NOTICE TO BIDDERS: Amend the Project Manuals and Drawings to the above referenced project as follows:

PROJECT MANUAL

ITEM NO. 1 DIVISION 230000 – INDEX

A. Change page number on Section 232123 “Hydronic Pumps” from “232123-1; 5” to “232123-1; 9”.

ITEM NO. 2 SECTION 232113 – HYDRONIC PIPING

A. Delete subparagraphs 2.2.H.1.b, c, d.

B. Add subparagraph 2.2.H.4 as follows:

“4. Tongue and recess couplings will be acceptable only with the use of a torque wrench per manufacturer’s installation instructions. Contractor shall remove and replace any improperly installed grooved joints.”

ITEM NO. 3 SECTION 232123 – HYDRONIC PUMPS

A. Delete Section 232123 “Hydronic Pumps” in its entirety and replace with new Section 232123 “Hydronic Pumps” attached to this Addendum 02.
DRAWINGS

ITEM NO. 4 SHEET M4.1 – MECH. DETAILS AND SCHEDULES

A. Delete "B" and "C" of the General Notes under the Pump Schedule and replace with the following:
   "B. Combination starter/disconnect provided by electrical for CWP-1 and CWP-2.
   C. VFD provided by mechanical with disconnect for CHP-1 and CHP-2."

B. Revise the "NOTE" under detail 21/M4.1 as follows:
   "NOTE: Provide required access and access panel w/ labeling as specified.
   Fire/Smoke Damper shall be Ruskin FSDR25-DSDF or equal."

ITEM NO. 5 SHEET E1.0 – BASEMENT – ELECTRICAL PLAN

A. Add fire alarm connection from existing fire alarm control panel to new fire smoke damper as described on the attachment ESK-1.

B. Delete non-fused disconnects for CWP-1 and CWP-2 and provide combination starters as shown on the attachment ESK-1.

C. Add note 10 to clarify that VFD’s for CHP-1 and CHP-2 are provided by Div 23 as shown on the attachment ESK-1.

ATTACHMENTS INCLUDED IN THIS ADDENDUM

1. Specification Section 232123 – Hydronic Pumps
2. ESK-1 (Electrical Sketch)
3. Contractor RFIs

END OF ADDENDUM
BASEMENT - ELECTRICAL PLAN

Scale: 1/4" = 1'-0"

1. Provide 1/2" C: #12, #12G to new fire/smoke damper. Provide 15A/1P, 120V square D circuit breaker in existing subpanel BD. Also provide fire alarm connection for fire smoke damper to existing fire alarm control panel, Simplex 4010, located on 4th floor room 442. Run 1/2" conduit and fire alarm wiring thru duct shaft. Total conduit length is approx 150'.

2. Provide NEMA type 1 FVNR combination starter with non-fusible disconnect switch and NEMA size 2 starter equal to GE catalogue number CR308D1041A1AAAAA.

3. VFD provided by Div 23.
SECTION 232123 - HYDRONIC PUMPS

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:
      1. Separately coupled, base-mounted, end-suction centrifugal pumps.

1.3 DEFINITIONS
   A. Buna-N: Nitrile rubber.
   B. EPT: Ethylene propylene terpolymer.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of pump. Include certified performance curves and rated
      capacities, operating characteristics, furnished specialties, final impeller dimensions, and
      accessories for each type of product indicated. Indicate pump's operating point on curves.
   B. Shop Drawings: For each pump.
      1. Show pump layout and connections.
      2. Include setting drawings with templates for installing foundation and anchor bolts and
         other anchorages.
      3. Include diagrams for power, signal, and control wiring.
   C. A submittal package, including drawings, shall be furnished for the Engineers’ approval prior to
      factory assembly of the AC Drives. These packages shall consist of elementary power and
      control wiring diagrams, and enclosure outline drawings. The enclosure outline drawings shall
      include front and side views of the enclosures with overall dimensions, and conduit entrance
      locations. Standard catalog specification sheets showing voltage, horsepower, and maximum
      current ratings shall be furnished as part of the submittal package.

1.5 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For pumps to include in emergency, operation, and
      maintenance manuals.
1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Mechanical Seals: One mechanical seal for each pump.

PART 2 - PRODUCTS

2.1 SEPARATELY COUPLED, BASE-MOUNTED, END-SUCTION CENTRIFUGAL PUMPS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Armstrong Pumps Inc.
2. Crane Pumps & Systems.
3. ITT Corporation; Bell & Gossett.
4. PACO Pumps.
5. TACO Incorporated.

B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal.

