

Central City, Kentucky
Wastewater Treatment Plant Expansion

ADDENDUM No. 2

August 24, 2018

This ADDENDUM to plans, specifications and bidding documents for the subject project modifies the referenced items to the extent described herein. Items not modified by this ADDENDUM remain unchanged and in full effect.

Bidders are required to acknowledge receipt of this ADDENDUM on the Bid Form.

Specifications

1. **Supplementary Conditions - SC-13.02 Allowances - Page 16 of 25**
 - a. The \$20,000 Electrical and Controls Allowance shall be removed.
 - b. The SCADA System Computer Allowance shall be changed from \$4,000 to \$15,000.
2. **Services of Manufacturer's Representative - Section 01-450, 1.01.G - Page 2 of 2**
 - a. Remove 16-000 Motor Controls and VFD's listed pre-startup operator training and post-startup services. These services are specified in specification section 16940 - Controls and Instrumentation.
 - b. Remove 16-000 Generator listed pre-startup operator training and post-startup services. These services are specified in specification section 16230 - Standby Power System.
3. **Summary of Work - Section 01010, 1.04.C.3.c.(1) & (2) - Page 01010-4**
 - a. Change all references to "MCC-65" to "MCC-70". Change all references to "SCC-65" to "SCC-70".
4. **Service Entrance-Rated Automatic Transfer Switch - Section 16253 - 2.01.A - Page 16253-1**
 - a. Remove Kohler, KEP, as an acceptable manufacturer.
5. **Controls and Instrumentation - Section 16940 - 1.01.B - Page 16940-2**

- a. Change the section index for “Motor Control Center 65 (MCC-65) Notes” to “Motor Control Center 70 (MCC-70) Notes”.
 - b. Change the section index from “Supervisory Control Center 65 (SCC-65)” to “Supervisory Control Center 70 (SCC-70)”.
- 6. Controls and Instrumentation - Section 16940 - Part 2-Products - Page 16940-15**
- a. Provide an automatic dialer within SCC-85 as described in the attached specification section 16940.2.03.
- 7. Controls and Instrumentation - Section 16940 - 2.01.B - Page 16940-15**
- a. Change the SCADA System Computers and Software allowance from \$7,000 to \$15,000.
 - b. System Supplier shall include a hardware firewall within the SCADA System Computers and Software allowance. System Supplier shall include all labor necessary to set up the firewall in the Lump Sum Base Bid (not part of the allowance). Firewall shall be configured to isolate the SCADA network from the Internet, but shall allow remote access to the network for specific users.
 - c. System Supplier shall provide report software and include the development of laboratory, inventory, and maintenance reports as described in the attached specification section 16940.2.02.
- 8. Controls and Instrumentation - Section 16940 - 2.08.I - Page 16940-31**
- a. Clarification: FE/FIT-80-01 shall be furnished by the Division 11361 System Supplier.
- 9. Controls and Instrumentation - Section 16940 - 3.02 - Page 16940-42**
- a. Change the section title from “Motor Control Center 65 (MCC-65) Notes” to “Motor Control Center 70 (MCC-70) Notes”.
- 10. Controls and Instrumentation - Section 16940 - 3.08 - Page 16940-49**
- a. Change the section title from “Supervisory Control Center 65 (SCC-65)” to “Supervisory Control Center 70 (SCC-70)”.
 - b. Change the reference to “MCC-65” in 3.08.A to “MCC-70”.
- 11. Controls and Instrumentation - Section 16940 - 3.08.B.2.e - Page 16940-51**

- a. Change the reference to “SCC-65” in to “SCC-70”.

12. Controls and Instrumentation - Section 16940 - 3.09.C.1 - Page 16940-54

- a. Change the reference to “SCC-65” in to “SCC-70”.

13. SCADA System I/O Listing - Section 16990

- a. Change the “SCADA System I/O Listing - SCC-65” to “SCADA System I/O Listing - SCC-70”.

14. Short-Circuit, Coordination, and Arc Flash Assessment Section 16949

- a. Add specification section 16949 attached.

Drawings

1. Peracetic Acid Feed System Electrical Drawing

The following DRAWINGS was inadvertently omitted from the BIDDING DOCUMENTS. Please add these attached DRAWINGS.

05-C-07	Existing Site Contours
70-E-03	Peracetic Acid Feed System Electrical Plan

2. Title Sheet

The attached title sheet drawing index had been modified to show the addition of the drawings in (1.) above. Please replace the previous title sheet drawing with the attached version.

3. WWTP Electrical Site Plan - Sheet 17 - 05-E-01

- a. Add a weatherproof GFCI receptacle within the backflow preventer hot box. Mount the weatherproof GFCI receptacle within the hot box per manufacturer requirements.
- b. Change “MCC-65” and “SCC-65” within the Effluent Electrical Building to “MCC-70” and “SCC-70” respectively.
- c. Change the Effluent Electrical Building structure number from 65 to 70.
- d. Change the PAA Feed System building number from 55 to 70.
- e. Change keynote 7 to the following:

“POWERED FROM LP-70 WITHIN MCC-70 IN EFFLUENT ELECTRICAL BUILDING.”

4. WWTP Electrical Enlarged Site Plan - Sheet 18 - 05-E-02

- a. Change the reference to MCC-65 in general note 4 to MCC-70.
- b. Change the reference to MCC-65 in key note 2 to MCC-70.

5. Lift Station and Screen Electrical Plan - Sheet 34 - 25-E-01

- a. Remove key note 5 from the Grit System Control Panel. Add key note 5 to the Gas detection control panel.
- b. Change the key note 16 reference for the “OHC-25-01” control station to reference key note 4.

6. Final Clarifier No. 3 Electrical Plan - Sheet 48 - 40-E-01

- a. Change the reference to LP-65 in general note 3 to LP-70.
- b. Change the references to MCC-65 in general note 3 to MCC-70.

7. RAS and Scum Pump Station Electrical Plans - Sheet 52 - 50-E-01

- a. Change the reference to LP-65 in general note 3 to LP-70.
- b. Change the references to MCC-65 in general note 3 to MCC-70.

