	[1]	[1]	[1]	[1]	
Fan speed increased to satisfy	[1]	[1]	[1]	[1]	[1]	[1]	[1]	Speed > 50%
Vacancy Mode	Y	Y	Y	Y	Y	Y	Y	
Simulate vacant space	Y	Y	Y	Y	Y	Y	Y	
Setpoint sets back to	Y	Y	Y	Y	Y	Y	Y	±5°F
Simulate economizer LO	n/a	n/a	n/a	Y	Y	Y	Y	
OAD closes	n/a	n/a	n/a	Y	Y	Y	Y	
Space setpoint changes +/- 5°F	Y	Y	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood	12/8/2020 1/6/2021

Comments:

[1] Sequence works by taking fans from balanced speed (not necessarily 50%) to 100%. All of these units have a balanced fan speed of 100%, so no change in fan speed is observed. On a sample basis, this was lowered to 85% and the fan speed appeared to modulate correctly.
[2] Setpoints low to help seal newly installed flooring.
[3] Unit AHU-3 had a cooling signal in line with the setpoint and zone temperature, but cooling was locked out based on OSA.

Coil Valve Leak and Capacity Test

Coil Valve Leak Test:

1. Verify heating and chilled water systems are enabled and circulating water. As required, override reset to produce water temperatures at the high/low end of the reset schedule. Record temperatures.
2. Verify that the heating and cooling valves are indicated as closed by the BAS.
3. Record the unit supply air temperature and mixed air temperature, verify by temperature change that the heating valve and cooling valve are closed.

Coil Capacity Test:

4. Verify fans are at design flow.
5. Simulate a condition to open the heating water valve 100% and chilled water valve closed.
6. Verify capacity of heating water coil by temperature change.
7. Simulate a condition to open the chilled water valve 100% and heating water valve closed.
8. Verify capacity of chilled water coil by temperature change.

Occupied Heating and Cooling Coil - Leak and Capacity

Unit	1	2	3	4	5	6	7	Expected
Valve leak test:								
Fans are at design air flow	Y	Y	Y	Y	Y	Y	Y	
HWS temperature start of test	130	130	130	130	130	130	130	140 [1]
HWR temperature start of test	123	123	123	123	123	123	123	
CHWS temperature start of test	45	45	45	45	45	45	45	44
CHWR temperature start of test	51	51	51	51	51	51	51	
Heating water valve displayed	0%	0%	0%	0%	0%	0%	0%	0%
Cooling water valve displayed	0%	0%	0%	0%	0%	0%	0%	0%
RA or Mixed air temperature	61.8	61.0	62.7	67.3	60.5	58.0	65.7	
Supply air temperature	64.8	63.2	64.9	69.5	61.5	61.0	65.7	
Temperature differential	3.0	2.2	2.2	2.2	1.0	3.0	0	0 ±
Coil capacity test:								
Heating water valve displayed	100%	100%	100%	100%	100%	100%	100%	100%
Cooling water valve displayed	0%	0%	0%	0%	0%	0%	0%	0%
RAT or Mixed air temperature	64.0	64.7	64.2	65.6	63.6	64.2	66.5	
Discharge air temperature	99.8	95.9	91.0	101.7	99.8	99.7	92.4	
Design EAT	70	70	70	67	66	70	70	
Design Delta	30.3	21.3	21.3	33	34	26	25.5	
Temperature change across the coil	35.8	31.2	26.8	36.1	36.2	35.5	25.9	
Heating water valve displayed	0%	0%	0%	0%	0%	0%	0%	0%
Cooling water valve displayed	100	100	100	100	92	100	94	100%
RAT or Mixed air temperature	79	75	73	72	75	75	78	
Discharge air temperature	61	55	52	52	55	55	62	
Temperature change across the coil	19	20	21	22	20	20	16	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG BH / PV	12/21/2020 8/29/23 trend

Comments [1] Boiler plant supply setpoint currently set to 132.

Zone Control - Cooling

1. Start test with unit in heating or null mode.
2. Verify outside air is below economizer lockout temperature.
3. Lower the zone set point slightly below the current zone temperature.
4. Verify outside air dampers open for economizer cooling and that chilled water valve remains closed.
5. With an increased call for cooling, verify fans speeds to max for second stage of economizer cooling.
6. With an increased call for cooling, cooling valve opens to control supply air set point.
7. Verify fan speed from min to max when valve opens.
8. Mixed Air Low Limit: Simulate a mixed air temperature below the mixed air low limit set point and verify mixed air low limit overrides the economizer control by closing the outside air damper. Release low limit when done.
9. Economizer Lockout1: Simulate an OSA temperature above the return air temperature and verify OSA dampers modulate to minimum position. Release when done.
10. Economizer Lockout2: Simulate an OSA temperature above the Economizer Lockout Set point and verify OSA dampers modulate to minimum position.
11. Raise set point to eliminate a call for cooling.
12. Cooling with economizer lockout: With economizer locked out. Create a demand for cooler air. Verify cooling valve opens immediately.
13. Leave the economizer lockout engaged.
14. CO2 Control: Record the current CO2 set point, CO2 readings and minimum OSA position. Simulate a CO2 level set point below the CO2 value and verify dampers open to control to the new set point.
15. Release the economizer lockout and verify dampers continue to control to CO2 set point

Cooling Control:

Unit:	1	2	3	4	5	6	7	Expected
Pre-Test:								
Economizer minimum set point	NA	NA	NA	2000	900	240	300	CFM
Zone temperature	64	62	62	73	69	69	68	
Zone set point	62	62	65	72	70	70	64	
Fan speed	100 %	100 %	100 %	100 %	80%	70%	58%	Min<Speed< Max
Discharge air temperature	58	57	67	63	73	69	55	
Mechanical Cooling lockout set point	NA	NA	NA	50	50	50	50	
Economizer damper position	NA	NA	NA	20%	25%	23%	100 %	
OAT	NA	NA	NA	57	57	57	57	
RAT	62	62	65	67	72	69	67	
MAT	NA	NA	NA	60	70	67	58	
DAT	58	59	68	63	73	69	59	
Mixed air low limit set point	NA	NA	NA	40	40	40	40	
Test:								
Economizer set point	NA	NA	NA	55	55	55	55	[5]
Zone set point changed to	NA	NA	NA	60	60	65	64	
Discharge air set point reset to	NA	NA	NA	55	55	55	55	55-95 (Min-Max)
Heating valve command displayed	NA	NA	NA	0%	0%	0%	0%	0%
Cooling valve command displayed	NA	NA	NA	0%	0%	0%	0%	
OSA damper position displayed	NA	NA	NA	100	100	100	100	
OSA damper position observed	NA	NA	NA	100	100	100	100	
Return air damper position displayed	NA	NA	NA	0	0	0	0	
Return air damper position observed	NA	NA	NA	0	0	0	0	
Return air temperature	NA	NA	NA	62	58	69	68	
Mixed air temperature	NA	NA	NA	57	55	59	57	
Discharge air temperature after stabilization	NA	NA	NA	54	57	62	59	
Economizer damper is first stage of cooling	NA	NA	NA	Y	Y	Y	Y	
Discharge air set point reset to	NA	NA	NA	55	55	55	55	
Verify fan speed resets up to max	NA	NA	NA	Y	Y	Y	Y	
Fan speed in second stage of cooling	NA	NA	NA	100 %	100 %	95%	100 %	
Zone set point changed to	60	58	58	60	60	65	64	
Economizer set point changed to	NA	NA	NA	min	min	min	min	
Discharge air set point reset to	55	55	55	55	55	55	55	
Cooling valve command displayed	100 %	96%	80%	100 %	79%	100 %	100 %	>0
Simulate OSA temperature lock out								
OSA damper position displayed	NA	NA	NA	13%	10%	20%	5%	

Unit:	1	2	3	4	5	6	7	Expected
Outside air flow minimum setpoint (CFM)	NA	NA	NA	2000	900	240	300	
Outside air flow (CFM)	NA	NA	NA	2004	918	218	267	
Return air damper position displayed	NA	NA	NA	87%	90%	80%	95%	
Return air temperature	62	62	66	65	69	70	68	
Mixed air temperature	NA	NA	NA	63	67	68	67	
Discharge air temperature after stabilization	58	54	53	57	56	59	60	
Cooling coil is next stage of cooling	Y	Y	Y	Y	Y	Y	Y	

CO2 control:

Unit	**5**
Pre-Test:	
CO2 SP	1000
CO2 reading	441
Outside Ref CO2 Reading	NA
Min OSA damper set point	900
OSA damper position	8%
Test:	
CO2 SP changed to	300
OSA damper position during test	47%
CO2 controls after economizer lockout release	Y

Sign-Off:	**Team Member**	**Name/Co.**	**Date**
	Testing Contractor:		
	CxA:	SG	4/28/2021

Comments:

Zone Control - Heating

1. While system is still in cooling, simulate a zone temperature below the zone temperature set point.
2. Verify economizer is at minimum.
3. Verify discharge air temperature set point is reset higher in response to heating demand.
4. Verify heating valve opens to control to set point.
5. Verify fan speed increased after heat valve open to maintain space temperature.

Heating Control:

Unit:	1	2	3	4	5	6	7	Expected
***Pre-Test*:**								
Economizer minimum set point (CFM)	NA	NA	NA	2000	900	240	300	Min
Zone temperature	62	63	65	69	70	72	67	
Zone set point	62	62	62	72	70	70	62	
Discharge air set point	NA	NA	NA	NA	NA	NA	NA	
Discharge air temperature	65	56	56	72	73	72	49	
Fan Speed	50%	100%	100%	100%	83%	70%	100%	
Test:								
Set point raised to	63	70	70	74	75	75	68	
Discharge air set point reset to	NA	NA	NA	NA	NA	NA	NA	
Economizer at minimum	NA	NA	NA	Y	Y	Y	NA	
Heating valve command displayed	67%	100%	100%	100%	100 %	100 %	89%	>0
Cooling valve command displayed	0%	0%	0%	0%	0%	0%	0%	0%
OSA damper position displayed	NA	NA	NA	9%	11%	22%	6%	
OSA damper position observed	NA	NA	NA	9%	11%	22%	6%	
Return air damper position displayed	NA	NA	NA	91%	89%	78%	94%	
Return air damper position observed	NA	NA	NA	91%	89%	78%	94%	
Return air temperature	63	63	64	74	72	73	73	
Mixed air temperature	NA	NA	NA	72	71	70	68	
Outside air temperature	48	62	63	62	63	63	47	
Discharge air temperature after stabilization	80	71	81	94	89	86	97	
Fan speed	100%	100%	100%	100%	100 %	100 %	50%	
Fan speed increased for more heat	Y	Y	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	4/28/2021 6/28/2021

Comments:

Fault Detection & Diagnostics:

1. Sample Test.
2. Verify outside air damper failure
3. Verify Sensor fault
4. Verify Economizer fault
5. Verify faulty damper
6. Verify excess outdoor air fault.

AHU:	**4**	
Simulate failure of outside air damper	Y	
OAD command closed and air flow	Y	
Simulate sensor failure	Y	
When in 100% return all temp sensors within range. (RAT, MAT, SAT)	Y	
Simulate Economizer Fault	Y	
OA flow < min	Y	
Simulate damper failure	Y	
When in 100% return all temp sensors within range. And 100% OA all temp sensors within range.	Y	
Simulate excess OA flow fault	Y	
OA flow not = setpoint	Y	
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:

Team Member	**Name/Co.**	**Date**
Testing Contractor:		
CxA:	BH/SG	6/28/2021

Comments:

DOAS units

Dedicated Outdoor Air Supply (DOAS) w/Heat Recovery Wheel

Unoccupied Mode

1. Place the control system in the unoccupied mode by changing the schedule.
2. Verify that all controlled points listed are off, OSA dampers are closed.
3. Verify by direct observation that all controlled points are off and dampers are in the correct position.

Unit:	1	2	3	4	5	6	CTE 1	Expected
Supply fan command/status displayed	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF/OFF
Supply fan observed	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Exhaust fan command/status displayed	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF/OFF
Exhaust fan observed	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Heat Wheel Command/Status	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Heating valve command displayed	C	C	C	C	C	C	C	CLOSED(C)
Cooling valve command displayed	NA	NA	NA	NA	NA	NA	NA	CLOSED(C)
OSA damper position displayed	C	C	C	C	C	C	C	CLOSED(C)
OSA damper position observed	C	C	C	C	C	C	C	CLOSED(C)
Exhaust air damper position displayed	C	C	C	C	C	C	C	CLOSED(C)
Exhaust air damper position observed	C	C	C	C	C	C	C	CLOSED(C)
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/9/2020 2/21/2021

Comments:

[1] GENERAL: DOAS 1 and DOAS 2 share OSA and Exhaust ductwork. The isolation dampers at the intake and exhaust louvers for the common ductwork open if either unit is on, and only close if both units are off. This was verified and appeared to work properly. (Damper added to DOAU-1 – Resolved)

Unoccupied Override (Sample Test)

1. With system in unoccupied mode.
2. Using multiple VAVs (must meet the user definable number of zones), test the unoccupied override by pressing the thermostat button.
3. Verify AHU comes on in occupied mode and controls to DAT set point. Outside air dampers at minimum or controlling to DAT set point.

DOAU	5	Expected
Pre-Test:		
AHU is off	OFF	
Override period	30	min
Test:		
Override period for test	30	Min
Button pressed	Y	
List VAV used for test	330	
Supply fan Command/Status	ON	ON/ON
Supply fan VFD%	44%	
Duct Static Pressure	1.2	
Duct Static Set point	1.22	
Relief fan command/Status	ON	ON/ON
Relief fan VFD%	32%	
Building Static Pressure	NA	
Building Static Set point	NA	
Heating valve command displayed	25%	
OSA damper position displayed	100%	>MIN
Relief damper position displayed	100%	
OAT	52.0	
MAT	NA	
DAT	98.3	
Restroom exhaust air damper position displayed	NA	
System off at end of override	Y	
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG Stuart Greenwood, WCG	12/9/2020

Comments:

Occupied Mode Tests

1. Start with unit in the unoccupied mode.
2. Place the system in the occupied mode by changing the schedule.
3. Verify by direct observation that the supply fan does not start until the dampers are fully open.
4. Verify by simulation the heat wheel (heat exchanger) operation.
5. Verify BAS displays the correct status for the units.

Unit:	1	2	3	4	5	6	CTE 1	Expected
Pre-Test:								
SF and EF status	Y	Y	Y	Y	Y	Y	Y	OFF
Test:								
Fans on after dampers open	Y	Y	Y	Y	Y	Y	Y	
Supply fan command/status displayed	ON	ON	ON	ON	ON	ON	ON	ON/ON
Supply fan observed	ON	ON	ON	ON	ON	ON	ON	ON
Exhaust fan command/status displayed	ON	ON	ON	ON	ON	ON	ON	ON/ON
Exhaust fan observed	ON	ON	ON	ON	ON	ON	ON	ON
Heat Wheel Command/Status	ON	ON	ON	ON	ON	ON	n/a [1]	
Heating valve command displayed	0	0	0	0	0	0	0	ON, OAT+/- RAT > 8°F
Cooling valve command displayed	NA	NA	NA	NA	NA	NA	NA	OFF, OAT+/- RAT < 8°F
OSA damper position displayed	O	O	O	O	O	O	O	OPEN
OSA damper position observed	O	O	O	O	O	O	O	OPEN
Exhaust air damper position displayed	O	O	O	O	O	O	O	OPEN
Exhaust air damper position observed	O	O	O	O	O	O	O	OPEN
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/9/2020 2/16/2021

Comments:

1. GENERAL: DOAS 1 and DOAS 2 share OSA and Exhaust ductwork. The isolation dampers at the intake and exhaust louvers for the common ductwork open if either unit is on, and only close if both units are off. This was verified and appeared to work properly. (Damper added to DOAU-1 – Resolved)
   [1] Not a heat wheel but a constant ERV type system.

Supply Fan Duct Static Pressure (DSP) Test

1. Record pre-test information.
2. Change the DSP set point from the current set point and verify VFD modulates to control to new set point.
3. Verify pressure control is stable. Set up trend logs for long term monitoring.
4. Return DSP set point to original; verify VFD tracks to original set point.

Unit:	1	2	3	4	5	6	CTE 1	Expected
Pre-Test:								
DSP set point	1.6	2.3	0.9	0.9	1.4	1.5	0.5	0.5 – 0.9" [1]
DSP displayed	1.58	2.29	0.82	0.88	1.5	1.5	0.46	
VFD command	55%	76%	48%	98%	45%	72%	41%	
Test:								
DSP set point adjusted to:	1.3	2.5	1.2	0.7	1.1	1.1	1.1	
DSP after stabilize	1.32	2.46	1.2	0.71	1.1	1.12	1.07	
VFD %	51%	80%	58%	91%	38%	62%	60%	
DSP returned to original	1.6	2.1	0.9	0.9	1.4	1.5	0.5	
DSP after stabilize	1.66	2.09	0.95	0.92	1.35	1.56	0.53	
VFD %	56%	74%	49%	97%	43%	75%	41%	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/9/2020 2/16/2021

Comments:

[1] Balancer determined that max SP was not enough to satisfy VAV's. The engineer stated that diversity was designed. Non-issue.

.

Supply DSP Reset (Sample Test)

1. Verify the programmed DSP set point reset range match with design.
2. Start test with fan off.
3. Verify the set point is freeze at max value.
4. Turn on the fan.
5. Adjust the reset frequency as needed.
6. Simulate pressure request.
7. Verify the set point stays at max after reset frequency.
8. Simulate no pressure request.
9. Verify the set point decrease by each reset interval after every reset frequency.
10. Verify the set point reset to min set point and stop.

DOAU:	6	Expected
Start of test:		
DSP set point min	1.0”	1.0”
DSP set point max	2.0”	2.0”
Set point reset frequency	5 min	5 min
Set point reset interval	0.1	0.05
Pressure increase request condition	VAV>90	VAV > 90%
Pressure decrease request condition	VAV<70	
# of pressure request needed for reset	1	≥1[1]
Verify that any rogue zone can be toggled out of calculation	Y	
Test:		
Simulate set point reset frequency	60s	< 1 min
Fan command/status	ON	ON
DSP set point	1.5	1.5
Simulate # of increase pressure request	2	≥1
Simulate # of decrease pressure request	0	
Wait for reset frequency	Y	
DSP does not go above max	Y	
Simulate # of increase pressure request	0	
Simulate # of decrease pressure request	1	≥1
Wait for the 1st reset frequency	Y	
DSP set point after 1st reset	-0.1”	-0.05”
DSP SP lowers when above min and more units calling for decrease than increase	Y	
Min DSP set point achieve	1.4	1.4
Simulate # of increase pressure request	0	
Simulate # of decrease pressure request	1	≥1
Wait for reset frequency	Y	
DSP setpoint does not drop below min	Y	
Simulate # of increase pressure request	2	≥1

DOAU:	6	Expected
Simulate # of decrease pressure request	0	
Fan command/status	ON	ON
Wait for reset frequency	Y	
DSP set point after 1st reset	+0.1”	+0.05”
DSP SP raises when below max and more units calling for increase than decrease	Y	
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/9/2020

Comments:

Exhaust Fan Duct Static Pressure (DSP) Test

1. Record pre-test information.
2. Change the DSP set point from the current set point and verify VFD modulates to control to new set point.
3. Verify pressure control is stable. Set up trend logs for long term monitoring.
4. Return DSP set point to original; verify VFD tracks to original set point.

Unit:	1	2	3	4	5	6	CTE 1	Expected
Pre-Test:								
DSP set point	-0.5	-2.3	-0.9	-0.8	-1.3	-1.0	-0.5	TAB to Adjust
DSP displayed	-0.45	-2.07	-0.86	-0.62	-1.28	-0.96	-0.5	
VFD command	32%	100%	50%	100%	44%	48%	38%	
Test:								
DSP set point adjusted to:	-0.7	-1.7	-1.1	-0.5	-1.6	-1.3	-1.1	
DSP after stabilize	-0.66	-1.71	-1.04	-0.56	-1.56	-1.22	-1.07	
VFD %	39%	89%	60%	81%	52%	61%	55%	
DSP returned to original	-0.5	-1.8 [1]	-0.9	-0.4[1]	-1.3	-1.0	-0.5	
DSP after stabilize	-0.54	-1.82	-0.95	-0.44	-1.34	-1.05	-0.52	
VFD %	35%	90%	54%	73%	45%	49%	37%	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/9/2020 12/22/2020 2/16/2021

Comments:

[1] Taking too long to wait return but is returning to original setpoint..

Exhaust DSP Reset (Sample Test)

1. Verify the programmed DSP set point reset range match with design.
2. Start test with fan off.
3. Verify the set point is freeze at max value.
4. Turn on the fan.
5. Adjust the reset frequency as needed.
6. Simulate pressure request.
7. Verify the set point stays at max after reset frequency.
8. Simulate no pressure request.
9. Verify the set point decrease by each reset interval after every reset frequency.
10. Verify the set point reset to min set point and stop.

DOAU:	6	Expected
Start of test:		
DSP set point min	-1.0”	-0.3”
DSP set point max	-1.8”	-1.0”
Set point reset frequency	5 min	5 min
Set point reset interval	0.1	0.1
Pressure increase request condition	VAV<70	VAV < 85%
Pressure decrease condition	VAV>90	VAV > 90%
# of pressure request needed for reset	≥1	≥1
Verify that any rogue zone can be toggled out of calculation	Y	Y
Test:		
Simulate set point reset frequency	1 min	< 1 min
DSP set point min adjusted to:	-1.0”	
DSP set point max adjusted to:	-1.1”	
Fan command/status	ON	ON
DSP set point	-1.1”	0.9
Simulate # of pressure increase request	2	≥1[1]
Simulate # of pressure decrease request	0	
Fan command/status	ON	ON
Wait for reset frequency	Y	
DSP is locked at max	Y	
Simulate # of pressure increase request	0	
Simulate # of pressure decrease request	1	≥1
Wait for the 1st reset frequency	Y	
DSP set point after 1st reset	-0.1”	-0.1”
Min DSP set point achieved	-1.0”	0.5
Wait for reset frequency	Y	
DSP is locked at min	Y	
Simulate # of pressure increase request	2	≥1
Simulate # of pressure decrease request	0	
Wait for the 1st reset frequency	Y	

DOAU:	6	Expected
DSP set point after 1st reset	+0.1”	+0.1”
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG	12-15-2020

Comments:

Coil Valve Leak and Capacity Test

Coil Valve Leak Test:

1. Verify heating and chilled water systems are enabled and circulating water. As required, override reset to produce water temperatures at the high/low end of the reset schedule. Record temperatures.
2. Verify that the heating and cooling valves are indicated as closed by the BAS.
3. Record the unit supply air temperature and mixed air temperature, verify by temperature change that the heating valve and cooling valve are closed.

Coil Capacity Test:

4. Simulate a condition to open the heating water valve 100% and chilled water valve closed.
5. Verify capacity of heating water coil by temperature change.
6. Simulate a condition to open the chilled water valve 100% and heating water valve closed.
7. Verify capacity of chilled water coil by temperature change.

Occupied Heating Coil - Leak and Capacity

Unit	1	2	3	4	5	6	Expected
Valve leak test:							
HWS temperature start of test	140	140	140	140	140	140	140
HWR temperature start of test	127	127	127	127	127	127	
Heating water valve displayed	0%	0%	0%	0%	0%	0%	0%
Mixed air temperature	60.3	60.5	58.6	51.1	62.9	58.1	
Discharge air temperature	62.6	62.4	61.5	50.9	65.4	62.1	
Temperature differential	2.3	1.9	2.9	-0.2	2.5	4.0	0 ±
Coil capacity test:							
Heating water valve displayed 100%	100 %	100 %	100 %	100 %	100 %	100 %	100%
Mixed air temperature	56	64	47	55	52	44	
Discharge air temperature	101	100	103	98	106	100	
Design EAT	52	52	52	49	43	45	
Design Delta T	38	40	41	44	45	51	
Temperature change across the coil	45	36	56	44	54	56	~50@45EAT
Tests are complete	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG SG	12/21/2020 2/25/2021

Comments:

DAT Control

Cooling with outside air temperature below 60 deg F:

1. Simulate an outside air temperature (OAT) below 60 deg F and below return air temperature (RAT).
2. Lower the discharge air temperature (DAT) set point.
3. Verify outside air dampers open for economizer cooling.
4. Simulate an increased call for cooling and verify mechanical cooling remains off.
5. Release overridden points.

Economizer Lockout:

6. Simulate an outside air temperature above return air temperature and verify outside air dampers modulate to minimum outside airflow set point.
7. Simulate a discharge air temperature above discharge air temperature set point.
8. Verify mechanical cooling operates to control discharge air temperature and outside air dampers remain at minimum position where applicable.

DOAU:	1	2	3	4	5	6	CTE 1	Exp.
Pre-Test:								
DAT set point	72.5	72.0	74.5	58	68.5	68	80	
DAT	72.6	70.8	76.0	59.9	69.6	64.1	79.8	
Outside air temperature	41.3	40.9	44.6	43.8	48.9	43.8	43.9	
Supply fan speed displayed	45%	69%	100%	93%	62%	74%	62%	
Relief fan speed displayed	33%	87%	100%	100%	85%	85%	36%	
Outside air damper position	Open	Open	Open	Open	Open	Open	Open	
RAT	65.9	69.7	64.8	62.7	68.2	71.5	71.7	
MAT	60.0	61.4	59.0	53.2	64.6	56.3	57.4	
Supply duct static pressure set point	1.0	1.8	2.2	0.8	1.9	1.4	1.3	
Supply duct static pressure	0.94	1.78	1.39	0.85	1.93	1.35	1.29	
Return duct static pressure set point	-0.5	-1.8	-1.6	-0.7	-1.7	-2.6	-0.5	
Return duct static pressure	-0.47	-1.75	-1.39	-0.55	-1.68	-2.61	-0.54	
Heating valve displayed	41%	31%	18%	0%	21%	8%	0%	
Test:								
Heat Wheel Control								
Simulated by overriding OAT								
Heatwheel ON when OAT < (RAT-8) OR OAT > (RAT+8)	Y	Y	Y	Y	Y	Y	n/a	[1]
Heatwheel OFF when (RAT+8)>OAT> (RAT+8)	Y	Y	Y	Y	Y	Y	n/a	[1]
No Call for Hydronic Heating								
OAT	44.3	43.9	44.9	44.7	46.3	43.8	43.9	
MAT	60.6	63.0	59.2	54.7	64.0	57.8	57.4	
DAT set point	60.0	60.0	60.0	58	64.0	78	80	<OAT
Heating water valve command displayed (%)	0%	0%	0%	0%	0%	0%	0%	0%
RAT	65.8	71.1	65.5	62.8	68.3	71.7	71.7	
DAT	61.3	66.1	62.7	57.2	66.6	76.6	79.8	
Heat Wheel Status	ON	ON	ON	ON	ON	ON	n/a	
Call for Hydronic Heating								
OAT	41.3	40.8	45.0	44.7	47.7	43.8	43.9	
MAT	50.7	62.7	59.9	57	65.0	56.3	57.4	
DAT set point	73.0	75.0	77.0	68	72.0	78	79	>OAT
Heating water valve (Furnace) command displayed (%)	42%	31%	12%	25%	30%	36%	100% [2]	>0%
RAT	65.8	70.2	65.9	62.7	68.9	71.6	63.4	
DAT	73.2	74.4	76.6	71.3	71.9	76	58.6	
Heat Wheel Status	ON	ON	ON	ON	ON	ON	n/a	
Call for Hydronic Cooling		DXN/ DXS						[3]
DAT set point changed to	NA	65/65	NA	NA	50	NA	NA	
Discharge air set point reset to	NA	65/65	NA	NA	50	NA	NA	
Cooling command displayed	NA	100	NA	NA	33%	NA	NA	
OSA damper position displayed	NA	100	NA	NA	100	NA	NA	
Outside air flow (CFM)	NA	17,500	NA	NA	11,347	NA	NA	
Exhaust air damper position displayed	NA	100	NA	NA	100	NA	NA	

DOAU:	1	2	3	4	5	6	CTE 1	Exp.
Return air temperature	NA	72	NA	NA	69	NA	NA	
Mixed air temperature	NA	80	NA	NA	49	NA	NA	
Discharge air temperature after stabilization	NA	68/68	NA	NA	52	NA	NA	
Cooling coil is third stage of cooling	NA	Y	NA	NA	Y	NA	NA	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG SG (CTE) BH, DOAU-2 & 5 Cooling	12/22/2020 2/25/2021 9/9/22 11/23/22

Comments:

[1] 8 F is the setpoint for the HW lockout, which is adjustable. [2] Gas heating. [3] DXN= DX cooling North zone, DXS= DX cooling South zone.

DAT Reset – Increment Method (Sample Test)

1. Record DAT reset parameters.
2. Change interval time to 5 seconds.
3. Simulate a condition that will cause an increase or decrease set point depending on current values. This can be done by change set points or demand at units.
4. Verify DAT set point is reset up or down accordingly
5. Repeat in other reset direction

Parameter	Set Point
Zone Requests for Increase set point	
Zone Requests for Decrease set point	< 50%
DAT Initial Set Point	68
Adjustment Interval Time	10 Min
DAT Reset Value	0.5°F
DAT Upper Limit	78
DAT Lower Limit	60

Test

Parameter	Set Point	Comment
Starting DAT set point	69.5	
Zones requesting increase	3	
Zones requesting decrease	0	
Zone Requests for Increase set point	2	Set point adjust
Zone Requests for Decrease set point	2	Set point adjust
Ending DAT set point	71.5	
System resets through range	Y	[3]
Starting DAT set point	71.5	
Zones requesting increase	2	
Zones requesting decrease	1	
Zone Requests for Increase set point	5	Set point adjust
Zone Requests for Decrease set point	1	Set point adjust
Ending DAT set point	69.0	
System resets through range	Y	[3]

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

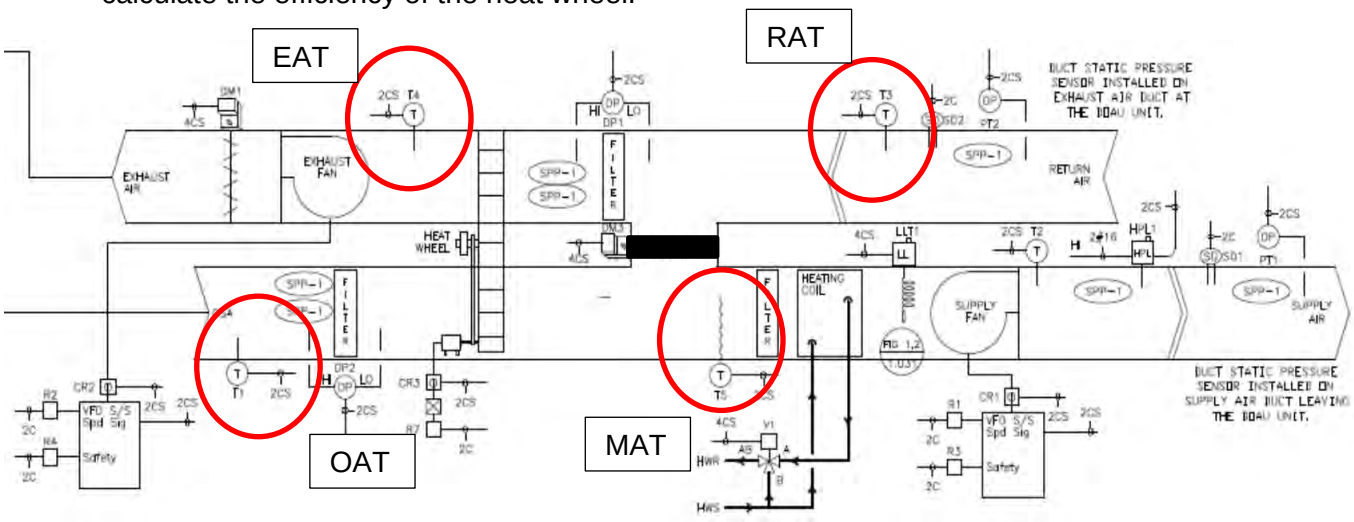
Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/22/2020

Comments:
General: DOAS-3 used for test. Time between resets lower to 60s.

Heat Wheel Efficiency

1. Ensure unit in normal operation, heat wheel running continuously and not close to 8 F heat wheel lockout dead band to ensure heat wheel runs for test duration.
2. Make sure the system is relatively stabilized, controlling to DAT.
3. Record temperatures per graphic below. Use equation detailed in the comment line to calculate the efficiency of the heat wheel.



Test

DOAS:	1	2	3	4	5	6	CTE	Comment
Unit operating normally, alarms clear	Y	Y	Y	Y	Y	Y	Y	
Heat wheel status	Y	Y	Y	Y	Y	Y	Y [1]	
OAT	39.5	38.0	37.6	42.4	45.1	39.5	42.8	
RAT	63.1	70.5	67.6	62.6	68.7	70.9	67	
MAT	59.5	61.4	58.2	58.1	64.5	59.0	55.4	
EAT	50.2	51.9	45.4	46.9	58.9	53.1	80.5	
Efficiency	0.84	0.72	0.68	0.77	0.82	0.62	0.79	(MAT-OAT)/ (RAT-OAT)
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG SG	12/22/2020 2/25/2021

Comments: [1] Not a heat wheel but plate type.

VAV Supply Air Terminal Unit Test

1. Conduct test with system in the occupied mode and rooms un-occupied so occupancy sensor is off.
2. Verify damper opens when occupancy sensor is activated.
3. Override (OR) room CO2 setpoint and verify damper opens and CFM changes from min to max to satisfy ventilation demand.
4. Verify BAS air flows matches design.
5. Release CO2 override and verify damper returns to minimum.

VAV No.	Room	Dmpr Closed (Sample)	Dmpr Opens to Min	CO2 SP	CO2 SP OR	CFM Min	CFM Max	BAS CFM = Design	Damper Modulates Open	Damper Modulates => Min	Notes
DOAS-1											
101	3D Art Lab 181	-	Y	N/A	N/A	535	535	Y	N/A	N/A	
102	SHARED LEARNING 180	-	Y	N/A	N/A	240	240	Y	N/A	N/A	
103	CLASSROOM 179	Y	Y	1000	200	110	420	Y	Y	Y	
104	CLASSROOM 178	Y	Y	1000	200	110	420	Y	Y	Y	
105	CLASSROOM 177	-	Y	1000	200	110	420	Y	Y	Y	
106	CULINARY ARTS 174	-	Y	1000	200	150	500	Y	Y	Y	
107	PRACTICE 169, 167, 168 & SCENE SHOP 164	-	Y	N/A	N/A	830	830	Y	N/A	N/A	
108	BAND 165	-	Y	1000	200	170	660	Y	Y	Y	
109	OFFICE 165A, 163A, CORRIDOR 162	-	Y	N/A	N/A	320	320	Y	N/A	N/A	
110	CHOIR 163	-	Y	1000	200	160	600	Y	Y	Y	
111	DRAMA 154	-	Y	1000	200	130	500	Y	Y	Y	
112	SPEECH THERAPY 151, PSYCH 150, 149, 146	-	Y	N/A	N/A	500	500	Y	N/A	N/A	
113	ASSIST LIFE SKILLS 140 & 141	-	Y	1000	200	150	560	Y	Y	Y	
DOAS-2											
201	CLASSROOM 267	-	Y	1000	200	110	420	Y	Y	Y	

VAV No.	Room	Dmpr Closed (Sample)	Dmpr Opens to Min	CO2 SP	CO2 SP OR	CFM Min	CFM Max	BAS CFM = Design	Damper Modulates Open	Damper Modulates => Min	Notes
202	ENGINEERING CLASSROOM 266	-	Y	1000	200	110	420	Y	Y	Y	
203	FABRICATION LAB 266B	-	Y	NA	NA	190	190	Y	NA	NA	
204	AG SCIENCE LAB 262	-	Y	NA	NA	1000	1000	Y	NA	NA	
205	AQUAPONICS 262A & KENNELS 258A	-	Y	NA	NA	500	500	Y	NA	NA	
206	ANIMAL VET SCIENCE LAB 258	-	Y	NA	NA	1000	1000	Y	NA	NA	
207	PREP 254A & HORTICULTURE LAB 254	-	Y	NA	NA	1200	1200	Y	NA	NA	
208	CLASSROOM 271	-	Y	1000	200	120	430	Y	Y	Y	
209	CLASSROOM 265	-	Y	1000	200	120	430	Y	Y	Y	
210	SCIENCE LAB 264 & PREP 264A	-	Y	NA	NA	1200	1200	Y	NA	NA	
211	SCIENCE LAB 261	-	Y	NA	NA	1000	1000	Y	NA	NA	
212	SHARED LEARNING 263	-	Y	NA	NA	460	460	Y	NA	NA	
213	PREP 261A & SCIENCE LAB 257	-	Y	NA	NA	1200	1200	Y	NA	NA	
214	PREP 257 & SCIENCE LAB 253	-	Y	NA	NA	1200	1200	Y	NA	NA	
215	SCIENCE LAB 251	-	Y	NA	NA	1000	1000	Y	NA	NA	
301	CLASSROOM 345	Y	Y	1000	200	110	420	Y	Y	Y	
302	CLASSROOM 343	Y	Y	1000	200	110	420	Y	Y	Y	
303	CLASSROOM 341	-	Y	1000	200	110	420	Y	Y	Y	
304	CLASSROOM 339	-	Y	1000	200	110	420	Y	Y	Y	
305	CLASSROOM 337	-	Y	1000	200	110	420	Y	Y	Y	
306	CLASSROOM 335	-	Y	1000	200	110	420	Y	Y	Y	
307	CLASSROOM 331	-	Y	1000	200	110	420	Y	Y	Y	
308	CLASSROOM 329	-	Y	1000	200	110	420	Y	Y	Y	
309	CLASSROOM 327	-	Y	1000	200	110	420	Y	Y	Y	
310	CLASSROOM 325	-	Y	1000	200	110	420	Y	Y	Y	
311	CLASSROOM 349	-	Y	1000	200	110	420	Y	Y	Y	
312	CLASSROOM 344	-	Y	1000	200	110	420	Y	Y	Y	

VAV No.	Room	Dmpr Closed (Sample)	Dmpr Opens to Min	CO2 SP	CO2 SP OR	CFM Min	CFM Max	BAS CFM = Design	Damper Modulates Open	Damper Modulates => Min	Notes
313	CLASSROOM 342	-	Y	1000	200	110	420	Y	Y	Y	
314	CLASSROOM 340	-	Y	1000	200	110	420	Y	Y	Y	
315	CLASSROOM 336	-	Y	1000	200	110	420	Y	Y	Y	
316	UNDESIGNATED OFFICE 333A	-	Y	NA	NA	440	440	Y	NA	NA	
317	PHOTO JOURNALISM 330	-	Y	1000	200	110	420	Y	Y	Y	
318	MULTI-MEDIA 328	-	Y	1000	200	110	420	Y	Y	Y	
319	CONTROL ROOM 326A & GREEN ROOM 326B	-	Y	NA	NA	60	60	Y	NA	NA	
320	PHOTOGRAPH YEARBOOK 324	-	Y	1000	200	110	420	Y	Y	Y	
321	CLASSROOM 323	-	Y	1000	200	110	420	Y	Y	Y	
DOAS-3											
114	WRESTLING 120	Y	Y	1000	200	800	3000	Y	Y	Y	
115	OFFICIALS 118, AV 115, CORRIDOR 111,	-	Y	NA	NA	3210	3210	Y	Y	Y	
116	STAFF 103A, C-STORE 102	-	Y	N/A	N/A	1310	1310	Y	Y	Y	
117	CUST. 108A, 108, LOCKER 106, 105	-	Y	N/A	N/A	2645	2645	Y	N/A	N/A	
118	WEIGHT ROOM 107	-	Y	1000	200	960	2040	Y	Y	Y	
DOAS-5											
216	PREP 241A & SCIENCE LAB 241	-	Y	N/A	N/A	1200	1200	Y	N/A	N/A	
219	CLASSROOM 207	Y	Y	1000	200	110	420	Y	Y	Y	
220	CLASSROOM 206	Y	Y	1000	200	110	420	Y	Y	Y	
221	CLASSROOM 205	-	Y	1000	200	110	420	Y	Y	Y	
222	OFFICE 205A	-	Y	N/A	N/A	20	20	Y	N/A	N/A	
223	TRAINING ROOM 203	-	Y	1000	200	120	450	Y	Y	Y	
224	CORRIDOR 210 & 220	-	Y	N/A	N/A	250	250	Y	N/A	N/A	
225	FITNESS CENTER 211	-	Y	1000	200	220	950	Y	Y	Y	

VAV No.	Room	Dmpr Closed (Sample)	Dmpr Opens to Min	CO2 SP	CO2 SP OR	CFM Min	CFM Max	BAS CFM = Design	Damper Modulates Open	Damper Modulates => Min	Notes
322	ASB 318	-	Y	N/A	N/A	25	25	Y	N/A	N/A	
323	CLASSROOM 317	-	Y	1000	200	110	420	Y	Y	Y	
324	CLASSROOM 316	-	Y	1000	200	110	420	Y	Y	Y	
325	BUSINESS LAB 315	-	Y	1000	200	110	420	Y	Y	Y	
326	BUSINESS LAB 314	-	Y	1000	200	110	420	Y	Y	Y	
327	CORRIDOR 300 & GROUP ROOM 302C	-	Y	N/A	N/A	150	150	Y	N/A	N/A	
328	CLASSROOM 312	-	Y	1000	200	110	420	Y	Y	Y	
329	CLASSROOM 311	-	Y	1000	200	110	420	Y	Y	Y	
330	CLASSROOM 310	-	Y	1000	200	110	420	Y	Y	Y	
331	CLASSROOM 309	-	Y	1000	200	110	420	Y	Y	Y	
332	LIBRARY 302	-	Y	1000	200	300	1000	Y	Y	Y	
333	STAFF LOUNGE 303	-	Y	N/A	N/A	490	490	Y	N/A	N/A	
334	CLASSROOM 304	-	Y	1000	200	110	420	Y	Y	Y	
335	CLASSROOM 305	-	Y	1000	200	110	420	Y	Y	Y	
336	CLASSROOM 306	-	Y	1000	200	110	420	Y	Y	Y	
337	OFFICE 302C	-	Y	N/A	N/A	435	435	Y	Y	Y	
DOAS-6											
217	TREATMENT 240A, 240B, 238, RECEPTION 231A	-	Y	N/A	N/A	740	740	Y	N/A	N/A	
218	HALLWAY 229C, MEETING 227, PRIN. 225, STUD. 223	-	Y	N/A	N/A	350	350	Y	N/A	N/A	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	Matt White, WCG Stuart greenwood, WCG	12-15-2020 12-21-2020

Comments:

Unit No.	Room	Dmpr Closed	Dmpr Opens to Min	CO2 SP	CO2 SP OR	CFM Max	CFM Min	BAS CFM = Design	Damper Modulates Open	Damper Modulates => Min	Notes
DOAS-1	**CTE**										
VAV-1	Classroom 402	Y	Y	1000	458	500	150	Y	Y	Y	[1]
VAV-2	Classroom 403	Y	Y	1000	457	500	150	Y	Y	Y	[1]
VAV-3	Woodshop 404	Y	Y	n/a	n/a	1600	480	Y	Y	Y	[1]
VAV-4	Mech/tech shop 405	Y	Y	n/a	n/a	2260	670	Y	Y	Y	[1]
VAV-5	Lobby 400/Sec 401	Y	Y	n/a	n/a	140	45	Y	Y	Y	[1]
DOAS-1	**CTE**										
EVAV-1	Lobby/ CR 402-403	Y	Y	n/a	n/a	320	100	Y	Y	Y	[1]
EVAV-2	Woodshop 404	Y	Y	n/a	n/a	1850	555	Y	Y	Y	[1]
EVAV-3	Mech/tech shop 405	Y	Y	n/a	n/a	2500	750	Y	Y	Y	[1]
EVAV-4	Restroom / Cust.	Y	Y	n/a	n/a	130	130	Y	Y	Y	[1]

x	Tests are complete
x	Performance is acceptable
x	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	SG	2/16/2021

Comments: [1] Units were overridden to Unoccupied to show damper closure and 0 cfm.

