January 9, 2020

ADDENDUM #2

TO CONTRACT DOCUMENTS FOR: Project #CP191921 – Gas Turbine Building - Chilled Water Plant Addition

ADVERTISEMENT DATE: December 3, 2019

PREPARED FOR: The Curators of the University of Missouri

425 South Woods Mill Rd, Suite 300
Chesterfield, MO 63017
(314) 682-1500

The contract documents for the above noted project and the work covered thereby and herein modified.

GENERAL INFORMATION:

1) Reference attached CP191921_Bid_QA_Log.pdf for responses to all recent bid questions

2) Chillers will be shipped un-insulated by the manufacturer. Contractor shall field-insulate per modifications to Specification 23 07 00 and 23 64 17 as indicated below.

3) Additional information to address bidder question #28 has been added to this addendum as follows:
   a. See SK-11 and SK-12 for locations of various equipment needing 120vac power
   b. See attached “QA Item 28 Electrical Circuits” document for explanation of circuits and panels for various equipment identified in SK-11 and SK-12.

PROJECT MANUAL:

1) General Requirements Section 1.a – Bid for Lump Sum Contract: Insert the following text as section 3.c.(8). Include base bid quantity and unit price for rock excavation as indicated:

(8) Rock excavation below the subgrade of footings, grade beams, utility trenches, and utility tunnels, proper disposal of excavated rock, and replacement with satisfactory materials. NOTE: For definition of rock excavation, see Section 31 63 29 - Drilled Shaft Foundations

Base Bid quantity = 800, cu. yd. $______/cu. yd.
2) Special Conditions page SC-18: Insert Special Condition #30 – ELECTRONIC DATA FILES per Attachment included with this Addendum document.

3) Section 23 07 00 – Mechanical Insulation
   a. Revise Section 3.16.A as follows: “Service: Domestic cold water, chilled water, and make-up water, and drinking fountain drain piping.”
   b. Add Section 3.15.C as follows: “Chillers: Insulate cold surfaces on Chillers as specified in 23 64 17 – Steam Turbine Centrifugal Water Chillers.”

4) Section 23 64 17 – Steam Turbine Centrifugal Water Chillers
   a. Revise Section 2.09.C to read “Contractor shall field insulate over all cold surfaces of chiller …”

5) Section 26 05 80 – Motors and Accessories
   a. See attached edits to Section 2.05

6) Section 26 27 13 – Electricity Metering
   a. See attached spec section with RED text indicating changes to spec section.

7) Section 33 73 13 – Liquid-Filled Utility Transformers
   a. Add the following as Acceptable Manufacturers
      iii. ABB
      iv. Cooper Power Systems
      v. CG Power Systems

DRAWINGS:

1) G-002
   a. Revise Phase 2 Objective 1 as follows: “All buried domestic water scope in alley completed and DCW loop returned to operation by end of phase”
   b. Add Phase 3 Objective 3 as follows: “All remaining buried domestic water scope (including tie-in under 5th street) completed and DCW loop returned to operation by end of phase.”
   c. Add Phase 3 Constraint 5 as follows: “Maximum duration of domestic water loop service disruption limited to six hours.”

2) MD-104
   a. See SK-3: Add keyed note to drawing stating that Contractor will go through Marley to modify CT platform currently shared with CT-1

3) MD-203
   a. See SK-4: Add keyed note to drawings stating that Contractor will go through Marley to demo equalizer connections to cooling tower.

4) M-103
   a. See SK-5: Relocated AHU-5 pump, meter, and piping
5) M-110
   a. See SK-6: Add keyed note to drawing stating that Contractor will go through Marley to cut in equalizer piping for existing towers CT-2 and CT-3

6) M-202
   a. See SK-7: Increase size of CHWR piping to FLTR-1
   b. See SK-7: Additional 36” manual isolation valve on LCHWR

7) M-600
   a. See SK-8: Revised Control Valve Actuator Schedule

8) M-601
   a. See SK-9: Revised Sand Filtration Schedule

9) M-701
   a. See SK-10: Add control point for chilled water blowdown valve

10) C-530
    a. See SK-2: Add water valve to allow use of existing DCW line under addition during construction