8. UV Channels Electrical Plan - Sheet 55 - 60-E-01

- a. Change the reference to LP-65 in general note 2 to LP-70.
- b. Change the reference to MCC-65 in general note 2 to MCC-70.
- c. Change all references to LP-65 on the Riser Diagram to LP-70.

9. Effluent Pump Station Electrical Plan - Sheet 62 - 70-E-01

- a. Change the reference to LP-65 in general note 2 to LP-70.
- b. Change the reference to MCC-65 in general note 2 to MCC-70.
- c. Change the reference to PP-65 for the Plant Water Pumps to PP-70.

10. Effluent Pump Station Building Electrical Plan - Sheet 63 - 70-E-02

- a. Change the MCC-65 to MCC-70. Change SCC-65 to SCC-70.

11. Sludge Dewatering Building Electrical Plan - Sheet 75 - 80-E-01

- a. Remove magnetic flow meter FIT-80-02.
- b. Add key note 1 to FIT-80-01.
- c. Clarification: All instruments and devices with key note 1 shall be provided by the 11361 system supplier.
- d. Clarification: Limit switches ZS-80-03 and ZS-80-04 shall be provided by the 14550 container handling system supplier.

12. Administration Building Plan - Sheet 77 - 85-ASME-01

- a. Add a dedicated telephone POTS line in raceway such as Legrand Wiremold, or equal, from telephone demarc to SCADA 1 computer in the Administration building Office.
- b. Add a dedicated telephone POTS line in raceway such as Legrand Wiremold, or equal, from the telephone demarc to the automatic dialer within SCC-85.
- c. Clarification: The telephone demarc is indoors adjacent to the north entrance to the Administration building.

13. One-Line Diagram - 2 - Sheet 101 - 100-E-03

- a. Change MCC-65 to MCC-70. Change PP-65 to PP-70. Change LP-65 to LP-70. Change XFMR-65 to XFMR-70. Change the structure number for MCC-70 to Structure 70.

- b. The feeders and conduit from SWBD-80 to MCC-80 shall be changed from:

3~600MCM
#3 GND
4"C.

To:

3~500MCM
#3 GND
4"C.

- c. The feeders and conduit from SWBD-80 to MCC-75 shall be changed from:

3~600MCM
#3 GND
4"C.

To:

3~500MCM
#3 GND
4"C.

d. The feeders and conduit from SWBD-80 to MCC-70 shall be changed from:

3~600MCM/PH
3~3/0 GND
3~4"C.

To:

4~350MCM/PH
4~3/0 GND
4~3"C.

14. SCADA Riser Diagram and SWBD-80 Elevation - Sheet 102 - 100-E-04

- a. Change structure 65 in the SCADA Riser Diagram to structure 70. Change the note "Located in SCC-65" to "Located in SCC-70". Change the note "Located in MCC-65" to "Located in MCC-70".
- b. Change "MCC-65 FCB" on the SWBD-80 elevation to "MCC-70 FCB".
- c. Add a Cat6 shielded cable in 3/4" conduit from the managed switch within SCC-80 to the Screw Press Dewatering Control Panel.
- d. Clarification: The telephone demarc is indoors adjacent to the north entrance to the Administration building.
- e. Provide Cat6 from SCC-85 managed switch to the firewall within SCC-85. Provide Cat6 in raceway from the firewall within SCC-85 to the internet router within the Administration Building.
- f. Add a dedicated telephone POTS line in raceway from telephone demarc to SCADA 1 computer in the Administration building Office.
- g. Add a dedicated telephone POTS line in raceway from the telephone demarc to the automatic dialer within SCC-85.

- h. Provide Cat6 from SCC-85 managed switch to the automatic dialer within SCC-85.

15. MCC-65 Schedule and Elevation - Sheet 104 - 100-E-06

- a. Change the sheet title from “MCC-65 Schedule and Elevation” to “MCC-70 Schedule and Elevation”.
- b. Change the title for the motor and motor control center schedule from “MCC-65” to “MCC-70”.
- c. Change the “Panel MCC” column in the Motor and Motor Control Center Schedule MCC-70 to have all rows change from “MCC-65” to “MCC-70”.
- d. Change the “MCC-65 Elevation” to “MCC-70 Elevation”.
- e. Change “SCC-65” in the MCC-70 Elevation to “SCC-70”. Change “PP-65” in the MCC-70 Elevation to “PP-70”. Change “LP-65” in the MCC-70 Elevation to “LP-70”. Change “XFMR-65” in the MCC-70 Elevation to “XFMR-70”.

16. Electrical Schedules - 1 - Sheet 107 - 100-E-09

- a. Change the panel schedule title for “Power Panel PP-65” to “Power Panel PP-70”. PP-70 shall be mounted in MCC-70.
- b. Change the panel schedule title for “Lighting Panel LP-65” to “Lighting Panel LP-70”. LP-70 shall be mounted in MCC-70.
- c. Change all references to “FIT-80-02” to “FIT-80-01” in the Screw Press Dewatering Equipment Conduit and Wiring Schedule.
- d. Change the conductors for the Press Inlet Sludge Pressure in the Screw Press Dewatering Equipment Conduit and Wiring Schedule from “4~#14” to “manufacturer furnished cable”.

17. Electrical Schedules - 2 - Sheet 108 - 100-E-10

- a. Add a 20-amp, 1-pole branch breaker within LP-10 and provide 2~#10 and #10 ground from LP-10 to the backflow preventer GFCI receptacle.

SECTION 16949

SHORT-CIRCUIT, COORDINATION, AND ARC FLASH ASSESSMENT

PART 1—GENERAL

1.01 SUMMARY

- A. Work included: CONTRACTOR shall retain the services of an independent third-party firm to perform a Short-Circuit, Coordination, and Arc Flash Assessment, as specified herein. The studies shall be submitted to ENGINEER prior to receiving final approval of the equipment shop drawings and prior to release of equipment for manufacture. See Section 1.04 Submittals for additional requirements.
- B. The analysis, testing, and inspection shall include all portions of the new and existing electrical distribution system. This shall include, but not be limited to, the following items. Equipment not specifically noted below that is part of the distribution shall also be included.
 - 1. Utility service entrance including primary switching and fusing.
 - 2. Pad-mounted exterior transformers.
 - 3. Automatic transfer switches.
 - 4. Standby generators.
 - 5. Generator distribution equipment, including paralleling controls and equipment.
 - 6. Switchboards.
 - 7. Low voltage motor control centers.
 - 8. OEM-provided control panels with electrical supply over 100 amperes at 480 volts.
 - 9. Motor control panels.
 - 10. Power panels.
 - 11. Lighting panels.
 - 12. Safety switches.
 - 13. 480V junction boxes and enclosures where terminations and splices are being made.
- C. Normal system connections and those which result in maximum fault conditions shall be adequately covered in the study. Alternative scenarios shall be included to illustrate normal and standby power sources and the relative effects on the distribution system.
- D. Related Sections and Divisions: Applicable provisions of Division 1 shall govern work in this section.