Building Pressure Test

Due to negative building pressure, SOO has been changed to incorporate supply VAV's to be running at all times instead of turning off with unoccupied mode. The Exhaust VAVs ADF-102 (bottom floor mechanical room pressure) and ADF-303 (Mezzanine mechanical room pressure) show the pressure of the building.

VAV No.	Room	CFM Min	CFM Max
DOAS-1			
101	3D Art Lab 181	535	535
102	SHARED LEARNING 180	240	240
103	CLASSROOM 179	110	420
104	CLASSROOM 178	110	420
105	CLASSROOM 177	110	420
106	CULINARY ARTS 174	150	500
107	PRACTICE 169, 167, 168 & SCENE SHOP 164	830	830
108	BAND 165	170	660
109	OFFICE 165A, 163A, CORRIDOR 162	320	320
110	CHOIR 163	160	600
111	DRAMA 154	130	500
112	SPEECH THERAPY 151, PSYCH 150, 149, 146	500	500
113	ASSIST LIFE SKILLS 140 & 141	150	560
DOAS-2			
201	CLASSROOM 267	110	420
202	ENGINEERING CLASSROOM 266	110	420
203	FABRICATION LAB 266B	190	190
204	AG SCIENCE LAB 262	1000	1000
205	AQUAPONICS 262A & KENNELS 258A	500	500
206	ANIMAL VET SCIENCE LAB 258	1000	1000
207	PREP 254A & HORTICULTURE LAB 254	1200	1200
208	CLASSROOM 271	120	430
209	CLASSROOM 265	120	430
210	SCIENCE LAB 264 & PREP 264A	1200	1200
211	SCIENCE LAB 261	1000	1000
212	SHARED LEARNING 263	460	460
213	PREP 261A & SCIENCE LAB 257	1200	1200
214	PREP 257 & SCIENCE LAB 253	1200	1200
215	SCIENCE LAB 251	1000	1000
301	CLASSROOM 345	110	420
302	CLASSROOM 343	110	420
303	CLASSROOM 341	110	420
304	CLASSROOM 339	110	420
305	CLASSROOM 337	110	420
306	CLASSROOM 335	110	420
307	CLASSROOM 331	110	420
308	CLASSROOM 329	110	420
309	CLASSROOM 327	110	420
310	CLASSROOM 325	110	420
311	CLASSROOM 349	110	420
312	CLASSROOM 344	110	420
313	CLASSROOM 342	110	420
314	CLASSROOM 340	110	420
315	CLASSROOM 336	110	420
316	UNDESIGNATED OFFICE 333A	440	440
317	PHOTO JOURNALISM 330	110	420
318	MULTI-MEDIA 328	110	420

VAV No.	Room	CFM Min	CFM Max
319	CONTROL ROOM 326A & GREEN ROOM 326B	60	60
320	PHOTOGRAPH YEARBOOK 324	110	420
321	CLASSROOM 323	110	420
DOAS-3			
114	WRESTLING 120	800	3000
115	OFFICIALS 118, AV 115, CORRIDOR 111,	3210	3210
116	STAFF 103A, C-STORE 102	1310	1310
117	CUST. 108A, 108, LOCKER 106, 105	2645	2645
118	WEIGHT ROOM 107	960	2040
DOAS-5			
216	PREP 241A & SCIENCE LAB 241	1200	1200
219	CLASSROOM 207	110	420
220	CLASSROOM 206	110	420
221	CLASSROOM 205	110	420
222	OFFICE 205A	20	20
223	TRAINING ROOM 203	120	450
224	CORRIDOR 210 & 220	250	250
225	FITNESS CENTER 211	220	950
322	ASB 318	25	25
323	CLASSROOM 317	110	420
324	CLASSROOM 316	110	420
325	BUSINESS LAB 315	110	420
326	BUSINESS LAB 314	110	420
327	CORRIDOR 300 & GROUP ROOM 302C	150	150
328	CLASSROOM 312	110	420
329	CLASSROOM 311	110	420
330	CLASSROOM 310	110	420
331	CLASSROOM 309	110	420
332	LIBRARY 302	300	1000
333	STAFF LOUNGE 303	490	490
334	CLASSROOM 304	110	420
335	CLASSROOM 305	110	420
336	CLASSROOM 306	110	420
337	OFFICE 302C	435	435
DOAS-6			
217	TREATMENT 240A, 240B, 238, RECEPTION 231A	740	740
218	HALLWAY 229C, MEETING 227, PRIN. 225, STUD. 223	350	350

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	BH / WCG	2/16/21

Comments:

VAV Exhaust Terminal Unit Test (Variable)

1. Conduct test with system in the occupied mode and rooms occupied so occupancy sensor is on and with doors and windows closed.
2. Measure room pressure with a reference standard and record reference and BAS indicated values.
3. Adjust room pressure setpoint.
4. Verify that BAS indicates damper reacts to maintain space pressure.

Reference Standard Used: Digital Manometer

Unit No.	Room	Ref inwg	BAS inwg	Adjust SP	Damper Modulates	Notes
DOAS-1						
AFD-102	PLENUM	0.00	0.002	0.1	Y	
DOAS-3						
AFD-112	WEIGHT ROOM 107	0.04	0.001	0.1	Y	
AFD-113	Wresting Room 120	0.02	0.001	0.1	Y	
DOAU-5						
AFD-303	PLENUM	0.03	0.01	0.1	Y	

x	Tests are complete
x	Performance is acceptable
x	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	BH/SG	01/28/2021

Comments:

VAV Exhaust Terminal Unit Test (Constant)

1. Conduct test with system in the occupied mode and supply VAV's open.
2. Check EVAV cfm is up to design flow and damper position.
3. Override unit to Unoccupied mode and check damper closes with no airflow.
4. Sample test rooms that are unoccupied. Walk into room and check damper opens and design flow is met. Check damper position.
5. Make sure everything is back to auto/OCC.

Unit No.	Room	VAV Box	OCC Damp %	Design CFM	OCC CFM	VAC Damp %	VAC CFM	Notes
DOAS-1								
AFD-101	3D ART LAB 181 & PROJECT STORAGE 181B	101	63%	975	963	0%	0	
AFD-103	WOMEN 173, MEN 171, TOILET 172, PANTRY 174B	n/a	30%	1385	1333	0%	0	
AFD-104	INSTRUMENT STORAGE 165B,	n/a	55%	280	272	0%	0	
AFD-105	TOILET 152/153, STORAGE 144, STORAGE 104A,	n/a	82%	620	606	0%	0	
DOAS-2								
AFD-201	WOMEN 268, MEN 269, FABRICATION LAB 266A	203	100%	1270	744	0%	0	
AFD-203	AQUAPONICS 262A, KENNELS 258A,	205	64%	450	454	0%	0	
AFD-204	ANIMAL VET SCIENCE LAB 258	206	100%	1200	1072	0%	0	
AFD-205	HORTICULTURE LAB 254	207	65%	950	921	0%	0	
AFD-210	SCIENCE LAB 251	215	90%	1550	1522	0%	0	
AFD-211	SCIENCE LAB 241	216	100%	1780	1579	0%	0	
AFD-301	WOMEN 346 & MEN 347	n/a	76%	900	931	0%	0	
AFD-302	CUSTODIAL 333C & STAFF TOILET 332	n/a	100%	200	96	0%	0	
AFD-304	RESTROOMS	n/a	100%	900	993	0%	0	
DOAS-3								
AFD-108	ATHLETIC STORAGE 117, MENS ATHLETIC 114	115	100%	4265	2978	0%	0	
AFD-109	KITCHEN 103	n/a	66%	1400	1357	0%	0	
AFD-110	TOILET 103D, CUSTODIAL 103C, DRY STORAGE 103B	n/a	60%	265	259	0%	0	
AFD-111	WOMENS ATHLETC LOCKER ROOM 105,COACH 105A	n/a	73%	3150	3130	0%	0	

Unit No.	Room	VAV Box	OCC Damp %	Design CFM	OCC CFM	VAC Damp %	VAC CFM	Notes
DOAS-5								
AFD-106	TABLE STORAGE 133, WOMEN 136, TOILET 134,	n/a	23%	1400	1467	0%	0	
AFD-107	WOMEN 123, MEN 122, CUSTODIAL 124A	n/a	56	870	899	0%	0	
AFD-214	STORAGE 205B, UTILITY 204	n/a	98%	360	386	0%	0	
AFD-215	WOMEN 214, MEN 212, PE STORAGE 216	n/a	99%	2015	2151	0%	0	
AFD-216	Fitness Center	225	13%	500	699	0%	0	
AFD-305	TOILET 302B, STAFF LOUNGE 303	333	36%	700	684	0%	0	
DOAS-6								
AFD-212	TOILET 239, SHOWER 240C, RECORDS 237	217?	51%	470	475	0%	0	
AFD-213	TOILET 219	224?	100%	100	98	0%	0	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	SG	01/28/2021

Comments:

VAV Exhaust Terminal Unit Test For Science Rooms

1. Conduct test with system in the occupied mode and fume hood fans off.
2. Verify AFD airflow.
3. Turn on fume hood fan.
4. Verify AFD air flow with fume hood fan on.

Unit No.	Room	VAV	Fume Hood EF	Design Min/Max CFM	EF OFF CFM	EF On CFM
DOAS-2						
AFD-202	AG SCIENCE LAB 262	204	201	950	961	917
AFD-206	SCIENCE LAB 264	210	203	1200	1016	1001
AFD-207	SCIENCE LAB 261	211	204	950	908	900
AFD-208	SCIENCE LAB 257	213	205	1200	1163	1156
AFD-209	SCIENCE LAB 253	214	206	950	920	917

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	SG	01/28/2021

Comments:

Fan Coil Units – 2 / 4-Pipe Heat & Cool

Overview:

This test procedure is for 2 and 4-pipe heat and cool fan coil units (FCU) but can be used for heating only or cooling only as well.

Test Objectives and Success Criteria:

Unoccupied Mode

1. Place the control system in the unoccupied mode.
2. Verify no zones are in are in push-button override or night low/high limit.
3. Verify associated AHUs are in unoccupied mode.
4. Verify FCU is indicated as being unoccupied.
5. Verify air valves serving FCUs are commanded shut and VAV cfm displays zero.
6. Proceed to unoccupied limit tests.

FCU	Zone Served	FCU Occupancy Status	FCU Valve(s) 0%	Fans Status	Comment
101	Ensemble 170	Unoccupied	0%	OFF	
102	Practice 169	Unoccupied	0%	OFF	
103	Practice 168	Unoccupied	0%	OFF	
104	Practice 167	Unoccupied	0%	OFF	
105	Storage 166	Unoccupied	0%	OFF	
106	Scene Shop 164	Unoccupied	0%	OFF	
107	Scene Shop 164	Unoccupied	0%	OFF	
108	Room 181	Unoccupied	0%	OFF	
109	Room 181	Unoccupied	0%	OFF	
110	Storage 175	Unoccupied	0%	OFF	
111	Hallway Room 180	Unoccupied	0%	OFF	
112	Classroom 179	Unoccupied	0%	OFF	
113	Classroom 179	Unoccupied	0%	OFF	
114	Classroom 178	Unoccupied	0%	OFF	
115	Classroom 178	Unoccupied	0%	OFF	
116	Classroom 177	Unoccupied	0%	OFF	
117	Classroom 177	Unoccupied	0%	OFF	
118	Shared Learning 175	Unoccupied	0%	OFF	
119	Culinary Arts 174	Unoccupied	0%	OFF	
120	Culinary Arts 174	Unoccupied	0%	OFF	
121	Band 165	Unoccupied	0%	OFF	
122	Band 165	Unoccupied	0%	OFF	
123	Office 165A	Unoccupied	0%	OFF	
124	Office 163A	Unoccupied	0%	OFF	
125	Choir 163	Unoccupied	0%	OFF	
126	Choir 163	Unoccupied	0%	OFF	
127	Drama 154	Unoccupied	0%	OFF	
128	Drama 154	Unoccupied	0%	OFF	
129	Speech Therapy 151	Unoccupied	0%	OFF	
130	Special Therapy 150	Unoccupied	0%	OFF	
131	Special Ed. Sec. 146	Unoccupied	0%	OFF	

FCU	Zone Served	FCU Occupancy Status	FCU Valve(s) 0%	Fans Status	Comment
132	Shared Office 148	Unoccupied	0%	OFF	
133	Psych. 149	Unoccupied	0%	OFF	
134	OT/PT 147	Unoccupied	0%	OFF	Setpoints
135	ILC 145	Unoccupied	0%	OFF	
136	ILC 145	Unoccupied	0%	OFF	
137	Sensory 145A	Unoccupied	0%	OFF	
138	Sensory 137	Unoccupied	0%	OFF	
139	Life Skills 140	Unoccupied	0%	OFF	
140	Life Skills 141	Unoccupied	0%	OFF	
141	Sensory 142	Unoccupied	0%	OFF	
142	Concessions 157	Unoccupied	0%	OFF	
143	Table Storage 133	Unoccupied	0%	OFF	
144	Women 123	Unoccupied	0%	OFF	
145	Wrestling 119	Unoccupied	0%	OFF	
146	Wrestling 119	Unoccupied	0%	OFF	
147	C-Store 102	Unoccupied	0%	OFF	
148	Serving 101	Unoccupied	0%	OFF	
149	Kitchen 103	Unoccupied	0%	OFF	
150	Kitchen 103	Unoccupied	0%	OFF	
151	Toilet 103D	Unoccupied	0%	OFF	
152	Staff 103A	Unoccupied	0%	OFF	
153	Dry Storage 103B	Unoccupied	0%	OFF	
154	Officials 118	Unoccupied	0%	OFF	
155	Athletics Storage 117	Unoccupied	0%	OFF	
156	Drying Room 114B	Unoccupied	0%	OFF	
157	Men’s Locker 114	Unoccupied	0%	OFF	
158	Office 114A	Unoccupied	0%	OFF	
159	Men’s Locker 113	Unoccupied	0%	OFF	
160	Office 113A	Unoccupied	0%	OFF	
161	Office 105A	Unoccupied	0%	OFF	
162	Women’s Locker 105	Unoccupied	0%	OFF	
163	Office 108A	Unoccupied	0%	OFF	
164	Custodial Sotrage 108	Unoccupied	0%	OFF	
165	Women’s Locker 106	Unoccupied	0%	OFF	
166	Office 106A	Unoccupied	0%	OFF	
167	Weights 107	Unoccupied	0%	OFF	
168	Weights 107	Unoccupied	0%	OFF	
169	Entry 131A	Unoccupied	0%	OFF	
170	Storage	Unoccupied	0%	OFF	
201	Classroom 267	Unoccupied	0%	OFF	
202	Classroom 267	Unoccupied	0%	OFF	
203	Classroom 266	Unoccupied	0%	OFF	
204	Classroom 266	Unoccupied	0%	OFF	
205	Room 266B	Unoccupied	0%	OFF	
206	Room 266A	Unoccupied	0%	OFF	
207	Room 262	Unoccupied	0%	OFF	

FCU	Zone Served	FCU Occupancy Status	FCU Valve(s) 0%	Fans Status	Comment
208	Room 262	Unoccupied	0%	OFF	
209	Room 262A	Unoccupied	0%	OFF	
210	Room 258	Unoccupied	0%	OFF	
211	Room 258	Unoccupied	0%	OFF	
212	Room 254B	Unoccupied	0%	OFF	
213	Room 254A	Unoccupied	0%	OFF	
214	Science 254	Unoccupied	0%	OFF	
215	Science 254	Unoccupied	0%	OFF	
216	Classroom 271	Unoccupied	0%	OFF	
217	Classroom 271	Unoccupied	0%	OFF	
218	Hallway 260	Unoccupied	0%	OFF	
219	Classroom 265	Unoccupied	0%	OFF	
220	Classroom 265	Unoccupied	0%	OFF	
221	Science 264A	Unoccupied	0%	OFF	
222	Science 264	Unoccupied	0%	OFF	
223	Science 264	Unoccupied	0%	OFF	
224	Hallway 263	Unoccupied	0%	OFF	
225	Room 261	Unoccupied	0%	OFF	
226	Room 261	Unoccupied	0%	OFF	
227	Room 261A	Unoccupied	0%	OFF	
228	Room 257	Unoccupied	0%	OFF	
229	Room 257	Unoccupied	0%	OFF	
230	Room 256	Unoccupied	0%	OFF	
231	Room 253	Unoccupied	0%	OFF	
232	Room 253	Unoccupied	0%	OFF	
233	Hallway 252	Unoccupied	0%	OFF	
234	Room 251	Unoccupied	0%	OFF	
235	Room 251	Unoccupied	0%	OFF	
236	Room 241A	Unoccupied	0%	OFF	
237	Room 241	Unoccupied	0%	OFF	
238	Room 241	Unoccupied	0%	OFF	
239	Room 231	Unoccupied	0%	OFF	
240	Room 240A	Unoccupied	0%	OFF	
241	Room 240	Unoccupied	0%	OFF	
242	Room 240B	Unoccupied	0%	OFF	
243	Room 232	Unoccupied	0%	OFF	
244	Room 233	Unoccupied	0%	OFF	
245	Room 234	Unoccupied	0%	OFF	
246	Room 235	Unoccupied	0%	OFF	
247	Room 236	Unoccupied	0%	OFF	
248	Room 238	Unoccupied	0%	OFF	
249	Room 237	Unoccupied	0%	OFF	
250	Room 229A	Unoccupied	0%	OFF	
251	Room 228	Unoccupied	0%	OFF	
252	Room 226	Unoccupied	0%	OFF	
253	Room 224	Unoccupied	0%	OFF	

FCU	Zone Served	FCU Occupancy Status	FCU Valve(s) 0%	Fans Status	Comment
254	Room 222	Unoccupied	0%	OFF	
255	Room 218	Unoccupied	0%	OFF	
256	Room 227	Unoccupied	0%	OFF	
257	Room 225	Unoccupied	0%	OFF	
258	Room 223	Unoccupied	0%	OFF	
259	Room 221	Unoccupied	0%	OFF	
260	Room 220	Unoccupied	0%	OFF	
261	Classroom 207	Unoccupied	0%	OFF	
262	Classroom 207	Unoccupied	0%	OFF	
263	Classroom 206	Unoccupied	0%	OFF	
264	Classroom 206	Unoccupied	0%	OFF	
265	Classroom 205	Unoccupied	0%	OFF	
266	Classroom 205	Unoccupied	0%	OFF	
267	Room 205A	Unoccupied	0%	OFF	
268	Room 203	Unoccupied	0%	OFF	
269	Room 204	Unoccupied	0%	OFF	
270	Room 216	Unoccupied	0%	OFF	
271	Fitness Center 211	Unoccupied	0%	OFF	
272	Fitness Center 211	Unoccupied	0%	OFF	
273	Entryway 250A	Unoccupied	0%	OFF	
274	Room 245	Unoccupied	0%	OFF	
275	Room 230A	Unoccupied	0%	OFF	
276	Room 230B	Unoccupied	0%	OFF	
277	Room 242	Unoccupied	0%	OFF	
301	Classroom 345	Unoccupied	0%	OFF	
302	Classroom 345	Unoccupied	0%	OFF	
303	Classroom 343	Unoccupied	0%	OFF	
304	Classroom 343	Unoccupied	0%	OFF	
305	Classroom 341	Unoccupied	0%	OFF	
306	Classroom 341	Unoccupied	0%	OFF	
307	Classroom 339	Unoccupied	0%	OFF	
308	Classroom 339	Unoccupied	0%	OFF	
309	Classroom 337	Unoccupied	0%	OFF	
310	Classroom 337	Unoccupied	0%	OFF	
311	Classroom 335	Unoccupied	0%	OFF	
312	Classroom 335	Unoccupied	0%	OFF	
313	Classroom 331	Unoccupied	0%	OFF	
314	Classroom 331	Unoccupied	0%	OFF	
315	Classroom 329	Unoccupied	0%	OFF	
316	Classroom 329	Unoccupied	0%	OFF	
317	Classroom 327	Unoccupied	0%	OFF	
318	Classroom 327	Unoccupied	0%	OFF	
319	Classroom 325	Unoccupied	0%	OFF	
320	Classroom 325	Unoccupied	0%	OFF	
321	Classroom 349	Unoccupied	0%	OFF	
322	Classroom 349	Unoccupied	0%	OFF	

FCU	Zone Served	FCU Occupancy Status	FCU Valve(s) 0%	Fans Status	Comment
323	Hallway 348	Unoccupied	0%	OFF	
324	Classroom 344	Unoccupied	0%	OFF	
325	Classroom 344	Unoccupied	0%	OFF	
326	Classroom 342	Unoccupied	0%	OFF	
327	Classroom 342	Unoccupied	0%	OFF	
328	Classroom 340	Unoccupied	0%	OFF	
329	Classroom 340	Unoccupied	0%	OFF	
330	Hallway	Unoccupied	0%	OFF	
331	Classroom 336	Unoccupied	0%	OFF	
332	Classroom 336	Unoccupied	0%	OFF	
333	Room 333A	Unoccupied	0%	OFF	
334	Classroom 330	Unoccupied	0%	OFF	
335	Classroom 330	Unoccupied	0%	OFF	
336	Classroom 328	Unoccupied	0%	OFF	
337	Classroom 328	Unoccupied	0%	OFF	
338	Room 326A	Unoccupied	0%	OFF	
339	Room 326B	Unoccupied	0%	OFF	
340	Classroom 324	Unoccupied	0%	OFF	
341	Classroom 324	Unoccupied	0%	OFF	
342	Hallway 322	Unoccupied	0%	OFF	
343	Classroom 323	Unoccupied	0%	OFF	
344	Classroom 323	Unoccupied	0%	OFF	
345	Room 318	Unoccupied	0%	OFF	
346	Classroom 317	Unoccupied	0%	OFF	
347	Classroom 317	Unoccupied	0%	OFF	
348	Classroom 316	Unoccupied	0%	OFF	
349	Classroom 316	Unoccupied	0%	OFF	
350	Classroom 315	Unoccupied	0%	OFF	
351	Classroom 315	Unoccupied	0%	OFF	
352	Classroom 314	Unoccupied	0%	OFF	
353	Classroom 314	Unoccupied	0%	OFF	
354	Room 313	Unoccupied	0%	OFF	
355	Classroom 312	Unoccupied	0%	OFF	
356	Classroom 312	Unoccupied	0%	OFF	
357	Classroom 311	Unoccupied	0%	OFF	
358	Classroom 311	Unoccupied	0%	OFF	
359	Classroom 310	Unoccupied	0%	OFF	
360	Classroom 310	Unoccupied	0%	OFF	
361	Classroom 309	Unoccupied	0%	OFF	
362	Classroom 309	Unoccupied	0%	OFF	
363	Book Storage 301	Unoccupied	0%	OFF	
364	Library Rm. 302C	Unoccupied	0%	OFF	
365	Library 302	Unoccupied	0%	OFF	
366	Library 302	Unoccupied	0%	OFF	
367	Library 302	Unoccupied	0%	OFF	
368	Library 302	Unoccupied	0%	OFF	

FCU	Zone Served	FCU Occupancy Status	FCU Valve(s) 0%	Fans Status	Comment
369	Staff Lounge 303	Unoccupied	0%	OFF	
370	Staff Lounge 303	Unoccupied	0%	OFF	
371	Classroom 304	Unoccupied	0%	OFF	
372	Classroom 304	Unoccupied	0%	OFF	
373	Classroom 305	Unoccupied	0%	OFF	
374	Classroom 305	Unoccupied	0%	OFF	
375	Classroom 306	Unoccupied	0%	OFF	
376	Classroom 306	Unoccupied	0%	OFF	
377	Library Work 302A	Unoccupied	0%	OFF	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	11/30/2020 12/1/2020 12/14/2020

Comments:

Unoccupied Low Limit

1. Conduct test on a sample basis.
2. Simulate a zone temperature below the unoccupied low limit.
3. Verify Fan turns on in full recirculation and controlling to heat mode DAT.
4. Verify FCU controls to unoccupied heating set point.
5. Verify remaining FCU units are OFF.
6. Verify unit stops when zone is satisfied.

FCU:	272	207	308	347	121	Expected
Pre-Test:						
FCU command	OFF	OFF	OFF	OFF	OFF	OFF
FCU zone temperature	68.0	68.0	70.0	72.5	65.5	
FCU ULL set point	60	60	60	60	60	
Fan command	OFF	OFF	OFF	OFF	OFF	CLOSED
Test:						
FCU ULL set point	75	75	75	75	75	
Fan command	ON	ON	ON	ON	ON	ON
FCU heating valve	100%	100%	100%	100%	100%	100%
FCU DAT	91.0	84.5	85.2	95.5	82.3	
Remaining FCUs	OFF	OFF	OFF	OFF	OFF	
Unit off when satisfied	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	
Overrides clear	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/1/2020

Comments:

Unoccupied High Limit (Cooling only units)

1. Conduct test on a sample basis.
2. Simulate a zone temperature above the unoccupied high limit.
3. Verify Fan turns on and controlling to cool mode DAT.
4. Verify FCU controls to unoccupied cooling set point.
5. Verify remaining FCU units are OFF.
6. Verify unit stops when zone is satisfied.

FCU:	240	243	247	251	256	Expected
Pre-Test:						
AHU command	OFF	OFF	OFF	OFF	OFF	OFF
FCU zone temperature	72	73	70	73	71	
FCU UHL set point	80	80	80	80	80	
Air valve command	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
Test:						
FCU UHL set point	65	65	65	65	65	
Fan command	ON	ON	ON	ON	ON	ON
FCU cooling valve	100%	100%	100%	100%	100%	100%
FCU DAT	61	60	60	59	60	
Remaining FCUs	OFF	OFF	OFF	OFF	OFF	OFF
Unit off when satisfied	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	
Overrides clear	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH/SG	6/28/2021

Comments:

Unoccupied Manual Override

1. Conduct test on a sample basis.
2. Set the override period to a minimum value.
3. Simulate a call for heating or cooling as required
4. One at a time, press the override button for the unit to be tested.
5. Verify the AHU goes into the occupied mode.
6. As applicable, verify primary air to associated FCU is open.
7. Verify tested FCU goes into occupied mode and controls to occupied set point.
8. Verify remaining FCU units are OFF.
9. Verify unit stops at end of override.

Unit:	272	207	308	347	121	Expected
Pre-Test:						
FCU command	OFF	OFF	OFF	OFF	OFF	OFF
FCU zone temperature	68.0	68.0	70.0	72.0	65.0	
FCU zone set point	60	60	60	60	60	
Override runtime	30 min	30 min	30 min	30 min	30 min	
Test:						
FCU zone set point	69	72	71	73	66	
FCU override status	ON	ON	ON	ON	ON	ON
Fan Command	ON	ON	ON	ON	ON	ON
FCU cooling valve	n/a	n/a	n/a	n/a	n/a	
FCU heating valve	26%	46%	18%	45%	80%	
FCU DAT	83.0	79.0	85.6	93.3	82.7	
Remaining FCUs	OFF	OFF	OFF	OFF	OFF	
Unit off at end of override	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	
Overrides clear	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	12/1/2020

Comments:

Occupied Mode

1. Place the control system in the occupied mode.
2. Verify associated VAVs are in occupied mode.
3. Verify FCU is indicated as being in occupied mode and operating in heating, cooling or null mode as appropriate to zone set point.
4. Verify air valves serving FCUs are commanded open and cfm is sable.

FCU	Zone Served	VAV	Occ. Status	Zone Temp	Zone Setpoint	Htg Vlv Comm.	Clg Vlv Comm.	Note
101	Ensemble 170	n/a	Occ	64	68	100%	n/a	
102	Practice 169	n/a	Occ	64	68	100%	n/a	
103	Practice 168	n/a	Occ	63.5	68	100%	n/a	
104	Practice 167	n/a	Occ	63.5	68	100%	n/a	
105	Storage 166	n/a	Occ	62.5	68	100%	n/a	
106	Scene Shop 164	107	Occ	63	68	100%	n/a	
107	Scene Shop 164	107	Occ	80	68	100%	n/a	
108	Room 181	101	Occ	65	68	100%	n/a	
109	Room 181	101	Occ	65	68	100%	n/a	
110	Storage 175	n/a	Occ	66	68	100%	n/a	
111	Hallway Room 180	102	Occ	68	88	100%	n/a	1
112	Classroom 179	103	Occ	68	68	100%	n/a	
113	Classroom 179	103	Occ	68	68	100%	n/a	
114	Classroom 178	104	Occ	68.0	68	100%	n/a	
115	Classroom 178	104	Occ	68.0	68	100%	n/a	
116	Classroom 177	105	Occ	67.0	68	100%	n/a	
117	Classroom 177	105	Occ	67.0	68	100%	n/a	
118	Shared Learning 175	n/a	Occ	64.0	68	100%	n/a	
119	Culinary Arts 174	106	Occ	62.5	88	100%	n/a	1
120	Culinary Arts 174	106	Occ	62.5	88	100%	n/a	1
121	Band 165	108	Occ	63.5	88	100%	n/a	1
122	Band 165	108	Occ	63.5	88	100%	n/a	1
123	Office 165A	n/a	Occ	63	88	100%	n/a	1
124	Office 163A	109	Occ	63.5	88	100%	n/a	1
125	Choir 163	110	Occ	63	88	100%	n/a	1
126	Choir 163	110	Occ	63	88	100%	n/a	1
127	Drama 154	111	Occ	61	88	100%	n/a	1
128	Drama 154	111	Occ	61	88	100%	n/a	1
129	Speech Therapy 151	n/a	Occ	65.5	88	100%	n/a	1
130	Special Therapy 150	n/a	Occ	64.5	88	100%	n/a	1
131	Special Ed. Sec. 146	n/a	Occ	63.5	88	100%	n/a	1
132	Shared Office 148	n/a	Occ	65.5	88	100%	n/a	1
133	Psych. 149	n/a	Occ	65.5	88	100%	n/a	1
134	OT/PT 147	n/a	Occ	65.5	88	100%	n/a	1
135	ILC 145	112	Occ	62.5	88	100%	n/a	1
136	ILC 145	112	Occ	62.5	88	100%	n/a	1, One vent not open
137	Sensory 145A	n/a	Occ	64.0	88	100%	n/a	1
138	Sensory 137	n/a	Occ	65.5	88	100%	0%	1
139	Life Skills 140	n/a	Occ	64.5	88	100%	0%	1

FCU	Zone Served	VAV	Occ. Status	Zone Temp	Zone Setpoint	Htg Vlv Comm.	Clg Vlv Comm.	Note
140	Life Skills 141	113	Occ	65.5	88	100%	n/a	1
141	Sensory 142	n/a	Occ	65.5	88	100%	n/a	1
142	Concessions 157	n/a	Occ	62.5	88	100%	n/a	1
143	Table Storage 133	n/a	Occ	64.5	88	100%	n/a	1
144	Women 123	n/a	Occ	62.5	88	100%	n/a	1
145	Wrestling 119	114	Occ	65.5	88	100%	n/a	1
146	Wrestling 119	114	Occ	65.5	88	100%	n/a	1
147	C-Store 102	n/a	Occ	62.0	88	100%	n/a	1
148	Serving 101	116	Occ	59.0	88	100%	n/a	1
149	Kitchen 103	n/a	Occ	58.0	88	100%	n/a	1
150	Kitchen 103	n/a	Occ	58.0	88	100%	n/a	1
151	Toilet 103D	n/a	Occ	60.5	73	100%	n/a	1
152	Staff 103A	n/a	Occ	57.5	88	100%	n/a	1
153	Dry Storage 103B	n/a	Occ	60.5	88	100%	n/a	1
154	Officials 118	n/a	Occ	63.5	88	100%	n/a	1
155	Athletics Storage 117	n/a	Occ	62.0	88	100%	n/a	1
156	Drying Room 114B	n/a	Occ	63.5	88	100%	n/a	1
157	Men's Locker 114	n/a	Occ	63.5	88	100%	n/a	1
158	Office 114A	n/a	Occ	66.0	88	100%	n/a	1
159	Men's Locker 113	n/a	Occ	63.0	88	100%	n/a	1
160	Office 113A	n/a	Occ	65.0	88	100%	n/a	1
161	Office 105A	n/a	Occ	68.5	88	100%	n/a	1
162	Women's Locker 105	n/a	Occ	66.5	88	100%	n/a	1
163	Office 108A	n/a	Occ	64.0	88	100%	n/a	1
164	Custodial Storage 108	n/a	Occ	65.0	88	100%	n/a	1
165	Women's Locker 106	n/a	Occ	66.5	88	100%	n/a	1
166	Office 106A	n/a	Occ	68.0	88	100%	n/a	1
167	Weights 107	118	Occ	63.0	88	100%	n/a	1
168	Weights 107	118	Occ	63.0	88	100%	n/a	1
169	Entry 131A	n/a	Occ	48.5	88	100%	n/a	1
170	Storage	n/a	Occ	64.5	68	100%	n/a	
201	Classroom 267	201	Occ	65	88	100%	n/a	1
202	Classroom 267	201	Occ	65	88	100%	n/a	1
203	Classroom 266	202	Occ	65.5	88	100%	n/a	1
204	Classroom 266	202	Occ	65.5	88	100%	n/a	1
205	Room 266B	203	Occ	65.0	88	100%	n/a	1
206	Room 266A	n/a	Occ	67.5	88	100%	n/a	1
207	Room 262	204	Occ	68.5	88	100%	n/a	1
208	Room 262	204	Occ	68.5	88	100%	n/a	1
209	Room 262A	205	Occ	70	88	100%	n/a	1
210	Room 258	206	Occ	69.5	88	100%	n/a	1
211	Room 258	206	Occ	69.5	88	100%	n/a	1
212	Room 254B	n/a	Occ	67.5	88	100%	n/a	1
213	Room 254A	n/a	Occ	68.5	88	100%	n/a	1
214	Science 254	207	Occ	69.0	88	100%	n/a	1
215	Science 254	207	Occ	69.0	88	100%	n/a	1
216	Classroom 271	208	Occ	63.5	88	100%	n/a	1

FCU	Zone Served	VAV	Occ. Status	Zone Temp	Zone Setpoint	Htg Vlv Comm.	Clg Vlv Comm.	Note
217	Classroom 271	208	Occ	63.5	88	100%	n/a	1
218	Hallway 260	n/a	Occ	68.5	88	100%	n/a	1
219	Classroom 265	209	Occ	68.5	88	100%	n/a	1
220	Classroom 265	209	Occ	68.5	88	100%	n/a	1
221	Science 264A	n/a	Occ	70.0	88	100%	n/a	1
222	Science 264	210	Occ	68.5	88	100%	n/a	1
223	Science 264	210	Occ	68.5	88	100%	n/a	1
224	Hallway 263	n/a	Occ	68.0	88	100%	n/a	1
225	Room 261	211	Occ	69	88	100%	n/a	1
226	Room 261	211	Occ	69	88	100%	n/a	1
227	Room 261A	n/a	Occ	69.0	88	100%	n/a	1
228	Room 257	213	Occ	70	88	100%	n/a	1
229	Room 257	213	Occ	70	88	100%	n/a	1
230	Room 256	n/a	Occ	68.0	88	100%	n/a	1
231	Room 253	214	Occ	66	88	100%	n/a	1
232	Room 253	214	Occ	66	88	100%	n/a	1
233	Hallway 252	n/a	Occ	67.0	88	100%	n/a	1
234	Room 251	215	Occ	67.5	88	100%	n/a	1
235	Room 251	215	Occ	67.5	88	100%	n/a	1
236	Room 241A	n/a	Occ	70.0	88	100%	n/a	1
237	Room 241	n/a	Occ	70.0	88	100%	n/a	1
238	Room 241	n/a	Occ	70.0	88	100%	n/a	1
239	Room 231	n/a	Occ	69.5	88	100%	0%	1
240	Room 240A	n/a	Occ	69.5	88	100%	0%	1
241	Room 240	n/a	Occ	70.0	88	100%	0%	1
242	Room 240B	n/a	Occ	70.5	88	100%	0%	1
243	Room 232	n/a	Occ	71.5	88	100%	0%	1
244	Room 233	n/a	Occ	71.0	88	100%	0%	1
245	Room 234	n/a	Occ	69.5	88	100%	0%	1
246	Room 235	n/a	Occ	69.0	88	100%	0%	1
247	Room 236	n/a	Occ	68.5	88	100%	0%	1
248	Room 238	n/a	Occ	70.0	88	100%	0%	1
249	Room 237	n/a	Occ	70.5	88	100%	0%	1
250	Room 229A	n/a	Occ	68.0	88	100%	0%	1
251	Room 228	n/a	Occ	68.0	88	100%	0%	1
252	Room 226	n/a	Occ	68.5	88	100%	0%	1
253	Room 224	n/a	Occ	67.5	88	100%	0%	1
254	Room 222	n/a	Occ	67.5	88	100%	0%	1
255	Room 218	n/a	Occ	68.0	88	100%	0%	1
256	Room 227	n/a	Occ	64.5	88	100%	0%	1
257	Room 225	n/a	Occ	65.5	88	100%	0%	1
258	Room 223	n/a	Occ	66.5	88	100%	0%	1
259	Room 221	n/a	Occ	65.5	88	100%	0%	1
260	Room 220	n/a	Occ	66.5	88	100%	0%	1
261	Classroom 207	219	Occ	69.0	68	0%	n/a	
262	Classroom 207	219	Occ	69.0	68	0%	n/a	
263	Classroom 206	220	Occ	69.0	68	0%	n/a	

FCU	Zone Served	VAV	Occ. Status	Zone Temp	Zone Setpoint	Htg Vlv Comm.	Clg Vlv Comm.	Note
264	Classroom 206	220	Occ	69.0	68	0%	n/a	
265	Classroom 205	221	Occ	68.0	68	89%	n/a	
266	Classroom 205	221	Occ	68.0	68	89%	n/a	
267	Room 205A	222	Occ	68.5	68	0%	n/a	
268	Room 203	223	Occ	66.5	68	100%	n/a	
269	Room 204	n/a	Occ	63.5	68	100%	n/a	
270	Room 216	n/a	Occ	68.5	68	0%	n/a	
271	Fitness Center 211	225	Occ	68.0	68	0%	n/a	
272	Fitness Center 211	225	Occ	68.0	68	0%	n/a	
273	Entryway 250A	n/a	Occ	65.5	88	100%	n/a	1
274	Room 245	n/a	Occ	63.0	88	100%	n/a	1
275	Room 230A	n/a	Occ	61.0	88	100%	n/a	1
276	Room 230B	n/a	Occ	63.0	88	100%	n/a	1
277	Room 242	n/a	Occ	69.5	88	100%	n/a	1
301	Classroom 345	301	Occ	65.5	68	100%	n/a	
302	Classroom 345	301	Occ	65.5	68	100%	n/a	
303	Classroom 343	302	Occ	67.0	68	100%	n/a	
304	Classroom 343	302	Occ	67.0	68	100%	n/a	
305	Classroom 341	303	Occ	67.0	68	100%	n/a	
306	Classroom 341	303	Occ	67.0	68	100%	n/a	
307	Classroom 339	304	Occ	67.0	68	100%	n/a	
308	Classroom 339	304	Occ	67.0	68	100%	n/a	
309	Classroom 337	305	Occ	67.5	68	100%	n/a	
310	Classroom 337	305	Occ	67.5	68	100%	n/a	
311	Classroom 335	306	Occ	67.5	68	100%	n/a	
312	Classroom 335	306	Occ	67.5	68	100%	n/a	
313	Classroom 331	307	Occ	68.5	68	0%	n/a	
314	Classroom 331	307	Occ	68.5	68	0%	n/a	
315	Classroom 329	308	Occ	68.5	68	0%	n/a	
316	Classroom 329	308	Occ	68.5	68	0%	n/a	
317	Classroom 327	309	Occ	68.5	68	0%	n/a	
318	Classroom 327	309	Occ	68.5	68	0%	n/a	
319	Classroom 325	310	Occ	68.0	68	85%	n/a	
320	Classroom 325	310	Occ	68.0	68	85%	n/a	
321	Classroom 349	311	Occ	64.5	68	100%	n/a	
322	Classroom 349	311	Occ	64.5	68	100%	n/a	
323	Hallway 348	n/a	Occ	65.0	68	100%	n/a	
324	Classroom 344	312	Occ	67.0	68	100%	n/a	
325	Classroom 344	312	Occ	67.0	68	100%	n/a	
326	Classroom 342	313	Occ	67.5	68	100%	n/a	
327	Classroom 342	313	Occ	67.5	68	100%	n/a	
328	Classroom 340	314	Occ	66.0	68	100%	n/a	
329	Classroom 340	314	Occ	66.0	68	100%	n/a	
330	Hallway	n/a	Occ	65.0	68	100%	n/a	
331	Classroom 336	315	Occ	66.0	68	100%	n/a	
332	Classroom 336	315	Occ	66.0	68	100%	n/a	
333	Room 333A	316	Occ	68.0	68	28%	n/a	

FCU	Zone Served	VAV	Occ. Status	Zone Temp	Zone Setpoint	Htg Vlv Comm.	Clg Vlv Comm.	Note
334	Classroom 330	317	Occ	67.5	68	100%	n/a	
335	Classroom 330	317	Occ	67.5	68	100%	n/a	
336	Classroom 328	318	Occ	68.0	68	0%	n/a	
337	Classroom 328	318	Occ	68.0	68	0%	n/a	
338	Room 326A	n/a	Occ	68.0	68	25%	n/a	
339	Room 326B	319	Occ	67.5	68	100%	n/a	
340	Classroom 324	320	Occ	67.5	68	100%	n/a	
341	Classroom 324	320	Occ	67.5	68	100%	n/a	
342	Hallway 322	n/a	Occ	67.0	68	100%	n/a	
343	Classroom 323	321	Occ	67.5	68	100%	n/a	
344	Classroom 323	321	Occ	67.5	68	100%	n/a	
345	Room 318	322	Occ	68.0	68	0%	n/a	
346	Classroom 317	323	Occ	69	68	0%	n/a	
347	Classroom 317	323	Occ	69	68	0%	n/a	
348	Classroom 316	324	Occ	68.5	68	0%	n/a	
349	Classroom 316	324	Occ	68.5	68	0%	n/a	
350	Classroom 315	325	Occ	69.0	68	0%	n/a	
351	Classroom 315	325	Occ	69.0	68	0%	n/a	
352	Classroom 314	326	Occ	68.5	68	0%	n/a	
353	Classroom 314	326	Occ	68.5	68	0%	n/a	
354	Room 313	338	Occ	68.0	68	0%	n/a	
355	Classroom 312	328	Occ	68.5	68	0%	n/a	
356	Classroom 312	328	Occ	68.5	68	0%	n/a	
357	Classroom 311	329	Occ	69.5	68	0%	n/a	
358	Classroom 311	329	Occ	69.5	68	0%	n/a	
359	Classroom 310	330	Occ	70.5	68	0%	n/a	
360	Classroom 310	330	Occ	70.5	68	0%	n/a	
361	Classroom 309	331	Occ	71.0	68	0%	n/a	
362	Classroom 309	331	Occ	71.0	68	0%	n/a	
363	Book Storage 301	n/a	Occ	68.0	68	0%	n/a	
364	Library Rm. 302C	327	Occ	68.5	68	0%	n/a	
365	Library 302	332	Occ	68.5	68	0%	n/a	
366	Library 302	332	Occ	68.5	68	0%	n/a	
367	Library 302	332	Occ	68.5	68	0%	n/a	
368	Library 302	332	Occ	68.5	68	0%	n/a	
369	Staff Lounge 303	333	Occ	65.5	68	100%	n/a	
370	Staff Lounge 303	333	Occ	65.5	68	100%	n/a	
371	Classroom 304	334	Occ	68.0	68	63%	n/a	
372	Classroom 304	334	Occ	68.0	68	63%	n/a	
373	Classroom 305	335	Occ	68.5	68	0%	n/a	
374	Classroom 305	335	Occ	68.5	68	0%	n/a	
375	Classroom 306	336	Occ	68.5	68	0%	n/a	
376	Classroom 306	336	Occ	68.5	68	0%	n/a	
377	Library Work 302A	337	Occ	68.0	68	0%	n/a	

Y	Tests are complete
Y	Performance is acceptable

[Y] Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG Stuart Greenwood, WCG	11/30/2020 12/1/2020 12/14/2020

Comments:

[1] Balancer had setpoints overridden to 90 F to ensure rooms in full call for heating. Setpoints left in balancer override.

