REBUILD VETERAN'S MEMORIAL POOL

ADDENDUM NO. 2

February 16, 2016

PART 1 - GENERAL

1.1 INTRODUCTION

A. **Basics:** This Addendum modifies or interprets (by addition, deletion, clarification, or correction) and takes precedence over previously issued Bidding Documents. Bidders are requested to attach this Addendum to their copy of the Project Manual and acknowledge receipt of this Addendum in the designated place on the Form of Proposal. The following Addendum items are further instructions to the Bidders/Contractor.

PART 2 - SPECIFICS

2.1 SPECIFICATIONS

A. Specification Attachments:

1. Section 23 09 00 "Mechanical Sequence of Operations."
2. Section 26 29 23 "Variable Frequency Motor Controllers."

END OF ADDENDUM NO. 2

REVISIONS TO SPECIFICATIONS

Section 23 09 93 – Mechanical Sequence of Operations

1. **DELETE** this Section in its entirety and REPLACE with Section 23 09 00 "Mechanical Sequence of Operations" (noted Addendum No., February) attached herein.

Section 26 29 23 – Variable-Frequency Motor Controllers

1. **ADD** new Section 26 29 23 "Variable Frequency Motor Controllers."

APPROVED SUBSTITUTIONS

Approval applies to manufacturer only and does not relieve the Contractor/Supplier from the responsibility of meeting all applicable requirements of the Plans and Specifications.

The following representatives and manufacturers have further agreed upon the following

1. The proposed substitution does not affect dimensions shown on the Drawings.
2. The supplier will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.
5. The proposed substitution function, appearance and quality are equivalent or superior to the specified item.

SECTION	PRODUCT	PROPOSED SUBSTITUTION	APPROVED
22 40 00 2.1	Showers	Willoughby Industries	Yes
22 40 00 2.1	Emergency Plumbing Fixtures	Acorn Engr.	Yes
26 51 00 F1	Light Fixture	Fail-Safe	Yes
26 51 00 F2	Light Fixture	Metalux	Yes
26 51 00 F3	Light Fixture	Metalux	Yes
26 51 00 F5	Light Fixture	Fail-Safe	Yes
26 51 00 F6	Light Fixture	Metalux	Yes
26 51 00 F7	Light Fixture	Metalux	Yes
26 51 00 F8	Light Fixture	Metalux	Yes
26 51 00 F9	Light Fixture	Metalux	Yes
26 51 00 S1	Light Fixture	McGraw-Edison	Yes
26 51 00 S2	Light Fixture	McGraw-Edison	Yes
26 51 00 S3	Light Fixture	McGraw-Edison	Yes
26 51 00 S4	Light Fixture	McGraw-Edison	Yes

END OF REVISIONS TO SPECIFICATIONS

REVISIONS TO DRAWINGS

Mechanical Drawings:

Sheet M0.02

1. Electric Heater Schedule:
   DELETE Thermostat (thermostat to be provided by DDC system contractor).

Electrical Drawings:

Sheet E0.02B

1. See “Approved Substitutions”

END OF REVISIONS TO DRAWINGS

SECTION 23 09 93 – MECHANICAL SEQUENCE OF OPERATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes control sequences for HVAC systems, subsystems, and equipment**;** plumbing systems.

B. Related Sections include the following:

1. Division 23 Section "Instrumentation and Control for HVAC" for control equipment and devices and for submittal requirements.

1.3 DEFINITIONS

A. AI: Analog Input. A hard-wired, physical input to a control module.

B. AO: Analog Output. A hard-wired, physical output from a control module.

C. AV: Analog Value. An intermediate (software) monitoring only point that may be editable or read-only. Editable AVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read-Only AVs are typically used to display the status of a control operation.

D. BI: Binary Input. A hard-wired, digital input to a control module.

E. BO: Binary Output. A hard-wired, digital output from a control module.

F. BV: Binary Value. An intermediate (software) monitoring only point that may be editable or read-only. Editable BVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read-Only BVs are typically used to display the status of a control operation.

G. DDC: Direct digital control.

H. Mixed Air: Combination mixture of outside- and return air entering heating and cooling coils.

I. Supply Air: Conditioned air on leaving side of both fan and heating and cooling coils.

J. System: DDC Controls System.

K. TAB: Testing, Adjusting and Balancing Firm.

1.4 **SEQUENCE:** STOP/START TIME OPTIMIZATION SEQUENCE

A. DDC application software shall provide Stop-Start Time Optimization (SSTO) energy management routines for the purpose of optimizing energy consumption while maintaining occupant comfort.