1.02 REFERENCES

- A. NFPA70—National Electrical Code.
- B. NFPA70E—Standard for Electrical Safety in the Workplace, Latest Edition.
- C. IEEE Standard 1584—IEEE Guide for Performing Arc Flash Hazard Calculations.
- D. OSHA 29 Code of Federal Regulations (CFR) Part 1910, Subpart S.
- E. ANSI/IEEE Standards C37, 242, and 399.
- F. UL 489—Underwriters Laboratories.

1.03 QUALITY ASSURANCE

- A. The firm shall be currently involved in high- and low-voltage power system evaluation. The study shall be performed, stamped, and signed by a registered professional engineer (electrical) in the State where the project is located. Credentials of the individual(s) performing the study and background of the firm shall be submitted to ENGINEER for review prior to start of the work. A minimum of 5 years' experience in power system analysis shall be required for the project manager.
- B. The firm performing the study shall demonstrate capability and experience to provide assistance during start-up, as required.

1.04 SUBMITTALS

- A. The following submittal process shall be followed and be coordinated with the suppliers of equipment specified in Divisions 8, 11, 14, and 15, along with other Division 16 sections. In general, the report specified below shall be completed prior to equipment shop drawings being approved and prior to equipment being released for manufacture, such that equipment changes may be made during shop drawing review if changes are recommended by the report. If completion of the report may cause delay in equipment manufacture, partial approval from ENGINEER may be obtained if the preliminary submittal includes data sufficient to determine that the selection of device ratings, settings, and characteristics will be satisfactory.
- B. The following submittals shall be provided for review by ENGINEER.
 - 1. Statement of Qualifications: Prior to equipment shop drawings being submitted, the third party testing firm shall submit a statement of qualifications including resumes of individuals who will perform the work, specific software and analysis tools that will be used, and at least three example reports that were completed for projects similar in size and nature.
 - 2. Final Report: At the time of, or prior to equipment shop drawings being submitted, the finalized report shall be submitted for formal review by ENGINEER. The report shall include all new equipment being provided based on shop drawing submittals, existing equipment based on information collected during site visits, and estimated cable lengths. The report shall also include a written document from the Utility Company indicating three-phase short circuit contribution and single-phase short circuit contribution, and X/R ratios for each utility service. This submittal shall be a completed, finalized report that will be updated with actual cable lengths once installed.
 - 3. Report Update, Field Testing, and Inspection: Once all equipment is operating based on its design intent, the specified field testing, inspection, device settings, and thermographic surveys shall be completed. The third party testing firm shall visit the site to confirm that the new equipment matches the shop drawings. Additionally, the previously submitted final report shall be updated with actual installed cable lengths, device settings, results of testing and field inspections, the thermographic survey, and changes made during construction. This item and the above items shall be completed prior to substantial completion.

- C. The final report shall meet the following requirements:
1. Submit six bound copies of the final report. Provide two compact discs with the final report, in PDF format, burned on each disc. The two CDs shall also include all report files in Word format, one-line diagrams in PDF format, and all power analysis software files and associated libraries.
 2. Organize and submit the report with the following sections. Below are minimum requirements, and the report shall be tailored to meet specific project requirements and equipment:
 - a. Part I: Overview.
 - b. Part II: Short-Circuit Study:
 - (1) Purpose.
 - (2) Explanation of data.
 - (3) Assumptions.
 - (4) General and specific procedures followed.
 - (5) Analysis of results.
 - (6) Recommendations.
 - (7) Fault Analysis Input Report.
 - c. Part III—Coordination Study:
 - (1) Purpose.
 - (2) Explanation of data.
 - (3) Assumptions.
 - (4) General and specific procedures followed.
 - (5) Analysis of results.
 - (6) Recommendations, including trip curves and device settings for project-specific equipment.
 - (7) Spreadsheet or report showing the range of all device settings and recommended settings.
 - d. Part IV—Arc Flash Study:
 - (1) Purpose.
 - (2) Explanation of Data.
 - (3) Assumptions.
 - (4) Analysis of results, including all items in Motor Control Centers, Switchboards, control panels, disconnects, etc.
 - (5) General and specific procedures followed.
 - (6) Recommendations, including system modifications that may reduce arc flash hazard based on analysis of results.
 - (7) Arc flash evaluation report including sample labels for major distribution equipment.
 - e. Part V—Thermographic Survey:
 - (1) Purpose, description, and scope.
 - (2) General and specific procedures followed, including equipment load at time of survey.
 - (3) Equipment used, along with calibration maintenance records.
 - (4) Analysis of results, including thermal images, digital photos, charts, and graphical data.
 - (5) Conclusions and recommendations.

- f. Appendices:
 - (1) One-line diagrams of the system in similar format as the Contract Documents from the power analysis software showing project-specific equipment, wire and cable types and lengths, fault currents, and recommended device settings.
 - (2) Protective device summaries generated by the power analysis software.
 - (3) Reference data.
 - (4) Paper copy of warning labels to be provided for the project.

D. Refer to Part 3–Execution for additional requirements and specific analyses to be performed.

PART 2–PRODUCTS

2.01 POWER ANALYSIS SOFTWARE

- A. The study and assessment shall be performed based on SKM PowerTools software utilizing Dapper, Captor, Arc Fault, and Arc Flash evaluation modules. Equivalent or alternative software packages may be used, but shall be submitted for review by ENGINEER as part of the preliminary submittal.