Heating Mode & Heating Capacity

1. Conduct test with only the heating water loop operational. Chilled water loop should be disabled.
2. Verify heating water system is enabled and circulating water at design temperature. Record temperatures.
3. Place the terminal units into the occupied mode.
4. Simulate a condition as needed such that the terminal unit occupied set point is higher than the zone temperature to create a demand for heat.
5. Allow heating water system terminal units to stabilize.
6. Verify that the terminal unit heating valve is indicated as open by the BAS.
7. Record the TU supply air temperature and the zone air temperature for each unit, verify temperature rise is consistent with design. Use IR gun if DAT sensor is not available.
8. Release all overrides.

Parameter	Value
Design heating coil entering water temperature	140
Heating loop supply temperature set point	119
Heating loop supply temperature	120

FCU	Zone Served	Design EAT	Design ΔT °F	HTG @ 100%	ZT	FCU SAT	ΔT °F	Comment
		70	27	100	~70	100+	30+	
101	Ensemble 170	70	27	100	~65	100+	30+	
102	Practice 169	70	27	100	~65	100+	30+	
103	Practice 168	70	27	100	~65	100+	30+	
104	Practice 167	70	27	100	~65	93	28	
105	Storage 166	70	27	100	64	97	30+	[1]
106	Scene Shop 164	70	27	100	~65	100+	30+	[1]
107	Scene Shop 164	70	27	100	68	100+	30+	
108	Room 181	70	27	100	~70	100+	30+	[3]
109	Room 181	70	27	100	~70	100+	30+	[3]
110	Storage 175	70	27	100	~70	100+	30+	
111	Hallway Room 180	70	27	100	~70	100+	30+	
112	Classroom 179	70	27	100	~70	100+	30+	
113	Classroom 179	70	27	100	~70	100+	30+	
114	Classroom 178	70	27	100	~65	100+	30+	[1]
115	Classroom 178	70	27	100	~65	100+	30+	[1]
116	Classroom 177	70	27	100	~70	100+	30+	[1]
117	Classroom 177	70	27	100	~70	100+	30+	[1]
118	Shared Learning 175	70	27	100	~65	100+	30+	
119	Culinary Arts 174	70	27	100	~65	100+	30+	[1]
120	Culinary Arts 174	70	27	100	~65	100+	30+	[1]
121	Band 165	70	27	100	65	100	30+	[1] [3]
122	Band 165	70	27	100	~65	100+	30+	[1] [3]
123	Office 165A	70	27	100	65	96	30+	[1]
124	Office 163A	70	27	100	~65	100+	30+	[1]
125	Choir 163	70	27	100	~65	100+	30+	[1] [3]
126	Choir 163	70	27	100	~65	100+	30+	[1] [3]

FCU	Zone Served	Design EAT	Design ΔT °F	HTG @ 100%	ZT	FCU SAT	ΔT °F	Comment
		70	27	100	~70	100+	30+	
127	Drama 154	70	27	100	~65	100+	30+	[1] [3]
128	Drama 154	70	27	100	~65	100+	30+	[1] [3]
129	Speech Therapy 151	70	27	100	~70	100+	30+	
130	Special Therapy 150	70	27	100	~70	100+	30+	
131	Special Ed. Sec. 146	70	27	100	~70	100+	30+	[1]
132	Shared Office 148	70	27	100	~70	100+	30+	
133	Psych. 149	70	27	100	~70	100+	30+	[1]
134	OT/PT 147	70	27	100	~70	100+	30+	
135	ILC 145	70	27	100	~65	100+	30+	[1]
136	ILC 145	70	27	100	~65	100+	30+	[1]
137	Sensory 145A	70	27	100	~65	100+	30+	
138	Sensory 137	70	27	100	~65	100+	30+	
139	Life Skills 140	70	27	100	~65	100+	30+	[1]
140	Life Skills 141	70	27	100	~65	100+	30+	[1]
141	Sensory 142	70	27	100	~65	100+	30+	
142	Concessions 157	70	27	100	~65	100+	30+	
143	Table Storage 133	70	27	100	~65	100+	30+	[1]
144	Women 123	70	27	100	~65	100+	30+	
145	Wrestling 120	70	27	100	63	97	30+	[1]
146	Wrestling 120	70	51	100	63	100+	30+	[1]
147	C-Store 102	70	51	100	~65	100+	30+	[1]
148	Serving 101	70	27	100	~65	100+	30+	[1]
149	Kitchen 103	70	27	100	~65	100+	30+	
150	Kitchen 103	70	27	100	~65	100+	30+	
151	Toilet 103D	70	27	100	~65	100+	30+	
152	Staff 103A	70	27	100	~65	100+	30+	
153	Dry Storage 103B	70	27	100	~65	100+	30+	
154	Officials 118	70	27	100	~65	100+	30+	
155	Athletics Storage 117	70	27	100	~65	97	30+	[1]
156	Drying Room 114B	70	50	100	~65	96	30+	[1]
157	Men's Locker 114	70	27	100	~65	95	30	
158	Office 114A	70	27	100	~65	100+	30+	
159	Men's Locker 113	70	27	100	~65	100+	30+	[1]
160	Office 113A	70	27	100	~65	100+	30+	
161	Office 105A	70	27	100	~65	100+	30+	
162	Women's Locker 105	70	27	100	~65	100+	30+	[1]
163	Office 108A	70	27	100	~65	100+	30+	
164	Custodial Sotrage 108	70	27	100	~65	100+	30+	
165	Women's Locker 106	70	27	100	~65	100+	30+	[1]
166	Office 106A	70	27	100	~65	100+	30+	

FCU	Zone Served	Design EAT	Design ΔT °F	HTG @ 100%	ZT	FCU SAT	ΔT °F	Comment
		70	27	100	~70	100+	30+	
167	Weights 107	70	27	100	~65	100+	30+	[1]
168	Weights 107	70	27	100	~65	100+	30+	[1]
169	Entry 131A	70	51	100	46	100+	30+	
170	Storage	70	51	100	63.5	100+	30+	
201	Classroom 267	70	27	100	~70	100+	30+	
202	Classroom 267	70	27	100	~70	100+	30+	
203	Classroom 266	70	27	100	~70	100+	30+	
204	Classroom 266	70	27	100	~70	100+	30+	
205	Room 266B	70	27	100	~70	100+	30+	
206	Room 266A	70	27	100	68	96	28	
207	Room 262	70	27	100	~70	100+	30+	
208	Room 262	70	27	100	~70	100+	30+	
209	Room 262A	70	27	100	51	93	42	
210	Room 258	70	27	100	66	98	32	
211	Room 258	70	27	100	66	101	35	
212	Room 254B	70	27	100	58	98	30	
213	Room 254A	70	27	100	58	98	30	
214	Science 254	70	27	100	~70	100+	30+	
215	Science 254	70	27	100	~70	100+	30+	
216	Classroom 271	70	27	100	~70	100+	30+	
217	Classroom 271	70	27	100	~70	100+	30+	
218	Hallway 260	70	27	100	~70	100+	30+	
219	Classroom 265	70	27	100	~70	100+	30+	
220	Classroom 265	70	27	100	~70	100+	30+	
221	Science 264A	70	27	100	~70	100+	30+	
222	Science 264	70	27	100	~70	100+	30+	
223	Science 264	70	27	100	70	100+	30+	
224	Hallway 263	70	27	100	~70	100+	30+	
225	Room 261	70	27	100	~70	100+	30+	
226	Room 261	70	27	100	~70	100+	30+	
227	Room 261A	70	27	100	~70	100+	30+	
228	Room 257	70	27	100	~70	100+	30+	
229	Room 257	70	27	100	~70	100+	30+	
230	Room 256	70	27	100	~70	100+	30+	
231	Room 253	70	27	100	~70	100+	30+	
232	Room 253	70	27	100	~70	100+	30+	
233	Hallway 252	70	27	100	~70	100+	30+	
234	Room 251	70	27	100	~70	100+	30+	
235	Room 251	70	27	100	~70	100+	30+	
236	Room 241A	70	27	100	~70	100+	30+	
237	Room 241	70	27	100	~70	100+	30+	
238	Room 241	70	27	100	~70	100+	30+	
239	Room 231	70	19	100	70	95	25	
240	Room 240A	70	20	100	70	93	23	
241	Room 240	70	20	100	70	92	22	
242	Room 240B	70	20	100	70	93	23	

FCU	Zone Served	Design EAT	Design ΔT °F	HTG @ 100%	ZT	FCU SAT	ΔT °F	Comment
		70	27	100	~70	100+	30+	
243	Room 232	70	20	100	70	90	20	
244	Room 233	70	20	100	70	90	20	
245	Room 234	70	20	100	70	90	20	
246	Room 235	70	20	100	70	90	20	
247	Room 236	70	20	100	70	91	21	
248	Room 238	70	25	100	70	100	30	
249	Room 237	70	20	100	70	94	24	
250	Room 229A	70	20	100	70	90	20	
251	Room 228	70	20	100	70	90	20	
252	Room 226	70	20	100	70	90	20	
253	Room 224	70	20	100	70	90	20	
254	Room 222	70	20	100	68	90	22	
255	Room 218	70	20	100	71	91	20	
256	Room 227	70	23	100	70	90	20	
257	Room 225	70	20	100	65	91	26	[2]
258	Room 223	70	20	100	65	93	28	
259	Room 221	70	20	100	65	94	29	[2]
260	Room 220	70	20	100	65	97	32	[2]
261	Classroom 207	70	27	100	~70	100+	30+	
262	Classroom 207	70	27	100	~70	100+	30+	
263	Classroom 206	70	27	100	~70	100+	30+	
264	Classroom 206	70	27	100	~70	100+	30+	
265	Classroom 205	70	27	100	~70	100+	30+	
266	Classroom 205	70	27	100	~70	100+	30+	
267	Room 205A	70	27	100	~70	100+	30+	
268	Room 203	70	27	100	~70	100+	30+	
269	Room 204	70	27	100%	66	90	23	
270	Room 216	70	27	100%	68	100	30+	
271	Fitness Center 211	70	27	100%	70	100	30	
272	Fitness Center 211	70	27	100%	70	100	30	
273	Entryway 250A	70	23	100%	56	100+	30+	
274	Room 245	70	27	100%	63	94	31	
275	Room 230A	70	27	100%	65	93	28	
276	Room 230B	70	23	100%	55	95	30+	
277	Room 242	70	27	100	~70	100+	30+	
301	Classroom 345	70	27	100	~70	100+	30+	
302	Classroom 345	70	27	100	~70	100+	30+	
303	Classroom 343	70	27	100	~70	100+	30+	
304	Classroom 343	70	27	100	~70	100+	30+	
305	Classroom 341	70	27	100	~70	100+	30+	
306	Classroom 341	70	27	100	~70	100+	30+	
307	Classroom 339	70	27	100	~70	100+	30+	
308	Classroom 339	70	27	100	~70	100+	30+	
309	Classroom 337	70	27	100	~70	100+	30+	
310	Classroom 337	70	27	100	~70	100+	30+	
311	Classroom 335	70	27	100	65	100+	30+	

FCU	Zone Served	Design EAT	Design ΔT °F	HTG @ 100%	ZT	FCU SAT	ΔT °F	Comment
		70	27	100	~70	100+	30+	
312	Classroom 335	70	27	100	65	100+	30+	
313	Classroom 331	70	27	100	~70	100+	30+	
314	Classroom 331	70	27	100	~70	100+	30+	
315	Classroom 329	70	27	100	~70	100+	30+	
316	Classroom 329	70	27	100	~70	100+	30+	
317	Classroom 327	70	27	100	~70	100+	30+	
318	Classroom 327	70	27	100	70	100+	30+	
319	Classroom 325	70	27	100	~70	100+	30+	
320	Classroom 325	70	27	100	~70	100+	30+	
321	Classroom 349	70	27	100	~70	100+	30+	
322	Classroom 349	70	27	100	~70	100+	30+	
323	Hallway 348	70	27	100	~70	100+	30+	
324	Classroom 344	70	27	100	~70	100+	30+	
325	Classroom 344	70	27	100	~70	100+	30+	
326	Classroom 342	70	27	100	~70	100+	30+	
327	Classroom 342	70	27	100	~70	100+	30+	
328	Classroom 340	70	27	100	~70	100+	30+	
329	Classroom 340	70	27	100	70	100+	30+	
330	Hallway	70	27	100	~70	100+	30+	
331	Classroom 336	70	27	100	~70	100+	30+	
332	Classroom 336	70	27	100	~70	100+	30+	
333	Room 333A	70	27	100	~70	100+	30+	
334	Classroom 330	70	27	100	~70	100+	30+	
335	Classroom 330	70	27	100	~70	100+	30+	
336	Classroom 328	70	27	100	~70	100+	30+	
337	Classroom 328	70	27	100	~70	100+	30+	
338	Room 326A	70	27	100	~70	100+	30+	
339	Room 326B	70	27	100	~70	100+	30+	
340	Classroom 324	70	27	100	~70	100+	30+	
341	Classroom 324	70	27	100	~70	100+	30+	
342	Hallway 322	70	27	100	~70	100+	30+	
343	Classroom 323	70	27	100	~70	100+	30+	
344	Classroom 323	70	27	100	70	100+	30+	
345	Room 318	70	27	100	~70	100+	30+	
346	Classroom 317	70	27	100	~70	100+	30+	
347	Classroom 317	70	27	100	~70	100+	30+	
348	Classroom 316	70	27	100	~70	100+	30+	
349	Classroom 316	70	27	100	~70	100+	30+	
350	Classroom 315	70	27	100	~70	100+	30+	
351	Classroom 315	70	27	100	~70	100+	30+	
352	Classroom 314	70	27	100	~70	100+	30+	
353	Classroom 314	70	27	100	~70	100+	30+	
354	Room 313	70	27	100	~70	100+	30+	
355	Classroom 312	70	27	100	~70	100+	30+	
356	Classroom 312	70	27	100	~70	100+	30+	
357	Classroom 311	70	27	100	~70	100+	30+	

FCU	Zone Served	Design EAT	Design ΔT °F	HTG @ 100%	ZT	FCU SAT	ΔT °F	Comment
		70	27	100	~70	100+	30+	
358	Classroom 311	70	27	100	~70	100+	30+	
359	Classroom 310	70	27	100	~70	100+	30+	
360	Classroom 310	70	27	100	~70	100+	30+	
361	Classroom 309	70	27	100	~70	100+	30+	
362	Classroom 309	70	27	100	~70	100+	30+	
363	Book Storage 301	70	27	100	~70	100+	30+	
364	Library Rm. 302C	70	27	100	~70	100+	30+	
365	Library 302	70	27	100	~70	100+	30+	
366	Library 302	70	27	100	~70	100+	30+	
367	Library 302	70	27	100	~70	100+	30+	
368	Library 302	70	27	100	~70	100+	30+	
369	Staff Lounge 303	70	27	100	~70	100+	30+	
370	Staff Lounge 303	70	27	100	~70	100+	30+	
371	Classroom 304	70	27	100	~70	100+	30+	
372	Classroom 304	70	27	100	~70	100+	30+	
373	Classroom 305	70	27	100	~70	100+	30+	
374	Classroom 305	70	27	100	~70	100+	30+	
375	Classroom 306	70	27	100	~70	100+	30+	
376	Classroom 306	70	27	100	~70	100+	30+	
377	Library Work 302A	70	27	100	~70	100+	30+	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	10/23/2020 11/16/2020

Comments: [1] The unit may need be set to high speed because of the high ceiling to minimize stratification if there are comfort complaints. This is adjustable by owner and the owner is aware of this option.

[2] These rooms fan speed have been turned up to 50% due to the temperature difference from unit to floor.

[3] These rooms fan speed have been turned up to 75% due the temperature difference from unit to floor.

Heating Coil Valve Leak Test

1. Conduct test with only the heating water loop operational. Chilled water loop should be disabled.
2. Verify heating water system is enabled and circulating water at design temperature. Record temperatures.
3. Simulate a condition as needed such that the terminal unit occupied set point is lower than space temperature to eliminate a demand for heat.
4. Allow heating water system, AHU DAT control and terminal units to stabilize.
5. Verify that the terminal unit heating valve is indicated as closed by the BAS.
6. Record the TU supply air temperature and the zone air temperature for each unit, verify by temperature change that the valve is closed. Use IR gun if DAT sensor is not available.
7. Release all overrides.

Parameter	Value
Design heating coil entering water temperature	140
Heating loop supply temperature set point	119
Heating loop supply temperature	120

FCU	Zone Served	HTG @ 0%	ZT	FCU SAT	ΔT °F ~0°F	Comment
		0	~69	~69	0	
101	Ensemble 170	0%	62	64.7	2.7	
102	Practice 169	0%	62.1	63.1	1	
103	Practice 168	0%	62	63.2	1.2	
104	Practice 167	0%	61.5	63.0	1.5	
105	Storage 166	0%	67.2	70	2.8	
106	Scene Shop 164	0%	66.0	69.0	3.0	
107	Scene Shop 164	0%	67.5	70	2.5	
108	Room 181	0%	69.9	72.4	2.5	
109	Room 181	0%	69.6	71.6	2.0	
110	Storage 175	0%	69.5	72.0	2.5	
111	Hallway Room 180	0%	63.4	64.9	1.5	
112	Classroom 179	0%	72.6	74.3	0.7	
113	Classroom 179	0%	72.8	73.9	1.1	
114	Classroom 178	0%	67.3	67.5	0.2	
115	Classroom 178	0%	66.4	68.4	2.0	
116	Classroom 177	0%	72.6	74.5	1.9	
117	Classroom 177	0%	73.0	73.4	0.4	
118	Shared Learning 175	0%	68.0	69.2	1.2	
119	Culinary Arts 174	0%	63.1	64.0	0.9	
120	Culinary Arts 174	0%	63.1	64.0	0.9	
121	Band 165	0%	73.0	75.4	2.4	
122	Band 165	0%	65.0	66.1	1.1	
123	Office 165A	0%	66.5	67.4	0.9	
124	Office 163A	0%	65.1	66.1	1.0	
125	Choir 163	0%	69.3	72.0	2.7	
126	Choir 163	0%	70.0	73.1	3.1	
127	Drama 154	0%	61.0	62.1	1.1	

FCU	Zone Served	HTG @ 0%	ZT	FCU SAT	ΔT °F ~0°F	Comment
		0	~69	~69	0	
128	Drama 154	0%	61.7	62.4	0.7	
129	Speech Therapy 151	0%	66.1	66.6	0.5	
130	Special Therapy 150	0%	66.5	66.8	0.3	
131	Special Ed. Sec. 146	0%	71.7	74	2.3	
132	Shared Office 148	0%	67.6	68.1	0.5	
133	Psych. 149	0%	67.4	68.1	0.7	
134	OT/PT 147	0%	68.0	69.1	1.1	
135	ILC 145	0%	67.5	67.6	0.1	
136	ILC 145	0%	68.0	69.0	1.0	
137	Sensory 145A	0%	65.2	65.3	0.1	
138	Sensory 137	0%	67.3	68.8	0.5	
139	Life Skills 140	0%	66.9	67.5	0.6	
140	Life Skills 141	0%	65.6	66.6	1.0	
141	Sensory 142	0%	68.4	71.3	1.9	
142	Concessions 157	0%	68.1	68.5	0.4	
143	Table Storage 133	0%	66.6	67.2	0.6	
144	Women 123	0%	73.8	74.2	0.6	
145	Wrestling 119	0%	69.6	71.2	0.6	
146	Wrestling 119	0%	69.6	70.1	0.5	
147	C-Store 102	0%	65.1	65.4	0.3	
148	Serving 101	0%	64.4	64.9	0.5	
149	Kitchen 103	0%	66.3	68.0	1.7	
150	Kitchen 103	0%	65.8	67.7	1.9	
151	Toilet 103D	0%	66.8	67.7	0.9	
152	Staff 103A	0%	65.4	65.5	1.1	
153	Dry Storage 103B	0%	65.0	66.0	1.0	
154	Officials 118	0%	67.0	67.6	0.6	
155	Athletics Storage 117	0%	68.3	69.5	1.2	
156	Drying Room 114B	0%	64.4	64.4	0	
157	Men’s Locker 114	0%	66.9	70.3	3.4	
158	Office 114A	0%	67.1	67.4	0.3	
159	Men’s Locker 113	0%	67.0	67.5	0.5	
160	Office 113A	0%	65.3	65.5	0.2	
161	Office 105A	0%	68.0	68.0	0	
162	Women’s Locker 105	0%	67.3	67.7	0.4	
163	Office 108A	0%	71.9	73.9	2.0	
164	Custodial Sotrage 108	0%	69.4	70.4	1.0	
165	Women’s Locker 106	0%	69.0	69.1	0.1	
166	Office 106A	0%	68.0	68.5	0.5	
167	Weights 107	0%	66.0	66.0	0	
168	Weights 107	0%	66.1	66.1	0	
169	Entry 131A	0%	50.1	50.8	0.7	
170	Storage	0%	63.3	63.9	0.6	
201	Classroom 267	0%	71.0	71.8	0.8	
202	Classroom 267	0%	71.0	72.0	1.0	
203	Classroom 266	0%	69.0	69.4	0.4	

FCU	Zone Served	HTG @ 0%	ZT	FCU SAT	ΔT °F ~0°F	Comment
		0	~69	~69	0	
204	Classroom 266	0%	69.0	70.1	1.1	
205	Room 266B	0%	68.5	69.8	1.3	
206	Room 266A	0%	70.3	71.5	1.2	
207	Room 262	0%	69.3	69.6	0.3	
208	Room 262	0%	69.5	69.6	0.1	
209	Room 262A	0%	72.2	73.4	1.2	
210	Room 258	0%	71.3	71.6	0.3	
211	Room 258	0%	71.1	72.1	1	
212	Room 254B	0%	70.1	70.3	0.2	
213	Room 254A	0%	71.0	73.0	2.0	
214	Science 254	0%	69.3	69.5	0.2	
215	Science 254	0%	69.0	69.1	0.1	
216	Classroom 271	0%	70.7	71.1	0.4	
217	Classroom 271	0%	70.7	71.5	0.8	
218	Hallway 260	0%	69.7	69.9	0.2	
219	Classroom 265	0%	71.5	73.5	2.0	
220	Classroom 265	0%	71.5	74.0	2.5	
221	Science 264A	0%	72.2	73.0	0.8	
222	Science 264	0%	72.7	74.0	0.8	
223	Science 264	0%	71.0	71.0	0.0	
224	Hallway 263	0%	71.4	73.9	2.5	
225	Room 261	0%	71.6	73.5	1.9	
226	Room 261	0%	72.0	73.1	1.1	
227	Room 261A	0%	72.6	74.4	1.8	
228	Room 257	0%	73.0	73.3	0.3	
229	Room 257	0%	72.8	73.8	1.0	
230	Room 256	0%	71.3	72.0	0.7	
231	Room 253	0%	70.3	71.1	0.8	
232	Room 253	0%	69.6	70.7	1.1	
233	Hallway 252	0%	69.8	69.8	0.0	
234	Room 251	0%	71.0	71.5	0.5	
235	Room 251	0%	71.5	71.8	0.3	
236	Room 241A	0%	73.6	74.1	0.5	
237	Room 241	0%	73.0	74.0	1.0	
238	Room 241	0%	72.6	73.7	1.1	
239	Room 231	0%	76.9	77.8	0.9	
240	Room 240A	0%	76.5	76.5	0	
241	Room 240	0%	76	76	0	
242	Room 240B	0%	75.5	76	0.5	
243	Room 232	0%	70.6	70.8	0.2	
244	Room 233	0%	69.8	70.5	0.7	
245	Room 234	0%	74.7	75	0.3	
246	Room 235	0%	73.7	74	0.3	
247	Room 236	0%	73.1	73.1	0	
248	Room 238	0%	76.1	76.3	0.2	
249	Room 237	0%	74.5	74.9	0.4	

FCU	Zone Served	HTG @ 0%	ZT	FCU SAT	ΔT °F ~0°F	Comment
		0	~69	~69	0	
250	Room 229A	0%	61.3	61.3	0	
251	Room 228	0%	65.6	65.9	0.3	
252	Room 226	0%	65.8	66.0	0.2	
253	Room 224	0%	65.2	65.6	0.4	
254	Room 222	0%	64.8	65.3	0.5	
255	Room 218	0%	65.8	66.9	1.1	
256	Room 227	0%	61.0	61.3	0.3	
257	Room 225	0%	65.3	66.5	0.2	
258	Room 223	0%	63.5	65.0	1.5	
259	Room 221	0%	62.8	64.1	1.3	
260	Room 220	0%	60.9	60.9	0	
261	Classroom 207	0%	71.5	72.5	1.0	
262	Classroom 207	0%	71.5	73.0	1.5	
263	Classroom 206	0%	71.4	72.2	0.8	
264	Classroom 206	0%	71.4	71.8	0.4	
265	Classroom 205	0%	75.2	77.0	1.8	
266	Classroom 205	0%	75.2	76.1	0.9	
267	Room 205A	0%	71.0	71.2	0.2	
268	Room 203	0%	72.5	74.0	1.5	
269	Room 204	0%	72.8	74.6	1.8	
270	Room 216	0%	70.5	71.6	1.1	
271	Fitness Center 211	0%	66.5	66.8	0.3	
272	Fitness Center 211	0%	66.5	66.8	0.3	
273	Entryway 250A	0%	67.5	68.0	0.5	
274	Room 245	0%	65.2	65.4	0.2	
275	Room 230A	0%	61.8	63.7	1.9	
276	Room 230B	0%	62.5	63.1	0.6	
277	Room 242	0%	73.1	74.4	1.3	
301	Classroom 345	0%	68.4	69.1	0.7	
302	Classroom 345	0%	68.4	68.6	0.2	
303	Classroom 343	0%	67.5	67.6	0.0	
304	Classroom 343	0%	67.5	67.5	0.1	
305	Classroom 341	0%	68.0	68.4	0.4	
306	Classroom 341	0%	68.0	68.5	0.5	
307	Classroom 339	0%	69.0	69.8	0.8	
308	Classroom 339	0%	69.0	69.1	0.1	
309	Classroom 337	0%	70.4	70.8	0.4	
310	Classroom 337	0%	70.4	70.8	0.4	
311	Classroom 335	0%	68.7	68.7	0.0	
312	Classroom 335	0%	68.7	68.8	0.1	
313	Classroom 331	0%	71.0	71.2	0.2	
314	Classroom 331	0%	71.0	71.0	0.0	
315	Classroom 329	0%	70.5	70.5	0.0	
316	Classroom 329	0%	70.5	70.7	0.2	
317	Classroom 327	0%	70.3	70.9	0.6	
318	Classroom 327	0%	70.3	70.5	0.2	

FCU	Zone Served	HTG @ 0%	ZT	FCU SAT	ΔT °F ~0°F	Comment
		0	~69	~69	0	
319	Classroom 325	0%	70.5	70.4	~0.0	
320	Classroom 325	0%	70.5	71.0	0.5	
321	Classroom 349	0%	64.0	64.9	0.9	
322	Classroom 349	0%	64.0	64.3	0.3	
323	Hallway 348	0%	65.5	65.6	0.1	
324	Classroom 344	0%	67.0	68.2	1.2	
325	Classroom 344	0%	67.0	68.0	1.0	
326	Classroom 342	0%	68.7	69.0	0.3	
327	Classroom 342	0%	68.7	69.2	0.5	
328	Classroom 340	0%	67.7	68.1	0.4	
329	Classroom 340	0%	67.7	68.8	1.1	
330	Hallway	0%	69.0	69.7	0.7	
331	Classroom 336	0%	68.8	69.9	1.1	
332	Classroom 336	0%	68.8	69.2	0.4	
333	Room 333A	0%	70.0	70.1	0.1	
334	Classroom 330	0%	69.9	70.4	0.5	
335	Classroom 330	0%	69.9	70.4	0.5	
336	Classroom 328	0%	69.2	69.3	0.1	
337	Classroom 328	0%	69.2	69.4	0.2	
338	Room 326A	0%	71.1	72.4	1.3	
339	Room 326B	0%	69.2	70.6	1.4	
340	Classroom 324	0%	69.7	70.6	0.9	
341	Classroom 324	0%	69.7	69.7	0.0	
342	Hallway 322	0%	71.1	71.4	0.3	
343	Classroom 323	0%	69.7	69.8	0.1	
344	Classroom 323	0%	69.7	71.1	1.4	
345	Room 318	0%	70.7	70.7	0.0	
346	Classroom 317	0%	70.5	70.5	0.0	
347	Classroom 317	0%	70.5	70.6	0.1	
348	Classroom 316	0%	70.4	70.7	0.3	
349	Classroom 316	0%	70.4	70.8	0.4	
350	Classroom 315	0%	70.5	71.3	0.8	
351	Classroom 315	0%	70.5	70.9	0.4	
352	Classroom 314	0%	69.8	70.1	0.3	
353	Classroom 314	0%	69.8	69.8	0.0	
354	Room 313	0%	69.9	70.7	0.8	
355	Classroom 312	0%	70.5	70.9	0.4	
356	Classroom 312	0%	70.5	70.8	0.3	
357	Classroom 311	0%	71.5	72.2	0.7	
358	Classroom 311	0%	71.5	72.6	1.1	
359	Classroom 310	0%	73.6	74.0	0.4	
360	Classroom 310	0%	73.6	74.0	0.4	
361	Classroom 309	0%	71.5	72.0	0.5	
362	Classroom 309	0%	71.5	72.5	1.0	
363	Book Storage 301	0%	68.4	69.0	0.6	
364	Library Rm. 302C	0%	68.3	69.1	0.8	

FCU	Zone Served	HTG @ 0%	ZT	FCU SAT	ΔT °F ~0°F	Comment
		0	~69	~69	0	
365	Library 302	0%	69.4	69.5	0.1	
366	Library 302	0%	69.0	69.7	0.7	
367	Library 302	0%	69.8	69.9	0.1	
368	Library 302	0%	69.9	70.2	0.3	
369	Staff Lounge 303	0%	72.1	72.8	0.7	
370	Staff Lounge 303	0%	72.1	73.6	1.5	
371	Classroom 304	0%	74.0	74.3	0.3	
372	Classroom 304	0%	74.0	74.3	0.3	
373	Classroom 305	0%	70.6	70.8	0.2	
374	Classroom 305	0%	70.6	71.2	0.6	
375	Classroom 306	0%	70.0	70.1	0.1	
376	Classroom 306	0%	70.0	70.0	0.0	
377	Library Work 302A	0%	68.8	69.3	0.5	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG Stuart Greenwood, WCG	11/30/2020 12/1/2020

Comments:

Cooling Mode & Cooling Capacity

1. Conduct test with only the cooling water loop operational. Heating water loop should be disabled.
2. Verify cooling water system is enabled and circulating water at design temperature. Record temperatures.
3. Place the terminal units into the occupied mode.
4. Simulate a condition as needed such that the terminal unit occupied set point is lower than the zone temperature to create a demand for cooling.
5. Allow cooling water system terminal units to stabilize.
6. Verify that the terminal unit cooling valve is indicated as open by the BAS.
7. Record the TU supply air temperature and the zone air temperature for each unit, verify temperature drop is consistent with design. Use IR gun if DAT sensor is not available.
8. Release all overrides.

Parameter	Value
Design cooling coil entering water temperature	45
FCU cooling loop supply temperature set point	44
FCU cooling loop supply temperature	44
FCU cooling loop return temperature	48

FCU	Zone Served	Design EAT	Design ΔT °F	CLG @ 100%	ZT	FCU SAT	ΔT °F	Comment
239	Room 231	75/62.5	55	100	72	56	17	
240	Room 240A	75/62.5	55	100	71	53	18	
241	Room 240	75/62.5	55	100	71	54	17	
242	Room 240B	75/62.5	55	100	71	54	17	
243	Room 232	75/62.5	55	100	73	54	19	
244	Room 233	75/62.5	55	100	71	54	17	
245	Room 234	75/62.5	55	100	72	55	17	
246	Room 235	75/62.5	55	100	71	54	17	
247	Room 236	75/62.5	55	100	72	55	17	
248	Room 238	75/62.5	55	100	73	53	20	
249	Room 237	75/62.5	55	100	72	53	17	
250	Room 229A	75/62.5	55	100	72	53	17	
251	Room 228	75/62.5	55	100	77	55	21	
252	Room 226	75/62.5	55	100	72	55	17	
253	Room 224	75/62.5	55	100	71	54	17	
254	Room 222	75/62.5	55	100	71	54	17	
255	Room 218	75/62.5	55	100	71	53	18	
256	Room 227	75/62.5	55	100	73	53	20	
257	Room 225 Principal	75/62.5	55	100	76	55	21	
258	Room 223	75/62.5	55	100	71	54	17	
259	Room 221	75/62.5	55	100	72	55	17	
260	Room 220	75/62.5	55	100	73	56	17	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	5/12/21

Comments:

Cooling Coil Valve Leak Test

1. Conduct test with only the cooling water loop operational. Heating water loop should be disabled.
2. Verify cooling water system is enabled and circulating water at design temperature. Record temperatures.
3. Place the terminal units into the occupied mode.
4. Simulate a condition as needed such that the terminal unit occupied set point is higher than space temperature to eliminate a demand for cooling.
5. Allow cooling water system, AHU DAT control and terminal units to stabilize.
6. Verify that the terminal unit cooling valve is indicated as closed by the BAS.
7. Record the TU supply air temperature and the zone air temperature for each unit, verify by temperature change that the valve is closed. Use IR gun if DAT sensor is not available.
8. Release all overrides.

Parameter	Value
Design cooling coil entering water temperature	45
FCU cooling loop supply temperature set point	44
FCU cooling loop supply temperature	44
FCU cooling loop return temperature	48

FCU	Zone Served	CLG @ 0%	ZT	FCU SAT	ΔT °F	Comment
239	Room 231	0	72	72	0	
240	Room 240A	0	71	71	0	
241	Room 240	0	71	71	0	
242	Room 240B	0	71	71	0	
243	Room 232	0	73	73	0	
244	Room 233	0	71	71	0	
245	Room 234	0	72	72	0	
246	Room 235	0	71	71	0	
247	Room 236	0	72	72	0	
248	Room 238	0	73	73	0	
249	Room 237	0	72	72	0	
250	Room 229A	0	72	72	0	
251	Room 228	0	77	77	0	
252	Room 226	0	72	72	0	
253	Room 224	0	71	71	0	
254	Room 222	0	71	71	0	
255	Room 218	0	71	71	0	
256	Room 227	0	73	73	0	
257	Room 225 Principal	0	73	73	0	
258	Room 223	0	71	71	0	
259	Room 221	0	72	72	0	
260	Room 220	0	73	73	0	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	5/12/21

Comments: In null mode the units fans shut off.

Condensate Pump and Float Switch (Cooling only units) (Sample Test)

1. Conduct test on a sample basis.
2. Set the unit to occupied cooling mode.
3. Simulate a condition for condensate in sump as required.
4. Verify float switch action. Disable Fan, Cooling coil valve closes and alarms.
5. Verify that condensate is pumped out.
6. Verify unit restarts after sump is pumped out.

FCU:	240	248	Expected
Pre-Test:			
AHU command	OFF	OFF	OFF
FCU zone temperature	72	71	
FCU zone set point	70	70	
Test:			
FCU zone set point	68	68	
FCU status	ON	ON	ON
Fan command	OCC	OCC	OCC
AHU damper command	Y	Y	≥ MIN
FCU cooling valve	100%	100%	
FCU heating valve	0%	0%	
FCU DAT	65	65	
Flood sump	ON	ON	
Float switch closes	Y	Y	
Fan stops	Y	Y	
Cooling Coil valve closes	Y	Y	
Condensate pump starts	Y	Y	
Alarm received	Y	Y	
Unit restarts after float switch opens	Y	Y	
	Y	Y	
Tests are complete	Y	Y	
Performance is acceptable	Y	Y	
Overrides clear	Y	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH/SG	6/28/2021 9/28/21

Comments: Internal float switch. There is no external alarm recorded by the DDC except for a general “Fan fail alarm” for any possibly error with that specific FCU.

Gas Furnaces– BAS Thermostatic, Damper, Scheduled

1. Place system into unoccupied mode.
2. As needed, simulate a zone temperature above the unoccupied zone temperature set point but below the occupied heating set point.
3. Verify unit is disabled and combustion dampers are commanded closed.
4. Simulate a zone temperature below the unoccupied zone temperature set point.
5. Verify Furnace is enabled by the BAS.
6. Place unit in occupied mode.
7. Simulate a zone temperature above the occupied set point.
8. Verify Furnace is disabled by the BAS.
9. Verify by direct observation that fan and heat are off.
10. Simulate a zone temperature below the occupied set point
11. Verify Furnace is enabled by the BAS.
12. Verify by direct observation that fan and heat are on.
13. Measure and record supply air temperature.
14. Simulate a fan failure at the unit and verify fan failure alarm.
15. Clear overrides or return set point to original.

