

TITLE PAGE

SLOT NUMBER: BX#E6475

JOB NUMBER: 2018-612

TITLE: Oncology Center Primary Care Additions

CITY: Sequim

STATE: WA

BID DATE: 9/11/18

TIME: 3:00 PM

PLACE OF BID:

Olympic Medical Center
939 Caroline Street
Port Angeles, WA 98362

PRIOR APPROVAL:

7 Days

COST ESTIMATE:

\$7,000,000

COMPLETION DATE:

LIQUID DAMAGES:

BUY AMERICAN:

PREVAILING WAGE:

Prevailing Wage Rates Apply

DATE RECEIVED:

8/13/18

ARCHITECT:

Coates Design Architects
900 Winslow Way E., Suite 210
Bainbridge Island, WA 98110
Contact: Bob Miller Rhees

PHONE: 206-780-0876

E-Mail: bob@coatesdesign.com

MECHANICAL ENGINEER:

Sazan Group
600 Stewart Street, Suite 1400
Seattle, WA 98101
Contact: Greg Boggie

PHONE: 206-267-1700

E-Mail: gboggie@sazan.com

ELECTRICAL ENGINEER:

Sazan Group
600 Stewart Street, Suite 1400
Seattle, WA 98101
Contact: Niels Fallisgaard

PHONE: 206-267-1700

E-Mail: nfallisgaard@sazan.com

REMARK: Work consists of additions of approximately 4,000 SF to the Oncology Center and 7,900 SF addition to The Primary Care building.

****TAKE-OFF IS BASED ON MATERIAL AVAILABLE FROM DESIGN AND SPECIFICATIONS PROVED BY THE ARCHITECTS AND ENGINEERS. WE ARE UNABLE TO ACCEPT ANY LIABILITY OR RESPONSIBILITY AS TO THE ACCURACY, COUNT, OR COMPATIBILITY, OF THE MATERIALS SHOWN FOR THE ABOVE PROJECTS.*

CUSTOM SURVEYS INC. 31811 PACIFIC HIGHWAY SOUTH, #B304, FEDERAL WAY, WA 98003

PHONE; 206-768-27700 E-MAIL: CARPENTER@CUSTOMSURVEYSINC.COM

6. **Utilities and runs.** The Bidder should assume that the exact locations of any underground or hidden utilities, underground fuel tanks, and any plumbing and electrical runs may be somewhat different from any location indicated in the surveys or Contract Documents.

7. **Division of Contract Documents.** The Contract Documents may be divided into parts, divisions, and sections for convenient organization and reference. Generally, there has been no attempt to divide the Specification sections into Work performed by the various building trades, any Work by separate contractors, or any Work required for separate facilities in of phases of the Project.

C SUBSTITUTIONS

1. **Standard.** The materials, products, procedures and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality that must be met by any proposed substitution.

2. **Substitution procedure.** No substitution will be considered prior to receipt of Bids unless the Architect receives a written request for approval on the Owner's Substitution Request form for the Project, with all data requested on the form completed, at least seven (7) days prior to the date for receipt of Bids. Each such request shall be submitted with a Request for Substitution form identical to or equivalent in content to the form found in the Project Manual, and shall include the name of the material or equipment proposed to be replaced and a complete description of the proposed substitute, including drawings, cuts, performance and test data, warranty information, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the substitute would require shall be included. The proposer has the burden to prove the merit of the proposed substitute; by proposing the substitution, the Bidder represents that it has personally investigated the proposed material or product and determined that it is equal or better in all respects to that specified, that the same or better warranty will be provided for the substitution, that complete cost data, including all direct and indirect costs of any kind, has been presented, that the Contract Time will not be increased, and that it will coordinate the installation of the substitute if accepted and make all associated changes in the Work. The Architect's decision to approve or disapprove a proposed substitution shall be final. Written requests for approval shall constitute a guarantee by the Bidder that the articles or materials are in all respects, including warranty and installation, equal or superior to those specified, unless otherwise noted. To the extent the proposed substitution will require additional services by the Architect or its consultants after Bid award, the Bidder, if successful, will be required to pay the Architect or its consultants for these services at their customary hourly rates.

3. **Addendum.** If the Architect approves a proposed substitution prior to receipt of Bids, the approval will be set forth in a written Addendum. Bidders shall not rely upon approvals made in any other manner. Substitution request forms returned by the Architect are a courtesy only, and Bidders/Sub-bidders shall rely solely on substitution approvals listed in an Addenda.
4. **Post-Bid substitutions.** After the Contract has been executed, the Owner and the Architect may consider a written request for the substitution of material or products in place of those specified in the Contract Documents only under the circumstances as specified therein.

D. ADDENDA

1. **Written.** All Addenda will be written. They will be mailed, emailed, faxed delivered, and/or posted electronically with notice to those the Architect knows to have received a complete set of Bidding Documents.
2. **Copies.** Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.
3. **Verification and acknowledgment of receipt.** Prior to bidding, each Bidder shall ascertain that it has received all Addenda issued. Each Bidder shall acknowledge its receipt of all Addenda in its Bid.

1.4 BIDDING PROCEDURE

A. FORM AND STYLE OF BIDS

1. **Form.** Bids (including any required attachments) shall be submitted on forms identical to the form included with the Bidding Documents. No oral, email, or telephonic responses or modifications will be considered to be Bids.
2. **Entries on the Bid form.** All blanks on the Bid form shall be filled in by typewriter or manually in ink.
3. **Words and figures.** Where so indicated by the makeup of the Bid form, sums shall be expressed in both words and figures; in case of discrepancy between the two, *the amount written in figures shall govern and the words shall be used to determine any ambiguities in the figures*. Portions of the Bid form may require the addition of component bids to a total or the identification of component amounts within a total. In case of discrepancy between component amounts listed and their sum(s), the component amounts listed shall govern.
4. **Initial changes.** Any interlineation, alteration or erasure must be initialed by an authorized representative of the Bidder.
5. **Alternates and Unit Prices.** All requested Alternates and unit prices should be bid. The Owner reserves the right, but is not obligated, to reject any Bid on which all requested Alternates or unit

SECTION 016000 – PRODUCT REQUIREMENTS:

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Spare parts and maintenance materials.

1.2 RELATED SECTIONS

- A. Section 00 21 13 - Instructions to Bidders.
- B. Section 01 33 00 - Submittal Procedures.
- C. Section 01 60 50 - Substitution Request Form: Form to be completed and submitted to Architect for pre-bid and post-bid substitution requests.

1.3 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- D. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

PART 2 PRODUCTS

2.1 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.

2.2 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.3 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.1 SUBSTITUTION PROCEDURES

- A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- B. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Owner's Consultants for review or redesign services associated with re-approval by authorities.
- C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- D. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The Owner's Project Manager will notify Contractor in writing of decision to accept or reject request.

3.2 APPROVAL OF ALTERNATIVE & SUBSTITUTE MATERIALS AND PRODUCTS

- A. General: If a bidder or the Contractor desires approval of some material or product other than that specified, it may submit a written request for approval of the alternate or substitute item in accordance with the requirements of this Article.
 - 1. All approvals are at the discretion of the Owner and its consultants.
 - 2. Substitution Requests will not be considered unless submitted in accordance with this Article.
 - 3. Substitution Requests will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- B. Requests for Approval: Every request for approval of alternative or substitute materials or products shall be accompanied by its reference in the Contract Documents and complete catalog, technical and other information and, if applicable, samples showing comparison of physical and other pertinent characteristics as required to establish equivalence or acceptability for the proposed application.
 - 1. Where specific test results are required by the Contract Documents, the comparison data for the proposed item shall be based upon the same test methods as those specified, or be correlated to clearly demonstrate comparability.

- C. **During Bid Period:** Submit written requests on the Substitution Request Form in Section 01 60 50 for approval of alternative materials or products.
1. **All requests must be received by the Owner's Project Manager not later than ten (10) days prior to scheduled time for receipt of bids in order to receive consideration.**
 2. Bidders will be informed by addendum of additional materials and products approved for use.
 3. No other form of approval will be given during the bid period and bidders shall not rely upon any approval not incorporated into the documents in this manner.
 4. A request for substitution during the Bid Period constitutes a representation that the submitter:
 - a. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - b. Will provide the same warranty for the substitution as for the specified product.
 - c. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - d. Waives claims for additional costs or time extension which may subsequently become apparent.
- D. **After Receipt of Bid:** Submit written requests on the Substitution Request Form in Section 01 60 50 for approval of alternative materials or products. Requests for approval of substitute materials or products will not be considered except under one or more of the following conditions. With their request, the Contractor shall indicate which condition it believes applies:
1. **Unavailability:** A substitution is required because the specified item is not available due to factors beyond the control of the Contractor.
 2. **Unsuitability:** Subsequent information or changes disclose inability of the specified item to perform as intended.
 3. **Regulatory requirements:** Final interpretation of Code, regulatory requirements, safety requirements, or insurance requirements necessitates a change due to inability of the specified item to conform.
 4. **Warranty:** Manufacturer or fabricator cannot certify or warrant performance of specified item as required.
 5. **Owner's benefit:** In the judgment of the Owner's Project Manager, acceptance of the proposed substitution is clearly in the Owner's best interest because of cost, quality, or other consideration. In requesting a substitution under this clause, the Contractor shall furnish substantiation of any such reason.
- A request for substitution after receipt of Bid constitutes a representation that the submitter:
- a. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - b. Will provide the same warranty for the substitution as for the specified product.
 - c. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - d. Waives claims for additional costs or time extension which may subsequently become apparent.

- e. Will reimburse Owner and its Consultants for review or redesign services associated with re-approval by authorities.
- E. Redesign and Coordination: In making request for approval of alternative or substitute materials, the Bidder/Contractor agrees to the following.
 - 1. Bidder/Contractor will coordinate all trades including changes thereto as may be required.
 - 2. Bidder/Contractor waives all claims for additional costs which subsequently become apparent as a consequence of the substitution
 - 3. Bidder/Contractor will bear all costs related thereto, including costs of Owner's Consultants' services for redesign if deemed necessary.

END OF SECTION 016000

SECTION 016050 – SUBSTITUTION REQUEST FORM:

SUBSTITUTION REQUEST FORM
RE: SUBMITTAL NO.

We hereby submit for consideration, the following product instead of specified item for above project:

SECTION PARAGRAPH SPECIFIED ITEM

Proposed substitution: _____

Attach complete dimensional information and technical data, including laboratory tests, if applicable. Include complete information on changes to Drawings and Specifications that proposed substitution will require for its proper installation.

Submit with request all necessary samples and substantiating data to prove equal quality, performance, and appearance to-that specified. Indicate laboratory tests, if applicable. Clearly mark Manufacturer's literature to indicate equality in performance. Indicate differences in quality of materials and construction. Fill in Blanks Below:

Does the substitution affect dimensions shown on Drawings? Yes _____ No _____ If yes, clearly indicate changes.

Will the undersigned pay for change to the building design, including engineering and detailing costs caused by the requested substitution?:

What affect does substitution have on other trades, other contracts, and contract completion date?:

What affect does substitution have on applicable code requirements?

Difference between proposed substitution and specified item?:

Manufacturer's guarantees of the proposed and specified items are: Same ___ Different _____ (explain)

List the names and addresses of 3 similar projects on which product was used, date of installation, and Architect's name and address:

What is the approximate delivery time from approval of shop drawings?

What are differences in maintenance procedures?

Are spare parts and maintenance available in U.S.A.? _____ Where? (For equipment submittals)

Cost impact:

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

Undersigned attests function and quality equivalent or superior to specified items.
Submitted By:

Signature _____

Firm:

Address:

Telephone:

Signature must be by person having authority to legally bind his/her firm to the above term.

For Use by Owner:

Accepted _____

Not Accepted _____

Accepted as Noted Received Too Late _____

Received Too Late _____

END OF SECTION 016050

SECTION 004213 – BID FORM:

Bids Due: September 11, 2018
Eric Lewis, Chief Executive Officer
939 Caroline Street
Port Angeles, WA 98362

Proposal For
Olympic Medical Center
Oncology Center / Primary Care Additions

The undersigned, having carefully examined all of the Contract Documents, the site of the proposed Work, and being familiar with all of the conditions relating to the Work of the proposed project, including the availability of materials and labor, hereby proposes to furnish, within the requirements of the schedule for completion of the Work of the Project, including all labor, supervision, materials, services, equipment and warranties required for the construction or modification of the Work as indicated for the Oncology Center Addition, and to perform all Work in accordance with the Contract Documents for the stipulated sum of:

1.1 TOTAL BASIC BID

_____ DOLLARS
(_____)

Basic bid does not include Washington State Sales Tax.

1.2 TIMES FOR COMMENCEMENT AND COMPLETION

The undersigned hereby agrees to substantially complete all of the Work under the Base Bid pursuant to the terms of the contract in **360 calendar days** from Notice to Proceed.

ADDENDUM RECEIPT

Receipt of the following addenda to the Contract Documents is acknowledged:

Addendum No. 1 _____	Date _____
Addendum No. 2 _____	Date _____
Addendum No. 3 _____	Date _____

A. 1.3 NOTIFICATION

If written notice of acceptance of this bid is mailed, telegraphed or delivered to the undersigned within the time limit noted in the Instructions to Bidders after the date of bid opening, or any time thereafter before this bid is withdrawn, the undersigned will, within ten (10) days after the date of such mailing, telegraphing or delivering of such notice, execute and deliver a Contract on the Forms set forth in the Bid Documents to the Owner, together with a satisfactory Performance Bond and a satisfactory Labor and Material Payment Bond in the forms currently issued by the American Institute of Architects (or prior approved equivalent) each in an amount equal to one hundred percent (100%) of the contract sum (including Washington State Sales Tax).

The undersigned hereby designates as his office address, to which such notice of acceptance may be mailed or delivered.

1.5 BID SECURITY

Enclosed is a Bid Bond, certified check or cashier's check in the amount shown below which is at least 5% of the total bid.

_____ DOLLARS
(_____)

1.6 LABOR AND INDUSTRIES FEES

In compliance with WAC 296-127 Contractor(s) shall pay to the Department of Labor and Industries required fee with each Statement of Intent to Pay Prevailing Wages or Affidavit of Wages Paid submitted to that department for certification and these costs shall be included in their bid.

NAME OF FIRM: _____

SIGNED BY: _____

OFFICIAL CAPACITY: _____

ADDRESS: _____

CITY AND STATE: _____ ZIP: _____

DATE: _____

TELEPHONE: _____

FAX: _____

TAX I.D.#: _____

STATE OF WASHINGTON CONTRACTOR'S LICENSE NO.: _____

NOTE: If bidder is a corporation, write State of Incorporation; if a partnership, give full names and addresses of all parties below.

CAUTION: Do not include any bids for other work in the envelope.

CCPHD RESERVES THE RIGHT TO REJECT ANY BID OR ALL BIDS AND TO WAIVE ANY INFORMALITY OR IRREGULARITY IN ANY BID. ANY CONTRACT AWARDED WILL BE LET TO THE LOWEST RESPONSIVE AND RESPONSIBLE BIDDER.

END OF SECTION 004213

SECTION 230923 - DIRECT DIGITAL CONTROL SYSTEMS

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION

- A. Furnish and install a complete Building Automation System (BAS) utilizing networked Direct Digital Control (DDC) technology for control and monitoring of the building heating, ventilating and air conditioning systems as described in this specification.
- B. System shall consist of stand-alone DDC panels, sensors, automatic valves, actuators, dampers, operating software, operator training, installation labor, warranty and all other necessary material and labor to provide a complete and workable system.

1.2 SCOPE OF WORK

- A. The Building Automation System (BAS) manufacturer shall furnish and install a fully integrated building automation system, incorporating Direct Digital Control (DDC) for energy management, equipment monitoring and control, and subsystems with open communications capabilities as herein specified.
- B. Provide open communications system. System shall be capable of utilizing standard protocols as follows as well as be able to integrate third-party systems via existing vendor protocols. System shall be capable of BACnet communication according to ASHRAE standard SPC-135A/95. System shall be capable of OPC server communications according to OPC Data Access 2.0 and Alarms and Events 1.0.
- C. The installation of the control system shall be performed under the direct supervision of the controls manufacturer with the shop drawings, flow diagrams, bill of materials, component designation or identification number and sequence of operation all bearing the name of the manufacturer. The installing manufacturer shall certify in writing, that the shop drawings have been prepared by the equipment manufacturer and that the equipment manufacturer has supervised their installation. In addition, the equipment manufacturer shall certify, in writing, that the shop drawings were prepared by their company and that all temperature control equipment was installed under their direct supervision.
- D. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. All systems and components shall have been thoroughly tested and proven in actual use for at least two years.