11) E-103
    a. Revise the quantity of unit heaters indicated from eight (8) to six (6)
    b. Revise the designation at each of the six (6) unit heaters to be SUH-1
    c. Power supply circuitry for the six (6) unit heaters shall be as currently indicated on sheet E-105
Attachments: (16)
1) CP191921_Bid_QA_Log
2) QA Item 28 Electrical Circuits
3) Special Condition 30 – Electronic Data Files
4) 260580 - MOTORS AND ACCESSORIES Section 2.05 Edits
5) Section 26 27 13 – Electricity Metering
6) SK-2: Site Civil DCW Plan (Revisions to C-530)
7) SK-3: CTI-1 Demo Plan (Revisions to MD-104)
8) SK-4: TW Flow Diagram (Revisions to MD-203)
9) SK-5: AHU-5 Piping Plan (Revisions to M-103)
10) SK-6: TW Piping Plan (Revisions to M-110)
11) SK-7: CHW Flow Diagram (Revisions to M-202)
12) SK-8: CV Actuator Sched (Revisions to M-600)
13) SK-9: Sand Fltr Sched (Revisions to M-601)
14) SK-10: DDC Points List (Revisions to M-701)
15) SK-11: Addition Pwr Plan (Revisions to E-105)
16) SK-12: Exist Bldg Pwr Plan (Revisions to E-105)

END OF ADDENDUM #2
<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Company</th>
<th>Contact Info</th>
<th>Date Requested</th>
<th>Question</th>
<th>Name</th>
<th>Company</th>
<th>Response</th>
<th>Date Responded</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>All underground chilled water piping shall be PVC except for lines passing directly over or under steam tunnels and lines passing under foundations. These locations have already been identified on the drawings provided in the bid documents.</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>2</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>What shall be the requirement for cables?</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>3</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Will the Laser Scan be available to contractors? If not, can contractor perform their own scan?</td>
<td>Kenneth Keane</td>
<td>University of Missouri</td>
<td></td>
<td>12/20/2019</td>
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<tr>
<td>5</td>
<td>Pre-Bid Meeting</td>
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<td></td>
<td>12/11/2019</td>
<td>All underground piping shall be PVC except for lines passing directly over or under steam tunnels.</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>6</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Special Conditions reference no paid Power Piping (PP) stamp. Is this required?</td>
<td>Kenneth Keane</td>
<td>University of Missouri</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>7</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>What existing flooding has been encountered or is being lined now STE and sanitary?</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>8</td>
<td>Pre-Bid Meeting</td>
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<td></td>
<td>12/11/2019</td>
<td>In the drainage systems that hazardous materials are encountered will be removed under separate contract.</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>9</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Is the 6&quot; IPS all cast iron?</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>10</td>
<td>Pre-Bid Meeting</td>
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<td></td>
<td>12/11/2019</td>
<td>Will the Laser Scan be available to contractors? If not, can contractor perform their own scan?</td>
<td>Kenneth Keane</td>
<td>University of Missouri</td>
<td></td>
<td>12/20/2019</td>
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<td>11</td>
<td>Pre-Bid Meeting</td>
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<td>University of Missouri</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>12</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Please clarify if the use of EMT is acceptable.</td>
<td>Mike Jaramillo</td>
<td>Burns &amp; McDonnell</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>13</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Wall thickness of 0.035&quot; by 3/4&quot;. Would you really expect a wall thickness of 0.035&quot; for this schedule? This is 1/8&quot; Schedule 40.</td>
<td>Mike Jaramillo</td>
<td>Burns &amp; McDonnell</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>14</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Is the existing domestic water line shown on drawing C200 is called to be removed. To facilitate the start of the addition, can the domestic water flow be valved/capped off to the pipe to be removed at the start of phase 1, with the new domestic cold water piping is operational.</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>15</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Information For Bidders Article 4.5 states &quot;Do not remove the form from the specifications.&quot; Where can the bid form that is to be utilized be found and/or when will this be issued?</td>
<td>Kenneth Keane</td>
<td>University of Missouri</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>16</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Referencing Special Conditions 17 (a) (v): It states the electrical contractor must have extensive experience installing 8&quot; IPS insulation with 1/16&quot; MIP connection strength between top of grade beam and bottom of slab on grade. Is the 8&quot; IPS insulation required on all grade beams and all columns?</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>17</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Specification Section 2605.33-3.1-B allows the use of EMT conduit with certain restrictions.</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>18</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Drawing A-503 showing jamb and head details for overhead doors does not show a steal tube head or jamb for doors at these locations.</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
<tr>
<td>19</td>
<td>Pre-Bid Meeting</td>
<td></td>
<td></td>
<td>12/11/2019</td>
<td>Please clarify no Air Flow Measuring Stations or devices are required under this project (delete from specification documents).</td>
<td>Joel McPhee</td>
<td>Whiting Turner</td>
<td></td>
<td>12/20/2019</td>
</tr>
</tbody>
</table>
Please clarify that:

- MT-600 Control Valve Schedule:
  - Schedule Note-5 indicates power provided by Controls Contractor (all valve sizes are no larger than 6" and higher for Control Valves) instead of DIV-26.

- MT-600 Flow Water Meter Schedule:
  - In particular, DIV-26 shall furnish & install all 460VAC or other three phase power for Control Valves and shall be furnished & installed as required, as indicated on Electrical Power Plans.

- M600 Flow Meter Schedule:
  - Control Contractor may extend from Valve Meter No. 5 (power subject to confirmation). Please clarify the application.

Please clarify that:

- M701 Point List:
  - Tag#214 & 215 are to be AO Type (not AO Type currently indicated) for O/C ELECTRIC ACTUATOR (2-position service).

- M600 Control Valve Schedule:
  - Controls Contractor is to furnish and install BACnet FC Bus per Detail-A&M-706 installation or commissioning) are by DIV-26 for Electric Metering or Smart Meters indicated on Plans.
Panels for future conversion. Please clarify requirements by locating existing panels on plans and indicating preferred routing of extended FC Bus and a) indoor b) ceilings not anticipated (conduit paths should be pre-existing) c) elevation changes should be limited to one floor between locations.

35 Robert Hansen ABB Donald.E.Mayberry@jci.com

Division 15. Jake Kliewer Burns & McDonnell Change reference to Div 15 to read Div 23. 1/2/2020 2 1/9/2020

Section 23 05 23 – General Duty Valves for HVAC Piping provides part 2.03 for “Iron, Lug Style Butterfly Valves” and part 2.04 for “High-Performance Butterfly Valves”. Please instruct how to differentiate when High Performance butterfly valves are used.

Andrew.Edwards@enerfab.com

Drawing M-203 shows a Tower Water Motor Operated Bypass Valve tagged TWBYP1-V, This valve tag does not match the control valve actuator schedule on drawing M-600 but is assumed to be valve TW23BYP-V, please confirm.

Andrew.Edwards@enerfab.com

Drawing M-204 shows a Tower Water Motor Operated Bypass Valve tagged TWBYP4-V, This valve tag does not match the control valve actuator schedule on drawing M-600 but is assumed to be valve TW48BYP-V, please confirm.

Section 3.16 Indoor Piping Insulation Application Schedule, Section A, states that “…chilled water, makeup water…” is to receive 1” elastomeric foam at pipe sizes .5”-6” and 1.5” elastomeric foam for pipe sizes above this. Section C then states .75” foam on 4” pipe and above. We have yet to encounter any domestic chilled water and would just like clarification on this.

daveb@walshinsulation.com

"Chilled Water" should be stricken from the opening sentence of Sub-Section 3.16.A of Section 23 07 00 -

DAMAGES FOR THIS PROJECT. In previous projects for the UM system, actual damages have been capped at 1.5 times the contractors fee. For this project can the UM System stipulate or provide an assumed calculation for capping damages?

Kenneth Keane University of Missouri Damages will not be capped 1/3/2020 2 1/9/2020

Locations and quantity of vents/drains/transmitters - or is that up to the GC?

Burns & McDonnell

Can saddle type branch connections be used on the large diameter Sch10 SS piping if more than half of the main size?