Furnace-	1	2	3	4	Expected
Pre-Test:					
Space temperature	71.5	68	69	67.5	
Occupied set point	72	72	72	72	65°F
Unoccupied set point	55	55	55	55	55°F
Unoccupied Mode:					
OCC SP [x] or SWO Space [ ] temp	72	72	72	68	
UNOCC SP [x] or SWO Space [ ] temp	55	55	55	55	
Fan command/status displayed	OFF	OFF	OFF	OFF	OFF
Unoccupied Heating:					OFF
UNOCC SP [x] or SWO Space [ ] temp	75	75	75	75	
Fan command/status displayed	ON	ON	ON	ON	ON
Occupied Mode:					
OCC SP [x] or SWO Space [ ] temp	72	72	72	68	
Fan command/status displayed	OFF	OFF	OFF	OFF	OFF
Damper command displayed	n/a	n/a	n/a	n/a	CLOSED
Fan & furnace observed	OFF	OFF	OFF	OFF	OFF
Occupied Heating:					
OCC SP [x] or SWO Space [ ] temp	80	72	74	72	
Fan command/status displayed	ON	ON	ON	ON	ON
Damper command displayed	n/a	n/a	n/a	n/a	OPEN
Fan & furnace observed	ON	ON	ON	ON	ON
Measured supply air temperature	95+	95+	95+	95+	
Fan Fail:					
Fan command displayed	ON	ON	ON	ON	ON
Fan status displayed	OFF	OFF	OFF	OFF	OFF
Fan alarm displayed and logged	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/5/2021

Comments:

Exhaust Fans

Manual Control EF (with BAS Fan Proof and interlock)

1. Turn exhaust fan on at local switch and verify fan starts, status reads ON
2. Turn on local interlocked equipment to start fan. ON
3. Turn exhaust fan off at local switch or interlocked equipment and verify fan stops, status reads OFF

CTE Welding Hood EF-	1	2	3	4	5	6
Turn on interlocked equipment	n/a	n/a	n/a	n/a	n/a	n/a
Turn on switch	Y	Y	Y	Y	Y	Y
Fan Starts	Y	Y	Y	Y	Y	Y
Fan Status ON	Y	Y	Y	Y	Y	Y
Make-up dampers OPEN	Y	Y	Y	Y	Y	Y
Fan Stops	Y	Y	Y	Y	Y	Y
Fan Status OFF	Y	Y	Y	Y	Y	Y
Make-up dampers CLOSE	Y	Y	Y	Y	Y	Y
Tests are complete	Y	Y	Y	Y	Y	Y
Performance is acceptable	Y	Y	Y	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/5/2021

Comments:

Manual Control EF (with BAS Fan Proof)

1. Turn on local interlocked equipment to start fan. ON.
2. Turn exhaust fan off at local switch or interlocked equipment and verify fan stops, status reads OFF.

EF-	211	212	Expected
Turn on interlocked equipment (Switch on wall)	Y	Y	Laser Engraver
Fan Starts	Y	Y	
Fan Status ON	Y	Y	
Turn off interlocked equipment (Switch on wall)	Y	Y	
Fan Stops after delay	Y	Y	5 Minutes
Fan Status OFF	Y	Y	
Tests are complete	Y	Y	
Performance is acceptable	Y	Y	
Overrides clear, set points to original	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/16/2021

Comments:

Thermostatically Controlled Exhaust Fan (BAS with proof, HOA, and dampers)

1. Start test with zone space temperature below set point, fan command off. Adjust set point as necessary.
2. Lower thermostat set point to below room temperature or simulate a space temperature higher than set point. Verify fan starts and damper(s) open when space temperature is above set point and BAS is correct.
3. Turn off the exhaust fan at the disconnect or HOA and verify fan failure alarm is generated.
4. Turn power to fan back on and verify alarm clears.
5. Raise thermostat set point above room temperature or simulate a space temperature lower than set point. Verify fan stops and damper(s) close when space temperature is below set point and BAS is correct.
6. Switch HOA to HAND. Verify fan in HAND alarm is generated.
7. Switch HOA to back to AUTO and verify alarm clears.

EF-	102	202	208	210	301	Expected
Pre-Test:						
Space temperature	62.4	70.6	70.5	67.6	65.6	
Space temperature set point	75	75	75	75	55	85 ON, 80 OFF
Test:						
Set point [ ] or Simulated Space [Y] temp	79.2	78.1	81.6	84.3	55	
Exhaust fan command/status displayed	OFF	ON	ON	ON	ON	ON
Damper command/status displayed	Y	Y	n/a	Y	Y	OPEN (Y)
Exhaust fan observed	OFF	ON	ON	ON	ON	ON
Damper observed	Y	Y	n/a	Y	Y	OPEN (Y)
Exhaust fan failure alarm received	Y	Y	Y	Y	Y	
Exhaust fan failure alarm cleared	Y	Y	Y	Y	Y	
Set point [ ] or Simulated Space [Y] temp	80	80	85	80	75	
Exhaust fan command/status displayed	OFF	OFF	OFF	OFF	OFF	OFF
Damper command/status displayed	Y	Y	n/a	Y	Y	CLOSED (Y)
Exhaust fan observed	OFF	OFF	OFF	OFF	OFF	OFF
Damper observed	Y	Y	n/a	Y	Y	CLOSED (Y)
Exhaust fan in HAND alarm received	n/a	n/a	n/a	n/a	n/a	
Exhaust fan in HAND alarm cleared	n/a	n/a	n/a	n/a	n/a	
Tests complete, performance acceptable	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH/SG	1/25/2021 5/12/21

Comments:

Manual Control Exhaust Fan w/ Motorized Damper

1. Start test with fan switch off.
2. Turn exhaust fan on at local switch and verify fan starts, damper fully open
3. Turn exhaust fan off at local switch and verify fan stops, damper fully closed

UNIT:	101	201	203	204	205	206	Expected
Pre-Test:							
Switch status	[2]	OFF	OFF	OFF	OFF	OFF	OFF
Fan observed		OFF	OFF	OFF	OFF	OFF	OFF
Damper observed		CL.	CL.	CL.	CL.	CL.	CLOSED
Test:							
Switch status		ON	ON	ON	ON	ON	ON
Fan observed		ON	ON	ON	ON	ON	ON
Damper observed		Open	Open	Open	Open	Open	OPEN
Switch status		OFF	OFF	OFF	OFF	OFF	OFF
Fan observed		OFF	OFF	OFF	OFF	OFF	OFF
Damper observed		CL.	CL.	CL.	CL.	CL.	CLOSED
Tests are complete		Y	Y	Y	Y	Y	
Performance is acceptable		Y	Y	Y	Y	Y	
Overrides clear, set points to original		Y	Y	Y	Y	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG	12/21/2020

Comments:

1. GENERAL: Dampers for EF-201 and EF-205 were not easily visible. Verified movement by sound and airflow when damper open and fan on.
2. No DDC interface. Deleted by owner.

BAS Controlled Exhaust Fan (with Proof)

1. Place the control system in the unoccupied mode.
2. Verify all exhaust fans under BAS control are commanded off, display an off status and are off by direct observation.
3. Place the system in the occupied mode.
4. Verify all exhaust fans under BAS control are commanded on, display an on status and are on by direct observation.
5. Turn off the exhaust fan at the disconnect and verify fan failure alarm is generated.
6. Turn power to fan back on and verify alarm clears.

EF-	110	207	Expected
Unoccupied Mode:			
Exhaust fan command displayed	OFF	OFF	OFF
Exhaust fan status displayed	OFF	OFF	OFF
Exhaust fan observed	OFF	OFF	OFF
Occupied Mode:			
Exhaust fan command displayed	ON	ON	ON
Exhaust fan status displayed	ON	ON	ON
Exhaust fan observed	ON	ON	ON
Exhaust fan failure alarm received	n/a	n/a	
Exhaust fan failure alarm cleared	n/a	n/a	
Tests are complete	Y	Y	
Performance is acceptable	Y	Y	
Overrides clear, set points to original	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/2/2021

Comments:

Manual Timer Control Exhaust Fan Test

1. Verify timer is at zero and exhaust fan is off.
2. Turn timer to minimum increment and record timer setting and time of day.
3. Verify fan comes on.
4. Monitor timer/fan till shut off and record time. Verify run time matches timer.

EF-	107	209	Expected
Timer at zero, fan off	Y	Y	
Timer set to	60m	60m	60min
Time of day	10:00am	10:09am	
Fan on	Y	Y	
Time of day fan off	11:10am	11:25am	
Fan run time	60m	60m	
Tests are complete	Y	Y	
Performance is acceptable	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/2/2021

Comments:

Kitchen Hood Exhaust Fan

Thermal Switch Control

1. Conduct test with kitchen exhaust fan off and kitchen appliances Off.
2. Record initial test parameters.
3. Turn fan on and off by hood switch and record.
4. Turn exhaust fan on by applying heat to the thermal switch and verify fan starts. Thermal switch sensitivity to be approximately 10°F above space temperature.
5. Turn exhaust fan off by removing heat to thermal switch and verify KEF stops.

UNIT:	104	105	108	109	Expected
Pre-Test:					
KEF command/status	OFF	OFF	OFF	OFF	OFF
Appliances	OFF	OFF	OFF	OFF	OFF
Turn on switch	Y	Y	Y	Y	
Fan Starts	Y	Y	Y	Y	
Fan Status ON	Y	Y	Y	Y	
Interlocked ADF damper ADF-109, 114	NA	NA	Y	Y	CLOSED
Fan Stops	Y	Y	Y	Y	[1]
Fan Status OFF	Y	Y	Y	Y	[1]
Interlocked ADF Damper ADF-109, 114	NA	NA	Y	Y	OPEN
On Test:					
Apply heat to thermal switch	Y	Y	Y	Y	85
KEF command/status	ON	ON	OFF	OFF	ON
Fan Status ON	Y	Y	N	N	
Interlocked ADF damper ADF-109, 114	NA	NA	NA	NA	CLOSED
Off Test:					
Remove heat	Y	Y	Y	Y	
KEF command/status	OFF	OFF	OFF	OFF	OFF
Fan Stops	Y	Y	Y	Y	[1]
Fan Status OFF	Y	Y	Y	Y	
Interlocked ADF Damper ADF-109, 114	NA	NA	NA	NA	OPEN
Tests are complete	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/25/2021 4/7/2021

Comments: [1] Fan stops after 30 minutes.

Manual Control EF (with BAS Fan Proof and interlock)

1. Turn on local interlocked equipment to start fan. ON.
2. Turn exhaust fan off at local switch or interlocked equipment and verify fan stops, status reads OFF.

EF-	103	106	Expected
Turn on interlocked equipment (Dishwasher)	Y	Y	
Fan Starts	Y	Y	
Fan Status ON	Y	Y	
Turn off interlocked equipment (Dishwasher)	Y	Y	
Fan Stops after delay	Y	Y	5 minutes
Fan Status OFF	Y	Y	
Tests are complete	Y	Y	
Performance is acceptable	Y	Y	
Overrides clear, set points to original	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	3/25/2021

Comments:

Interlocked Booster Fan

1. Start test with Dryer off
2. Verify booster fan is off.
3. Turn Dryer on.
4. Verify booster fan is on.

EF-	101	102	103	
Dryers switched off	Y	Y	Y	
Booster fan off	Y	Y	Y	
Dryer switched on	Y	Y	Y	
Booster fan on	Y	Y	Y	
Tests are complete	Y	Y	Y	
Performance is acceptable	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	3/25/2021

Comments:

Destratification Fans; Thermostatically Controlled Ceiling Fan (BAS with proof)

1. Record pre-test conditions.
2. Start test with zone space temperature below set point. Adjust set point as necessary.
3. Verify fan stops when space temperature is below set point and BAS is correct.
4. Lower thermostat set point to below room temperature or simulate a space temperature higher than set point. Verify fan starts when space temperature is above set point and BAS is correct.
5. Turn off the exhaust fan at the disconnect and verify fan failure alarm is generated.
6. Turn power to fan back on and verify alarm clears.
7. Return set points to pre-test conditions.

DF-	1	2	3	4	Expected
Pre Test					
Space temperature start of test	64	64	64	64	AHU-04
Set point start of test	69	69	69	69	5°F> Space T
Test					
Set point [x] or Simulated Space [ ] temp	68	68	68	68	<5°F ΔT
Exhaust fan command/status displayed	OFF	OFF	OFF	OFF	OFF
Exhaust fan observed	OFF	OFF	OFF	OFF	OFF
Set point [x] or Simulated Space [ ] temp	70	70	70	70	>5°F ΔT
Exhaust fan command/status displayed	ON	ON	ON	ON	ON
Exhaust fan observed	ON	ON	ON	ON	ON
Fan speed is 30% at start-up	Y	Y	Y	Y	
Fan speed increments every 5 minutes	Y	Y	Y	Y	
Manual speed override	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	Matt White, WCG	12/8/2020

Comments:

Air Conditioning Units

Ductless Split System Air Conditioning Unit – Local Thermostat Control

1. Lower thermostat set point below room temperature or simulate a space temperature higher than set point.
2. Verify Indoor unit fan starts and outdoor unit compressor and fan starts when space temperature is above set point.
3. Allow system to stabilize. Measure and record return and discharge temperature. Verify cooling differential temperature. (Note on inverter and modulating units, delta T will be lower when room temperature is cooler, unit modulates to demand).
4. Raise thermostat set point above room temperature or simulate a space temperature lower than set point.
5. Verify Indoor unit fan stops and outdoor unit compressor and fan are off.
6. Test functionality of various local thermostat features including fan speed control (off, auto, speeds), blade control and other features as appropriate.

ICU-	101	102	103	201	202	301	Expected
Pre-Test:							
Space temperature	68	69	68	66	73	72	
Thermostat Reading	67	68	67	67	73	73	
Set point at local thermostat	70	70	67	67	67	67	
Test:							
Set point [ ] or Simulated Space [x] temp	67	67	83	67	67	67	ST>SP
AC unit status displayed	ON	ON	ON	ON	ON	ON	ON
AC Unit, Observation	ON	ON	ON	ON	ON	ON	ON
Return Temperature	68	69	68	66	73	72	
Discharge Temperature	54	54	114	55	128	55	
Delta T	14	15	46	11	55	17	
Set point [ ] or Simulated Space [x] temp	n/a	n/a	67	n/a	67	83	ST<SP
AC unit status displayed	n/a	n/a	ON	n/a	ON	ON	ON
AC Unit, Observation	n/a	n/a	ON	n/a	ON	ON	n/a
Discharge Temperature	n/a	n/a	55	n/a	55	n/a	
Condensate Reservoir ok	Y	Y	Y	Y	Y	Y	Y
Condensate Pump ok	N	Y	Y	Y	Y	Y	Y
Fan speed control verified	Y	Y	Y	Y	Y	Y	
Manual blade adjustment verified	Y	Y	Y	Y	Y	Y	
Automatic blade swing verified	Y	Y	Y	Y	Y	Y	
Tests are complete	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	

ICU-	302	303	1 CTE	Expected
Pre-Test:				
Space temperature	70	68	69	
Thermostat Reading	70	68	70	
Set point at local thermostat	67	70	77	
Test:				
Set point [x] or Simulated Space [ ] temp	83	82	67	ST>SP
AC unit status displayed	ON	ON	ON	ON
AC Unit, Observation	ON	ON	ON	ON
Return Temperature	70	70	67	
Discharge Temperature	83	84	56	
Delta T	13	14	11	
Set point [ ] or Simulated Space [x] temp	67	67	n/a	ST<SP
AC unit status displayed	ON	ON	n/a	ON
AC Unit, Observation	ON	ON	n/a	ON
Discharge Temperature	55	58	n/a	
Condensate Reservoir ok	Y	Y	Y	Y
Condensate Pump ok	Y	Y	Y	Y
Fan speed control verified	Y	Y	Y	
Manual blade adjustment verified	Y	Y	Y	
Automatic blade swing verified	Y	Y	Y	
Tests are complete	Y	Y	Y	
Performance is acceptable	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	4/7/2021

Comments:

Unit Heater – Electric with Line Volt Thermostat

1. Record current set point.
2. On all units for a given test zone or floor, go to each room and lower thermostat set point to achieve a satisfied space temperature so that unit is off.
3. If necessary, wait until the unit heater has cooled to close to ambient temperature.
4. Check the surface temperatures of units to confirm unit is off
5. Measure the zone temperature, record value.
6. Raise the thermostat set point slowly till audible click is heard, record set point indication and verify it is close to zone temperature (calibration).
7. Turn thermostat to maximum and allow to run for a few minutes
8. Verify fan is on.
9. Measure supply air temperature.
10. Return set point to original value.

(HS) EWH-	101	102	103	104	201	CTE EWH-1	Expected
Set point start of test	~85%	50%	Min.	Min.	Min.	Min	55
Space temperature start of test	64	66	55	64	70	75	
No Heat Call:							
Set point adjusted to:	Min.	Min.	Min.	Min.	Min.	Min	
Fan observed	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Coil temperature	66	67	55.7	62	72.7	75	AMBIENT
Heating:							
Zone temperature	64	66	55	64	70	75	
Thermostat clicks at	~50%	~30%	~15%	~30%	50%	60%	
Fan observed	ON	ON	ON	On	ON	ON	ON
Measured supply air temperature	115	120	110	115	120	140+	
Tests are complete	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	6/25/2021

Comments:

Unit Heater, Gas Fired – BAS Thermostatically Controlled (CTE)

1. Simulate a zone temperature above the zone temperature set point.
2. Verify UH is disabled by the BAS.
3. Verify by direct observation that fan and heat are off and MU dampers are closed
4. Simulate a zone temperature below the zone temperature set point
5. Verify UH is enabled by the BAS.
6. Verify Make-up Dampers OPEN
7. Verify by direct observation that fan and heat are on.
8. Measure and record supply air temperature.
9. Verify that the units enable with interlocks

(CTE) UH-	1	2	3	4	Expected
Space temperature start of test	64	64	61	61	
Set point start of test	70	70	70	70	
Dampers closed (Unoccupied)	Y	Y	Y	Y	CLOSED
Occupied Cooling (no heat):					
Set point [X] or Simulated Space [ ] temp	70	70	70	70	
Fan command displayed	Y	Y	Y	Y	OFF
Fan observed	Y	Y	Y	Y	OFF
Furnace command	Y	Y	Y	Y	OFF
Furnace status observed	Y	Y	Y	Y	OFF
Dampers open	Y	Y	Y	Y	CLOSED
Occupied Heating:					
Set point [X] or Simulated Space [ ] temp	70	70	70	70	
Fan command displayed	Y	Y	Y	Y	ON
Fan observed	Y	Y	Y	Y	ON
Furnace command	Y	Y	Y	Y	ON
Furnace status observed	Y	Y	Y	Y	ON
Measured supply air temperature	117	120	126	120	
Dampers open (interlocked with Sawdust collector)	Y	Y	NA	NA	ON
Dampers open (interlocked with EFs)	NA	NA	Y	Y	ON
Tests are complete	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	SG	2/16/2021

Comments: [1] Interlocked with EF's. [2] Interlocked with sawdust collector.

Kitchen Hood Exhaust Fan (Interlocked Make-Up Air Unit)

Manual Switch Control

1. Conduct test with kitchen exhaust fan off and outside air below MAU discharge air temperature set point, adjust MAU if needed.
2. Record initial test parameters.
3. Turn exhaust fan on by turning on hood switch and verify fan starts.
4. Verify MAU starts and unit controls to discharge air temperature.
5. Turn exhaust fan off by turning off kitchen switch and verify KEF and MAU stop.

UNIT:	1	Expected
Pre-Test:		
KEF command/status	OFF	OFF
MAU command/status	OFF	OFF
Outside air temperature	45	
MAU DAT set point	72	65
On Test:		
MAU DAT set point	72	65
KEF command/status	ON	ON
MAU command/status	ON	ON
MAU DAT	71.3	
Off Test:		
KEF command/status	OFF	OFF
MAU command/status	OFF	OFF
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	SG	4/7/2021

Comments:

Dust Collector – Equipment Interlock, Abort Dampers & Shaker

Interlock

1. Start test with unit off, all interlocked equipment off.
2. Record shaker delay and run time set points.
3. Record dust collect run time delay on shut down set point.
4. Start an individual interlocked piece of equipment.
5. Verify dust collector starts.
6. Shut down interlocked equipment.
7. Verify dust collector continues to run for specified delay time.
8. Verify additional equipment interlocks.

Master Control Switches

9. Turn master switch to OFF, MAN/AUTO switch to AUTO.
10. Start an interlocked piece of equipment.
11. Verify dust collector does not start.
12. Turn MAN/AUTO switch to MANUAL and verify dust collector does not start.
13. Turn master switch to ON, MAN/AUTO switch to AUTO.
14. Start an interlocked piece of equipment and confirm dust collector starts.
15. Push emergency stop mushroom button and verify dust collector stops immediately.
16. Pull out emergency button out and shutdown interlocked equipment.
17. Turn MAN/AUTO switch to ON and confirm dust collector starts.
18. Push emergency stop mushroom button and verify dust collector stops immediately.
19. Pull out emergency button and verify dust collector is enabled again.
20. Return master switch to ON, MAN/AUTO switch to AUTO.

Shaker

21. Observe dust collector with all interlocked equipment off and dust collector shut down.
22. Confirm fan is off and abort dampers are in the full exhaust (abort) mode.
23. Start an interlocked piece of equipment.
24. Verify the abort dampers modulate from full exhaust to full recirculation mode.
25. Shut down interlocked equipment.
26. Verify and record the delay time to start of shaking cycle.
27. Verify and record the shake cycle run time.

UNIT:	SDCU-01	Expected
PRE-TEST:		
Unit master switch	ON	ON
Unit MAN/AUTO switch	Remote	AUTO
Emergency shutdown	OFF	OFF
Dust collector run time delay	0s	
Shaker cycle delayed start set point	90s	
Shaker cycle run time set point	5s	
Interlocked equipment & dust collector fan	OFF	OFF
INTERLOCK TEST:		
Interlocked equipment station activated	Y	
Measured run time delay	~2 min	
Additional interlocked stations:	Y	
EMERGENCY SHUTDOWN TEST:		
Interlocked equipment station activated	n/a	ON
Simulate emergency shutdown (spark detection)	n/a	ON
Unit shuts down	NO	OFF
MASTER CONTROL:		
Master switch	OFF	OFF
Dust collector locked out in AUTO	Y	
Dust collector locked out in MAN	Y	
Master switch	ON	ON
Dust collector emergency stop in AUTO	Y	
Dust collector emergency stop in MAN	Y	
Reset OK	Y	
SHAKER TEST:		
Interlocked equipment & dust collector fan	OFF	OFF
Abort damper position	OPEN	EXHAUST
Interlocked equipment & dust collector fan	ON	ON
Abort damper position	OPEN	RETURN
Measured shaker cycle delay on shutdown	90s	
Measured shaker cycle run time	5s	
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH/SG	2/23/2021

Comments:

Division 26 – Electrical System

Classroom & Office Lighting Control (LCP)– Sample Test

Pre-Test:

1. Start test with room unoccupied, lights OFF.
2. Verify all occupancy sensors are configured to vacancy mode: manual on, auto off via sensor, set at 30 minutes.

Light Switch (LS) Test:

3. Simulate a different delay set point as needed, turn on the lights via switch and verify the switch programming:
    a. Classroom: Button 1: all lights on full level; Button 2: increase brightness level; Button 3: decrease brightness level; Button 4: all lights off.
    b. Office: Button 1: On/OFF; Button 2: Manual dim lights up or down.

Photocell (PC) Daylight Harvesting Sensor Test:

4. Record the daylight condition in the room at the photocell surface: bright or dark.
5. Place the light meter underneath the dimming zone lighting fixtures at table level and measure the light level for the photocell test.
    a. If the daylight condition is bright: cover up the photocell and verify the light meter reading goes up.
    b. If the daylight condition is dark: shine a flashlight against the photocell and verify the light meter reading goes down.

Occupancy Sensor (OS) Test:

6. Lights turn on via switch (manual on).
7. Leave the room with lights on and verify the lights turn off automatically after delay time.

Controlled Receptacle (CR) Test:

8. With occupancy sensor active, verify all the controlled receptacles have power.
9. With occupancy sensor inactive, verify all the controlled receptacles have no power.

Pre-Test			LS Test	PC Test			OS Test		CR Test (Sample)	
Room Location	**Occ. Sensor Delay**	**Lighting Fixture (OFF)**	**Light Switch OK?**	**Daylight Condition (Dark/Bright)**	**Before Test (FC)**	**After Test (FC)**	**Lights Manual ON**	**Lights OFF After Delay (Y/N)**	**OS Active CR w/ Power?**	**OS Inactive CR w/o Power?**
3D art lab 181	30	Y	Y	Dark	67	55	Y	Y	-	-
CR 179	30	Y	Y	Bright	26	29	Y	Y	-	-
CR 178	30	Y	Y	Dark	75	47	Y	Y	-	-
CR 177	30	Y	Y	Dark	91	77	Y	Y	-	-
Cul Arts 174 [1]	30	Y	Y	Dark	39	38	Y	Y	-	-
Science 241	30	Y	Y	Dark	54	33	Y	Y	-	-
CR 205	30	Y	Y	Dark	75	57	Y	Y	-	-

Pre-Test			LS Test	PC Test			OS Test		CR Test (Sample)	
Room Location	Occ. Sensor Delay	Lighting Fixture (OFF)	Light Switch OK?	Daylight Condition (Dark/Bright)	Before Test (FC)	After Test (FC)	Lights Manual ON	Lights OFF After Delay (Y/N)	OS Active CR w/ Power?	OS Inactive CR w/o Power?
CR 206	30	Y	Y	Dark	58	45	Y	Y	-	-
CR 207	30	Y	Y	Dark	52	40	Y	Y	-	-
Office 218	30	Y	Y	NA	NA	NA	Y	Y	-	-
Office 220	30	Y	Y	Dark	76	55	Y	Y	-	-
Office 221	30	Y	Y	Dark	72	53	Y	Y	Y	Y
Office 222	30	Y	Y	NA	NA	NA	Y	Y	Y	Y
Office 223	30	Y	Y	Dark	77	58	Y	Y	Y	Y
Office 224	30	Y	Y	NA	NA	NA	Y	Y	-	-
Office 225	30	Y	Y	Dark	86	59	Y	Y	-	-
Office 226	30	Y	Y	NA	NA	NA	Y	Y	-	-
Workroom 228	30	Y	Y	NA	NA	NA	Y	Y	-	-
Office 232	30	Y	Y	Dark	44	31	Y	Y	Y	Y
Office 233	30	Y	Y	Dark	43	31	Y	Y	-	-
Office 235	30	Y	Y	Dark	32	21	Y	Y	-	-
Office 236	30	Y	Y	Dark	61	46	Y	Y	-	-
Conf. 238	30	Y	Y	Na	NA	NA	Y	Y	-	-
Science 241	30	Y	Y	Dark	54	33	Y	Y	-	-
Prep 241A	30	Y	Y	Dark	38	31	Y	Y	-	-
Science 251	30	Y	Y	Dark	40	29	Y	Y	-	-
Science 253	30	Y	Y	Dark	46	34	Y	Y	-	-
Science 254	30	Y	Y	Dark	56	40	Y	Y	-	-
Prep 254B	30	Y	Y	NA	NA	NA	Y	Y	-	-
Prep 256B	30	Y	Y	NA	NA	NA	Y	Y	-	-
Science 257	30	Y	Y	Dark	42	30	Y	Y	-	-
Science 258	30	Y	Y	Dark	60	48	Y	Y	-	-
Science 261	30	Y	Y	Dark	47	35	Y	Y	-	-
Prep 261A	30	Y	Y	Dark	37	30	Y	Y	-	-
CR 262	30	Y	Y	Dark	45	35	Y	Y	-	-
Storage 262A	30	Y	Y	NA	NA	NA	Y	Y	-	-
CR 264	30	Y	Y	Dark	43	31	Y	Y	-	-
Prep 264A	30	Y	Y	Dark	29	18	Y	Y	-	-

Pre-Test			LS Test	PC Test			OS Test		CR Test (Sample)	
Room Location	Occ. Sensor Delay	Lighting Fixture (OFF)	Light Switch OK?	Daylight Condition (Dark/Bright)	Before Test (FC)	After Test (FC)	Lights Manual ON	Lights OFF After Delay (Y/N)	OS Active CR w/ Power?	OS Inactive CR w/o Power?
CR 265	30	Y	Y	Dark	53	42	Y	Y	-	-
CR 266	30	Y	Y	Dark	58	44	Y	Y	-	-
Lab 266 A	30	Y	Y	NA	NA	NA	Y	Y	-	-
Lab 266 B	30	Y	Y	Dark	54	44	Y	Y	-	-
CR 267	30	Y	Y	Dark	48	38	Y	Y	-	-
CR 271	30	Y	Y	Dark	54	40	Y	Y	-	-
Library 302	30	Y	Y	Dark	89	71	Y	Y	-	-
CR 303	30	Y	Y	Dark	65	50	Y	Y	-	-
CR 306	30	Y	Y	Dark	27	19	Y	Y	-	-
CR 307	30	Y	Y	Dark	44	34	Y	Y	-	-
CR 308	30	Y	Y	Dark	35	26	Y	Y	-	-
CR 309	30	Y	Y	Dark	49	39	Y	Y	-	-
CR 310	30	Y	Y	Dark	45	36	Y	Y	-	-
CR 311	30	Y	Y	Dark	50	39	Y	Y	-	-
CR 312	30	Y	Y	Dark	55	32	Y	Y	-	-
ASB 318	30	Y	Y	Dark	57	39	Y	Y	-	-
CR 315	30	Y	Y	Dark	40	30	Y	Y	-	-
CR 317	30	Y	Y	Dark	34	25	Y	Y	-	-
CR 323	30	Y	Y	Dark	47	32	Y	Y	-	-
CR 324	30	Y	Y	Dark	33	22	Y	Y	Y	Y
CR 325	30	Y	Y	Dark	42	31	Y	Y	-	-
Green Room 326B	30	Y	Y	Dark	55	31	Y	Y	-	-
CR 327	30	Y	Y	Dark	40	27	Y	Y	-	-
CR 328	30	Y	Y	Dark	32	22	Y	Y	-	-
CR 329	30	Y	Y	Bright	34	55	Y	Y	Y	Y
CR 330	30	Y	Y	Bright	35	47	Y	Y	Y	Y
CR 331	30	Y	Y	Dark	36	24	Y	Y	-	-
Storage 333	30	Y	Y	-	-	-	Y	Y	-	-
CR 335	30	Y	Y	Dark	37	24	Y	Y	-	-
CR 336	30	Y	Y	Dark	43	32	Y	Y	Y	Y
CR 337	30	Y	Y	Dark	37	26	Y	Y	Y	Y

Pre-Test			LS Test	PC Test			OS Test		CR Test (Sample)	
Room Location	Occ. Sensor Delay	Lighting Fixture (OFF)	Light Switch OK?	Daylight Condition (Dark/Bright)	Before Test (FC)	After Test (FC)	Lights Manual ON	Lights OFF After Delay (Y/N)	OS Active CR w/ Power?	OS Inactive CR w/o Power?
CR 339	30	Y	Y	Dark	35	25	Y	Y	-	-
CR 340	30	Y	Y	Dark	36	22	Y	Y	Y	Y
CR 342	30	Y	Y	Dark	46	24	Y	Y	Y	Y
CR 341	30	Y	Y	Dark	47	32	Y	Y	-	-
CR 343	30	Y	Y	Dark	32	22	Y	Y	-	-
CR 344	30	Y	Y	Dark	42	31	Y	Y	-	-
CR 349	30	Y	Y	Bright	36	25	Y	Y	-	-

[Y] Tests are complete and performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
CxA:	BH	6/25/21

Comments:

Corridors / Vestibules / Restrooms Lighting Control (LCP)

Pre-Test:

1. Verify the time clock calibration on the lighting control system. Record the programmed schedule.
2. Test the occupancy sensors with the space unoccupied. Simulate a shorter occupancy sensor delay time set point as needed.

Unoccupied Test:

3. Change the schedule to unoccupied hour and verify all the corridor and vestibule lights turn off. Walk around the building and verify lights turn on after sense motion. Verify lights turn off after delay.

Occupied Test:

4. Change the schedule to occupied hour and verify all the corridor and vestibule lights stay on.

Photocell (PC) Daylight Harvesting Sensor Test:

5. Record the daylight condition in the room at the photocell surface: bright or dark.
6. Place the light meter underneath the dimming zone lighting fixtures at table level and measure the light level for the photocell test.
    a. If the daylight condition is bright: cover up the photocell and verify the light meter reading goes up.
    b. If the daylight condition is dark: shine a flash light against the photocell and verify the light meter reading goes down.

Designed Schedule	Programmed Schedule	Current Time	System Displayed Time
Monday to Friday 6:00AM to 6:00PM	Monday to Friday 6:00AM to 6:00PM	2:30 PM	2:30 PM

Pre-Test			Unoccupied Test		Occ. Test	PC Test		
Space Location	Occ. Sensor Delay	Lighting Fixture (OFF)	Lighting Fixture (Auto ON)	Lights OFF After Delay (Y/N)	Lighting Fixture (ON)	Daylight Condition (Dark/Bright)	Before Test (FC)	After Test (FC)
Corridors	20	Y	On	<30	On	NA	NA	NA
Restrooms	20	Y	On	<30	On	NA	NA	NA
Vestibules	20	Y	On	<30	On	NA	NA	NA

[Y] Tests are complete and performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
CxA:	BH	6/25/21

Comments:

Gym & Common Lighting Control (LCP)

Pre-Test:

1. Start test with room unoccupied, lights OFF.

Occupancy Sensor (OS) Test:

2. Verify all occupancy sensors are configured to occupancy mode: automatic on to 50%, auto off via sensor, set at 30 minutes.
3. Simulate a different delay set point as needed, verify lights automatically turn off after delay.

Light Switch (LS) Test:

4. Turn the lights on and off via switch and verify the switch functions.

Photocell (PC) Daylight Harvesting Sensor Test:

5. Record the daylight condition in the room at the photocell surface: bright or dark.
6. Place the light meter underneath the dimming zone lighting fixtures at table level and measure the light level for the photocell test.
    a. If the daylight condition is bright: cover up the photocell and verify the light meter reading goes up.
    b. If the daylight condition is dark: shine a flash light against the photocell and verify the light meter reading goes down.

Pre-Test			OS Test		LS Test	PC Test		
Room Location	**Occ. Sensor Delay**	**Lighting Fixture (OFF)**	**Lighting Fixture (Auto ON @ 50%)**	**Lights OFF After Delay (Y/N)**	**Light Switch OK?**	**Daylight Condition (Dark/Bright)**	**Before Test (FC)**	**After Test (FC)**
Gymnasiums	20	Y	On	<30	On	NA	NA	NA
Commons	20	Y	On	<30	On	Bright	65	30

[Y] Tests are complete and performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
CxA:	BH	6/25/21

Comments:

Locker Room Lighting Control (LCP)

Pre-Test:

1. Start test with room unoccupied, lights OFF.

Occupancy Sensor (OS) Test:

2. Verify all occupancy sensors are configured to occupancy mode: automatic on to 100%, auto off via sensor, set at 30 minutes.
3. Simulate a different delay set point as needed, verify the lights turn off automatically after delay time.

Light Switch (LS) Test:

4. Turn the lights on and off via switch and verify the switch functions.

Pre-Test			OS Test		LS Test
Room Location	**Occ. Sensor Delay**	**Lighting Fixture (OFF)**	**Lighting Fixture (Auto ON @ 100%)**	**Lights OFF After Delay (Y/N)**	**Light Switch OK?**
Lockers	20	Y	On	<30	On

[Y] Tests are complete and performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
CxA:	BH	6/25/21

Comments:

Exterior Lighting Control (EMCS)

Test:

1. Verify the time clock calibration on the lighting control system. Record the programmed schedule.
2. Simulate a shorter occupancy sensor delay time set point as needed.

Designed Schedule	Programmed Schedule	Current Time	System Displayed Time
ON at dusk, OFF at 11:00PM ON at 5:00AM, OFF at 8:00AM	ON at dusk, OFF at 11:00PM ON at 5:00AM, OFF at 8:00AM	2:30 PM	2:30 PM

3. Start test with all zones commanded off.
4. Verify all controlled zones are off.
5. Override individual zones one at a time and verify that only zone overridden turns on
6. Change the schedule to unoccupied hour and verify all the lights turn off.
7. Change the schedule to occupied hour and verify all the lights turn on.

Zone	Verified OFF	Verified ON	Comment
1	Y	Y	
2	Y	Y	
3	Y	Y	
4	Y	Y	
5	Y	Y	

Y	Tests are complete.
Y	Performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
CxA:	BH	6/25/21

Comments:

Power Metering

1. Set up trend logs to monitor each meter.
2. Review each meter set up and confirm that meter is configured correctly and is reading a reasonable consumption value for the current building operation.
3. Turn off power at main disconnect.
4. Confirm that meter consumption values go to zero.
5. Turn on equipment with a known rating.
6. Confirm that demand is equal to known load.
7. Turn power on and allow the building to run normally.
8. Trend consumption for a full calendar month and compare total consumption with utility bill consumption.

Meter:	HVAC	Lights
Trends set up and confirmed operational	Y	Y
Meters read reasonable consumption for current load	Y	Y
Power off, gas off, Water off – meter reading	Y	Y
KW rating for applied load	192	45
KW value displayed with load on	190	45
Demand calibration OK	Y	Y
Cubic ft load Gas	-	-
GPH Water	-	-
Month trended	Y	Y
BAS consumption (KWH)	Y	Y
Utility bill consumption (KWH)	-	-
Trend (KWH)	Y	Y
Consumption calibration OK	Y	Y

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	2/2/23

Comments [1] Some of the meters are not connected correctly and needs to be adjusted and can only be done when building power is shut down.

Field House

Division 22 – Plumbing System

Domestic Water Heater – Electric (w/o BAS Control)

1. Start test with hot water tank satisfied.
2. Record water heater set point and verify is as specified.
3. Create a demand for hot water by running the hot water in a utility sink.
4. Verify heater is enabled.
5. Measure the hot water exiting the sink faucet and verify is as specified.
6. Record the thermometer reading at tank if equipped.
7. Close hot water tap.
8. Verify tank shuts off after reheating tank.

WH-	HWT-1 FH	Notes
Pre-Test:		
Hot water tank enabled and up to temperature, not firing	Y	
Hot water tank set point	120	
Thermometer reading	118	
Test:		
Hot water tap opened (Shower)	Y	
Water heater is enabled.	Y	
Measured hot water temperature at tap	121	
Thermometer reading	122	
Hot water tap closed	Y	
Hot water tank shuts off after reheat	Y	
Hot water tank set point returned to original setting.	Y	
Tests are complete.	Y	
Performance is acceptable.	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	4/9/2020

Comments:

Circulation Pump (Aqua-Stat w/BAS Control)

1. Verify system is in the occupied mode.
2. Place a temperature probe on the pipe near the aqua-stat or use temperature indicator if available, record aqua-stat set point and system temperature.
3. Turn the aqua-stat set point up higher than the return water temperature until the pump starts, record set point.
4. Place the system in the unoccupied mode and verify the pump turns off.
5. Place the system back into the occupied mode and verify pump is on.
6. Turn the aqua-stat set point down to lower than the return water temperature until the pump stops, record the set point.
7. Return set point to original setting.

CP	(FH) CP	
Aqua-Stat setting at start of test.	105	105
Return water temperature.	112	
Pump comes on when set point is above return water temp.	Y	
Pump off when put into unoccupied	Y	
Pump on when put into occupied mode	Y	
Pump goes off when set point is below return water temp.	Y	
Aqua-Stat returned to original setting.	Y	
Tests are complete.	Y	
Performance is acceptable.	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	4/9/2020

Comments:

Division 23 – HVAC System

Room Sensor Calibration, Point-to-Point Test

1. Measure room air temperature with a reference standard and record reference and BAS indicated values.

Reference Standard Used: Fluke 52 Thermocouple

Unit No.	Room	Ref Temp	BAS Temp	Graphics Match
EUH-1 & 11	100	63	63	
EUH-13	102	62	62	
EUH-14	103	63	63	
EUH-6	105	56	56	
EUH-8	106	55	55	
EUH-7	108	58	58	
EUH-12	110	63	63	
EUH-9	112	64	63	
EUH-2	113	65	64	
EUH-4	114	66	66	
EUH-3	115	61	61	
EUH-5	116	54	54	
EUH-1	118	51	51	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
	BH	4/9/2020

Comments:

Heat Recovery Unit

Unoccupied Mode

1. Verify there is no call for operation.
2. Verify HRU is disabled, dampers closed, fans are off and status is correct, record values.

HRU	1	**Expected**
HRU command OFF	Off	
Dampers closed	Y	
Supply fan status OFF	Y	
Supply fan OFF observed	Y	
Return fan status OFF	Y	
Return fan OFF observed	Y	
Filter status	0	
Discharge air temperature, BAS	61	

Occupied Mode

4. Place in occupied mode to create a call to the HRU.
5. Verify unit is enabled, dampers are open, fans start and status is correct, record values.

HRU	1	**Expected**
HRU command ON	On	
OA Dampers open	Y	
RA Damper closed	Y	
Supply fan status ON	On	
Supply fan ON observed	On	
Exhaust fan status ON	On	
Exhaust fan ON observed	On	
Filter status	OK	
Discharge air temperature, BAS	70	

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	**Name/Co.**	**Date**
Testing Contractor:		
CxA:	BH	4/9/2020

Comments:

HRU Alarms

1. Simulate a fan failure by disconnecting power to each fan one at a time and verify status shows off and alarm reports.
2. Simulate a filter differential pressure in excess of alarm point using pressure bulb and manometer.

HRU	1 OA	1 EA	1 SA	**Expected**
HRU command ON	On	On	On	
Supply fan status OFF	Off	Off	Off	
Supply fan failure alarm reports	Y	Y	Y	
Return fan status OFF	Off	Off	Off	
Return fan failure alarm reports	Y	Y	Y	
Filter alarm set point in inches W.C.	0.5	0.5	0.5	
Filter alarm trips at	0.5	0.5	0.5	
Graphics Alarm reports	Y	Y	Y	
Alarm reports	Y	Y	Y	

DAT Control – Heating

1. Start tests with discharge air temperature (DAT) above DAT set point so no call for heating.
2. Simulate a supply air temperature below supply air temperature set point.
3. Verify heating water valve modulates to control to set point and heat wheel is on.