2.02 ARC FLASH HAZARD LABELS

- A. Labels shall be provided for existing and new equipment shown on the one-line diagrams on the drawings and specified in all Division 16 technical sections, as well as for equipment provided in Divisions 8, 11, 14, and 15 where an arc flash hazard may exist. This shall include junction boxes and motors 50 hp and larger. A separate label shall be installed on each MCC bucket, switchboard section, panel board, motor junction box, generator, automatic transfer switch, etc. For switchboards and MCCs with a main circuit breaker, a minimum of two labels shall be provided (one for main circuit breaker section and one for remaining sections in the equipment lineup). Provide labels as manufactured by Conney Safety Products, or equal, and meet the following minimum requirements:
 - 1. Self-adhesive, vinyl, 6 inches by 4 inches minimum.
 - 2. Equipment identification corresponding to the Contract Documents.
 - 3. Study date.
 - 4. Arc-flash boundary.
 - 5. Incident Energy Working Distance.
 - 6. Nominal system voltage.
 - 7. Shock-hazard boundaries (limited approach and restricted approach).
 - 8. Site specific Personal Protective Equipment (PPE) level.
 - 9. Available incident energy.
 - 10. Bolted fault current.

2.03 ONE-LINE DIAGRAM

- A. In each electrical room, provide a one-line diagram meeting the requirements of IEEE/ANSI Standard 141, mounted on a 24-inch by 36-inch minimum Styrofoam backboard.

PART 3-EXECUTION

3.01 DATA COLLECTION

- A. CONTRACTOR and testing firm shall gather the required data from shop drawings and existing equipment for preparation of the studies. Firm performing the system studies shall visit the site as needed to properly carry out the work and meet the requirements of these specifications.
- B. CONTRACTOR and testing firm shall expedite collection of the data to complete the studies defined above. The following minimum information shall be collected and used:
 - 1. Available fault current from the local utility company.
 - 2. If applicable, existing equipment ratings including bus bracing, interrupting device ratings, and age/condition.
 - 3. Installed cable or busway lengths, along with the specific rating, type and manufacturer.

3.02 SHORT-CIRCUIT AND COORDINATION STUDY

- A. Include in the appropriate report sections noted above, calculation methods and assumptions, base per unit quantities selected, one-line diagrams, source impedance data including power company system characteristics, typical calculations, and recommendations. Calculations shall be provided for multiple distribution system scenarios when source equipment can provide multiple power feeds to downstream equipment (i.e., standby generators, etc.).
- B. Calculate short-circuit interrupting and momentary (when applicable) duties for an assumed three-phase bolted fault at each bus (each change of impedance), transformer primary and secondary terminals (new and existing), switchboard (new), Motor Control Center, as well as other significant locations throughout the system, including all three phase motors. Provide a ground fault current study for the same system areas (new), including the associated zero sequence impedance data. Include in tabulations, fault impedance, X to R ratios, asymmetry factors, motor contribution, short-circuit kVA, and symmetrical and asymmetrical fault currents.
- C. In the Protective Device Coordination Study, provide time-current curves graphically for new and existing distribution equipment, indicating the coordination proposed for the system, centered on conventional, full-size, log-log forms. Include with each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered by that particular curve sheet. Include a detailed description of each protective device identifying its type, function, manufacturer, and time-current characteristics. Tabulate recommended device tap, time dial, pickup, instantaneous, and time-delay settings.
- D. Include on the curve sheets power company relay and fuse characteristics, system equipment relay and fuse characteristics, low voltage equipment circuit breaker trip device characteristics, pertinent transformer characteristics, and characteristics of other system load protective devices such as protective relaying equipment and multifunction relays. Include at least all devices down to largest three-feeder circuit breakers in each new switchboard.
- E. Include all adjustable settings for new ground fault protective devices. Include manufacturing tolerance and damage bands in plotted circuit breaker characteristics. Show transformer full load and 150, 400, or 600% currents, transformer magnetizing inrush, ANSI transformer

withstand parameters, and significant symmetrical and asymmetrical fault currents. Terminate device characteristic curves at a point reflecting the maximum symmetrical or asymmetrical fault current to which the device is exposed.

- F. Select each primary protective device required for a Delta-Wye connected transformer so that its characteristic or operating band is within the transformer characteristics, including a point equal to 58% of the ANSI withstand point to provide secondary line-to-ground fault protection. Where the primary device characteristic is not within the transformer characteristics, show a transformer damage curve. Separate transformer primary protective device characteristic curves from associated secondary device characteristics by a 16% current margin to provide proper coordination and protection in the event of secondary line-to-line faults.
- G. Utilize equipment load data for the study obtained by CONTRACTOR from Contract Documents, including Contract addendums issued prior to Bid opening.
- H. Include fault contribution of all motors and generators in the study, including scenarios where the generators and utility sources are both supplying electricity concurrently, such as with a closed transition transfer or paralleling power generation scheme. Notify ENGINEER in writing of circuit protective devices not properly rated for fault conditions. Provide recommended settings for motor starters and note any system inadequacies or potentially hazardous conditions. Show each MCC full-load current plus symmetrical and asymmetrical of the largest motor-starting current so that protective devices will not trip major or group operation.
- I. A standby generator is provided, include phase and ground coordination of the generator paralleling equipment and generator protective devices to meet NEC 700.27 requirements. Show the generator decrement curve and damage curve along with the operating characteristic of the protective devices. Obtain the information from the generator manufacturer and include the generator actual impedance value, time constants, and current boost data in the study. Do not use typical values for the generator.

3.03 ARC FLASH HAZARD STUDY

- A. As part of the Short-Circuit and Coordination Study, the Arc Flash Hazard Study shall be included. Include in the appropriate report sections noted above, the following minimum requirements:
 - 1. Determine and document all possible utility and generator sources and scenarios that are capable of being connected to each piece of electrical gear. Calculations shall be based on highest possible source connection.
 - 2. Arc flash values for two normal cases to define the highest values (low short-circuit and high short-circuit).
 - 3. Arc flash values for two maintenance cases which define the arc flash values available at the equipment, which would be available if the instantaneous trip of the upstream circuit breaker is set at a minimum value. This is recommended for personnel working on live equipment.
 - 4. Recommendations to reduce the arc flash incident energy in all areas that require 8 cal/cm² and higher PPE.
 - 5. Calculations to conform to National Fire Protection Association (NFPA) 70E calculation standards. All incident energy units shall be calculated in calories per square centimeter.

