WAYNE STATE UNIVERSITY
ELECTRICAL RELIABILITY UPGRADE

603 - COLLEGE OF PHARMACY
259 MACK AVENUE, DETROIT, MICHIGAN 48202
WSU PROJECT NO: 603-243264

BIDS  08/26/2014

WAYNE STATE UNIVERSITY
Facilities Planning & Management
Design & Construction Services
8454 Cass Ave.,
Detroit, MI 48202
WSU PROJECT NO: 603-243264

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PBA PROJECT NO: 2014.0097

CAMPUS MAP
PROJECT LOCATION
COLLEGE OF PHARMACY

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STRUCTURAL DRAWING INDEX

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CONTROLS

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### Electrical Standard Schedules

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### Notes
- Some symbols and abbreviations shown may not apply to this project.
### Anixter Building Automation Cables

#### Non-Plenum

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### REVISION HISTORY

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 Siemens Industry, Inc. Building Technologies Division

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WSU College of Pharm Generator
Detroit, MI

FOR REFERENCE ONLY
500 - ELECTRICAL INSTALLATION AND WIRING FOR HVAC TEMPERATURE AND LAB CONTROLS

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.

B. Division 23, Common Work Results for mechanical requirements apply to this section and will require the contractor participation on the Above Ceiling Coordination Program.

1.2 GENERAL INFORMATION

A. This specification section shall include all electrical responsibilities required for the installation & wiring of all temperature controls, as outlined on job plans, specification and temperature control drawings. Specifically, this contractor shall provide piping direct to those general or mechanical contractors (left to prime on project) contractors bidding this work, and will be responsible for installation & wiring of all automatic temperature control devices furnished by Siemens Building Technologies as outlined below and as may be required per the project plans & specifications.

B. Siemens Building Technologies, Inc. will provide the following equipment for the building automation system as shown in the temperature control drawings BIL of Materials to include but not limited to:

1. Terminal Equipment Controllers (TEC's)
2. Auxiliary TEC power panels
3. Room Temperature Sensors
4. Damper actuators
5. Receivers
6. Low Voltage Transformers

The Electrical Installation & Wiring Contractor (EWC) shall be responsible for installation of all preceding devices as applicable to this project. This list shall not be considered complete and all bids shall refer to temperature control drawings for specific equipment quantities and locations.

C. During the bidding process, the EWC shall address all questions relative to the Siemens temperature control drawings in writing (RTD) through the tier of bidding contractors. Siemens shall respond in writing through the tier of bidding contractors.

D. EWC shall install all control equipment provided by Siemens. The EWC shall furnish, install, and terminate of necessary wiring, conduit, hangers, etc. to provide a complete control system installation. All controls to be installed and adjusted by a Siemens qualified electrician in the full time employ of the EWC.

E. The EWC must have full time project superintendent who shall attend all construction meetings after notification that their services are required onsite.

F. Upon completion of all installation and wiring by the EWC, Siemens Building Technologies will conduct verification of point to point wiring and any pneumatic tubing. The EWC will be responsible to make any necessary wiring corrections. At the completion of the point to point verification, approval shall be made by the Owner's Construction Inspection Department and Siemens Building Technologies, Inc.

G. Upon approval by the Owners Construction Inspection Department, Siemens shall program all DDC panels, create necessary graphics and provide any interface between the building automation system and the campus environmental control system.

H. Upon completion of the aforementioned, a performance test shall be conducted as specified in the commissioning section of the specifications.

I. Upon a successful conclusion of the final checkout, performance test and the Owner's acceptance, the EWC's responsibility reverts to a standard warranty (12 months) for labor and material installed by the EWC and labor only for equipment supplied by others.

J. Siemens assumes the manufacturer's warranty for all equipment supplied to the EWC for installation on this project.

K. Siemens services to include the following: Design engineering labor required to interface with WSU and the consulting engineer to design the temperature control system. Supervision of the EWC installation and final checkout and approval.

L. Equipment provided by others may require specific cable type and terminations. It is up to EWC to provide cable and terminations needed for a complete working system.

