

PARTIAL 14TH FLOOR PLAN  
SCALE: 1/8"=1'-0"

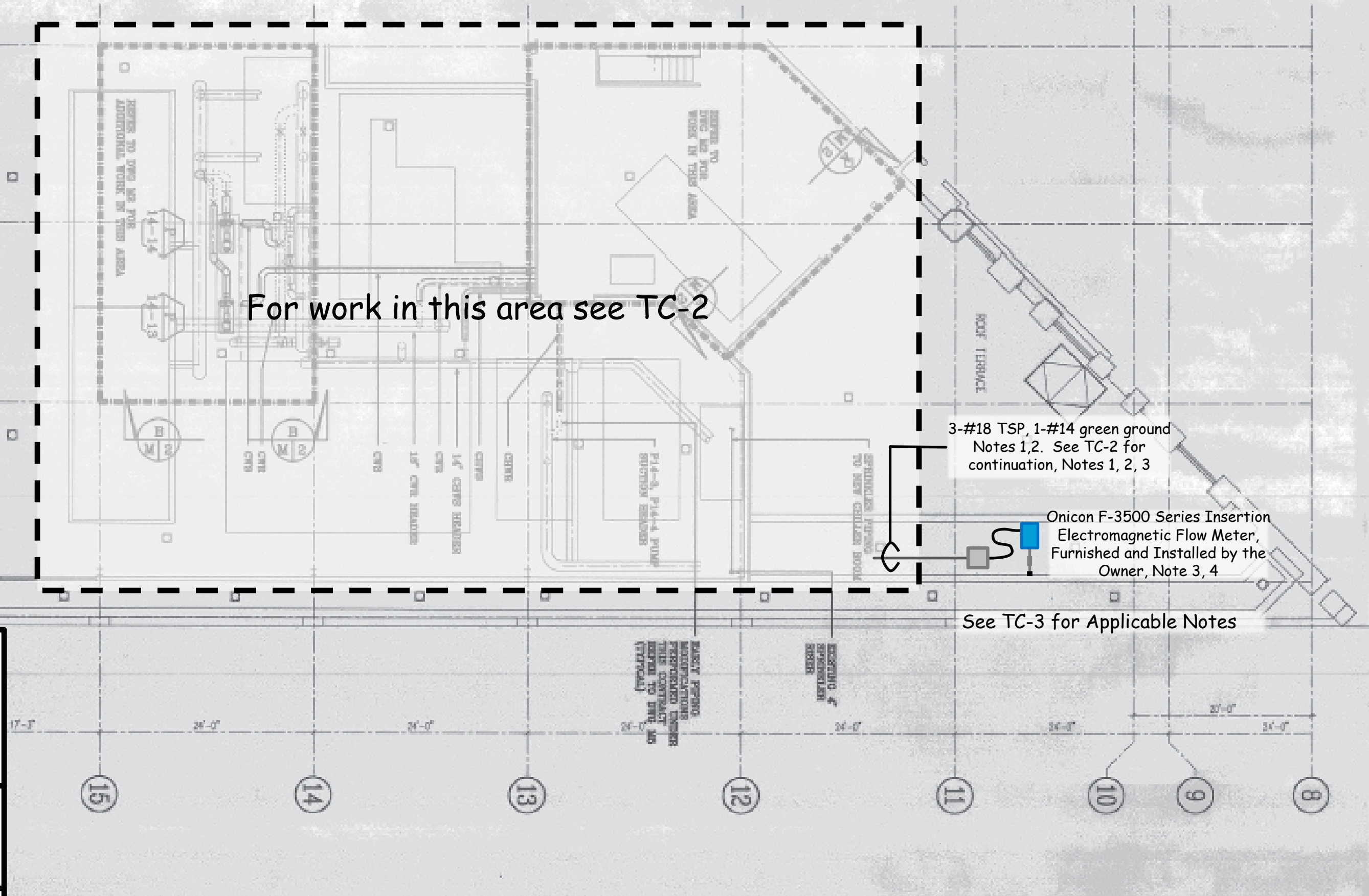


# Central Plant Sensor Additions

2015-06-16
Drawn By: DAS
Checked By: CBM
TC-1

## 14<sup>th</sup> Floor Central Overview

See TC-2 for chiller plant work  
See TC-3 for numbered notes  
See TC-4 and 5 for specifications








Notes (Apply to TC-1 and TC-2)