1.3 WORK BY OTHERS

- A. The mechanical contractor shall install all pipe wells, valves, taps, dampers, flow stations and other inline pipe mounted devices. Reference mechanical specifications for additional information.

- B. The electrical contractor shall provide:
1. Motor starters and disconnects
 2. 120V power to all BAS and/or temperature control panels
 3. Installation and power wiring for Variable Frequency Drives
 4. Wiring of all power feeds through all disconnect starters to electrical motor
 5. Wiring of any remote start/stop switches and manual or automatic motor speed control devices not furnished by BAS manufacturer
 6. Duct smoke detectors including installation and hardwire interlocks to fans as required.

1.4 RELATED WORK

- A. The following related sections will provide additional coordination information related to the provision, installation and commissioning of the BAS
1. Division 01 General and Special Conditions
 2. Division 23 General Mechanical
 3. Division 26 General Electrical

1.5 QUALITY ASSURANCE

- A. The BAS system shall be designed, installed, commissioned and serviced by manufacturer-employed, factory-trained personnel. Manufacturer shall have fully dedicated Service Department facility within 100 miles of the site with technical staff, spare parts inventory and necessary test and diagnostic equipment. Distributors or licensed installing contractors that are not factory direct Branch Offices of the control system manufacturer are not acceptable.
- B. The Bidder shall be regularly engaged in the manufacturing, installation and maintenance of BAS systems and shall have a minimum of ten (10) years of demonstrated technical expertise and experience in the manufacture, installation and maintenance of BAS systems similar in size and complexity to this project. A maintained service organization consisting of at least ten (10) competent servicemen for a period of not less than ten years and provide a list of 10 projects, similar in size and scope to this project, completed within the last five years.
- C. Materials and equipment shall be the cataloged products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.
- D. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX; Standard ULC C100, category UUKL7; and under Standard UL 864, categories UUKL, UDTZ, and QVAX and be so listed at the time of bid.
- E. All floor level controllers shall comply, at a minimum, with UL Standard UL 916 category PAZX; Standard UL 864, categories UDTZ and QVAX and be so listed at the time of bid.
- F. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

- G. The BAS contractor shall provide documentation supporting compliance with ISO-9002 (Model for Quality Assurance in Production, Installation, and Servicing) and ISO-140001 (The application of well-accepted business management principles to the environment). The intent of this specification requirement is to ensure that the products from the manufacturer are delivered through a Quality System and Framework that will assure consistency in the products delivered for this project.
- H. This system shall have a documented history of backwards compatibility for a minimum of the last 5 years. Future compatibility shall be supported for no less than 10 years. Compatibility shall be defined as:
 - 1. The ability to upgrade existing field panels to current level of technology, and extend new field panels on a previously installed network.
 - 2. The ability for any existing field panel microprocessor to be connected and directly communicate with new field panels without bridges, routers or protocol converters.

1.6 SUBMITTALS

- A. Submit 5 complete sets of documentation consisting of the in the following minimum components:
 - 1. Valve and damper schedules
 - 2. Equipment data cut sheets
 - 3. System schematics, including:
 - a. Sequences of operations
 - b. Point names
 - c. Point addresses
 - d. Schematic wiring diagrams
 - e. DDC Panel layouts
 - f. BAS system riser diagrams
 - g. Auto-CAD compatible as-built drawings
- B. Upon project completion, submit operation and maintenance manuals, consisting of the following:
 - 1. Index sheet, listing contents in alphabetical order
 - 2. Updated as-builts for all items contained in the original project submittal
 - 3. Manufacturer's equipment parts list of all functional components of the system
 - 4. Auto-CAD disk of system schematics, including wiring diagrams
 - 5. Description of sequence of operations
 - 6. Operator's manuals as specified
 - 7. Trunk cable schematic showing general routing as installed
 - 8. Recommended spare parts list
 - 9. Copies of commissioning reports and system checkout logs generated by BAS contractor
 - 10. Copies of any trend data utilized in building commissioning by the BAS contractor

1.7 WARRANTY

- A. The building control system, including all hardware and software components shall be warranted for a period of one year following owner's beneficial use of system. For phased project completion, the warranty shall also commence in phases. Any manufacturing defects arising during this period shall be corrected without cost to the owner.
- B. In addition to the hardware warranty, the Contractor shall correct any software sequences that do not meet the specified sequence of operation. Modification or repairs required due to changes enacted by the owner's system operators during the warranty period will not be considered warranty items.
- C. Provide local on-line support services to allow BAS subcontractor to dial out over telephone lines to diagnose the facility's BAS in the event of system problems during the warranty period. This remote connection to the facility shall be provided within 4 hours of the time that the problem is reported during normal business hours.
- D. If the problems cannot be resolved by remote diagnostics, the BAS contractor shall provide same day, on-site response for any life safety or critical process system problems and next business day on-site response for comfort-related system problems.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. By prior agreement Olympic Medical Center's standard BAS control system is the Siemens Apogee System as provided by the local branch office of Siemens Building Technologies (425-507-4300).

2.2 GENERAL BAS CAPABILITIES

- A. The design of the BAS shall network operator workstations and stand-alone DDC Controllers. The network architecture shall consist of three levels.
 - 1. A city-wide Management Level Network (MLN) Ethernet network based on TCP/IP protocol.
 - 2. A high performance, peer-to-peer Building Level Network (BLN) and
 - 3. A distributed Floor Level Network (FLN)
- B. Access to all levels of the BAS system architecture shall be totally transparent to the user when accessing data or developing control programs.
- C. The design of BAS shall allow the co-existence of new DDC Controllers with existing DDC Controllers in the same network without the use of gateways or protocol converters.
- D. System shall have the capability to communicate with a BACnet network over Ethernet or BACnet/IP (according to Annex J).

- E. System shall have the capability to be an OLE for Process Control (OPC) Server for dynamic communication with third party systems (OPC Clients) over an Ethernet network. At a minimum, the following must be supported:
 - a. Data Access
 - b. Alarms & Events

2.3 BUILDING LEVEL NETWORK COMPONENTS (BLN)

A. STANDALONE DIRECT DIGITAL CONTROL (DDC) PANELS

1. DDC Controllers shall be a stand-alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules.
2. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point I/O schedule. Each controller shall support a minimum of three (3) Floor Level Application Specific Controller Device Networks.
3. Each DDC Controller shall have sufficient memory to support its own operating system and databases, including:
 - a. Control processes
 - b. Energy management applications
 - c. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
 - d. Historical/trend data for points specified
 - e. Maintenance support applications
 - f. Custom processes
 - g. Operator I/O
 - h. Dial-up communications
 - i. Manual override monitoring
4. Each DDC Controller shall support firmware upgrades without the need to replace hardware.
5. Provide all processors, power supplies and communication controllers so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.
6. DDC Controllers shall provide a minimum two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC Controllers shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers or terminals.
7. As indicated in the point I/O schedule, the operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points.
8. Switches shall be mounted either within the DDC Controllers key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides.

9. DDC Controllers shall monitor the status of all overrides and inform the operator that automatic control has been inhibited. DDC Controllers shall also collect override activity information for reports.
10. DDC Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.
11. Each DDC Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.
12. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with:
 - a. RF-Conducted Immunity (RFCI) per ENV 50141 (IEC 1000-4-6) at 3 V
 - b. Electro Static Discharge (ESD) Immunity per EN 61000-4-2 (IEC 1000-4-2) at 8 kV air discharge, 4 kV contact
 - c. Electrical Fast Transient (EFT) per EN 61000-4-4 (IEC 1000-4-4) at 500 V signal, 1 kV power
 - d. Output Circuit Transients per UL 864 (2,400V, 10A, 1.2 Joule max)
 - e. Isolation shall be provided at all peer-to-peer panel's AC input terminals to suppress induced voltage transients consistent with:
 - f. IEEE Standard 587-1980
 - g. UL 864 Supply Line Transients
 - h. Voltage Sags, Surge, and Dropout per EN 61000-4-11 (EN 1000-4-11)
13. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 60 days.
14. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.
15. Should DDC Controller memory be lost for any reason, the user shall have the capability of reloading the DDC Controller via the local RS-232C port, via telephone line dial-in or from a network workstation PC.

B. HVAC MECHANICAL EQUIPMENT CONTROLLERS (MEC's/PX's)

1. HVAC Mechanical Equipment Controllers (MEC's/PX's) shall be a stand- alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors.
2. Each MEC/PX shall have sufficient memory to support its own operating system and databases, including:
 - a. Control processes
 - b. Energy management applications
 - c. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
 - d. Historical/trend data for points specified

- e. Maintenance support applications
 - f. Custom processes
 - g. Operator I/O
 - h. Dial-up communications
3. Each MEC/PX shall support firmware upgrades without the need to replace hardware.
 4. MEC's/PX's shall provide a RS-232C serial data communication port for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals.
 5. MEC's/PX's shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device.
 6. Each MEC/PX shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all components. The MEC shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.
 7. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with:
 - a. RF-Conducted Immunity (RFCI) per ENV 50141 (IEC 1000-4-6) at 3 V
 - b. Electro Static Discharge (ESD) Immunity per EN 61000-4-2 (IEC 1000-4-2) at 8 kV air discharge, 4 kV contact
 - c. Electrical Fast Transient (EFT) per EN 61000-4-4 (IEC 1000-4-4) at 500 V signal, 1 kV power
 - e. Output Circuit Transients per UL 864 (2,400V, 10A, 1.2 Joule max)
 - f. Isolation shall be provided at all peer-to-peer panel's AC input terminals to suppress induced voltage transients consistent with:
 - g. IEEE Standard 587-1980
 - h. UL 864 Supply Line Transients
 - i. Voltage Sags, Surge, and Dropout per EN 61000-4-11 (EN 1000-4-11)
 8. In the event of the loss of normal power, there shall be an orderly shutdown of all MEC's to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.
 9. Upon restoration of normal power, the MEC shall automatically resume full operation without manual intervention.
 10. Should the MEC's/PX's memory be lost for any reason, the user shall have the capability of reloading the MEC/PX via the local RS-232C port, via telephone line dial-in or from a network workstation PC.

2.4 FLOOR LEVEL NETWORK (FLN) APPLICATION SPECIFIC CONTROLLERS (ASC)

- A. Each Standalone DDC Controller shall be able to extend its performance and capacity through the use of remote Application Specific Controllers (ASC's) through the Floor Level LAN Device Networks.
- B. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a

microprocessor-based, multi-tasking, real-time digital control processor. Provide the following types of ASC's as a minimum:

1. Unitary Controllers
 2. Terminal Equipment Controllers
- C. Each ASC shall be capable of control of the terminal device independent of the manufacturer of the terminal device.
- D. Unitary Controllers (UC's)
1. Provide for control of central HVAC systems and equipment including, but not limited to, the following:
 - a. Rooftop units
 - b. Packaged air handling units
 - c. Built-up air handling systems
 2. UC's shall include all point inputs and outputs necessary to perform the specified control sequences. Provide a hand/off/automatic switch for each digital output for manual override capability. Switches shall be mounted either within the controller's key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides. In addition, each switch position shall be supervised in order to inform the system that automatic control has been overridden.
 3. Each controller shall support its own real-time operating system. Provide a time clock with battery backup to allow for stand-alone operation in the event communication with its DDC Controller is lost and to insure protection during power outages.
 4. All programs shall be field-customized to meet the user's exact control strategy requirements.
 5. Programming of UC's shall utilize the same language and code as used by DDC Controllers to maximize system flexibility and ease of use. UC's that utilize a different control language or programming interface software shall not be acceptable and Standalone DDC Controllers shall be provided to meet the specified functionality.
 6. Each controller shall have connection provisions for a portable operator's terminal. This tool shall allow the user to display, generate or modify all point databases and operating programs.
 7. The terminal shall provide the user with the following functionality as a minimum:
 - a. View and set date and time
 - b. Modify and override time-of-day schedules
 - c. View points and alarms
 - d. Monitor points
 - e. Command and modify setpoints
 8. Should the system controller be unable to interface to a door-mounted terminal, provide a laptop or similar terminal at the controller, or provide a DDC Controller with a door-mounted or local terminal in lieu of the system controller in order to meet the specified minimum functionality.
- E. Terminal Equipment Controllers (TEC's)

1. Provide for control of each piece of equipment, including, but not limited to, the following:
 - a. Variable Air Volume (VAV) boxes
 - b. Fan Powered Constant Air Volume (FPCVT) boxes
 - c. Unit Conditioners
 - d. Heat Pumps
 - e. Unit Ventilators
2. The Terminal Equipment Controller (TEC) shall interface to the BAS on a LAN communications network originating at the Standalone DDC panel. An individual controller shall be provided for each terminal unit. The terminal controller must be listed by Underwriters Laboratory under UL 916 PAZX and UL 864 UDTZ.
3. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. Analog outputs shall be industry standard signals such as 24V floating control, 3-15 psi pneumatic, or 0-10vdc allowing for interface to a variety of modulating actuators.
4. All controller sequences and operation shall provide closed loop control of the intended application. Closing control loops over the FLN, BLN or MLN is not acceptable.
5. For VAV boxes, the BAS contractor shall furnish the terminal controller (controller, damper motor, flow transducer) to the terminal unit manufacturer for factory mounting. Costs associated with factory mounting of terminal controller shall be covered by terminal unit manufacturer. The terminal box manufacturer shall provide an averaging air velocity sensor suitable for interfacing with the TEC's differential pressure transducer.
6. The controller shall include a differential pressure transducer that shall connect to the terminal unit manufacturer's standard averaging air velocity sensor to measure the average differential pressure in the duct. The controller shall convert this value to actual airflow. Single point air velocity sensing is not acceptable. The differential pressure transducer shall have a measurement range of 0 to 4000 fpm (0 to 20.4 m/s) and measurement accuracy of $\pm 5\%$ at 400 to 4000 fpm (2 to 20 m/s), insuring primary air flow conditions shall be controlled and maintained to within $\pm 5\%$ of setpoint at the specified parameters. The BAS contractor shall provide the velocity sensor if required to meet the specified functionality.
7. Each controller shall include provisions for manual and automatic calibration of the differential pressure transducer in order to maintain stable control and insuring against drift over time. Calibration shall be accomplished by stroking the terminal unit damper actuator to a 0% position so that a 0 cfm air volume reading is sensed. The controller shall automatically accomplish this whenever the system mode switches from occupied to unoccupied or vice versa. Manual calibration may be accomplished by either commanding the actuator to 0% via the POT or by depressing the room sensor override switch. Calibration of the transducer at the controller location shall not be necessary.
8. Each TEC shall be accessible for purposes of control and monitoring from a central or remote operator's terminals as specified herein.
9. TEC damper actuator shall be of the 24 VAC floating-point type. Upon power loss, the actuator maintains its current damper position. Position status is shown in percentage open notation.
10. TEC room temperature sensor shall come complete with a terminal jack and programmable override switch integral to the sensor assembly. The terminal jack shall be used to connect the portable operators terminal to control and monitor all hardware and software points associated with the terminal unit. A terminal jack may be alternatively located on a stainless steel wall plate mounted adjacent to the sensor. An override switch shall initiate override of the night setback or unoccupied mode to normal operation when activated. A

thumbwheel-type temperature setpoint dial shall also be provided with 1 Deg F temperature increments. Override switch and temperature setpoint functions may be locked out, canceled or limited as to time or temperature via software.

11. TEC's for VAV or CV applications shall be provided with integral differential pressure transducer capable of accepting an average airflow measurement signal from the terminal box averaging air velocity sensor. The value is converted through a square root function to average airflow by the TEC.
12. TEC control valve electronic actuators shall mount on the valve body and provide complete modulating control of the valve. Valve body shall separate from actuator for servicing without requiring any special tools or electrical connections. The actuator shall be of the floating control point type.
13. TEC wiring terminal bars are to be detachable type allowing quick serviceability of the electronic controller hardware without removal of the existing wiring.

2.5 FIELD DEVICES

A. TEMPERATURE SENSORS

1. All temperature sensors shall be solid state electronic, employing a resistance type output. Room and zone temperature sensors may be thermistor type. All duct sensors shall be rigid or flexible probe, averaging RTD-type sensors. All duct mixed air sensors shall be flexible averaging RTD-type sensors with sensor element length suitable for complete duct coverage. Pipe sensors shall be RTD-type. Provide outside air temperature sensors with watertight inlet fitting and sunlight shield.
2. All single point sensors shall be accurate to a minimum of ± 0.5 degrees F at 77 degrees F calibration point. Duct averaging sensors shall be accurate to a minimum of ± 1.0 degrees F.