Bryan Pemberton Environmental Engineering, Inc

Can the existing domestic waterline be filled with flowable fill and abandoned in place since it will have to remain in service and cannot be easily replaced due to being new?

Chris Schnieder Jeff Schnieders Construction Co. 573-636-7335 1/7/2020

The circuit setter indicated in the slip stream in Detail D on M-707 may be substituted with a ball valve with PT ports before and after at contractor’s discretion.

55 Bryan Pemberton Environmental Engineering, Inc
Item #28 from Bidder Q and A log

Drawing Revisions

Drawings E-103 and E-105

a) Provide a 120 Volt, 20 Amp power supply circuit to DDC cabinet containing the DDC devices shown in detail C on sheet M-706. Circuit shall originate at new panel RP, circuit #27. Power supply wiring shall be 2#12, 1#12G – ¾” C. Extend and connect power supply wiring to each DDC device shown in this detail. Coordinate all electrical work with DDC equipment installer.

b) Provide a 120 Volt, 20 Amp power supply circuit to each Magnetic Flow Meter (sketch designation MFM-x). Circuit shall originate at new panel RP, circuit #29. Power supply wiring shall be 2#12, 1#12G – ¾” C. Extend and connect power supply wiring to each Magnetic Flow Meter. Coordinate all electrical work with equipment installer.

c) Provide a 120 Volt, 20 Amp power supply circuit to each Refrigerant Monitoring panel (sketch designation REF-MON). Circuit shall originate at new panel RP, circuit #31. Power supply wiring shall be 2#12, 1#12G – ¾” C. Extend and connect power supply wiring to each Refrigerant Monitoring Panel. Coordinate all electrical work with equipment installer.

d) Provide a 120 Volt, 20 Amp power supply circuit to Outside Air Damper OAD-1 (sketch designation OAD). Circuit shall originate at new panel RP, circuit #33. Power supply wiring shall be 2#12, 1#12G – ¾” C. Extend and connect power supply wiring to electrical connection point on damper. Provide a 20 Amp, 1-pole snap switch at damper to serve as local disconnecting means. Coordinate all electrical work with equipment installer.

Drawing E-601

a) New panel “RP” shall be REVISED to be a sixty (60) circuit position panel. All additional circuit breaker positions being added as part of this Addendum shall be equipped with a 20 Amp, 1-pole circuit breaker.
30. ELECTRONIC DATA FILES

The Owner will provide electronic data files to the Contractor for their convenience and use in progressing the Work and the preparation of shop drawings or other submittal requirements required for construction of the referenced project. The electronic data files shall reflect "blue line" (Construction Documents + Bid Addenda) only. These files will be transmitted subject to the following terms and conditions:

a. The Owner makes no representation as to the compatibility of these files with the Contractor's hardware or software.

b. Data contained on these electronic files shall not be used by the Contractor or anyone else for any purpose other than as a convenience in progressing the Work or in the preparation of shop drawings or other required submittals for the referenced project. Any other use or reuse by the Contractor or by others will be at their own sole risk and without liability or legal exposure to Owner. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Owner and its consultants, contractors, agents, employees, and representatives that may arise out of or in connection with the use of the electronic files transmitted.

c. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless the Owner and its consultants, contractors, agents, employees, and representatives, against all damages, liabilities or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

d. These electronic files are not contract documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. The Owner makes no representation regarding the accuracy or completeness of the electronic files you receive. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by the Consultant and the electronic files, the signed and sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents.

e. Because information presented on the electronic files can be modified, unintentionally or otherwise, the Owner reserves the right to remove all indications of ownership and/or involvement from each electronic display.

f. Under no circumstances shall delivery of the electronic files be deemed a sale by the Owner and no warranties are made, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Owner be liable for any loss of profit, or any consequential damages as a result of use or reuse of these electronic files.
This will serve as a binding agreement between Owner and Contractor for all like requests related to the referenced project. Upon receipt of each written request, Owner agrees to transmit electronic files as agreed upon between parties.
VERTICAL POLYPHASE MOTORS (10 HP AND GREATER):