- B. Furnish and install labeling as specified herein based upon the results of the Arc Flash Hazard Study.

3.04 FIELD SETTINGS

- A. CONTRACTOR shall perform field adjustments of the new and existing protective devices as required to place the equipment in final operating condition. The settings shall be in accordance with the updated final version of the Short-Circuit Study, Coordination Study, and Arc Flash Hazard Study.
- B. Necessary field settings of devices and adjustments and minor modifications to equipment to accomplish conformance with the final version of the Short-Circuit and Protective Device Coordination Study shall be carried out by CONTRACTOR at no additional cost to OWNER.

3.05 THERMOGRAPHIC SURVEY

- A. Prior to project substantial completion, perform a thermographic survey of all electrical equipment specified herein to be inspected and tested. Survey shall be performed with load applied to the system. In addition to equipment specified to be inspected and tested, the following items shall also have a thermographic survey performed:
 - 1. Three-phase disconnect switches.
 - 2. Overcurrent protective devices.
 - 3. Utility and CONTRACTOR-provided metering and CT cabinets.
 - 4. Panelboards.
 - 5. Standby Power System.
 - 6. Transient voltage surge suppression equipment operating at a nominal voltage of 460, or higher.
 - 7. Splices (where allowed), lugs, or taps for conductors larger than 6 AWG. This shall include all junction boxes, pull boxes, and handholes.
 - 8. Motor junction boxes.
- B. Covers shall be removed to provide thermographic inspection. Covers unable to be removed shall be noted in the report, along with restriction for cover removal.
- C. A report shall be provided listing each item surveyed along with the observed temperature. Temperature shall be listed for each phase. Any hot spots encountered shall include thermographic photo of the area along with the temperature reading, the issue causing the hot spot condition, and proposed actions to correct the condition. Once the hot spot condition has been corrected, a new survey shall be taken and the results provided.
- D. At approximately 12 months following project final completion, perform a follow-up thermographic survey, and provide an updated report to OWNER.

END OF SECTION

2.02 REPORTS

- A. System Supplier shall provide the software and include the development of laboratory, inventory, and maintenance reports as described below. Development and implementation of all laboratory, inventory, and maintenance reports shall be provided by the software manufacturer. Three 8-hour sessions of on-site training shall be provided by the software manufacturer. On-site time spent configuring reports and setting up software and travel time to and from the site shall not be considered part of the training sessions. Travel and expenses shall be included for all site visits. In addition to the work described above, System Supplier shall include the following as part of report development:
1. Initial meeting with System Supplier's programmer, OWNER, and ENGINEER to discuss report formats, method of accessing reports, method of entering data into reports, etc. All meetings will be held at ENGINEER's office in Kentucky, and shall be assumed to be a minimum of 8 hours in duration. Meetings may be attended by any parties associated with the Contract. At a minimum, one representative of System Supplier capable of making binding decisions related to this scope of work shall attend.
 2. Meeting at 25% completion of the reports with System Supplier's programmer, OWNER, and ENGINEER to review report formats, calculations, layout, etc. Reports shall be submitted to ENGINEER one week prior to the meeting.
 3. Meeting at 50% completion of the reports with System Supplier's programmer, OWNER, and ENGINEER to review report formats, calculations, layout, etc. Reports shall be submitted to ENGINEER one week prior to the meeting.
 4. Meeting at 75% completion of the reports with System Supplier's programmer, OWNER, and ENGINEER to review report formats, calculations, layout, etc. Reports shall be submitted to ENGINEER one week prior to the meeting.
 5. Meeting at 90% completion of the reports with System Supplier's programmer, OWNER, and ENGINEER for final modifications and/or additions to the reports. Reports shall be submitted to ENGINEER one week prior to the meeting.
 6. Preparation and submittal of all reports at 100% completion for shop drawing review.
 7. An allowance of 40 hours for software enhancements and modifications to improve operation of the system.
 8. Additional meetings may be required if laboratory and inventory maintenance reports are not at the required completion stages when the above meetings are held.
- B. Using Hach WIMs, System Supplier shall develop reports for the system that include real time and historical data from the SCADA System. Reports shall be automatically generated to an OWNER defined printer location. In addition, users may generate reports on demand from the computer for either on-screen viewing or printing. The reports shall consist of the following:
1. The reports shall include, but not be limited to, minimum, maximum, average, and totalized daily values from the various inputs as listed in Section 16990-SCADA System I/O Listing. The system shall also

incorporate manually entered operations and laboratory data and calculated statistics. The system shall be configured so that all automatically acquired data and manual input data be accessible from any report application without need for redundant data entry. Report data collection and totalization periods shall be operator-adjustable (i.e., 7 A.M. to 7 A.M.). There shall be included in the Bid a minimum of 20 reports and 10 data input/viewing forms. Reports shall have the capability of incorporating any system variables as shown in Section 16990-SCADA System I/O Listing, any manually collected operations and laboratory data, and statistics calculated from the integration of manually collected data and real-time data. These statistics shall be included for each unit process in the treatment facility.

2. A total of ten individual monthly reports in row/column format shall be included with manually entered and/or process generated data. The columns to include in the ten reports will be determined prior to the initial meeting.
3. State report currently submitted by OWNER shall be generated automatically by the system.
4. Daily and monthly reports will be as implied monthly and will include up to 31 daily summaries for the given type.
5. All maximum and minimum values will be assigned a time and date (where applicable).
6. The system shall maintain data on the SCADA Server's fixed disk drive for a minimum period of one year and then compact and archive data to save disk space.
7. Calculated values shall have the capability of ignoring "No Data" points on the report or requiring data in all points per value. Averages of values shall not include the effects of "No Data" entries.
8. In addition to these values, the Monthly Summary shall include, but not be limited to: Flows, daily totals, monthly averages, and peak and minimum values at the bottom for all analog and totalized variables shown in the I/O list in Section 16990.
9. Procedures and instructions shall be included to allow OWNER modifications, addition, and deletion of reports.