B. CONTROL DAMPERS

1. Provide low leakage, galvanized steel control dampers with roll-formed steel frames and blades and oil-impregnated bronze bearings. Dampers shall have blade seals and stops, equal to Ruskin CD36.
2. Leakage shall be no greater than 10 CFM per square foot at 4 in. W.C. with 20 in.-lbs. torque applied regardless of size.
3. Provide opposed blade type dampers unless indicated otherwise. All multi-section dampers shall be provided with factory linkage to allow for connection of actuator at one common point.

C. DAMPER ACTUATORS (ELECTRONIC)

1. Actuators shall be designed for mounting directly to the damper shaft without the need for connecting linkages.
2. All actuators having more than 100 in-lb torque output shall accept a 1" diameter shaft directly without the need for auxiliary adapters and shall have a self-centering damper shaft clamp that guarantees concentric alignment of the actuator's output coupling with the damper shaft.

3. All actuators shall be designed to withstand a continuous stall condition throughout the full range of rotation without premature failure, or degradation in performance. The actuator shall resume normal operation once the stall condition has been eliminated.
4. All spring return actuators shall be capable of both clockwise or counterclockwise spring return fail-safe operation and shall use a continuously engaged mechanical return spring that returns the actuator to a fail-safe position in response to a loss of power.
5. Actuators shall provide a means of manually positioning the output coupling in the absence of power.
6. Actuators shall not require more than 10VA power draw at anytime.
7. Modulating actuators shall be capable of accepting a 0-10Vdc, 4-20ma or floating point control signal and shall provide an easily readable high contrast position indicator.
8. All actuators shall be UL873 listed.

D. CONTROL VALVES

1. Modulating Valves 2" and Smaller: Bronze body and seat with stainless steel stem and screwed ends. ANSI Class 250 body rating. Suitable for fluid temperatures of up to 300 degrees F. Equal percentage flow characteristics capable of smooth operation at differential pressures present in system. Landis & Gyr Powers VE VVG/VXG 44, VE698, Flowrite VE598 or approved equal.
2. Modulating Valves 2-1/2" and Larger: Cast iron body with bronze trim and stainless steel stem and flanged ends. ANSI Class 125 body rating. Suitable for fluid temperatures of up to 300 degrees F. Equal percentage flow characteristics capable of smooth operation at differential pressures present in system. Landis & Gyr Powers Flowrite VE598 or approved equal.
3. Sizing: Modulating control valves shall be correctly selected for service and flow of system served. A pressure drop of 5 psi shall be used as a sizing guideline unless specifically noted otherwise in project documents. Two position shutoff valves shall be line size.

E. VALVE ACTUATORS

1. All modulating valve actuators shall be 24vac electric motor type; floating point, 0-10Vdc, 0-16Vdc or other industry standard input signal type. Actuators shall function properly within the range of 85 to 110 percent of linevoltage.
2. Provide actuators in sufficient size, quantity and type to match application.
3. All valve actuators for steam applications shall be mounted at a 45 degree offset from vertical to avoid heat damage to actuator.
4. Actuators shall be spring return as indicated by Normally Closed or Normally Open designation on drawings or in sequence of operation.

F. LOW TEMPERATURE DETECTION THERMOSTATS

1. Provide low temperature control thermostat, electric type manual reset, non- averaging 20 feet long sensing elements that switch whenever any 6 inch section or more of any portion senses a temperature as low as the thermostat setpoint as specified in sequences.
2. Provide with two sets of contacts, one for hardwired fan shutdown and one for remote monitoring.
3. Powers ET141 or approved equal.

G. DIFFERENTIAL PRESSURE SWITCHES

1. Provide air and liquid differential pressure switches for status of pumps and fans as called out in sequences and input/output summary.
2. Diaphragm-operated SPDT snap switch with ranges from .05" W.G to 12.0" W.G. for air. Airflow switch shall be Powers SW141 or approved equal.
3. Liquid switch shall be PENN P74 or equal.

H. CURRENT SENSING RELAYS

1. Provide current sensing relays for status of fans or pumps as called out in sequences or input/output summary. Provide with field adjustable current setpoint range.
2. Veris, Nielsen-Kuljian or approved equal.

I. DUCT STATIC OR VELOCITY PRESSURE TRANSMITTERS

1. Provide integral pressure transducer and transmitter in enclosure suitable for external duct mounting. 4-20ma output proportional to the input pressure span.
2. Transmitter range shall be selected so that the normal operating setpoint is midway between the upper and lower range of the transmitter.
3. Each transmitter shall have field adjustable span and zero adjustments for field calibration. Accuracy $\pm 1.0\%$ of full scale. Linearity $\pm 0.1\%$. Setra, Ashcroft or approved equal.

J. BUILDING STATIC PRESSURE TRANSMITTERS

1. Provide integral pressure transducer and transmitter in enclosure suitable for wall or panel mounting. 4-20ma output proportional to the input pressure span.
2. Transmitter range shall be selected so that the normal operating setpoint is midway between the upper and lower range of the transmitter. Transmitter range shall be unidirectional.
3. Each transmitter shall have field adjustable span and zero adjustments for field calibration. Accuracy $\pm 1.0\%$ of full scale. Linearity $\pm 0.1\%$. Setra, Ashcroft or approved equal.

K. LIQUID OR STEAM PRESSURE TRANSMITTERS

1. Provide integral pressure transducer and transmitter in enclosure suitable for exposed mechanical room or panel mounting. 4-20ma output proportional to the input pressure span.
2. Internal components shall be selected appropriate for the sensed medium taking temperature, pressure, corrosive properties and medium consistency into account.
3. Transmitter range shall be selected so that the normal operating setpoint is midway between the upper and lower range of the transmitter. Transmitter shall be rated for a minimum of 125% of maximum expected system operating pressures.
4. For differential pressure sensing applications, provide transmitter unit with 3- valve manifold to allow unit to be serviced without draining system. For steam applications, provide a coiled tubing loop between the pressure sensing tap and the transmitter.
5. Each transmitter shall have field adjustable span and zero adjustments for field calibration. Accuracy $\pm 1.0\%$ of full scale. Linearity $\pm 0.1\%$. Ashcroft, Robinson-Halpern, Johnson-Yokogawa, Rosemount or approved equal.

L. STEAM OR LIQUID PRESSURE TRANSMITTERS

1. Provide strain gauge sensing with 4-20ma transmitter output linearly scaled to the pressure being sensed. Transmitter range shall be selected so that the normal operating setpoint is midway between the upper and lower range of the transmitter.
2. Each transmitter shall have field adjustable span and zero adjustments for field calibration. Transmitter accuracy shall be $\pm 0.25\%$ of calibrated span including the combined effects of linearity, hysteresis and repeatability. Units shall be provided with a watertight NEMA Type 4 electrical enclosure with $\frac{1}{2}$ " NPT conduit connection. Provide Robinson-Halpern, Ashcroft, Rosemount or approved equal.
3. For steam applications, provide a coiled tubing loop between the pressure sensing tap and the transmitter.

M. PRESSURE SAFETY SWITCHES

1. Provide static pressure high limit switches as required by sequence of operation to sensing duct over pressure condition. Provide with adjustable setpoint. Provide with spare contacts for monitoring by DDC system.
2. Switch shall be suitable for duct mounting. Dwyer Series 3000, Ashcroft or approved equal.

N. CARBON DIOXIDE SENSOR

1. Provide Non-Dispersive Infra-Red (NDIR) carbon dioxide sensor suitable for room mounting. 4-20ma output signal corresponding to input CO₂ concentration.
2. Range 0-2000 PPM. Accuracy $\pm 3\%$ of full scale. Repeatability $\pm 1\%$ of full scale. Valtronics Model 2089 or approved.
3. Provide with a complete field calibration kit for initial startup including a CO₂ canister.

2.6 CARBON MONOXIDE SENSOR

1. Provide single channel, solid-state sensor capable of generating a 4-20ma signal corresponding to carbon monoxide levels of 0-500 PPM. Calibrated for typical CO levels of 50-100 PPM.
2. Sensing element shall be rated for a minimum of 2 years of service and shall be completely field replaceable.
3. Suitable for temperature ranges of 32-120 degrees F. Accuracy $\pm 3\%$ of full scale. repeatability $\pm 1\%$ of full scale. QEL, MSA or approved equal.

2.7 REFRIGERANT DETECTOR

1. Provide self-contained R-410 refrigerant vapor detector capable of detecting hazardous gas levels. Provide with alarm contacts for 2 separate concentration levels as indicated. Self-contained unit shall also be provided with local audible and visual alarm indication based on preset alarm levels.
2. Provide QEL model QAS-10128 or approved equal.

2.8 DUCT AIRFLOW MEASURING STATIONS

1. Provide as indicated on floor plans for measuring air flow quantities through duct. Station shall consist of multiple insertion-type, Pitot tube probes designed to measure both the static and total pressures of the air in the duct and transmit a differential (velocity) pressure signal. Probes shall be installed across the entire width of the duct.
2. When more than one probe is required, provide 1/4" copper tube averaging manifolds for both sensing ports.
3. Accuracy $\pm 5\%$. Range 0-2500 FPM, minimum. Air Monitor Voluprobe/VS or approved equal.

B. HUMIDITY SENSORS

1. Combination sensor/transmitter measuring resistance change through bulk polymer sensor with accuracy at 77 degrees F of $\pm 2\%$ RH between 20-95% RH including hysteresis, linearity and repeatability.
2. Output shall be 4-20mA, 2-wire, isolated loop powered, 0-100% linearly proportional.
3. Provide duct or outside air sensors complete with element guard and mounting plate.

C. DUCT SMOKE DETECTORS

1. Detectors shall be photoelectric or ionization type for sensing products of combustion within the airstream of ducted fan systems over 2000 cfm. Provide detector with sampling tube extending the width of the duct to provide a complete cross-sectional sampling. Visual indication of trouble or alarm condition shall be provided on the detector housing. An auxiliary set of contacts shall be provided for remote monitoring purposes.

D. LIQUID OR STEAM FLOWMETERS

E. INTERPOSING RELAYS

1. Track mounted SPDT relays (or as required) for all interposing applications.
2. IDEC or approved equal.

F. LEVEL SWITCHES

1. Provide single stage displacer-type level switch suitable for mounting at top of tank or sump. Displacer element shall be porcelain or stainless steel and shall slide up and down a stainless steel displacer cable as liquid level fluctuates. Displacer movement above or beyond designated level setpoint(s) shall actuate a pivoted magnet and trip an associated electric switch indicating a high or low level condition.
2. Provide NEMA 4 switch enclosure for mounting at top of level switch. Provide with flanged or threaded connection as appropriate.
3. Provide 2 sets of dry contacts within switching enclosure for remote level indication. For applications requiring switching of 120v motors, provide mercury switch suitable for application. Entire unit shall be FM approved.

G. DAMPER END SWITCHES

H. VARIABLE SPEED DRIVES

1. Consult Siemens or equipment reps for job-specific VSD specifications.
2. Manufacturer: Graham, ABB, Robicon, Square D or approved equal. If the facility has existing drives, it is preferred that new drives be by the same manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide and install devices, relays, switches, thermostats, sensors, dampers, conduit, wiring, and tubing to provide a complete temperature regulation and control operation system. All wiring shall be run in concealed areas where possible. Where necessary to be exposed it shall be installed in a workmanlike manner.
- B. Contractor is responsible for providing a complete and operational system as called out in the sequence of operation and/or in the input/output summary and/or the mechanical/electrical drawings for this project. Any item referenced in one part of the system documentation but not listed elsewhere shall be covered under contractors pricing (i.e. damper called out in sequence but not indicated on drawings).

3.2 SEQUENCE OF OPERATION

A. GENERAL

1. All setpoints, limits, etc. shall be adjustable through the central CPU or the laptop computer connected to the system.

3.3 GRAPHICS SCREENS

- A. Contractor shall create graphics for each discrete mechanical system controlled by the BAS. These graphics shall include the following types of systems at a minimum:
 1. Building Floor Plans Indicating Zone Temperatures
 2. Air Handling Units
 3. Building Terminal Units (VAV, CV, Fan Powered, CV Heating Coils, etc)
 4. Zone Coils
 5. Air Terminal Units
 6. Air Handling Units and Make-up Air Units
 7. Main Exhaust Fans
 8. Building Floor Plan

3.4 INPUT/OUTPUT SUMMARY

- A. See drawings.

3.5 START-UP AND COMMISSIONING

- A. Upon completion of the installation, the contractor shall initiate operation of the control system and perform all necessary testing and diagnostics to ensure proper operation. A formal commissioning procedure shall be utilized to insure complete system integrity and conformance to these specifications. This procedure shall consist of two separate steps incorporating point verification and program verification. Commissioning forms shall address all field devices, field controllers, software statements, and software points. The EMCS vendor will submit for approval a written testing procedure indicating how each of these steps will be accomplished at least two weeks prior to the start of the commissioning process.
- B. Verify correct installation and wiring of all points.
- C. Prior to commissioning the system, submit for approval Point Verification Commissioning Forms listing all points for the system. At a minimum, the forms will identify the following information for each point:
 - 1. Point name.
 - 2. Point descriptor.
 - 3. Point type (analog/digital, input/output).
 - 4. Point address.
 - 5. Correct installation check-off.
 - 6. Correct point to point wiring check-off.
 - 7. Command and verify check-off.
 - 8. Signature and date that point startup has been completed.
 - 9. Displayed value of point for owner acceptance.
 - 10. Actual measured value of point for owner acceptance.
 - 11. Confirmation that displayed and measured point value are equal.
 - 12. Signature and date that owner has accepted point.
- D. Confirm that all devices are installed correctly. Verify that terminations are tight and of correct polarity. Document and signoff the results on Point Verification form.
- E. Verify that all points are wired to the correct termination block at the control panel by verifying continuity between the device and the panel termination. Document and signoff results on Point Verification form.
- F. Command all digital output points on and off and confirm proper operation of the associated output device. Command all analog output points to various levels within their range and confirm proper operation of the associated output device. Activate all digital input sensors and confirm proper point status at the panel. Measure conditions at all analog input sensors with an independent reference device, calibrate as required, and confirm proper point status at the panel. Document and signoff the results on Point Verification form.
- G. Provide signed off Point Verification commissioning forms to mechanical engineer and owner prior to owner acceptance walkthrough.
- H. Upon completion of startup and testing of each step, an acceptance test in the presence of the owners representative, and/or the Project Manager shall be performed. Deficiencies revealed by failed test(s) shall be repaired and corrected and the test(s) repeated until successful.

- I. Provide completed Point Verification commissioning forms to mechanical engineer and owner.
- J. Verify correct execution of all sequence of operations.
- K. Prior to commissioning system, submit for approval Program Verification Commissioning Forms listing all sequences of operations for all controlled equipment and all subset sequences required to perform each sequence of operation. At a minimum, the forms will identify the following information for each sequence.
 - 1. Equipment tag.
 - 2. Shop drawing number.
 - 3. Program file name.
 - 4. Sequence of operations description and specific individual steps required in sequence.
 - 5. Cabinet number.
 - 6. Programming code lines.
 - 7. Signature and date that sequences have been tuned and are operating correctly.
 - 8. Signature and date that owner has accepted sequence.
- L. Verify that each sequence performs as specified in contract documents. Tune each loop as required for proper operation.
- M. Document and signoff the results on Program Verification form.
- N. Provide signed off Program Verification commissioning forms to mechanical engineer and owner prior to owner acceptance walkthrough.
- O. Upon completion of startup and testing of each step, an acceptance test in the presence of the owners representative, and/or the Project Manager shall be performed.
- P. Deficiencies revealed by failed test(s) shall be repaired and corrected and the test(s) repeated until successful.
- Q. Include completed Program Verification commissioning forms in the as-built / O&M documentation.

3.6 OUTSIDE COMMISSIONING AGENT

- A. Contractor is required to provide a completely installed and commissioned DDC control system as outlined in previous portions of this specification.
- B. At the Owner's option an outside commissioning agent may be retained to insure mechanical system compliance with specifications. The control system contractor shall have the following responsibilities under the scope of this contract:
 - 1. Provide submittal and/or as-built documentation.
 - 2. Participate in specified job acceptance test with owner's representative.
 - 3. Provide specified owner training.
 - 4. Perform all system startup and commissioning procedures as required and described previously by the specification.

5. Respond to project punch list and correct any system deficiencies.

C. Any additional training, documentation, software, on-site or modem assistance, system functionality or general project management required in support of a commissioning process not specified as part of the Contract Documents shall be considered work outside of this contract.

3.7 ELECTRICAL WIRING AND MATERIALS

A. Power and signal circuits routed through the building shall be enclosed in suitable raceways provided and installed by the BAS contractor or installed with properly supported, plenum-rated cable as noted below. For applications requiring conduit, EMT shall be used wherever practical and permitted by code.