1.3 DEFINITIONS

A. DDC: Direct digital control.

B. I/O: Input/output.

C. BACnet: A control network technology platform for designing and implementing interoperable control devices and networks.

D. MS/TP: Master slave/token passing.

E. PC: Personal computer.

F. PID: Proportional integral plus derivative.

G. RTD: Resistance temperature detector.
1.4 PRODUCTS & SERVICES PROVIDED BY OTHERS
A. Mechanical Contractor: Installation of flow switches, temperature or thermometer sensor wells, gage taps, pressure sensor pipe taps, final valves & tubing into pipe pressure taps and variable frequency drives.
B. Electrical Contractor: Provide 120/208 VAC power to all DDC panels, wire power to all VFD’s. Furnish & Install 4" x 4" trough above all control panels. Furnish & install conduit up maximum ten feet from all 4" x 4" troughs. Installation of required nipples between electrical panels and through.
C. Sheetmetal Contractor: Installing all terminal units, airflow stations and dampers.

1.5 PRODUCTS INSTALLED BY THE DMC BUT NOT FURNISHED UNDER THIS SECTION
A. Connect control components, as shown on the plans, factory supplied as part of equipment controlled.

1.6 RELATED SECTIONS
A. Division 23 – General Mechanical Requirements.
B. Division 23 – Instrumentation and controls for HVAC.
C. Division 23 – Indoor Air Handling Units.
D. Division 23 – Air Terminal Units.
E. Division 23 – Testing and Balancing for HVAC.
F. Division 23 – Commissioning of HVAC.
G. Division 26 – Electrical Work.
H. Standard Specifications and Codes: In addition to the requirements shown or specified, comply with the following applicable standard specifications, codes or ordinances:
   2. UL – Underwriter’s Laboratories.
   4. Include all items of labor and material required to comply with such standards, codes or ordinances in accordance with the contract documents. Where quantities, sizes, or other requirements indicated on the drawings or herein specified are in excess of the standard or code requirements, the specification and drawings shall govern.

1.7 QUALIFICATIONS FOR THE DMC
A. Controls Installation Contractor: The DMC’s will be pre approved by WSU prior to bidding this project.

1.8 QUALITY ASSURANCE
A. Installer Qualifications: DMC contractor must be able to provide references, upon request, for similar projects (in size & scope) that were completed satisfactorily, in Michigan. Project names, owner contacts and companies who awarded this work to you shall all be provided upon request to WSU and/or the AE of record. DMC contractor must be prepared to submit a minimum of three (3) satisfactorily completed projects, annually, for the past five (5) years.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with ASHRAE 135 for DDC system components.

1.9 SEQUENCING AND SCHEDULING
A. Sequence work to ensure installation of components is complimentary to installation of similar components in other systems.
B. Coordinate work with other Contractors and subcontractors to ensure system is completed and commissioned by the Date of Substantial Completion.
C. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

1.10 WARRANTY
A. Provide as per project general conditions.

1.11 CONTROL Wiring
A. The DMC is required to use the cable below. Refer to temperature control drawings ABAC Building Automation Cable Specification Catalog. If a wire type is required that is not referenced on the ABAC sheet then it is up to the DMC to provide the appropriate wire for the application.
B. The DMC is required to tag all wiring. Wiring that is used for DDC control points should be tagged with abbreviated DDC point name from control submittal. If wire is to be demolded make sure the wire is labeled "spare" or "not in use".

1.12 INSTALLATION
A. Refer to project plans and DDC temperature control drawings for control wiring required and equipment locations.
B. Install control devices per installation requirements of control device. Before installing, always refer to local codes.

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ELECTRICAL INSTALLATION AND WIRING FOR HVAC TEMPERATURE AND LAB CONTROLS

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WSU College of Pharm Generator

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FOR REFERENCE ONLY
1.1 ELECTRICAL WIRING INSTALLATION BY THE EMC (Project Plans and Specifications Permit)

A. Furnish and install ALL wiring and interlock wiring as specified and as shown on the project plans DDC temperature control drawings. Connect controls in accordance with DDC temperature control drawings.