C. Maintenance Report System:

1. An equipment preventive maintenance system using Hach JobCal Plus shall be included with the system. The system shall be menu driven. Consecutively numbered work orders shall be automatically printed for each maintenance task on any selected equipment based on accumulated runtime, starts, or calendar intervals each day. Intervals shall be selected by the operator.
2. Runtimes and starts shall be totalized in the PLC database or entered manually only when equipment run signals are not available in the database. Each maintenance task shall have changeable yearly starting and ending dates so work orders are not generated during off season for the piece of equipment.
3. Each work order shall include the name and location of the equipment, the maintenance task required, directions on performing the task, a listing of the tools and supplies required, a list of notes and warnings, plus a sign-off

section to be filled in after the task is completed. A job completion date shall be included on each work order.

4. Completed work order numbers shall be entered into the system with the date completed, the identification of the person who completed the task, and any remarks made by the person. It shall not be required to enter the completed work order number on the same day it was completed. The entered information shall be added to the maintenance database for the equipment.
5. It shall be possible for the operator to command the system to invoke a specified work order and to reprint current work orders in case of loss.
6. A maintenance historical database shall be created to record the history of each maintenance task in the system. The operator shall be able to easily copy the history file to a diskette. This diskette shall then be capable of being used on other computers with Windows compatible word processing or other programs.
7. The information for the maintenance tasks shall be stored in database format.
8. The maintenance system shall provide the following reports:
 - a. Description of each maintenance task with next service dates and points. This report shall be used to help schedule manpower for the next month, quarter, or year.
 - b. An uncompleted work order report that shall list all uncompleted work orders.
 - c. A late work order report that shall list all the uncompleted work orders past their date.
 - d. Equipment history report that will list maintenance history for the selected piece of equipment, plus any notes or remarks made by the maintenance personnel (if entered).
 - e. A work order history that will list all the work orders with the date issued and completed, starting from a specified date.
 - f. A configuration report that consists of a complete list of all maintenance tasks along with all work order information.
9. The system shall be configured to include the uncompleted work order report, the last work order report, and/or reprint all current work orders on a daily basis after the new work orders have been automatically printed. OWNER shall be able to specify the time of day the new work orders will be printed.

D. System Equipment Inventory:

1. A software module shall be included on the system for inventory of equipment in the system. Information stored in the inventory shall include but not be limited to equipment number of the device, type of equipment, date installed, date last checked or used, manufacturer name with contact name, address and phone number, local manufacturer representative name with contact name, address, and phone number, model or factory part number, installer's name with contact name, address, and phone number, local service representative name with contact name, address, and phone numbers, new or installation cost, plus an area for notes and comments for each piece of equipment.
2. Information shall be entered and maintained by plant personnel with a simple to use, interactive inventory screen editor.

3. It shall be possible to print information, both the inventory information and the device history, for any single piece of equipment, group of equipment, or the complete equipment inventory. Also, the operator shall be able to generate reports from the inventory database using any of the data fields or group of data fields as keys with the reports only including selected data fields.
4. Information shall be stored in database format and shall be exportable to ASCII text file for transfer to floppy disk. It shall not be necessary to interrupt the system manager's monitoring and control functions to use the inventory system.

2.03 AUTOMATIC DIALER

- A. The dialer shall be a solid-state component capable of dialing up to 16 phone numbers, each up to 24 digits in length. Phone numbers and standard pulse dialing or touch tone DTMF dialing shall be user programmable via the system's keyboard or touch tone phone.
- B. The unit shall have two different categories of speech message capability, all implemented with permanent nonvolatile solid-state circuitry with no mechanical tape mechanisms.

User Field Recorded Messages

The user may record and rerecord his own voice messages for each input channel and for the Station ID. The time for each message shall be adjustable, and recordings may be made at the front panel or from any remote touch tone phone. Provisions shall be included for status only (nonalarmable) messages.

Permanent Resident Nonrecorded Messages

Permanent built-in voice messages shall be included to support user programming operations, to provide supplemental warning messages such as advising that the alarms have been disabled and to allow the unit to be fully functional even when the user or installer has not recorded any messages of its own.

- C. The user may optionally elect to alter the following parameters from their standard normal default values via keyboard entry or remotely from any touch tone phone.
- D. Alarm Call Grouping:
 - 1. On alarm, system shall selectively call the correct phone numbers according to the current alarm(s):
 - a. Alarm Response Delay: 0.1 to 999.9 seconds
 - b. Delay Between Alarm Call Outs: 0.1 to 99.9 minutes
 - c. Alarm Reset Time: 0.1 to 99 hours or "NO RESET"
 - d. Incoming Ring Response (answer) Delay: 1 to 20 rings
 - e. Number of Message Repetitions: 1 to 20 repetitions
 - 2. Input Alarm Criteria: Each channel shall be independently configured for "Alarm On Open Circuit," "Alarm On Closed Circuit," "No Alarm."
 - 3. Autocall Test: When enabled, the unit shall place a single round of test calls, both at the time this function is enabled and also at regular subsequent intervals, until this function is disabled at the keyboard.
 - 4. Runtime Meter: Selected inputs shall accumulate and report the number of hours that its input contacts have been closed.
 - 5. Remote System Microphone Activation:
 - a. Remote and Local Arming and Disarming of System
 - b. Pulse Totalizer Function
- E. User-entered programming and voice messages shall be kept intact even when all power is removed for up to ten years.