C. Pump Construction:

1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and flanged connections. Provide integral mount on volute to support the casing, and provide attached piping to allow removal and replacement of impeller without disconnecting piping or requiring the realignment of pump and motor shaft.
2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. For pumps not frequency-drive controlled, trim impeller to match specified performance.
3. Pump Shaft: Steel, with copper-alloy shaft sleeve.
4. Seal: Mechanical seal consisting of carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket.
5. Seal: Packing seal consisting of stuffing box with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.

D. Shaft Coupling: Molded-rubber insert and interlocking spider capable of absorbing vibration. EPDM coupling sleeve for variable-speed applications.

E. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
F. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.

G. Motor: Single speed, secured to mounting frame, with adjustable alignment.
   1. 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.
   2. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
      a. Enclosure: Totally enclosed, fan cooled.
      b. Enclosure Materials: Cast iron.
      c. Motor Bearings: Permanently lubricated ball bearings.
      d. Unusual Service Conditions:
         1) Ambient Temperature: 75 deg F (24 deg C).
         2) Altitude: 1066 feet (324 meters) above sea level.
         3) Low humidity.
      e. Efficiency: Premium efficient.
      f. Service Factor: 1.15.


2.2 PUMP SPECIALTY FITTINGS

A. Suction Diffuser:
   1. Angle pattern.
   2. 175-psig (1204-kPa) pressure rating, cast-iron body and end cap, pump-inlet fitting.
   3. Bronze startup and bronze or stainless-steel permanent strainers.
   4. Bronze or stainless-steel straightening vanes.
   5. Drain plug.
   6. Factory-fabricated support.

B. Triple-Duty Valve:
   1. Angle or straight pattern.
   2. 175-psig (1204-kPa) pressure rating, cast-iron body, pump-discharge fitting.
   3. Drain plug and bronze-fitted shutoff, balancing, and check valve features.
   4. Brass gage ports with integral check valve and orifice for flow measurement.

2.3 VARIABLE FREQUENCY MOTOR CONTROLLERS FOR PUMPS

A. Summary:
1. This section provides specification requirements for solid-state, pulse-width modulated (PWM) Adjustable Frequency Drive Controllers, herein referred to as AC Drives, for use with NEMA design inverter duty AC motors.

2. The AC Drive supplier shall furnish, field test, and adjust all installed AC Drives for satisfactory operation.

B. Warranty: An 18-month warranty, from date of shipment, shall be provided on materials and workmanship.

C. Quality Assurance:

1. The manufacturer of the AC Drive shall be a certified ISO 9001 facility.
2. The AC Drive and all associated optional equipment shall be UL Listed according to UL 508 C—Power Conversion Equipment. As verification, a UL designation shall be attached on the inside of the combination enclosure.
3. The AC Drive shall be designed, constructed, and tested in accordance with UL, cUL, NEMA, IEC, and NEC standards.
4. Every power converter shall be tested in the factory with an AC induction motor.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ABB
2. Danfoss Inc.
3. Square D
4. Yaskawa Electric America

E. General Description:

1. The AC Drive shall convert the input AC mains power to an adjustable frequency and voltage.
2. The input power section shall comply with the following requirements:
   a. It shall utilize a full wave bridge design.
   b. It shall convert AC line power of fixed voltage and frequency to fixed DC voltage.
   c. It shall be insensitive to phase rotation of the AC line.
3. The output power section shall change fixed DC voltage to adjustable frequency AC voltage.
4. The adjustable frequency drive UL Type 1 enclosure package shall consist of a circuit breaker disconnect, a 2-contactor bypass power circuit, a 120 V control transformer, and a control circuit terminal block for digital and analog field wiring. The drive shall have a selector switch mounted and wired for Adjustable Frequency Controller-Off-Bypass, which shall be accessible on the front of the enclosure package.
5. The entire drive package, including the bypass starter, shall be UL508C listed and coordinated with NEMA ICS 7.1.

F. Construction:
1. The AC Drive power converter shall be enclosed in a UL Type 1 enclosure with a circuit breaker disconnect, user terminal block connections, and bypass controls. The enclosure shall provide dedicated user terminations for power and control device connection.
2. Provisions shall be included for locking the disconnect in the Off position with a padlock.
3. Provisions shall be included for using a padlock to limit enclosure access by unauthorized personnel.
4. The UL Type 1 enclosure shall have bottom conduit knock-outs for power and control wiring.
5. The AC Drive shall be sized to operate a variable torque load.
6. The speed range shall be from a minimum speed of 1 Hz to a maximum speed of 200 Hz.