1. The SSTO program shall utilize outside temperature trends, indoor room temperature trends and empirical factors to calculate optimized stop-start times:
   a. SSTO shall start HVAC equipment at the latest possible time that will allow the equipment to achieve the desired zone condition by time of occupancy.
   b. SSTO shall also shut down HVAC equipment at the earliest possible time before the end of the occupancy period, and still maintain desired comfort conditions.
   c. SSTO shall maintain minimum outside air ventilation while the building is occupied.
   d. Provide a separate "Cleaning" schedule.
2. The SSTO program shall:
   a. Automatically coordinate with occupancy and event scheduling.
   b. Operate in both the heating and cooling seasons.
   c. Provide individual control for each HVAC zone.

1.5 **SEQUENCE:** BUILDING FLUSH-OUT OPERATING SEQUENCES

A. Conduct a minimum 2-week building "Flush-Out" with new filtration media at 100% outside air after construction has been completed and prior to occupancy.

B. Building Flush-Out Sequence of Operation:

1. HVAC Units, Furnace Units, and Power Ventilators shall run continuously during scheduled Flush-Out period.
2. Outside air and relief dampers shall be 100% open and return air dampers shall be closed.
3. Heating and cooling control valves shall modulate and direct-expansion cooling units shall operate to maintain the room temperatures between the Flush-Out heating setpoint of 55 deg F (adj.) and Flush-Out cooling setpoint 85 deg F (adj.).
4. Heating and cooling equipment shall operate as specified in this Section.

1.6 **SEQUENCE:** ALARM REPORTING

A. All alarms shall be reported to central graphic display (web page).

B. High priority alarms shall also generate an e-mail alert and be automatically sent to up to 10 e-mail accounts. Owner's Representative will determine which alarms are highest priority.

C. Highest priority alarms shall, in addition to e-mails, shall automatically send an alert to up to 10 phone numbers and deliver a pre-recorded generic alarm message.

1.7 **SEQUENCE:** GLOBAL CONTROL SEQUENCES

A. Design and create a "Shelter-in-Place/Dust Storm" switch, commandable from the graphics screen. When commanded, dampers for all connected systems will be overridden to the closed position. This function shall be activated manually by the user either for a timed period, or until released by the user.

B. Design and create an "All Start" switch commandable from the graphics screen for use during extreme low temperature conditions. When commanded, all scheduled unoccupied commands will be overridden to run the connected systems in the occupied mode. This function shall be activated manually by the user either for a timed period, or until released by the user. This function will be used in conjunction with the "Shelter-in-Place/Dust Storm" switch to close outside dampers with a manual or automatic command in a timed manner under low ambient conditions. The "All Start" function will also occur automatically below 20 deg. F (adj.) outside air temperature.

C. Master Schedule Override: Design and create a "Master Schedule Override" that overrides all other individual programmed schedules at the highest priority to shut down all HVAC equipment based on occupied schedule, holidays, and summer vacations. When enabled, all HVAC systems shall shut down or be placed in unoccupied period operation.

D. System Graphics: Display the following data:

1. "Shelter-in-Place/Dust Storm" status and command (BO).
2. Flashing indication when "Shelter-in-Place/Dust Storm" is active.
3. "All Start" status and command (BO).
4. Flashing indication when "All Start" is active.

1.8 **SEQUENCE:** ELECTRIC FURNACE OPERATING SEQUENCES (FURNACE F-3 AND EXHAUST FAN EF-2)

A. Room thermostat/sensor shall be a vandal resistant plain blank stainless steel plate.

B. Run Conditions – Scheduled: Unit shall run according to a user-definable time schedule in the following modes:

1. Occupied Mode: Heating setpoint of 70 deg F (adj.)
2. Unoccupied Mode: Heating setpoint of 50 deg F (adj.).
3. Signal alarm if zone temperature is 5 deg F less than heating setpoint.

C. Supply air Fan Control:

1. System starts fan to run continuously during occupied periods and stops fan during unoccupied periods. Signal alarm if fan fails to start as commanded.

D. Exhaust Fan Control:

1. System starts fan to run continuously during occupied periods and stops fan during unoccupied periods. Signal alarm if fan fails to start as commanded.