B. In any accessible mechanical space, all wiring that is susceptible to damage in any way, or is accessible by reach in any direction up to a height of eight feet (8') shall be in conduit until such time that it is routed out of the space, out of reach, or above a height of eight feet. This applies to low voltage *and* communication wiring as well as wiring terminating at controllers and devices.

C. Maintain the conduit sizing, codes, and standards per the project specifications. Upon leaving conduit, low voltage or communication wiring shall be plenum rated cable and shall be bundled in a neat and orderly fashion and secured perpendicular or parallel to gridlines with permanent fasteners and utilizing common bundles where possible. A "mechanical space" is defined as *any* space containing mechanical equipment.

D. Size conduit for a maximum of 40% fill, minimum conduit size shall be 3/4" unless noted otherwise. Conduit serving a single device can be 1/2".

E. Plenum cable: Plenum cable is permissible in the following installations:

1. Data trunk serving terminal unit controllers
2. Sensor and control wire installed above suspended ceilings
3. Wiring installed in building data communication cable trays
4. Plenum cable shall be UL approved cable for use in air handling plenums (i.e. Teflon coated or mineral insulated wire). All plenum cable shall be securely supported and supported directly from the structure. Install parallel to building elements. All vertical runs shall be plumb.
5. Coverplates: Provide blank finished coverplates where required on junction or pullboxes. Finish shall be consistent with surrounding room decor and approved by the Architect.
6. Raceways and wiring systems shall be supported from the structure, not from mechanical equipment, mechanical ductwork, suspended ceilings or other building elements.
7. Provide electrical wall box and conduit sleeve for all wall mounted devices.

3.8 OWNER TRAINING

A. The contractor shall provide to the Owner two (2) copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system.

- B. The contractor shall instruct the owner's designated representatives in these procedures during the start-up and test period. The instruction shall consist of two separate training components: on-site, project specific training and off- site factory training.
- C. On-site training shall consist of a minimum of four (4) full days (32 hours total) of training performed by an engineer familiar with the specific design of the system provided for this project. On-site training shall be separated into an initial two (2) day session that will occur at or prior to building completion and a second two (2) day session that will occur 1-2 months after building completion. The instructions shall consist of both hands-on and classroom training at the jobsite and shall be open to up to 6 owner personnel. All training shall be held during normal working hours of 8:00 am to 4:30 PM weekdays.

END OF SECTION 230923

SECTION 230923.12 - CONTROL DAMPERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes control dampers and actuators for DDC systems.
- B. Related Requirements:
 - 1. Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.

1.3 DEFINITIONS

- A. DDC: Direct-digital control.
- B. RMS: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
 - 1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
 - 3. Product description with complete technical data, performance curves, and product specification sheets.
 - 4. Installation instructions, including factors affecting performance.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For control dampers to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASME Compliance: Fabricate and label products to comply with ASME Boiler and Pressure Vessel Code where required by authorities having jurisdiction.
- C. Ground Fault: Products shall not fail due to ground fault condition when suitably grounded.
- D. Environmental Conditions:
 - 1. Provide electric control-damper actuators, with protective enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Electric control-damper actuators not available with integral enclosures, complying with requirements indicated, shall be housed in protective secondary enclosures.
- E. Selection Criteria:
 - 1. Control dampers shall be suitable for operation at following conditions:
 - a. Supply Air: Min 2000 ft/min., 55 deg F to 100 deg F.
 - b. Return Air: Min 2000 ft/min., 55 deg F to 100 deg F.
 - c. Outdoor Air: 40 deg F to 120 deg F.
 - d. Mixed Air: 55 deg F to 100 deg F.
 - e. Exhaust Air: 55 deg F to 100 deg F.
 - 2. Fail positions unless otherwise indicated:
 - a. Supply Air: Open.
 - b. Return Air: Open.
 - c. Outdoor Air: Close.
 - d. Mixed Air: Open.
 - e. Exhaust Air: Close.
 - 3. Dampers shall have stable operation throughout full range of operation, from design to minimum airflow over varying pressures and temperatures encountered.
 - 4. Two-position dampers shall be full size of duct or equipment connection unless otherwise indicated.

2.2 RECTANGULAR CONTROL DAMPERS

A. General Requirements:

1. Unless otherwise indicated, use parallel blade configuration for two-position control, equipment isolation service, and when mixing two airstreams. For other applications, use opposed blade configuration.
2. Factory assemble multiple damper sections to provide a single damper assembly of size required by the application.
3. Damper actuator shall be factory installed by damper manufacturer as integral part of damper assembly. Coordinate actuator location and mounting requirements with damper manufacturer.

B. Rectangular Dampers with Aluminum Airfoil Blades:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Ruskin Company.
 - b. Greenheck Fan Corporation
 - c. Nailor Industries
2. Performance:
 - a. Leakage: AMCA 511, Class 1A. Leakage shall not exceed 3 cfm/sq. ft. against 1-in. wg differential static pressure.
 - b. Pressure Drop: 0.05-in. wg at 1500 fpm across a 24-by-24-inch damper when tested according to AMCA 500-D, figure 5.3.
 - c. Velocity: Up to 6000 fpm.
 - d. Temperature: Minus 40 to plus 185 deg F.
 - e. Pressure Rating: Damper close-off pressure equal to fan shutoff pressure with a maximum blade deflection of 1/200 of blade length.
 - f. Damper shall have AMCA seal for both air leakage and air performance.
3. Construction:
 - a. Frame:
 - 1) Material: ASTM B 211, Alloy 6063 T5 extruded-aluminum profiles, 0.07 inch thick.
 - 2) Hat-shaped channel with integral flange(s). Mating face shall be a minimum of 1 inch.
 - 3) Width not less than 5 inches.
 - b. Blades:
 - 1) Hollow, airfoil, extruded aluminum.
 - 2) Parallel or opposed blade configuration as required by application.
 - 3) Material: ASTM B 211, Alloy 6063 T5 aluminum, 0.07 inch thick.
 - 4) Width not to exceed 6 inches.

- 5) Length as required by close-off pressure, not to exceed 48 inches.
- c. Seals:
- 1) Blades: Replaceable, mechanically attached extruded silicone, vinyl, or plastic composite.
 - 2) Jams: Stainless steel, compression type.
- d. Axles: 0.5-inch- diameter plated steel, mechanically attached to blades.
- e. Bearings:
- 1) Molded synthetic or stainless-steel sleeve mounted in frame.
 - 2) Where blade axles are installed in vertical position, provide thrust bearings.
- f. Linkage:
- 1) Concealed in frame.
 - 2) Constructed of aluminum and plated steel.
 - 3) Hardware: Stainless steel.
- g. Transition:
- 1) For round and flat oval duct applications, provide damper assembly with integral transitions to mate to adjoining field connection.
 - 2) Factory mount damper in a sleeve with a close transition to mate to field connection.
 - 3) Damper size and sleeve shall be connection size plus 2 inches.
 - 4) Sleeve length shall be not less than 12 inches for dampers without jackshafts and shall be not less than 16 inches for dampers with jackshafts.
 - 5) Sleeve material shall match adjacent duct.

2.3 GENERAL CONTROL-DAMPER ACTUATORS REQUIREMENTS

- A. Actuators shall operate related damper(s) with sufficient reserve power to provide smooth modulating action or two-position action and proper speed of response at velocity and pressure conditions to which the damper is subjected.
- B. Actuators shall produce sufficient power and torque to close off against the maximum system pressures encountered. Actuators shall be sized to close off against the fan shutoff pressure as a minimum requirement.
- C. The total damper area operated by an actuator shall not exceed 80 percent of manufacturer's maximum area rating.
- D. Provide one actuator for each damper assembly where possible. Multiple actuators required to drive a single damper assembly shall operate in unison.
- E. Avoid the use of excessively oversized actuators which could overdrive and cause linkage failure when the damper blade has reached either its full open or closed position.

- F. Use jackshafts and shaft couplings in lieu of blade-to-blade linkages when driving axially aligned damper sections.
- G. Provide mounting hardware and linkages for connecting actuator to damper.
- H. Select actuators to fail in desired position in the event of a power failure.

2.4 ELECTRIC AND ELECTRONIC ACTUATORS

- A. Manufacturer:
 - 1. Siemens
 - 2. Belimo.: GK series.
- B. Type: Motor operated, with or without gears, electric and electronic.
- C. Voltage:
 - 1. Voltage selection is delegated to professional designing control system.
 - 2. Actuator shall deliver torque required for continuous uniform movement of controlled device from limit to limit when operated at rated voltage.
 - 3. Actuator shall function properly within a range of 85 to 120 percent of nameplate voltage.
- D. Construction:
 - 1. Less Than 100 W: Fiber or reinforced nylon gears with steel shaft, copper alloy or nylon bearings, and pressed steel enclosures.
 - 2. 100 up to 400 W: Gears ground steel, oil immersed, shaft-hardened steel running in bronze, copper alloy, or ball bearings. Operator and gear trains shall be totally enclosed in dustproof cast-iron, cast-steel, or cast-aluminum housing.
 - 3. Greater Than 400 W: Totally enclosed reversible induction motors with auxiliary hand crank and permanently lubricated bearings.
- E. Field Adjustment:
 - 1. Spring return actuators shall be easily switchable from fail open to fail closed in the field without replacement.
 - 2. Provide gear-type actuators with an external manual adjustment mechanism to allow manual positioning of the damper when the actuator is not powered.
- F. Two-Position Actuators: Single direction, spring return or reversing type.
- G. Modulating Actuators:
 - 1. Capable of stopping at all points across full range, and starting in either direction from any point in range.
 - 2. Control Input Signal:

- a. Three Point, Tristate, or Floating Point: Clockwise and counter-clockwise inputs. One input drives actuator to open position, and other input drives actuator to close position. No signal of either input remains in last position.
- b. Proportional: Actuator drives proportional to input signal and modulates throughout its angle of rotation. Suitable for 2- to 10-V dc and 4- to 20-mA signals.
- c. Pulse Width Modulation (PWM): Actuator drives to a specified position according to a pulse duration (length) of signal from a dry-contact closure, triac sink or source controller.
- d. Programmable Multi-Function:
 - 1) Control input, position feedback, and running time shall be factory or field programmable.
 - 2) Diagnostic feedback of hunting or oscillation, mechanical overload, mechanical travel, and mechanical load limit.
 - 3) Service data, including at a minimum, number of hours powered and number of hours in motion.

H. Position Feedback:

1. Where indicated, equip modulating actuators with a position feedback through current or voltage signal for remote monitoring.
2. Provide a position indicator and graduated scale on each actuator indicating open and closed travel limits.

I. Integral Overload Protection:

1. Provide against overload throughout the entire operating range in both directions.
2. Electronic overload, digital rotation sensing circuitry, mechanical end switches, or magnetic clutches are acceptable methods of protection.

J. Damper Attachment:

1. Unless otherwise required for damper interface, provide actuator designed to be directly coupled to damper shaft without need for connecting linkages.
2. Attach actuator to damper drive shaft in a way that ensures maximum transfer of power and torque without slippage.
3. Bolt and set screw method of attachment is acceptable only if provided with at least two points of attachment.

K. Temperature and Humidity:

1. Temperature: Suitable for operating temperature range encountered by application with minimum operating temperature range of minus 20 to plus 120 deg F.
2. Humidity: Suitable for humidity range encountered by application; minimum operating range shall be from 5 to 95 percent relative humidity, non-condensing.

L. NEMA 250, Type 2 for indoor and protected applications.

M. Stroke Time:

1. Operate damper from fully closed to fully open within 90 seconds.
2. Operate damper from fully open to fully closed within 90 seconds.
3. Move damper to failed position within 90 seconds.
4. Select operating speed to be compatible with equipment and system operation.

N. Sound:

1. Spring Return: 62 dBA.
2. Non-Spring Return: 45 dBA.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for dampers and instruments installed in duct systems to verify actual locations of connections before installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONTROL-DAMPER APPLICATIONS

- A. Control Dampers:
- B. For damper types and sizes, see Mechanical Drawings.

3.3 INSTALLATION, GENERAL

- A. Furnish and install products required to satisfy most stringent requirements indicated.
- B. Properly support dampers and actuators, tubing, wiring, and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to a <Insert valve> force.
- C. Provide ceiling, floor, roof, and wall openings and sleeves required by installation. Before proceeding with drilling, punching, or cutting, check location first for concealed products that could potentially be damaged. Patch, flash, grout, seal, and refinish openings to match adjacent condition.
- D. Seal penetrations made in fire-rated and acoustically rated assemblies.
- E. Fastening Hardware:

1. Stillson wrenches, pliers, or other tools that will cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for assembling and tightening nuts.
 2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
 3. Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.
- F. Install products in locations that are accessible and that will permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for Owner's access, confirm unrestricted ladder placement is possible under occupied condition.

3.4 ELECTRIC POWER

- A. Furnish and install electrical power to products requiring electrical connections.

3.5 CONTROL DAMPERS

- A. Install smooth transitions, not exceeding 30 degrees, to dampers smaller than adjacent duct. Install transitions as close to damper as possible but at distance to avoid interference and impact to performance. Consult manufacturer for recommended clearance.
- B. Clearance:
1. Locate dampers for easy access and provide separate support of dampers that cannot be handled by service personnel without hoisting mechanism.
 2. Install dampers with at least 24 inches of clear space on sides of dampers requiring service access.
- C. Service Access:
1. Dampers and actuators shall be accessible for visual inspection and service.
 2. Install access door(s) in duct or equipment located upstream of damper to allow service personnel to hand clean any portion of damper, linkage, and actuator. Comply with requirements in Section 233300 "Air Duct Accessories."
- D. Install dampers straight and true, level in all planes, and square in all dimensions. Install supplementary structural steel reinforcement for large multiple-section dampers if factory support alone cannot handle loading.
- E. Attach actuator(s) to damper drive shaft.
- F. For duct-mounted and equipment-mounted dampers installed outside of equipment, install a visible and accessible indication of damper position from outside.

3.6 CONNECTIONS

- A. Connect electrical devices and components to electrical grounding system. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems."

Olympic Medical Center
Oncology Center / Primary Care Addition
CONTROL DAMPERS

Construction Document Submittal
August 6, 2018

END OF SECTION 230923.12

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PACKAGED HEAT PUMP UNIT SCHEDULE

Table with columns: EQUIP. NO, LOCATION, SERVICE, BASIS OF DESIGN MANUFACTURER, BASIS OF DESIGN SERIES, NOMINAL CAPACITY (TONS), SUPPLY AIR CFM, MIN OUTSIDE AIR CFM, ECONOMIZER, SUPPLY AIR FAN, COOLING COIL, PRIMARY HEAT, ELECTRIC PRE-HEAT COIL, FILTERS, ELECTRICAL, MAXIMUM SOUND PRESSURE, OPERATING WEIGHT, REMARKS.

FAN POWERED CONSTANT VOLUME TERMINAL UNIT SCHEDULE

Table with columns: EQUIP. NO, LOCATION, SERVICE, BASIS OF DESIGN MANUFACTURER, BASIS OF DESIGN SERIES, PRIMARY AIR, FAN, ELECTRICAL, HEATING COIL, TERMINAL UNIT, MAXIMUM SOUND PRESSURE OUTLET, MAXIMUM SOUND PRESSURE RADIATED, OPERATING WEIGHT, REMARKS.

FAN SCHEDULE

Table with columns: EQUIP NO, LOCATION, SERVICE, BASIS OF DESIGN MANUFACTURER, BASIS OF DESIGN SERIES, TYPE, DRIVE TYPE, AIRFLOW (CFM), TOTAL SP (IN WG), FAN RPM, MOTOR (BHP), MOTOR (HP), YES/NO, V/PHHZ, NOISE (SONES), MAXIMUM SOUND POWER INLET/OUTLET (dBA), OPERATING WEIGHT (LBS), REMARKS.

TERMINAL UNIT - CONSTANT VOLUME

Table with columns: EQUIP. NO, SERVICE, BASIS OF DESIGN MANUFACTURER, BASIS OF DESIGN SERIES, PRIMARY AIR, ELECTRIC HEATING COIL, REMARKS.

EXHAUST VALVE SCHEDULE

Table with columns: EQUIP MARK, AREA SERVED, TYPE, BASIS OF DESIGN, REMARKS.

LOUVER SCHEDULE

Table with columns: EQUIP. NO, LOCATION, SERVICE, BASIS OF DESIGN MANUFACTURER, BASIS OF DESIGN SERIES, TYPE, FRAME TYPE, AIRFLOW (CFM), FREE AREA (SQFT), FREE AREA VELOCITY (FPM), MAXIMUM PD (IN WG), SIZE WxHxD (INxINxIN), OPERATING WEIGHT (LBS), REMARKS.