- 1. Conduit size based on Belden 8760 cable. Cables to be pulled from the sensor location to the Siemens control panel location with no splices. Terminate the shields at the Siemens control panel location only. Cut the shield and drain wire flush with the cable jacket and insulate with heat shrink tubing at the other end of the run to prevent ground loops. Make final terminations to the Siemens equipment under the direction of the Siemens field technician while they are on site. Do not make final terminations with out the direct supervision of Siemens field personnel.
- 2. One cable each for power, analog output, and meter alarm contacts. Siemens to furnish and install 24 vdc 250 ma power supply located at their temperature control panel location to power the meter.
- 3. Coordinate final terminations with Siemens per the manufacturers instructions.
- 4. Locate the junction box so that the factory supplied meter cable has enough slack in it to allow the meter to be removed/inserted into the pipe via the service valve assembly.
- 5. The cable system serving the flow meter and temperature transmitters shall be re-used by the renovated plant and shall be run in EMT as indicated. Provide cord and cable connectors for open wiring where it exits the conduit system to serve motor kW transmitters.
- 6. Cables to the motor kW transmitters will be reworked when the central plant is renovated in 2016/2017. For the current installation, they shall to be open wiring routed along the existing piping and structure at the contractor's discretion. Secure the cables to the existing piping and structure using tie-wraps approximately every 24 inches and/or as required for a neat, secure installation. Trim excess length from the tie-wraps after they are pulled tight.
- 7. Furnish and install new Rosemount indicating temperature transmitters as specified on TC-4 to replace the existing Siemens chilled water distribution loop temperature transmitters. Re-use the existing Siemens thermometer well. Run a new #18 TSP from the new sensor to the existing input module. Remote mount the temperature transmitter to allow it to be easily read by the operators at eye level the operators. Provide the transmitters assemblies with the armored cable lead extension option with an electrical plug at the RTD location to allow it to be quickly disconnected from the wiring so the sensor can be removed from the well for ice point calibration in the field. Provide sufficient armored cable to span the distance between the transmitter and RTD and then span from the RTD location to floor level to facilitate ice point calibration in the field. Neatly route and secure the cable between the transmitter and the RTD location to structure. Neatly coil and secure the excess cable length at the RTD location to allow it to be extended to floor level as required for ice point calibration. Field verify insertion lengths, extension lengths, armored cable lengths and mounting bracket options prior to ordering.
- 8. Coordinate with Siemens and the Owner to reconnect the new temperature transmitter in place of the existing transmitter, including all necessary point data base and software modifications require to fully integrate the new sensor into the existing system. Perform an ice point calibration and provide an offset in the point data base so that all of the temperature sensors installed under this scope of work have an identical indication of 32°F on the Operator's Work Station when immersed in an ice bath composed of melting ice and water that is in equilibrium with the melting ice and stirred.



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TC-3

- 9. Furnish and install new Ohio Semitronics kW transmitters as specified on TC-4. Furnish and install a hinged cover NEMA 1 enclosure adjacent to the starter or motor wiring compartment to house the transmitter or transmitters. Locate the enclosure to meet the Ohio Semitronics maximum lead length requirements for their CTs and voltage connections. Size the enclosure as required by the number of transmitters and code
- 10. Route cables at ceiling structure to the point where the conduits drop to the chiller control panel. Support the cables from the chiller control panel conduit drops to route them to the chiller. Route the cables along with other tubing and cabling on the chiller to the location of the kW transmitter enclosures.
- 11. Route new cables and conduit down to the square duct located over the existing Siemens panel. Use a hydraulic cutter to make any new holes required in the existing square duct to minimize the risk of metal shavings being thrown into the MBCs. Route cables to the appropriate MBC location through the existing square duct and conduit as directed by Siemens. Provide sufficient cable length during rough-in to facilitate final terminations at the location specified by Siemens. Match existing infrastructure for terminal strips and other specialty items associated with making terminations at the MBC.
- 12. All work to comply with all applicable codes and standards.
- 13. Coordinate all work and site visits with the Owner 2 weeks in advance.
- 14. Furnish submittals for review and approval prior to ordering for the following items:
  - a. Rosemount temperature transmitters
  - b. Ohio Semitronics kW Transmitters and CTs
  - c. Vaisalla HMT337 and accessories
  - d. Siemens hardware
  - e. Siemens terminations, point data base information, graphics, and logic for both new and modified items.

**kW Transmitter Specifications**

- 1. kW transmitters shall be Ohio Semitronics PLC 5 E2 Series three phase, three wire, two element watt transducers. Units shall be factory calibrated, loop powered, 4-20 ma devices with external voltage connections and current transformers.
- 2. Field verify the required voltage, amperage, and CT size prior to ordering. Verify that the CTs will fit and can be installed around the power conductors at the location shown. Coordinate with the Owner and FDE to select an alternative location if there are problems fitting the CTs and/or making voltage connections at the location shown.
- 3. Coordinate with the Owner as required for access to electrical gear for verification.


**Temperature Transmitter Specifications**

- 1. Temperature transmitters shall be Rosemount Model 3144P temperature transmitters with factory assembled Model 0078 platinum temperature sensors.
- 2. Transmitters shall be Rosemount Model 3144P D1 A1 NA P8 B5 M5 C2 Q4 XA WR5 with the model dash numbers intended to provide the following features and options.