E. Damper Control:

1. During occupied periods, when both fans are running, open outside air damper to full open position, return damper to full closed position and exhaust damper to full open position.
2. During unoccupied periods, position outside air damper and exhaust damper closed and return air damper open

F. During Occupied Mode, when fan is running, system activates electric duct heater in three stages as required to maintain room temperature heating setpoint.

G. During Unoccupied Mode, system to cycle the fan and heat steps as required to maintain room temperature heating setpoint.

H. System to keep supply fan running for 2 minutes (adj.) after the electric heat is turned off.

1. Supply air temperature sensor shall signal system and reduce the heat steps as required to maintain a maximum supply air temperature of 90 deg or as set. Signal alarm if discharge air temperature is above 125 deg F (adj.) for a user definable time.

I. Electric duct heater shall be disabled whenever outside air temperature is greater than 60 deg F. (adj.).

1. System Graphics: Display the following data:
   a. System graphic.
   b. Room/area served.
   c. Room temperature setpoint (AV).
   d. Room temperature indication (AI).
   e. Electric duct heater command indication (BO).
   f. Supply air temperature indication (AI)
   g. Supply fan status (DI)
   h. Exhaust fan status (DI)
   i. Damper Command (AO)
   j. Outside air temperature (AV)

1.9 **SEQUENCE:** ELECTRIC HEATER OPERATING SEQUENCES (EH-1, 2 AND 3)

A. Room thermostat/sensor shall be standard type with temperature indication, limited temperature adjustment (+ / - 2 deg, adj.) and 2 hour override button to activate occupied mode.

B. Run Conditions – Scheduled: Unit shall run according to a user-definable time schedule in the following modes:

1. Occupied Mode: Heating setpoint of 60 deg F (adj.).
2. Unoccupied Mode: Heating setpoint of 50 deg F (adj.).

C. System activates unit fan and heating elements as required to maintain room temperature heating setpoint.

1. System Graphics: Display the following data:
   a. System graphic.
   b. Room/area served.
   c. Room temperature setpoint (AV).
   d. Room temperature indication (AI).
   e. Electric heater command indication (BO).

1.10 **SEQUENCE:** ELECTRIC HEATER OPERATING SEQUENCES (EH-4 and 5)

A. Room thermostat/sensor shall be corrosion resistant temperature sensor only.

B. Run Conditions – Scheduled: Unit shall run according to a user-definable time schedule in the following modes:

1. Occupied Mode: Heating setpoint of 60 deg F (adj.).
2. Unoccupied Mode: Heating setpoint of 50 deg F (adj.).

C. System activates unit fan and heating elements as required to maintain room temperature heating setpoint

1. System Graphics: Display the following data:
   a. System graphic.
   b. Room/area served.
   c. Room temperature setpoint (AV).
   d. Room temperature indication (AI).
   e. Electric heater command indication (BO).

1.11 **SEQUENCE:** GAS-FIRED UNIT HEATER OPERATING SEQUENCES (GUH-1 AND 2)

A. Room thermostat/sensor shall be corrosion resistant temperature sensor only.

B. Run Conditions – Scheduled: Unit shall run according to a user-definable time schedule in the following modes:

1. Occupied Mode: Heating setpoint of 60 deg F (adj.).
2. Unoccupied Mode: Heating setpoint of 50 deg F (adj.).

C. System activates unit fan and gas heat as required to maintain room temperature heating setpoint

1. System Graphics: Display the following data:
   a. System graphic.
   b. Room/area served.
   c. Room temperature setpoint (AV).
   d. Room temperature indication (AI).
   e. Gas heater command indication (BO).

1.12 **SEQUENCE:** GAS FURNACE OPERATING SEQUENCES (FURNACE F-1 AND EXHAUST FAN EF-1)

A. Room thermostat/sensor shall be a vandal resistant plain blank stainless steel plate.

B. Run Conditions – Scheduled: Unit shall run according to a user-definable time schedule in the following modes:

1. Occupied Mode: Heating setpoint of 70 deg F (adj.)
2. Unoccupied Mode: Heating setpoint of 50 deg F (adj.).
3. Signal alarm if zone temperature is 5 deg F less than heating setpoint.

C. Supply air Fan Control:

1. System starts fan to run continuously during occupied periods and stops fan during unoccupied periods. Signal alarm if fan fails to start as commanded.