A. All vertical polyphase motors 10 HP and larger shall conform to IEEE Standard 841-2009.
B. Rated for 460-volt, 3 phase operation with Variable Frequency drive.
C. Squirrel cage, induction type.
D. Solid or hollow shaft design (with nonreversing ratchet).
E. NEMA Design B:
   1. Minimum starting torque 100% of full load.
   2. Maximum torque greater than 200% of full load.
   3. Maximum starting current 650% of full load.
F. NEMA Class F insulation.
G. TEFC enclosure unless specified otherwise.
H. Horsepower Rating Requirements:
   1. Ambient Temperature: 40°C.
   2. Temperature Rise Per Table:

<table>
<thead>
<tr>
<th>Horsepower Rating Requirements:</th>
<th>1.</th>
<th>2.</th>
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<tr>
<td>Continuous Rated Motors (all enclosures)</td>
<td>Class B Insulation</td>
<td>Class F Insulation</td>
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<td>S.F. 1.0</td>
<td>80</td>
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<td>S.F. 1.15</td>
<td>90</td>
<td>115</td>
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   Temperature Rise by Embedded Detector - °C

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<th>Horsepower Rating Requirements:</th>
<th>1.</th>
<th>2.</th>
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<td>S.F. 1.0</td>
<td>90</td>
<td>115</td>
</tr>
<tr>
<td>S.F. 1.15</td>
<td>100</td>
<td>125</td>
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</tbody>
</table>

3. Service factor of 1.15.
4. 1800 rpm unless specified or indicated otherwise.
5. Adequate to drive equipment without using service factor except in emergency conditions.

I. Bearings:
   1. Designed for static and dynamic, and continuous and momentary thrusts as required by the driven equipment.
   2. Grease- or oil-lubricated bearings with relubrication fittings and flushing system.
   3. Antifriction or Kingsbury type.
   5. Minimum L10 bearing life for continuous operation of 100,000 hours to conform to ABMA.
   6. All motors in this category shall be provided with an internal Aegis Bearing Protection Ring (shaft grounding ring) and bearing insulation. Motor bearings shall be protected against VFD induced bearing damage, including fluting, by application of Aegis SGR products for each motor type, size, and application of this category. Motor manufacturer shall provide documentation that the warranty for each motor includes repair and or replacement for damage caused by bearing fluting, within the motor warranty period.
   7. Motors 100 HP and larger shall be equipped with insulated bearings.

J. Provide one thermocouple per bearing, including thrust bearings as follows:
   1. Factory installed in contact with stationary part of the bearing.
   2. Iron-constantan (Type J) end sensitive, metal sheathed monitoring thermocouple, L&N or Honeywell.
   3. Terminate thermocouple wire extensions in a box on the side of the motor enclosure.
K. Screened openings or other suitable means for safety.
L. Stainless steel nameplate with all electrical and lubrication information.
M. Drip covers and lifting lugs.
N. Accessories:
   1. Motor conduit boxes shall be oversized to permit solderless connection of external leads.
   2. Motor leads permanently identified and of sufficient length to allow easy connection of external leads.
   3. Provision for grounding motor frame.
   4. Provision for field mounting of the tachometer generator as required for the pump variable speed control system.
   5. Provide six "Klixon" type disc temperature detectors (two per phase) imbedded in the stator windings. Provide N.C. contacts and wire out to a separate conduit box on the motor.
4. The temperature at which the contacts open will be chosen by the manufacturer to protect the motor when it overheats.
5. Vibration Protection Equipment
   a. Provide four-point attachment 1/2-inch steel plate bracket on motor case for switch mounting near top of the motor.
7. Vibration Protection Equipment:
   b. Provide unit with normally closed contacts to sound alarm and/or deenergize motor starter circuit on excessive motor vibration.
   c. Provide four-point attachment 1/2-inch steel plate bracket on motor case for switch mounting near top of the motor.
SECTION 262713 - ELECTRICITY METERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
A. Section includes equipment for electricity metering by Owner.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For electricity-metering equipment.
   1. Dimensioned plans and sections or elevation layouts.
   2. Wiring Diagrams: For power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.