Unit:	**1**	**Expected**
Pre-Test:		
DAT set point	70	70°F
DAT	70	
Outside air temperature	54	
No Call for Heating:		
DAT set point	55	
DAT	56	
Heating command displayed (%)	0	0%
Heat wheel status	On	
Heating		
DAT set point	80	
DAT	78	
Heating command displayed (%)	34	>0%
Heat wheel status	On	ON
EA-T	68	
OA-T	54	
HR-T	60	
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Frost Free System

1. Place a temperature reference on the outside air intake side of the coil.
2. Record the temperature, this is the reference point for the frost free system.
3. Position the thermostat set point above the measured reference, frost-free turns off the heat wheel with a cycle timer.
4. Lower the cycle timer in increments to 1 minute and record heat wheel motion.
5. Verify heat wheel stops and runs around reference.
6. Return set point to 35.

Exhaust reference temperature: 54

Set point	Heat wheel motion
35	On
60	Off for one minute then on for one minute then repeats
35	On

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	4/9/2020

Comments:

HRU Freeze Protection

Freezestat setpoint	37°F
Adjusted to exhaust fan shutdown (supply fan remains ON)	59°F
OA damper closes	Y
Recirc damper opens	Y
Heater is ON	Y
Set screw returned to original position	37°F
Unit returns to normal occupied mode	Y

Y	Tests are complete
Y	Performance is acceptable
Y	Overrides clear, set points to original

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	4/9/2020

Comments:

Exhaust Fans

Manual Control Exhaust Fan w/ Motorized Damper

1. Start test with fan switch off.
2. Turn exhaust fan on at local switch and verify fan starts, damper fully open
3. Turn exhaust fan off at local switch and verify fan stops, damper fully closed

UNIT:	Kitchen EF-1	Expected
Pre-Test:		
Switch status	Off	OFF
Fan observed	Off	OFF
Damper observed	CLOSED	CLOSED
Test:		
Switch status	On	ON
Fan observed	On	ON
Damper observed	OPEN	OPEN
Switch status	Off	OFF
Fan observed	Off	OFF
Damper observed	CLOSED	CLOSED
Tests are complete	Y	
Performance is acceptable	Y	
Overrides clear, set points to original	Y	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	4/9/2020

Comments:

Unit Heater – Electric with BAS Control

1. Verify room temperature is satisfied, lower room set point if necessary, to achieve a satisfied space temperature so that fan is off.
2. Record BAS values.
3. Verify by direct observation that fan is off.
4. Place the zone in a full call for heating.
5. Record BAS values.
6. Verify by direct observation that unit fan comes on and the unit heats.
7. Measure supply air temperature.

UH-	1	2	3	4	5	6	7	Expected
Pre-Test:								
Space temperature start of test								
Set point start of test	55	55	55	55	55	55	55	
Test:								
Cooling (no heat):								
Set point [x] or Simulated Space [ ] temp	55	55	55	55	55	55	55	
Fan command displayed	Off	Off	Off	Off	Off	Off	Off	OFF
Heating command displayed	0	0	0	0	0	0	0	0%
Fan observed	Off	Off	Off	Off	Off	Off	Off	OFF
Heating:								
Set point [x] or Simulated Space [ ] temp	75	75	75	75	75	75	75	
Fan command displayed	On	On	On	On	On	On	On	ON
Heating command displayed	100	100	100	100	100	100	100	100%
Fan observed	On	On	On	On	On	On	On	ON
Measured supply air temperature	150 +	150 +	150 +	150 +	150 +	150 +	150 +	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	Y	Y	Y	Y	

UH-	8	9	10	11	12	13	14	Expected
Pre-Test:								
Space temperature start of test								
Set point start of test	55	55	55	55	55	55	55	
Test:								
Cooling (no heat):								
Set point [x] or Simulated Space [ ] temp	55	55	55	55	55	55	55	
Fan command displayed	Off	Off	Off	Off	Off	Off	Off	OFF
Heating command displayed	0	0	0	0	0	0	0	0%
Fan observed	Off	Off	Off	Off	Off	Off	Off	OFF
Heating:								
Set point [x] or Simulated Space [ ] temp	75	75	75	75	75	75	75	
Fan command displayed	On	On	On	On	On	On	On	ON
Heating command displayed	100	100	100	100	100	100	100	100%
Fan observed	On	On	On	On	On	On	On	ON
Measured supply air temperature	120 +	120 +	150 +	150 +	150 +	150 +	150 +	
Tests are complete	Y	Y	Y	Y	Y	Y	Y	
Performance is acceptable	Y	Y	Y	Y	Y	Y	Y	
Overrides clear, set points to original								

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	4/9/2020

Comments:

Fieldhouse Lighting Control

Pre-Test:

1. Start test with room unoccupied, lights OFF.

Occupancy Sensor (OS) Test:

2. Verify all occupancy sensors are configured to occupancy mode: automatic on to 100%, auto off via sensor, set at 30 minutes.
3. Simulate a different delay set point as needed, verify the lights turn off automatically after delay time.

Light Switch (LS) Test:

4. Turn the lights on and off via switch and verify the switch functions.

Pre-Test			OS Test		LS Test
Room Location	**Occ. Sensor Delay**	**Lighting Fixture (OFF)**	**Lighting Fixture (Auto ON @ 100%)**	**Lights OFF After Delay (Y/N)**	**Light Switch OK?**
100	30	Off	Y	Y	Y
102	30	Off	Y	Y	Y
103	30	Off	Y	Y	Y
105	30	Off	Y	Y	Y
106	30	Off	Y	Y	Y
108	30	Off	Y	Y	Y
110	30	Off	Y	Y	Y
112	30	Off	Y	Y	Y
113 Elec. / Mech.	NA	NA	NA	NA	Y
114	30	Off	Y	Y	Y
115	30	Off	Y	Y	Y
116 Storage	NA	NA	NA	NA	Y
118	30	Off	Y	Y	Y

[Y] Tests are complete and performance is acceptable.

Sign-Off:

Team Member	Print Name/Co.	Date
Installing Contractor:		
CxA:	BH	4/9/2020

Comments:

Batting Cages

Division 22 – Plumbing System

Domestic Water Heater – Electric (w/o BAS Control)

1. Start test with hot water tank satisfied.
2. Record water heater set point and verify is as specified.
3. Create a demand for hot water by running the hot water in a utility sink.
4. Verify heater enabled and heats.
5. Measure the hot water exiting the sink faucet and verify is as specified.
6. Record the thermometer reading at tank if equipped.
7. Close hot water tap.
8. Verify tank shuts off after reheating tank.

HWT-	1	Note
Pre-Test:		
Hot water tank enabled and up to temperature, not firing	Y	
Hot water tank set point	120	
Thermometer reading	119	
Test:		
Hot water tap opened	Y	
Water heater is enabled and heating.	Y	
Measured hot water temperature at tap	117	
Thermometer reading	119	
Hot water tap closed	Y	
Tests are complete.	X	
Performance is acceptable.	X	

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	Matt White, WCG SG	12/8/2020 2/4/2021

Comments:

Plumbing Fixture

Installation Verification and Test Water Closet

Unit No.	Dwg No.	Description/Location	Observation			Test			Note
			D	C	I	F	S	NL	
P-1A	NA	Women's RR	Y	Y	Y	Y	Y	Y	
P-1A	NA	Men's RR	Y	Y	Y	Y	Y	Y	

Plumbing Fixture IV and Test Lavatory & Sink

Unit No.	Dwg No.	Description/Location	Observation				Test				Note
			D	C	I	FL	S	NL	T	P	
P-3A	NA	Drinking Fountain	Y	Y	NA	Y	Y	Y	NA	Y	
P-2A	NA	Men's Lavatory	Y	Y	Y	Y	Y	Y	109	Y	
P-2A	NA	Women's Lavatory	Y	Y	Y	Y	Y	Y	109	Y	
P-5	NA	Utility Sink	Y	Y	Y	Y	Y	Y	119	Y	

Key:
D = Drain installed correctly & operational.
C= Caulked to mounting surface.
I = Faucet: Hot left/Cold right.
F= Flush cycle correct and does not splash out of bowl
FL = No Leaks at Faucet
S= Faucet shuts off tight-no leaks or drips.
NL=No leaks in drain fitting below counter between fixture and wall.
T =Water temperature ºF.
P = Petcocks shut off water

Notes: Engineer responded that temperature can be adjusted by shower valve.

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	6/14/21

Division 23 – HVAC System

Exhaust Fans

Manual Control EF (w/o BAS Fan Proof)

1. Turn exhaust fan on at local switch and verify fan starts
2. Turn exhaust fan off at local switch or interlocked equipment and verify fan stops

EF-	1	2	3
Turn on switch	Y [1]	Y [1]	Y [1]
Fan Starts	Y	Y	Y
Turn OFF switch	Y [1]	Y [1]	Y [1]
Fan Stops	Y	Y	Y
Tests are complete	Y	Y	Y
Performance is acceptable	Y	Y	Y
Overrides clear, set points to original	Y	Y	Y

Sign-Off:	Team Member	Name/Co.	Date
	Testing Contractor:		
	CxA:	BH	6/14/21

Comments: [1] Fans operate 24/7. The only ON & OFF currently is the circuit breaker. Acceptable and preferred by owner.

Unit Heater – Electric with Line Volt Thermostat

1. Record current set point.
2. On all units for a given test zone or floor, go to each room and lower thermostat set point to achieve a satisfied space temperature so that unit is off.
3. If necessary, wait until the unit heater has cooled to close to ambient temperature.
4. Check the surface temperatures of units to confirm unit is off
5. Measure the zone temperature, record value.
6. Raise the thermostat set point slowly till audible click is heard, record set point indication and verify it is close to zone temperature (calibration).
7. Turn thermostat to maximum and allow to run for a few minutes
8. Verify fan is on.
9. Measure supply air temperature.
10. Return set point to original value.

EH	1	2	3	Expected
Set point start of test	0%	100%	0%	55
Space temperature start of test	64	69	68	
No Heat Call:				
Set point adjusted to:	Min.	Min.	Min.	
Fan observed	OFF	OFF	OFF	OFF
Coil temperature	64	69	68	AMBIENT
Heating:				
Zone temperature	64	66	55	
Thermostat clicks at	~15%	~90%	~15%	
Fan observed	ON	ON	ON	ON
Measured supply air temperature	115+	115+	115+	
Tests are complete	Y	Y	Y	
Performance is acceptable	Y	Y	Y	
Overrides clear, set points to original	Y	Y	Y	

Sign-Off:

Team Member	Name/Co.	Date
Testing Contractor:		
CxA:	BH	6/14/21

Comments:

Appendix 10 – Trend Log Analysis

Stanwood Highschool
Trend Analysis Report

Report Date: 05/27/2021

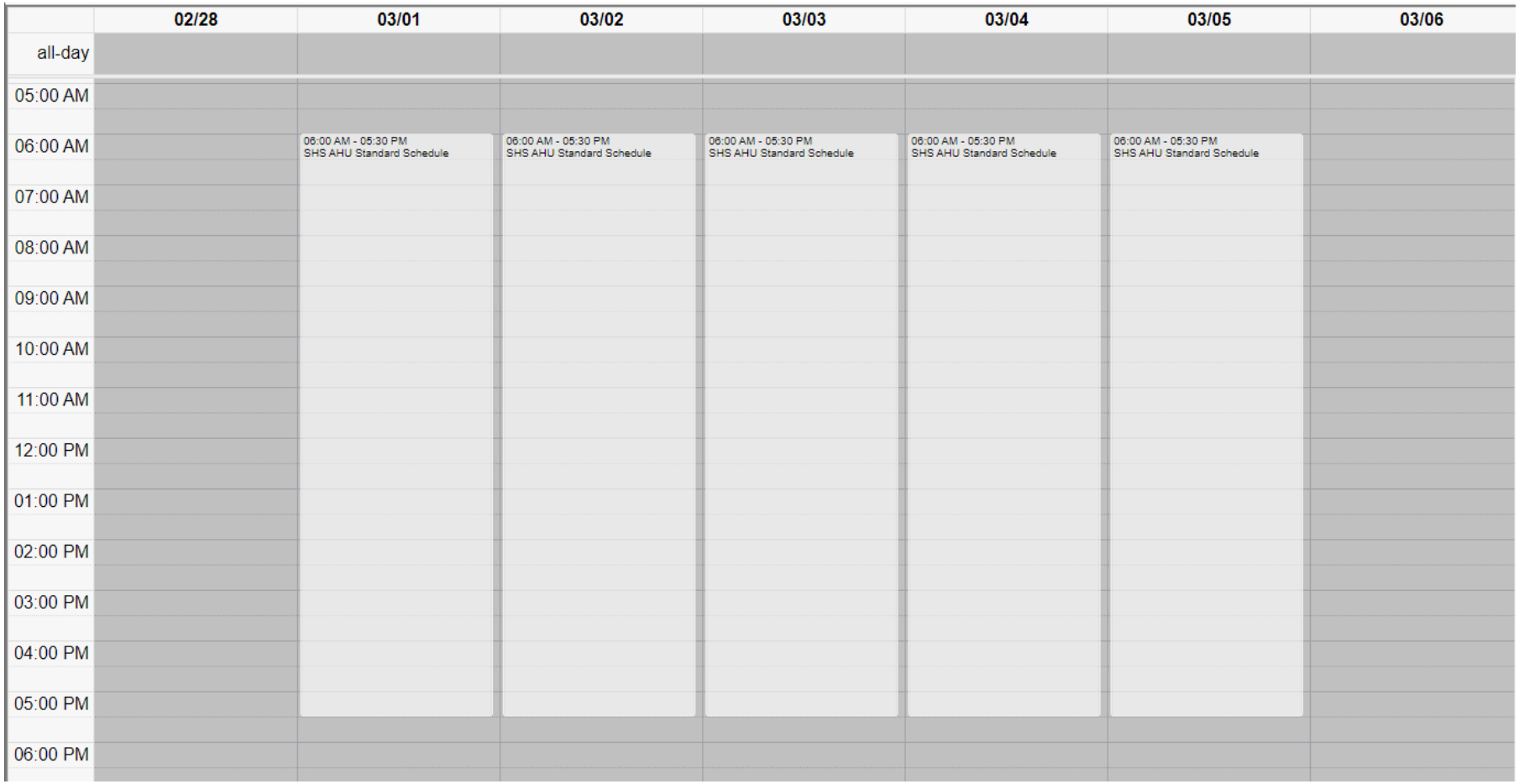
Trend Data Time Frame: 2/22/2021 to 5/27/2021

WCG verified the following via trend analysis.

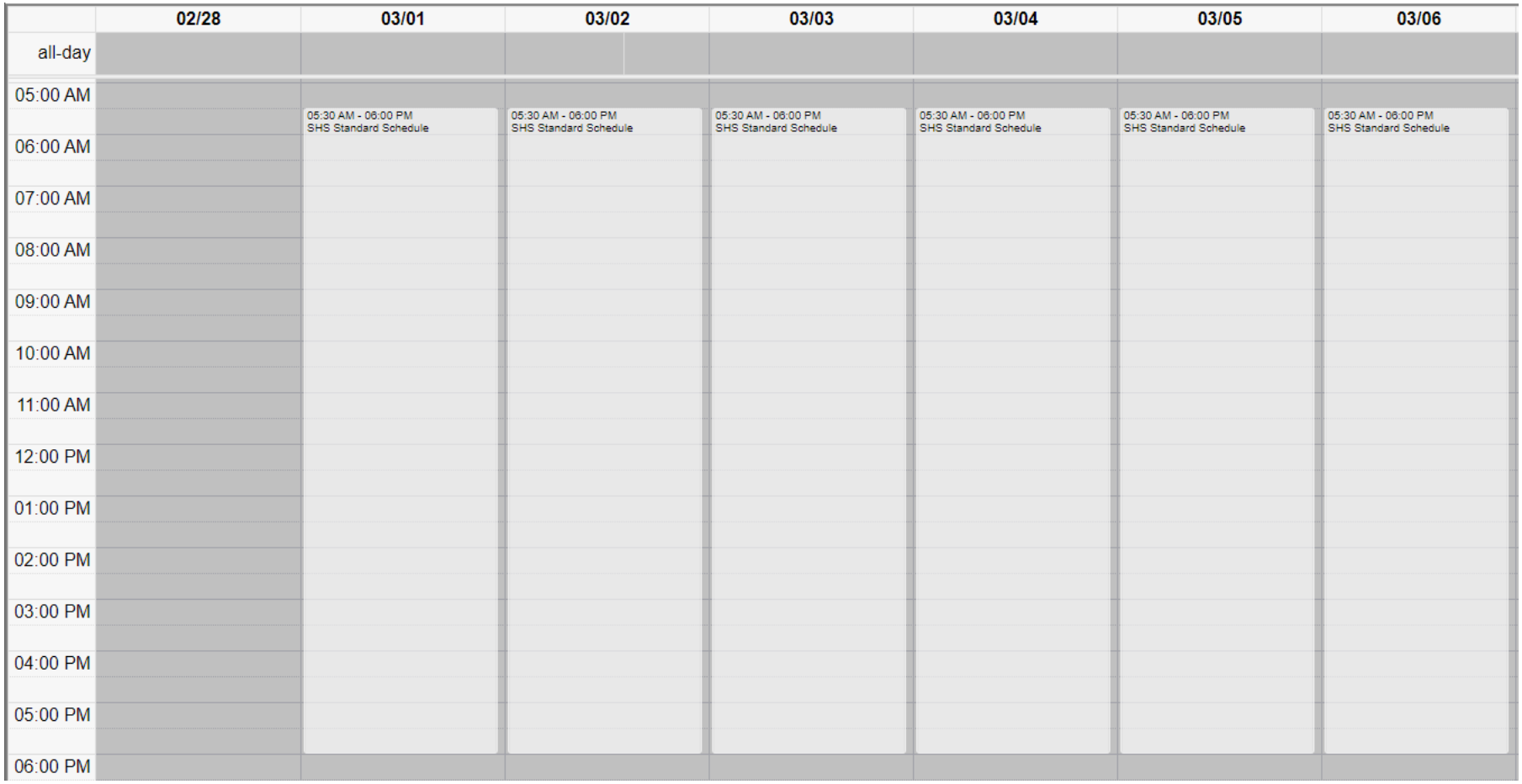
1. VAV space temperature and schedule control (sample evaluation)
2. VAV occupancy sensor status and timer control (sample evaluation)
3. FCU space temperature and schedule control (sample evaluation)
4. DOAU discharge air temperature and energy recovery wheel schedule control (sample evaluation)
5. DOAU duct static pressure control (sample evaluation)
6. AHU space temperature and schedule control (sample evaluation)
7. Furnace space temperature and schedule control (sample evaluation)
8. FCU with VAV space cooling (sample evaluation)
9. AHU space cooling (sample evaluation)

Table of Contents:

Schedule for DOAU-1 through DOAU-6.



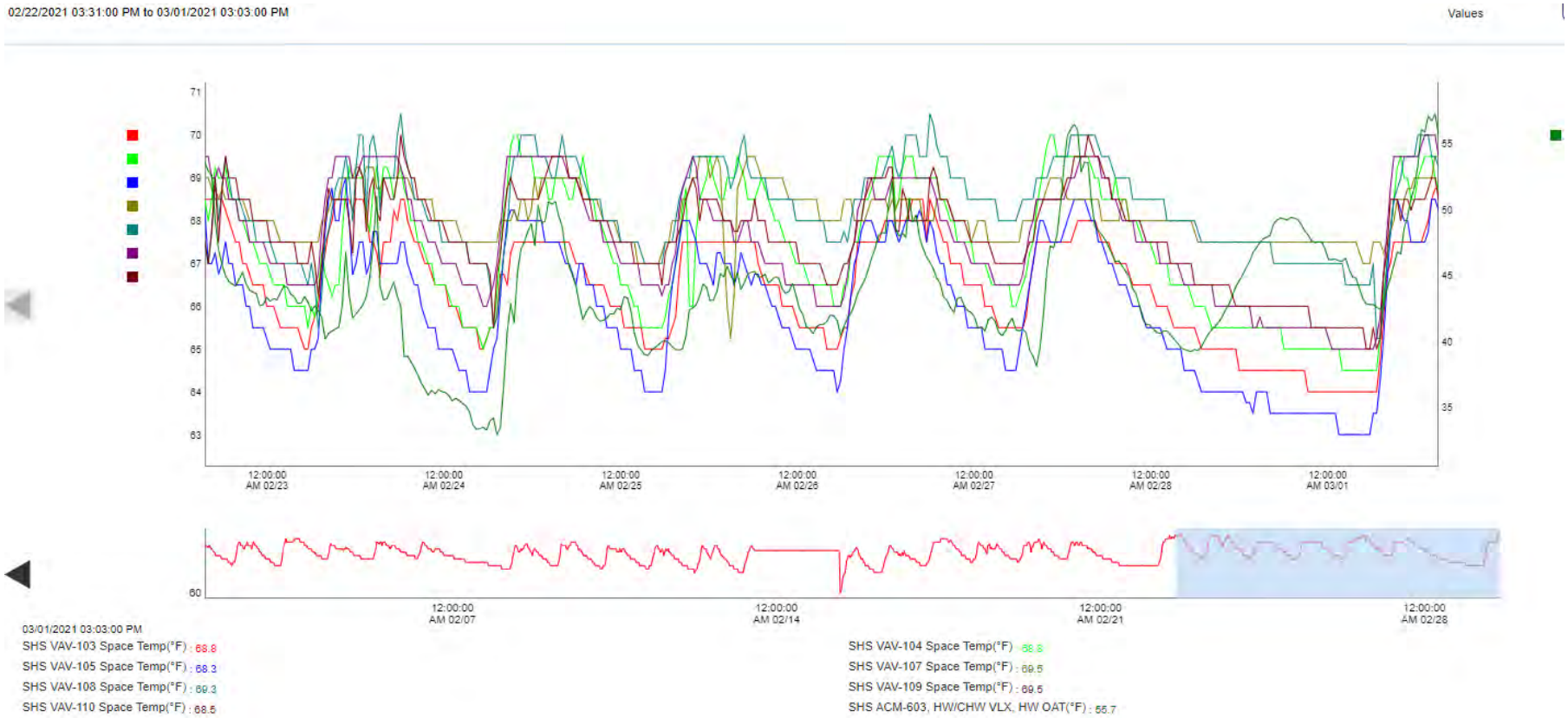
Schedule for VAV's, FCU's and AHU-1 through AHU-7.



FCU Zone With VAV Space Temperature - Sampled

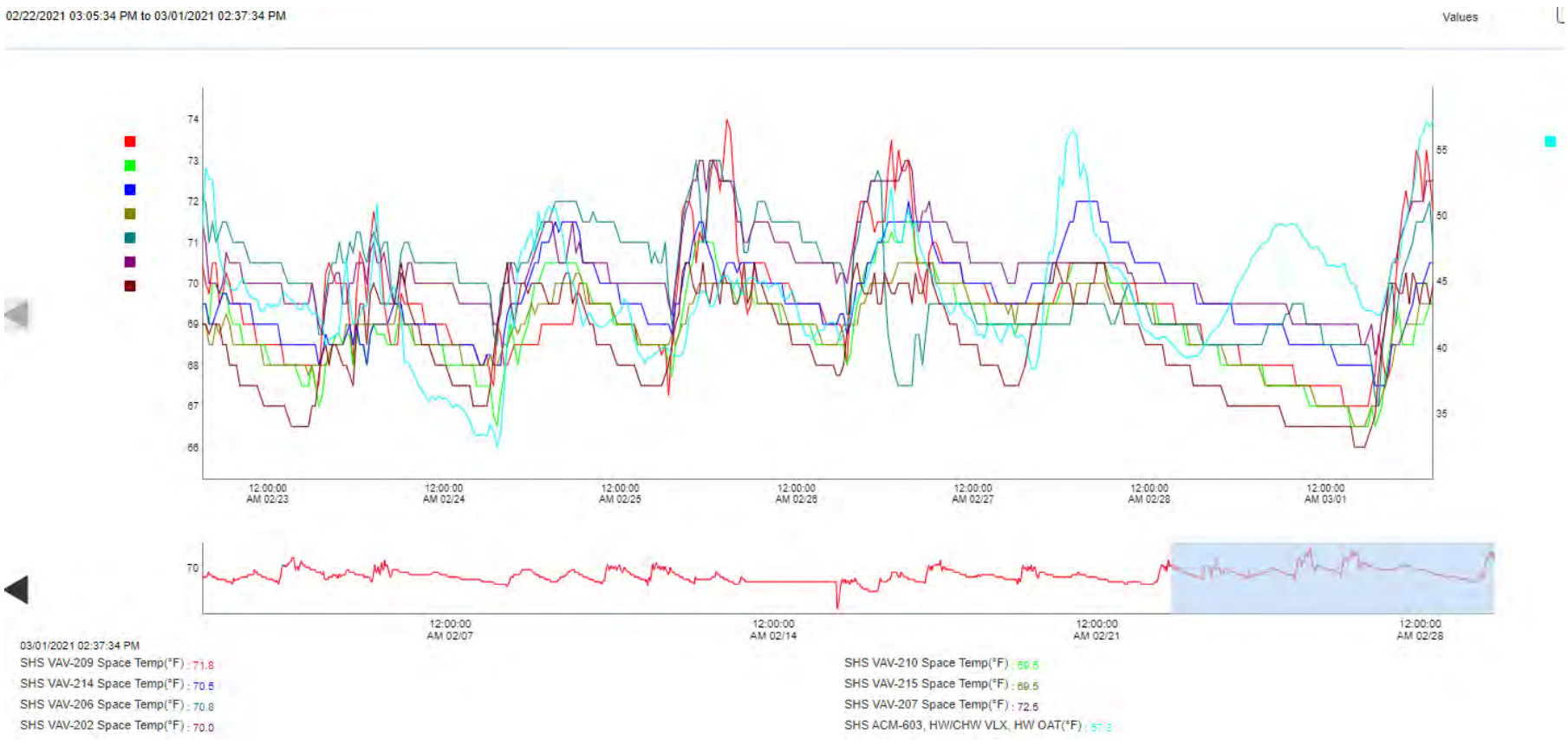
Weekly Study (2/23/2021 to 3/1/2021)

1st Floor Classrooms Area



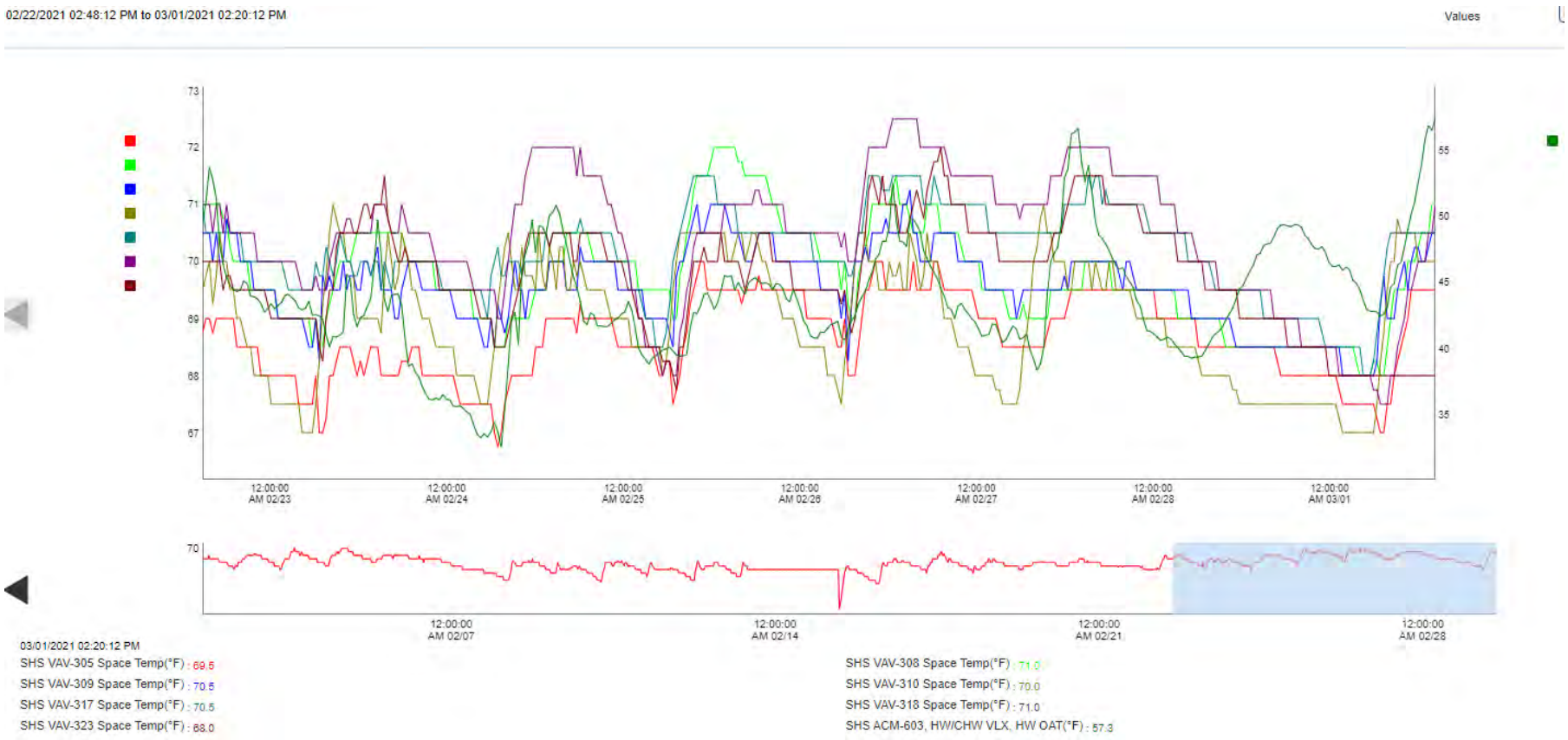
Comments: VAV's are linked to FCU's. Outside Air Temperature reference plotted on 2nd Y-axis. Verified FCU's run according to building schedule.

2nd Floor Classrooms Area



Comments: VAV's are linked to FCU's. Outside Air Temperature reference plotted on 2nd Y-axis. Verified FCU's run according to building schedule.

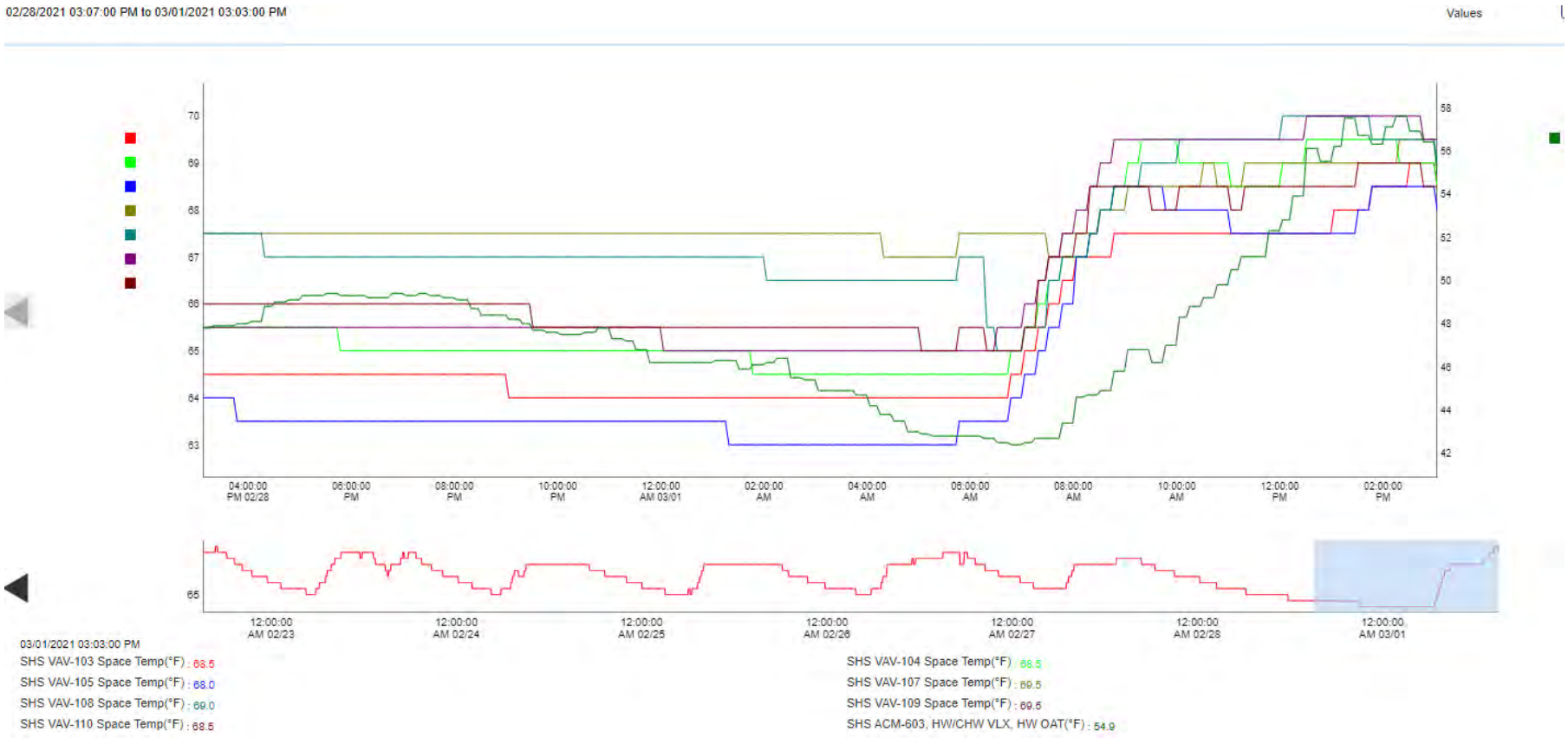
3rd Floor Classrooms Area



Comments: VAV's are linked to FCU's. Outside Air Temperature reference plotted on 2nd Y-axis. Verified FCU's run according to building schedule.

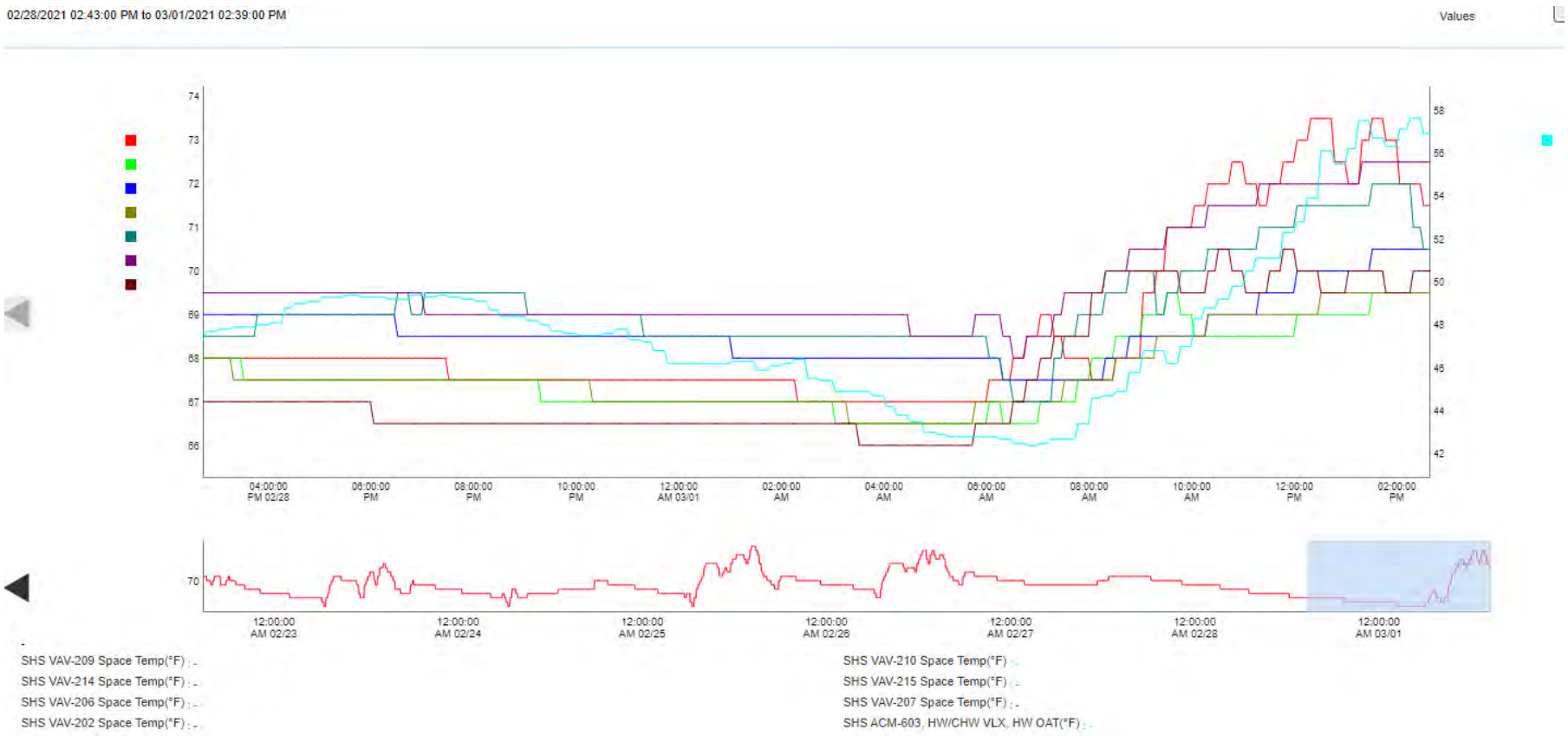
Daily Study (3/1/2021)

1st Floor Classrooms Area



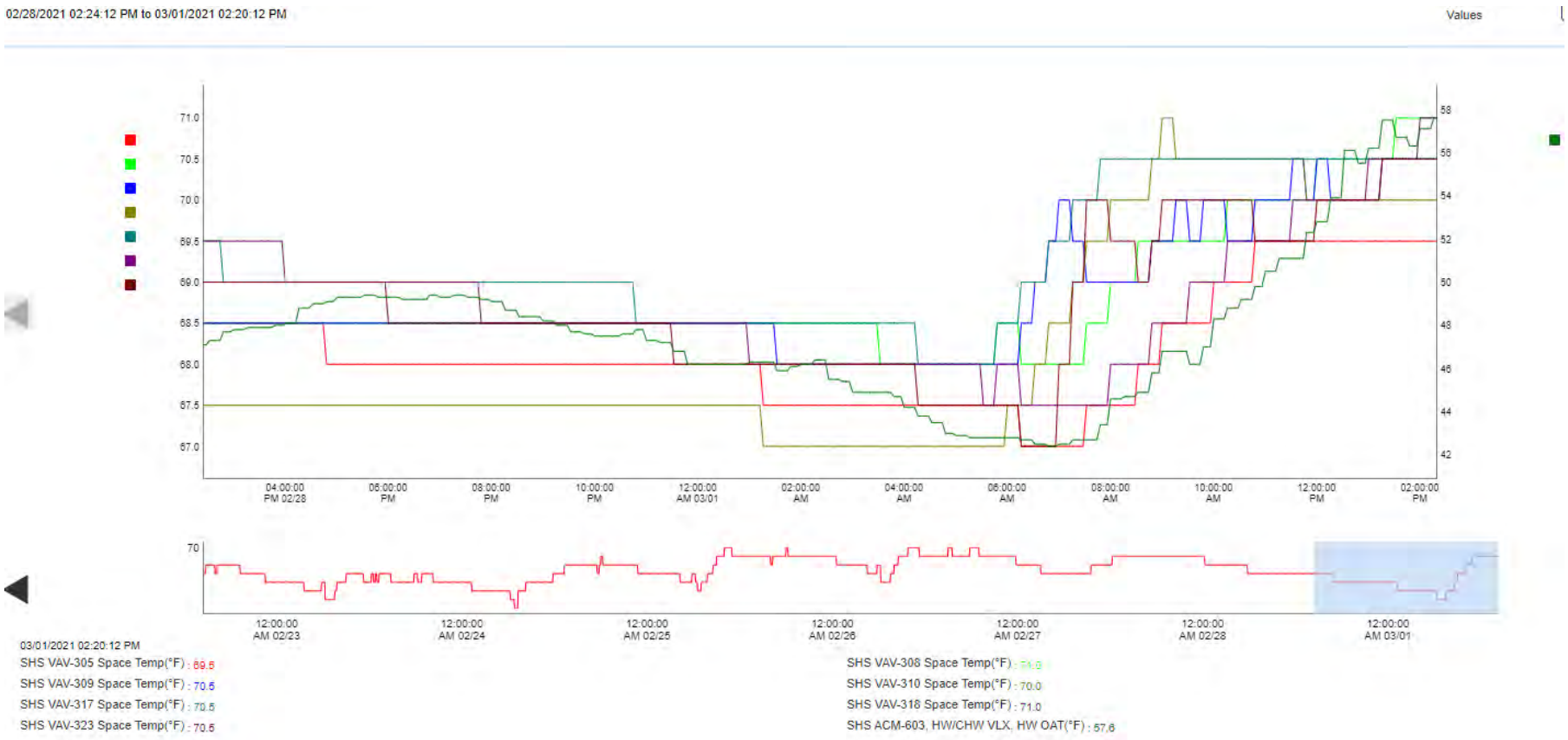
Comments: VAV's are linked to FCU's. Verified that the space temperature was rising before occupied time showing that the morning warm up works. Verified that the space temperature regulates to unoccupied heating set point during the weekend (Sunday 2/28/2021). Verified units regulate space temperature control to individual occupied heating setpoint. Outside Air Temperature reference plotted on 2nd Y-axis.

2nd Floor Classrooms Area



Comments: VAV's are linked to FCU's. Verified that the space temperature was rising before occupied time showing that the morning warm up works. Verified that the space temperature regulates to unoccupied heating set point during the weekend (Sunday 2/28/2021). Verified units regulate space temperature control to individual occupied heating setpoint. Outside Air Temperature reference plotted on 2nd Y-axis.