D. Exhaust Fan Control:

1. System starts fan to run continuously during occupied periods and stops fan during unoccupied periods. Signal alarm if fan fails to start as commanded.

E. Damper Control:

1. During occupied periods, when both fans are running, modulate open the outside air damper and closed the return air damper as required to maintain a minimum mixed air temperature of 60 deg. (adj). Exhaust damper shall open when exhaust fan is running.
2. During unoccupied periods, position outside air damper and exhaust damper closed and return air damper open

F. During Occupied Mode, when fan is running, system activates gas duct heater in two stages as required to maintain room temperature heating setpoint.

G. During Unoccupied Mode, system to cycle the fan and heat steps as required to maintain room temperature heating setpoint.

H. System to keep supply fan running for 2 minutes (adj.) after the gas heat is turned off.

1. Supply air temperature sensor shall signal system and reduce the heat steps as required to maintain a maximum supply air temperature of 90 deg or as set. Signal alarm if discharge air temperature is above 125 deg F (adj.) for a user definable time.

I. Gas heater shall be disabled whenever outside air temperature is greater than 60 deg F. (adj.).

1. System Graphics: Display the following data:
   a. System graphic.
   b. Room/area served.
   c. Room temperature setpoint (AV).
   d. Room temperature indication (AI).
   e. Electric duct heater command indication (BO).
   f. Supply air temperature indication (AI)
   g. Mixed air temperature (AV)
   h. Supply fan status (DI)
   i. Exhaust fan status (DI)
   j. Damper Command (AO)
   k. Outside air temperature (AV)

1.13 **SEQUENCE:** GAS FURNACE WITH ELECTRIC DX COOLING AND ECONOMIZER (F-2)

A. Room thermostat/sensor shall be standard type with temperature indication, limited temperature adjustment (+ / - 2 deg, adj.) and 2 hour override button to activate occupied mode.

B. Run Conditions – Scheduled: Unit shall run according to a user-definable time schedule in the following modes:

1. Occupied Mode: Heating setpoint of 70 deg F (adj.); Cooling setpoint of 75 deg F (adj.).
2. Unoccupied Mode: Heating setpoint of 60 deg F (adj.); Cooling setpoint of 85 deg F (adj.).

C. Fan Control: SSTO program starts fan to run continuously during occupied periods. System cycles fan during unoccupied periods to maintain programmed setpoints.

1. Signal alarm if fan fails to start as commanded.

D. Warm-Up Mode: SSTO program starts fan to operate continuously with 100% return air and heating coil valve open to bring space temperature to occupied period setpoint.

E. Occupant Manual Override: During unoccupied periods, override button on room temperature sensor places system in occupied period operation for a 2-hour (adj.) programmed period.

F. Freeze Protection: Supply air temperature sensor signals alarm when supply temperature falls below 40 deg F. for 5 minutes (adj.). System stops fan, closes outside air damper and opens heating control valve.

G. Mixed air Control:

1. During occupied periods, when fan is running, open outside air damper to scheduled minimum position.
2. During heating sequence, set outside air damper to minimum position.
3. During occupied periods, system modulates outside air, return air, and relief air dampers on an economizer cycle (1st stage of cooling). Start to open relief air damper when outside air damper is past minimum position.
   a. The economizer cycle shall be enabled whenever the outside air temperature is less than the space temperature.
   b. Set economizer control mixed air low-limit temperature to 50 deg F (adj.). Override scheduled minimum outside air damper position as required to maintain mixed air low-limit temperature setpoint.
   c. During unoccupied periods, position outside air and relief air dampers closed and return air damper open, unless system is in night high limit and conditions are satisfactory for economizer operation.
   d. Integrated economizer control provides a portion of cooling requirements, even when mechanical cooling is required to maintain space setpoint.

H. Gas Heating: When fan is running, system controls the gas heat in two steps to maintain space temperature setpoint.

I. DX Cooling: When fan is running, system cycles condensing unit (2nd stage of cooling) to maintain space temperature setpoint.

J. System Graphics: Display the following data:

1. System graphic.
2. Room number/area served.
3. System occupied/unoccupied mode (BV).
4. Fan command indication (BO).
5. Fan status (BI).
6. Outside air temperature indication (AI).
7. Mixed air temperature setpoint (AV).
8. Mixed air temperature indication (AI).
9. Supply air temperature indication (AI).
10. Room temperature setpoints, occupied (AV).
11. Room temperature setpoints, unoccupied (AV).
12. Room temperature indication (AI).
13. Room temperature alarm indication (BV).
14. Outside air/Return air damper positions (AI).
15. Relief air damper position (AV).
16. Heating command two steps (BI).
17. Cooling command (BII).