1.4 QUALITY ASSURANCE
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.

1.5 DELIVERY, STORAGE, AND HANDLING
A. Receive, store, and handle modular meter center according to NECA 400.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY OWNER
A. Manufacturers: Subject to compliance with specified requirements, provide products by one of the following:
   1. E-Mon (no substitutions permitted)
B. General Requirements for Owner's Meters:

1. Comply with UL 1244.
2. Meters used for billing shall have an accuracy of 0.5 percent of reading, complying with requirements in ANSI C12.20.
3. Enclosure: NEMA 250, Type 1 minimum, with hasp for padlocking or sealing.
4. Identification: Comply with requirements in Section 260553 "Identification for Electrical Systems."
5. Memory Backup: Self-contained to maintain memory throughout power outages of 72 hours, minimum.
6. Sensors: Current-sensing type, with current or voltage output, selected for optimum range and accuracy for meters indicated for this application.
   a. Type: Split and solid core.
7. Current-Transformer Cabinet: Listed or recommended by metering equipment manufacturer for use with sensors indicated.
8. Interface with DDC System for HVAC: One digital KY pulse to a user-definable increment of energy measurement. Match signal to DDC system for HVAC input and arrange to convey the instantaneous, integrated, demand level measured by meter to provide data for processing and possible programmed demand control action by destination system.

C. Kilowatt-hour/Demand Meter: Electronic three-phase meters, measuring electricity use and demand. Demand shall be integrated over a 15-minute interval.

1. Voltage and Phase Configuration: Meter shall be designed for use on circuits with voltage rating and phase configuration indicated for its application.
2. Display: LCD with characters not less than 0.25 inch high, indicating accumulative kilowatt-hours, current time and date, current demand, and historic peak demand, and time and date of historic peak demand. Retain accumulated kilowatt-hour and historic peak demand in a nonvolatile memory, until reset.
3. Meters shall be equipped with RS-485 protocol features compatible with the Owners existing building automation/energy management system.
4. Meters shall be EMON Class 3200 series Smart Meters, Amperage and Voltage characteristics as required by the equipment being served by the meter.

D. Multiple Meter Cabinet.

1. Compatible with EMON Class 3200 Smart Meters.
2. Equipped with twenty-four (24) meter positions.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with equipment installation requirements in NECA 1.

B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.

C. Install modular meter center according to NECA 400 switchboard installation requirements.

D. Provide a dedicated 20 Amp, 120 Volt circuit for power supply to the smart meters within the MMU cabinet. New circuit shall originate at new panel RP located within the Chiller Plant addition. Circuit conductors shall be #10 AWG. Extend and connect circuit to each meter within the MMU cabinet.

3.2 IDENTIFICATION

A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

   1. Equipment Identification Labels: Engraved nameplated secured with mechanical fasteners.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

   2. Start up and Functional Operation: The contractor and the factory authorized service representative shall provide all material, labor, components, accessories, etc. as required to energize the meters such that they are functional and ready for their intended use by the Owner.

   3. Provide system components as required to interface meters to the Owner's existing Building Automation System.

B. Tests and Inspections:

   1. Connect a load of known kilowatt rating, 1.5 kW minimum, to a circuit supplied by metered feeder.

   2. Turn off circuits supplied by metered feeder and secure them in off condition.
SECTION 262713 – ELECTRICITY METERING: continued

3. Run test load continuously for eight hours minimum, or longer, to obtain a measurable meter indication. Use test-load placement and setting that ensures continuous, safe operation.

4. Check and record meter reading at end of test period and compare with actual electricity used, based on test-load rating, duration of test, and sample measurements of supply voltage at test-load connection. Record test results.

