# AGREEMENT BETWEEN CITY OF PEMBROKE PINES AND EDWARDS ELECTRIC

THIS AGREEMENT	("Agreement"), dated the	day of	, 2020
by and between:			

CITY OF PEMBROKE PINES, a municipal corporation of the State of Florida with a business address of 601 City Center Way, Pembroke Pines, Florida 33025 hereinafter referred to as "CITY",

and

EDWARDS ELECTRIC CORP, a Corporation as listed with the Florida Division of Corporations, authorized to do business in the State of Florida, and with a business address of 7231 Southern Blvd., Suite C-2, West Palm Beach, FL 33413 (hereinafter referred to as the "CONTRACTOR"). CITY and CONTRACTOR may hereinafter be referred to collectively as the "Parties."

#### WITNESSETH:

In consideration of the mutual terms and conditions, promises, covenants and payments hereinafter set forth, CITY and CONTRACTOR agree as follows:

#### ARTICLE 1 PREAMBLE

In order to establish the background, context and form of reference for this Agreement, and to generally express the objectives and intentions of the respective Parties herein, the following statements, representations, and explanations shall be accepted as predicates for the undertakings and commitments included within the provisions which follow, and may be relied upon by the Parties as essential elements of the mutual considerations upon which this Agreement is based.

1.1 On June 23, 2020, the CITY advertised its notice to bidders of the CITY's desire to hire a firm to furnish all labor materials, equipment, services and incidentals for the electrical rehabilitation of the effluent pump station located at CITY's Wastewater Treatment Plant as more particularly described in Exhibit "A" attached hereto and by this reference made a part hereof, for the said bid entitled:

Invitation for Bid # PSUT-20-06
"Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation"

1.2 On July 28, 2020 the bids were opened at the offices of the City Clerk.

1.3	On	, the CITY awarded the bid to CONTRACTOR and authorized
the	proper CIT	Y officials to negotiate and enter into an agreement with CONTRACTOR to render
the	services mo	re particularly described herein below.

1.4 Negotiations pertaining to the services to be performed by the CONTRACTOR were undertaken and this Agreement incorporates the results of such negotiation.

#### ARTICLE 2 SERVICES AND RESPONSIBILITIES

- 2.1 CONTRACTOR hereby agrees to furnish all labor materials, equipment, services and incidentals for the electrical rehabilitation of the effluent pump station, which is located at CITY's Wastewater Treatment Plant, 13955 Pembroke Road, Pembroke Pines, FL 33029 (herein "Property") as more particularly described in, and in accordance with the Scope of Services outlined in the specifications, attached hereto and made a part hereof as Exhibit "A" and CONTRACTOR's response thereto, attached hereto and made a part hereof as Exhibit "B". CONTRACTOR agrees to perform all services required pursuant to this Agreement, the Sealed Bid Package, Addenda to this Agreement, and Commission award complete with proposal form.
- 2.2 CONTRACTOR shall furnish all services, labor, equipment, and materials necessary and as may be required in the performance of this Agreement, except as otherwise specifically provided for herein, and all work performed under this Agreement shall be done in a professional manner.
- 2.3 CONTRACTOR shall supervise the work force to ensure that all workers conduct themselves and perform their work in a safe and professional manner. CONTRACTOR shall comply with all OSHA safety rules and regulations in the operation of equipment and in the performance of the work. CONTRACTOR shall at all times have a competent field supervisor available to enforce these policies and procedures at the CONTRACTOR's expense.
- 2.4 CONTRACTOR shall provide CITY with seventy-two (72) hours written notice prior to the beginning of work under this Agreement and prior to any schedule change with the exception of changes caused by inclement weather.
- 2.5 CONTRACTOR hereby represents to CITY, with full knowledge that CITY is relying upon these representations when entering into this Agreement with CONTRACTOR, that CONTRACTOR has the professional expertise, experience and manpower to perform the services to be provided by CONTRACTOR pursuant to the terms of this Agreement.
- 2.6 CONTRACTOR hereby represents to CITY that CONTRACTOR is properly licensed by the applicable federal, state, and local agencies to provide the services under this Agreement. Furthermore, CONTRACTOR agrees to maintain such licenses during the term of this Agreement. If CONTRACTOR's license is revoked, suspended, or terminated for any reason by any governmental agency, CONTRACTOR shall notify the CITY immediately.

- 2.7 CONTRACTOR shall comply with any and all Federal, State, and local laws and regulations now in effect, or hereinafter enacted during the term of this Agreement, which are applicable to CONTRACTOR, its employees, agents or subcontractors, if any, with respect to the work and services described herein. A violation of any federal, state, or local law or regulation may be cause for breach, allowing the CITY to terminate this Agreement.
- 2.8 Return of Keys. Upon completion of services rendered or termination of this agreement, CONTRACTOR must promptly return to CITY all CITY keys and/or access cards. By agreeing herein, CONTRACTOR understands that any loss or failure to return a CITY key shall subject CONTRATOR to the costs associated with key replacement and/or re-keying. For keys unlocking several doors, replacement and re-keying costs can be substantial. In case of failure to return a key and failure to pay for key replacement and/or lock re-keying, CONTRACTOR understands that CITY shall enforce by all legal means its right to repayment for all costs incident to key replacement and/or lock re-keying.

### ARTICLE 3 TIME OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

- 3.1 The work to be performed under this Agreement shall be commenced after CITY execution of the Agreement and not later than ten (10) days after the date that CONTRACTOR receives CITY's Notice to Proceed. The work shall be completed within **five hundred and sixty (560)** calendar days from issuance of CITY's Notice to Proceed, subject to any permitted extensions of time pursuant to this Agreement and any amendments and/or addenda thereto. For the purposes of this Agreement, the term "completion" shall mean the satisfactory completion and final inspection of the Property by the CITY.
- 3.2 During the pre-construction portion of the work hereunder, the Parties agree to work diligently and in good faith in performing their obligations hereunder, so that all required permits for the construction portion of the work may be obtained. In the event that any delays in the pre-construction or construction portion of the work occur, despite the diligent efforts of the Parties hereto, and such delays are the result of force majeure or are otherwise outside of the control of either party hereto, then the Parties shall agree on an equitable extension of the time for substantial completion hereunder and any resulting increase in general condition costs.
- 3.3 In the event that CONTRACTOR abandons this Agreement or causes it to be terminated, CONTRACTOR shall indemnify CITY against any loss pertaining to this termination up to a maximum of the full contracted fee amount. All finished or unfinished documents, data, studies, surveys, and reports prepared by CONTRACTOR shall become the property of CITY and shall be delivered by CONTRACTOR to CITY.

## ARTICLE 4 COMPENSATION AND METHOD OF PAYMENT

4.1 CITY agrees to compensate CONTRACTOR for all services performed under this Agreement by CONTRACTOR upon issuance of final inspection approval / monthly for work that has been completed, inspected and properly invoiced.

- 4.2 The total amount of compensation to be paid for the services herein described shall NOT EXCEED ONE MILLION FIVE HUNDRED NINETY ONE THOUSAND TWO HUNDRED NINETY SEVEN DOLLARS AND FORTY FIVE CENTS (\$1,591,297.45) which includes a owner's contingency fee of ONE HUNDRED TWENTY TWO THOUSAND FOUR HUNDRED FORTY DOLLARS AND TWENTY CENTS (\$122,440.20), a 3% permit allowance of FORTY TWO THOUSAND SEVEN HUNDRED EIGHTY TWO DOLLARS AND TWENTY FIVE CENTS (\$42,782.25), and a 1.5% payment and performance bond of TWENTY ONE THOUSAND AND SEVENTY FIVE DOLLARS (\$21,075).
- 4.2.1 This contingency or allowance authorizes the CITY to execute change orders up to the amount of the contingency without the need to obtain additional Commission approval. <u>It is hereby understood and agreed that the CONTRACTOR shall not expend any dollars in connection with the owner's contingency or allowance without the expressed prior written approval of the CITY's authorized representative. Any owner's contingency funds or allowance that have not been utilized at the end of the project will remain with the CITY, the CONTRACTOR shall only be paid for the proposed project cost as approved by the City Commission along with any owner contingency expenses or allowances that were approved by the CITY's authorized representative.</u>
- 4.2.2 The total compensation amount may not be exceeded without a written amendment to this Agreement. A retainage of ten percent (10%) will be deducted from monthly payments until fifty percent (50%) of the project is complete. Retainage will be reduced to five percent (5%) thereafter. Retainage monies will be released upon satisfactory completion and final inspection of the work. Invoices must bear the project name, project number, bid number and purchase order number. CITY has up to thirty (30) days to review, approve and pay all invoices after receipt. CONTRACTOR shall invoice CITY and provide a written request to CITY to commence the one (1) year warranty period. All necessary Releases and Affidavits and approval of final payments shall be processed before the warranty period begins.
- 4.3 **Prompt Payment Act.** All payments shall be governed by the Local Government Prompt Payment Act, as set forth in Part VII, Chapter 218, Florida Statutes.
- 4.4 <u>Method of Billing and Payment</u>. The CITY shall within thirty (30) days, from the date the CITY's Public Service Director approves the Application for Payment, pay the CONTRACTOR the amount approved by the CITY's Public Services Director or his or her assignees. Payment will be made to CONTRACTOR at:

Edwards Electric Corp. Attn: Tyrone Fox 7231 Southern Blvd., Suite C-2 West Palm Beach, FL 33413

### ARTICLE 5 WAIVER OF LIENS

Prior to final payment of the amount due under the terms of this Agreement, a final waiver of lien shall be submitted by the CONTRACTOR as well as all suppliers and subcontractors who worked on the project that is the subject of this Agreement. Payment of the invoice and acceptance of such payment by CONTRACTOR shall release CITY from all claims of liability by CONTRACTOR in connection with this Agreement.

### ARTICLE 6 WARRANTY

CONTRACTOR warrants the work against defect for a period of one (1) year from the date of completion of work. In the event that defect occurs during this time, CONTRACTOR shall perform such steps as required to remedy the defects. CONTRACTOR shall be responsible for any damages caused by defect to affected area or to interior structure. The one (1) year warranty period does not begin until substantial completion of the entire project, and the subsequent release of any Performance or Payment Bonds, which may be required by the original bid document.

### ARTICLE 7 CHANGES IN SCOPE OF WORK

- 7.1 CITY or CONTRACTOR may request changes that would increase, decrease, or otherwise modify the Scope of Services, as described in **Exhibit "A"**, to be provided under this Agreement. These changes may affect the monthly compensation accordingly. Such changes or additional services must be in accordance with the provisions of the Code of Ordinances of the CITY, and must be contained in a written amendment, executed by the Parties hereto, with the same formality, equality and dignity herewith prior to any deviation from the terms of this Agreement, including the initiation of any additional or extra work.
- 7.2 CONTRACTOR shall continue work when seeking change order unless work has not been authorized herein, or by written amendment or change order, executed by the parties hereto, with the same formality, equality, and dignity herewith.
- 7.3 In no event will the CONTRACTOR be compensated for any work which has not been described either herein or in a separate written agreement executed by the Parties hereto.

### ARTICLE 8 PAYMENT & PERFORMANCE BOND

8.1 Within fifteen (15) calendar days after Notice of Award and in any event prior to commencing work, the CONTRACTOR shall execute and furnish to CITY a payment and performance bond, each written by a corporate surety, having a resident agent in the State of Florida and having been in business with a record of successful continuous operation for at least five (5) years. The surety shall hold a current certificate of authority from the Secretary of Treasury of the

United States as an acceptable surety on federal bonds in accordance with United States Department of Treasury Circular No. 570. If the amount of the bond exceeds the underwriting limitation set forth in the circular, in order to qualify, the net retention of the surety company shall not exceed the underwriting limitation in the circular and the excess risks must be protected by coinsurance, reinsurance, or other methods, in accordance with Treasury Circular 297, revised September 1, 1978 (31DFR, Section 223.10, Section 223.11). Further, the surety company shall provide CITY with evidence satisfactory to CITY, that such excess risk has been protected in an acceptable manner. The surety company shall have at least the following minimum qualification in accordance with the latest edition of A.M. Best's Insurance Guide, published by Alfred M. Best Company, Inc., Ambest Road, Oldwick, New Jersey 08858:

B+ to A+

8.2 Two (2) separate bonds are required and both must be approved by the CITY. The penal sum stated in each bond shall be 100% of the contract value. The performance bond shall be conditioned upon the CONTRACTOR's performance of the work in the time and manner prescribed in the Agreement. The payment bond shall be conditioned upon the CONTRACTOR's promptly making payments to all persons who supply the CONTRACTOR with labor, materials and supplies used directly or indirectly by the CONTRACTOR in the prosecution of the work provided for in this Agreement and shall provide that the surety shall pay the same in the amount not exceeding the sum provided in such bonds, together with interest at the maximum rate allowed by law; and that they shall indemnify and save harmless the CITY to the extent of any and all payments in connection with the carrying out of said Agreement which the CITY may be required to make under the law.

Pursuant to the requirements of Section 255.05(1)(a), Florida Statutes, it shall be the duty of the CONTRACTOR to record the aforesaid payment and performance bonds in the public records of Broward County, and CONTRACTOR shall be responsible for payment of all recording costs.

#### ARTICLE 9 INDEMNIFICATION

9.1 The CONTRACTOR shall indemnify and hold harmless the CITY and its officers, employees, agents and instrumentalities from liability, losses or damages, including attorneys' fees and costs of defense, which the CITY or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from negligence, recklessness, or intentional wrongful misconduct of CONTRACTOR or its employees, agents, servants, partners, principals or subcontractors. The CONTRACTOR shall pay all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the CITY, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorneys' fees which may issue thereon. The CONTRACTOR expressly understands and agrees that any insurance protection required by this Agreement or otherwise provided by the CONTRACTOR shall in no way limit the responsibility to indemnify, keep and save harmless and defend the CITY or its officers, employees, agents and instrumentalities as herein provided.

- 9.2 CONTRACTOR's aggregate liability shall not exceed the proceeds of insurance required to be placed pursuant to this Agreement, plus the compensation received by CONTRACTOR.
- 9.3 Upon completion of all services, obligations and duties provided for in this Agreement, or in the event of termination of this Agreement for any reason, the terms and conditions of this Article shall survive indefinitely.
- 9.4 CITY reserves the right to select its own legal counsel to conduct any defense in any such proceeding and all costs and fees associated therewith shall be the responsibility of CONTRACTOR.
- 9.5 Nothing contained herein is intended nor shall be construed to waive CITY's rights and immunities under the common law or Section 768.28, Florida Statutes, as may be amended from time to time.

#### ARTICLE 10 INSURANCE

- 10.1 CONTRACTOR shall indemnify and hold harmless the CITY, its trustees, elected and appointed officers, agents, servants, assigns, employees, consultants, separate contractors, any of their subcontractors, sub-subcontractors, agents and employees from and against claims, demands, or causes of action whatsoever, and the resulting losses, damages, costs and expenses, including but not limited to attorneys' fees, including paralegal expenses, liabilities, damages, orders, judgments, or decrees, sustained by the CITY arising out of or resulting from performance of the work or the failure of the CONTRACTOR to take out and maintain insurance as required under this Agreement.
- 10.2 CONTRACTOR shall not commence work under this Agreement until it has obtained all insurance required under this paragraph and such insurance has been approved by the Risk Manager of the CITY nor shall the CONTRACTOR allow any subcontractor to commence work on any subcontract until all similar such insurance required of the subcontractor has been obtained and similarly approved.
- 10.3 Certificates of Insurance, reflecting evidence of the required insurance, shall be filed with the CITY's Risk Manager prior to the commencement of this Agreement. Policies shall be issued by companies authorized to do business under the laws of the State of Florida. The insurance company shall be rated no less than "A" as to management, and no less than "Class VI" as to financial strength according to the latest edition of Best's Insurance Guide published by A.M. Best Company.
- 10.4 Certificates of Insurance shall provide for thirty (30) days' prior written notice to the CITY in case of cancellation or material changes in the policy limits or coverage states. If the carrier cannot provide thirty (30) days' notice of cancellation, either the CONTRACTOR or their insurance broker must agree to provide notice.
- 10.5 Insurance shall be in force until all obligations required to be fulfilled under the terms of the Agreement are satisfactorily completed as evidenced by the formal acceptance by the CITY. In the

event the insurance certificate provided indicates that the insurance shall terminate and lapse during the period of this Agreement, the CONTRACTOR shall furnish, at least forty-five (45) days prior to the expiration of the date of such insurance, a renewed certificate of insurance as proof that equal and like coverage for the balance of the period of the Agreement and extension thereunder is in effect. The CONTRACTOR shall neither commence nor continue to provide any services pursuant to this Agreement unless all required insurance remains in full force and effect. CONTRACTOR shall be liable to CITY for any lapses in service resulting from a gap in insurance coverage.

#### 10.6 REQUIRED INSURANCE

CONTRACTOR shall be required to obtain all applicable insurance coverage, as indicated below, prior to commencing any work pursuant to this Agreement:

Yes No

- ✓ □ 10.6.1 Comprehensive General Liability Insurance written on an occurrence basis including, but not limited to: coverage for bodily injury and property damage, personal & advertising injury, products & completed operations, and contractual liability. Coverage must be written on an occurrence basis, with limits of liability no less than:
  - 1. Each Occurrence Limit \$1,000,000
  - 2. Fire Damage Limit (Damage to rented premises) \$100,000
  - 3. Personal & Advertising Injury Limit \$1,000,000
  - 4. General Aggregate Limit \$2,000,000
  - 5. Designated Construction Project(s) General Aggregate Limit \$2,000,000

Products & Completed Operations Coverage shall be maintained for the later of ten (10) years after the delivery of goods/services or final payment under the Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

✓ □ 10.6.2 Workers' Compensation and Employers' Liability Insurance covering all employees, and/or volunteers of the CONTRACTOR engaged in the performance of the scope of work associated with this Agreement. In the case any work is sublet, the CONTRACTOR shall require the subcontractors similarly to provide Workers' Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. Coverage for the CONTRACTOR and all subcontractors shall be in accordance with applicable state and/or federal laws that may apply to Workers' Compensation Insurance with limits of liability no less than:

1. Workers' Compensation: Coverage A - Statutory

2. Employers Liability: Coverage B \$500,000 Each Accident

\$500,000 Disease – Policy Limit \$500,000 Disease – Each Employee If CONTRACTOR claims to be exempt from this requirement, CONTRACTOR shall provide CITY proof of such exemption along with a written request for CITY to exempt CONTRACTOR, written on CONTRACTOR letterhead.