- D1 - Aluminum field mount housing with 1/2" 14 NPT conduit connection
- A1 - single 4-20 ma output
- NA - No approvals
- P8 - Enhance transmitter accuracy
- B5 - Stainless steel L mounting bracket
- M5 - LCD display
- C2 - Callendar-Van Dusen Constants
- Q4 - Calibration Certificate
- XA - Sensor specified separately and assembled to the transmitter
- WR5 - 5 year warranty

- 3. The RTD elements shall be Rosemount Model 0078 N 11 C60 N 040 V1 Q4 M7 D1 L4 with the model dash numbers intended to provide the following features and options. Note the requirements to field verify several of the dimensions prior to ordering.

- N - Sensor only to be assembled to the transmitter
- 11 - General purpose style -200 to 500°C single element sensor
- C 60 - 6 inch nipple union stainless steel extension
- N - No thermowell; field verify extension dimensions and insertion length to work with the existing Siemens thermometer well.
- 040 - 4 inch insertion length; field verify extension dimensions and insertion length to work with the existing Siemens thermometer well.
- V1 - Callendar-Van Dusen Constants - 32- 212 °F
- Q4 - Calibration Certification
- M7 - 1/2-14 NPT Mounting adapter
- D1 - 1.5 foot armored cable lead wire extension with electrical plug to allow sensor to be disconnected and removed for ice bath calibration to the Siemens system
- L4 - 12 foot armored cable mating plug with lead wire extension to allow remote mounting of the transmitter with indicator so it is easily readable by the operators. Neatly coil excess cable with tie-wraps and secure it at the transmitter location. Field verify length before ordering.



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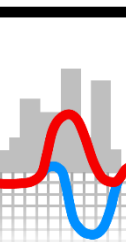
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TC-4

## Siemens Specifications

1. Coordinate with the Owner, FDE and the Owner's electrician to add the physical points shown on the drawings to the existing Siemens control network including:
    - a. Point expansion modules as required if sufficient spares to not already exist.
    - b. Point data base additions and modifications as required to fully define and integrate the points into the control system.
    - c. Power supplies for current loops and transmitter power as required for the devices specified and/or furnished by others.
    - d. Wiring diagrams and hardware submittals as required to document the installation.
    - f. Logic modifications and additions as required to create virtual meters as specified subsequently.
    - g. Supervision as required to coordinate final terminations, cable requirements, etc. with the Owner's electrician.
  2. Set up trends for all points physical points and virtual meters installed or created under this scope of work, accumulating data with a one minute sampling time.
  3. Archive data as required to create a continuous record of the plant operation.
  4. Furnish trend reports via e-mail to the Owner and Facility Dynamics on a monthly basis for up to two years.
  5. Create virtual meters for the following parameters:
    - a. kW and kWh for all compressors and cooling tower fans based on data from the new transmitters
    - b. kW and kWh for all pumps using a constant provided by FDE for each device in each possible operating mode.
    - c. Tons and ton-hours based on the distribution loop flow and temperature sensors
    - d. kW per ton for the plant based on the instantaneous kW parameters monitored by the installation.
  6. Create a chiller plant energy graphic that displays the operating metrics described in 5 above including:
    - a. Current value
    - b. Accumulated total for the week, current and previous week
    - c. Accumulated total for the calendar month, current and the same month the previous year
    - d. Accumulated total for the calendar year; current and the total for the same time period the previous year
  - e. Provide links from the existing chiller plant graphics to the plant energy graphic and vice-versa to facilitate the use of the system by the operators.
  - f. Coordinate with the Owner during the submittal process to define the appearance and arrangement of the graphic and data base penetration methods prior to developing the actual graphic.
  7. Modify existing graphics as required to include the new points in them and integrate them with the new graphics and point data base.
  8. Provide submittals as noted on TC-2. Comply with all existing point naming conventions, logic conventions, etc. for any new work or modification work and reflect this in the submittals.
  9. Include a control integration and coordination meeting as a part of the scope of work.
    1. Provide hardware submittals for review and approval as soon as possible after notice to proceed.
    2. Provide point database, graphic and logic/programming submittals for review prior to the control integration and coordination meeting.
    3. Final approval of the point database, graphic and logic/programming submittal will occur at the control integration and coordination meeting.
  10. Replace the existing outdoor air conditions sensors with a Vaisalla HMT337 with display and a warmed probe and additional temperature sensor for measuring outdoor air temperature, dew point, and relative humidity.
    - a. Include a HMT330MIK mounting kit with:
      - i. A wall mounting plate for the transmitter.
      - ii. A support bar and shield for the warmed dew point probe
      - iii. A DTR502 radiation shield for the temperature probe
    - b. Include an HM70 hand held meter and connection cable for calibration purposes.
    - c. Include a USB service port and cable with PC software.
    - d. Include 2 stainless steel grid filters; one installed on the probe and one as a spare.
    - e. Include analog outputs for temperature, relative humidity, and dew point.
    - f. Include sufficient cable to allow the transmitter electronics to be mounted indoors.
    - g. Include a 6 point factory calibration with calibration certificate.
    - h. Include an allowance for relocating the existing sensor up to 50 feet from the current location. If the sensor is not relocated, the allowance is returned to the Owner. Specify the allowance amount in the proposal.



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## TC-5