- F. Acknowledgment of an alarm phone call is to be accomplished by pressing a Touch Tone "9" as the alarm call is being received, and/or by returning a phone call to the unit after having received an alarm call.
- G. The unit shall continuously monitor the presence of AC power and the status of four contact closure inputs. AC power failure, or violation of the alarm criteria at any input, shall cause the unit to go into alarm status and begin dial-outs.
- H. Upon initiating an alarm phone call, the system is to "speak" only those channels that are currently in "alarm status."
- I. The unit shall be capable of dialing any phone number on command and function as a speaker phone.
- J. Inquiry phone calls shall be able to be made directly to the unit at any time from any telephone, locally or long distance, for a complete status report of all variables being monitored, including power status.
- K. Normal power shall be 105-135 VAC, 15 watts nominal. The product shall contain its own gel cell rechargeable battery that is automatically kept charged when AC power is present. The system shall operate on battery power for a minimum of six continuous hours in the event of AC power failure. A shorter backup time shall not be acceptable. The built-in charger shall be precision voltage controlled, not a "trickle charger" to minimize recharge time and maximize battery life.
- L. The dialer is to use a standard rotary pulse or touch tone "dial up" phone line (direct leased line not to be required) and is to be F.C.C. approved. Connection to the telephone shall be through a 4-pin modular jack (RJ-11).
- M. Gas tube and solid-state surge protection shall be provided on all inputs, including power, phone, and signal lines. These protectors are to be integrally incorporated into the main circuit board for maximum protection. Protectors mounted external to the main circuit board shall not be an acceptable substitute. The supplier shall provide a good electrical ground connection point near the unit to maximize the effectiveness of the surge protection.
- N. The system shall include expansion connectors to accommodate field upgrades for additional dry contact inputs, remote supervisory control outputs, analog inputs, and communication with remote printers and computers.
- O. All keyboard and front panel switches shall be sealed to prevent contamination. Front panel LEDs shall indicate: Normal Operation, Program Mode, Phone Call in Progress, Status for each Channel, AC Power Present, AC Power Failure, and Low Discharging or Recharging Battery. On any Inquiry telephone call or On Site status check, the voice shall provide specific warning if no dial-out phone numbers are entered, if the unit is in the "alarm disable" mode, or if AC power is off or has been off since last reset. A built-in microphone shall allow anyone at a remote phone to listen to local sounds and have a two-way conversation with personnel at the dialer.
- Q. The dialer shall be as manufactured by RACO, Verbatim Series VSS, or equal.

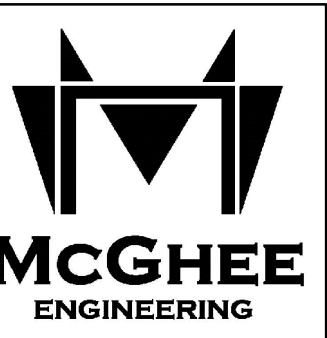
END OF ADDENDUM NO. 2 TEXT

This addendum consists of 21 pages of text and 3 plan sheets for a total of 24 pages.

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2	00-G-02	INDEX OF DRAWINGS
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5	00-G-05	ABBREVIATIONS
6	00-G-06	DESIGN CRITERIA
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101	100-E-03	ONE-LINE DIAGRAM - 2
102	100-E-04	SCADA RISER DIAGRAM AND SWBD-80 ELEVATION



August 20, 2018

DATE:	08/20/18	08/23/18	08/23/18					
REVISIONS	ADD 4 ADDITIONAL DRAWINGS IN STRUCTURE 10	ADD 1 EXISTING SITE CONTOURS	ADD 1 ELECTRICAL DRAWING IN STRUCTURE 70					
NO.	1.	2.						