1.14 **SEQUENCE:** VENTILATION OPERATING SEQUENCES

A. Power Ventilators (EF): System starts fan to run continuously or on-off with local manual control as scheduled during occupied periods and stops fan during unoccupied periods.

B. For Exhaust Fans with Motorized Dampers In Discharge Duct: For fans scheduled, system opens motorized damper when fan is enabled and then starts fan once the damper end switch contact is completed and the damper is open. System closes damper when fan is commanded off.

C. Exhaust fans with outside air intake louvers: System shall open the outside air damper when the exhaust fan is running.

D. System Graphics: Display the following data:

1. System graphic.
2. Room/area served.

3. Fan enable status (BI).
4. Fan status (BI).
5. Damper command indication (BO).
6. Alarm indication (BI).

1.15 **SEQUENCE:** DOMESTIC HOT WATER SYSTEM OPERATING SEQUENCES

A. Recirculation Pumps (HWRP): System starts pump to run continuously during occupied periods and stops pump during unoccupied periods.

B. System Graphics: Display the following data:

1. System graphic.
2. Pump command indication (BO).
3. Pump status (BI).
4. Thermostatic Mixing Valve (TMV) leaving domestic hot water temperature indication (AI)
5. High temperature and low temperature alarms for water heater and mixing valves (BV).

1.16 **SEQUENCE:** PLUMBING ELECTRONIC TRAP PRIMING ASSEMBLY OPERATING SEQUENCES

A. Periodic Valve Operation: System shall initiate periodic opening of trap priming solenoid valves for a user definable time and duration.

B. System Graphics: Display the following data:

1. Trap primer locations and areas served.
2. Trap primer solenoid command indication (BO)
3. Trap primer operating schedule (BV).
4. Trap primer "ON" duration (BV).

1.17 **SEQUENCE:** SUMP PUMP ALARM MONITORING

A. High Water Level Alarm Indication: Signal alarm for duplex sump pump high water level alarm indication.

B. System Graphics: Display the following data:

1. System graphic.
2. High water level alarm indication (BI).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 09 93

SECTION 26 29 23 – VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 PROVISIONS

A. Furnish and install variable-frequency motor controllers (VFD) in the locations shown on the draawigns

1.2 RELATED REQUIREMENTS

A. All provisions of the contract including Division 01 apply to work specified in each section of this Division 26, 27, 28.

B. See Sections 260500, 260553, 262816 and 262924.

PART 2 - PRODUCTS

2.1 MATERIALS

A. VFDs to be solid state Pulse-width modulation for speed control of three-phase induction motors.

B. Provide product data submittals or each type and rated of VFD indicated. Include features, performance, electrical ratings, operating characteristics, and furnished specialties and accessories.

C. Furnish Operation and Maintenance manuals for each VFD.

D. VFDs shall:

1. Have NEMA 12 enclosure.
2. Operate with an input Voltage of 208 and frequency of 60 Hertz, plus or minus 6 percent.
3. Provide manual speed adjustment via key pad or dial mounted on the enclosure's exterior.
4. Have required number of outputs for connection to relays and equipment as required. Refer to sheets PL5.11 and PL5.21 for control overview.
5. Be suitable for an operating environment from 0° to 40° Celsius and humidity up to 90% non-condensing.
6. When used filtration system with regenerative media filter, provide with capability of 30 second ramp up to full speed and 5 second ramp down from full speed to zero.
7. Bypass Controller: Electric, two contactor style with service switch allows motor operation via the VFD or the bypass controller.

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

1. ABB Industrial Systems.
2. Allen Bradley.
3. Cutler-Hammer
4. Danfoss Graham.
5. Honeywell.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount VFDs generally in location shown on the drawings, with exact locations chosen to provide necessary code clearances.

B. VFDs are required for:

1. P1A
2. P2A
3. P3A
4. P1B

C. Provide nameplate as described in Section 16199 for each VFD.

D. VFD manufacturer or designated representative to perform a field test of each drive and provide owner operational and maintenance training.

END OF SECTION 26 29 23