Yes No

- ✓ □ 10.6.3 Comprehensive Auto Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the performance of work under this Agreement, with a combined single limit of liability for bodily injury and property damage no less than:
  - Any Auto (Symbol 1)
     Combined Single Limit (Each Accident) \$1,000,000
  - Hired Autos (Symbol 8)
     Combined Single Limit (Each Accident) \$1,000,000
  - Non-Owned Autos (Symbol 9)
     Combined Single Limit (Each Accident) \$1,000,000

If work under this Agreement includes transportation of hazardous materials, policy shall include pollution liability coverage equivalent to that provided by the latest version of the ISO pollution liability broadened endorsement for auto and the latest version of the ISO Motor Carrier Act endorsement, equivalents or broader language.

Yes No

10.6.3.1 If CONTRACTOR requests reduced limits under a Personal Auto Liability Policy and it is agreed to by the CITY, coverage shall include Bodily Injury limits of \$100,000 per person/\$300,000 per occurrence and Property Damage limits of \$300,000 per occurrence

Yes No ✓ □

10.6.4 Umbrella/Excess Liability Insurance in the amount of \$2,000,000 as determined appropriate by the CITY depending on the type of job and exposures contemplated. Coverage must be follow form of the General Liability, Auto Liability and Employer's Liability. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment pursuant to this Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

10.6.5 Professional Liability/Errors & Omissions Insurance with a limit of liability no less than \$1,000,000 per wrongful or negligent act. This coverage shall be maintained for a period of no less than ten-(10) years after the delivery of goods/services final payment pursuant to this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

Yes No

✓ □ 10.6.6 Environmental/Pollution Liability insurance shall be required with a limit of no less than \$1,000,000 per wrongful act. Coverage shall include: CONTRACTOR's completed operations, sudden, accidental and gradual pollution conditions. This coverage shall be maintained for a period of no less than the later of ten (10) years after the delivery of goods/services or final payment pursuant to this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

☐ 🗴

10.6.7 Cyber Liability including Network Security and Privacy Liability with a limit of liability no less than \$1,000,000 per loss. Coverage shall include liability arising from: theft, dissemination and/or use of confidential information stored or transmitted in electronic form, unauthorized access to, use of, or tampering with computer systems, including hacker attacks or inability of an authorized third party to gain access to your services, including denial of service, and the introduction of a computer virus into, or otherwise causing damage to, a customer's or third person's computer, computer system, network, or similar computer-related property and the data, software and programs thereon. If vendor is collecting credit card information, it shall cover all PCI breach expenses. Coverage is to include the various state monitoring and state required remediation as well as meet the various state notification requirements. This coverage shall be maintained for a period of no less than the later of three (3) years after delivery of goods/services or final payment of the Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

□ x 10.6.8 Crime Coverage shall include employee dishonesty, forgery or alteration, and computer fraud in an amount of no less than \$1,000,000 per loss. If CONTRACTOR is physically located on CITY's premises, a third-party fidelity coverage extension shall apply.

Yes No

□ x 10.6.9 Garage Liability & Garage-keepers Legal Liability for those that manage parking lots for the CITY or service CITY vehicles. Coverage must be written on an occurrence basis, with limits of liability no less than \$1,000,000 per Occurrence, including products & completed operations. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment of this Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

□ × 10.6.10 Liquor Liability for those in the business of selling, serving or furnishing of any alcoholic beverages, whether licensed or not, shall carry a limit of liability of no less than \$1,000,000 per occurrence. Coverage shall be maintained for the later of three (3) years after the delivery of goods/services or final payment under the Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

□ × 10.6.11 Sexual Abuse & Molestation for any agreement involving a vulnerable population. Limits shall be no less than \$500,000 per occurrence. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment of this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

10.6.12 Builder's Risk Insurance shall be "All Risk" for one hundred percent (100%) of □ × the completed value of the project that is the subject of this Agreement with a deductible of not more than five percent (5%) for Named Windstorm and \$20,000 per claim for all other perils. The Builder's Risk Insurance shall include interests of the CITY, the CONTRACTOR and subcontractors of the project. The CONTRACTOR shall include a separate line item for all costs associated with the Builder's Risk Insurance Coverage for the project. The CITY reserves the right at its sole discretion to utilize the CONTRACTOR's Builder's Risk Insurance or for the CITY to purchase its own Builder's Risk Insurance for the Project. Prior to the CONTRACTOR purchasing the Builder's Risk insurance for the project, the CONTRACTOR shall allow the CITY the opportunity to analyze the CONTRACTOR's coverage and determine who shall purchase the coverage. Should the CITY utilize the CONTRACTOR's Builder's Risk Insurance, the CONTRACTOR shall be responsible for all deductibles. If the CITY chooses to purchase the Builder's Risk Coverage on the project, the CONTRACTOR shall provide the CITY with a change order deduct for all premiums and costs associated with the Builder's Risk insurance in their schedule. Should the CITY choose to utilize the CITY's Builder's Risk Program, the CITY shall be responsible for the Named Windstorm Deductible and the CONTRACTOR shall be responsible for the All Other Perils Deductible.

If and when 100% is not available or reasonable, the CITY Risk Manager is to make the determination as to what limits are appropriate for the given project.

#### 10.7 REQUIRED ENDORSEMENTS

- 10.7.1 The City of Pembroke Pines shall be named as an Additional Insured on each of the Liability Policies required herein.
- 10.7.2 Waiver of all Rights of Subrogation against the CITY.
- 10.7.3 Thirty (30) Day Notice of Cancellation or Non-Renewal to the CITY.
- 10.7.4 CONTRACTOR's policies shall be Primary & Non-Contributory.
- 10.7.5 All policies shall contain a "severability of interest" or "cross liability" clause without obligation for premium payment of the CITY.

- 10.7.6 The City of Pembroke Pines shall be named as a Loss Payee on all Property and/or Inland Marine Policies as their interest may appear.
- 10.8 Any and all insurance required of the CONTRACTOR pursuant to this Agreement must also be required by any subcontractor in the same limits and with all requirements as provided herein, including naming the CITY as an additional insured, in any work that is subcontracted unless such subcontractor is covered by the protection afforded by the CONTRACTOR and provided proof of such coverage is provided to CITY. The CONTRACTOR and any subcontractors shall maintain such policies during the term of this Agreement.
- 10.9 The CITY reserves the right to require any other additional types of insurance coverage and/or higher limits of liability it deems necessary based on the nature of work being performed under this Agreement.
- 10.10 The insurance requirements specified in this Agreement are minimum requirements and in no way reduce any liability the CONTRACTOR has assumed in Article 9, herein.

### ARTICLE 11 NON-DISCRIMINATION & EQUAL OPPORTUNITY EMPLOYMENT

During the performance of the Agreement, neither the CONTRACTOR nor any subcontractors shall discriminate against any employee or applicant for employment because of race, religion, color, gender, national origin, sex, age, marital status, political affiliation, familial status, sexual orientation, or disability if qualified. CONTRACTOR will take affirmative action to ensure that employees are treated during employment, without regard to their race, religion, color, gender, national origin, sex, age, marital status, political affiliation, familial status, sexual orientation, or disability if qualified. Such actions must include, but not be limited to, the following: employment, promotion, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. CONTRACTOR shall agree to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause. CONTRACTOR further agrees that CONTRACTOR will ensure that subcontractors, if any, will be made aware of and will comply with this nondiscrimination clause.

#### ARTICLE 12 INDEPENDENT CONTRACTOR

This Agreement does not create an employee/employer relationship between the Parties. It is the intent of the Parties that the CONTRACTOR is an independent contractor under this Agreement and not the CITY's employee for all purposes, including but not limited to, the application of the Fair Labor Standards Act minimum wage and overtime payments, Federal Insurance Contribution Act, the Social Security Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, the State Workers' Compensation Act, and the State unemployment insurance law. The CONTRACTOR shall retain sole and absolute discretion in the judgment of the manner and means of carrying out CONTRACTOR's activities and responsibilities

hereunder provided, further that administrative procedures applicable to services rendered under this Agreement shall be those of CONTRACTOR, which policies of CONTRACTOR shall not conflict with CITY, State, or Federal policies, rules or regulations relating to the use of CONTRACTOR's funds provided for herein. The CONTRACTOR agrees that it is a separate and independent enterprise from the CITY, that it has full opportunity to find other business, that it has made its own investment in its business, and that it will utilize a high level of skill necessary to perform the work. This Agreement shall not be construed as creating any joint employment relationship between the CONTRACTOR and the CITY and the CITY will not be liable for any obligation incurred by CONTRACTOR, including but not limited to unpaid minimum wages and/or overtime premiums.

#### ARTICLE 13 TERMINATION

- 13.1 <u>Termination for Convenience</u>. This Agreement may be terminated by CITY for convenience, upon seven (7) business days of written notice by the CITY to the CONTRACTOR for such termination in which event CONTRACTOR shall be paid its compensation for services performed to termination date, including services reasonably related to termination. In the event that CONTRACTOR abandons this Agreement or causes it to be terminated, CONTRACTOR shall indemnify CITY against loss pertaining to this termination.
- 13.2 <u>Default by CONTRACTOR</u>. In addition to all other remedies available to CITY, this Agreement shall be subject to cancellation by CITY for cause, should CONTRACTOR neglect or fail to perform or observe any of the terms, provisions, conditions, or requirements herein contained, if such neglect or failure shall continue for a period of thirty (30) days after receipt by CONTRACTOR of written notice of such neglect or failure.

## ARTICLE 14 AGREEMENT SUBJECT TO FUNDING

This Agreement shall remain in full force and effect only as long as the expenditures provided for in the Agreement have been appropriated by the City Commission of the City of Pembroke Pines in the annual budget for each fiscal year of this Agreement, and is subject to termination based on lack of funding.

#### ARTICLE 15 UNCONTROLLABLE FORCES

15.1 Neither CITY nor CONTRACTOR shall be considered to be in default of this Agreement if delays in or failure of performance shall be due to Uncontrollable Forces, the effect of which, by the exercise of reasonable diligence, the non-performing party could not avoid. The term "Uncontrollable Forces" shall mean any event which results in the prevention or delay of performance by a party of its obligations under this Agreement and which is beyond the reasonable control of the nonperforming party. It includes, but is not limited to fire, flood, earthquakes, storms, lightning, epidemic, war, riot, civil disturbance, sabotage, and governmental actions.

15.2 Neither party shall, however, be excused from performance if nonperformance is due to forces, which are preventable, removable, or remediable, and which the nonperforming party could have, with the exercise of reasonable diligence, prevented, removed, or remedied with reasonable dispatch. The nonperforming party shall, within a reasonable time of being prevented or delayed from performance by an uncontrollable force, give written notice to the other party describing the circumstances and uncontrollable forces preventing continued performance of the obligations of this Agreement.

### ARTICLE 16 GOVERNING LAW AND VENUE

This Agreement shall be governed by and construed in accordance with the laws of the State of Florida as now and hereafter in force. The venue for any and all actions or claims arising out of or related to this Agreement shall be in Broward County, Florida.

#### ARTICLE 17 SIGNATORY AUTHORITY

CONTRACTOR shall provide CITY with copies of requisite documentation evidencing that the signatory for CONTRACTOR has the authority to enter into this Agreement.

### ARTICLE 18 DEFAULT OF CONTRACT & REMEDIES

- 18.1 <u>Damages</u>. CITY reserves the right to recover any ascertainable actual damages incurred as a result of the failure of CONTRACTOR to perform in accordance with the requirements of this Agreement, or for losses sustained by CITY resultant from CONTRACTOR's failure to perform in accordance with the requirements of this Agreement.
- Liquidated Damages. As a breach of the service provided by this Agreement would cause serious and substantial damage to CITY Property, and the nature of this Agreement would render it impracticable or extremely difficult to fix the actual damage sustained by CITY by such breach, it is agreed that, in case of breach of service wherein CONTRACTOR fails to maintain the Property, leaving the said property in disrepair, CITY may elect to collect liquidated damages for each such breach, and CONTRACTOR will pay CITY as liquidated damages, and not as penalty, two hundred and fifty dollars (\$250) for every day of such malfunction. This sum is the agreed upon amount by which CITY will be damaged by the breach of such service. An election to seek such remedies shall not be construed as a waiver of any legal remedies CITY may have as to any subsequent breach of service under this Agreement.
- 18.3 <u>Correction of Work</u>. If, in the judgment of CITY, work provided by CONTRACTOR does not conform to the requirements of this Agreement, or if the work exhibits poor workmanship, CITY reserves the right to require that CONTRACTOR correct all deficiencies in the work to bring the work into conformance without additional cost to CITY, and/or replace any personnel who fail to perform in accordance with the requirements of this Agreement. CITY shall be the sole judge of non-conformance and the quality of workmanship.

- 18.4 <u>Default of Contract</u>. The occurrence of any one or more of the following events shall constitute a default and breach of this Agreement by CONTRACTOR:
- 18.4.1 The abandonment of the Property by CONTRACTOR for a period of more than seven (7) business days.
- 18.4.2 The abandonment, unnecessary delay, refusal of, or failure to comply with any of the terms of this Agreement or neglect, or refusal to comply with the instructions of the Public Services Director relative thereto.
- 18.4.3 The failure by CONTRACTOR to observe or perform any of the terms, covenants, or conditions of this Agreement to be observed or performed by CONTRACTOR, where such failure shall continue for a period of seven (7) days after written notice thereof by CITY to CONTRACTOR; provided, however, that if the nature of CONTRACTOR's default is such that more than seven (7) days are reasonably required for its cure, then CONTRACTOR shall not be deemed to be in default if CONTRACTOR commences such cure within said seven (7) day period and thereafter diligently prosecutes such cure to completion.
- 18.4.4 The assignment and/or transfer of this Agreement or execution or attachment thereon by CONTRACTOR or any other party in a manner not expressly permitted hereunder.
- 18.4.5 The making by CONTRACTOR of any general assignment or general arrangement for the benefit of creditors, or the filing by or against CONTRACTOR of a petition to have CONTRACTOR adjudged a bankruptcy, or a petition for reorganization or arrangement under any law relating to bankruptcy (unless, in the case of a petition filed against CONTRACTOR, the same is dismissed within sixty (60) days); or the appointment of a trustee or a receiver to take possession of substantially all of CONTRACTOR's assets, or for CONTRACTOR's interest in this Agreement, where possession is not restored to CONTRACTOR within thirty (30) days; for attachment, execution or other judicial seizure of substantially all of CONTRACTOR's assets, or for CONTRACTOR's interest in this Agreement, where such seizure is not discharged within thirty (30) days.
- 18.5 Remedies in Default. In case of default by CONTRACTOR, CITY shall notify CONTRACTOR, in writing, of such abandonment, delay, refusal, failure, neglect, or default and direct CONTRACTOR to comply with all provisions of the Agreement. A copy of such written notice shall be mailed to the Surety on the Performance Bond. If the abandonment, delay, refusal, failure, neglect or default is not cured within seven (7) days of when notice was sent by CITY, CITY may declare a default of the Agreement and notify CONTRACTOR of such declaration of default and terminate the Agreement. The Surety on the Performance Bond shall within ten (10) days of such declaration of default, rectify or cause to be rectified any mismanagement or breach of service in the Agreement and assume the work of CONTRACTOR and proceed to perform services under the Agreement, at its own cost and expense.
- 18.5.1 Upon such declaration of default, all payments remaining due CONTRACTOR at the time of default, less all sums due CITY for damages suffered, or expenses incurred by reason of

default, shall be due and payable to Surety. Thereafter the Surety shall receive monthly payments equal to those that would have been paid by the CONTRACTOR had the CONTRACTOR continued to perform the services under the Agreement.

- 18.5.2 CITY may complete the Agreement, or any part thereof, either by day labor, use of a subcontractor, or by re-letting a contract for the same, and procure the equipment and the facilities necessary for the completion of the Agreement, and charge the cost of same to CONTRACTOR and/or the Surety together with the costs incident thereto to such default.
- 18.5.3 In the event CITY completes the Agreement at a lesser cost than would have been payable to CONTRACTOR under this Agreement, if the same had been fulfilled by CONTRACTOR, CITY shall retain such differences. Should such cost to CITY be greater, CONTRACTOR shall pay the amount of such excess to the CITY.
- 18.5.4 Notwithstanding the other provisions in this Article, CITY reserves the right to terminate the Agreement at any time, whenever the service provided by CONTRACTOR fails to meet reasonable standards of the trade after CITY gives written notice to the CONTRACTOR of the deficiencies as set forth in the written notice within fourteen calendar (14) days of the receipt by CONTRACTOR of such notice from CITY.

#### ARTICLE 19 BANKRUPTCY

It is agreed that if CONTRACTOR is adjudged bankrupt, either voluntarily or involuntarily, then this Agreement shall terminate effective on the date and at the time the bankruptcy petition is filed.

#### ARTICLE 20 MERGER; AMENDMENT

This Agreement constitutes the entire Agreement between CONTRACTOR and CITY, and all negotiations and oral understandings between the Parties are merged herein. This Agreement can be supplemented or amended only by a written document executed by both CONTRACTOR and CITY with the same formality and equal dignity herewith.

#### ARTICLE 21 DISPUTE RESOLUTION

In the event that a dispute, if any, arises between CITY and CONTRACTOR relating to this Agreement, performance or compensation hereunder, CONTRACTOR shall continue to render service in full compliance with all terms and conditions of this Agreement as interpreted by CITY regardless of such dispute. CONTRACTOR expressly recognizes the paramount right and duty of CITY to provide adequate maintenance of CITY's Property, and further agrees, in consideration for the execution of this Agreement, that in the event of such a dispute, if any, it will not seek injunctive relief in any court, but will negotiate with CITY for an adjustment on the matter or matters in dispute and, upon failure of said negotiations to resolve the dispute, may present the matter to a court of competent jurisdiction in an appropriate suit therefore instituted by it or by CITY.