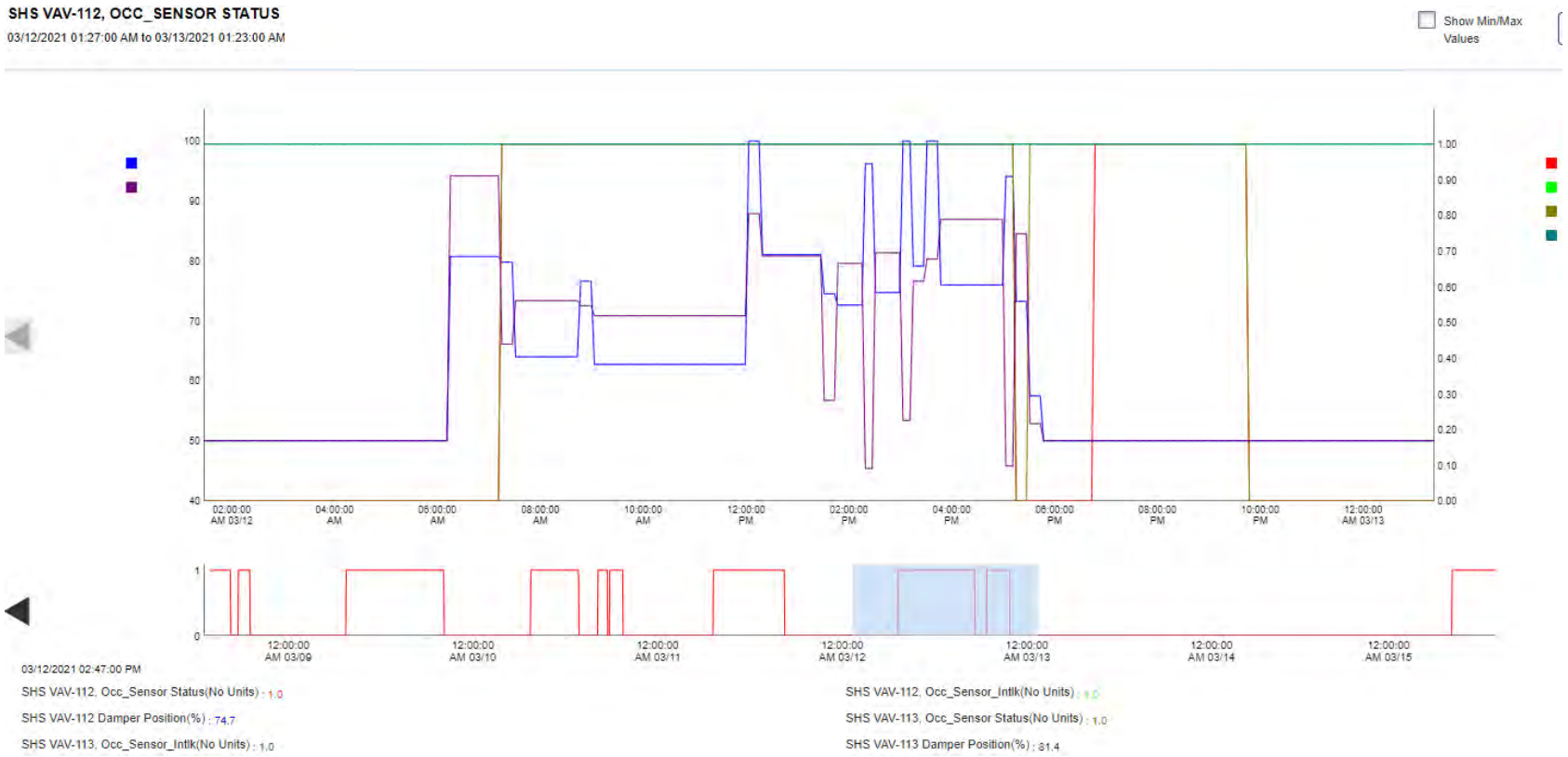
3rd Floor Classrooms Area



Comments: VAV's are linked to FCU's. Verified that the space temperature was rising before occupied time showing that the morning warm up works. Verified that the space temperature regulates to unoccupied heating set point during the weekend (Sunday 2/28/2021). Verified units regulate space temperature control to individual occupied heating setpoint. Outside Air Temperature reference plotted on 2nd Y-axis.

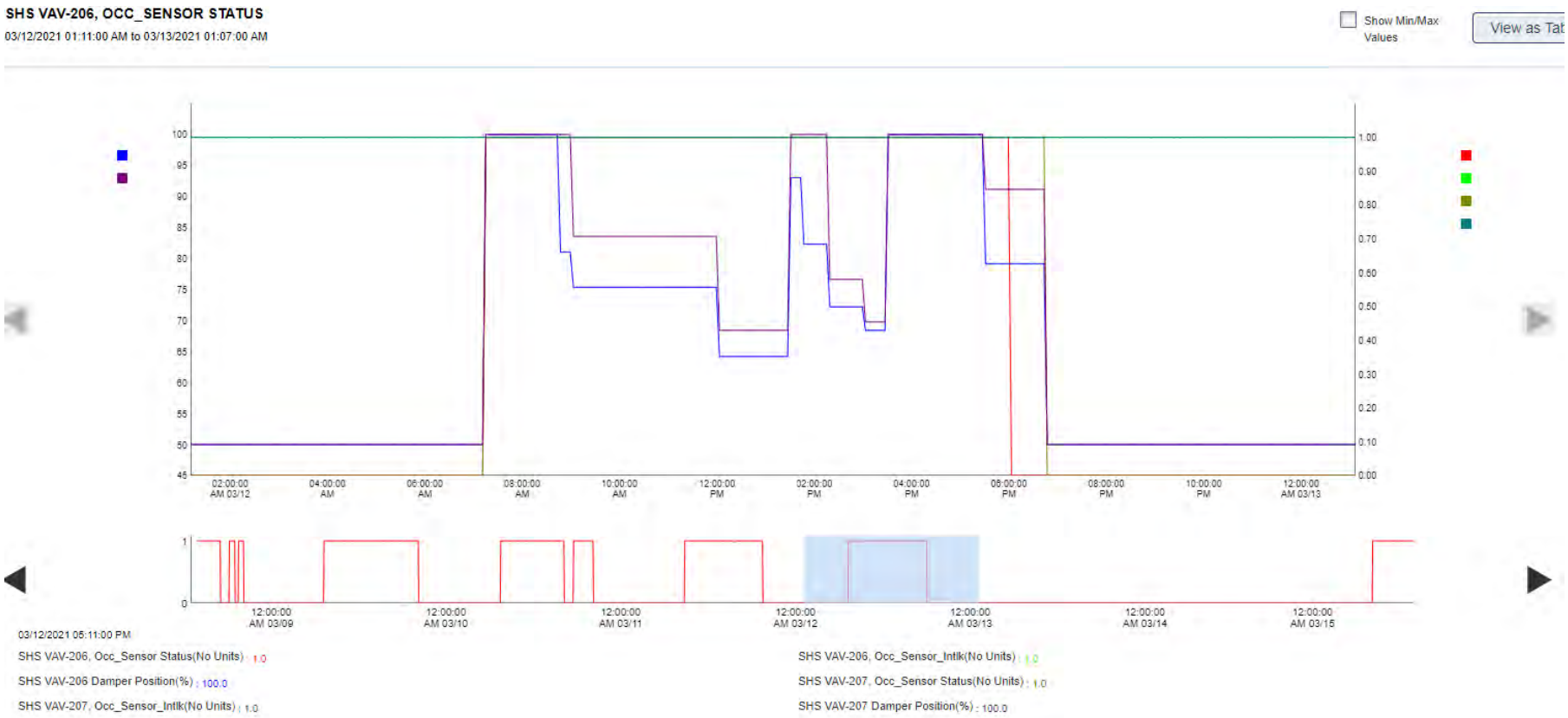
VAV OS Room Status and Timer - 3/12/2021

1st Floor Classrooms Area



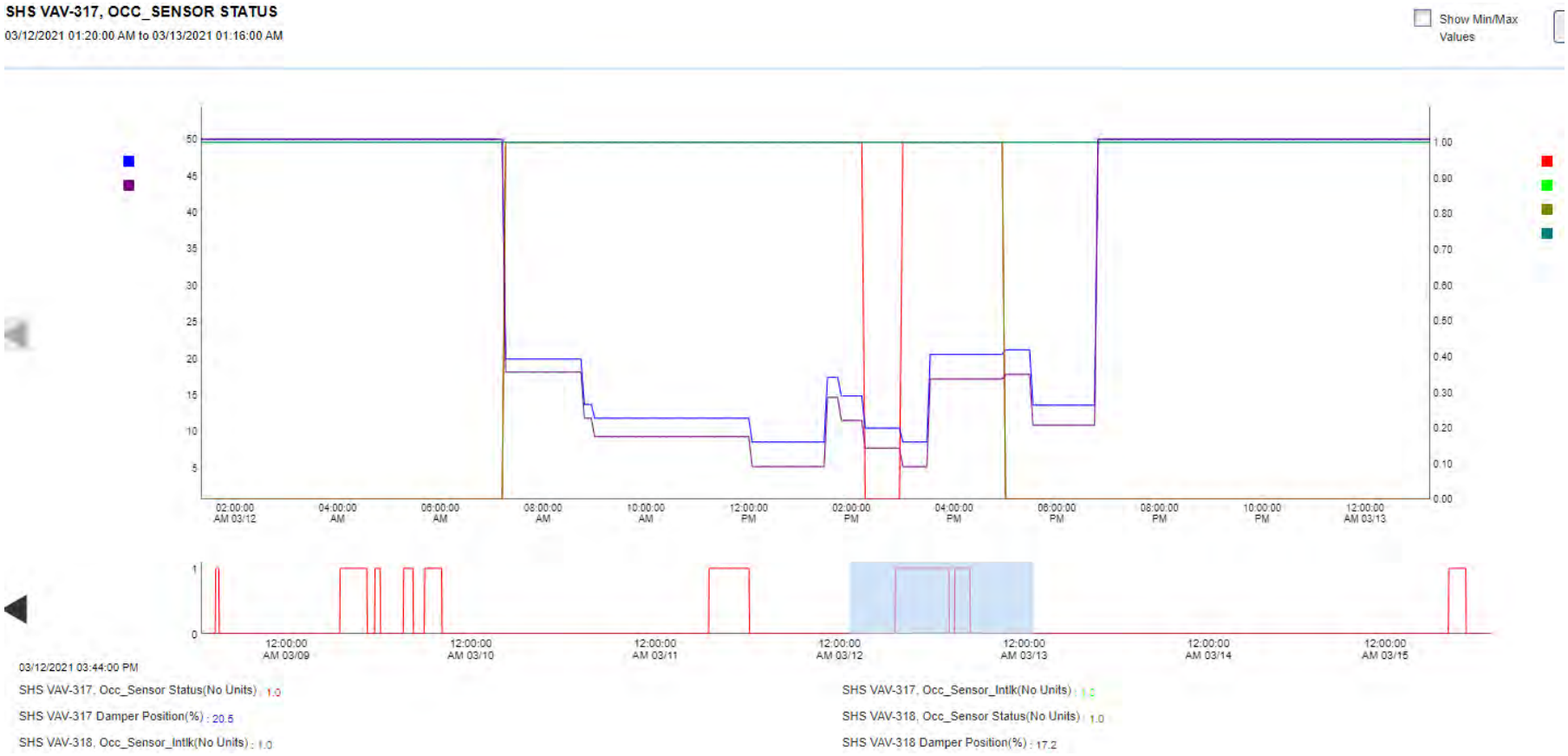
Comments: Verified VAV's are opening and operating when Room Occupancy Sensor has been tripped. Verified Occupancy Sensor interlocked timer is operating.

2nd Floor Classrooms Area



Comments: Verified VAV's are opening and operating via Room Occupancy Sensor. Verified Occupancy Sensor interlocked timer is operating.

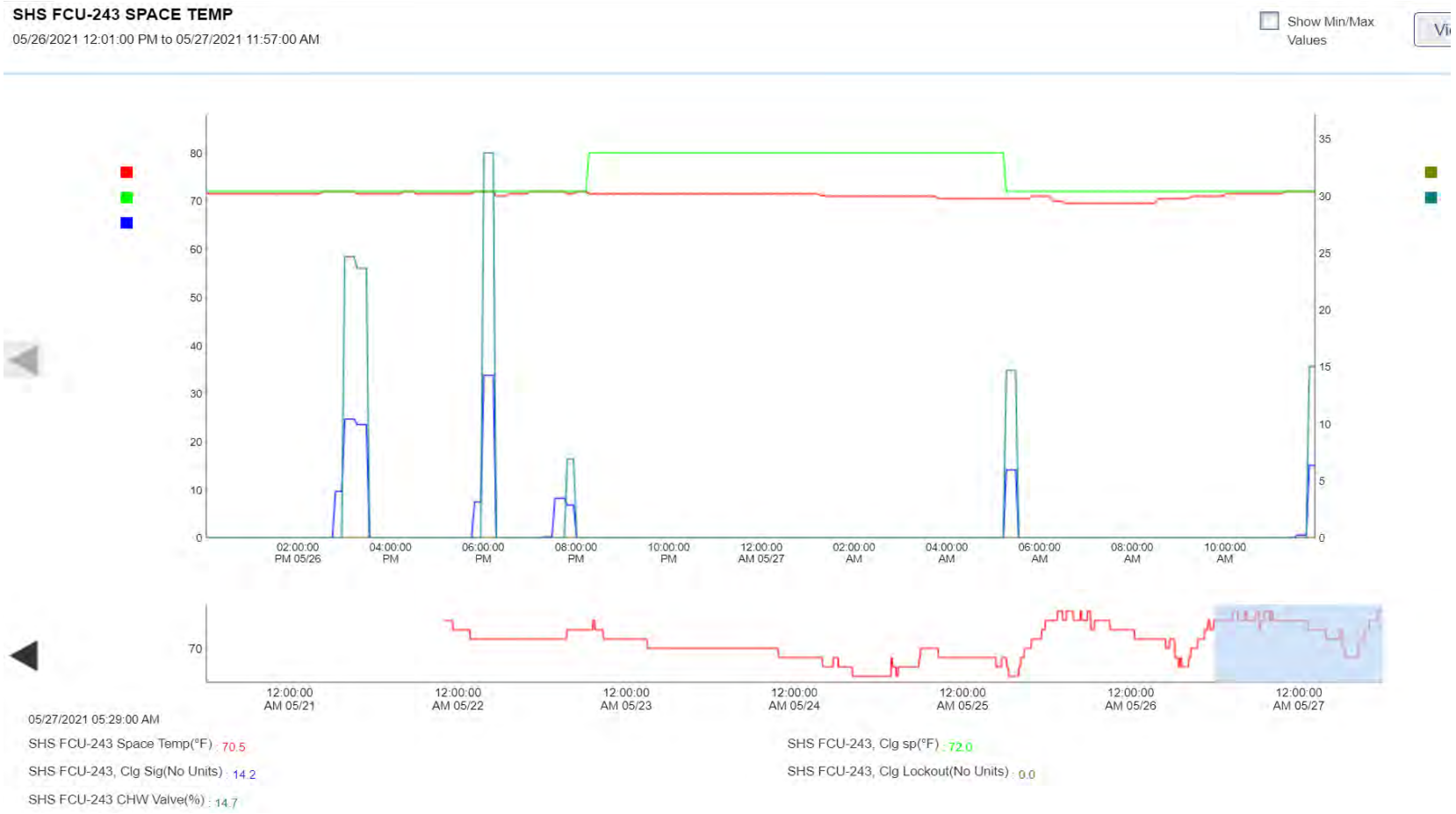
3rd Floor Classrooms Area



Comments: Verified VAV's are opening and operating via Room Occupancy Sensor. Verified Occupancy Sensor interlocked timer is operating.

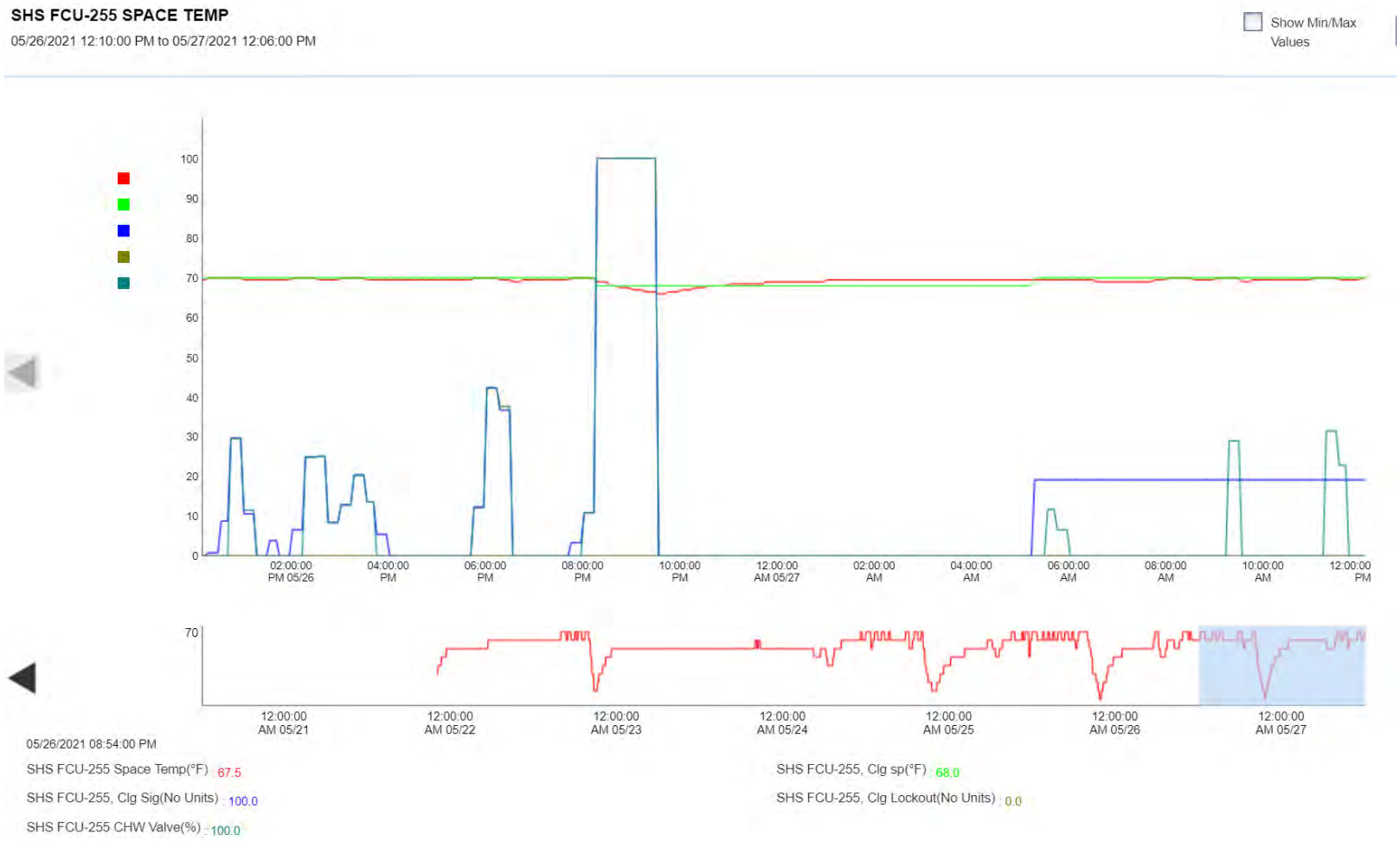
FCU Zone With VAV Space Cooling – Sampled

FCU-243



Comments: Verified FCU regulates to cooling setpoint with the cooling signal and shilled water valve working in conjunction. Shows 8pm unoccupied cooling setpoint is 80 degrees and there is no call for cooling. Also verified is the cooling lockout function.

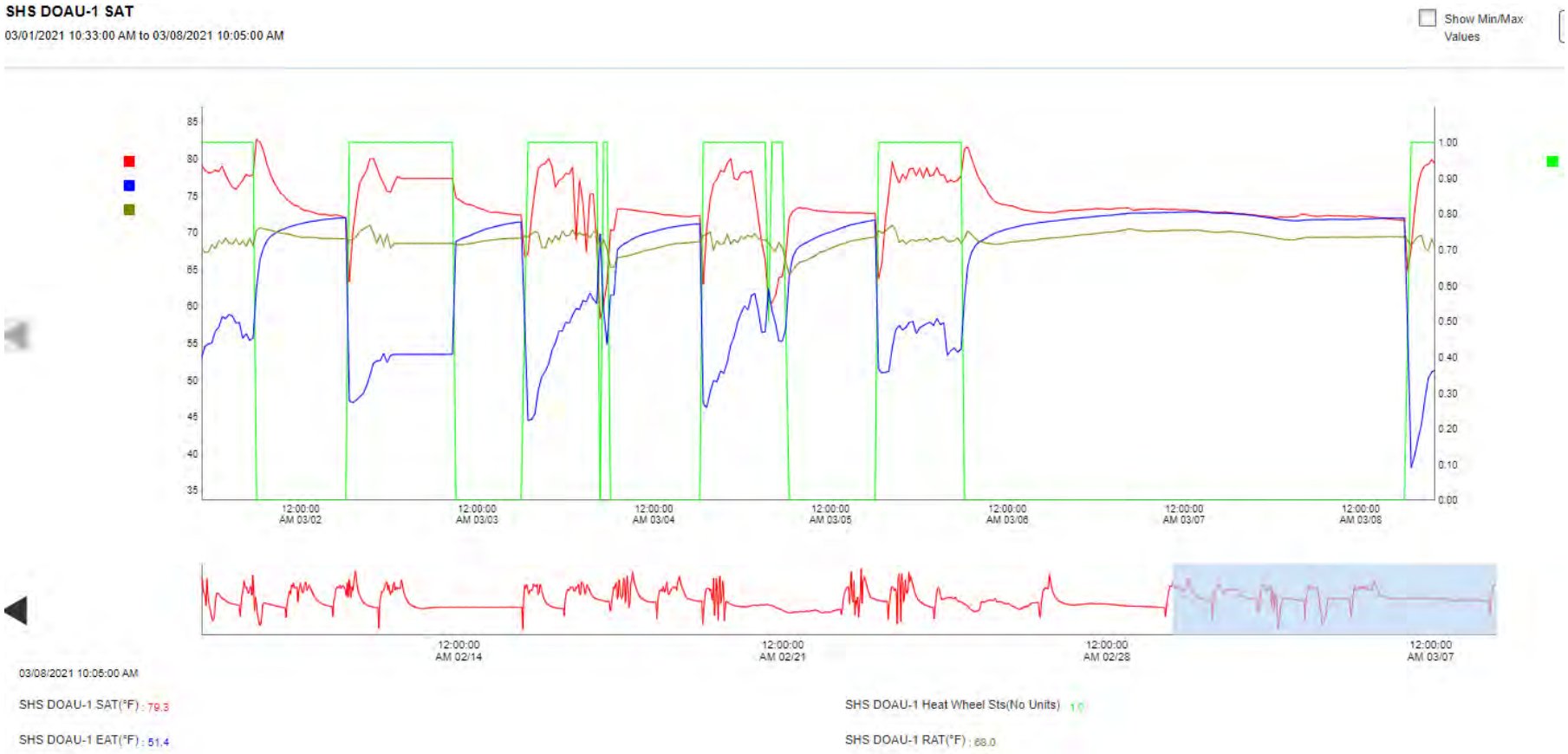
FCU-255



Comments: Verified FCU regulates to cooling setpoint with the cooling signal and shilled water valve working in conjunction. Shows at 8pm unoccupied cooling is manually overwritten from thermostat (which makes sense since this is the security office). Also verified is the cooling lockout function.

DOAU SAT Control and Heat Wheel Status - Sampled

DOAU-1 Weekly Study (3/2/2021 – 3/8/2021)

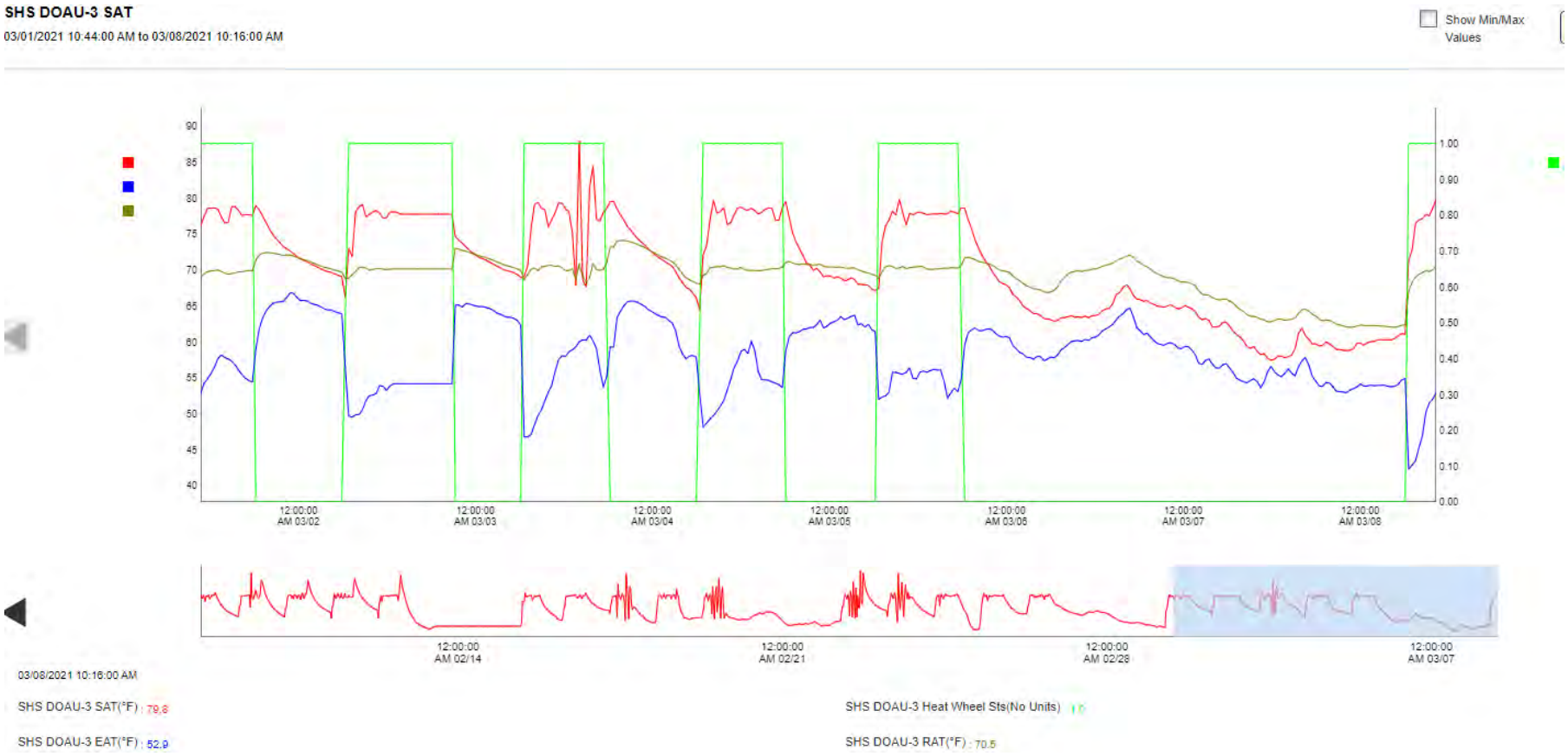


Comments: Verified the supply air temperature is controlled to setpoint while VAV boxes are calling for heating. Verified energy recovery wheel operates on building schedule. The energy recovery wheel will start when supply fan status is on and EAT and RAT differential is greater than 8°F. Verified DOAU's run according to building schedule.

DOAU-1 Daily Study (3/8/2021)

Comments: Verified the supply air temperature is controlled to setpoint while VAV boxes are calling for heating. Verified energy recovery wheel operates on building schedule. The energy recovery wheel will start when supply fan status is on and EAT and RAT differential is greater than 8°F.

DOAU-3 Weekly Study (3/2/2021 – 3/8/2021)



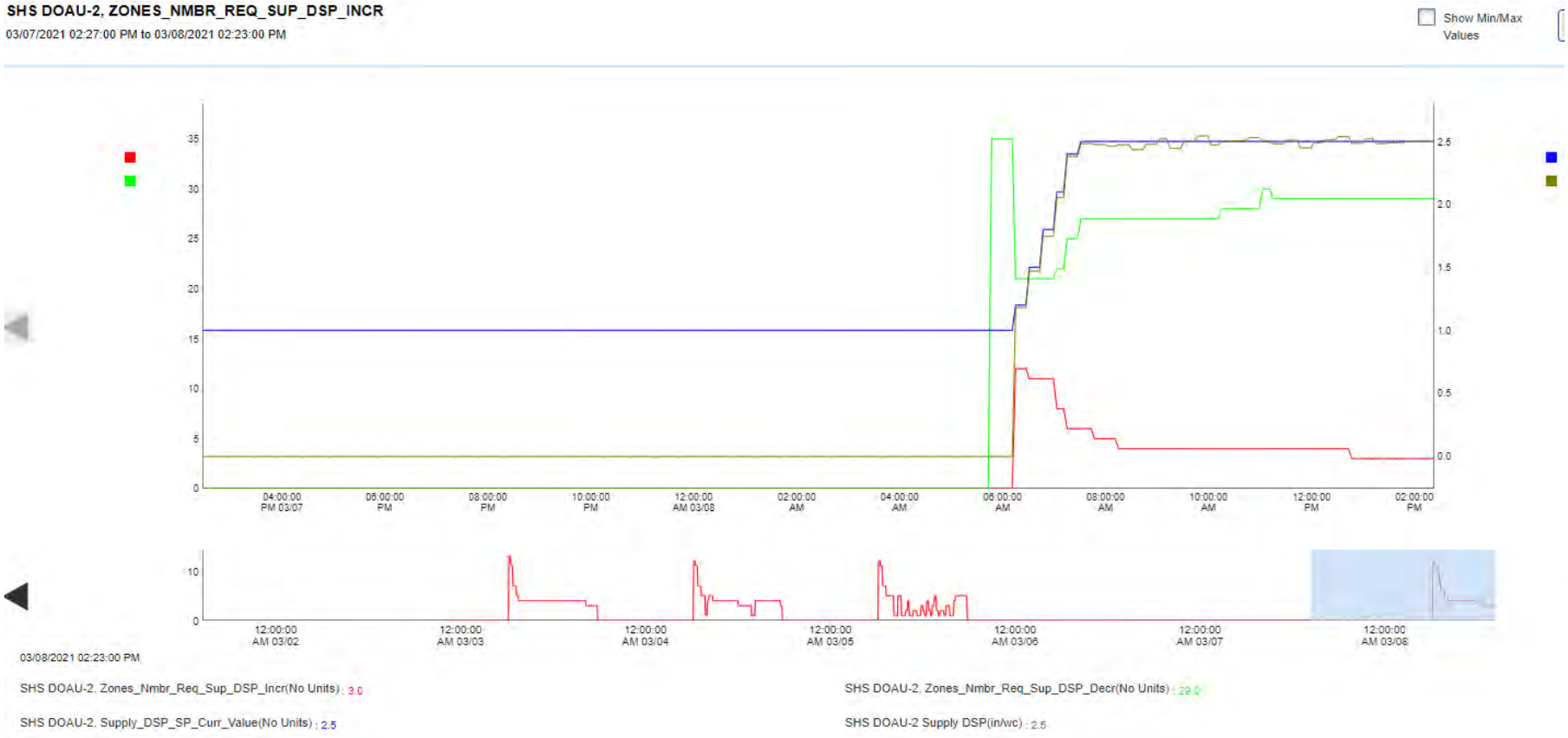
Comments: Verified the supply air temperature is controlled to setpoint while VAV boxes are calling for heating. Verified energy recovery wheel operates on building schedule. The energy recovery wheel will start when supply fan status is on and EAT and RAT differential is greater than 8°F. Verified DOAU's run according to building schedule.

DOAU-3 Daily Study (3/8/2021)

Comments: Verified the supply air temperature is controlled to setpoint while VAV boxes are calling for heating. Verified energy recovery wheel operates on building schedule. The energy recovery wheel will start when supply fan status is on and EAT and RAT differential is greater than 8°F.

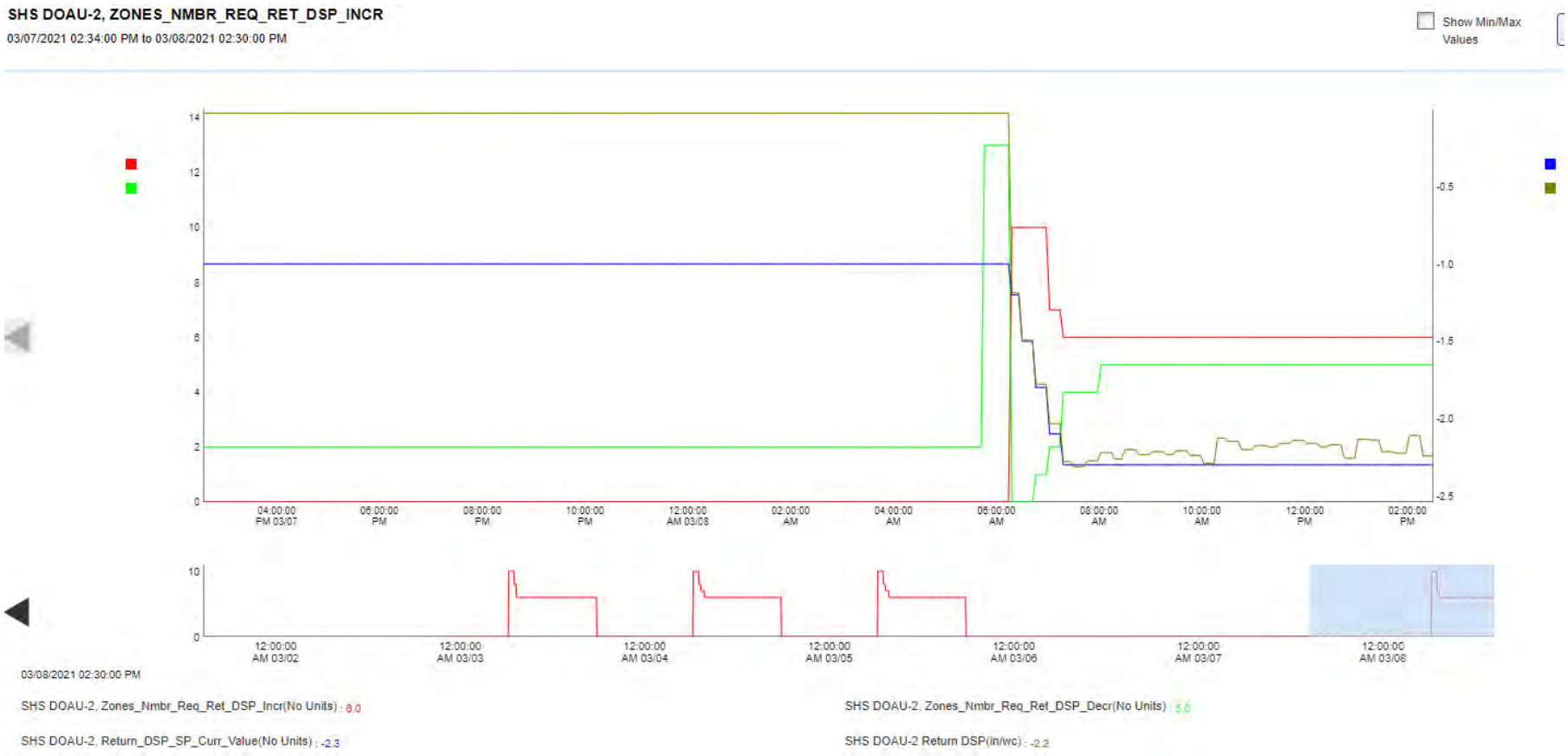
DOAU DSP Control - Sampled

DOAU-2 SUPPLY Daily Study (3/8/2021)



Comments: Verified unit regulates to Duct static Pressure Setpoint on supply side with multiple zones calling for an increase or decrease. Setpoints were trended starting on 3/3/2021.

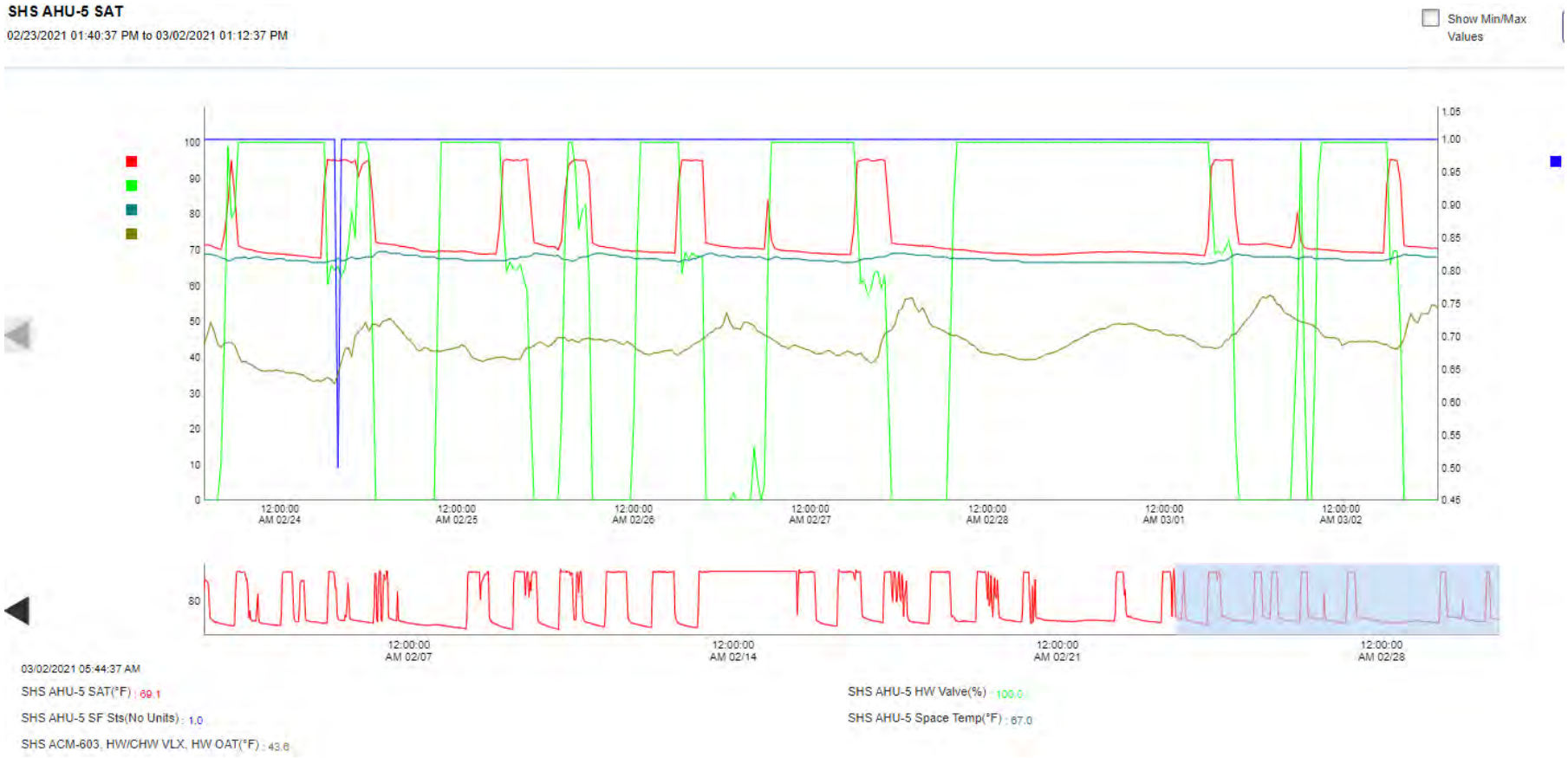
DOAU-2 RETURN Daily Study (3/8/2021)



Comments: Verified unit regulates to Duct static Pressure Setpoint on return side with multiple zones calling for an increase or decrease. Setpoints were trended starting on 3/3/2021.

AHU Schedule and SAT Control - Sampled

AHU-5 Weekly Study (2/24/2021 – 3/2/2021)



Comments: Verified supply fans are constantly on to counteract negative building pressure. Verified supply air temperature upon morning warm up period. Verified space temperature controls to occupied heating setpoint of 68°F.