DIFFUSER-GRILLE SCHEDULE

Table with columns: EQUIP. NO, LOCATION, SERVICE, BASIS OF DESIGN MANUFACTURER, BASIS OF DESIGN SERIES, DESCRIPTION, MAXIMUM SOUND PRESSURE (dBA), REMARKS.

COATES DESIGN ARCHITECTS Responsible Architecture.

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ISSUED FOR:

DATE:

CONSTRUCTION DOCUMENTS - 100% 08/06/2018

ONCOLOGY CENTER ADDITION

844 N. 5TH AVENUE, SEQUIM, WA 98382

HVAC SCHEDULES

M1.00

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Project Number

ONCOLOGY CENTER ADDITION

EXISTING PACKAGED HEAT PUMP UNIT SCHEDULE

EQUIP. NO	LOCATION	SERVICE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN SERIES	NOMINAL CAPACITY (TONS)	SUPPLY AIR CFM	MIN OUTSIDE AIR CFM	ECONOMIZER	SUPPLY AIR FAN							COOLING COIL						PRIMARY HEAT				ELECTRIC PRE-HEAT COIL				FILTERS				ELECTRICAL		REMARKS			
									QTY	EXT SP (IN WG)	TOTAL SP (IN WG)	TYPE	MOTOR (BHP / HP) EACH	DRIVE	VFD	COOLING LOAD		AIR				SEER (5)	TOTAL LOAD (MBH) (6)	EAT DB (DEG F)	LAT DB (DEG F)	HSPF (7)	KW	EAT DB (DEG F)	LAT DB (DEG F)	MAXIMUM FACE VEL (FPM)	TYPE	MERV RATING	INITIAL PD (IN WG)	FINAL PD (IN WG)	MCA		V/PH/Hz	MAXIMUM SOUND PRESSURE (dBA)	OPERATING WEIGHT (LBS)
																TOTAL	SENSIBLE	EAT DB (DEG F)	EAT WB (DEG F)	LAT DB (DEG F)	LAT WB (DEG F)																		
HP-10	MECH. ATTIC	CV	CARRIER	HJQ004	3	1,145	340	YES	1	0.8	-	-	1.2	BELT	-	33.5	29.3	78.9	62.9	59.1	55.5	10.2	34.3	54.2	81.7	6.7	11.5	20	51.5	350	Z"	8	0.31	1	28.4	460/360	-	700	1.3,4
HP-11	MECH. ATTIC	CV	CARRIER	HJQ004	3	900	200	YES	1	1.0	-	-	1.2	BELT	-	31.7	27.4	77.8	60.5	55.1	51.5	10.2	33.6	28.3	62.6	6.7	11.5	20	60.0	350	Z"	8	0.31	1	28.4	460/360	-	700	3,4
HP-12	MECH. ATTIC	CV	CARRIER	HJQ005	3.5	1,150	300	7	1	1.0	-	-	1.2	BELT	-	40.4	37.7	81.1	62.7	54.3	52.4	10.0	46.5	56.6	93.7	7.0	11.5	20	51.3	350	Z"	8	0.31	1	30.0	460/360	-	800	1.3,4
HP-13	MECH. ATTIC	CV	CARRIER	HJQ004	3	975	200	YES	1	1.0	-	-	1.2	BELT	-	32.4	26.6	78.8	62.9	55.8	54.3	10.2	33.6	57.9	89.5	6.7	11.5	20	57.0	350	Z"	8	0.31	1	28.4	460/360	-	700	1.3,4
HP-14	MECH. ATTIC	CV	CARRIER	HJQ006	5	1,490	700	YES	1	1.2	-	-	2.4	BELT	-	59	56.3	79.1	61.5	58.9	53.8	10.0	56.5	53.1	87.9	7.5	14	20	49.4	350	Z"	8	0.31	1	37.9	460/360	-	800	1.3,4
HP-15	MECH. ATTIC	CV	CARRIER	HJQ005	3.5	0	0	YES	1	0.75	-	-	2.4	BELT	-	40.4	37.7	81.1	62.7	54.3	52.4	10.0	46.5	20.0	63.6	7.0	23	20	93.6	350	Z"	8	0.31	1	47.4	460/360	-	800	2,4

1. EXISTING HEAT PUMP. AIR BALANCE TO INDICATED AIR FLOW.
 2. EXISTING HEAT PUMP TO BE ABANDONED IN PLACE. ALL DUCT WORK, DIFFUSERS, GRILLES, SENSORS, AND POWER & CONTROL COMPONENTS TO BE REMOVED. HEAT PUMP SERVED DEMOLISHED PHARMACY.
 3. PROVIDED WITH POWER EXHAUSTER
 4. PROVIDED WITH ELECTRICAL CONVENIENCE OUTLET.
 5. ARI CAPACITY AT 80 F/67 F INDOOR ENTERING AIR AND 95 F OUTDOOR TEMPERATURE.
 6. INTEGRATED HEATING CAPACITY AT 47 F OUTDOOR TEMPERATURE AND 70 F EXERTING AIR TEMPERATURE.
 7. ARI HIGH TEMPERATURE CAPACITY AT 70 F INDOOR ENTERING AIR AND 47 F DB/43 F WB OUTDOOR TEMPERATURE

OMC CANCER CARE PRESSURIZATION SCHEDULE

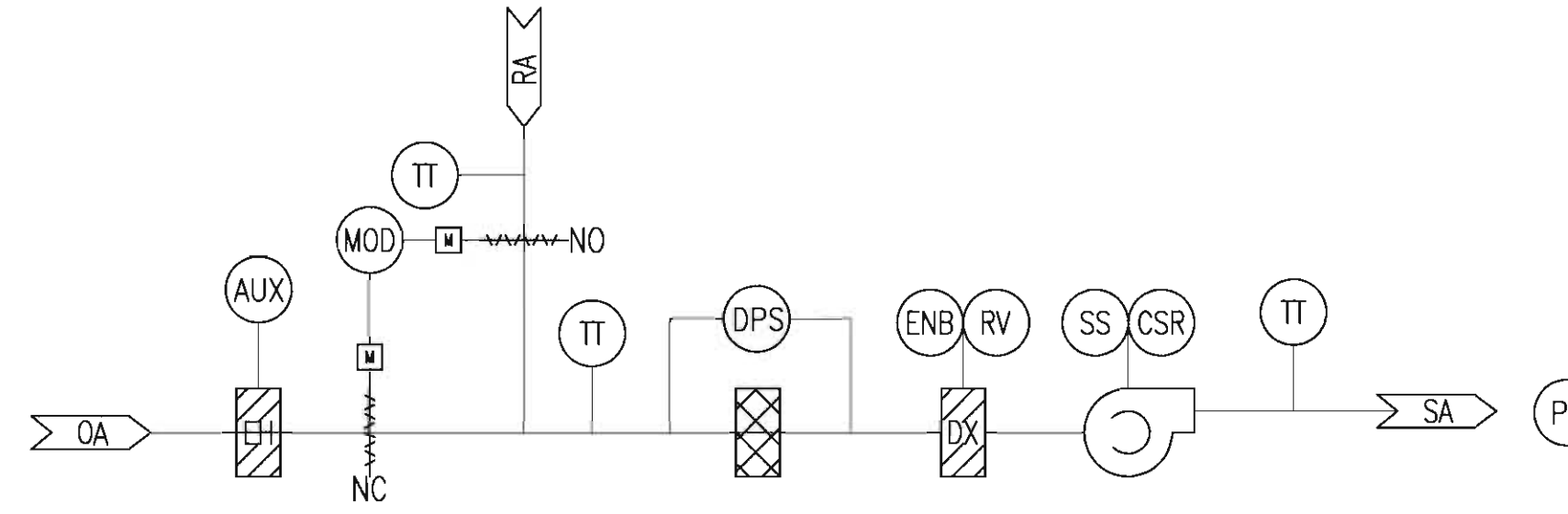
ROOM NUMBER	ROOM AREA (S.F.)	CEILING HEIGHT (FT.)	INDIV. T-STAT Y/N	CODE AIR CHANGE OSA(WAC)	CODE AIR CHANGE SUPPLY(WAC)	PRESS (WAC) N=NEGATIVE P=POSITIVE E=EQUAL	CODE AIR CHANGE (CFM)	VENT (CFM)	TRANE LOAD (CFM)	SUPPLY (CFM)
VAV SYSTEM										
140 - PHARMACY OFFICE-Interior	397	9.5	Y	2	4	P	251	126	560	560
140 - PHARMACY OFFICE-Perimeter	130	14.0	Y	2	4	P	121	61	185	185
140A - RECEIVING	146	9.0	N	2	4	E	88	44	90	90
140B - HAZ COMPOUNDING	249	9.0	Y	4	30	N	1121	149		1370
140C - ANTI ROOM	141	9.0	Y	4	30	P	635	85		635
140D - NON HAZ COMPOUNDING	189	9.0	Y	4	30	N	851	113		855
153 - CORRIDOR	346	8.0	N	2	4	E	185	92	235	235
155 - CORRIDOR	206	8.0	N	2	4	E	110	55	140	140
154 - INFUSION	124	8.0	Y	2	6	E	99	33	110	110
156 - INFUSION	125	8.0	Y	2	6	E	100	33	100	100
157 - INFUSION	125	8.0	N	2	6	E	100	33	100	100
158 - INFUSION	125	8.0	N	2	6	E	100	33	110	110
159 - INFUSION	159	8.0	Y	2	6	E	127	42	165	165
160 - INFUSION	152	8.0	Y	2	6	E	122	41	125	125
161 - PAT RR	46	8.0	N	75	10	N	61	75		-
153A - JANITOR	73	8.0	N	2	4	E	39	19		-
162 - STAFF RR	42	8.0	N	75	10	E	56	75		-
164 - RN STATION	584	9.5	Y	2	6	E	555	185	555	560
165 - HAZMAT/SOILED	144	8.0	N	2	10	N	192	38		115
166 - MEDICATION RM	149	8.0	Y	2	4	P	79	40		100
E103 - SCHEDULING (EXIST)	207	9.0	Y	2	4	E	124	62		175
E104 - INFUSION (EXIST)	112	9.0	N	2	6	E	101	34		185
E105 - INFUSION (EXIST)	117	9.0	Y	2	6	E	105	35		185
E106 - INFUSION (EXIST)	117	9.0	Y	2	6	E	105	35		185
EXISTING BUILDING										
E100 HALLWAY	480	9.25	Y	-	2	E	148	-	-	1050
E101 PAT RR	48	8	N	-	-10	N	-64	-75	-	-80
E109 DRAW ST	54	8	N	-	2	E	14	-	-	180
E110 PAT/FOOD/EQ. ST	153	8	N	-	2	E	41	-	-	140
E113 MECH	75	8	N	-	-10	N	-100	-	-	-100
E133 JAN RM	44	8	N	-	-10	N	-59	-100	-	-60
E114 ADJUSTED EXAM	144	8	Y	2	6	E	115	38	-	120
E118 HALL	546	9.25	N	-	2	E	168	-	-	240
E123 RECEIVING AREA	152	9	N	2	4	E	91	46	-	200
E128 HALL	188	9.25	N	-	2	E	58	-	-	60
E131 HEIGHT WEIGHT	36	9.25	N	2	4	E	22	11	-	25
E134 NURSE TRIAGE	284	9.25	Y	2	-12	N	-525	88	-	-525
E141 NURSE STATION	162	9.25	N	2	4	E	100	50	-	240
E144 EDU RM	144	8	N	2	4	E	77	38	-	120
E146 HALL	560	9.25	N	-	2	E	173	-	-	175
E148 OFFICE	155	8	N	2	4	E	83	41	-	100
E149 SCHEDULING	98	8	N	2	4	E	52	26	-	160
E150 CLEAN RM	177	8	N	2	4	P	94	47	-	100

ONCOLOGY CENTER ADDITION

844 N. 5TH AVENUE, SEQUIM, WA 98382

HVAC SCHEDULES

M1.01



SEQUENCE OF OPERATIONS - HP-16, HP-17

1. GENERAL: THE HEAT PUMP UNIT CONSISTS OF A SUPPLY FAN SECTION, DIRECT EXPANSION (DX) COIL WITH STAGED COMPRESSORS AND REVERSING VALVE, AUXILIARY ELECTRIC HEAT, AND 100% OSA ECONOMIZER MIXING BOX.
2. WARM-UP MODE: START THE SUPPLY FAN BASED UPON AN OPTIMAL START SIGNAL FROM THE DDC SYSTEM. ONCE THE SUPPLY FAN HAS PROVEN ON BASED ON CURRENT SENSING RELAY, SHUT THE MIXING DAMPERS TO 0 PERCENT OUTDOOR AIR. IF THE MIXED AIR TEMPERATURE IS GREATER THAN 50 DEG F, THEN SET THE REVERSING VALVE TO HEATING MODE AND STAGE THE COMPRESSORS AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE 15 DEG F (ADJ) GREATER THAN THE ZONE TEMPERATURE. TURN OFF ALL STAGES OF ELECTRIC HEAT. IF THE MIXED AIR TEMPERATURE IS LESS THAN 49 DEG F, STAGE THE ELECTRIC HEAT AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE 15 DEG F (ADJ) GREATER THAN THE ZONE TEMPERATURE. TURN OFF ALL COMPRESSOR STAGES. OPERATE THE UNIT IN WARM-UP MODE UNTIL THE OCCUPIED HEATING SETPOINT IS SATISFIED OR THE SCHEDULED DAY MODE PERIOD BEGINS, WHICHEVER OCCURS FIRST.
3. OCCUPIED MODE: PLACE THE SYSTEM IN OCCUPIED MODE IF SCHEDULED TO BE OCCUPIED. START THE SUPPLY FAN AND RETURN FANS. ONCE THE SUPPLY FAN HAS PROVEN ON BASED ON CURRENT SENSING RELAY, ALLOW THE SYSTEM TO CONTROL DISCHARGE AIR TEMPERATURE SETPOINT. IN HEATING MODE, IF THE MIXED AIR TEMPERATURE IS GREATER THAN 50 DEG F, THEN SET THE REVERSING VALVE TO HEATING MODE AND STAGE THE COMPRESSORS AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT (SEE DISCHARGE AIR TEMPERATURE SETPOINT RESET). TURN OFF ALL STAGES OF ELECTRIC HEAT. SET THE MIXING DAMPERS TO MINIMUM OUTDOOR AIR POSITION SETPOINT (SEE MINIMUM OUTDOOR AIR POSITION SETPOINT RESET). IF THE MIXED AIR TEMPERATURE IS LESS THAN 49 DEG F, STAGE THE ELECTRIC HEAT AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. SET THE MIXING DAMPERS TO MINIMUM OUTDOOR AIR POSITION SETPOINT. IF IN COOLING MODE AND THE ECONOMIZER CYCLE IS ENABLED, MODULATE THE MIXING DAMPERS FROM MINIMUM OUTDOOR AIR POSITION SETPOINT TO 100 PERCENT OUTDOOR AIR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. ONCE THE MIXING DAMPERS HAVE REACHED 100 PERCENT OUTDOOR AIR, COMMAND THE REVERSING VALVE TO COOLING MODE AND STAGE THE COMPRESSORS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. IF IN COOLING MODE AND THE ECONOMIZER CYCLE IS DISABLED, MODULATE THE MIXING DAMPERS TO MAINTAIN THE MINIMUM OUTDOOR POSITION SETPOINT. COMMAND THE REVERSING VALVE TO COOLING MODE AND STAGE THE COMPRESSORS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. THE OCCUPIED HEATING SETPOINT IS 70 DEG F (ADJ) AND THE OCCUPIED COOLING SETPOINT IS 75 DEG F (ADJ).
4. WARM-UP/COOL-DOWN SCHEDULE - OPTIMAL START HEATING & COOLING
 - A. THE GLOBAL CONTROLLER OPTIMAL START PROGRAM USES INDOOR SPACE TEMPERATURE TO DETERMINE THE START TIME OF ZONES SO THAT THE COMFORT TEMPERATURE IS PROVIDED PRIOR TO OCCUPANCY. THE FIRST ZONE CALCULATED TO REQUIRE OPTIMUM START HEATING OR COOLING IS COMMANDED TO THE DAY MODE (ZONE OPERATES WITH DAY HEATING AND COOLING SETPOINTS) AS ARE ALL OTHER WITHIN ITS GROUP. ALL ZONES OPERATE TO SATISFY DAY MODE SETPOINTS. AC UNIT REMAINS OFF DURING A MORNING WARMUP PERIOD. AC UNIT IS ENABLED DURING A MORNING COOL-DOWN PERIOD.
5. UNOCCUPIED MODE: PLACE THE SYSTEM IN UNOCCUPIED MODE IF SCHEDULED TO BE UNOCCUPIED. STOP THE SUPPLY FAN. SHUT MIXING DAMPERS TO 0 PERCENT OUTDOOR AIR. DISABLE ALL ELECTRIC HEAT STAGES. DISABLE ALL COMPRESSORS.
5. UNOCCUPIED HEATING MODE: PLACE THE SYSTEM IN UNOCCUPIED HEATING MODE IF SCHEDULED TO BE UNOCCUPIED AND THE ZONE TEMPERATURE FALLS BELOW 55 DEG F. OPERATE THE SYSTEM THE SAME AS IN WARM-UP MODE UNTIL THE ZONE TEMPERATURE REACHES 60 DEG F. ONCE THE ZONE TEMPERATURE REACHES 60 DEG F, PLACE THE SYSTEM BACK IN UNOCCUPIED MODE. PREVENT THE SYSTEM FROM CYCLING MORE THAN ONCE PER HOUR.
6. DISCHARGE AIR TEMPERATURE SETPOINT RESET: RESET THE DISCHARGE AIR TEMPERATURE SETPOINT (55 DEG F TO 90 DEG F) (ADJ) IN 5 DEG F (ADJ) INCREMENTS PERIODICALLY (10 MINUTES) TO MAINTAIN ZONE TEMPERATURE AT ZONE TEMPERATURE SETPOINT.
7. ECONOMIZER CYCLE: ENABLE THE ECONOMIZER CYCLE IF THE ZONE TEMPERATURE IS 2 DEG F MORE THAN THE OUTDOOR AIR TEMPERATURE. DISABLE THE ECONOMIZER CYCLE IF THE ZONE TEMPERATURE IS LESS THAN THE OUTDOOR AIR TEMPERATURE.
8. SAFETIES:
 - A. PROVIDE ALL DAMPER AND COIL ACTUATORS WITH SPRING RETURN TO NORMAL POSITION AS INDICATED IN THE DRAWINGS UPON POWER FAILURE. ALL FAN INTERLOCKS ARE TO STOP THE SUPPLY FAN, REGARDLESS OF DDC COMMAND OR HAND-OFF-AUTO SWITCH POSITION.
 - B. UPON A LOSS OF POWER, PERFORM AN ORDERLY SHUTDOWN OF THE SYSTEM. ONCE POWER IS RESTORED, RESTORE THE SYSTEM TO ITS PREVIOUS MODE OF OPERATION.
12. MONITORING AND ALARMS: PROVIDE MONITORING AND ALARMS AS SHOWN ON THE POINTS LIST.