### ARTICLE 22 PUBLIC RECORDS

- 22.1 The City of Pembroke Pines is public agency subject to Chapter 119, Florida Statutes. The CONTRACTOR shall comply with Florida's Public Records Law. Specifically, the CONTRACTOR shall:
  - 22.1.1 Keep and maintain public records required by the CITY to perform the service;
  - 22.1.2 Upon request from the CITY's custodian of public records, provide the CITY with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law;
  - 22.1.3 Ensure that public records that are exempt or that are confidential and exempt from public record disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and, following completion of the Agreement, CONTRACTOR shall destroy all copies of such confidential and exempt records remaining in its possession after the CONTRACTOR transfers the records in its possession to the CITY; and
  - 22.1.4 Upon completion of the Agreement, CONTRACTOR shall transfer to the CITY, at no cost to the CITY, all public records in CONTRACTOR's possession. All records stored electronically by the CONTRACTOR must be provided to the CITY, upon request from the CITY's custodian of public records, in a format that is compatible with the information technology systems of the CITY.
- 22.2 The failure of CONTRACTOR to comply with the provisions set forth in this Article shall constitute a default and breach of this Agreement.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT:

CITY CLERK
601 CITY CENTER WAY, 4<sup>th</sup> FLOOR
PEMBROKE PINES, FL 33025
(954) 450-1050
mgraham@ppines.com

### ARTICLE 23 MISCELLANEOUS

- 23.1 Ownership of Documents. Reports, surveys, studies, and other data provided in connection with this Agreement are and shall remain the property of CITY, whether or not the project for which they are made is completed.
- 23.2 <u>Legal Representation</u>. It is acknowledged that each party to this agreement had the opportunity to be represented by counsel in the preparation of this Agreement, and accordingly, the rule that a contract shall be interpreted strictly against the party preparing same shall not apply herein due to the joint contributions of both parties.
- 23.3 Records. CONTRACTOR shall keep such records and accounts and require any and all subcontractors to keep records and accounts as may be necessary in order to record complete and correct entries as to personnel hours charged to this engagement, and any expenses for which CONTRACTOR expects to be reimbursed. Such books and records will be available at all reasonable times for examination and audit by CITY and shall be kept for a period of ten (10) years after the completion of all work to be performed pursuant to this Agreement. Incomplete or incorrect entries in such books and records will be grounds for disallowance by CITY of any fees or expenses based upon such entries.
- 23.4 <u>Assignments</u>; Amendments. This Agreement, and any interests herein, shall not be assigned, transferred or otherwise encumbered, under any circumstances, by CONTRACTOR without the prior written consent of CITY. For purposes of this Agreement, any change of ownership of CONTRACTOR shall constitute an assignment which requires CITY approval. However, this Agreement shall run to the benefit of CITY and its successors and assigns.
- 23.5 No Contingent Fees. CONTRACTOR warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for CONTRACTOR to solicit or secure this Agreement, and that it has not paid or agreed to pay any person, company, corporation, individual or firm, other than a bona fide employee working solely for CONTRACTOR any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of this Agreement. For the breach or violation of this provision, CITY shall have the right to terminate the Agreement without liability at its discretion, to deduct from the contract price, or otherwise recover the full amount of such fee, commission, percentage, gift or consideration.
- 23.6 Notice. Whenever any party desires to give notice unto any other party, it must be given by written notice, sent by certified United States mail, with return receipt requested, addressed to the party for whom it is intended and the remaining party, at the places last specified, and the places for giving of notice shall remain such until they shall have been changed by written notice in compliance with the provisions of this section. For the present, CONTRACTOR and CITY designate the following as the respective places for giving of notice:

CITY

Charles F. Dodge, City Manager

City of Pembroke Pines 601 City Center Way

Pembroke Pines, Florida 33025

Telephone No.

(954) 450-1040

Copy To:

Samuel S. Goren, City Attorney

Goren, Cherof, Doody & Ezrol, P.A.

3099 East Commercial Boulevard, Suite 200

Fort Lauderdale, Florida 33308

Telephone No.

(954) 771-4500

Facsimile No.

(954) 771-4923

CONTRACTOR:

Edwards Electric Corp.

Attn: Tyrone Fox

7231 Southern Blvd., Suite C-2 West Palm Beach, FL 33413

Phone: 561-683-7066 Fax: 561-683-8115 TFoxVPEEC@aol.com

- 23.7 <u>Binding Authority</u>. Each person signing this Agreement on behalf of either party individually warrants that he or she has full legal power to execute this Agreement on behalf of the party for whom he or she is signing, and to bind and obligate such party with respect to all provisions contained in this Agreement.
- 23.8 <u>Headings</u>. Headings herein are for the convenience of reference only and shall not be considered in any interpretation of this Agreement.
- 23.9 **Exhibits.** Each exhibit referred to in this Agreement forms an essential part of this Agreement. The exhibits if not physically attached should be treated as part of this Agreement and are incorporated herein by reference.
- 23.10 <u>Severability</u>. If any provision of this Agreement or application thereof to any person or situation shall to any extent, be held invalid or unenforceable, the remainder of this Agreement, and the application of such provisions to persons or situations other than those as to which it shall have been held invalid or unenforceable, shall not be affected thereby, and shall continue in full force and effect, and be enforced to the fullest extent permitted by law.
- 23.11 Extent of Agreement. This Agreement represents the entire and integrated agreement between CITY and CONTRACTOR and supersedes all prior negotiations, representations or agreements, either written or oral.
- 23.12 <u>Waiver</u>. Failure of CITY to insist upon strict performance of any provision or condition of this Agreement, or to execute any right therein contained, shall not be construed as a

waiver or relinquishment for the future of any such provision, condition, or right, but the same shall remain in full force and effect.

- 23.13 Attorney's Fees. In the event that either party brings suit for enforcement of this Agreement, each party shall bear its own attorney's fees and court costs, except as otherwise provided under the indemnification provisions set forth herein above.
- 23.14 <u>Protection of City Property</u>. At all times during the performance of this Agreement, CONTRACTOR shall protect CITY's property from all damage whatsoever on account of the work being carried on under this Agreement.
- 23.15 <u>Counterparts and Execution</u>. This Agreement may be executed by hand or electronically in multiple originals or counterparts, each of which shall be deemed to be an original and together shall constitute one and the same agreement. Execution and delivery of this Agreement by the Parties shall be legally binding, valid and effective upon delivery of the executed documents to the other party through facsimile transmission, email, or other electronic delivery.
- 23.16 <u>Compliance with Statutes</u>. It shall be the CONTRACTOR's responsibility to be aware of and comply with all statutes, ordinances, rules, orders, regulations and requirements of all local, city, state, and federal agencies as applicable.
- 23.17 <u>Scrutinized Companies.</u> CONTRACTOR, its principals or owners, certify that they are not listed on the Scrutinized Companies that Boycott Israel List, Scrutinized Companies with Activities in Sudan List, Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or is engaged in business operations with Syria. In accordance with Section 287.135, Florida Statutes, as amended, a company is ineligible to, and may not, bid on, submit a proposal for, or enter into or renew a contract with any agency or local governmental entity for goods or services of:
  - 23.17.1 any amount of, at the time bidding on, submitting a proposal for, or entering into or renewing such contract, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statutes or is engaged in a boycott of Israel; or
  - 23.17.2 one million dollars or more if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company:
    - 23.17.2.1 is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, Florida Statutes; or
    - 23.17.2.2 is engaged in business operations in Syria.
- 23.18 <u>Domestic Partnership.</u> CONTRACTOR certifies that it is aware of the requirements of Section 35.39 of the CITY's Code of Ordinances and certifies that (check only one box below):
  - ✓ CONTRACTOR currently complies with the requirements of Section 35.39 of the CITY's Code of Ordinances; or

CONTRACTOR will comply with the conditions of Section 35.39 of the CITY's
Code of Ordinances; or
CONTRACTOR will not comply with the conditions of Section 35.39 of the
CITY's Code of Ordinances; or
CONTRACTOR does not comply with the conditions of Section 35.39 of the
CITY's Code of Ordinances because of the following allowable exemption
(check only box below):
☐ CONTRACTOR does not provide benefits to employees' spouses in
traditional marriages; or
☐ CONTRACTOR provides an employee the cash equivalent of benefits
because CONTRACTOR is unable to provide benefits to employees'
Domestic Partners or spouses despite making reasonable efforts to provide
them. To meet this exception, CONTRACTOR shall provide a notarized
affidavit that it has made reasonable efforts to provide such benefits. The
affidavit shall state the efforts taken to provide such benefits and the
amount of the cash equivalent. Case equivalent means the amount of
money paid to an employee with a Domestic Partner or spouse rather than
providing benefits to the employee's Domestic Partner or spouse. The case
equivalent is equal to the employer's direct expense of providing benefits
to an employee's spouse; or
☐ CONTRACTOR is a religious organization, association, society, or any
non-profit charitable or educational institution or organization operated,
supervised, or controlled by or in conjunction with a religious
organization, association, or society; or
☐ CONTRACTOR is a governmental agency.

- 23.18.1 Except where federal or state law mandates to the contrary, a contractor awarded a contract pursuant to a competitive solicitation shall provide benefits to Domestic Partners and spouses of its employees, irrespective of gender, on the same basis as it provides benefits to employees' spouses in traditional marriages.
- 23.18.2 CONTRACTOR shall provide the City Manager and his/her designee, access to its records for the purpose of audits and/or investigations to ascertain compliance with the provisions of this Article, and upon request shall provide evidence that the CONTRACTOR is in compliance with the provisions of this Article upon the renewal of this AGREEMENT or when the City Manager or his/her designee receives a complaint or has reason to believe CONTRACTOR may not be in compliance with the provisions of this Article. Records shall include but not be limited to providing the City Manager and his/her designee with certified copies of CONTRACTOR's records pertaining to its benefits policies and its employment policies and practices.
- 23.18.3 CONTRACTOR must conspicuously make available to all employees and applicants for employment the following statement:

"During the performance of a contract with the City of Pembroke Pines, Florida, the CONTRACTOR will provide Equal Benefits to its employees with spouses, as defined by Section 35.39 of the City of Pembroke Pines Code of Ordinances, and its employees with Domestic Partners and all Married Couples".

If CONTRACTOR has questions regarding the application of Section 35.39 of the City of Pembroke Pines Code of Ordinances to CONTRACTOR's duties pursuant to this Agreement, contact Human Resources at (954) 954-392-292 or <a href="mailto:drottein@ppines.com">drottein@ppines.com</a>.

23.18.4 By executing this Agreement, CONTRACTOR certifies that it agrees to comply with the above and Section 35.39 of the City of Pembroke Pines Code of Ordinances, as may be amended from time to time.

### SIGNATURE PAGE FOLLOWS

	NG, the Parties have set their hands and seals the day
and year first written above.	CITY:
ATTEST:	CITY OF PEMBROKE PINES, FLORIDA
MARLENE D. GRAHAM, CITY CLERK APPROVED AS TO FORM:	By:CHARLES F. DODGE, CITY MANAGER
Name:	
OFFICE OF THE CITY ATTORNEY	CONTRACTOR:  EDWARDS ELECTRIC CORP.  Signed By:  Name: Tyrone A. Fox
	Title: Vice President

#### **SNIEDERMEYER**



#### CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 9/17/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed.

	SUBROGATION IS WAIVED, subjents certificate does not confer rights t				ich endorsement(s	i).		it. A si	atement on
	DUCER				CONTACT Susan	Niedermeye	r		
Col	linsworth, Alter, Fowler & French, LL0 0 Governors Square Blvd	)			PHONE (A/C, No, Ext):		FAX (A/C, No):		
Sui	te 301				E-MAIL ADDRESS: Snieder	meyer@caf	fllc.com		
IVIIa	mi Lakes, FL 33016				IN	SURER(S) AFFO	RDING COVERAGE		NAIC#
					INSURER A : Execut	tive Risk Ind	demnity Inc.		35181
INSU	JRED				INSURER B : Federa	I Insurance	Company		20281
	<b>Edwards Electric Corp</b>				INSURER C: Nation	al Union Fir	e Ins Co of Pittsburgl	n, PA	19445
	7231 Southern Blvd, Suite C West Palm Beach, FL 33413				INSURER D : Ironsh	ore Special	ty Insurance Compan	y	
	West Faili Beach, FE 33413				INSURER E :		(F) - (F) - (F)		
1865 700					INSURER F:				
				NUMBER:			REVISION NUMBER:		
C	HIS IS TO CERTIFY THAT THE POLICIE IDICATED. NOTWITHSTANDING ANY R ERTIFICATE MAY BE ISSUED OR MAY XCLUSIONS AND CONDITIONS OF SUCH	EQU PER	IREMI TAIN,	ENT, TERM OR CONDITION THE INSURANCE AFFORD	N OF ANY CONTRA DED BY THE POLIC	CT OR OTHER	R DOCUMENT WITH RESPE SED HEREIN IS SUBJECT T	CT TO	WHICH THIS
INSR LTR			SUBR		POLICY EFF (MM/DD/YYYY)			s	
A	X COMMERCIAL GENERAL LIABILITY	III	1111		(MINI/DD/1111)	(MINIOS / 1 1 1 1 )	EACH OCCURRENCE	s	1,000,000
	CLAIMS-MADE X OCCUR	х		54309832	11/1/2019	11/1/2020	DAMAGE TO RENTED PREMISES (Ea occurrence)	\$	100,000
							MED EXP (Any one person)	\$	5,000
							PERSONAL & ADV INJURY	\$	1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	\$	2,000,000
	POLICY X PRO-						PRODUCTS - COMP/OP AGG	\$	2,000,000
	OTHER:							\$	
В	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	\$	1,000,000
	X ANY AUTO		54309831	54309831	11/1/2019	11/1/2020	BODILY INJURY (Per person)	\$	
	OWNED SCHEDULED AUTOS						BODILY INJURY (Per accident)	\$	
	HIRED AUTOS ONLY AUTOS ONLY						PROPERTY DAMAGE (Per accident)	\$	
_								\$	4 000 000
С	UMBRELLA LIAB X OCCUR			EBU065714330	11/1/2019	11/1/2020	EACH OCCURRENCE	\$	4,000,000
	X EXCESS LIAB CLAIMS-MADE	Х		LB00037 14330	11/1/2019 11/1/2		AGGREGATE		4,000,000
В	DED RETENTION \$						X PER OTH-	\$	
_	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			54309833	11/1/2019	11/1/2020			1,000,000
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)	N/A					E.L. EACH ACCIDENT	\$	1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE  E.L. DISEASE - POLICY LIMIT	s	1,000,000
D	Pollution Liability			ICELLUW00102570	9/16/2020	9/16/2021	Each/Aggregate	3	1,000,000
DESC	CRIPTION OF OPERATIONS / LOCATIONS / VEHICL job 918 Pembroke Pines Effluent Pump	ES (A	CORD	101, Additional Remarks Schedul	e, may be attached if mo	re space Is requir	ed)		
	of Pembroke Pines is included as addit en contract or permit.	ional	insu	red with respects to Gener	al Liability, Pollutio	n Liability, an	d Excess/Umbrella Liabili	ty as re	equired by
	on community permit								
CEI	TIFICATE HOLDER				CANCELLATION		-	_	
CEI	RTIFICATE HOLDER				CANCELLATION				
	City of Pembroke Pines 601 City Center Way					N DATE TH	ESCRIBED POLICIES BE CA EREOF, NOTICE WILL E Y PROVISIONS.		
	Pembroke Pines, FL 33025				AUTHORIZED REPRESE	NTATIVE			



## "Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation"

### Invitation for Bids # PSUT-20-06

General Information					
Project Cost Estimate	\$1,992,800	See Section 1.4			
Project Timeline	560 Calendar Days from NTP	See Section 1.4			
Evaluation of Proposals	Staff	See Section 1.7			
Mandatory Pre-Bid Meeting	9:00 a.m. on July 7, 2020	See Section 1.8			
	at the Wastewater Treatment Facility				
	located at 13955 Pembroke Road,				
	Pembroke Pines, FL 33029				
Question Due Date	July 14, 2020	See Section 1.8			
Proposals will be accepted until	2:00 p.m. on July 28, 2020	See Section 1.8			
5% Proposal Security / Bid Bond	Required in the event that the	See Section 4.1			
	proposal exceeds \$200,000				
100% Payment and Performance Bonds	Required in the event that the	See Section 4.2			
	proposal exceeds \$200,000				
Grant or Federal Funding Information	Not Applicable	Not Applicable			

THE CITY OF PEMBROKE PINES
PURCHASING DIVISION
8300 SOUTH PALM DRIVE
PEMBROKE PINES, FLORIDA 33025
(954) 518-9020

### **Table of Contents**

SECTION	I 1 - INSTRUCTIONS	5
1.1	NOTICE	5
1.2	PURPOSE	5
1.3	SCOPE OF WORK	6
1.4	PROJECT COST ESTIMATE & TIMELINE	6
1.4.1	PERMITS	6
1.4.2	PERMIT ALLOWANCE	7
1.5	PROPOSAL REQUIREMENTS	7
1.5.1	Attachment A: Contact Information Form	7
1.5.2	Attachment B: Non-Collusive Affidavit	8
1.5.3	Attachment C: Proposer's Qualifications Statement	8
1.5.4	Attachment F: References Form	8
1.5.5	Proposal Security (Bid Bond Form or Cashier's Check)	8
1.6	VENDOR REGISTRATION AND QUALIFICATION DOCUMENTS	
1.6.1	Vendor Information Form	9
1.6.2	Form W-9 (Rev. October 2018)	9
1.6.3	Sworn Statement on Public Entity Crimes Form	9
1.6.4	Local Vendor Preference Certification	9
1.6.5	Local Business Tax Receipts	10
1.6.6	Veteran Owned Small Business Preference Certification	10
1.6.7	Equal Benefits Certification Form	10
1.6.8	Vendor Drug-Free Workplace Certification Form	10
1.6.9	Scrutinized Company Certification	10
1.7	EVALUATION OF PROPOSALS & PROCESS OF SELECTION	10
1.8	TENTATIVE SCHEDULE OF EVENTS	10
1.7.1	MANDATORY PRE-BID MEETING / SITE VISIT	11
1.9	SUBMISSION REQUIREMENTS	11
SECTION	I 2 - INSURANCE REQUIREMENTS	12
SECTION	I 3 - GENERAL TERMS & CONDITIONS	18
3.1	EXAMINATION OF CONTRACT DOCUMENTS	18
3.2	CONFLICT OF INSTRUCTIONS	18
3.3	ADDENDA or ADDENDUM	18

	3.4	INTERPRETATIONS AND QUESTIONS	. 18
	3.5	RULES, REGULATIONS, LAWS, ORDINANCES and LICENSES	. 18
	3.6	WARRANTIES FOR USAGE	. 19
	3.7	BRAND NAMES	. 19
	3.8	QUALITY	. 19
	3.9	SAMPLES	. 19
	3.10	DEVELOPMENT COSTS	. 19
	3.11	PRICING	. 19
	3.12	DELIVERY POINT	. 19
	3.13	TAX EXEMPT STATUS	. 19
	3.14	CONTRACT TIME	. 19
	3.15	COPYRIGHT OR PATENT RIGHTS	. 20
	3.16	PUBLIC ENTITY CRIMES	. 20
	3.17	CONFLICT OF INTEREST	. 20
	3.18	FACILITIES	. 20
	3.19	ENVIRONMENTAL REGULATIONS	. 20
	3.20	SIGNATURE REQUIRED	. 21
	3.21	MANUFACTURER'S CERTIFICATION	. 21
	3.22	MODIFICATION OR WITHDRAWAL OF PROPOSAL	. 21
	3.23	PUBLIC BID; BID OPENING AND GENERAL EXEMPTIONS	. 21
	3.24	RESERVATIONS FOR REJECTION AND AWARD	. 22
	3.25	BID PROTEST	. 22
	3.26	INDEMNIFICATION	. 22
	3.27	DEFAULT PROVISION	. 22
	3.28	ACCEPTANCE OF MATERIAL	. 23
	3.29	LOCAL GOVERNMENT PROMPT PAYMENT ACT	. 23
	3.30	SCRUTINIZED COMPANIES LIST	. 23
	3.31	PUBLIC RECORDS; TRADE SECRET, PROPRIETARY AND CONFIDENTIA	
		TTALS	
	3.32	PURCHASING AGREEMENTS WITH OTHER GOVERNMENT AGENCIES	
	3.33	CONE OF SILENCE	
S		4 - SPECIAL TERMS & CONDITIONS	
	4.1	PROPOSAL SECURITY	
	4.2	PAYMENT AND PERFORMANCE BONDS	. 26



	4.3	OWNER'S CONTINGENCY
	4.4	TAX SAVER PROGRAM
	4.5	RELEASE OF LIEN
	4.6 AND D	SOLID WASTE CONSTRUCTION AND DEMOLITION DEBRIS COLLECTION ISPOSAL REQUIREMENTS
4	ТТАСН	MENTS
	Attacl	nment A: Contact Information Form
	Attacl	nment B: Non-Collusive Affidavit
	Attacl	nment C: Proposer's Qualifications Statement
	Attacl	nment D: Sample Insurance Certificate
	Attacl	nment E: Specimen Contract - Construction Agreement
	Attacl	nment F: References Form
	Attach	nment G: Standard Release of Lien Form
	Attach	nment H: Contract Documents
		Appendix 1 – Bid Set Specifications
		Appendix 2 – Bid Set

#### **SECTION 1 - INSTRUCTIONS**

#### **1.1 NOTICE**

Notice is hereby given that the City Commission of the City of Pembroke Pines is seeking sealed proposals for:

# IFB # PSUT-20-06 "Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation"

Solicitations may be obtained from the City of Pembroke Pines website at <a href="http://www.ppines.com/index.aspx?NID=667">http://www.ppines.com/index.aspx?NID=667</a> and on the <a href="www.BidSync.com">www.BidSync.com</a> website.