G. Environmental Ratings:

1. The AC Drive shall meet IEC 60664-1 Annex A and NEMA ICS 1, UL, and cUL standards.
2. The AC Drive shall be designed to operate in an ambient temperature from -10 to 40 °C (+14 to 104 °F).
3. The storage temperature range shall be -25 to 70 °C (-13 to 158 °F).
4. The maximum relative humidity shall be 95%, non-condensing or dripping water.
5. The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m). For altitudes above 3300 ft (1000 m), the AC Drive current should be derated 1% for every 330 ft (100 m) up to 10,000 ft (3,000 m).
6. The AC Drive shall be Seismic qualified to 2003 IBC, NFPA 5000 and ASCE 7 Building Codes in compliance with ICC ES AC156 testing criteria with an Importance Factor Ip=1.5.
7. The AC Drive shall be UL Type 1 plenum rated, suitable for placement in a compartment circulating conditioned air to the building.

H. Ratings:

1. The AC Drive shall be designed to operate at 460 Vac ± 10%.
2. The AC Drive shall operate from an input frequency range of 50 to 60 Hz ± 5%.
3. The displacement power factor shall not be less than 0.96 lagging under any speed or load condition.
4. The efficiency of the AC Drive at 100% speed and load shall typically be 95% or greater.
5. The variable-torque rated AC Drive nominal full load current limit shall be not less than 110% for 60 seconds.

I. Protection:

1. Upon power-up, the AC Drive power converter shall automatically test for valid operation of memory, valid operation of precharge circuit, loss of communication, DC-to-DC power supply, and control power.
2. The enclosure shall provide a fully coordinated 100,000 A short circuit current rating marked on the enclosure nameplate, with short circuit coordination to UL 508C Power Conversion Equipment and NEMA ICS 7.1.
3. The AC Drive power converter shall be protected against short circuits between output phases and also phase-to-ground.
4. Upon loss of the analog process follower reference signal, the AC Drive power converter shall be programmable to display a detected fault condition signal.
5. The AC Drive power converter shall have a solid-state UL 508C listed overload protective device.
6. The output frequency shall be software enabled to fold back when the motor is in an overcurrent condition.
7. The output switching frequency of the AC Drive power converter shall be selectable from 6 to 16 kHz. Derating of the AC Drive power converter may be required if the factory setting is modified.
8. The AC Drive power converter shall provide an auto reset feature which can provide up to 10 programmable reset attempts after a detected fault has occurred.

J. Adjustments and Configurations:
1. The AC Drive power converter will be factory programmed to operate all specified optional devices.
2. The acceleration and deceleration ramp times shall be adjustable from 0.1 to 3200 seconds.
3. The AC Drive power converter configuration shall have provisions for an Energy Savings motor type.
4. The AC Drive power converter shall have memory capability to retain and record drive operation and detected fault type for the past four faults.

K. Keypad Display Interface:
1. A. An operator interface shall offer the modification of AC Drive power converter adjustments through a keypad. All electrical values, configuration parameters, I/O assignments, application and activity function access, detected fault condition signals, local control, adjustment storage, and diagnostics shall be accessible.
2. The AC Drive power converter software revision, output current, motor frequency, and motor voltage shall be readable through the drive display.

L. Operator Controls:
1. The control power for the digital inputs and outputs shall be 24 Vdc.
2. The terminal block shall be used for all logic and analog signal connections to the power converter.
3. Three voltage-free relay output contacts may be provided. One of the contacts shall indicate the detected fault status of the AC Drive and shall always be available. One of the contacts shall indicate bypass operation and shall always be available. One contact shall indicate a drive run status and shall only be available when communication cards are not used.
4. The combination enclosure shall have dedicated operator controls for Adjustable Frequency Controller-Off-Bypass selection.
5. The combination enclosure shall include a terminal point connection for fire/freeze stat interlock, to prevent drive or bypass operation. The interlock must shut down the motor in drive and bypass modes.
6. The combination enclosure shall include a terminal point connection for smoke/purge controls.

M. Serial Communication:
1. The AC Drive shall have serial communications capability for the following protocols:
N. Drive Output and Bypass Contractors:
   1. The AC Drive shall include electrically interlocked bypass contactors complete with a
      Class 10 thermal overload relay, circuit breaker disconnect, control circuit transformer,
      and Adjustable Frequency Controller-Off-Bypass selector switch.
   2. The operator shall have full control of the bypass starter by operation of the Adjustable
      Frequency Controller-Off-Bypass selector switch.