DDC POINTS MATRIX-HEAT PUMP HP-1								
DESCRIPTION	CONTROL SYMBOL	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT	PULSED INPUT	ALARM/CAPABLE	SHOWN ON GRAPHICS
ECONOMIZER DAMPER	MOD		X					X
MIXED AIR TEMPERATURE	TT	X						X
SUPPLY FAN START/STOP	SS				X		X	X
SUPPLY FAN STATUS	CSR			X				X
DUCT STATIC PRESSURE SENSOR	PS			X			X	X
COMPRESSOR STAGE (TYP)	ENB				X			X
REVERSING VALVE ENABLE	RV				X			X
AUXILIARY ELECTRIC HEAT STAGE (TYP)	AUX				X			X
DISCHARGE AIR TEMPERATURE	TT	X						X
FILTER DIFFERENTIAL PRESSURE SWITCH	DPS			X			X	X
RETURN AIR TEMPERATURE	TT	X						X

REMARKS
1. ALL SETPOINTS PROGRAMMED INTO THE SYSTEM MUST BE TREND CAPABLE, OVERRIDE CAPABLE AND SHOWN ON GRAPHICS.

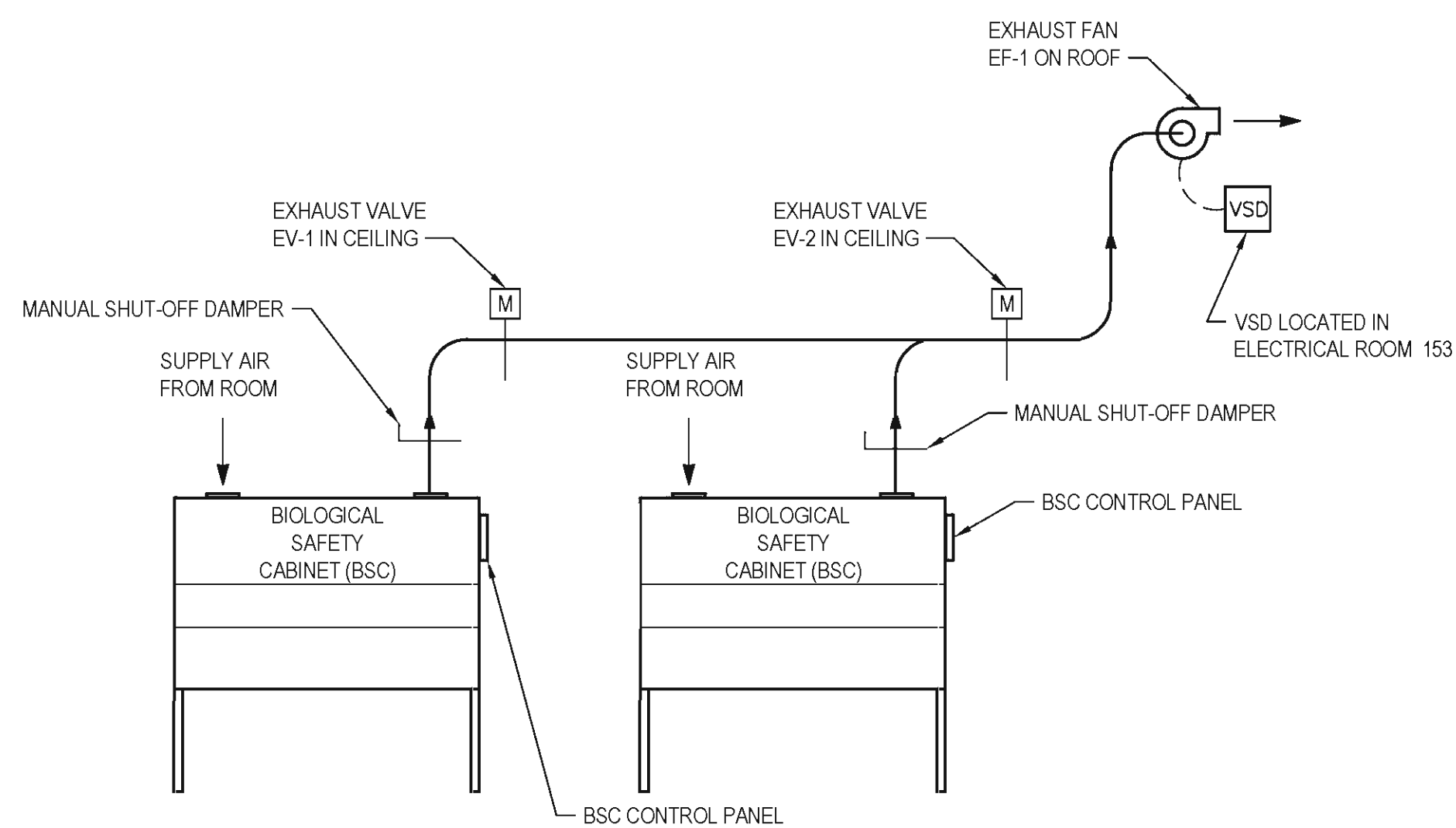
ISSUED FOR: DATE:

ONCOLOGY CENTER ADDITION

844 N. 5TH AVENUE, SEQUIM, WA 98382

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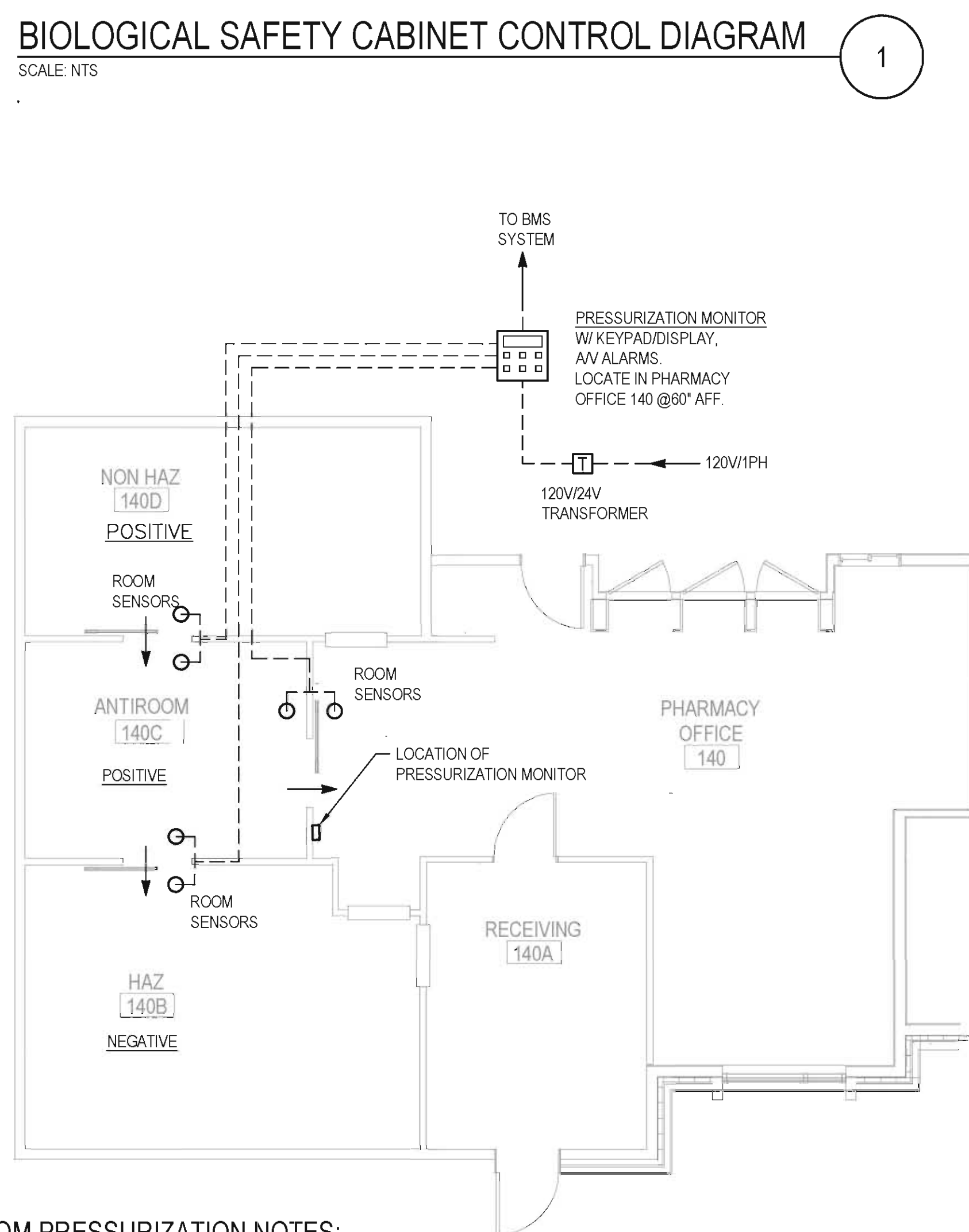
- NOTES:
- BIOLOGICAL SAFETY CABINETS (BSC) AND ROOF MOUNTED EXHAUST FAN EF-1 TO OPERATE ACCORDING TO BUILDING OCCUPANCY SCHEDULE.
 - AS THE BSC INTEGRAL EXHAUST HEPA FILTERS LOAD UP, AS SENSED BY PRESSURE DROP AT THE EXHAUST VALVES (EV-1 AND EV-2), (EV-1 AND EV-2) WILL MODULATE TO MAINTAIN THE PRESET REQUIRED AIRFLOW FROM THE BSC.
 - THE CABINET SHALL CONTAIN AN EXHAUST INTERLOCK SYSTEM THAT PREVENTS OPERATION OF THE INTERNAL SUPPLY BLOWER UNLESS THE EXHAUST FLOW IS SUFFICIENT TO PROVIDE THE CORRECT AIR BARRIER INFLOW VELOCITY AT START UP. HOOD TO ALARM LOCALLY AND AT THE BUILDING MANAGEMENT SYSTEM (BMS) IN THE EVENT THAT THE CABINET GOES INTO ALARM MODE.
 - (OPTIONAL CAPABILITY) NIGHT SETBACK MODE: TO REDUCE EXHAUST VOLUME DURING NON-USE TIMES. UPON NIGHT SETBACK MODE, FPVAV-01 TO TRACK AIRFLOW PERCENTAGE DOWN TO USER PROVIDED AIRFLOWS TO MAINTAIN ROOM AT A NEGATIVE TO THE ANTEROOM. PROVIDE AN INPUT POINT FOR THE BUILDING MANAGEMENT SYSTEM (BMS) TO INDICATE NIGHT SETBACK MODE (AIRFLOW SETPOINTS TO BE DETERMINED BY USERS).



DDC POINTS MATRIX								
DESCRIPTION	CONTROL SYMBOL	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT	ALARM CAPABLE	SHOWN ON GRAPHICS	COMMENTS
EF-1								
EXHAUST FAN START/STOP	SS			X				
EXHAUST FAN STATUS	CS		X			X	X	
VFD STATUS	SS			X		X	X	
EF-2								
EXHAUST FAN START/STOP	SS			X				
EXHAUST FAN STATUS	CS		X			X	X	
SPACE TEMPERATURE	T	X				X		
TERMINAL UNIT W/ELEC HEAT								
DISCHARGE AIR TEMPERATURE	DAT	X						
PRIMARY AIR DAMPER	MOD1		X					
ZONE TEMPERATURE	T	X				X	X	

BIOLOGICAL SAFETY CABINET CONTROL DIAGRAM

SCALE: NTS

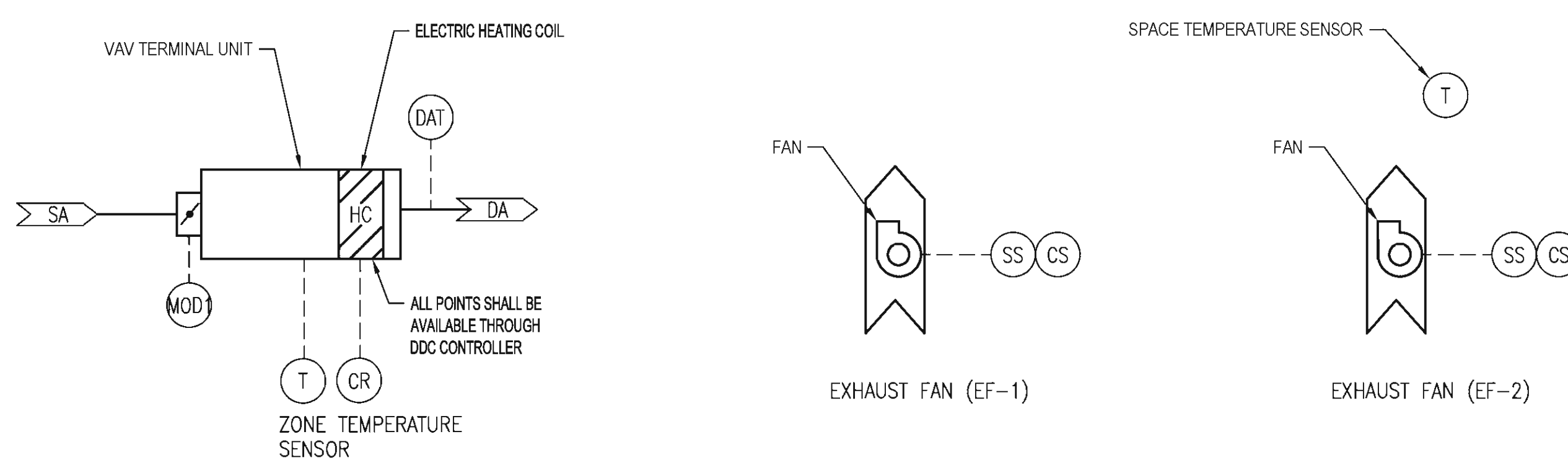


ROOM PRESSURIZATION NOTES:

- MAINTAIN NON-HAZARDOUS MIXING ROOM 140D UNDER POSITIVE PRESSURE WITH RESPECT TO PHARMACY ANTEROOM 140C.
- MAINTAIN PHARMACY ANTEROOM 140C UNDER POSITIVE PRESSURE WITH RESPECT TO HAZARDOUS MIXING ROOM 140B AND PHARMACY OFFICE 140.