If you have any problems downloading the solicitation, please contact the BidSync Support line at 1-800-990-9339.

If additional information help is needed with downloading the solicitation package please contact the Purchasing Office at (954) 518-9020 or by email at <a href="mailto:purchasing@ppines.com">purchasing@ppines.com</a>. The Purchasing Office hours are between 7:00 a.m. - 6:00 p.m. on Monday through Thursday and is located at 8300 South Palm Drive, Pembroke Pines, Florida 33025.

The City requires all questions relating to the solicitation be entered through the "Ask a Question" option tab available on the BidSync website. Responses to the questions will be provided online at www.bidsync.com. Such request must be received by the "Question Due Date" stated in the solicitation. The issuance of a response via BidSync is considered an Addendum and shall be the only official method whereby such an interpretation or clarification will be made.

**Proposals will be accepted until 2:00 p.m., Tuesday, July 28, 2020.** Proposals must be **submitted electronically at <u>www.BidSync.com</u>**. The sealed electronic proposals will be publicly opened at 2:30 p.m. by the City Clerk's Office, in the City Hall Administration Building, 4<sup>th</sup> Floor Conference Room located at 601 City Center Way, Pembroke Pines, Florida, 33025.

#### 1.2 PURPOSE

The City of Pembroke Pines is seeking proposals from qualified firms, hereinafter referred to as the Contractor, to furnish all labor, materials, equipment, services and incidentals for the electrical rehabilitation of the effluent pump station located at the Wastewater Treatment Plant, 13955 Pembroke Road, Pembroke Pines, FL 33029, in accordance with the terms, conditions, and specifications contained in this solicitation.

#### 1.3 SCOPE OF WORK

The work includes the furnishing of all labor, materials, equipment, services and incidentals for the Electrical Rehabilitation of the Effluent Pump Station. Refer to Attachment H: Contract Documents.

The demolition work includes the demolition of existing Switchboard EPS, VFDs, ATS, transformers, panelboards, lighting systems, disconnect switches, conduits and conductors as per specifications and plans. Refer to Attachment H: Contract Documents.

The temporary work during construction includes temporary generators, temporary VFDs, temporary conduits and temporary conductors as per specifications and plans. Refer to Attachment H: Contract Documents.

The new work includes a new main-tie-main switchboard, new VFDs, new disconnect switches, new medium voltage pad mounted transformers, new lighting systems, new grounding systems, new panelboard, new low voltage transformers, modifications to existing east and west switchboards, new cable tray, new concrete encased duct banks, new conduit and conductor systems, modifications to existing Effluent Pump Station PLC and new instrumentation and control systems as per Attachment H: Contract Documents.

#### 1.4 PROJECT COST ESTIMATE & TIMELINE

Staff estimates this project to cost approximately \$1,992,800, which does not include permit costs.

Please note the City will include a Permit Allowance for this project, therefore proposers should not include permit costs in their total proposal price.

The work shall be completed within 560 days from issuance of City's Notice to Proceed.

#### **1.4.1 PERMITS**

The City anticipates this project to require the following permits:

Permit	Agency	Cost (or related
		method of calculation)
Engineering	City of Pembroke Pines	4.9136% of construction costs
	Engineering Department	
Building	City of Pembroke Pines	1. Construction costs up to \$2,500 (Per
	Building Department	structure per trade) = \$97.17
	(Calvin, Giordano &	2. Construction costs greater than \$2,500
	Associates, Inc.)	up to \$1,000,000 = 2.96%

#### 1.4.2 PERMIT ALLOWANCE

The City shall include a "Permit Allowance" for this project. The Contractor shall obtain all required permits to complete the work, however the City shall utilize the Permit Allowance to reimburse the contractor for the related permit, license, impact or inspection fees. Payments will be made to the contractor based on the actual cost of permits upon submission of paid permit receipts. The City shall not pay for other costs related to obtaining or securing permits.

The City shall determine the amount of the allowance at time of award. The allowance may be based on a specified percent of the proposed project amount and shall be established for the specific project being performed under the contract. This dollar amount shall be shown on the specific project purchase order as a distinct item from the vendor's overall offer to determine the total potential dollar value of the contract. Any Permit Allowance funds that have not been utilized at the end of the project will remain with the City, if the City Permit fees exceed the allowance indicated, the City will reimburse the contractor the actual amount of City Permit Fees required for project completion.

#### 1.5 PROPOSAL REQUIREMENTS

The <u>www.bidsync.com</u> website allows for vendors to complete, scan and upload their documents as part of the bidder's submittal on the website. Prospective proposers interested in responding to this solicitation are requested to provide all of the information listed in this section. Submittals that do not respond completely to all of requirements specified herein may be considered non-responsive and eliminated from the process. Brevity and clarity are encouraged.

#### 1.5.1 Attachment A: Contact Information Form

- a. Attached is contact information form (Attachment A) where the vendor will enter their contact information and complete the proposal checklist. The Contact information form shall be electronically signed by the contact person authorized to represent the contractor. This form must be completed and submitted through <a href="https://www.bidsync.com">www.bidsync.com</a> as part of the bidder's submittal.
- b. The vendor must provide their pricing through the designated lines items listed on the BidSync website.
- c. Please note vendors should be registered on BidSync under the name of the organization that they are operating as and it should match the organization name on the documents that they are submitting and utilizing when responding to the solicitation.
- d. The contact information form should contain an electronic signature of the authorized representative of the Proposer along with the address and telephone number for communications regarding the Proposal.

- e. Proposals by corporations should be executed in the corporate name by the President or other corporate officer accompanied by evidence of authority to sign. The corporate address and state of incorporation must also be shown.
- f. Proposals by partnerships should be executed in the partnership name and signed by a partner whose title and the official address of the partnership must be shown.

#### 1.5.2 Attachment B: Non-Collusive Affidavit

#### 1.5.3 Attachment C: Proposer's Qualifications Statement

#### 1.5.4 Attachment F: References Form

a. Complete Attachment F: References Form, preferably where the team was the same. References should be from the last five years and should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. As part of the proposal evaluation process, the City may conduct an investigation of references, including a record check or consumer affairs complaints. Proposers' submission of a proposal constitutes acknowledgment of the process and consent to investigate. The City is the sole judge in determining Proposers qualifications.

#### 1.5.5 Proposal Security (Bid Bond Form or Cashier's Check)

- a. Each Proposal should be accompanied by a certified or cashier's check or by a Bid Bond made payable to the City of Pembroke Pines on an approved form, duly executed by the Proposer as principal and having as surety thereon a surety company acceptable to CITY and authorized to write such Bond under the laws of the State of Florida, in an amount not less than five percent (5%) of the amount of the base Proposal price.
- b. Contingency is not to be counted in the total amount the proposal security is based on.
- c. Proposers must submit a scanned copy of their bid security (bid bond form or cashier's check) with their bid submittal through BidSync.
- d. Proposers should also submit their original bid security (bid bond form or cashier's check) at time of the bid due date, or they may be deemed as non-responsive.
- e. The original Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked "BID SECURITY IFB # PSUT-20-06 Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation" and sent to the City of

Pembroke Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

f. Please see SECTION 4 - SPECIAL TERMS & CONDITIONS of this IFB for additional information.

#### 1.6 VENDOR REGISTRATION AND QUALIFICATION DOCUMENTS

The City has implemented a new process that is intended to make the bidding process easier for vendors that bid on multiple City projects. This process will require vendors to complete and submit the following standard forms and documents at any time prior to bidding on a project. In addition, the vendors will be able to utilize these same forms without the need to re-fill and resubmit the forms each time they bid on a City project.

# <u>Furthermore</u>, please make sure to update this information on an as-needed basis so that all pertinent information is accurate, such as local business tax receipts, and any other relevant information.

These forms will be found under the "Vendor Registration" group of "Qualifications" on the BidSync website for the City of Pembroke Pines. Please note that the BidSync website requires bidders to complete all of these qualifications prior to being able to submit questions on any bids, therefore, please make sure to complete this information as soon as possible.

The following documents can be completed prior to the bidding process through the BidSync website and do not need to be attached to your submittal as the BidSync website will automatically include it.

#### 1.6.1 Vendor Information Form

#### 1.6.2 Form W-9 (Rev. October 2018)

a. Previously dated versions of this form will delay the processing of any payments to the selected vendor.

#### 1.6.3 Sworn Statement on Public Entity Crimes Form

#### 1.6.4 Local Vendor Preference Certification

- a. If claiming Local Pembroke Pines Vendor Preference, business must attach a current business tax receipt from the City of Pembroke Pines
- b. If claiming Local Broward County Vendor Preference, business must attach a current business tax receipt from Broward County or the city within Broward County where the business resides.

c. The Local Vendor Preference Certification form must be completed by/for the proposer; the proposer <u>WILL NOT</u> qualify for Local Vendor Preference based on their sub-contractors' qualifications.

#### 1.6.5 Local Business Tax Receipts

#### 1.6.6 Veteran Owned Small Business Preference Certification

- a. If claiming Veteran Owned Small Business Preference Certification, business must attach the "Determination Letter" from the United States Department of Veteran Affairs Center for Verification and Evaluation notifying the business that they have been approved as a Veteran Owned Small Business (VOSB).
- b. The Veteran Owned Small Business Preference Certification form must be completed by/for the proposer; the proposer <u>WILL NOT</u> qualify for Veteran Owned Small Business Preference based on their sub-contractors' qualifications.

#### 1.6.7 Equal Benefits Certification Form

#### 1.6.8 Vendor Drug-Free Workplace Certification Form

#### 1.6.9 Scrutinized Company Certification

#### 1.7 EVALUATION OF PROPOSALS & PROCESS OF SELECTION

- A. Staff will evaluate all responsive proposals received from proposers who meet or exceed the bid requirements contained in the solicitation. Evaluations shall be based upon the information contained in the proposals as submitted.
- B. Staff will make a recommendation to the City Commission for award of contract.

#### 1.8 TENTATIVE SCHEDULE OF EVENTS

Event	Time &/or Date
Issuance of Solicitation (Posting Date)	June 23, 2020
Mandatory Pre-Bid Meeting	9:00 a.m. on July 7, 2020
Question Due Date	July 14, 2020
Anticipated Date of Issuance for the	July 20, 2020
Addenda with Questions and Answers	
Proposals will be accepted until	2:00 p.m. on July 28, 2020
Proposals will be opened at	2:30 p.m. on July 28, 2020
Evaluation of Proposals by Staff	July 28, 2020 – August 3, 2020
Recommendation of Contractor to	August 19, 2020
City Commission award	
Issuance of Notice to Proceed	August 20, 2020



Project Commencement	Not later than 10 days after NTP	
Project Completion	June 23, 2020	

#### 1.7.1 MANDATORY PRE-BID MEETING / SITE VISIT

There will be a mandatory scheduled pre-bid meeting on July 7, 2020 at 9:00 a.m. Meeting location will be at the Public Services Building, Large Conference Room, located at 8300 S. Palm Drive, Pembroke Pines, FL 33025.

All vendors will be required to sign in at the meeting to show proof of attendance to the mandatory meeting. It is the vendor's responsibility to make sure that they sign in at the meeting.

#### 1.9 SUBMISSION REQUIREMENTS

Bids/proposals <u>must be submitted electronically</u> at <u>www.bidsync.com</u> on or before 2:00 p.m. on July 28, 2020.

Please note vendors should be registered on BidSync under the name of the organization that they are operating as and it should match the organization name on the documents that they are submitting and utilizing when responding to the solicitation.

The vendor must provide their pricing through the designated lines items listed on the BidSync website. In addition, the vendor must complete any webforms on the BidSync website and provide any additional information requested throughout this solicitation. Any additional information requested in the solicitation should be scanned and uploaded. <u>Unless otherwise specified, the City requests for vendors to upload their documents as one (1) PDF document in the order that is outline in the bid package.</u>

The City recommends for proposers to submit their proposals as soon as they are ready to do so. Please allow ample time to submit your proposals on the BidSync website. Proposals may be modified or withdrawn prior to the deadline for submitting Proposals. BidSync Support is happy to help you with submitting your proposal and to ensure that you are submitting your proposals correctly, but we ask that you contact their support line at 1-800-990-9339 with ample time before the bid closing date and time.

#### PLEASE <u>DO NOT</u> SUBMIT ANY PROPOSALS VIA MAIL, E-MAIL OR FAX.

However, please note that any required Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked "BID SECURITY - IFB # PSUT-20-06 Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation" and sent to the City of Pembroke Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

### **SECTION 2 - INSURANCE REQUIREMENTS**

- 2.1 The CONTRACTOR shall indemnify and hold harmless the CITY and its officers, employees, agents and instrumentalities from any and all liability, losses or damages, including attorneys' fees and costs of defense, which the CITY or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the performance of this Agreement by the CONTRACTOR or its employees, agents, servants, partners, principals or subcontractors. The CONTRACTOR shall pay all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the CITY, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorneys' fees which may issue thereon. The CONTRACTOR expressly understands and agrees that any insurance protection required by this Agreement or otherwise provided by the CONTRACTOR shall in no way limit the responsibility to indemnify, keep and save harmless and defend the CITY or its officers, employees, agents and instrumentalities as herein provided.
- 2.2 CONTRACTOR shall not commence work under this Agreement until it has obtained all insurance required under this paragraph and such insurance has been approved by the Risk Manager of the CITY nor shall the CONTRACTOR allow any subcontractor to commence work on any subcontract until all similar such insurance required of the subcontractor has been obtained and similarly approved.
- 2.3 Certificates of Insurance, reflecting evidence of the required insurance, shall be filed with the CITY's Risk Manager prior to the commencement of this Agreement. Policies shall be issued by companies authorized to do business under the laws of the State of Florida. The insurance company shall be rated no less than "A" as to management, and no less than "Class VI" as to financial strength according to the latest edition of Best's Insurance Guide published by A.M. Best Company.
- 2.4 Certificates of Insurance shall provide for thirty (30) days' prior written notice to the CITY in case of cancellation or material changes in the policy limits or coverage states. If the carrier cannot provide thirty (30) days' notice of cancellation, either the CONTRACTOR or their Insurance Broker must agree to provide notice.
- 2.5 Insurance shall be in force until all obligations required to be fulfilled under the terms of the Agreement are satisfactorily completed as evidenced by the formal acceptance by the CITY. In the event the insurance certificate provided indicates that the insurance shall terminate and lapse during the period of this Agreement, the CONTRACTOR shall furnish, at least forty-five (45) days prior to the expiration of the date of such insurance, a renewed certificate of insurance as proof that equal and like coverage for the balance of the period of the Agreement and extension thereunder is in effect. The CONTRACTOR shall neither commence nor continue to provide any services pursuant to this Agreement unless all required insurance remains in full force and effect. CONTRACTOR shall be liable to CITY for any lapses in service resulting from a gap in insurance coverage.
- 2.6 REQUIRED INSURANCE

CONTRACTOR shall be required to obtain all applicable insurance coverage, as indicated below, prior to commencing any work pursuant to this Agreement:

Yes No

✓ □ 2.6.1 Comprehensive General Liability Insurance written on an occurrence basis including, but not limited to: coverage for bodily injury and property damage, personal & advertising injury, products & completed operations, and contractual liability. Coverage must be written on an occurrence basis, with limits of liability no less than:

- 1. Each Occurrence Limit \$1,000,000
- 2. Fire Damage Limit (Damage to rented premises) \$100,000
- 3. Personal & Advertising Injury Limit \$1,000,000
- 4. General Aggregate Limit \$2,000,000
- 5. Products & Completed Operations Aggregate Limit \$2,000,000

Products & Completed Operations Coverage shall be maintained for the later of three (3) years after the delivery of goods/services or final payment under the Agreement. (For Construction projects: Increase to ten (10) years and include a Designated Construction Project(s) General Aggregate Limit)

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

✓ □ 2.6.2 Workers' Compensation and Employers' Liability Insurance covering all employees, and/or volunteers of the CONTRACTOR engaged in the performance of the scope of work associated with this Agreement. In the case any work is sublet, the CONTRACTOR shall require the subcontractors similarly to provide Workers' Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. Coverage for the CONTRACTOR and all subcontractors shall be in accordance with applicable state and/or federal laws that may apply to Workers' Compensation Insurance with limits of liability no less than:

1. Workers' Compensation: Coverage A – Statutory

2. Employers Liability: Coverage B \$500,000 Each Accident

\$500,000 Disease – Policy Limit \$500,000 Disease – Each Employee

If CONTRACTOR claims to be exempt from this requirement, CONTRACTOR shall provide CITY proof of such exemption along with a written request for CITY to exempt CONTRACTOR, written on CONTRACTOR letterhead.