AHU-5 Daily Study (3/2/2021)

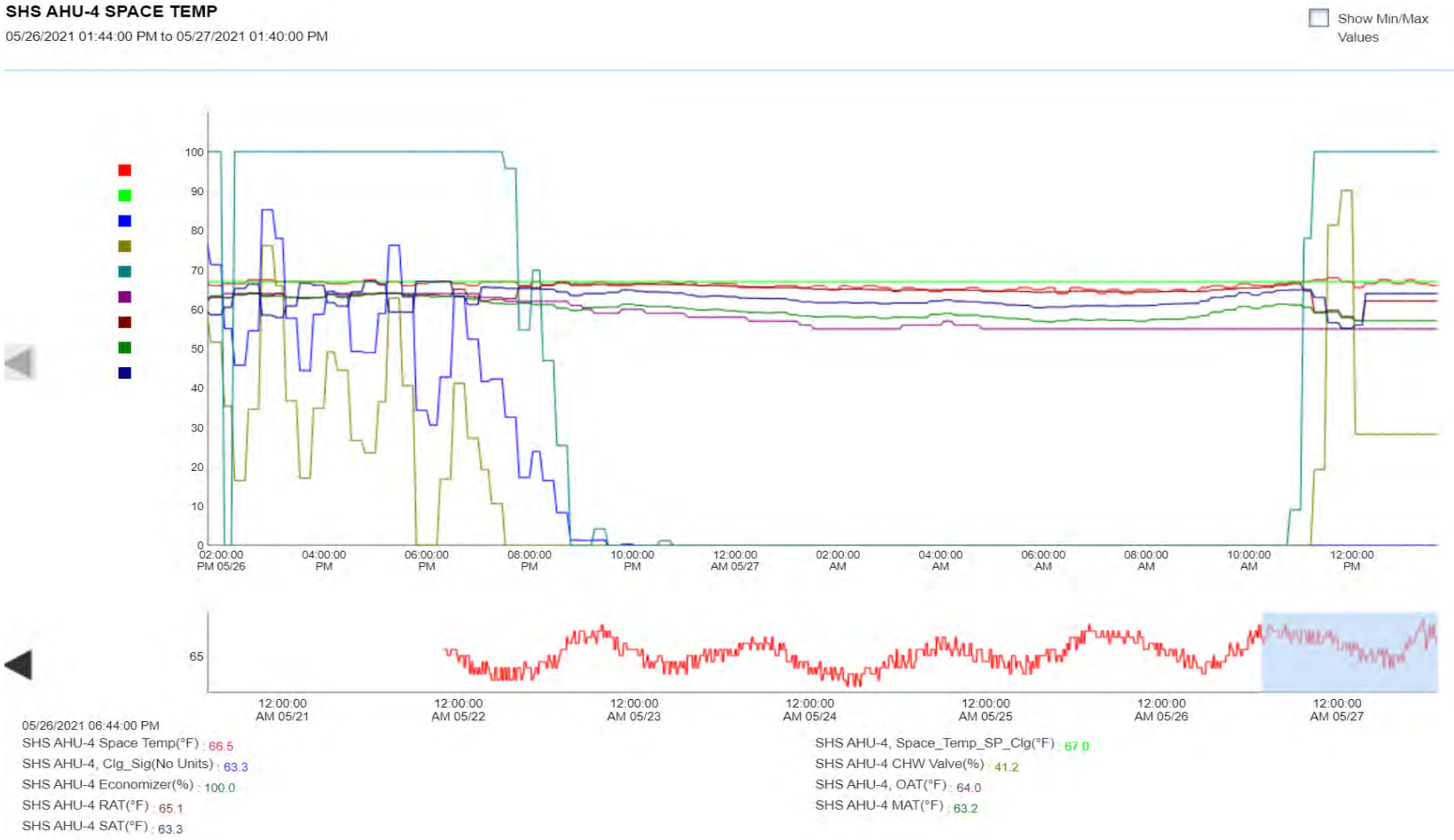
Comments: Verified supply fans are constantly on to counteract negative building pressure. Verified supply air temperature upon morning warm up period. Verified space temperature controls to occupied heating setpoint of 68°F.

AHU Cooling Setpoint and Control – Sampled

AHU-1 without Economizer

Comments: Verified zone control cooling to space temperature cooling setpoint. Cooling signal and chilled water valve working accordingly with each other. Dampers working accordingly to control CO2 setpoint. Verified unoccupied cooling setpoint changed with schedule.

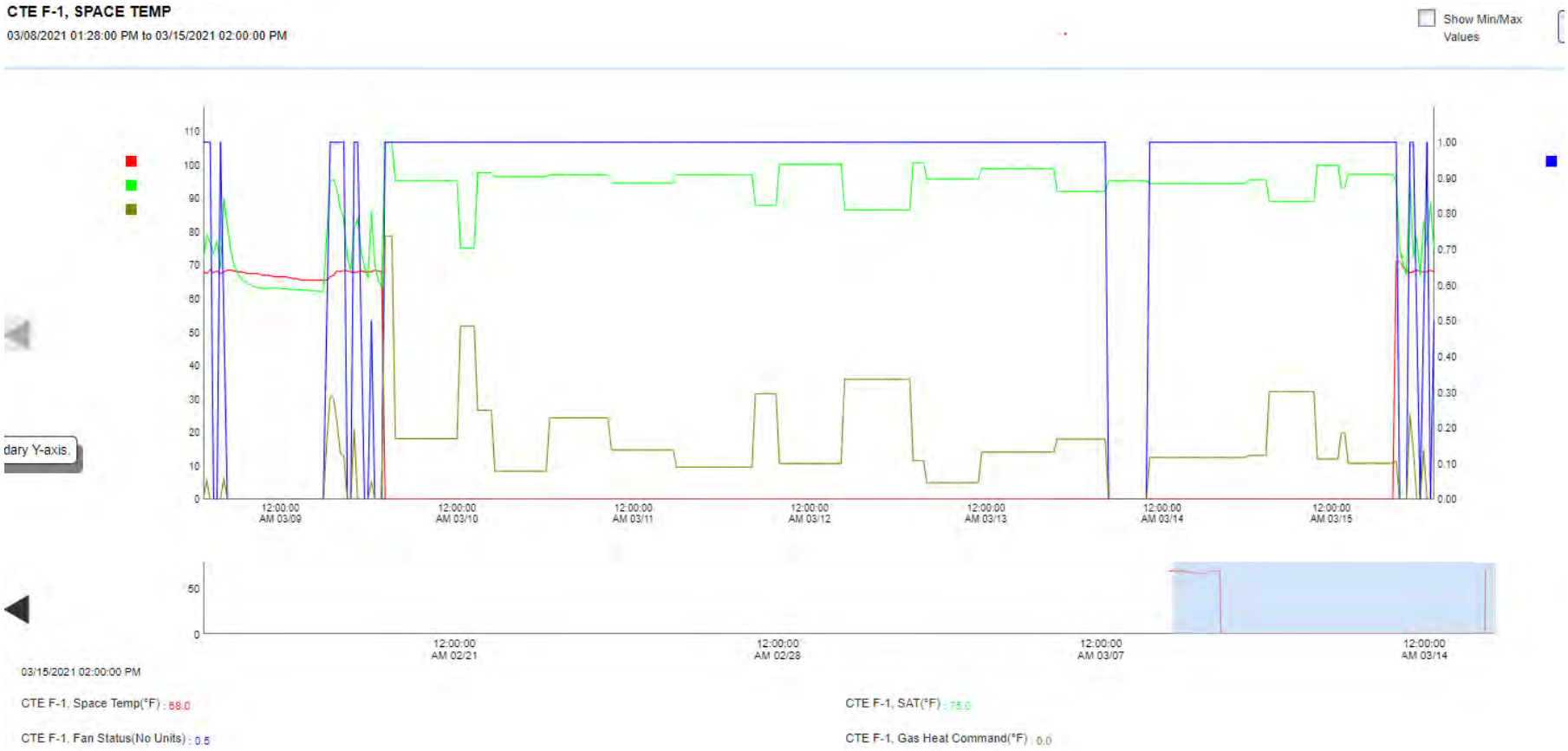
AHU-4 with Economizer



Comments: Verified zone control cooling to space temperature cooling setpoint. Cooling signal and chilled water valve working accordingly with each other. Verified occupied/unoccupied schedule controls equipment operation. Verified economizer cooling is first 33% of cooling signal with mechanical cooling coming on after.

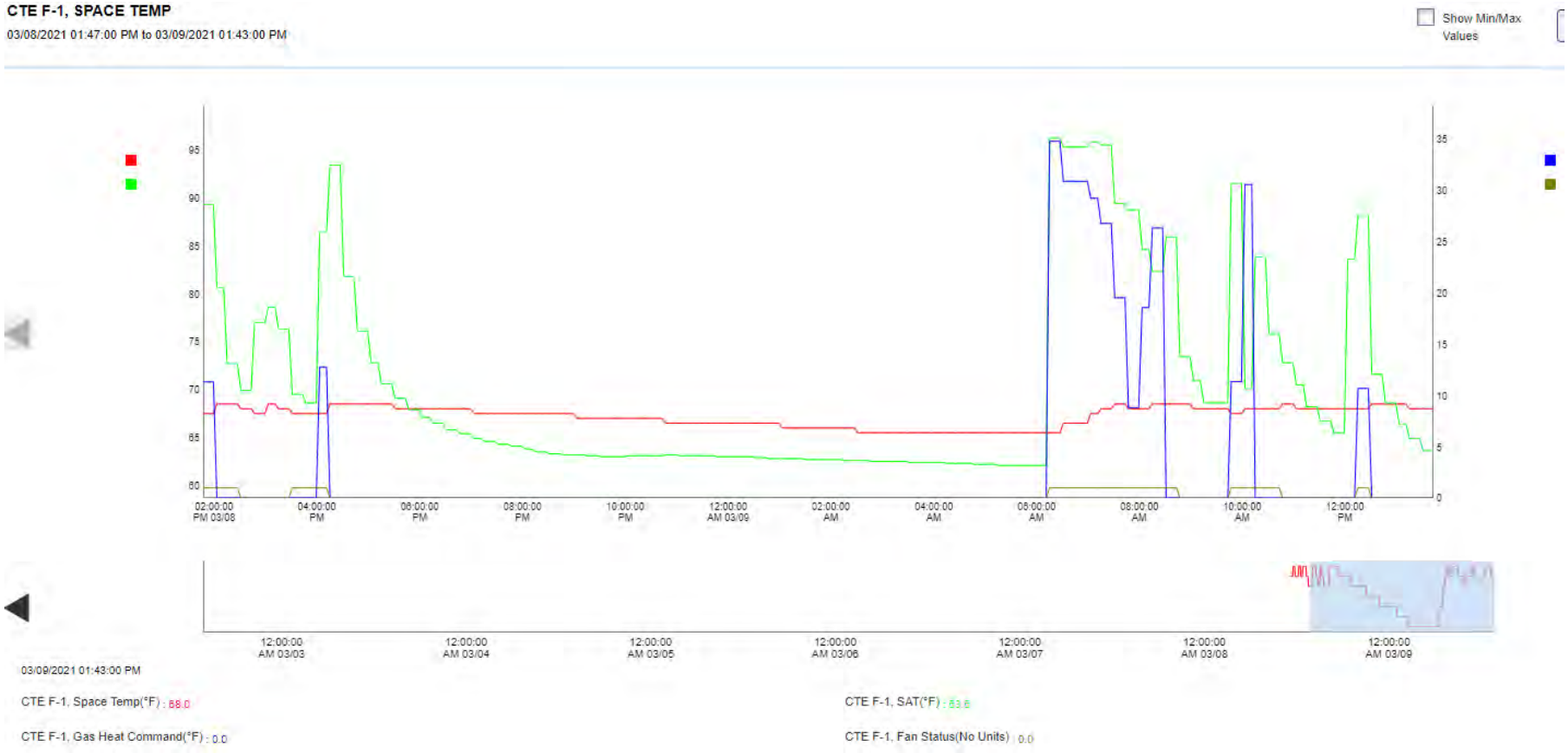
Furnace Schedule and SAT Analysis - Sampled

F-1 Weekly Study



Comments: Verified space temperature controlled to occupied heating setpoint. Verified warm up mode works sufficiently. Shows issue with space temperature sensor that has been corrected.

F-1 Daily Study



Comments: Verified space temperature controlled to occupied heating setpoint. Verified warm up mode works sufficiently.

Appendix 11 – Full Commissioning Issues List

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

Printed: 9/27/2023

Issue #: **1** *Status:* Resolved

Assigned: Milne *Location:* Lighting Controls (2nd & 3rd floors)

The following spaces seem too dark (around 10 fc) when the lights are dimmed:
Rooms 343, 344
Classrooms should not dim less than about 30 fc at desk height per WAC 246-366-120

10/22/2020 Posted
12/15/2020 WCG checked a couple of the effected rooms, appears condition still exists.
1/29/2021 WCG checked all but 343 and 344. Corrected

Issue #: **2** *Status:* Resolved

Assigned: Milne *Location:* Lighting Controls (2nd & 3rd floors)

The photocells did not seem to work for the following spaces:
Office 227, Reception 231, office 234,

10/22/2020 Posted
12/15/2020 WCG was not able to backcheck all areas, but appears condition is resolved. Still need to look at third floor spaces, appeared to be manually overridden onsite.
1/29/2021 WCG checked all but 2nd floor admin area. Corrected.

Issue #: **3** *Status:* Resolved

Assigned: Milne *Location:* Lighting Controls (2nd & 3rd floors)

Lights that seem to stay on longer than the scheduled 30 minutes:
Office 205A, Records 237

10/22/2020 Posted
12/15/2020 WCG re-tested, condition still exists.
1/6/2021 Corrected

Issue #: **4** *Status:* Resolved

Assigned: Milne *Location:* Lighting Controls (2nd & 3rd floors)

The lights do not seem to be working in the following spaces:
Waiting 229
Classroom 345 has no ceiling
Storage 333 - daylit zone does not appear to be controlled by wall switch.

10/22/2020 Posted
12/15/2020 Most spaces appear to be functioning as designed. Room 229 has 4 lighting scenes at the switch, but it appears only scene 1 is controlling a lighting zone. Is this intended?
1/6/2021 Condition still exists, Was informed by person working in office that each scene controls a different floor? Is this true and what does it control?
1/28/2021 Need response from Wattstopper
5/12/2021 Reported as complete by contractor. And verified

Issue #: **5** *Status:* Resolved

Assigned: Milne *Location:* Lighting Controls (2nd & 3rd floors)

Book storage room 301 is set for "Vacancy" mode. Should this be set for "Occupancy" mode for safety when working inside and not let the lights turn off and can't see to get back to the switch? Possibly do the same for other storage rooms?

10/22/2020 Posted
12/15/2020 Condition still exists.
1/6/2021 Corrected

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***Issue #:* 6** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler room

Expansion tanks and make-up water pressure settings for both heating water and chilled water do not appear to be set correctly. Currently operating and set about 45 psi. Drawings call for PRV set to 25 psi and the expansion tank to be pre-pressurized to 2 psi less that the PRV.

10/22/2020 Posted
11/19/2020 Reported as corrected.. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 7** *Status:* Resolved

Assigned: ATS *Location:* Classroom 258

FCU-211 is commanded on but not running.

11/3/2020 Posted
11/19/2020 ATS response: Start up tech should look at this. Re-assigned from ATS to Ramset.
12/14/2020 WCG verified unit is on when commanded from DDC.

***Issue #:* 8** *Status:* Resolved

Assigned: ATS *Location:* Room 240

FCU-241, The thermostat can only be adjusted down and not up.

11/3/2020 Posted
11/11/2020 Reported as complete by contractor.
11/16/2020 Resolved and verified.

***Issue #:* 9** *Status:* Resolved

Assigned: ATS *Location:* Room 232

FCU-243 commanded on but not running.

11/3/2020 Posted
11/16/2020 Resolved and verified.

***Issue #:* 10** *Status:* Resolved

Assigned: ATS *Location:* FCU-248, Room 238

Thermostat not flush with the wall.

11/3/2020 Posted
12/14/2020 Issue corrected, thermostat appears to be mounted properly.

***Issue #:* 11** *Status:* Resolved

Assigned: ATS *Location:* Thermostats

FCU - 275, 274, 273, 212 thermostats are reading 0F

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check on Graphics.
12/14/2020 WCG verifies thermostats reading sensible values.

***Issue #:* 12** *Status:* Resolved

Assigned: ATS *Location:* Room 253

FCU - 232 labeled as FCU 323,

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check on graphics
12/14/2020 WCG verified labelling is corrected.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

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***Issue #:* 13** *Status:* Resolved

Assigned: ATS *Location:* Thermostats

The following FCUs do not have thermostats installed, FCUs- 169 & 212.

11/3/2020 Posted
11/19/2020 Reported that 212 as corrected. 169 is pending.
11/21/2020 Resolved and verified.

***Issue #:* 14** *Status:* Resolved

Assigned: Cornerstone *Location:* Room 203, 321

Rooms 203 & 321, Sheetrock plaster hole around issue.

11/3/2020 Posted
1/6/2021 Corrected

***Issue #:* 15** *Status:* Resolved

Assigned: ATS *Location:* CO2 sensors

CO2 scale appears to be incorrect. Reading 420 ppm and BMS was 550 ppm.
(FCU 365, 366, 367, 368)

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/14/2020 CO2 readings from reference meter and BAS graphics now within tolerance. Reference reads 443, BAS is at 425 PPM.
9/9/2021 It appears that many of the CO2 reading scales are not correct. Some of the CO2 at the sensor are reading lower than the BMS.
9/15/2021 Reported as complete. WCG & owner to back check.
3/11/2022 SHS has experienced some high CO2 readings and has implemented higher rates of ventilation air to help resolve the issue. The CO2 readings appear to be accurate based on measurements. Other action may be to decrease CO2 setpoints at spot areas or open windows as necessary.

***Issue #:* 16** *Status:* Resolved

Assigned: ATS *Location:* Room 271

CO2 scale appears to be incorrect. Reading 410 ppm and BMS was 643 ppm. (FCU-216, 217)

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/14/2020 WCG verifies CO2 is in tolerance from reference.

***Issue #:* 17** *Status:* Resolved

Assigned: ATS *Location:* Controls Graphics

FCU-348 & 349 has a broken link on the floor plan. (room 316)

11/3/2020 Posted and fixed

***Issue #:* 18** *Status:* Resolved

Assigned: ATS *Location:* Room 327

CO2 sensor is reading 0 PPM.

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/15/2020 Corrected and verified.

WCG Commissioning Issues Log - Full List by Issue Number
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***Issue #:* 19** *Status:* Resolved

Assigned: ATS *Location:* Room 335 & 331

CO2 on wall unit (matched the measured reading) did not match the BMS

11/3/2020 Posted
12/14/2020 WCG verifies reference and graphic readings now within tolerance. Unable to verify 331 as it is reading a value of 2057 CO2 on graphics.
1/6/2021 Corrected

***Issue #:* 20** *Status:* Resolved

Assigned: ATS *Location:* Room 348

Blank plate thermostat hanging from the wires.

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 21** *Status:* Resolved

Assigned: ATS *Location:* Electrical room 255

Thermostat not reading correctly (EF-208)

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/14/2020 Corrected and verified.

***Issue #:* 22** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

AHU thermostats do not appear to be on the floor plan graphics.

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/14/2020 Corrected and verified.

***Issue #:* 23** *Status:* Resolved

Assigned: ATS *Location:* FCU-141

The FCU was in heating but not commanded on in the graphics

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/14/2020 Corrected and verified.

***Issue #:* 24** *Status:* Resolved

Assigned: Ramsett *Location:* Kitchen

Kitchen hash wash sinks (quantity of 6) half of them are hotter than 120F.

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 25** *Status:* Resolved

Assigned: Ramsett *Location:* Toiler/shower 106 D

All of the water closet caulking is cracking and not appear to be applied adequately

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

WCG Commissioning Issues Log - Full List by Issue Number
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Stanwood HS

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***Issue #:* 26** *Status:* Resolved

Assigned: Ramsett *Location:* Men 122

One of the Urinals is not installed and water is off,

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 27** *Status:* Resolved

Assigned: Ramsett *Location:* Men 135

South water closet has cracks in the caulking.

11/3/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 28** *Status:* Resolved

Assigned: BCE *Location:* Toiler/shower 105 & 106

Shower water temperature is around 130F , which appears to be scalding hot.

11/3/2020 Posted
11/19/2020 Contractor response: No mixing valve before shower so supplies 140F HW. Could try to use shower valve to mix CW but not correct way to get "mixed temperature. Re-assigned from Ramset to BCE
12/3/2020 MANUAL TEMPERATURE CONTROL WITH SHOWER VALVE IS ACCEPTABLE TO BCE

***Issue #:* 29** *Status:* Resolved

Assigned: Ramsett *Location:* Corridor 111

Drinking fountain is not installed.

11/3/2020 Posted
11/19/2020 Contractor response: Waiting in (4) replacement DF. (1) CTE, (1) 3rd floor zone 6, (1) ticket booth, (1) Locker corridor.
12/14/2020 Unit installation verified.

***Issue #:* 30** *Status:* Resolved

Assigned: Ramsett *Location:* Toilet/shower 114C

No water pressure at center shower.

11/3/2020 posted
11/19/2020 Contractor response: Cleaned shower head aerator. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 31** *Status:* Resolved

Assigned: Ramsett *Location:* Womens 136

Center and north lavatories has very low flow and only room temperature.

11/3/2020 Posted
11/19/2020 Contractor response: Saw great flow and temperature from 108F to 112F. Temperatures took time to achieve. WCG to back check.
11/21/2020 Resolved and verified.

WCG Commissioning Issues Log - Full List by Issue Number
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***Issue #:* 32** *Status:* Resolved

Assigned: Ramsett *Location:* Toilet 134

Lavatory is only at room temperature

11/3/2020 Posted
11/19/2020 Contractor response: Temperatures took time to achieve 112F. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 33** *Status:* Resolved

Assigned: Ramsett *Location:* Corridor 130

Drinking fountain is disconnected

11/3/2020 Posted
11/19/2020 Contractor response: Will install when replacement arrives.
12/14/2020 Corrected and verified.

***Issue #:* 34** *Status:* Resolved

Assigned: Ramsett *Location:* Storage 262A

Sink water temperature is measuring at 122F, too hot.

11/3/2020 posted
11/16/2020 Resolved and verified.

***Issue #:* 35** *Status:* Resolved

Assigned: Ramsett *Location:* Mens 268, womens 269

All lavatories are measuring above 120F, too hot.

11/3/2020 Posted
11/16/2020 Resolved and verified.

***Issue #:* 36** *Status:* Resolved

Assigned: Ramsett *Location:* Mechanical Penthouse

DOAU-5 on freeze stat trip the valve only opens to 50%. Should open to 100%. And the exhaust damper did not close.
Also when investigating the valve was closed to 0% and it appeared that the valve was leaking by water.

11/3/2020 Posted
11/19/2020 Contractor response: Valve gets stuck. Startup tech needs to look at. Assigned to Ramset
1/21/2021 Resolved and verified.

***Issue #:* 37** *Status:* Resolved

Assigned: Ramsett/ATS *Location:* Mechanical Penthouse

AHU-4 on freeze stat trip the heating valve did not open up.

11/3/2020 Posted
11/19/2020 Contractor response: Valve gets stuck. Startup tech needs to look at. Assigned to Ramset
1/21/2021 Resolved and verified.

***Issue #:* 38** *Status:* Resolved

Assigned: Ramsett *Location:* Mens 135

South water closet has cracks in caulking

11/4/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

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***Issue #:* 39** *Status:* Resolved

Assigned: Ramsett *Location:* Men 171

South Urinal has loose piping.

11/4/2020 Posted
12/15/2020 Condition still exists.
1/6/2021 Condition still exists.
1/14/2021 Corrected.

***Issue #:* 40** *Status:* Resolved

Assigned: Ramsett *Location:* Men 171

North water closet caulking is falling off

11/4/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 41** *Status:* Resolved

Assigned: Ramsett *Location:* Women 173

Second from North water closet caulking is falling off

11/4/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/15/2020 Corrected and verified.

***Issue #:* 42** *Status:* Resolved

Assigned: Ramsett *Location:* Toilet 141

No hot water to lavatories.

11/4/2020 Posted
11/19/2020 Reported as corrected. Each at 111F & 112 F respectively. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 43** *Status:* Resolved

Assigned: BCE *Location:* Scene shop 164

Sink has low flow and too hot (>120F)

11/4/2020 Posted
11/19/2020 Contractor response: Great flow w/o specified aerator, temperature is OK per plans with no mixing valve and 140F at water heater. Reassigned from Ramset to BCE.
12/3/2020 140 DEGREE WATER AT MOP SINK IS ACCEPTABLE TO BCE

***Issue #:* 44** *Status:* Resolved

Assigned: BCE *Location:* Storage 210

Sink water is >120F

11/4/2020 Posted
11/16/2020 Contractor response. Installed per design. Is water temperature >120F OK? Changed from Ramset to BCE
12/3/2020 140 DEGREE WATER AT MOP SINK IS ACCEPTABLE TO BCE

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

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***Issue #:* 45** *Status:* Resolved

Assigned: Ramsett *Location:* Concessions 210

The sink handles hit each other when attempting to turn the water on. Conflict.

11/4/2020 Posted
11/16/2020 Different handles to be installed as instructed by engineer. Changed from BCE to Ramset
12/15/2020 Condition still exists.
12/30/2020 Corrected.

***Issue #:* 46** *Status:* Resolved

Assigned: Ramsett *Location:* Science lab 241

North sink has disconnected drain pipe.

11/4/2020 Posted
11/16/2020 Resolved and verified.

***Issue #:* 47** *Status:* Resolved

Assigned: Ramsett *Location:* Storage 262A

The sink hot water is > 120F

11/4/2020 Posted
11/16/2020 Resolved and verified.

***Issue #:* 48** *Status:* Resolved

Assigned: Ramsett *Location:* Science 253

The teacher sink does not have hot water

11/4/2020 Posted
11/16/2020 Resolved and verified.

***Issue #:* 49** *Status:* Resolved

Assigned: Ramsett *Location:* Restroom 302B

No hot water.

11/4/2020 Posted
11/16/2020 Resolved and verified. Hot water takes about 20 seconds.

***Issue #:* 50** *Status:* Resolved

Assigned: Delta *Location:* AHUs & DOAS units

AHUs and DOAS units do not appear to have flexible duct connections per the detail 2/M5.03

11/11/2020 Posted
1/21/2021 Internal vibration isolation installed. Issue closed.

***Issue #:* 51** *Status:* Resolved

Assigned: BCE *Location:* AHUs & DOAS units

Some of the AHUs and DOAS units do not have flexible connections per detail 1 & 2 M5.02.

11/11/2020 Posted
11/19/2020 Contractor response: Installed per plan. And fans have internal isolation springs. Re-assigned from Ramset to BCE
12/3/2020 BCE: PER SPEC SECTION 23 31 13 PART 3 PARA 3.02 C 1 FLEXIBLE CONNECTIONS ARE NOT REQUIRED ON EQUIPMENT WITH INTERNAL SPRING ISOLATION.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

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***Issue #:* 52** *Status:* Resolved

Assigned: BCE *Location:* AHUs & DOAS units

The strainers do not seem to be serviceable with the location of the isolation valve.

11/11/2020 Posted
11/19/2020 Contractor response: Installed per plan. Re-assigned from Ramset to BCE
2/8/2021 Per correspondence with Byron the issue is the strainer is directly connected to the isolation valve. As installed the strainer internal components can be replaced without issue. If the strainer body needed to replace (not likely) then localized isolation would be to be used (not the coil isolation). This installation as is acceptable to BCE and recommend this item be closed.

***Issue #:* 53** *Status:* Resolved

Assigned: BCE *Location:* AHU-2 & 3, DOAS - 6

No vibration Isolation is provided per 230548.3.01.A.

11/11/2020 Posted
11/19/2020 Contractor response: Internally isolated. Re-assigned from Ramset to BCE
11/29/2020 INTERNAL ISOLATION IS ACCEPTABLE TO BCE.
12/3/2020 These fans do not have internal or external vibration isolation. However, these units do not appear to be noisy. BCE to confirm if acceptable.
12/7/2020 Engineers Response: Per correspondence with the vendor rep these units are internally isolated with rubber shims. No external isolation required. Issue closed.

***Issue #:* 54** *Status:* Resolved

Assigned: Ramsett *Location:* DOAS -2

DOAS - 2 seems to have burst a seam and leaking air.

11/11/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
12/15/2020 WCG observes new sealant around are that had burst. Unit was running and it appeared no air was leaking.

***Issue #:* 55** *Status:* Resolved

Assigned: Camano - Stanwood SD *Location:* AHU- 6 & 7, DOAS - 6

The fans do not have access doors with handle. The access is via a removable panel. Is this acceptable with the owner?

11/11/2020 Posted
11/19/2020 Contractor response: Installed per approved submittal. Re-assigned from Ramset to BCE
12/3/2020 BCE recommended for owner to assess if acceptable.
12/29/2020 From ATS: AHU-6 Access Panel is riveted in place and even after bolts are taken off, the panel is not accessible. Maybe this fan is not supposed to be a serviceable thing on this particular style of unit.
1/21/2021 Access only required if major repair. Issue closed.

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***Issue #:* 56** *Status:* Resolved

Assigned: ATS *Location:* AHU-6

Fan access panel is blocked by an electrical conduit and should be moved.

11/11/2020	Posted
11/19/2020	Re-assigned from Ramset to Milne
1/6/2021	Condition still exists.
1/14/2021	Condition still exists, Conduit is from ATS and they are aware however the panel is riveted and thus un-accessible.
1/21/2021	Conduit should be relocated in case of needed access.
3/25/2021	Reported as corrected by contractor, WCG to back check.
4/14/2021	Resolved and verified.

***Issue #:* 57** *Status:* Resolved

Assigned: Ramsett *Location:* DOAS units

DOAS- 1 and 5 have a buckled frames.

11/11/2020	Posted
11/19/2020	Contractor response: Were not this way when installed. Does it affect operation? Ramset should verify warranty.
1/21/2021	Manufacture supplier observed units and are respecting the warranty.

***Issue #:* 58** *Status:* Resolved

Assigned: BCE *Location:* AHU - 5

No Unions per detail 1 & 2 /M5.02. The control valves have to be unsoldered to be removed.

11/11/2020	Posted
11/19/2020	Contractor response: None to take at this point of installation & operation. Re-assigned from Ramset to BCE
12/3/2020	BCE: COORDINATING WITH CONTRACTOR. SUBMITTALS SEEM TO INDICATE UNIONS.
12/7/2020	Engineers Response: Detail 1 & 2 on M5.02 only requires unions at coil connections. If the owner desires unions on control valves a COP will have to be written. Issue closed.

***Issue #:* 59** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler room

The chilled water and heating water pumps do not have any vibration isolation.

11/11/2020	Posted
11/19/2020	Contractor response: Installed per design standard. No installation detail on drawings and early RFI.

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Stanwood / Camano SD
Stanwood HS

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***Issue #:* 60** *Status:* Resolved

Assigned: Ramsett *Location:* Trap Primers

The following rooms the floor drain traps appears to be dry. Trap primer might not be working:
Men's 213
Kennels 258A
Storage 254B
Health bathroom
Concessions 217
Toilet 332
All Emergency Shower/Eyewash floor drains.

11/11/2020 Posted
11/19/2020 Reported as corrected, Emergency shower and eyewashes have mechanical trap seal per RFI. WCG to backcheck.
12/3/2020 Resolved and verified.

***Issue #:* 61** *Status:* Resolved

Assigned: ATS *Location:* Controls Graphics

There are some CO2 sensors not reading on the graphics for the first floor.

11/11/2020 Posted.
12/15/2020 Condition still exists.
1/6/2021 Corrected

***Issue #:* 62** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

Thermostat for room 140 does not seem to be adjustable.

11/11/2020 Posted
11/19/2020 Reported as corrected. WCG to back check.
11/21/2020 Resolved and verified.

***Issue #:* 63** *Status:* Resolved

Assigned: ATS *Location:* Thermostats

The following thermostats appear to be out of calibration by more than 2 deg F:
Room 102
Room 103D
Room 118
Room 106
Room 107

11/11/2020 Posted
12/15/2020 Issue Update: Condition still exists in rooms 181A, 118, 106, 250A, 245 (some added). Issue appears corrected in the other spaces listed in the original issue.
2/2/2021 ATS: Cannot calibrate thermostats. Foam insulation added to back of thermostat to help regulate readings. WCG sample back checked.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

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***Issue #:* 64** *Status:* Resolved

Assigned: Ramsett/ATS *Location:* FCUs

The following FCUs did not seem to heat when in heating command:
206
207
208
223
234
235
236
237
238

11/11/2020 Posted

11/19/2020 Reported as corrected. WCG has back checked all but 223. WCG to back check.

12/15/2020 Corrected and verified.

***Issue #:* 65** *Status:* Resolved

Assigned: ATS *Location:* FCUs

FCU-333 and FCU-328/329 were not reacting to the unoccupied mode command. Command appeared to save but units remained on and controlling to controlling to occupied setpoints

11/30/2020 Posted. ATS resolved onsite, issue dealt with priority order of commands. WCG re-tested and verified correction.

***Issue #:* 66** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

Link from equipment summary for FCU-303/304 + VAV 302 went to the incorrect page.

11/30/2020 Posted. ATS resolved onsite, WCG backchecked and verified.

***Issue #:* 67** *Status:* Resolved

Assigned: ATS *Location:* FCUs

Heating valve appears to be leaking on FCU-322. The DAT was >90F after having the valve manually overridden closed for over an hour.

11/30/2020 Posted. ATS corrected onsite, said wires were landed incorrectly on the control valve, and the close signal was not reaching the valve. WCG backchecks and verifies.

***Issue #:* 68** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

FCU's 355-362, 369-376 are not communicating with the control system.

11/30/2020 Posted. ATS corrected onsite by verifying power was reaching the control card. WCG backchecks and verifies.

***Issue #:* 69** *Status:* Resolved

Assigned: ATS *Location:* FCUs

FCU-105 is not powering on when commanded to.

12/3/2020 Posted.

12/15/2020 ATS informs WCG onsite that issue has been corrected, believe it stemmed from a manual fan speed override. WCG to verify.

***Issue #:* 70** *Status:* Resolved

Assigned: Ramsett *Location:* Room 141 Sink P-4B

No hot water at sink.

12/3/2020 Posted

12/15/2020 Corrected and verified.

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***Issue #:* 71** *Status:* Resolved

Assigned: Ramsett *Location:* Room 140 C Kitchenette

No hot water at sink.

12/3/2020 Posted
12/15/2020 Corrected and verified.

***Issue #:* 72** *Status:* Resolved

Assigned: Ramsett *Location:* Horticulture Lab 254

No water pressure at the emergency shower / Eyewash station.

12/3/2020 Posted
12/15/2020 Corrected and verified.

***Issue #:* 73** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

Alarms for pump failure on chilled water pumps not functioning when condition exists.

12/8/2020 Posted. ATS corrected onsite.

***Issue #:* 74** *Status:* Resolved

Assigned: ATS *Location:* AHUs & DOAS units

AHU's with economizers were not opening economizer to minimum position when in unoccupied override mode to provide ventilation.

12/9/2020 Posted. ATS corrected onsite.

***Issue #:* 75** *Status:* Resolved

Assigned: Ramsett *Location:* FCUs

FCU-221 union on HW return appears to be leaking.

12/9/2020 Posted. TAB contractor corrected when issue was discovered.

***Issue #:* 76** *Status:* Resolved

Assigned: Ramsett *Location:* FCUs

FCU-223 does not appear to have flow through the heating coil when control valve is open.

12/9/2020 Posted.
1/6/2021 Corrected.

***Issue #:* 77** *Status:* Resolved

Assigned: Ramsett *Location:* DOAS units

DOAS-5 HW valve does not seem to close to 0%, water appears to be leaking through. DOAS has high discharge air temperature when valve is closed.

12/9/2020 Posted.
1/21/2021 Reported as corrected, WCG to back check.
1/29/2021 Back checked with differential temperature being about 3 degrees with valve closed. OK?
2/12/2021 Resolved and verified.

***Issue #:* 78** *Status:* Resolved

Assigned: ATS *Location:* DOAS -2

Unable to locate exhaust isolation damper on DOAS-2. Each unit is on the submittal as having their own damper upstream of the junction with the other DOAS unit.

12/9/2020 Posted.
12/11/2020 Per BCE response, seems EA isolation dampers not required for the individual units. Controls submittal had these dampers drawn incorrectly compared to design intent. Units should have individual OSA isolation dampers. See issue 79 for tracking.

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***Issue #:* 79** *Status:* Resolved

Assigned: ATS *Location:*

It seems the installed condition of DOAS units 1&2 may allow one to pull air backwards through the other if only one is running. Engineer to review the installed condition and see if it is acceptable.

12/9/2020 Posted.
12/11/2020 BCE Response: OSA Damper at DOAU-1 and DOAU-2 to be interlocked to unit operation per sequence on sheet M-605 to prevent air being pulled backwards through DOAU.
12/15/2020 WCG Update: Inspected again onsite and spoke with ATS. DOAS-2 has an OSA damper that currently has no actuator and is fixed 100% open. DOAS-1 has isolation dampers on both ducts, but the actuator was not connected to the OSA damper. ATS is aware of this and correcting the installation to match the design intent. Issue reassigned to ATS
2/2/2021 Corrected.

***Issue #:* 80** *Status:* Resolved

Assigned: ATS *Location:*

ATS brought it to our attention that in the science areas with fume hoods, the SOO states Exhaust AFD's should go from max to min airflow when the fume hood is on, but most of these spaces are scheduled as constant volume exhaust AFD's. Is this okay as-is, or should those exhaust units have a second airflow setpoint for when the fume hood is running?

12/17/2020 Posted.
1/21/2021 Instruction has been received by the engineer. BCE has responded to this issue on Dec 17th, 2020. Recommend re-assigning to ATS
2/2/2021 Corrected. ATS has changed the lower cfm values when exhaust hood turns on.

***Issue #:* 81** *Status:* Resolved

Assigned: ATS *Location:*

VAV-307 shows 730 CFM when VAV control damper shows closed.

12/17/2020 Posted.
1/6/2021 Corrected.

***Issue #:* 82** *Status:* Resolved

Assigned: ATS *Location:*

VAV-308 shows 0 CFM when control damper is at 100% and associated DOAS is running.

12/17/2020 Posted.
1/6/2021 Corrected

***Issue #:* 83** *Status:* Resolved

Assigned: ATS *Location:* Controls Graphics

Graphic for VAV-212 link appears broken, does not take you to the correct page from the floorplan.

12/15/2020 Posted. ATS resolved onsite.

***Issue #:* 84** *Status:* Resolved

Assigned: ATS *Location:* Controls Graphics

VAV-115 does not appear to be on the floorplan.

12/17/2020 Posted.
1/6/2021 Corrected

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***Issue #:* 85** *Status:* Resolved

Assigned: Ramsett/ATS *Location:* DOAU-4

Return/Bypass damper seemed to be vibrating and was partially open. Damper should be fastened closed.

12/29/2020 Posted.
1/6/2021 Corrected.

***Issue #:* 86** *Status:* Resolved

Assigned: Ramsett/ATS *Location:* RM 164 Scene Shop

The east Fan Coil Unit in the scene shop does not seem to be operating when space is in calling for heat.

12/30/2020 Posted.
1/6/2021 Condition still exists
2/12/2021 Reported as complete by contractor.
3/10/2021 Resolved and verified.

***Issue #:* 87** *Status:* Resolved

Assigned: ATS *Location:* DOAU-5

DOAU-5 will turn off under high duct static pressure as it should, but after resetting, the unit will not turn back on and continues to have a High DSP Alarm on the graphics. How to reset DOAU after high DSP test?

12/30/2020 Posted.
1/6/2021 Resolved.

***Issue #:* 88** *Status:* Resolved

Assigned: Ramsett/ATS *Location:* Rm 114b Drying Room

FCU has plastic wrap (possibly from painting or installation) dangling around the unit that needs to be taken off.

12/30/2020 Posted.
1/14/2021 Corrected.

***Issue #:* 89** *Status:* Resolved

Assigned: ATS *Location:* DOAU-1 and DOAU-2

Upon high DSP shutdown of DOAU-2, the exhaust fan of DOAU-1 will also turn off. Could not find a reason in SOO for this.

1/6/2021 Posted.
2/2/2021 ATS back checked and exhaust fan is not physically shutting off. They will back check graphics.
3/22/2021 Reported as corrected by the contractor, WCG to back check.
5/19/2021 Resolved and verified.

***Issue #:* 90** *Status:* Resolved

Assigned: Milne *Location:* EF-107

EF-107 has exposed wiring. Fan speed controller does not seem to be working.

1/14/2021 Posted.
5/18/2021 Reported as corrected. WCG to back check.
6/14/2021 Resolved and verified.

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***Issue #:* 91** *Status:* Resolved

Assigned: ATS graphics *Location:* EF-102 and EF-209

EF-102 and EF-209 do not seem to agree with the DDC graphics. For example, EF-102 was working correctly and had air flow but in the graphics had an off Fan Status.

1/14/2021 Posted.
2/18/2021 Reported as complete by contractor. WCG to back check.
2/19/2021 Corrected.

***Issue #:* 92** *Status:* Resolved

Assigned: Milne *Location:* RM 163 Choir

FCU seems to be turned off but no alarm on graphics (commanded on and 40%). Could be a possible power issue.

1/20/2021 Posted.
2/12/2021 Resolved and verified.

***Issue #:* 93** *Status:* Resolved

Assigned: ATS *Location:* Main Entry Way Vestibule (FCU-169)

Temperature sensor seems to be off by more than 5 degrees and the fan speed on wall unit FCU-169 needs to be turned up since it is not effectively heating the space (possibly needs to be rewired to analog instead of binary).

1/20/2021 Posted.
2/18/2021 Reported as complete by contractor. Foam insulation installed, Fan speed increased. WCG to back check.
2/19/2021 Corrected.

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***Issue #:* 94** *Status:* Resolved

Assigned: ATS *Location:* Stanwood HS

Air balancers showing exhaust VAV's are about 10,000 cfm more than supply VAV's, causing the building to go extremely negative pressure. Please look at TAB report and analyze how to make the building positive pressure.

1/20/2021 Posted.

1/28/2021 Control sequence on sheet M6.03 should address this issue. Contacted to the TAB team and it appears make-up air units were not operating and sequences not fully implemented at the time of this comment. Recommend re-assigning to ATS.

2/2/2021 ATS changed the supply VAV's to have their dampers open all the time to offset negative pressure.

2/10/2021 Still getting negative pressure on first floor with all AHU's and the make up air unit pulling max OA. See separate file for graphics showing airflow rates. Re-assigned to BCE.

2/12/2021 BCE: Based on the information given, there appears to be massive leakage in the building. We suggest reviewing the air barrier testing report and verifying any potential envelope leakage issues that may be occurring since the amount of air that is being introduced into the space under this testing should provide more than adequate pressurization.

2/17/2021 Nothing in this envelope pressure test report jumps out at me as showing air leakage issues. WCG asked Cornerstone if they know of any air leaks.
BCE: Open louvers, misfunctioning backdraft/motor dampers for OSA and relief ducting…open doors during testing…etc.…essentially ALL the openings in the building that were probably made sure that were isolated for the envelope testing that may not have been during commissioning.
WCG: Good point. There was one door blocked open on the first floor by the band room with a 2x4 sideways and had the same -0.02" measurement while doing this testing. We randomly checked some rooms for open windows but not all of them. It should be checked again to see if any windows are open. I'm adding Pieter into this email to maybe get his input as to advise if he may know if there were any temporary openings that had to be closed off for the envelope test that may be causing the possible buoyancy issue.