PHARMACY PRESSURIZATION MONITORING DIAGRAM

SCALE: NTS



VAV TERMINAL UNIT

SCALE: NTS

EF CONTROL SCHEMATIC

SCALE: NTS

EF CONTROL SCHEMATIC

SCALE: NTS

SEQUENCE OF OPERATION - TERMINAL UNIT W/ ELECTRIC HEAT

- SINGLE DUCT TERMINAL UNIT WITH ELECTRIC HEAT
- OCCUPIED MODE:
 - CONTROLLER SETPOINTS RETURN TO OCCUPIED SETTINGS.
 - HEATING 70 DEG., ADJUSTABLE.
 - COOLING 75 DEG., ADJUSTABLE.
 - THE ROOM TEMPERATURE SENSOR SIGNALS HEATING AND COOLING DEMAND.
 - COOLING IS PROVIDED THROUGH MODULATION OF THE VAV DAMPER. PRIMARY AIR VOLUME IS REGULATED BY A VELOCITY SENSOR. PRIMARY AIR VOLUME MODULATES FROM MINIMUM POSITION TO MAXIMUM COOLING VOLUME AS COOLING SIGNAL RAMP FROM 0% TO 100%.
 - HEATING IS PROVIDED THROUGH THE TERMINAL UNIT ELECTRIC HEAT SIGNAL. PRIMARY AIR DAMPER MAINTAINS MINIMUM CFM IN HEATING MODE.
 - IN DEADBAND, THE PRIMARY AIR DAMPER MAINTAINS MINIMUM CFM.
 - UNOCCUPIED MODE:
 - CONTROLLER SETPOINTS RETURN TO UNOCCUPIED SETTINGS.
 - HEATING 60 DEG., ADJUSTABLE.
 - COOLING 85 DEG., ADJUSTABLE.
 - PRIMARY AIR DAMPER IN CLOSED POSITION.
 - NIGHT SETBACK
 - UPON A CALL FOR HEAT, THE SUPPLY FAN SHALL BE COMMANDED ON. OUTSIDE AIR DAMPER SHALL BE CLOSED AND RETURN AIR DAMPERS SHALL BE 100% OPEN. TERMINAL UNIT ELECTRIC HEAT SIGNAL SHALL MODULATE TO MAINTAIN ZONE TEMPERATURE SETPOINT. AC UNIT DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE INITIATED AT MAXIMUM SETPOINT PER SUPPLY AIR TEMPERATURE RESET SEQUENCE.
 - UPON A CALL FOR COOLING, THE SUPPLY FAN SHALL BE COMMANDED ON. ECONOMIZER SHALL BE ENABLED IF OUTSIDE AIR TEMPERATURE IS LESS THAN RETURN AIR TEMPERATURE. IF OUTSIDE AIR TEMPERATURE IS GREATER THAN RETURN AIR TEMPERATURE, OUTSIDE AIR DAMPER SHALL BE CLOSED AND RETURN AIR DAMPERS SHALL BE 100% OPEN. ZONE PRIMARY AIR DAMPERS SHALL MODULATE TO MAINTAIN ZONE TEMPERATURE SETPOINT. AC UNIT DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE INITIATED AT MINIMUM SETPOINT PER SUPPLY AIR TEMPERATURE RESET SEQUENCE.
 - AC UNIT SHALL RUN FOR A MINIMUM OF 15 MINUTES OR UNTIL THE ZONE TEMPERATURE SETPOINT IS SATISFIED, WHICHEVER IS GREATER.
 - OVERRIDES:
 - ALL ROOM THERMOSTATS HAVE THE CAPABILITY OF OVERRIDING TO OCCUPIED MODE FOR THE TIME AMOUNT INDICATED BY THE OCCUPANT.
 - THE ZONE OVERRIDDEN TO THE OCCUPIED MODE WILL OPERATE IN OCCUPIED MODE AS WILL A MINIMUM NUMBER OF VAV UNITS AS REQUIRED FOR AC UNIT TO OPERATE. THE EMCS SHALL CALCULATE WHICH ZONES SHALL TURN ON IN ORDER TO MAINTAIN THE MINIMUM FLOW ABOVE AC UNIT MINIMUM TURNDOWN. ZONES WILL REQUEST A START FOR THE ASSOCIATED MAIN MECHANICAL UNIT TO OPERATE IN OCCUPIED MODE. UPON EXPIRATION OF THE OVERRIDE TIMER, ALL VAV UNITS RETURN TO UNOCCUPIED MODE AND AC UNIT IS DISABLED.
 - WARM-UP/COOL-DOWN SCHEDULE - OPTIMAL START HEATING & COOLING:
 - THE GLOBAL CONTROLLER OPTIMAL START PROGRAM USES INDOOR SPACE TEMPERATURE TO DETERMINE THE START TIME OF ZONES SO THAT THE COMFORT TEMPERATURE IS PROVIDED PRIOR TO OCCUPANCY. THE FIRST ZONE CALCULATED TO REQUIRE OPTIMUM START HEATING OR COOLING IS COMMANDED TO THE DAY MODE (ZONE OPERATES WITH DAY HEATING AND COOLING SETPOINTS) AS ARE ALL OTHER WITHIN ITS GROUP. ALL ZONES OPERATE TO SATISFY DAY MODE SETPOINTS. AC UNIT REMAINS OFF DURING A MORNING WARMUP PERIOD. AC UNIT IS ENABLED DURING A MORNING COOL-DOWN PERIOD.

SEQUENCE OF OPERATION - EXHAUST FANS

- EXHAUST FAN (EF-2)
- THE EXHAUST FAN SHALL OPERATE BASED ON ROOM TEMPERATURE SETPOINT DETERMINED BY WALL TEMPERATURE SENSOR SETTING.
 - WHEN FAN IS ENABLED, THE DAMPER ACTUATOR SHALL BE OPEN. THE DAMPER ACTUATOR IS NORMALLY CLOSED AND SHALL BE SPRING RETURN UPON LOSS OF POWER.
 - WHEN FAN IS DISABLED, THE DAMPER IS CLOSED.

COATES DESIGN ARCHITECTS

Responsible Architecture.

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BAINBRIDGE ISLAND WA 98110
P. 206.780.0876

OLYMPIC MEDICAL CENTER

SÄZAN GROUP

600 Stewart St., Ste 1400
Seattle, Washington 98101
Tel 206.267.1700
Fax 206.267.1701
SAZAN # 555-1808

ISSUED FOR: _____ DATE: _____

CONSTRUCTION DOCUMENTS - 100% 08/06/2018

ONCOLOGY CENTER ADDITION

844 N. 5TH AVENUE, SEQUIM, WA 98382

CONTROLS, DIAGRAMS, POINTS LIST

M7.02

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Project Number: ONCOLOGY CENTER ADDITION

EXISTING HEAT PUMP UNIT OUTDOOR SCHEDULE

EQUIP. NO	LOCATION	SERVICE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN SERIES	NOMINAL CAPACITY (TONS)	SUPPLY AIR CFM	MIN OUTSIDE AIR CFM	SUPPLY AIR FAN						COOLING COIL					PRIMARY HEAT				ELECTRIC PRE-HEAT COIL				FILTERS					ELECTRICAL			MAXIMUM SOUND PRESSURE (dBA)	OPERATING WEIGHT (LBS)	REMARKS						
								QTY	EXT SP (IN WG)	TYPE	MOTOR (BHP / HP) EACH	DRIVE	VFD	TOTAL LOAD (MBH)	SENSIBLE LOAD (MBH)	EAT DB (DEG F)	EAT WB (DEG F)	LAT DB (DEG F)	LAT WB (DEG F)	SEER	TOTAL LOAD (MBH)	EAT DB (DEG F)	LAT DB (DEG F)	COP	KW	STEPS	EAT DB (DEG F)	LAT DB (DEG F)	MAXIMUM FACE VEL (FPM)	TYPE	MERV RATING	INITIAL PD (IN WG)	FINAL PD (IN WG)	CR 1 MCA				CR 2 MCA	VPH/Hz	CR 1	CR 2	VIP/Hz	
HP-5	OUTSIDE	PTIOT	LENNOX	HP29-024	2	-	-	-	-	-	-	-	-	22.2	-	-	-	-	-	10.05	21.0/12.00	-	-	3.00/2.10	-	-	-	-	-	-	-	-	-	-	-	-	13.8	-	208/60/1	-	-	-	EXISTING
HP-6	OUTSIDE	PTIOT	LENNOX	HP29-036	3	-	-	-	-	-	-	-	-	35.6	-	-	-	-	-	11.20	34.4/23.0	-	-	3.28/2.42	-	-	-	-	-	-	-	-	-	-	-	21.1	-	208/60/1	-	-	-	EXISTING	
HP-7	OUTSIDE	PTIOT	LENNOX	HP29-030	2.5	-	-	-	-	-	-	-	-	33.4	-	-	-	-	-	10.20	38.2/24.2	-	-	3.00/2.18	-	-	-	-	-	-	-	-	-	-	-	19.5	-	208/60/1	-	-	-	EXISTING	
HP-8	OUTSIDE	PTIOT	LENNOX	HP29-024	2	-	-	-	-	-	-	-	-	22.2	-	-	-	-	-	10.05	21.0/12.0	-	-	3.00/2.10	-	-	-	-	-	-	-	-	-	-	-	13.8	-	208/60/1	-	-	-	EXISTING	

EXISTING HEAT PUMP INDOOR UNIT SCHEDULE

EQUIP. NO	LOCATION	SERVICE	BASIS OF DESIGN MANUFACTURER	BASIS OF DESIGN SERIES	NOMINAL CAPACITY (TONS)	SUPPLY AIR CFM	MIN OUTSIDE AIR CFM	QTY	EXT SP (IN WG)	TYPE	MOTOR (BHP / HP) EACH	DRIVE	VFD	TOTAL LOAD (MBH)	SENSIBLE LOAD (MBH)	EAT DB (DEG F)	EAT WB (DEG F)	LAT DB (DEG F)	LAT WB (DEG F)	SEER	TOTAL LOAD (MBH)	EAT DB (DEG F)	LAT DB (DEG F)	COP	KW	STEPS	EAT DB (DEG F)	LAT DB (DEG F)	MAXIMUM FACE VEL (FPM)	TYPE	MERV RATING	INITIAL PD (IN WG)	FINAL PD (IN WG)	CR 1 MCA	CR 2 MCA	VIP/Hz	CR 1	CR 2	VIP/Hz	MAXIMUM SOUND PRESSURE (dBA)	OPERATING WEIGHT (LBS)	REMARKS
BC-5	BASEMENT	PTIOT	LENNOX	CB30M-31	-	800	140	1	0.5	-	1/3	-	-	-	-	-	-	-	-	-	-	-	-	-	10	2	-	-	500	-	-	-	1	47	-	208/60/1	-	-	-	-	-	1.2
BC-6	BASEMENT	PTIOT	LENNOX	CB30M-48	-	1,050	200	1	0.5	-	1/3	-	-	-	-	-	-	-	-	-	-	-	-	-	20	4	-	-	500	-	-	-	1	44	50	208/60/1	-	-	-	-	-	1.3
BC-7	BASEMENT	PTIOT	LENNOX	CB30M-41	-	1,000	350	1	0.5	-	1/3	-	-	-	-	-	-	-	-	-	-	-	-	-	15	3	-	-	500	-	-	-	1	41	-	208/60/1	-	-	-	-	-	1.4
BC-8	BASEMENT	PTIOT	LENNOX	CB30M-31	-	900	200	1	0.5	-	1/3	-	-	-	-	-	-	-	-	-	-	-	-	-	10	2	-	-	500	-	-	-	1	47	-	208/60/1	-	-	-	-	-	1.5

- REMARKS:
- EXISTING UNIT. RE-BALANCE TO AIRFLOW LISTED.
 - EQUIPPED WITH 5/8" RS AND 5/16" RL
 - EQUIPPED WITH 3/4" RS AND 3/8" RL
 - EQUIPPED WITH 3/4" RS AND 3/8" RL
 - EQUIPPED WITH 5/8" RS AND 5/16" RL

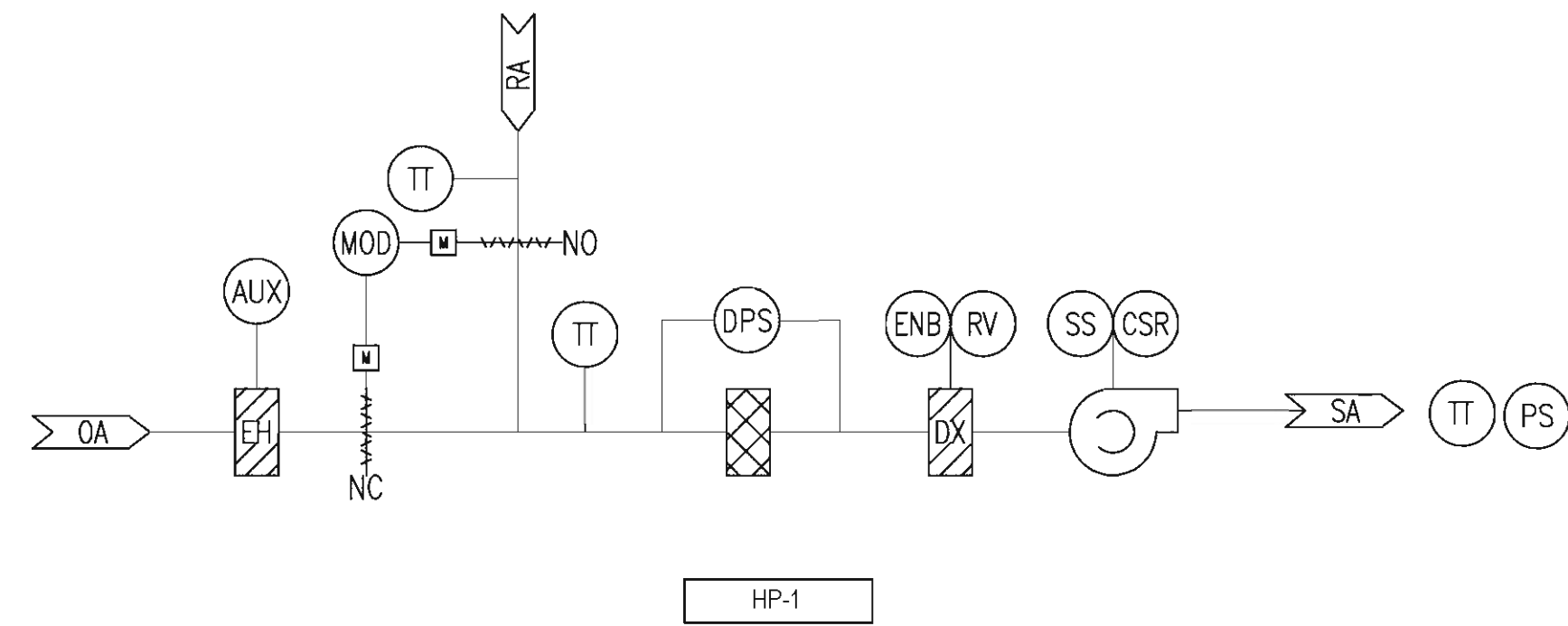


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DATE:

PRIMARY CARE ADDITION PHASE 1

844 N. 5TH AVENUE, SEQUIM, WA 98382



SEQUENCE OF OPERATIONS - HP-1

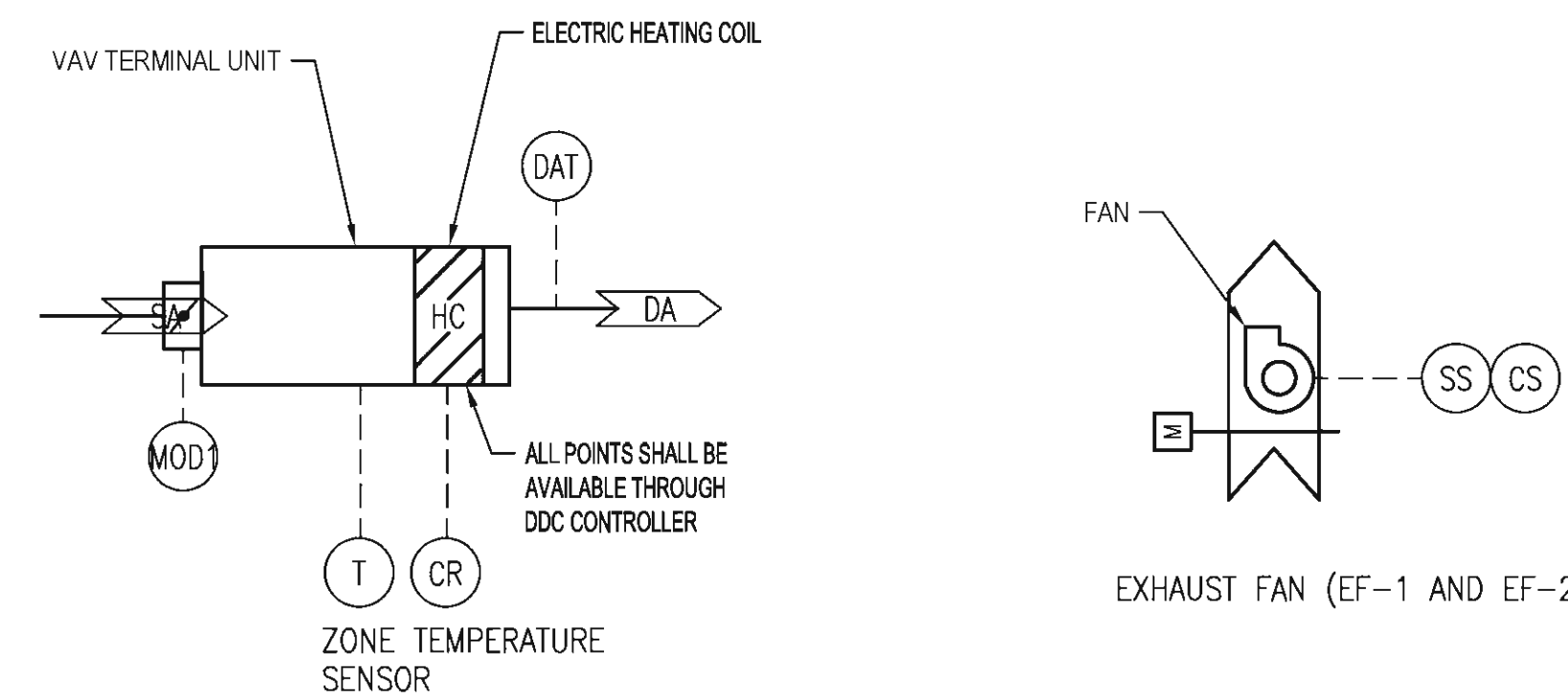
1. GENERAL:
THE HEAT PUMP UNIT CONSISTS OF A SUPPLY FAN SECTION, DIRECT EXPANSION (DX) COIL WITH STAGED COMPRESSORS AND REVERSING VALVE, AUXILIARY ELECTRIC HEAT, FILTER SECTION AND 100% OSA ECONOMIZER MIXING BOX.
2. WARM-UP MODE:
START THE SUPPLY FAN BASED UPON AN OPTIMAL START SIGNAL FROM THE DDC SYSTEM. ONCE THE SUPPLY FAN HAS PROVEN ON BASED ON CURRENT SENSING RELAY, SHUT THE MIXING DAMPERS TO 0 PERCENT OUTDOOR AIR. IF THE MIXED AIR TEMPERATURE IS GREATER THAN 50 DEG F, THEN SET THE REVERSING VALVE TO HEATING MODE AND STAGE THE COMPRESSORS AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE 15 DEG F (ADJ) GREATER THAN THE ZONE TEMPERATURE. TURN OFF ALL STAGES OF ELECTRIC HEAT. IF THE MIXED AIR TEMPERATURE IS LESS THAN 49 DEG F, STAGE THE ELECTRIC HEAT AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE 15 DEG F (ADJ) GREATER THAN THE ZONE TEMPERATURE. TURN OFF ALL COMPRESSOR STAGES. OPERATE THE UNIT IN WARM-UP MODE UNTIL THE OCCUPIED HEATING SETPOINT IS SATISFIED OR THE SCHEDULED DAY MODE PERIOD BEGINS, WHICHEVER OCCURS FIRST.
3. OCCUPIED MODE:
PLACE THE SYSTEM IN OCCUPIED MODE IF SCHEDULED TO BE OCCUPIED. START THE SUPPLY FAN ONCE THE SUPPLY FAN HAS PROVEN ON BASED ON CURRENT SENSING RELAY, ALLOW THE SYSTEM TO CONTROL DISCHARGE AIR TEMPERATURE SETPOINT. IN HEATING MODE, IF THE MIXED AIR TEMPERATURE IS GREATER THAN 50 DEG F, THEN SET THE REVERSING VALVE TO HEATING MODE AND STAGE THE COMPRESSORS AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT (SEE DISCHARGE AIR TEMPERATURE SETPOINT RESET). TURN OFF ALL STAGES OF ELECTRIC HEAT. SET THE MIXING DAMPERS TO MINIMUM OUTDOOR AIR POSITION SETPOINT (SEE MINIMUM OUTDOOR AIR POSITION SETPOINT RESET). IF THE MIXED AIR TEMPERATURE IS LESS THAN 49 DEG F, STAGE THE ELECTRIC HEAT AS REQUIRED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. SET THE MIXING DAMPERS TO MINIMUM OUTDOOR AIR POSITION SETPOINT. IF IN COOLING MODE AND THE ECONOMIZER CYCLE IS ENABLED, MODULATE THE MIXING DAMPERS FROM MINIMUM OUTDOOR AIR POSITION SETPOINT TO 100 PERCENT OUTDOOR AIR TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. ONCE THE MIXING DAMPERS HAVE REACHED 100 PERCENT OUTDOOR AIR, COMMAND THE REVERSING VALVE TO COOLING MODE AND STAGE THE COMPRESSORS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. IF IN COOLING MODE AND THE ECONOMIZER CYCLE IS DISABLED, MODULATE THE MIXING DAMPERS TO MAINTAIN THE MINIMUM OUTDOOR POSITION SETPOINT. COMMAND THE REVERSING VALVE TO COOLING MODE AND STAGE THE COMPRESSORS TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT. THE OCCUPIED HEATING SETPOINT IS 70 DEG F (ADJ) AND THE OCCUPIED COOLING SETPOINT IS 75 DEG F (ADJ).
5. UNOCCUPIED MODE:
PLACE THE SYSTEM IN UNOCCUPIED MODE IF SCHEDULED TO BE UNOCCUPIED. STOP THE SUPPLY FAN. SHUT MIXING DAMPERS TO 0 PERCENT OUTDOOR AIR. DISABLE ALL ELECTRIC HEAT STAGES. DISABLE ALL COMPRESSORS.
2. UNOCCUPIED HEATING MODE:
PLACE THE SYSTEM IN UNOCCUPIED HEATING MODE IF SCHEDULED TO BE UNOCCUPIED AND THE ZONE TEMPERATURE FALLS BELOW 55 DEG F. OPERATE THE SYSTEM THE SAME AS IN WARM-UP MODE UNTIL THE ZONE TEMPERATURE REACHES 60 DEG F. ONCE THE ZONE TEMPERATURE REACHES 60 DEG F, PLACE THE SYSTEM BACK IN UNOCCUPIED MODE. PREVENT THE SYSTEM FROM CYCLING MORE THAN ONCE PER HOUR.
3. DISCHARGE AIR TEMPERATURE SETPOINT RESET:
RESET THE DISCHARGE AIR TEMPERATURE SETPOINT (55 DEG F TO 90 DEG F) (ADJ) IN 5 DEG F (ADJ) INCREMENTS PERIODICALLY (10 MINUTES) TO MAINTAIN ZONE TEMPERATURE AT ZONE TEMPERATURE SETPOINT.
4. ECONOMIZER CYCLE:
ENABLE THE ECONOMIZER CYCLE IF THE ZONE TEMPERATURE IS 2 DEG F MORE THAN THE OUTDOOR AIR TEMPERATURE. DISABLE THE ECONOMIZER CYCLE IF THE ZONE TEMPERATURE IS LESS THAN THE OUTDOOR AIR TEMPERATURE.
5. SAFETIES:
A. PROVIDE ALL DAMPER AND COIL ACTUATORS WITH SPRING RETURN TO NORMAL POSITION AS INDICATED IN THE DRAWINGS UPON POWER FAILURE. ALL FAN INTERLOCKS ARE TO STOP THE SUPPLY FAN, REGARDLESS OF DDC COMMAND OR HAND-OFF-AUTO SWITCH POSITION.
B. UPON A LOSS OF POWER, PERFORM AN ORDERLY SHUTDOWN OF THE SYSTEM. ONCE POWER IS RESTORED, RESTORE THE SYSTEM TO ITS PREVIOUS MODE OF OPERATION.
12. MONITORING AND ALARMS:
PROVIDE MONITORING AND ALARMS AS SHOWN ON THE POINTS LIST.

DDC POINTS MATRIX-HEAT PUMP HP-1									
DESCRIPTION	CONTROL SYMBOL	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT	PULSED INPUT	ALARMS CAPABLE	SHOWN ON GRAPHICS	COMMENTS
ECONOMIZER DAMPER	MOD		X					X	
MIXED AIR TEMPERATURE	TT	X						X	
SUPPLY FAN START/STOP	SS				X		X	X	
SUPPLY FAN STATUS	CSR			X				X	
DUCT STATIC PRESSURE SENSOR	PS			X			X	X	LOCATE 2/3 IN SUPPLY DUCTWORK
COMPRESSOR STAGE (TYP)	ENB				X		X	X	VERIFY NUMBER OF STAGES
REVERSING VALVE ENABLE	RV				X		X	X	
AUXILIARY ELECTRIC HEAT STAGE (TYP)	AUX				X		X	X	VERIFY NUMBER OF STAGES
DISCHARGE AIR TEMPERATURE	TT	X						X	
FILTER DIFFERENTIAL PRESSURE SWITCH	DPS			X			X	X	
RETURN AIR TEMPERATURE	TT	X						X	

REMARKS

1. ALL SETPOINTS PROGRAMMED INTO THE SYSTEM MUST BE TREND CAPABLE, OVERRIDE CAPABLE AND SHOWN ON GRAPHICS.

DDC POINTS MATRIX								
DESCRIPTION	CONTROL SYMBOL	ANALOG INPUT	ANALOG OUTPUT	DIGITAL INPUT	DIGITAL OUTPUT	ALARMS CAPABLE	SHOWN ON GRAPHICS	COMMENTS
EF-1								
EXHAUST FAN START/STOP	SS				X			
EXHAUST FAN STATUS	CS			X		X	X	
EF-2								
EXHAUST FAN START/STOP	SS				X			
EXHAUST FAN STATUS	CS			X		X	X	
TERMINAL UNIT W/ ELEC HEAT								
DISCHARGE AIR TEMPERATURE	DAT	X						
PRIMARY AIR DAMPER	MOD1		X					
ZONE TEMPERATURE	T	X				X	X	



VAV TERMINAL UNIT

SCALE: NTS

EF CONTROL SCHEMATIC

SCALE: NTS

SEQUENCE OF OPERATION - TERMINAL UNIT W/ ELECTRIC HEAT

SINGLE DUCT TERMINAL UNIT WITH ELECTRIC HEAT

- A. OCCUPIED MODE:
 1. CONTROLLER SETPOINTS RETURN TO OCCUPIED SETTINGS.
 - a. HEATING 70 DEG., ADJUSTABLE.
 - b. COOLING 75 DEG., ADJUSTABLE.
 2. THE ROOM TEMPERATURE SENSOR SIGNALS HEATING AND COOLING DEMAND.
 3. COOLING IS PROVIDED THROUGH MODULATION OF THE VAV DAMPER, PRIMARY AIR VOLUME IS REGULATED BY A VELOCITY SENSOR. PRIMARY AIR VOLUME MODULATES FROM MINIMUM POSITION TO MAXIMUM COOLING VOLUME AS COOLING SIGNAL RAMPES FROM 0% TO 100%.
 4. HEATING IS PROVIDED THROUGH THE TERMINAL UNIT ELECTRIC HEAT SIGNAL. PRIMARY AIR DAMPER MAINTAINS MINIMUM CFM IN HEATING MODE.
 5. IN DEADBAND, THE PRIMARY AIR DAMPER MAINTAINS MINIMUM CFM.
- B. UNOCCUPIED MODE:
 1. CONTROLLER SETPOINTS RETURN TO UNOCCUPIED SETTINGS.
 - a. HEATING 60 DEG., ADJUSTABLE.
 - b. COOLING 85 DEG., ADJUSTABLE.
 2. PRIMARY AIR DAMPER IN CLOSED POSITION.
- C. NIGHT SETBACK
 1. UPON A CALL FOR HEAT, THE SUPPLY FAN SHALL BE COMMANDED ON. OUTSIDE AIR DAMPER SHALL BE CLOSED AND RETURN AIR DAMPERS SHALL BE 100% OPEN. TERMINAL UNIT ELECTRIC HEAT SIGNAL SHALL MODULATE TO MAINTAIN ZONE TEMPERATURE SETPOINT. AC UNIT DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE INITIATED AT MAXIMUM SETPOINT PER SUPPLY AIR TEMPERATURE RESET SEQUENCE.
 2. UPON A CALL FOR COOLING, THE SUPPLY FAN SHALL BE COMMANDED ON. ECONOMIZER SHALL BE ENABLED IF OUTSIDE AIR TEMPERATURE IS LESS THAN RETURN AIR TEMPERATURE. IF OUTSIDE AIR TEMPERATURE IS GREATER THAN RETURN AIR TEMPERATURE, OUTSIDE AIR DAMPER SHALL BE CLOSED AND RETURN AIR DAMPERS SHALL BE 100% OPEN. ZONE PRIMARY AIR DAMPERS SHALL MODULATE TO MAINTAIN ZONE TEMPERATURE SETPOINT. AC UNIT DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE INITIATED AT MINIMUM SETPOINT PER SUPPLY AIR TEMPERATURE RESET SEQUENCE.
 3. AC UNIT SHALL RUN FOR A MINIMUM OF 15 MINUTES OR UNTIL THE ZONE TEMPERATURE SETPOINT IS SATISFIED, WHICHEVER IS GREATER.
- D. OVERRIDES:
 1. ALL ROOM THERMOSTATS HAVE THE CAPABILITY OF OVERRIDING TO OCCUPIED MODE FOR THE TIME AMOUNT INDICATED BY THE OCCUPANT.
 - a. THE ZONE OVERRIDDEN TO THE OCCUPIED MODE WILL OPERATE IN OCCUPIED MODE AS WILL A MINIMUM NUMBER OF VAV UNITS AS REQUIRED FOR AC UNIT TO OPERATE. THE EMCS SHALL CALCULATE WHICH ZONES SHALL TURN ON IN ORDER TO MAINTAIN THE MINIMUM FLOW ABOVE AC UNIT MINIMUM TURNDOWN. ZONES WILL REQUEST A START FOR THE ASSOCIATED MAIN MECHANICAL UNIT TO OPERATE IN OCCUPIED MODE. UPON EXPIRATION OF THE OVERRIDE TIMER, ALL VAV UNITS RETURN TO UNOCCUPIED MODE AND AC UNIT IS DISABLED.
- E. WARM-UP/COOL-DOWN SCHEDULE - OPTIMAL START HEATING & COOLING:
 1. THE GLOBAL CONTROLLER OPTIMAL START PROGRAM USES INDOOR SPACE TEMPERATURE TO DETERMINE THE START TIME OF ZONES SO THAT THE COMFORT TEMPERATURE IS PROVIDED PRIOR TO OCCUPANCY. THE FIRST ZONE CALCULATED TO REQUIRE OPTIMUM START HEATING OR COOLING IS COMMANDED TO THE DAY MODE (ZONE OPERATES WITH DAY HEATING AND COOLING SETPOINTS) AS ARE ALL OTHER WITHIN ITS GROUP. ALL ZONES OPERATE TO SATISFY DAY MODE SETPOINTS. AC UNIT REMAINS OFF DURING A MORNING WARMUP PERIOD. AC UNIT IS ENABLED DURING A MORNING COOL-DOWN PERIOD.

SEQUENCE OF OPERATION - EXHAUST FANS

- EXHAUST FAN (EF-1,2)
 - a. THE EXHAUST FAN SHALL OPERATE BASED ON BUILDING OCCUPANCY SCHEDULE (TBD).
 - b. WHEN FAN IS ENABLED, THE DUCT DAMPER ACTUATOR SHALL BE OPEN. THE DAMPER ACTUATOR IS NORMALLY CLOSED AND SHALL BE SPRING RETURN UPON LOSS OF POWER.
 - c. WHEN FAN IS DISABLED, THE DAMPER IS CLOSED.

ISSUED FOR: DATE:

PRIMARY CARE ADDITION PHASE 1

844 N. 5TH AVENUE, SEQUIM, WA 98382