Yes No

- ✓ □ 2.6.3 Comprehensive Auto Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the performance of work under this Agreement, with a combined single limit of liability for bodily injury and property damage no less than:
  - 1. Any Auto (Symbol 1)
    Combined Single Limit (Each Accident) \$1,000,000
  - 2. Hired Autos (Symbol 8) Combined Single Limit (Each Accident) - \$1,000,000
  - 3. Non-Owned Autos (Symbol 9) Combined Single Limit (Each Accident) - \$1,000,000

If work under this Agreement includes transportation of hazardous materials, policy shall include pollution liability coverage equivalent to that provided by the latest version of the ISO pollution liability broadened endorsement for auto and the latest version of the ISO Motor Carrier Act endorsement, equivalents or broader language.



2.6.3.1 If CONTRACTOR requests reduced limits under a Personal Auto Liability Policy and it is agreed to by the CITY, coverage shall include Bodily Injury limits of \$100,000 per person/\$300,000 per occurrence and Property Damage limits of \$300,000 per occurrence

Yes No ✓ □

2.6.4 Umbrella/Excess Liability Insurance in the amount of \$2,000,000.00 as determined appropriate by the CITY depending on the type of job and exposures contemplated. Coverage must be follow form of the General Liability, Auto Liability and Employer's Liability. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment pursuant to this Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

2.6.5 Professional Liability/Errors & Omissions Insurance with a limit of liability no less than \$1,000,000 per wrongful or negligent act. This coverage shall be maintained for a period of no less than three (3) years after the delivery of goods/services final payment pursuant to this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY. (Limit to align with size and scope of the Agreement and exposure inherent with operation/services being performed. For Construction projects: Increase to ten (10) years.)

Yes No

2.6.6 Environmental/Pollution Liability insurance shall be required with a limit of no less than \$1,000,000 per wrongful act. Coverage shall include: CONTRACTOR's completed operations, sudden, accidental and gradual pollution conditions. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment pursuant to this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY. (Limit to align with size and scope of the Agreement and exposure inherent with operation/services being performed. For Construction projects: Increase to ten (10) years)

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No Cyber Liability including Network Security and Privacy Liability with a limit of 2.6.7 liability no less than \$1,000,000 per loss. Coverage shall include liability arising from: theft, dissemination and/or use of confidential information stored or transmitted in electronic form, unauthorized access to, use of, or tampering with computer systems, including hacker attacks or inability of an authorized third party to gain access to your services, including denial of service, and the introduction of a computer virus into, or otherwise causing damage to, a customer's or third person's computer, computer system, network, or similar computer-related property and the data, software and programs thereon. If vendor is collecting credit card information, it shall cover all PCI breach expenses. Coverage is to include the various state monitoring and state required remediation as well as meet the various state notification requirements. This coverage shall be maintained for a period of no less than the later of three (3) years after delivery of goods/services or final payment of the Agreement. Retroactive date, if any, to be no later than the first day of

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

2.6.8 Crime Coverage shall include employee dishonesty, forgery or alteration, and computer fraud in an amount of no less than \$1,000,000 per loss. If CONTRACTOR is physically located on CITY's premises, a third-party fidelity coverage extension shall apply.

□ × 2.6.9 Garage Liability & Garage-keepers Legal Liability for those that manage parking lots for the CITY or service CITY vehicles. Coverage must be written on an occurrence basis, with limits of liability no less than \$1,000,000 per Occurrence, including products & completed operations. This coverage shall be maintained for a period of no less than the

Yes No

service to the CITY.

later of three (3) years after the delivery of goods/services or final payment of this Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

□ × 2.6.10 Liquor Liability for those in the business of selling, serving or furnishing of any alcoholic beverages, whether licensed or not, shall carry a limit of liability of no less than \$1,000,000 per occurrence. Coverage shall be maintained for the later of three (3) years after the delivery of goods/services or final payment under the Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

□ × 2.6.11 Sexual Abuse & Molestation for any agreement involving a vulnerable population. Limits shall be no less than \$500,000 per occurrence. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment of this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY. (Limit to align with size and scope of the Agreement and exposure inherent with operation/services being performed.)

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

2.6.12 Builder's Risk Insurance shall be "All Risk" for one hundred percent (100%) of the completed value of the project that is the subject of this Agreement with a deductible of not more than five percent (5%) for Named Windstorm and \$20,000 per claim for all other perils. The Builder's Risk Insurance shall include interests of the CITY, the CONTRACTOR and subcontractors of the project. The CONTRACTOR shall include a separate line item for all costs associated with the Builder's Risk Insurance Coverage for the project. The CITY reserves the right at its sole discretion to utilize the CONTRACTOR's Builder's Risk Insurance or for the CITY to purchase its own Builder's Risk Insurance for the Project. Prior to the CONTRACTOR purchasing the Builder's Risk insurance for the project, the CONTRACTOR shall allow the CITY the opportunity to analyze the CONTRACTOR's coverage and determine who shall purchase the coverage. Should the CITY utilize the CONTRACTOR's Builder's Risk Insurance, the CONTRACTOR shall be responsible for all deductibles. If the CITY chooses to purchase the Builder's Risk Coverage on the project, the CONTRACTOR shall provide the CITY

with a change order deduct for all premiums and costs associated with the Builder's Risk insurance in their schedule. Should the CITY choose to utilize the CITY's Builder's Risk Program, the CITY shall be responsible for the Named Windstorm Deductible and the CONTRACTOR shall be responsible for the All Other Perils Deductible.

If and when 100% is not available or reasonable, the CITY Risk Manager is to make the determination as to what limits are appropriate for the given project.

Yes No	2.6.13	Other Insurance

### 2.7 REQUIRED ENDORSEMENTS

- 2.7.1 The City of Pembroke Pines shall be named as an Additional Insured on each of the Liability Policies required herein.
- 2.7.2 Waiver of all Rights of Subrogation against the CITY.
- 2.7.3 Thirty (30) Day Notice of Cancellation or Non-Renewal to the CITY.
- 2.7.4 CONTRACTOR's policies shall be Primary & Non-Contributory.
- 2.7.5 All policies shall contain a "severability of interest" or "cross liability" clause without obligation for premium payment of the CITY.
- 2.7.6 The City of Pembroke Pines shall be named as a Loss Payee on all Property and/or Inland Marine Policies as their interest may appear.
- 2.8 Any and all insurance required of the CONTRACTOR pursuant to this Agreement must also be required by any subcontractor in the same limits and with all requirements as provided herein, including naming the CITY as an additional insured, in any work that is subcontracted unless such subcontractor is covered by the protection afforded by the CONTRACTOR and provided proof of such coverage is provided to CITY. The CONTRACTOR and any subcontractors shall maintain such policies during the term of this Agreement.
- 2.9 The CITY reserves the right to require any other additional types of insurance coverage and/or higher limits of liability it deems necessary based on the nature of work being performed under this Agreement.
- 2.10 The insurance requirements specified in this Agreement are minimum requirements and in no way reduce any liability the CONTRACTOR has assumed in the indemnification/hold harmless section(s) of this Agreement.

## <u>SECTION 3 - GENERAL TERMS &</u> CONDITIONS

### 3.1 EXAMINATION OF CONTRACT DOCUMENTS

Before submitting a Proposal, each Proposer should (a) consider federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost or performance of the work, (b) study and carefully correlate the Proposer's observations with the Proposal Documents; and (c) notify the Purchasing Manager of all conflicts, errors and discrepancies, if any, in the Proposal Documents.

The Proposer, by and through the submission of a Proposal, agrees that Proposer shall be held responsible for having familiarized themselves with the nature and extent of the work and any local conditions that may affect the work to be done and the services, equipment, materials, parts and labor required.

### 3.2 CONFLICT OF INSTRUCTIONS

If a conflict exists between the General Conditions and Instructions stated herein and specific conditions and instructions contained in specifications, the specifications shall govern.

### 3.3 ADDENDA or ADDENDUM

A formal solicitation may require an Addendum to be issued. An addendum in some way may clarify, correct or change the original solicitation (i.e. due date/time, specifications, terms, conditions, line item). Vendors submitting a proposal should check the BidSync website for any addenda issued. Vendors are cautioned not to consider verbal modifications to the solicitation, as the addendum issued through BidSync will be the only official method whereby changes will be made.

## 3.4 INTERPRETATIONS AND QUESTIONS

If the Proposer is in doubt as to the meaning of any of the Proposal Documents, is of the opinion Conditions that the Specifications contain errors contradictions or reflect omissions, or has any question concerning the conditions and specifications, the Proposer shall submit a question for interpretation or clarification. The City requires all questions relating to the solicitation be entered through the "Ask a Question" option tab available on the BidSync website. Responses questions will be provided online at www.bidsync.com. Such request must be received by the "Question Due Date" stated in the solicitation. Questions received after "Question Due Date" shall not be answered. Interpretations or clarifications in response to such questions will be issued via BidSync. The issuance of a response via BidSync is considered an Addendum and shall be the only official method whereby such an interpretation or clarification will be made.

BidSync Support is also available to assist proposers with submitting their proposal and to ensure that proposers are submitting their proposals correctly. Proposers should ensure that they contact they BidSync support line at 1-800-990-9339 with ample time before the bid closing date and time.

For all other questions related to this solicitation, please contact the Purchasing Division at purchasing@ppines.com.

## 3.5 RULES, REGULATIONS, LAWS, ORDINANCES and LICENSES

The awarded contractor shall observe and obey all laws, ordinances, rules, and regulations of the federal, state, and CITY, which may be applicable to the service being provided. The awarded firm shall have or be responsible for obtaining all necessary permits or licenses required, if necessary, in order to provide this service.

Bidder warrants by submittal that prices quoted here are in conformity with the latest federal price guidelines, if any.

### 3.6 WARRANTIES FOR USAGE

Whenever a bid is sought, seeking a source of supply for a specified time for materials or service, the quantities or usage shown are estimated only. No guarantee or warranty is given or implied by the City as to the total amount that may or may not be purchased from any resulting contracts. These quantities are for bidders information only and will be used for tabulation and presentation of bid.

### 3.7 BRAND NAMES

If and wherever in the specifications a brand name, make, name of manufacturer, trade name, or vendor catalog number is mentioned, it is for the purpose of establishing a grade or quality of material only. Since the City does not wish to rule out other competition and equal brands or makes, the phrase "OR EQUAL" is added. However, if a product other than that specified is bid, Bidders shall indicate on their proposal and clearly state the proposed substitution and deviation. It is the vendor's responsibility to provide any necessary documentation and samples within their bid submittal to prove that the product is equal to that specified. Such samples are to be furnished before the date of bid opening. unless otherwise specified. Additional evidence in the form of documentation and samples may be requested if the proposed brand is other than that specified. The City retains the right to determine if the proposed brand shall be considered as an approved equivalent or not.

### 3.8 QUALITY

All materials used for the manufacture or construction of any supplies, materials, or equipment covered by this bid shall be new, the latest model, of the best quality, and highest grade workmanship, unless otherwise noted.

### 3.9 SAMPLES

Samples, when requested, must be furnished before, or at the bid opening, unless otherwise specified, and delivered free of expense to the City and if not used in testing or destroyed, will upon request within thirty (30) days of bid award be returned at the bidders expense.

### 3.10 DEVELOPMENT COSTS

Neither the City nor its representatives shall be liable for any expenses incurred in connection with the preparation, submission or presentation of a Bid in response to this solicitation. All information in the Bid shall be provided at no cost to the City.

### 3.11 PRICING

Prices should be stated in units of quantity specified in the bidding specifications. In case of discrepancy in computing the amount of the bid, the unit prices quoted will govern.

Bidder warrants by virtue of bidding that prices, terms, and conditions quoted in his bid will be firm for acceptance for a period of ninety (90) days from date of bid opening unless otherwise stated by the City or bidder.

### 3.12 DELIVERY POINT

All items shall be delivered F.O.B. destination, and delivery cost and charges included in the bid price. Failure to do so may be cause for rejection of bid.

### 3.13 TAX EXEMPT STATUS

The City is exempt from Florida Sales and Federal Excise taxes on direct purchase of tangible property.

### 3.14 CONTRACT TIME

By virtue of the submission of the Proposal, Proposer agrees and fully understands that the completion time of the work of the Contract is an essential and material condition of the Contract and that time is of the essence. The Successful Proposer agrees that all work shall be prosecuted regularly, diligently and uninterrupted at such rate of progress as will ensure full completion thereof within the time specified. Failure to complete the work within the time period specified shall be considered a default.

In addition, time will be of the essence for any orders placed as a result of this bid. Purchaser reserves the right to cancel such orders, or part thereof, without obligation if delivery is not made at the time(s) or place(s) specified.

### 3.15 COPYRIGHT OR PATENT RIGHTS

Bidder warrants that there have been no violations of copyrights or patent rights in manufacturing, producing, or selling other goods shipped or ordered as a result of this bid, and seller agrees to hold the purchaser harmless from any and all liability, loss or expense occasioned by such violation.

### 3.16 PUBLIC ENTITY CRIMES

"A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a supplier, subcontractor, or contractor. consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list."

The Public Entity Crime Affidavit Form, attached to this solicitation, includes

documentation that shall be executed by an individual authorized to bind the Proposer. The Proposer further understands and accepts that any contract issued as a result of this solicitation shall be either voidable or subject to immediate termination by the City. In the event there is any misrepresentation or lack of compliance with the mandates of Section 287.133 or Section 287.134, respectively, Florida Statutes. The City in the event in such termination, shall not incur any liability to the Bidder for any goods, services or materials furnished.

### 3.17 CONFLICT OF INTEREST

The award of any contract hereunder is subject to the provisions of Chapter 112, Florida Statutes. Proposers must disclose with their Proposal the name of any officer, director, partner, proprietor, associate or agent who is also an officer or employee of CITY or any of its agencies. Further, all Proposers must disclose the name of any officer or employee of CITY who owns, directly or indirectly, an interest of five percent (5%) or more in the Proposer's firm or any of its branches or affiliate companies.

### 3.18 FACILITIES

The City reserves the right to inspect the Bidder's facilities at any time with prior notice.

### 3.19 ENVIRONMENTAL REGULATIONS

CITY reserves the right to consider Proposer's history of citations and/or violations of environmental regulations in determining a Proposer's responsibility, and further reserves the right to declare a Proposer not responsible if the history of violations warrant such determination. Proposer shall submit with the Proposal, a complete history of all citations and/or violations, notices and dispositions thereof. non-submission of anv documentation shall be deemed to be an affirmation by the Proposer that there are no citations or violations. Proposer shall notify CITY immediately of notice of any citation or violation that Proposer may receive after the Proposal opening date and during the time of performance of any contract awarded to Proposers.

### 3.20 SIGNATURE REQUIRED

All proposals must be signed with the firm name and by an officer or employee having authority to bind the company or firm by his signature. FAILURE TO PROPERLY SIGN PROPOSAL SHALL INVALIDATE SAME, AND IT MAY NOT BE CONSIDERED FOR AWARD.

The individual executing this Bid on behalf of the Company warrant to the City that the Company is authorized to do business in the State of Florida, is in good standing and that Company possesses all of the required licenses and certificates of competency required by the State of Florida and Broward County to provide the goods or perform the services herein described.

The signed bid shall be considered an offer on the part of the bidder or contractor, which offer shall be deemed accepted upon approval by the City Commission of the City of Pembroke Pines and in case of default on the part of the bidder or contractor after such acceptance, the City of Pembroke Pines may take such action as it deems appropriate including legal action for damages or specific performance.

## 3.21 MANUFACTURER'S CERTIFICATION

The City of Pembroke Pines reserves the right to request from bidder separate manufacturer certification of all statements made in the proposal.

## 3.22 MODIFICATION OR WITHDRAWAL OF PROPOSAL

The City recommends for proposers to submit their proposals as soon as they are ready to do so. Please allow ample time to submit your proposals on the BidSync website. Proposals may be modified or withdrawn prior to the deadline for submitting Proposals.

## 3.23 PUBLIC BID; BID OPENING AND GENERAL EXEMPTIONS

All submittals received by the deadline will be recorded, and will subsequently be publicly opened on the same business day at 2:30 p.m. at the office of the City Clerk, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

All Proposals received from Proposers in response to the solicitation will become the property of CITY and will not be returned to the Proposers. In the event of Contract award, all documentation produced as part of the Contract shall become the exclusive property of CITY. Proposers are requested to identify specifically any information contained in their Proposals which they consider confidential and/or proprietary and which they believe to be exempt from disclosure, citing specifically the applicable exempting law.

Pursuant to Section 119.071 of the Florida Statutes, sealed bids, proposals, or replies received by a Florida public agency shall remain exempt from disclosure until an intended decision is announced or until 30 days from the opening, whichever is earlier.

Therefore, bidders will not be able to procure a copy of their competitor's bids until an intended decision is reached or 30 days has elapsed since the time of the bid opening.

However, pursuant to Section 255.0518 of the Florida Statutes, when opening sealed bids that are received pursuant to a competitive solicitation for construction or repairs on a public building or public work, the entity shall:

(a) Open the sealed bids at a public meeting.

- (b) Announce at that meeting the name of each bidder and the price submitted in the bid.
- (c) Make available upon request the name of each bidder and the price submitted in the bid.

For solicitations that are **not** for "**construction or repairs on a public building or public work**" the City shall not reveal the prices submitted in the bids until an intended decision is announced or until 30 days from the opening, whichever is earlier.

### 3.24 RESERVATIONS FOR REJECTION AND AWARD

The City of Pembroke Pines reserves the right to accept or reject any and all bids or parts of bids, to waive irregularities and technicalities, and to request rebids. The City also reserves the right to award a contract on such items(s) or service(s) the City deems will best serve its interests. All bids shall be awarded to the most responsive/responsible bidder, provided the (City) may for good cause reject any bid or part thereof. It further reserves the right to award a contract on a split order basis, or such combinations as shall best serve the interests of the City unless otherwise specified. No premiums, rebates or gratuities permitted, either with, prior to, or after award. This practice shall result in the cancellation of said award and/or return of items (as applicable) and the recommended removal of bidder from bid list(s).

### 3.25 BID PROTEST

Any protests or challenges to this competitive procurement shall be governed by Section 35.38 of the City's Code of Ordinances.

### 3.26 INDEMNIFICATION

The Successful Proposer shall pay all claims, losses, liens, settlements or judgments of any nature whatsoever in connection with the subsequent indemnifications including, but not limited to,

reasonable attorney's fees (including appellate attorney's fees) and costs.

CITY reserves the right to select its own legal counsel to conduct any defense in any such proceeding and all costs and fees associated therewith shall be the responsibility of Proposer under Successful the indemnification agreement. Nothing contained herein is intended nor shall it be construed to waive City's rights and immunities under the common law or Florida Statute 768.28 as amended from time to time.

Additional indemnification requirements may be included under Special Terms and Conditions and/or as part of a specimen contract included in the solicitation package.