B. Installation minimum requirements:
   1. Mechanical Rooms & Penthouses Areas: EMT up ten feet, then exposed plenum I/O point wiring
   2. TEC Space Sensors: All cables furnished by Siemens, installed within wall construction without EMT.
   3. Other Space Sensors: I/O point wire in EMT for all non-accessible walls, approved plenum open wire in accessible walls.
   5. Ceiling Returns (non-accessible) and all other inaccessible areas: All wiring in EMT.
   6. Power and low voltage wiring shall not be run in the same conduit.

2.0 ON-SITE TESTING

A. Provide Owner-approved operation and acceptance testing of the complete system. The following shall witness the performance tests:
   1. The EMС – Electrical (controls) installation & wiring contractor
   2. The equipment manufacturer's representative
   3. The Owner's agent
   4. The Owner
   5. Architect/Engineer

B. Field Tests: When installation of the system is complete, all systems shall be tested to their sequence of operation including all safety circuits.

END OF SECTION 28 0900

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**SEQUENCE OF OPERATIONS FOR TESTING GENERATOR CONNECTIONS MONITORED VIA THE SIEMENS APOSEC SYSTEM**

Testing will provide generator “RUN” alarm, “FAULT” alarm, fuel “RIPTRIP” alarm, fuel “SOS” alarm, fuel “BOSS” alarm. Each alarm once triggered will provide a Siemens Renz Pacing alarm and graphical command center alarm.

Additionally, the fuel and phone line will also be tested and verified for proper operation.

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**TEST #: NORMAL RUNNING ALARM**

Start and run generator for normal monthly testing. Once generator started, generator interlock relay provides Siemens Renz pacing and graphic alarms as shown. "Generatpr Run Status = ON" and "Generator Run Status = OFF."

**TEST #: ALARM FAULT TEST**

Generator off and panel selector switch in Auto. Move selector switch to Manual Run. (Delay occurs then Generator starts) Now push in red stop button. This will force generator into an alarm condition. Generator interlock relay provides Siemens Renz pacing and graphic alarms as shown. To reset alarm, pull out red stop button, switch selector switch to Auto. Note that generator selector switch should always be in the "Auto" position.

"Generator alarm = Alarm" and "Generator alarm = Normal."

**TEST #: TANK Rupture alarm**

Press and hold the momentarily wall mounted “Rupture” push button (PB). Generator interlock relay provides Siemens Renz pacing and graphic alarms as shown. Note that the Renz alarm should be broadcasted within 1 minute. Release PB once completed.

"Fuel tank rupture = On" and "fuel tank rupture = OFF."

**TEST #: SOX FUEL LEVEL ALARM**

Fuel level sensor test activates both the local phone dialer and Siemens system. Contact Glenn Williams (313-350-9123) at Dawn Fuel Supply Company (313-834-2580). Inform Glenn that he will receive a SOX fuel call out from the respective building. Glenn will be standing by and will need to call back the SOX onsite person once each alarm has been received.

Test procedure as follows: Press and hold the momentary wall mounted "SOX test" push button (PB). Generator interlock relay provides phone dialer, Siemens Renz pacing and graphic alarms as follows. Note that alarm should be broadcasted within 1 minute. Continue to hold PB until Glenn receives, accepts and then returns his confirmation call that phone dialer was received. Phone message reads...”WSU respective building generator started, delivery fuel within 4 hours. 100% fuel level = Normal” and “SOX fuel level = Normal.”

Note: 2 minute delay before return to normal on Renz alarm.

**TEST #: BOSS FUEL LEVEL ALARM**

Fuel level sensor test activates both the local phone dialer and Siemens system. Contact Glenn Williams (313-350-9123) at Dawn Fuel Supply Company (313-834-2580). Inform Glenn that he will be receiving a BOSS fuel call out fuel call out from the computer services building. Glenn will be standing by and will need to call back the SOX onsite person once each alarm has been received.