O. Harmonic Mitigation:
   1. Each drive shall include reduced harmonics technology to reduce power system
      harmonics.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for
      installation tolerances and other conditions affecting performance of the Work.
   B. Examine roughing-in for piping systems to verify actual locations of piping connections before
      pump installation.
   C. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.
   D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION
   A. Comply with HI 1.4 and HI 2.4.
   B. Install pumps to provide access for periodic maintenance including removing motors, impellers,
      couplings, and accessories.
   C. Independently support pumps and piping so weight of piping is not supported by pumps and
      weight of pumps is not supported by piping.
      Comply with requirements for equipment bases specified in Division 03 Section "Cast-in-Place
      Concrete."
      1. Coordinate sizes and locations of concrete bases with actual equipment provided.
      2. Construct bases to withstand, without damage to equipment, seismic force required by
         code.
      3. Construct concrete bases 4 inches (100 mm) high and extend base not less than 6 inches
         (150 mm) in all directions beyond the maximum dimensions of base-mounted pumps
         unless otherwise indicated or unless required for seismic-anchor support.
4. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.

E. Equipment Mounting: Install base-mounted pumps on cast-in-place concrete equipment base(s) using restrained spring isolators. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

3.3 ALIGNMENT

A. Comply with requirements in Hydronics Institute standards for alignment of pump and motor shaft. Add shims to the motor feet and bolt motor to base frame. Do not use grout between motor feet and base frame.

B. Comply with pump and coupling manufacturers' written instructions.

C. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.4 VFD INSTALLATION AND TRAINING

A. Installation shall be in compliance with the manufacturer's instructions, drawings, and recommendations.

B. The AC Drive supplier shall provide a trained representative to test and start up the AC Drive(s) furnished under this specification.

C. The AC Drive training shall be provided by the AC Drive manufacturer.

3.5 CONNECTIONS

A. Comply with requirements for piping specified in Division 23 Section "Steam and Condensate Heating Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to pump, allow space for service and maintenance.

C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.

D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

E. Install triple-duty valve on discharge side of pumps.

F. Install suction diffuser and shutoff valve on suction side of pumps.

G. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.

H. Install pressure gages on pump suction and discharge or at integral pressure-gage tapping, or install single gage with multiple-input selector valve.
I. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

J. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Perform the following startup checks for each pump before starting:
   a. Verify bearing lubrication.
   b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
   c. Verify that pump is rotating in the correct direction.
5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Open discharge valve slowly.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps.
Contractor RFIs

1. **CHP-1 & CHP-2 are shown connected to a VFD on sheet E1.0 & M1.0. I have not been able to find a specification for these VFD’S.**

   VFD specs has been added to “Section 232123 – Hydronic Pumps” as part of Addendum 02. Please see Item No. 3 of this addendum.

2. **Drawing E1.0 does not indicated whether a disconnect switch is integral to the CHP-1 & CHP-2 VFD’S, mounted separately, or not required.**

   Disconnect switch is integral with the VFD package. No separate disconnect is needed for the motors of CHP-1 and CHP-2. VFD shall be provided by Division 23. Please see Item No. 3 of this addendum.

3. **Drawing E1.0 shows non fused disconnects for CWP-1 & CWP-2. Starters are shown as being supplied by mechanical on the mechanical equipment schedule on drawing M4.1 but the location of the starters are not shown on the mechanical or electrical drawings. If a disconnect and starter are required I think the installation would be better served with a combination starter not two separate pieces of equipment.**

   Combination motor starter and disconnect switch will be provided by Division 26 for pumps CWP-1 and CWP-2. See Item No. 5-B of this addendum.

4. **On drawing M4.1 the circuit for the chiller room exhaust fan fire/smoke damper is called out to be supplied from existing sub panel BD. Are we supplying the fan from that sub panel as well?**

   No. The fan will be fed from the Penthouse panel PP. See Note 5/E1.0.

5. **For the fire/smoke damper shown on E1.0 and M4.1 who is responsible to connect the fire/smoke damper to the existing fire alarm system? If the contractor is required where would that connection take place, would any additional fire alarm equipment be required, who is the manufacturer of the existing fire alarm system, and would programming changes to the fire alarm system be required?**

   Fire alarm connection for new Fire Smoke Damper to existing Fire Alarm Control Panel is added as part of Addendum 2 in electrical drawing E1.0. Existing FACP is Simplex 4010 and is located on the 4th floor RM 442. Conduit and wiring to be provided thru duct shaft. See Item No. 5-A of this addendum.

END OF CONTRACTOR RFIs