General Indemnification: To the fullest extent permitted by laws and regulations, Successful Proposer shall indemnify, defend, save and hold harmless the CITY, its officers, agents and employees, harmless from any and all claims, damages, losses, liabilities and expenses, direct, indirect or consequential arising out of or consequential arising out of or alleged to have arisen out of or in consequence of the products, goods or services furnished by or operations of the Successful Proposer or his subcontractors, agents, officers, employees or independent contractors pursuant to or in the performance of the Contract.

### Patent and Copyright Indemnification:

Successful Proposer agrees to indemnify, defend, save and hold harmless the CITY, its officers, agents and employees, from all claims, damages, losses, liabilities and expenses arising out of any alleged infringement of copyrights, patent rights and/or the unauthorized or unlicensed use of any invention, process, material, property or other work manufactured or used in connection with the performance of the Contract, including its use by CITY.

### 3.27 DEFAULT PROVISION

In the case of default by the bidder or contractor, the City of Pembroke Pines may procure the articles or services from any other sources and hold the bidder or contractor responsible for any excess costs occasioned or incurred thereby.

The City shall be the sole judge of nonperformance, which shall include any failure on the part of the successful Bidder to accept the Award, to furnish required documents, and/or to fulfill any portion of the contract within the time stipulated. Upon default by the successful Bidder to meet any terms of this agreement, the City will notify the Bidder five (5) days (weekends and holidays excluded) to remedy the default. Failure on the Contractor's part to correct the default within the required five (5) days shall result in the contract being terminated and upon the City notifying in writing the Contractor of its intentions and the effective date of the termination. The following shall constitute default:

- A. Failure to perform the Work required under the contract and/or within the time required or failing to use the subcontractor, entities and personnel as identified and set forth, and to the degree specified in the contract.
- B. Failure to begin the Work under this Bid within the time specified.
- C. Failure to perform the Work with sufficient Workers and equipment or with sufficient materials to ensure timely completion.
- D. Neglecting or refusing to remove materials or perform new Work where prior Work has been rejected as non-conforming with the terms of the contract.
- E. Becoming insolvent, being declared bankrupt, or committing act of bankruptcy or insolvency, or making an assignment renders the successful Bidder incapable of performing the Work in accordance with and as required by the contract.

F. Failure to comply with any of the terms of the contract in any material respect.

In the event of default of a contract, the successful Bidder shall pay all attorney's fees and court costs incurred in collecting any damages. The successful Bidder shall pay the City for any and all costs incurred in ensuing the completion of the project.

Additional provisions may be included in the specimen contract.

### 3.28 ACCEPTANCE OF MATERIAL

The material delivered under this proposal shall remain the property of the seller until a physical inspection and actual usage of this material and/or services is made and thereafter accepted to the satisfaction of the City and must comply with the terms herein, and be fully in accord with specifications and of the highest quality. In the event the material and/or services supplied to the City are found to be defective or do not conform to specifications, the City reserves the right to cancel the order upon written notice to the seller and return product to seller at the sellers expense.

## 3.29 LOCAL GOVERNMENT PROMPT PAYMENT ACT

The City complies with Florida Statute 218.70, Florida Prompt Payment Act.

### 3.30 SCRUTINIZED COMPANIES LIST

In accordance with Florida Statue 287.135, as amended, a company is ineligible to, and may not, bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services if:

(a) Any amount of, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to s. 215.4725, or is engaged in a boycott of Israel; or

- (b) One million dollars or more if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company:
- 1. Is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to s. 215.473; or
- 2. Is engaged in business operations in Syria.

By submitting a bid, proposal or response, the company, principals or owners certify that they are not listed on the Scrutinized Companies that boycott Israel List, Scrutinized Companies with activities in Sudan List, Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or is engaged in business operations in Syria.

## 3.31 PUBLIC RECORDS; TRADE SECRET, PROPRIETARY AND CONFIDENTIAL SUBMITTALS

The Proposer's response to this solicitation is a public record pursuant to Florida law, which is subject to disclosure by the City under the State of Florida Public Records Law, Florida Statutes Chapter 119.07 ("Public Records Law"). The City shall permit public access to all documents, papers, letters or other material submitted in connection with this solicitation and the Contract to be executed for this solicitation, subject to the provisions of Chapter 119.07 of the Florida Statutes.

Any language contained in the Proposer's response to the solicitation purporting to require confidentiality of any portion of the Proposer's response to the solicitation, except to the extent that certain information is in the City's opinion a Trade Secret pursuant to Florida law, shall be void. If a Proposer submits any documents or other information to the City which the Proposer

claims is Trade Secret information and exempt from Florida Statutes Chapter 119.07 ("Public Records Laws"), the Proposer shall clearly designate that it is a Trade Secret and that it is asserting that the document or information is exempt. The Proposer must specifically identify the exemption being claimed under Florida Statutes 119.07. The City shall be the final arbiter of whether any information contained in the Proposer's response to the solicitation constitutes a Trade Secret.

Any claim of confidentiality on financial statements must be asserted at the time of submittal. The firm must identify the specific statute that authorizes the exemption from the Public Records Law. Please note that the financial statement exemption provided for in Section 119.071(1)c, Florida Statutes only applies to submittals in response to a solicitation for a "public works" project.

**EXCEPT** FOR **CLEARLY** MARKED PORTIONS THAT ARE BONA FIDE TRADE SECRETS PURSUANT TO FLORIDA LAW, DO NOT MARK YOUR RESPONSE TO THE SOLICITATION AS PROPRIETARY OR CONFIDENTIAL. DO NOT MARK YOUR RESPONSE TO THE SOLICITATION OR ANY PART THEREOF AS COPYRIGHTED. ALL DOCUMENTS THAT THE FIRM PURPORTS TO BE CONFIDENTIAL, PROPRIETARY OR A TRADE SECRET SHALL BE UPLOADED TO THE BIDSYNC WEBSITE AS A SEPARATE ATTACHMENT CLEARLY IDENTIFYING THE EXEMPTION BEING CLAIMED UNDER FLORIDA STATUTES 119.07.

The city's determination of whether an exemption applies shall be final, and the proposer agrees to defend, indemnify, and hold harmless the city and the city's officers, employees, and agent, against any loss or damages incurred by any person or entity as a result of the city's treatment of records as public records.

## 3.32 PURCHASING AGREEMENTS WITH OTHER GOVERNMENT AGENCIES

It is hereby made part of this solicitation that the submission of any bid response to this advertised request constitutes a bid made under the same or similar terms and conditions, for the same price, or better price, to other government agencies if agreeable by the bidder and the government agency.

At the option of the vendor/contractor, the use of the contract resulting from this solicitation may be extended to other governmental agencies, including the State of Florida, its agencies, political subdivisions, counties, and cities.

Each governmental agency allowed by the vendor/contractor to use this contract shall do so independently of any other governmental entity. Each agency shall be responsible for its own purchases and shall be liable only for goods or services ordered, received, and accepted. No agency receives any liability by virtue of this bid and subsequent contract award.

### 3.33 CONE OF SILENCE

**Prohibited Communication:** In accordance with the Cone of Silence Ordinance, Section 35.40 of the City's Code of Ordinances, during the course of a sealed competitive solicitation, a cone of silence shall be in effect between:

- (1) Any person or entity that seeks a contract, contract amendment, award, recommendation, or approval related to a sealed competitive solicitation or that is subject to being evaluated or having its response evaluated in connection with a sealed competitive solicitation, including a person or entity's representative; and
- (2) The City Manager or any person or group of persons appointed or designated by the City Commission or the City Manager to evaluate, select, or make a recommendation to the City Commission or the City Manager

regarding a sealed competitive solicitation, including any member of the selection/evaluation committee.

Effective Dates: A cone of silence shall be in effect during a sealed competitive solicitation process beginning upon the advertisement for the sealed competitive solicitation or during such other procurement activities as declared by the City Commission, and shall terminate at the time the City Commission takes final action or gives final approval of a contract, rejects all bids or responses to the sealed competitive solicitation, or takes other action which ends the sealed competitive solicitation process.

**Permitted communication:** The cone of silence shall not apply to:

- (1) Written or oral communications with legal counsel for the city, the Procurement Department staff for the city, and the person or persons designated in the sealed competitive solicitation as the contact person for clarification or information related to the sealed competitive solicitation.
- (2) Public presentations, asking questions, or providing feedback at pre-bid meetings, site visits or conferences or at a selection, evaluation or negotiation meeting related to the sealed competitive solicitation.
- (3) Contract negotiations with the selected entity.

**Violations:** Any action in violation of this section shall be cause for disqualification of the bid or the proposal.

## <u>SECTION 4 - SPECIAL TERMS &</u> CONDITIONS

### 4.1 PROPOSAL SECURITY

Proposal Security Requirements: Each Proposal must be accompanied by a certified or cashier's check or by a Bid Bond made payable to the City of Pembroke Pines on an approved form, duly executed by the Proposer as principal and having as surety thereon a surety company acceptable to CITY and authorized to write such Bond under the laws of the State of Florida, in an amount not less than five percent (5%) of the amount of the base Proposal price.

Proposers must submit a scanned copy of their bid security (bid bond form or cashier's check) with their bid submittal through BidSync. Proposers must also submit their original bid security (bid bond form or cashier's check) at time of the bid due date, or they may be deemed as non-responsive. The original Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked "BID SECURITY - IFB # PSUT-20-06 Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation" and sent to the:

City of Pembroke Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

Successful Proposer: The Proposal Security of the Successful Proposer will be retained until such Proposer has executed the Contract and furnished the required insurance, payment and performance bonds, whereupon the Proposal Security will be returned. If the Successful Proposer fails to execute and deliver the Contract and furnish the required insurance and bonds within fifteen (15) calendar days of the Notice of Award, CITY may annul the Notice of Award and the entire sum of the Proposal Security shall be forfeited.

Three Lowest Proposers: The Proposal Security of the three (3) lowest Proposers will be returned within seven (7) calendar days after CITY and the Successful Proposer have executed the written Contract or if no such written Contract is executed within ninety (90) calendar days after the date of the Proposal opening, upon the demand of any Proposer at any time thereafter, provided that he has not been notified of the acceptance of his Proposal.

All Other Proposers: Proposal Security of all other Proposer will be returned within seven (7) calendar days after the proposal opening. The agent or attorney in fact or other officer who signs a Bid Bond for a surety company must file with such bond a certified copy of his power of attorney authorizing him to do so.

## 4.2 PAYMENT AND PERFORMANCE BONDS

Within fifteen (15) calendar days after Notice of Award and in any event prior to commencing work, the Contractor shall execute and furnish to City a performance bond and a payment bond, each written by a corporate surety, having a resident agent in the State of Florida and having been in business with a record of successful continuous operation for at least five (5) The surety shall hold a current certificate of authority from the Secretary of Treasury of the United States as an acceptable surety on federal bonds in accordance with United States Department of Treasury Circular No. 570. If the amount of the Bond exceeds the underwriting limitation set forth in the circular, in order to qualify, the net retention of the surety company shall not exceed the underwriting limitation in the circular and the excess risks must be protected bν coinsurance. reinsurance. or other methods. accordance with Treasury Circular 297, revised September 1, 1978 (31DFR, Section 223.10, Section 223.11). Further, the surety

company shall provide City with evidence satisfactory to City, that such excess risk has been protected in an acceptable manner. The surety company shall have at least the following minimum qualification in accordance with the latest edition of A.M. Best's Insurance Guide, published by Alfred M. Best Company, Inc., Ambest Road, Oldwick, New Jersey 08858:

### B+ to A+

Two (2) separate bonds are required and both must be approved by the City. penal sum stated in each bond shall be 100% of the contract price. performance bond shall be conditioned that the Contractor performs the contract in the time and manner prescribed in the contract. The payment bond shall be conditioned that the Contractor promptly make payments to all persons who supply the Contractor with labor, materials and supplies used directly or indirectly bν the Contractor prosecution of the work provided for in the Contract and shall provide that the surety shall pay the same in the amount not exceeding the sum provided in such bonds. together with interest at the maximum rate allowed by law; and that they shall indemnify and save harmless the City to the extent of any and all payments in connection with the carrying out of said Contract which the City may be required to make under the law.

Pursuant to the requirements of Section 255.05(1)(a), Florida Statutes, it shall be the duty of the Contractor to record the aforesaid payment and performance bonds in the public records of Broward County, with the Contractor to pay all recording costs.

### 4.3 OWNER'S CONTINGENCY

While the specifications contained in this solicitation and any ensuing Purchase Orders or contracts have incorporated all anticipated work to be accomplished, there may be unanticipated work required of the vendor in conjunction with a specific

project. For this reason. the Citv Commission may award a project with an "Owner's Contingency". This contingency or allowance authorizes the City execute change orders up to the amount of the contingency without the need to obtain additional Commission approval. Owner's Contingency is usually based on a specified percent of the proposed project amount and is established for the specific project being performed under the contract. This dollar amount shall be shown on the specific project purchase order as a distinct item from the vendor's overall offer to determine the total potential dollar value of the contract. It is hereby understood and agreed that the vendor shall not expend any dollars in connection with the Owner's Contingency without the expressed prior City's approval of the authorized representative. Any Owner's Contingency funds that have not been utilized at the end of the project will remain with the Owner, the contractor shall only be paid for the proposed project cost as approved by the City Commission along with anv Owner Contingency expenses that were approved by the City's authorized representative.

### 4.4 TAX SAVER PROGRAM

The Contractor shall cooperate on certain projects to allow the City to avail itself of a sales tax savings program.

### 4.5 RELEASE OF LIEN

Contractor must provide an executed Partial/Final Release of Lien utilizing the City's standard Release of Lien Form in order for the City to release any payments to the Contractor.

# 4.6 SOLID WASTE CONSTRUCTION AND DEMOLITION DEBRIS COLLECTION AND DISPOSAL REQUIREMENTS

The City of Pembroke Pines has an exclusive solid waste franchise agreement with Waste

Pro of Florida, Inc. for the collection and disposal of all solid waste including construction and demolition (C & D) debris. All applicants for bids to perform construction work for the City of Pembroke Pines shall be subject to the requirements found in the City's exclusive sold waste franchise agreement and must contract Waste Pro of Florida, Inc. for the collection and disposal of all construction and demolition debris generated at such construction job sites.

For the current applicable rates and fees for Waste Pro of Florida, Inc. dumpsters, roll-off containers, and other related solid waste service equipment needs, please contact David Perez, Waste Pro's Pembroke Pines Sales Representative at (954) 967-4200 or dperez@wasteprousa.com.

For further information related to the solid waste franchise requirements, please contact Rose Colombo, Solid Waste Franchise Agreement Contract Manager, at (954) 518-9011 or rcolombo@ppines.com.

For solid waste franchise enforcement questions, please contact the City of Pembroke Pines Code Compliance Unit at (954) 431-4466.

### **CONTACT INFORMATION FORM**

IN ACCORDANCE WITH PSUT-20-06 titled "Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation" attached hereto as a part hereof, the undersigned submits the following:

### A) Contact Information

**COMPANY INFORMATION:** 

The Contact information form shall be electronically signed by one duly authorized to do so, and in case signed by a deputy or subordinate, the principal's properly written authority to such deputy or subordinate must accompany the proposal. This form must be completed and submitted through <a href="www.bidsync.com">www.bidsync.com</a> as part of the bidder's submittal. The vendor must provide their pricing through the designated lines items listed on the BidSync website.

<del></del>	
COMPANY:	
STREET ADDRESS:	
CITY, STATE & ZIP CODE:	
PRIMARY CONTACT FOR THE PROJECT:	
NAME: TITLE:	
E-MAIL:	
TELEPHONE: FAX:	
AUTHORIZED APPROVER:	
NAME: TITLE:	
E-MAIL:	
TELEPHONE: FAX:	
SIGNATURE:	
) Proposal Checklist	
id you make sure to submit the following items, as stated in section 1.5 "Package?	roposal Requirements" of the
Attachment A - Contact Information Form	Yes 🗆
Attachment B - Non-Collusive Affidavit	Yes 🗆
Attachment C - Proposer's Completed Qualification Statement	Yes 🗆
Attachment F - References Form	Yes

Did you make sure to update the following documents found under the "Vendor Registration" group of "Qualifications" on the BidSync website for the City of Pembroke Pines?

Vendor Information Form	Yes $\square$
Form W-9 (Rev. October 2018)	Yes
Sworn Statement on Public Entity Crimes Form	Yes
Local Vendor Preference Certification	Yes
Local Business Tax Receipts	Yes
Veteran Owned Small Business Preference Certification	Yes
Equal Benefits Certification Form	Yes
Vendor Drug-Free Workplace Certification Form	Yes
Scrutinized Company Certification	Yes

### C) Sample Proposal Form

The following sample price proposal is for information only. The vendor must provide their pricing through the designated lines items listed on the BidSync website.

### **Base Option:**

Item #	Item Description	Total Cost
1)	Mobilization/Demobilization	Price to be Submitted
		Via BidSync
2)	All Work Associated with the Electrical Rehabilitation of	<b>Price to be Submitted</b>
	the Effluent Pump Station including, but not limited to, all	Via BidSync
	general appurtenances; electrical systems; equipment;	
	modifications to existing electrical and instrumentation	
	and control systems; temporary systems; testing; startup	
	services; site investigations; site restoration; construction	
	sequencing requirements; preparation and submittal of	
	shop drawings; and other related work required, but not	
	necessarily defined, for a complete and operable system in	
	accordance with the Contract Documents.	
3)	Cost to provide Insurance	<b>Price to be Submitted</b>
		Via BidSync
4)	Additional Cost to provide a Payment & Performance	<b>Price to be Submitted</b>
	Bond in the form of a <b>Percent</b> of the total contract	Via BidSync
	amount.	



Attachment B

### **NON-COLLUSIVE AFFIDAVIT**

BIDDER is the	,	
	(Owner, Partner, Officer, Representative or Agent)	
•	y informed respecting the preparation and contents of the ares respecting such Bid;	ttached Bid and of all pertinent
Such Bid is genu	uine and is not a collusive or sham Bid;	
interest, inclindirectly, we Contract for Contract; or communicate Bid or any of any other BI	BIDDER nor any of its officers, partners, owners, agents, uding this affidavit, have in any way colluded, conspired, ith any other BIDDER, firm or person to submit a collusive which the attached Bid has been submitted; or to refrain factors, or conference with any BIDDER, firm, or person to the BIDDER, or to fix any overhead, profit, or cost elementary or to secure through any collusion conspiracy, congainst (Recipient), or any person interested in the proposed	connived or agreed, directly or e or sham Bid in connection with the com bidding in connection with such ment or collusion, or ix the price or prices in the attached ent of the Bid Price or the Bid Price of nivance, or unlawful agreement any
connivance,	ns quoted in the attached Bid are fair and proper and are not unlawful agreement on the part of the BIDDER or any ployees or parties in interest, including this affidavit.	
	Printed Name/Signature	
	Title	
	Name of Company	



### Attachment C

### **PROPOSER'S QUALIFICATIONS STATEMENT**

PROPOSER shall furnish the following information. Failure to comply with this requirement will render Bid non-responsive and shall cause its rejection. Additional sheets shall be attached as required.