Test procedure as follows: Press and hold the momentary wall mounted "BOSS test" push button (PB). Generator interlock relay provides phone dialer, Siemens Renz pacing and graphic alarms as follows. Note that alarm should be broadcasted within 1 minute. Continue to hold PB until Glenn receives, accepts and then returns his confirmation call that phone dialer was received. Phone message reads...”WSU respective building generator fuel level low, deliver fuel immediately.”

"BOSS fuel level = alarm" and "BOSS fuel level = Normal.”

Note: 2 minute delay before return to normal on Renz alarm.

**DOC MONITORING POINTS PER GENERATOR:**

**GENERATOR RUN**

Digital input via dry contact

**GENERATOR FAULT**

Digital input via dry contact

**BATTERY CHARGER FAULT**

Digital input via dry contact

FOR REFERENCE ONLY
EDC MONITORING POINTS FOR FUEL STORAGE TANK:

- FUEL LEVEL BOX  DIGITAL INPUT VIA DRY CONTACT
- FUEL LEVEL BDM2  DIGITAL INPUT VIA DRY CONTACT
- TANK RUPTURE ALARM  DIGITAL INPUT VIA DRY CONTACT
- LOW DETECTION ALARM  DIGITAL INPUT VIA DRY CONTACT
- TANK LEVEL  ANALOG INPUT VIA 4-20MA SIGNAL

RENO – REMOTE EXHIBITION THRU APÖGEE

SET UP REINO GROUP FOR GENERATORS, "COMP CTR GENERATOR"
1. SUPERVISOR PAGE (COMMAND CENTRAL)
2. OWNER DEFINED
3. OWNER DEFINED
4. OWNER DEFINED

DEFINE THE FOLLOWING POINTS FOR REINO

GENERATOR RUN – "GEN # IS RUNNING" (USE RUNNING AND OFF AS CHANGE OF STATES)
RETURN TO NORMAL – "GEN # IS OFF"

GENERATOR ALARM – "GEN # FAILED TO START"

LOW FUEL LEVEL (DAY TANK) – "GEN # (ARE DAY TANKS NUMBERED)
50% FUEL LEVEL – "FUEL TANK 50% ALARM"
80% FUEL LEVEL – "FUEL TANK BOX ALARM"

NO ATS POINTS DEFINED FOR REINO

ANALOG PHONE DIALER INFORMATION

THE FOLLOWING FOUR NUMBERS TO BE PROGRAMMED INTO THE "DIALER" PANEL
1. ATLAS OIL COMPANY (FUEL DELIVERY) 800-878-2000
2. KATIE MELLEA (ACCOUNT REPRESENTATIVE) (OFFICE) 313-662-3621
(CELL) 313-932-4873
3. WSU SUPERVISOR (COMMAND CENTER) 313-577-4844
4. WSU PUBLIC SAFETY (NON-EMERGENCY) 313-577-3224

FOR REFERENCE ONLY
Reference Only

This drawing is for reference only. This drawing must be used only to add additional detail to what is being provided by the engineer of record. Not all terminations, wire pulls or interlocks are shown in these diagrams as this will be dependent on the equipment purchased by others. Once equipment submittals are secured, the final drawings will reflect all work necessary to provide a full and functioning control system as outline in the plans and specs. It is the bidder's responsibility to review all contract documents provided by the engineer of record to ensure that a complete scope is bids. Quantity of items and location of devices/panels that are not clearly spelled out in the drawings must be field verified to ensure that the project is properly bid. It is assumed that the bidder of the temperature controls - electrical installation is knowledgeable in such work and requires minimal guidance. Siemens assumes no responsibility or risk for bidders not fully understanding the scope or extent of the work required.

INSTALLATION NOTES:
1) LUBRICATING POWER CIRCUIT HARDWIRE TO BE CONNECTED.
2) PROVIDE DESIGNATED PHONE LINE FOR DUAL-OUT OF FUEL DELIVERY SYSTEM.
3) ALL WIRING TO MEET REQUIREMENTS OF STANDARD WIRING SPECIFICATIONS DRAWINGS.

FUEL OIL DELIVERY TEST SYSTEM

REFERENCE ONLY