3/10/2021 Cornerstone provided an investigation with the CxA and the report dated 2/26/21. CxA will retest building pressure after the issues and tasks are addressed.

4/14/2021 Still no response from Cornerstone report dated 2/26/21;
WCG did some more investigation and made some progress with reducing air flow with AFD units not associated with athletic spaces or LAB spaces and restrooms. Recommend reducing air flow to these AFDs.
There are some other issues found and tracked on separate issue number. (116, 120 through 125)

5/12/2021 Need Cornerstone response to report and updated sequence from the engineer for the stage relief damper/hood.

5/19/2021 With ALL units OFF the air pressure at the bottom floor are neutral 0.00" and the attic mechanical room is positive +0.01". The issues on the Cornerstone punch list needs to be addressed and the 3rd floor back draft damper needs to be installed and the stage relief louver actuator needs to be wired and controlled to building pressure.

6/14/2021 Added note for BCE: there does not appear to be any make up air for the kitchen hoods. It is recommended that the commons AHU (AHU-4) be used to make up air for the kitchen hoods. When the kitchen hood exhaust fans are on then the AHU-4 outside air damper should open to help keep the building pressure positive.

6/23/2021 Cornerstone issued RFI 1120 with engineer response: Revise AHU-4 sequence such that "When either kitchen exhaust hood is on and building pressurization is below 0.02"WC AHU-4 is to go into Max CFM operation.
Re-assigned to ATS.

6/25/2021 In change order process to modify the sequence of operation..

8/20/2021 ATS modified the sequence that when the building pressure is negative relating to the plenum pressure controlling ADF - 102 (exhaust vav box) 0.02" the OA damper goes to 12,000 cfm.

***Issue #:* 95** *Status:* Resolved

Assigned: Camano - Stanwood SD *Location:* Boiler RM

Need help from mechanical contractor to test make up water alarm for chilled water system.

1/20/2021 Posted.

2/3/2023 This test was not performed to not dump and waste glycol down the sewer. It is assumed that this alarm functions because the heating water make up alarm does function. The owner should work with the contractor to simulate the alarm if verification is desired.

4/14/2023 The owner will work with the CxA to get a comfort level of performance and a chemical treatment company for proper water treatment.

9/27/2023 Email from the owner:
Hi Bryon,
This is a follow-up to our conversation concerning signing off on the glycol chilled water makeup alarm test. With the lack of containment for collecting and storing the glycol chilled water and the inability to put the treated water back into the system we should forgo the testing of the chilled water makeup alarm test. The alarm graphics for the chilled water are displayed on the DDC system as per design.
The heating makeup water alarm is also displayed on the DDC graphics. When tested, the heating water makeup alarm performed as designed. There is a reasonable assumption that the chilled water makeup alarm would perform in the same manner.

Kevin Cruse

***Issue #:* 96** *Status:* Resolved

Assigned: Cornerstone/Ramsett *Location:* Boiler RM

Safety relief valve on heating/chilled water are extended to a floor drain that doesn't catch all the water which is then spilled all over the mechanical room floor and through holes in the floor. Should this have been a floor sink not a floor drain? Also many pipe penetration have cracked caulking allowing water to leak down.

1/21/2021 Posted

1/21/2021 Re-assigned from Ramset to BCE. There should be a floor sink here. Cannot put a dam around the drain because it is front of an electrical panel. Looking for direction from engineer for a floor sink.

1/28/2021 Mark Wheeler will be on site this week and investigate. - TBD

2/8/2021 Possible solutions:
Adding a step over drain to allow electrical panel access. Extends adjacent drain pipes to floor drain and add dam underneath step
Core drill floor and route drains to floor sink or mop sink on floor below.
Mill the floor such that it is sloped to drain.
BCE recommends solution 1 be pursued.

5/12/2021 Resolved and verified. A rubber water dam has been added.

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***Issue #:* 97** *Status:* Resolved

Assigned: ATS *Location:* DOAU-4

Need help with accessing freeze stat trip for DOAU-4.

1/20/2021 Posted.
6/25/2021 The freeze stat is located on the fan unit outlet and test ok.

***Issue #:* 98** *Status:* Resolved

Assigned: ATS *Location:* AHU-1

Unable to find freeze stat and high duct static pressure does not work in override. VFD in hand unit still operates.

1/20/2021 Posted.
1/21/2021 AHU is recirc only. NA

***Issue #:* 99** *Status:* Resolved

Assigned: ATS *Location:* DOAU-1

Upon freeze stat shutdown, OA damper is not closing.

1/20/2021 Posted.
3/22/2021 Reported as corrected by the contractor, WCG to back check.
5/12/2021 Resolved and verified.

***Issue #:* 100** *Status:* Resolved

Assigned: ATS *Location:* Boiler Room EF 210

Exhaust fan status off when exhaust fan was running causing a fan failure alarm.

1/25/2021 Posted.
2/18/2021 Reported as complete by contractor. WCG to back check.
2/19/2021 Corrected.

***Issue #:* 101** *Status:* Resolved

Assigned: Cornerstone/Delta *Location:* Boiler room

Refrigerant pipe room penetration is open to outside letting air in. Needs to be sealed.

1/25/2021 Posted.

***Issue #:* 102** *Status:* Resolved

Assigned: ATS graphics *Location:* MDF

On graphics MDF 176A is served by EF-102 but it seems it is served by ICU-103. Mechanical RM 175 is served by EF-102.

1/25/2021 Posted.
2/18/2021 Reported as complete by contractor. WCG to back check.
2/19/2021 Corrected.

***Issue #:* 103** *Status:* Resolved

Assigned: ATS *Location:* EF 102

EF 102 thermostat and fan status does not seem to be working.

1/25/2021 Posted.
2/2/2021 Corrected.

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***Issue #:* 104** *Status:* Resolved

Assigned: ATS *Location:* Culinary Arts Rm 174

Display / Control panels on Culinary Arts Hood do not seem to work.

1/25/2021 Posted.
2/10/2021 WCXG tested and controls for both the culinary room and kitchen hoods do not seem to be functioning correctly.
5/19/2021 The exhaust fans turn on from temperature control as designed but there no fan status and the MAU does not turn on when the large hood EF is on. The MAU did turn on when the smaller kitchen hood turned on. No status on the dishwasher hood fan either. Re-assigned from Delta to ATS.
6/25/2021 Resolved and verified.

***Issue #:* 105** *Status:* Resolved

Assigned: Delta/ATS *Location:* Culinary Arts Rm 174

Need start up info for Culinary Arts EF and DDC interface.

1/25/2021 Posted.
6/23/2021 Smith & Green submitted kitchen hood start-up documents.

***Issue #:* 106** *Status:* Resolved

Assigned: ATS *Location:* EF-209 and EF-107

EF-209 and EF-107 push button timers do not appear to be labeled. Timers work but there seems to be no fan status when using the push button.

1/25/2021 Posted.
2/2/2021 Corrected.

***Issue #:* 107** *Status:* Resolved

Assigned: Camano - Stanwood SD *Location:* Drying Room EF-107

Timer button is located in the very back of the room. Consider moving closer.to door so it doesn't get blocked by equipment.

1/25/2021 Posted.
2/8/2021 Recommend owner looks to see if timer button location works for them. The timer button was shown on design drawings on the back wall of the room.
6/23/2021 SCSD to issue CCD to move the button close to the door.
8/17/2021 ATS response: Working on getting Change order put together with EC to execute this work. Should be able to send that soon.
9/2/2021 Reported as corrected. WCG to back check.
9/9/2021 Resolved and verified.

***Issue #:* 108** *Status:* Resolved

Assigned: Delta *Location:* ICU-101

Condensate pump does not seem to be working.

1/25/2021 Posted.
2/12/2021 Reported as corrected, WCG to back check.
5/19/2021 Still is not working.
7/9/2021 Reported as corrected. WCG to back check.
8/20/2021 Resolved and verified.

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***Issue #:* 109** *Status:* Resolved

Assigned: Delta *Location:* ICU-303

System does not seem to be operational.

1/25/2021 Posted.
2/10/2021 Corrected.

***Issue #:* 110** *Status:* Resolved

Assigned: Delta *Location:* ICU-303

Condensate pipe installed 4 feet vertically straight up from the pump. Can the pump operate correctly under this design?

1/25/2021 Posted.
2/12/2021 WCG to Back check.
2/25/2021 WCG Verified.

***Issue #:* 111** *Status:* Resolved

Assigned: Delta *Location:* ICU-301

System heating does not seem to be working.

1/25/2021 Posted.
5/19/2021 The unit appears to be cooling only.

***Issue #:* 112** *Status:* Resolved

Assigned: Milne *Location:* Mech RM 176 EWH-102

Electric wall heater 102 does not seem to have power.

1/29/2021 Posted.
5/18/2021 Reported as corrected and WCG to back check.
5/19/2021 Resolved and verified.

***Issue #:* 113** *Status:* Resolved

Assigned: ATS *Location:* DOAU-1

Damper seems to be reading 0% on graphics when unit has full airflow of 900+ cfm.

1/29/2021 Posted.
2/2/2021 Corrected.

***Issue #:* 114** *Status:* Resolved

Assigned: Milne *Location:* Science Lab 261

Lab exhaust hood 204 does not seem to have power.

1/29/2021 Posted.
5/18/2021 Reported as corrected with power added. WCG to back check.
5/19/2021 Resolved and verified.

***Issue #:* 115** *Status:* Resolved

Assigned: BCE *Location:* Supply VAV's

Supply VAV dampers have been changed to be consistently open to offset the extremely negative building pressure rather than closing when in unoccupied mode. This is necessary but seems to not agree with SOO. OK?

2/2/2021 Posted.
2/8/2021 BCE response: This should be addressed by this control sequence on sheet M6.03 – Recommend this issue be moved to ATS issue unless this sequence is already in place and the issue persists.
2/12/2021 Refer to issue 94.

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***Issue #:* 116** *Status:* Resolved

Assigned: ATS *Location:* Roof

Roof Hood (RH-1) has motorized damper that does not appear to be wired up. There does not seem to be any SOO for it. Please provide SOO for this damper.

2/10/2021 Posted. (Damper is currently closed)

3/22/2021 Waiting for direction from BCE.

4/2/2021 Engineer's response: That is the relief for AHU-5 that serves the PAC. Essentially the motorized damper should be open when AHU-5's OSA damper is open and closed when AHU-5s OSA damper is closed.

4/5/2021 Welsh Response: Should this tie into the building pressurization strategy since we are having pressure issues?

6/25/2021 Change order in process.

9/15/2021 Reported as compete. WCG to back check.

3/11/2022 Verified corrected. One suggestion was to control the hood based on building pressure but after investigation that the hood control should be with the auditorium / stage to minimize any wind tunnel effect on auditorium entrance.

***Issue #:* 117** *Status:* Resolved

Assigned: Milne *Location:* CTE

EF-2 circuit breaker seems to trip when commanded on. EF-5 does not seem to be getting power, may be off at the disconnect.

2/10/2021 Posted.

5/18/2021 Reported as corrected by replacing relay. WCG to back check.

5/19/2021 Resolved and verified.

***Issue #:* 118** *Status:* Resolved

Assigned: Ramsett *Location:* CTE Mechanical Room

Recirculation Pump does not seem to be working. Will have a command but no status.

2/23/2021 Posted.

3/25/2021 Corrected.

***Issue #:* 119** *Status:* Resolved

Assigned: Milne *Location:* CTE

E3.11C sawdust collector emergency shutdown switch (note 10) does not seem to work. Sawdust collector switches and emergency buttons are not labeled.

2/23/2021 Posted.

5/18/2021 Reported as corrected. WCG to back check.

5/19/2021 Resolved and verified.

***Issue #:* 120** *Status:* Resolved

Assigned: Delta *Location:* North Facing Louvers / round Dampers

Most of the North facing louvers along gridline 8.2 where there are round dampers connected to them, are being blocked by long sheet metal screws and not opening. These need to be removed so the damper operates. There are at least 5 dampers in question.

4/14/2021 Posted

6/29/2021 Based on the TAB report it does appear that the dampers do function with out obstructions.

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***Issue #:* 121** *Status:* Resolved

Assigned: Delta *Location:* 3rd Floor relief air louver

There is a relief duct connected to the first louver on the attic level from the west (above classroom 341) that it appears that the backdraft damper is missing. Air is blowing freely into the building in the shared leering space 348. With the building having pressure problems it is recommended that a motorized damper gets installed in lieu of a back craft damper to help with building pressure control.

4/14/2021 Posted
6/29/2021 Damper has been ordered
8/9/2021 Reported as installed and WCG to back check.
9/9/2021 Resolved and verified.

***Issue #:* 122** *Status:* Resolved

Assigned: ATS *Location:* EF-205

It appears that EF-205 damper does not open when fan is commanded on. And the damper and fan seems to cycle every 2 minutes.

4/14/2021 Posted
4/21/2021 ATS response: Science Hood EF, I have not seen it run, I adjusted the trends to see it cycle on/off
5/12/2021 Cycling unit was 301, appears corrected.

***Issue #:* 123** *Status:* Resolved

Assigned: ATS *Location:* EF-201

It appears that EF-201damper does not open when fan is commanded on. And the damper and fan seems to cycle every 2 minutes.

4/14/2021 Posted
4/21/2021 ATS response: Science Hood EF, I have not seen it run, I adjusted the trends to see it cycle on/off
5/19/2021 Resolved and verified. Setpoints adjusted and does not cycle any more.

***Issue #:* 124** *Status:* Resolved

Assigned: ATS *Location:* EF-301

It appears that EF301 damper does not open when fan is commanded on. And the damper and fan seems to cycle every 2 minutes.

4/14/2021 Posted
4/21/2021 ATS Response: Mech/Elect room EF responding to space temperature. Temperature deadband was not correct, the unit will now enable when the room reaches setpoint and run until the space temp drops 3°F below setpoint.
5/6/2021 Appears corrected. ATS made program adjustments.

***Issue #:* 125** *Status:* Resolved

Assigned: ATS *Location:* EF-209

It appears that EF-209 is cycling on and off every 10 minutes. Please verify operation

4/14/2021 Posted
4/21/2021 ATS response: Triage room EF, I have not seen it run, it should only run when the button in the room is pressed, I adjusted the trends to see it cycle on/off
5/6/2021 The unit was actually 301 and appears corrected

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***Issue #:* 126** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler RM

DOAU-03 is missing one of the filter magnahelic pressure gauges

5/12/2021 Posted
7/1/2021 This is not a specified device for the equipment. The supplier put them in for convenience but missed.one. Non-issue.

***Issue #:* 127** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler RM

Boiler B-1 is dripping condensate at the base of the stack when running.

5/12/2021 Posted
6/29/2021 Johnson Barrow Tech on site to investigate.
8/9/2021 Reported to be repaired on 8/11/21
9/9/2021 Resolved and verified.

***Issue #:* 128** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler RM

There appears to be glycol water leaks at the chemical feed tank and at the chiller flow bypass.

5/12/2021 posted
7/1/2021 Reported as complete by contractor. WCG to back check.
9/9/2021 Resolved and verified.

***Issue #:* 129** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler RM

The back flow preventor drains (make up water) seem to be installed backwards. Water drips on the floor missing the drain pipe inlet.

5/12/2021 Posted
7/1/2021 Reported as complete by contractor. WCG to back check.
9/9/2021 Resolved and verified.

***Issue #:* 130** *Status:* Resolved

Assigned: Ramsett *Location:* Principal's office

FCU - 257 in the Principal's office does not cool with chilled water in demand.

5/12/2021 Posted
6/23/2021 Reported as Corrected and WCG to back check.
6/25/2021 Resolved and verified.

***Issue #:* 131** *Status:* Resolved

Assigned: Delta/ATS *Location:* AHU-4

The air flow meter on AHU-4 does not appear to be calibrated. When the OA damper is commanded to 0% the OA flow reads ~ 7,700 cfm. This needs to be re-checked.

5/19/2021 Posted
6/25/2021 The damper is binding inside the duct. ATS investigated the power. The installer needs to investigate the binding problem. Re-assigned from ATS to Delta.
6/29/2021 It appears that the damper is binding when it opens fully. Delta recommends that the damper be reset at 0% and limit the damper actuator at approx. 90% to avoid the binding. This appears that there will be adequate air flow for this to happen.
8/17/2021 ATS Response: Complete - Damper Actuator has been replaced to a larger size that can overcome the binding issue. WCG to Back check.
9/9/2021 Resolved and verified.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

Printed: 9/27/2023

***Issue #:* 132** *Status:* Resolved

Assigned: ATS *Location:* DOAU-6

The EF on DOAU-6 always shows as "ON" and has a manual on alarm. The fan actually is off when commanded off.

5/19/2021 Posted
6/25/2021 ATS investigating
6/28/2021 Upon testing the fire alarm shut down, the unit fans do shut down but the graphics still showed fan status ON.
9/2/2021 Reported as corrected. WCG to back check.
9/9/2021 Resolved and verified.

***Issue #:* 133** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

The kiln fans in room 181 do not have status when on. See RFI 1080 for switched receptacle direction.

5/19/2021 Posted
6/23/2021 The owner indicated that the Kiln EF do not need to tie them to the DDC. This is a non-issue.

***Issue #:* 134** *Status:* Resolved

Assigned: Ramsett *Location:* DOAU-2

DOAU-2 heat wheel is spinning even when commanded off, It appears that the pressure differentials inside the unit causes the heat wheel to spin all the time. This is causing overheating issues in the ventilation system.

6/14/2021 Posted
6/23/2021 Johnson Barrow is going to investigate on 6/28 the same day that they are doing maintenance.
6/29/2021 Johnson Barrow visited to witness the issue. JB to talk to engineer for options. Other units appear to have the same problem. Trends to be reviewed to verify which other units have the same issue.
7/1/2021 Reported as complete by contractor. WCG to back check.
8/26/2021 Resolved and verified. The JB tech increased the friction on the wheel so that it stops rotating when the motor is off.

***Issue #:* 135** *Status:* Resolved

Assigned: ATS *Location:* various spaces

There are spaces that are overheating and the morning purge does not appear to be adequate. It is recommended that in spaces that do not have mechanical cooling to have a cooling night setback the same are the occupied cooling setpoint to take advantage of the cool night time temperatures to help keep spaces from over heating in the daytime.

6/14/2021 Posted
6/23/2021 Direction is issued to ATS from the district to adjust night cooling setpoint for the systems with free cooling to be the same as occupied cooling sett point.
ATS target date week of 6/21.
7/1/2021 Response form the BCE that this is acceptable to them. Re-assigned from BCE to ATS.
8/26/2021 Resolved and verified. ATS made the adjustments to spaces that are not mechanically cooled.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

Printed: 9/27/2023

***Issue #:* 136** *Status:* Resolved

Assigned: Milne *Location:* Batting Cage restrooms / locker rooms

The exhaust fans in the batting cage restrooms are running 24/7. The mechanical schedule indicates to tie the control to the light.

6/14/2021 Posted

6/23/2021 Cornerstone to write an RFI for direction on Fan control. The fans are to operate when the lights are on.
Changed form Ramset to Milne.

12/6/2021 The owner is ok with the fans running all the time for ventilation.

***Issue #:* 137** *Status:* Resolved

Assigned: Ramset / Delta / Milne / ATS *Location:* Start-up documents

Missing start-up documents. This could possibly pose as a problem in the future regarding warranty.

6/18/2021 Posted.

2/3/2023 Many of the start-up documents were not submitted by the contractor to the commission agent. These missing documents do not affect the performance of the building. The owner should work with the contractor to obtain these documents if desired.

4/14/2023 The owner is aware of missing documents and agrees that the warranty concerns are covered in the O&M manuals. No further action needed.

***Issue #:* 138** *Status:* Resolved

Assigned: Ramset / Delta / Milne / ATS *Location:* Contractor Checklists

Contractor checklists are only partially complete. These checklists serve as a signal to move forward with functional performance testing but does not affect the performance of the equipment.

6/18/2021 Posted.

2/3/2023 Most of the contractor checklists were not submitted by the contractor to the commission agent. These missing documents do not affect the performance of the building. The owner should work with the contractor to obtain these documents if desired.

4/14/2023 The owner is aware of missing documents and agrees that these are not pertinent to close out of this project. No further action needed.

***Issue #:* 139** *Status:* Resolved

Assigned: ATS *Location:* Kennel

The kennel EF is in alarm may appear to have stopped working or status is not working.

6/25/2021 Posted

8/17/2021 Reported as complete. WCG to back check.

9/9/2021 Resolved and verified.

***Issue #:* 140** *Status:* Resolved

Assigned: ATS *Location:* Culinary Arts EF-109

EF-109 seems to show running all the time on the graphics

6/28/2021 Posted

9/2/2021 Reported as corrected. WCG to back check.

9/9/2021 Resolved and verified.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

Printed: 9/27/2023

***Issue #:* 141** *Status:* Resolved

Assigned: ATS *Location:* Exterior Lights

Exterior lights are on during the day time. They need to be put on a schedule or photocell control.

6/28/2021 Posted.
9/2/2021 Conversation between ATS & Night are ongoing how to solve this issue.
3/11/2022 Resolved and verified.

***Issue #:* 142** *Status:* Resolved

Assigned: Ramsett *Location:* Boiler room

Chilled water pump P-2 VFD is in alarm and need to be investigated.

6/28/2021 Posted
8/26/2021 Resolved and verified. JB tech Looked into ol2. Saw that it was running at 73 hz and drawing over its motor fla of 18a. I called Yasakawa to see if there were parameters we could adjust to bring amp draw down. He could only recommend going back down closer to 60hz. Motor was inverter rather with a class h insulation so it should be able to go over 60hz. I set it to 67 hz per tabs speed they needed for design. Confirmed with ats and commissioner that they had enough flow in after that adjustment was made and it looked good on their front end graphics. After that set the other drive to the same max Hertz of 67 and confirmed they were both drawing withing fla of 18a. They were drawing 16A.

***Issue #:* 143** *Status:* Resolved

Assigned: Ramsett *Location:* Cooling FCU's

While testing the condensate pump and float switch on FCUs, the fan did not stop nor the chilled water coil valve did not close but the FCU fan alarm was on the DDC after float switch was held up for 5 minutes. Per the SOO the fan should be commanded off and valve should be shut then unit should restart after float switch is no longer triggered.
There was water already in the pans and it appears that the pumps are working fine. We simulated a failure by holding up the float switch.

6/28/2021 Posted.
8/17/2021 ATS response: The Float switch is internal to the FCU...should it not shut itself down? ATS can only monitor an alarm point that is assumed to include the float switch, usually when the unit is in alarm the unit shuts down, at least is has for other types of alarms that we have seen so far, need Ramset to confirm if the Leak detector will trigger the alarm point and/or does it shut down the unit automatically.
Re-assigned from ATS to Ramset.
9/2/2021 Corrected, FCU goes into alarm after a 5min delay of the continuous activation of the leak detector. New programming implemented for the FCUs with CHW. they will shut down upon any alarm from the FCU.
WCG to backcheck.
9/9/2021 Resolved and verified.

***Issue #:* 144** *Status:* Resolved

Assigned: ATS *Location:* Control graphics

The Unoccupied override for the library is only allowing 2 minutes. This needs to be adjusted to 2 hours. This needs to be adjusted for all thermostats.

8/12/2021 Posted
9/2/2021 Reported as corrected. WCG to back check.
12/6/2021 Resolved and verified.

WCG Commissioning Issues Log - Full List by Issue Number
Stanwood / Camano SD
Stanwood HS

Printed: 9/27/2023

***Issue #:* 145** *Status:* Resolved

Assigned: Delta *Location:* IDF

ICU-201 Appears to have stopped working.

9/10/2021 Posted

3/11/2022 Resolved and verified.

***Issue #:* 146** *Status:* Resolved

Assigned: ATS *Location:* Graphics & controls

The Dashboard is not complete.

12/6/2021 Posted

3/11/2022 Resolved and verified. Installed. Action item is to student proof the display computer. Action by SCSD.

***Issue #:* 147** *Status:* Resolved

Assigned: ATS / Milne *Location:* Graphics & controls

It looks like meter on panel MH1 leg C reading is not correct. It looks like it is off by a 1000. Panel MH3 looks incorrect as well.
The boiler gas meters do not seem to be working either.

12/6/2021 Posted

4/12/2023 Resolved and verified.

***Issue #:* 148** *Status:* Resolved

Assigned: Ramsett *Location:* CTE

Shop air compressor start/stop control. The unit has to be started up by admin every day. The controls need to be re-wired correctly.

3/11/2022 Posted. The manufacturer's rep is addressing the issue. Coordination with the manufacturer's rep needs to be followed up with until resolved.

4/15/2022 Resolved and verified. Owner addressed with manufactures' rep.

Appendix 12 – O&M and Warrfanty Review Report

O&M Warranty Review Report

Project: **Stanwood Highschool**
Report Date: **2/28/23**
Reviewers: **Byron Holmstead**

O&M Versions: **Fieldhouse Div 22 & 23**
Main Building Div 22 & 23
CTE Div 22 & 23
Batting Cages Div 22 & 23

The Operations and Maintenance Manual was reviewed for compliance with contract documents as part of the commissioning process. This review is supplemental to any other reviews provided by the contractor or design team.

Issues identified and provided in this review are intended to assist the design and contractor team in providing the Owner with an O&M Manual that meets the requirements of the project documents.

Please see attached review comments and provide a return response on each issue under the column "Resolution" to assist the commissioning team.

If there are any questions regarding these review comments, please call Stuart Greenwood.

O&M Manual Review					
Project: Stanwood Highschool				Review Team: Stuart Greenwood	
Item	***Sheet/Page***	***Review Comment***	***By*:**	***Resolution***	***Check***
1.	Warranty review for 1-year requirment	Cx related equipment: All 1 year warranties included	BH	No action required.	
2.	Extended warranties	• Electric and gas water heaters 3 years – include in O&M • DDC (ATS) Supervisory Control Module requires 5-year Warranty. 3-year workstation warranty. • Boiler spec requires10-year heat exchanger & 20-year thermal shock. • Chiller has 5-year compressor warranty, • DOAS heat exchangers require 5-year warranty. • MAU only requires 1 year on heat exchanger. • AC units require 4-year motor compressor warranty.	BH	• Water heaters 3 years – included in O&M • DDC over one-year warranties not specifically mentioned but respects the warranty. • Boiler has 25 years on heat exchanger and thermal shock. • Chiller has 5-year warranty on compressors. • MAU provides 5-year warranty on heat exchanger. • Mitsubishi has 7-year warranty.	OK
3.	Extended warranties	Lighting control panel requires 10-year warranty.		Lighting warranty information seems to be in order.	OK

Appendix 13 – Owner Training Verification

Stanwood School District
Stanwood High School

Project Training Requirements*

System Description	Responsible Contractor(s)	Related Specification Section(s)	Required Training Duration	Proposed Training Date(s)	Proposed Agenda Transmitted	Attendance Sheets Transmitted	Special Training Requirements
ALL	ALL						1. Approved O&M manuals shall be used to facilitate all training sessions. 2. Training shall be per Owner-approved training agenda.
PLUMBING SYSTEMS		200000.3.03	4				
Domestic Water Piping	Ramset			6-29-21	Y	Y	
Domestic Water Heaters	Ramset			6-29-21	Y	Y	
Domestic Hot Water Pumps	Ramset			6-29-21	Y	Y	
Fixtures	Ramset			6-29-21	Y	Y	
Emergency Procedures	Ramset			6-29-21	Y	Y	
MECHANICAL SYSTEMS		200000.3.03	8				
Heating Water System	Ramset						
HHW Piping	Ramset			5-11-21	Y	Y	
Boilers	Ramset	200000.3.03	4	5-11-21	Y	Y	Manufacture Rep.
HHW Pumps	Ramset			5-11-21	Y	Y	
HHW Water Treatment	Ramset			5-11-21	Y	Y	
Emergency Procedures	Ramset			5-11-21	Y	Y	
Chilled Water System	Ramset			5-11-21	Y	Y	
CCW Piping	Ramset			5-11-21	Y	Y	
Chillers	Ramset			5-11-21	Y	Y	
CCW Pumps	Ramset			5-11-21	Y	Y	
CCW Water Treatment	Ramset			5-11-21	Y	Y	
Emergency Procedures	Ramset			5-11-21	Y	Y	
Air Distribution System	Ramset			5-14-21	Y	Y	
Air Handling Units	Ramset			5-14-21	Y	Y	
Fan Coil Units	Ramset			5-14-21	Y	Y	
VAV Terminal Units	Ramset			5-14-21	Y	Y	
Exhaust Fans	Ramset			5-14-21	Y	Y	
Fire/Smoke Dampers	Ramset			5-14-21	Y	Y	
Emergency Procedures	Ramset			5-14-21	Y	Y	
Temperature Control System	ATS	200000.3.03	8	5-12-21	Y	Y	

System Description	Responsible Contractor(s)	Related Specification Section(s)	Required Training Duration	Proposed Training Date(s)	Proposed Agenda Transmitted	Attendance Sheets Transmitted	Special Training Requirements
Architecture	ATS			5-12-21	Y	Y	
Controllers	ATS			5-12-21	Y	Y	
Components	ATS			5-12-21	Y	Y	
Sequences of Operation	ATS			5-12-21	Y	Y	
Variable Frequency Drives	ATS			5-12-21	Y	Y	
Metering / Monitoring	ATS			5-12-21	Y	Y	
Emergency Procedures	ATS			5-12-21	Y	Y	
ELECTRICAL SYSTEMS							
Interior Lighting System	Milne	260000.1.16	4	6/1/21			
Fixtures / Lamps	Milne			6/1/21	Y	Y	
Occupancy Sensors	Milne			6/1/21	Y	Y	
Daylight Harvesting System	Milne			6/1/21	Y	Y	
Low Voltage Lighting Controls	Milne			6/1/21	Y	Y	
Emergency Procedures	Milne			6/1/21	Y	Y	
Exterior Lighting System	Milne			6/1/21	Y	Y	
Fixtures / Lamps	Milne			6/1/21	Y	Y	
Exterior Lighting Controls	Milne			6/1/21	Y	Y	
Emergency Procedures	Milne			6/1/21	Y	Y	
Electrical Power System	Milne			6/1/21	Y	Y	
Switchgear	Milne			6/1/21	Y	Y	
Distribution Panels	Milne			6/1/21	Y	Y	
Transformers	Milne			6/1/21	Y	Y	
Metering	Milne			6/1/21	Y	Y	
Emergency Procedures	Milne			6/1/21	Y	Y	

Notes:

*This table is to be used for tracking purposes only; it is not part of the contract documents and may not include all specified or required training related items.

Stanwood High School
Owner Training

CORNERSTONE
General Contractors

Training Sign-In: ATS-Controls	Date: 05/12/2021
Subcontractor / Training by: ATS	Time: 11:00am

PRINTED NAME	COMPANY	INITIAL
Austin Blake	ATS	AB
JACKIE BROOKS	STANWOOD	JB
Troy Vanderschel	SCSD	TV
Byron Holmstead	WCG	BH
Cris Overland	SCSD	CO
KEVIN CROSE	SCSD	KC
STEVE Amidon	SCSD	
LIZ JAMIESON	SCSD	LJ

Comments:

Stanwood High School
Owner Training

CORNERSTONE
General Contractors

Training Sign-In: Air-Cooled Chiller	Date: 05/11/2021
Subcontractor / Training by: Ramsett - ~~CMS~~ Johnson Controls	Time: 11:00am

PRINTED NAME	COMPANY	INITIAL
Kevin Cruse	SCSD	KC
Cris Overlane	SCSD	CO
Barry Reed	SCSD	BR
Mike Woods	York / JCI	MW
Shane Andrews	CGC	~~SA~~

Comments:

CORNERSTONE
General Contractors

Project: Stanwood High School

Training Subject: Compressor

Training Contractor: Ramsett

Date: 5/10/21

NAME	COMPANY
KEVIN CRUSE	SCSD
Ross Short	SCSD
Shane Andres	CGC
Barry Reed	SCSD
Jr Tr Dustin Talbot	Rogers Machinery Co

CORNERSTONE
General Contractors

Project: Stanwood High School

Training Subject: Generator Training

Training Contractor: Milne

Date: 5/3/2021

NAME	COMPANY
Cody Richards	Cornerstone
Jacob Higgins	Cummins Inc.
Brian Berdahl	MILNE EL
Shane Anelay	CGC
Jackie Brooks	S.H.S
KEVIN CRUSE	SCSD
Barry Reed	S.C.S.D.

Stanwood High School
Owner Training

CORNERSTONE
General Contractors

Training Sign-In: HVAC Units	Date: 05/14/2021
Subcontractor / Training by: Johnson Barrow	Time: 11:00am

PRINTED NAME	COMPANY	INITIAL
Cris Overlund	SCSD	CO
Barry Reed	SCSD	B.R.
KEVIN CROSE	SCSD	KC
Dexter Charles	Johnson Barrow	DL
Robert Gelatzmayer	" "	RG
JACKIE BROOKS	SCSD	JB

Comments:

Stanwood High School
Owner Training

CORNERSTONE
General Contractors

Training Sign-In: Lighting Controls	Date: 06/01/2021
Subcontractor / Training by: Milne	Time: 8:00AM

PRINTED NAME	COMPANY	INITIAL
Troy Vanderschel	SCSD	TV
Barry Reed	SCSD	B.R.
Jackie Brooks	SCSD	JB
Mack Palmer	SCSD	M.P.
Cameron Eccles	TLG/TCG	CE
Ross Short	STHS	RS
Christine Talbot	STHS	CTD
Tom Lo/Tony	STHS	TL
Kevin Cruse	SCSD	KC

Comments:

Stanwood High School
Owner Training

CORNERSTONE
General Contractors

Training Sign-In: Low Voltage	Date: 05/17/2021
Subcontractor / Training by: Milne/Dimensional	Time: 9:00am

PRINTED NAME	COMPANY	INITIAL
Shaun Andres	CGL	SA
Nathan Hollingshead	Skyline	
Enrique Bermudez	SKYLINE	EB
Troy Vanderschel	SCSD	TV
Brian Serafini		BS
Kyle White	SCSD	KW

Comments:
21-25 JUN 21 → Skyline to have "free reign" of Bldg to complete testing.

Stanwood High School
Owner Training

CORNERSTONE
General Contractors

Training Sign-In: Water Heaters	Date: 06/29/2021
Subcontractor / Training by: Ramsett/Heater Rep.	Time: 11:00AM

PRINTED NAME	COMPANY	INITIAL
S.C. Amfour	SHS	
Todd Gunerius	SHS	
Jackie Brooks	S.H.S.	JB
Justin Stenwick	Hollabaugh Bros.	
Elisa Ludwick	SHS	
Kevin Cruse	SCSD	KC

Comments:

Appendix 14 – Post Occupancy Review

Commissioning Post Occupancy Review Report
Stanwood High School
March 10, 2022 rev1

Table of Contents

Executive Summary

Welsh Commissioning Group, the commissioning authority (CxA) for the project, conducted a post occupancy review (POR) for the facility on March 10, 2022. The purpose of the POR was to review the facility for warranty related issues prior to the expiration of the one-year warranty period. Additional goals included evaluating the general occupant satisfaction, ability to maintain space comfort and energy efficiency of the facility.

The on-site POR format included an initial meeting with the maintenance staff and occupant representatives to review the overall operation and maintenance history of the building. This was followed by a building walk through to further identify and discuss potential issues.

Based on the document reviews, building performance review and building walk-through, system diagnostics were conducted to include focused functional testing, back checks, review of control parameters and trending.

This report includes the results of POR along with action items, warranty items and lessons learned. The action items are issues that are not specifically warranty related but the owner should work to resolve these to improve the operation and maintenance of the facility. The warranty items should be turned into the contractor immediately. The lessons learned items should be passed on to project managers, the design team and contracting team as appropriate.

Meeting Minutes:

The post occupancy review began with a meeting to review the performance of the building. Attendees included representatives from the Stanwood – Camano school district (SCSD), Engineer (BCE), Architect, ATS (Controls) and WCG (Commissioning).

Introductions

- Sign In –

A	Name	Co.	Phone	Cell	E-mail
X	Liz Jamieson	SCSD	360-629-1202		ejamieson@stanwood.wednet.edu
X	Kevin Cruse	SCSD	360-629-1235	425-418-4959	kcruse@stanwood.wednet.edu
X	Chris Overland	SCSD	360-985-9878		coverland@stanwood.wednet.edu
X	Dan Stemkoski	BCE		253-922-0446	daniel.stemkoski@bceengineers.com
X	Byron Holmstead	WCG	253-856-3322	206-965-5626	byron@wcxg.com
X	Steve Broback	McGranahan Architects	253-383-3084		steve.broback@mcgranahan.com
	GC:				
	Pieter VanDamme	Cornerstone GC		360-348-3596	pieterv@cornerstonegci.com
	Shane Andrew	Cornerstone GC		425-530-3838	shanea@cornerstonegci.com
	Kelsey Lewis	Cornerstone GC		425-269-8351	kelsey@cornerstonegci.com
	Cody Richards	Cornerstone GC			codyr@cornerstonegci.com
X	Austin Blake	ATS		206.459.2644	austinb@atsinc.org

- Meeting Purpose – WSSP requirement to review status of facility prior to warranty expiration.

Building Performance Review

Review of commissioning process, commissioning report and any outstanding issues from report	Action Items
• Cx issue 15 – CO2 problems	SHS has experienced some high CO2 readings and has implemented higher rates of ventilation air to help resolve the issue. The CO2 readings appear to be accurate based on measurements. Other action may be to decrease CO2 setpoints at spot areas or open windows as necessary.
• Cx issue 95 – Chilled water make up water alarm testing.	**Ramset** to assist CxA to test alarm because glycol is involved. The test is a contract requirement.
• Cx issue 116 – Stage roof hood relief.	It was found that this roof hood damper actuator was not wired needed to be controlled. One suggestion was to control the hood based on building pressure but after investigation that the hood control should be with the auditorium / stage to minimize any wind tunnel effect on auditorium entrance. *Resolved*
• Cx issue 141 – Outside lights on during the day.	Corrected – no action needed
• Cx issue 145- MDF room (ICU-201) stopped working because	Corrected – no action needed

the space temperature was in the upper 80s.	
• Cx issue 146 – Energy usage dashboard installation-	Installed – Action item is to student proof the display computer – Action by SCSD.
• Cx issue 147 – some Energy meters do not appear calibrated.	It looks like meter on panel MH1 leg C reading is not correct. It looks like it is off by a 1000. Panel MH3 looks incorrect as well. **Milne** to investigate power meters. The boiler gas meters do not seem to be working either. **ATS** to investigate gas meters.
O&M Manuals	The architect to finalize the O&Ms and turn them over to the owner.
Review of occupant satisfaction indicators, documents	**Action Items**
• Temperature Comfort	Action plan in place to improve comfort: addressing CO2 issues is also improving comfort; adding supply air cooling to some of the upper-level zones at spring break.
• Ventilation Comfort	Action plan in place to improve comfort: addressing CO2 issues is also improving comfort
• Acoustical Comfort	Kitchen exhaust duct is in shaft is making noise. – **Cornerstone** to address, direction to be issued from **McGranahan** as deficiency notice.
• Lighting Comfort	Lights are on at night **Milne** to investigate to see why lights are on at night. Kevin Cruse sometimes drives by at night and has witnessed lights on at night with vacant building. No daytime issues.
Review of utility consumption (Energy Dashboard)	Water use has doubled in the last two billing cycles. Kevin and Chris to investigate. SCSD to monitor energy use trends for building future performance and maintenance.
Open discussion of issues that have been observed since occupancy	**Action Items**
• Cooling problems	Cooling coils being added or adding chilled water to the upper zones to supplement cooling. To be installed at spring break. The ceiling cassettes may need to be set up to run the fans as cooling demand is increased.

• FCU-204 keeps tripping off.	This needs to be addressed by **Ramset**. This may be a warranty issue since it was discovered last year and is still a problem.
• CTE furnace F-4 keeps tripping on high heat.	This needs to be addressed by **Ramset**. This may be a warranty issue since it was discovered last year and is still a problem.
• CTE shop air compressor – starting controls is not working and has to be started daily by admin.	The manufacturer's rep is addressing the issue. Coordination with the manufacturer's rep needs to be followed up with until resolved.
• CTE - shop make up air unit heaters problems.	There was a high CO warning alarm last month and units have been turned off while contractor investigates. One suggestion is to look at condensate not draining properly? **– Contractor, Design team and SCSD** to investigate solution. The units are Only on / off, and gets space too hot. Need modulation? SCSD suggests LEAD/LAG? **ATS** to incorporate to see if this helps resolve issue. **BCE** to investigate other alternatives; Damper loose linkage needs to be addressed by **contractor.**
Review of any issues associated with the maintenance and operation of the facility	
○ Access	Access Control equipment/technology functioning, however there are significant issues with the storefront doors that are being reviewed. Not a Cx issue.
○ Training effectiveness	SCSD needs more training on the fire pump system. **Cornerstone** to address this.
○ O&M Manuals - usefulness and quality	Architect to turn over final O&Ms to SCSD. WCG can send SCSD the Final report and System manual from the ALC building for interim

Building Walk Through

During the meeting and at the conclusion of the building performance review session, walk-throughs of portions of the building was conducted by all meeting attendees. These walk-throughs investigated problems discussed above and building pressure observation, and observed the energy dashboard displayed in the commons.

Lessons Learned:

During the building performance review and project walk through, various issues were noted that could be improved in future designs. These are listed below to be passed on to the project management team, designers and installing contractors as appropriate.

1. Cooling for the building seemed insufficient. Future design to accommodate cooling flexibility if building isn't supplied with AC.
2. Ventilation for the classrooms seems border line. Future design to oversize the ventilation system with no diversity *(full capacity)* is surely a good thing to consider. It appears that the ASHRAE guidelines as followed are just the right amount and does not account for *too* much diversity.
3. Make-up air for a shop space should have some modulation control to keep the space more comfortable.