PROPOSER'S Name and Principal Address:
PROPOSER'S License Number:  (Please attach certificate of status, competency, and/or state registration.)
Number of years your organization has been in business
State the number of years your firm has been in business under your present business name
State the number of years your firm has been in business in the work specific to this solicitation
Names and titles of all officers, partners or individuals doing business under trade name:
IF USING A FICTITIOUS NAME, SUBMIT EVIDENCE OF COMPLIANCE WITH FLORIDA FICTITIOUS NAME STATUTE.
Under what former name has your business operated? Include a description of the business. Failure to include such information shall be deemed to be intentional misrepresentation by the City and shall render the proposer non-responsive.
At what address was that business located?

Name, address, and telephone number of surety company and agent who will provide the required bonds on the contract:
Have you ever failed to complete work awarded to you. If so, when, where and why?
Have you personally inspected the proposed WORK and do you have a complete plan for its performance?
Will you subcontract any part of this WORK? If so, give details including a list of each sub-contractor(s) that will perform work in excess of ten percent (10%) of the contract amount and the work that will be performed by each subcontractor(s).
The foregoing list of subcontractor(s) may not be amended after award of the contract without the price written approval of the Contract Administrator, whose approval shall not be reasonably withheld.
List and describe all bankruptcy petitions (voluntary or involuntary) which have been filed by or against the Proposer, its parent or subsidiaries or predecessor organizations during the past five (5) years. Include it the description the disposition of each such petition.
List and describe all successful Bond claims made to your surety (ies) during the last five (5) years. The list and descriptions should include claims against the bond of the Proposer and its predecessor organization(s)

List all claims, arbitrations, administrative hearings and lawsuits brought by or against the Proposer or its predecessor organizations(s) during the last (10) years. The list shall include all case names; case, arbitration or hearing identification numbers; the name of the project over which the dispute arose; and a description of the subject matter of the dispute.

3/2/2020	Attachment C - Proposers Qualifications Statement						
	cribe all criminal proceedings or hearings concerning business related offenses in which the						
Propose	r, its principals or officers or predecessor organization(s) were defendants.						
	Original provider sales representative distributor, broker, manufacturer other, of the						
commoditie	s/services proposed upon? If other than the original provider, explain below.						
Have you ev explain:	ver been debarred or suspended from doing business with any governmental agency? If yes, please						
	e firm's local experience/nature of service with contracts of similar size and complexity, it the see (3) years:						

The PROPOSER acknowledges and understands that the information contained in response to this Qualification Statement shall be relied upon by CITY in awarding the contract and such information is warranted by PROPOSER to be true. The discovery of any omission or misstatement that materially affects the PROPOSER's qualifications to perform under the contract shall cause the CITY to reject the Bid, and if after the award, to cancel and terminate the award and/or contract.

Attachment C - Proposers Qualifications Statement					
(Company Name)	J				
(Printed Name/Signature)					

<b>ACORD</b> CERTIFICATE OF LIABILI	TY INS	DATE (MM/DD[YY)					
PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.						
		INSUF	RERS AFFORDING COVERA	GE			
YOUR COMPANY NAME HERE	INSURER A: INSURER B, INSURER C, INSURER D, INSURER E,		Companies providing coverage				
COVERAGES	•						
THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INS ANY REQUIREMENT TERM OR CONDITION OF ANY CONTRACT OR OTHER D MAY PERTAIN THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEF POLICIES. AG6REGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CI	OCUMENT WITH REIN IS SUBJEC	H RESPECT	TO WHICH THIS CERTIFICATE	MAY BE ISSUED OR			
	OLICY EFFECTIVE DATE (MM/DDIYY)	POLICY EXPII DATE (MM/D	RATION LIM	ITS			
GENERAL LIABILITY  COMMERCIAL GENERAL LIABILITY  CLAIMS MADE OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER:  GEN'L AGGREGATE LIMIT APPLIES PER:	Must Include General Liability			EACH OCCURRENCE \$ FIRE DAMAGE (Any one fire) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$			
policy project loc							
ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS  GARAGE LIABILITY	IPLE C	ERT	AUTO ONLY - EA ACCIDENT				
ANY AUTO			OTHER THAN EA ACCIDENT	\$ :   \$			
			AUTO ONLY: AGG				
EXCESS LIABILITY OCCUR CLAIMS MADE  DEDUCTIBLE RETENTION \$  WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			EACH OCCURRENCE  AGGREGATE  WC STATU- TORY LIMITS ER				
			E.L. EACH ACCIDENT  E.L. DISEASE - EA EMPLOYE	\$ E \$			
			E.L. DISEASE - POLICY LIMIT				
OTHER  Certificate must contain wording similar to what appears below  DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCL							
"THE CERTIFICATE HOLDER IS NAMED AS ADDITIONALLY INSURED WITH REGARD TO GENERAL LIABILITY"							
CERTIFICATE HOLDER ▼ ADDITIONAL INSURED; INSURER LETTER:	CANCELLATION						
City of Pembroke Pines  601 City Center Way  Pembroke Pines FL 33025  City Must Be	Named as Certificate Holder    Should any of the above described policies be cancelled before the expiration all 30 days written left.						
I GIIIDIONG FIIIGS I L 33023	AUTHORIZED REPRESENTATIVE						
ACORD 25-S (7/97)	<u> </u>		(DACORD C	ORPORATION 1988			

### **CONSTRUCTION AGREEMENT**

THIS IS AN AGREEMENT ("Agreement"), dated the day of, 2020, by and between:
CITY OF PEMBROKE PINES, a municipal corporation of the State of Florida with a business address of 601 City Center Way, Pembroke Pines, Florida 33025 hereinafter referred to as "CITY",
and
, a
as listed with the Florida Division of Corporations,
authorized to do business in the State of Florida, and with a business address of
(hereinafter referred to as the "CONTRACTOR"). CITY and CONTRACTOR may
hereinafter be referred to collectively as the "Parties."
WITNESSETH:
In consideration of the mutual terms and conditions, promises, covenants and payments hereinafter set forth, CITY and CONTRACTOR agree as follows:
ARTICLE 1 PREAMBLE
In order to establish the background, context and form of reference for this Agreement, and to generally express the objectives and intentions of the respective Parties herein, the following statements, representations, and explanations shall be accepted as predicates for the undertakings and commitments included within the provisions which follow, and may be relied upon by the Parties as essential elements of the mutual considerations upon which this Agreement is based.
1.1 On, the CITY advertised its notice to bidders of the CITY's desire
to hire a firm to as more
particularly described in Exhibit "A" attached hereto and by this reference made a part hereof, for
the said bid entitled:

					#					
1.2	On		, th	e bids were	e open	ed at the offi	ces of the	he City Cler	k.	
1.3 On, the CITY awarded the bid to CONTRACTOR and authorized the proper CITY officials to negotiate and enter into an agreement with CONTRACTOR to render the services more particularly described herein below.										
1.4 under	1.4 Negotiations pertaining to the services to be performed by the CONTRACTOR were undertaken and this Agreement incorporates the results of such negotiation.									were
			SERVIC		ICLE RESP(	2 DNSIBILIT	<u>IES</u>			
2.1	CONTRACT	OR	hereby	J		perform			for,	the at
								(herein	"Proper	ty")
specification responsible to per	ore particularly ications, attach use thereto, atta form all service greement, and	ned her ached h es requ	reto and nereto and uired pursu	nade a par made a par ant to this	rt here rt here Agree	of as <b>Exhib</b> of as <b>Exhibi</b> ement, the S	oit "A' t "B". ealed B	and CON CONTRAC	TRACT	TOR's grees

- 2.2 CONTRACTOR shall furnish all services, labor, equipment, and materials necessary and as may be required in the performance of this Agreement, except as otherwise specifically provided for herein, and all work performed under this Agreement shall be done in a professional manner.
- 2.3 CONTRACTOR shall supervise the work force to ensure that all workers conduct themselves and perform their work in a safe and professional manner. CONTRACTOR shall comply with all OSHA safety rules and regulations in the operation of equipment and in the performance of the work. CONTRACTOR shall at all times have a competent field supervisor available to enforce these policies and procedures at the CONTRACTOR's expense.
- 2.4 CONTRACTOR shall provide CITY with seventy-two (72) hours written notice prior to the beginning of work under this Agreement and prior to any schedule change with the exception of changes caused by inclement weather.
- 2.5 CONTRACTOR hereby represents to CITY, with full knowledge that CITY is relying upon these representations when entering into this Agreement with CONTRACTOR, that

CONTRACTOR has the professional expertise, experience and manpower to perform the services to be provided by CONTRACTOR pursuant to the terms of this Agreement.

- 2.6 CONTRACTOR hereby represents to CITY that CONTRACTOR is properly licensed by the applicable federal, state, and local agencies to provide the services under this Agreement. Furthermore, CONTRACTOR agrees to maintain such licenses during the term of this Agreement. If CONTRACTOR's license is revoked, suspended, or terminated for any reason by any governmental agency, CONTRACTOR shall notify the CITY immediately.
- 2.7 CONTRACTOR shall comply with any and all Federal, State, and local laws and regulations now in effect, or hereinafter enacted during the term of this Agreement, which are applicable to CONTRACTOR, its employees, agents or subcontractors, if any, with respect to the work and services described herein. A violation of any federal, state, or local law or regulation may be cause for breach, allowing the CITY to terminate this Agreement.
- 2.8 **Return of Keys.** Upon completion of services rendered or termination of this agreement, CONTRACTOR must promptly return to CITY all CITY keys and/or access cards. By agreeing herein, CONTRACTOR understands that any loss or failure to return a CITY key shall subject CONTRATOR to the costs associated with key replacement and/or re-keying. For keys unlocking several doors, replacement and re-keying costs can be substantial. In case of failure to return a key and failure to pay for key replacement and/or lock re-keying, CONTRACTOR understands that CITY shall enforce by all legal means its right to repayment for all costs incident to key replacement and/or lock re-keying.

## ARTICLE 3 TIME OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

The work to be performed under this Agreement shall be commenced after CITY execution

of the Agreement and not later than ten (10) days a CITY's Notice to Proceed.	after the date that CONTRACTOR receives
The work shall be completed within CITY's Notice to Proceed, subject to any permitted exand any amendments and/or addenda thereto. For "completion" shall mean the satisfactory completion CITY.	stensions of time pursuant to this Agreement the purposes of this Agreement, the term

3.2 During the pre-construction portion of the work hereunder, the Parties agree to work diligently and in good faith in performing their obligations hereunder, so that all required permits for the construction portion of the work may be obtained. In the event that any delays in the pre-construction or construction portion of the work occur, despite the diligent efforts of the Parties hereto, and such delays are the result of force majeure or are otherwise outside of the control of either party hereto, then the Parties shall agree on an equitable extension of the time for substantial completion hereunder and any resulting increase in general condition costs.

3.1

3.3 In the event that CONTRACTOR abandons this Agreement or causes it to be terminated, CONTRACTOR shall indemnify CITY against any loss pertaining to this termination up to a maximum of the full contracted fee amount. All finished or unfinished documents, data, studies, surveys, and reports prepared by CONTRACTOR shall become the property of CITY and shall be delivered by CONTRACTOR to CITY.

### **ARTICLE 4** COMPENSATION AND METHOD OF PAYMENT

		_	_				es performed val / monthly fo		
_	•						tion for all serv		
NOT	EXCE	ED							
			which	includes	a	 owner's	contingency	fee	of
			and	a	-	 permit	allowanc	e	of

- This contingency or allowance authorizes the CITY to execute change orders up to the amount of the contingency without the need to obtain additional Commission approval. It is hereby understood and agreed that the CONTRACTOR shall not expend any dollars in connection with the owner's contingency or allowance without the expressed prior written approval of the CITY's authorized representative. Any owner's contingency funds or allowance that have not been utilized at the end of the project will remain with the CITY, the CONTRACTOR shall only be paid for the proposed project cost as approved by the City Commission along with any owner contingency expenses or allowances that were approved by the CITY's authorized representative.
- 4.1.2 The total compensation amount may not be exceeded without a written amendment to this Agreement. A retainage of ten percent (10%) will be deducted from monthly payments until fifty percent (50%) of the project is complete. Retainage will be reduced to five percent (5%) thereafter. Retainage monies will be released upon satisfactory completion and final inspection of the work. Invoices must bear the project name, project number, bid number and purchase order number. CITY has up to thirty (30) days to review, approve and pay all invoices after receipt. CONTRACTOR shall invoice CITY and provide a written request to CITY to commence the one (1) year warranty period. All necessary Releases and Affidavits and approval of final payments shall be processed before the warranty period begins.

4.2 **Prompt Payment Act.** All payments shall be governed by the Local Government Prompt Payment Act, as set forth in Part VII, Chapter 218, Florida Statutes.

### 4.3 **Method of Billing and Payment.**

4.3.1 The CITY shall within thirty (30) days, from the date the CITY's Public Service Director approves the Application for Payment, pay the CONTRACTOR the amount approved by the CITY's Public Services Director or his or her assignees.

4.3.2	Payment will be made to CONTRACTOR at:

## ARTICLE 5 WAIVER OF LIENS

Prior to final payment of the amount due under the terms of this Agreement, a final waiver of lien shall be submitted by the CONTRACTOR as well as all suppliers and subcontractors who worked on the project that is the subject of this Agreement. Payment of the invoice and acceptance of such payment by CONTRACTOR shall release CITY from all claims of liability by CONTRACTOR in connection with this Agreement.

### ARTICLE 6 WARRANTY

CONTRACTOR warrants the work against defect for a period of one (1) year from the date of completion of work. In the event that defect occurs during this time, CONTRACTOR shall perform such steps as required to remedy the defects. CONTRACTOR shall be responsible for any damages caused by defect to affected area or to interior structure. The one (1) year warranty period does not begin until substantial completion of the entire project, and the subsequent release of any Performance or Payment Bonds, which may be required by the original bid document.

## ARTICLE 7 CHANGES IN SCOPE OF WORK

7.1 CITY or CONTRACTOR may request changes that would increase, decrease, or otherwise modify the Scope of Services, as described in **Exhibit "A"**, to be provided under this Agreement.

These changes may affect the monthly compensation accordingly. Such changes or additional services must be in accordance with the provisions of the Code of Ordinances of the CITY, and must be contained in a written amendment, executed by the Parties hereto, with the same formality, equality and dignity herewith prior to any deviation from the terms of this Agreement, including the initiation of any additional or extra work.

- 7.2 CONTRACTOR shall continue work when seeking change order unless work has not been authorized herein, or by written amendment or change order, executed by the parties hereto, with the same formality, equality, and dignity herewith.
- 7.3 In no event will the CONTRACTOR be compensated for any work which has not been described either herein or in a separate written agreement executed by the Parties hereto.

## ARTICLE 8 PAYMENT & PERFORMANCE BOND

Within fifteen (15) calendar days after Notice of Award and in any event prior to 8.1 commencing work, the CONTRACTOR shall execute and furnish to CITY a payment and performance bond, each written by a corporate surety, having a resident agent in the State of Florida and having been in business with a record of successful continuous operation for at least five (5) years. The surety shall hold a current certificate of authority from the Secretary of Treasury of the United States as an acceptable surety on federal bonds in accordance with United States Department of Treasury Circular No. 570. If the amount of the bond exceeds the underwriting limitation set forth in the circular, in order to qualify, the net retention of the surety company shall not exceed the underwriting limitation in the circular and the excess risks must be protected by coinsurance, reinsurance, or other methods, in accordance with Treasury Circular 297, revised September 1, 1978 (31DFR, Section 223.10, Section 223.11). Further, the surety company shall provide CITY with evidence satisfactory to CITY, that such excess risk has been protected in an acceptable manner. The surety company shall have at least the following minimum qualification in accordance with the latest edition of A.M. Best's Insurance Guide, published by Alfred M. Best Company, Inc., Ambest Road, Oldwick, New Jersey 08858:

B+ to A+

8.2 Two (2) separate bonds are required and both must be approved by the CITY. **The penal sum stated in each bond shall be 100% of the contract value.** The performance bond shall be conditioned upon the CONTRACTOR's performance of the work in the time and manner prescribed in the Agreement. The payment bond shall be conditioned upon the CONTRACTOR's promptly making payments to all persons who supply the CONTRACTOR with labor, materials and supplies used directly or indirectly by the CONTRACTOR in the prosecution of the work provided for in this Agreement and shall provide that the surety shall pay the same in the amount not exceeding the sum provided in such bonds, together with interest at the maximum rate allowed by law; and that they shall indemnify and save harmless the CITY to the extent of any and all payments in connection with the carrying out of said Agreement which the CITY may be required to make under the law.

Pursuant to the requirements of Section 255.05(1)(a), Florida Statutes, it shall be the duty of the CONTRACTOR to record the aforesaid payment and performance bonds in the public records of Broward County, and CONTRACTOR shall be responsible for payment of all recording costs.

## ARTICLE 9 INDEMNIFICATION

- 9.1 CONTRACTOR shall indemnify and hold harmless the CITY, its trustees, elected and appointed officers, agents, servants, assigns, employees, consultants, separate contractors, any of their subcontractors, sub-subcontractors, agents and employees from and against claims, demands, or causes of action whatsoever, and the resulting losses, damages, costs and expenses, including but not limited to attorneys' fees, including paralegal expenses, liabilities, damages, orders, judgments, or decrees, sustained by the CITY arising out of or resulting from performance of the work or the failure of the CONTRACTOR to take out and maintain insurance as required under this Agreement.
- 9.2 CONTRACTOR's aggregate liability shall not exceed the proceeds of insurance required to be placed pursuant to this Agreement, plus the compensation received by CONTRACTOR.
- 9.3 Upon completion of all services, obligations and duties provided for in this Agreement, or in the event of termination of this Agreement for any reason, the terms and conditions of this Article shall survive indefinitely.
- 9.4 CITY reserves the right to select its own legal counsel to conduct any defense in any such proceeding and all costs and fees associated therewith shall be the responsibility of CONTRACTOR.
- 9.5 Nothing contained herein is intended nor shall be construed to waive CITY's rights and immunities under the common law or Section 768.28, Florida Statutes, as may be amended from time to time.

### ARTICLE 10 INSURANCE

10.1 The CONTRACTOR shall indemnify and hold harmless the CITY and its officers, employees, agents and instrumentalities from any and all liability, losses or damages, including attorneys' fees and costs of defense, which the CITY or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the performance of this Agreement by the CONTRACTOR or its employees, agents, servants, partners, principals or subcontractors. The CONTRACTOR shall pay all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the CITY, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorneys' fees which may issue thereon. The CONTRACTOR expressly understands and agrees that any insurance protection required by this Agreement or otherwise provided by the CONTRACTOR shall in no way limit the responsibility to indemnify, keep and save harmless and defend the CITY or its officers, employees, agents and instrumentalities as herein provided.