C. Electricity metering will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 262713
INSTALL 10"X6" CROSS
(1) 10" GATE VALVE
(1) 6" GATE VALVE
CONNECT TO EXISTING WATER LINE TO THE EAST & WEST W/ NECESSARY FITTINGS
N = 1133698.18
E = 1688002.15

CONTRACTOR TO VERIFY THIS LINE IS NO LONGER IN SERVICE

REMOVE EXISTING VALVE AND TEE & CONNECT TO EXISTING WEST WATERLINE
CAP EXISTING DOMESTIC WATER LINE TO THE SOUTH

INSTALL NEW WATER VALVE FOR FUTURE ABANDONMENT OF DOMESTIC WATER LINE BELOW THE PROPOSED BUILDING
CONNECT TO BUILDING DOMESTIC 8" WATER LINE (RE: MEP FOR EXACT LOCATION & DEPTH)

NEW 6' VALVE
INSTALL NEW FIRE HYDRANT
N = 1133666.03
E = 1687971.25

PROPOSED EXPANSION
FFE = 714.00

10' MIN SEPARATION EDGE-EDGE

SITE CIVIL DCW PLAN
(REVISIONS TO C-530)

UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
GT BLDG CHILLED WATER PLANT ADDITION

Project number CP191921
Date 01/09/2020
Drawn by JH
Checked by MS
Scale

1/8/2020 2:42:02 PM
KEYED NOTES:

1. CONTRACTOR SHALL ISOLATE AND DEMOLISH COOLING TOWER 1 (CT-1) AND ALL ASSOCIATED PIPING AND CONNECTIONS PER PFDs. CONTRACTOR SHALL COORDINATE WITH OWNER FOR TOWER PARTS TO BE KEPT.

2. CONTRACTOR SHALL UTILIZE COOLING TOWER MANUFACTURER (MARLEY) TO MODIFY COOLING TOWER PLATFORM BETWEEN CT-1 AND CT-2 UPON CT-1 DEMOLITION.

CT-1 DEMO PLAN
(REVISIONS TO MD-104)

- Project number: CP191921
- Date: 01/09/2020
- Drawn by: JH
- Checked by: MS

Univ. of Missouri - Gt Bldg Chilled Water Plant Addition

Sketch: SK-3

1/8/2020 4:58:23 PM
GENERAL NOTES:
1. FOR GENERAL NOTES, ABBREVIATIONS AND LEGEND, SEE M-001.

KEYED NOTES:
1. CONTRACTOR SHALL UTILIZE COOLING TOWER MANUFACTURER (MARLEY) TO DEMOLISH, ISOLATE AND BLOCK OFF EXISTING EQUALIZER CONNECTIONS.
MATERIALS:
2x NCS302 FILL KIT D45534
2x TOP MODULE DRIFT ELIMINATOR KIT D47159
2x BOTTOM MODULE DRIFT ELIMINATOR KIT D47160

ONLY MARLEY OEM MATERIALS ARE ACCEPTABLE, NO SUBSTITUTIONS WILL BE ALLOWED.
CONTRACTOR TO PROVIDE REGISTERED MARLEY WARRANTY CERTIFICATE OF PERFORMANCE
UPON COMPLETION.

CONTRACTOR SHALL UTILIZE COOLING TOWER MANUFACTURER (MARLEY) TO CUT IN EQUALIZER
PIPING CONNECTION TO THE BOTTOM OF THE COOLING TOWER.

GT PLANT - COOLING TOWER DECK
PROCESS NEW WORK
CHW FLOW DIAGRAM
(REVISED TO M-202)

UNIVERSITY OF MISSOURI
COLUMBIA, MISSOURI
GT BLDG CHILLED WATER PLANT ADDITION

Project number: CP191921
Date: 01/09/2020
Drawn by: JH
Checked by: MS
Scale:

1/8/2020 5:41:25 PM
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NOTES:
SEE NOTES IN BELOW CONTROL VALVE ACTUATOR SCHEDULE.
# SAND FILTRATION SCHEDULE

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**NOTES:**

1. SIZING BASED ON AMERIWATER SYSTEMS ONLY.
   SUBSTITUTIONS SIZED PER MANUFACTURER PUBLISHED DATA OR INDUSTRY STANDARD 5-10% OF RECIRCULATION RATE.
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ALTERNATE #1

226 BO CW-BLWDWN CHILLED WATER BLOWDOWN SRNC ELECTRIC ACTUATOR
OWNER FURNISHED DDC CABINET (SECOND FLOOR ELEC ROOM REF: E-401)