INDEX OF DRAWINGS
WASTEWATER TREATMENT PLANT EXPANSION
CITY OF CENTRAL CITY
MUHLENBURG COUNTY, KENTUCKY

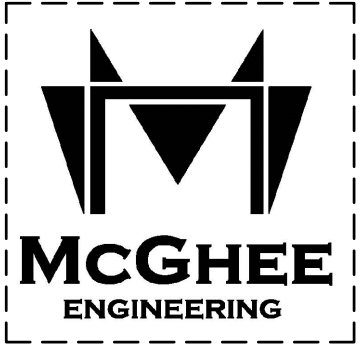
Professional Engineer's Seal



Signature Date 08/20/2018



SHEET
2
00-G-02

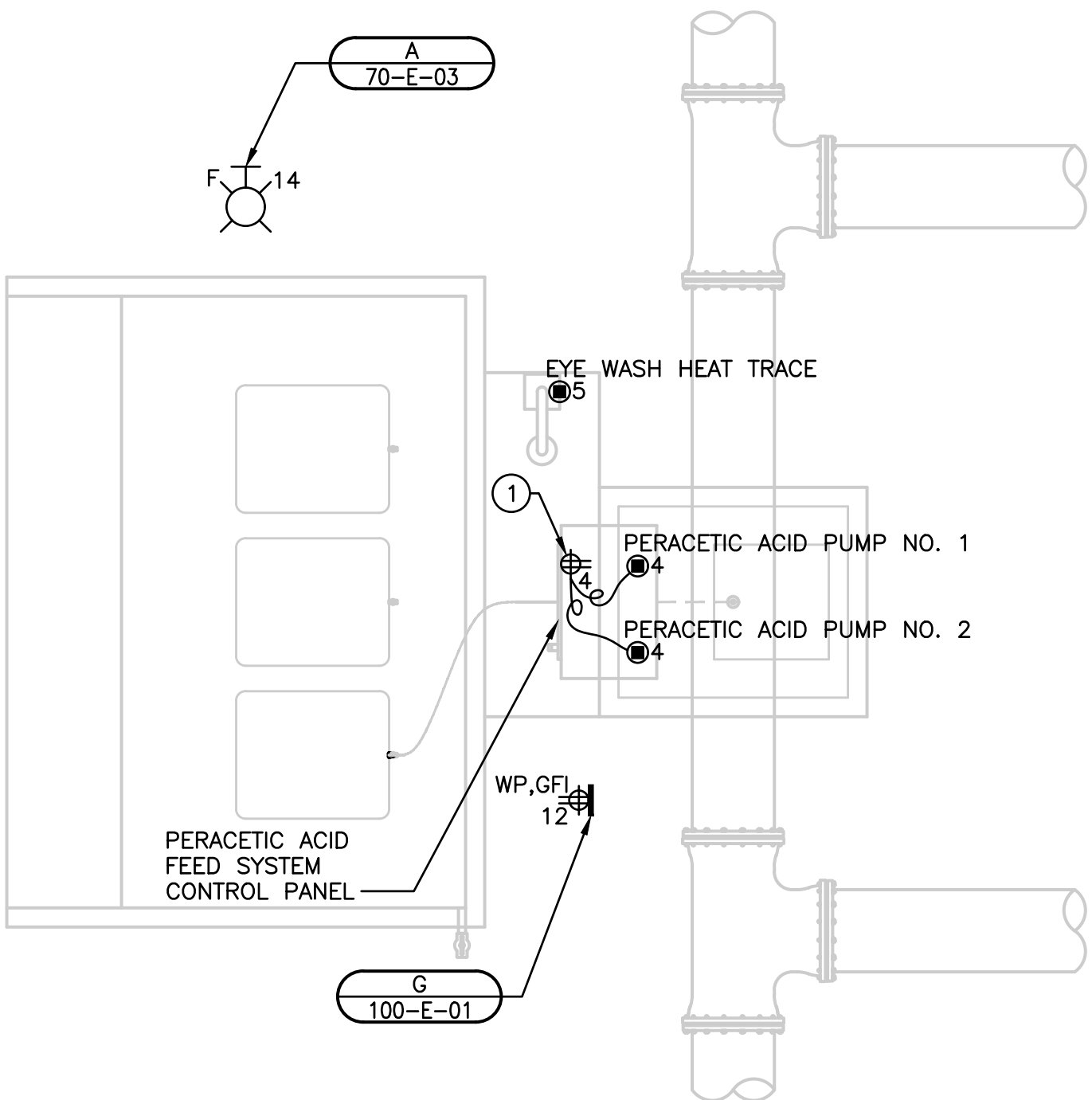


GENERAL NOTES:

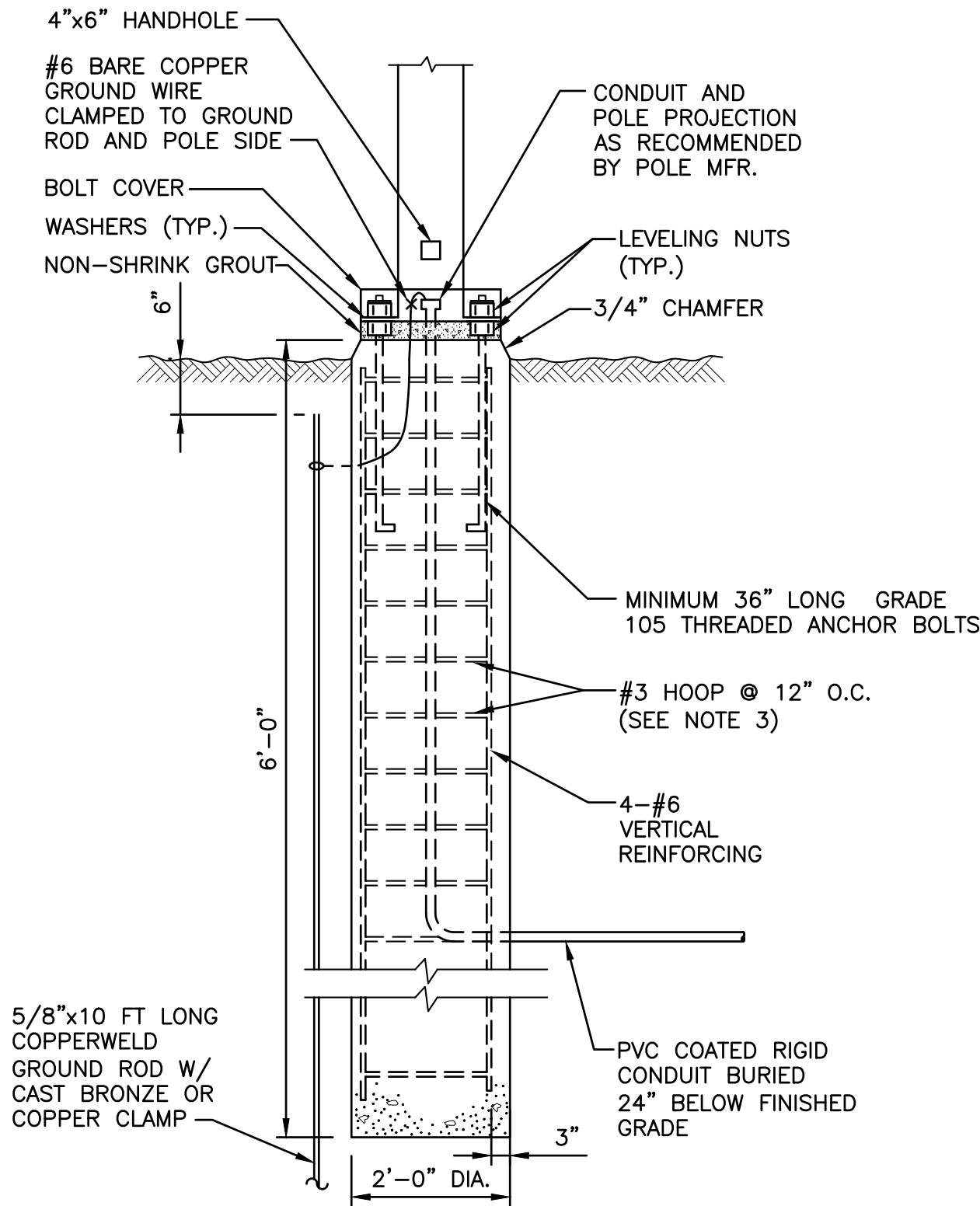
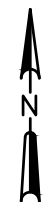
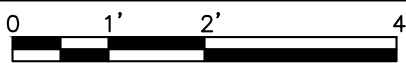
1. ALL 120V LOADS SHALL BE POWERED FROM LP-70 LOCATED IN MCC-70 IN THE EFFLUENT ELECTRICAL BUILDING.

KEY NOTES:

- ① RECEPTACLE FURNISHED BY DIVISION 11 MANUFACTURER.



ELECTRICAL PERACETIC ACID FEED SYSTEM PLAN



NOTES:

1. TOP OF BASE TO BE 4" ABOVE TOP OF CURB, TOP 12" TO BE FORMED.
2. POLE SHALL BE MOUNTED 4'-0" BACK FROM EDGE OF PAVEMENT, UNLESS NOTED OTHERWISE.
3. PROVIDE 3-#3 TIES @3" O.C. AT TOP OF POLE BASE.

A LIGHT POLE BASE
70-E-03 NO SCALE

PERACETIC ACID FEED SYSTEM
ELECTRICAL PLAN

WASTEWATER TREATMENT PLANT EXPANSION
CITY OF CENTRAL CITY
MUHLENBURG COUNTY, KENTUCKY

Professional Engineer's Seal



SHEET

70-E-03