- 10.2 CONTRACTOR shall not commence work under this Agreement until it has obtained all insurance required under this paragraph and such insurance has been approved by the Risk Manager of the CITY nor shall the CONTRACTOR allow any subcontractor to commence work on any subcontract until all similar such insurance required of the subcontractor has been obtained and similarly approved.
- 10.3 Certificates of Insurance, reflecting evidence of the required insurance, shall be filed with the CITY's Risk Manager prior to the commencement of this Agreement. Policies shall be issued by companies authorized to do business under the laws of the State of Florida. The insurance company shall be rated no less than "A" as to management, and no less than "Class VI" as to financial strength according to the latest edition of Best's Insurance Guide published by A.M. Best Company.
- 10.4 Certificates of Insurance shall provide for thirty (30) days' prior written notice to the CITY in case of cancellation or material changes in the policy limits or coverage states. If the carrier cannot provide thirty (30) days' notice of cancellation, either the CONTRACTOR or their insurance broker must agree to provide notice.
- 10.5 Insurance shall be in force until all obligations required to be fulfilled under the terms of the Agreement are satisfactorily completed as evidenced by the formal acceptance by the CITY. In the event the insurance certificate provided indicates that the insurance shall terminate and lapse during the period of this Agreement, the CONTRACTOR shall furnish, at least forty-five (45) days prior to the expiration of the date of such insurance, a renewed certificate of insurance as proof that equal and like coverage for the balance of the period of the Agreement and extension thereunder is in effect. The CONTRACTOR shall neither commence nor continue to provide any services pursuant to this Agreement unless all required insurance remains in full force and effect. CONTRACTOR shall be liable to CITY for any lapses in service resulting from a gap in insurance coverage.

### 10.6 REQUIRED INSURANCE

CONTRACTOR shall be required to obtain all applicable insurance coverage, as indicated below, prior to commencing any work pursuant to this Agreement:



- 10.6.1 Comprehensive General Liability Insurance written on an occurrence basis including, but not limited to: coverage for bodily injury and property damage, personal & advertising injury, products & completed operations, and contractual liability. Coverage must be written on an occurrence basis, with limits of liability no less than:
  - 1. Each Occurrence Limit \$1,000,000
  - 2. Fire Damage Limit (Damage to rented premises) \$100,000
  - 3. Personal & Advertising Injury Limit \$1,000,000
  - 4. General Aggregate Limit \$2,000,000
  - 5. Designated Construction Project(s) General Aggregate Limit \$2,000,000

Products & Completed Operations Coverage shall be maintained for the later of ten (10) years after the delivery of goods/services or final payment under the Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No



10.6.2 Workers' Compensation and Employers' Liability Insurance covering all employees, and/or volunteers of the CONTRACTOR engaged in the performance of the scope of work associated with this Agreement. In the case any work is sublet, the CONTRACTOR shall require the subcontractors similarly to provide Workers' Compensation Insurance for all the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. Coverage for the CONTRACTOR and all subcontractors shall be in accordance with applicable state and/or federal laws that may apply to Workers' Compensation Insurance with limits of liability no less than:

1. Workers' Compensation: Coverage A – Statutory

2. Employers Liability: Coverage B \$500,000 Each Accident

\$500,000 Disease – Policy Limit \$500,000 Disease – Each Employee

If CONTRACTOR claims to be exempt from this requirement, CONTRACTOR shall provide CITY proof of such exemption along with a written request for CITY to exempt CONTRACTOR, written on CONTRACTOR letterhead.

Yes No



10.6.3 Comprehensive Auto Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the performance of work under this Agreement, with a combined single limit of liability for bodily injury and property damage no less than:

- 1. Any Auto (Symbol 1)
  Combined Single Limit (Each Accident) \$1,000,000
- 2. Hired Autos (Symbol 8) Combined Single Limit (Each Accident) - \$1,000,000
- 3. Non-Owned Autos (Symbol 9) Combined Single Limit (Each Accident) - \$1,000,000

If work under this Agreement includes transportation of hazardous materials, policy shall include pollution liability coverage equivalent to that provided by the latest version of the ISO pollution liability broadened endorsement for auto and the latest version of the ISO Motor Carrier Act endorsement, equivalents or broader language.

Yes No

10.6.3.1 If CONTRACTOR requests reduced limits under a Personal Auto Liability Policy and it is agreed to by the CITY, coverage shall include Bodily Injury limits of \$100,000 per person/\$300,000 per occurrence and Property Damage limits of \$300,000 per occurrence

Yes No



10.6.4 Umbrella/Excess Liability Insurance in the amount of \$\(\frac{2,000,000}{2,000,000}\) as determined appropriate by the CITY depending on the type of job and exposures contemplated. Coverage must be follow form of the General Liability, Auto Liability and Employer's Liability. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment pursuant to this Agreement.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No



10.6.5 Professional Liability/Errors & Omissions Insurance with a limit of liability no less than \$1,000,000 per wrongful or negligent act. This coverage shall be maintained for a period of no less than ten (10) years after the delivery of goods/services final payment pursuant to this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

Yes No



10.6.6 Environmental/Pollution Liability insurance shall be required with a limit of no less than \$1,000,000 per wrongful act. Coverage shall include: CONTRACTOR's completed operations, sudden, accidental and gradual pollution conditions. This coverage shall be maintained for a period of no less than the later of ten (10) years after the delivery of goods/services or final payment pursuant to this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No



10.6.7 Cyber Liability including Network Security and Privacy Liability with a limit of liability no less than \$1,000,000 per loss. Coverage shall include liability arising from: theft, dissemination and/or use of confidential information stored or transmitted in electronic form, unauthorized access to, use of, or tampering with computer systems, including hacker attacks or inability of an authorized third party to gain access to your services, including denial of service, and the introduction of a computer virus into, or otherwise causing damage to, a customer's or third person's computer, computer system, network, or similar computer-related property and the data, software and programs thereon. If vendor is collecting credit card information, it shall cover all PCI breach expenses. Coverage is to include the various state monitoring and state required

remediation as well as meet the various state notification requirements. This coverage shall be maintained for a period of no less than the later of three (3) years after delivery of goods/services or final payment of the Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.

The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No 10.6.8 Crime Coverage shall include employee dishonesty, forgery or alteration, and computer fraud in an amount of no less than \$1,000,000 per loss. If CONTRACTOR is physically located on CITY's premises, a third-party fidelity coverage extension shall apply. Yes No ✓ 10.6.9 Garage Liability & Garage-keepers Legal Liability for those that manage parking lots for the CITY or service CITY vehicles. Coverage must be written on an occurrence basis, with limits of liability no less than \$1,000,000 per Occurrence, including products & completed operations. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment of this Agreement. The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein. Yes No 10.6.10 Liquor Liability for those in the business of selling, serving or furnishing of any alcoholic beverages, whether licensed or not, shall carry a limit of liability of no less than \$1,000,000 per occurrence. Coverage shall be maintained for the later of three (3) years after the delivery of goods/services or final payment under the Agreement. The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

10.6.11 Sexual Abuse & Molestation for any agreement involving a vulnerable population. Limits shall be no less than \$500,000 per occurrence. This coverage shall be maintained for a period of no less than the later of three (3) years after the delivery of goods/services or final payment of this Agreement. Retroactive date, if any, to be no later than the first day of service to the CITY.



The City of Pembroke Pines must be shown as an additional insured with respect to this coverage. The CITY's additional insured status shall extend to any coverage beyond the minimum limits of liability found herein.

Yes No

10.6.12 Builder's Risk Insurance shall be "All Risk" for one hundred percent (100%) of the completed value of the project that is the subject of this Agreement with a deductible of not more than five percent (5%) for Named Windstorm and \$20,000 per claim for all other perils. The Builder's Risk Insurance shall include interests of the CITY, the CONTRACTOR and subcontractors of the project. The CONTRACTOR shall include a separate line item for all costs associated with the Builder's Risk Insurance Coverage for the project. The CITY reserves the right at its sole discretion to utilize the CONTRACTOR's Builder's Risk Insurance or for the CITY to purchase its own Builder's Risk Insurance for the Project. Prior to the CONTRACTOR purchasing the Builder's Risk insurance for the project, the CONTRACTOR shall allow the CITY the opportunity to analyze the CONTRACTOR's coverage and determine who shall purchase the coverage. Should the CITY utilize the CONTRACTOR's Builder's Risk Insurance, the CONTRACTOR shall be responsible for all deductibles. If the CITY chooses to purchase the Builder's Risk Coverage on the project, the CONTRACTOR shall provide the CITY with a change order deduct for all premiums and costs associated with the Builder's Risk insurance in their schedule. Should the CITY choose to utilize the CITY's Builder's Risk Program, the CITY shall be responsible for the Named Windstorm Deductible and the CONTRACTOR shall be responsible for the All Other Perils Deductible.

If and when 100% is not available or reasonable, the CITY Risk Manager is to make the determination as to what limits are appropriate for the given project.

#### 10.7 REQUIRED ENDORSEMENTS

- 10.7.1 The City of Pembroke Pines shall be named as an Additional Insured on each of the Liability Policies required herein.
- 10.7.2 Waiver of all Rights of Subrogation against the CITY.
- 10.7.3 Thirty (30) Day Notice of Cancellation or Non-Renewal to the CITY.
- 10.7.4 CONTRACTOR's policies shall be Primary & Non-Contributory.
- 10.7.5 All policies shall contain a "severability of interest" or "cross liability" clause without obligation for premium payment of the CITY.
- 10.7.6 The City of Pembroke Pines shall be named as a Loss Payee on all Property and/or Inland Marine Policies as their interest may appear.

10.8 Any and all insurance required of the CONTRACTOR pursuant to this Agreement must also be required by any subcontractor in the same limits and with all requirements as provided herein, including naming the CITY as an additional insured, in any work that is subcontracted unless such subcontractor is covered by the protection afforded by the CONTRACTOR and provided proof of such coverage is provided to CITY. The CONTRACTOR and any subcontractors shall maintain such policies during the term of this Agreement.

- 10.9 The CITY reserves the right to require any other additional types of insurance coverage and/or higher limits of liability it deems necessary based on the nature of work being performed under this Agreement.
- 10.10 The insurance requirements specified in this Agreement are minimum requirements and in no way reduce any liability the CONTRACTOR has assumed in Article 9, herein.

# ARTICLE 11 NON-DISCRIMINATION & EQUAL OPPORTUNITY EMPLOYMENT

During the performance of the Agreement, neither the CONTRACTOR nor any subcontractors shall discriminate against any employee or applicant for employment because of race, religion, color, gender, national origin, sex, age, marital status, political affiliation, familial status, sexual orientation, or disability if qualified. CONTRACTOR will take affirmative action to ensure that employees are treated during employment, without regard to their race, religion, color, gender, national origin, sex, age, marital status, political affiliation, familial status, sexual orientation, or disability if qualified. Such actions must include, but not be limited to, the following: employment, promotion, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. CONTRACTOR shall agree to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause. CONTRACTOR further agrees that CONTRACTOR will ensure that subcontractors, if any, will be made aware of and will comply with this nondiscrimination clause.

# ARTICLE 12 INDEPENDENT CONTRACTOR

This Agreement does not create an employee/employer relationship between the Parties. It is the intent of the Parties that the CONTRACTOR is an independent contractor under this Agreement and not the CITY's employee for all purposes, including but not limited to, the application of the Fair Labor Standards Act minimum wage and overtime payments, Federal Insurance Contribution Act, the Social Security Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, the State Workers' Compensation Act, and the State unemployment insurance law. The CONTRACTOR shall retain sole and absolute discretion in the judgment of the manner and means of carrying out CONTRACTOR's activities and responsibilities hereunder provided, further that administrative procedures applicable to services rendered under this Agreement shall be those of CONTRACTOR, which policies of CONTRACTOR shall not conflict with CITY, State, H.U.D., or United States policies, rules or regulations relating to the use of CONTRACTOR's funds provided for herein. The CONTRACTOR agrees that it is a separate and independent enterprise from the CITY, that it has full opportunity to find other business, that it has made its own investment in its business, and that it will utilize a high level of skill necessary to perform the work. This Agreement shall not be construed as creating any joint employment relationship between the CONTRACTOR and the CITY and the CITY will not be liable for any obligation incurred by CONTRACTOR, including but not limited to unpaid minimum wages and/or overtime premiums.

# ARTICLE 13 TERMINATION

- 13.1 **Termination for Convenience**. This Agreement may be terminated by CITY for convenience, upon **seven (7) business days** of written notice by the CITY to the CONTRACTOR for such termination in which event CONTRACTOR shall be paid its compensation for services performed to termination date, including services reasonably related to termination. In the event that CONTRACTOR abandons this Agreement or causes it to be terminated, CONTRACTOR shall indemnify CITY against loss pertaining to this termination.
- 13.2 **Default by CONTRACTOR**. In addition to all other remedies available to CITY, this Agreement shall be subject to cancellation by CITY for cause, should CONTRACTOR neglect or fail to perform or observe any of the terms, provisions, conditions, or requirements herein contained, if such neglect or failure shall continue for a period of thirty (30) days after receipt by CONTRACTOR of written notice of such neglect or failure.

# ARTICLE 14 AGREEMENT SUBJECT TO FUNDING

This Agreement shall remain in full force and effect only as long as the expenditures provided for in the Agreement have been appropriated by the City Commission of the City of Pembroke Pines in the annual budget for each fiscal year of this Agreement, and is subject to termination based on lack of funding.

# ARTICLE 15 UNCONTROLLABLE FORCES

- 15.1 Neither CITY nor CONTRACTOR shall be considered to be in default of this Agreement if delays in or failure of performance shall be due to Uncontrollable Forces, the effect of which, by the exercise of reasonable diligence, the non-performing party could not avoid. The term "Uncontrollable Forces" shall mean any event which results in the prevention or delay of performance by a party of its obligations under this Agreement and which is beyond the reasonable control of the nonperforming party. It includes, but is not limited to fire, flood, earthquakes, storms, lightning, epidemic, war, riot, civil disturbance, sabotage, and governmental actions.
- 15.2 Neither party shall, however, be excused from performance if nonperformance is due to forces, which are preventable, removable, or remediable, and which the nonperforming party could have, with the exercise of reasonable diligence, prevented, removed, or remedied with reasonable dispatch. The nonperforming party shall, within a reasonable time of being prevented or delayed from performance by an uncontrollable force, give written notice to the other party describing the circumstances and uncontrollable forces preventing continued performance of the obligations of this Agreement.

# ARTICLE 16 GOVERNING LAW AND VENUE

This Agreement shall be governed by and construed in accordance with the laws of the State of Florida as now and hereafter in force. The venue for any and all actions or claims arising out of or related to this Agreement shall be in Broward County, Florida.

# ARTICLE 17 SIGNATORY AUTHORITY

CONTRACTOR shall provide CITY with copies of requisite documentation evidencing that the signatory for CONTRACTOR has the authority to enter into this Agreement.

# ARTICLE 18 DEFAULT OF CONTRACT & REMEDIES

- 18.1 <u>Damages</u>. CITY reserves the right to recover any ascertainable actual damages incurred as a result of the failure of CONTRACTOR to perform in accordance with the requirements of this Agreement, or for losses sustained by CITY resultant from CONTRACTOR's failure to perform in accordance with the requirements of this Agreement.
- 18.2 <u>Liquidated Damages</u>. As a breach of the service provided by this Agreement would cause serious and substantial damage to CITY Property, and the nature of this Agreement would render it impracticable or extremely difficult to fix the actual damage sustained by CITY by such breach, it is agreed that, in case of breach of service wherein CONTRACTOR fails to maintain the Property, leaving the said property in disrepair, CITY may elect to collect liquidated damages for each such breach, and CONTRACTOR will pay CITY as liquidated damages, and not as penalty,

for every day of such malfunction. This sum is the agreed upon amount by which CITY will be damaged by the breach of such service. An election to seek such remedies shall not be construed as a waiver of any legal remedies CITY may have as to any subsequent breach of service under this Agreement.

- 18.3 <u>Correction of Work.</u> If, in the judgment of CITY, work provided by CONTRACTOR does not conform to the requirements of this Agreement, or if the work exhibits poor workmanship, CITY reserves the right to require that CONTRACTOR correct all deficiencies in the work to bring the work into conformance without additional cost to CITY, and/or replace any personnel who fail to perform in accordance with the requirements of this Agreement. CITY shall be the sole judge of non-conformance and the quality of workmanship.
- 18.4 **<u>Default of Contract.</u>** The occurrence of any one or more of the following events shall constitute a default and breach of this Agreement by CONTRACTOR:
- 18.4.1 The abandonment of the Property by CONTRACTOR for a period of more than seven (7) business days.

- 18.4.2 The abandonment, unnecessary delay, refusal of, or failure to comply with any of the terms of this Agreement or neglect, or refusal to comply with the instructions of the Public Services Director relative thereto.
- 18.4.3 The failure by CONTRACTOR to observe or perform any of the terms, covenants, or conditions of this Agreement to be observed or performed by CONTRACTOR, where such failure shall continue for a period of seven (7) days after written notice thereof by CITY to CONTRACTOR; provided, however, that if the nature of CONTRACTOR's default is such that more than seven (7) days are reasonably required for its cure, then CONTRACTOR shall not be deemed to be in default if CONTRACTOR commences such cure within said seven (7) day period and thereafter diligently prosecutes such cure to completion.
- 18.4.4 The assignment and/or transfer of this Agreement or execution or attachment thereon by CONTRACTOR or any other party in a manner not expressly permitted hereunder.
- 18.4.5 The making by CONTRACTOR of any general assignment or general arrangement for the benefit of creditors, or the filing by or against CONTRACTOR of a petition to have CONTRACTOR adjudged a bankruptcy, or a petition for reorganization or arrangement under any law relating to bankruptcy (unless, in the case of a petition filed against CONTRACTOR, the same is dismissed within sixty (60) days); or the appointment of a trustee or a receiver to take possession of substantially all of CONTRACTOR's assets, or for CONTRACTOR's interest in this Agreement, where possession is not restored to CONTRACTOR within thirty (30) days; for attachment, execution or other judicial seizure of substantially all of CONTRACTOR's assets, or for CONTRACTOR's interest in this Agreement, where such seizure is not discharged within thirty (30) days.
- 18.5 **Remedies in Default.** In case of default by CONTRACTOR, CITY shall notify CONTRACTOR, in writing, of such abandonment, delay, refusal, failure, neglect, or default and direct CONTRACTOR to comply with all provisions of the Agreement. A copy of such written notice shall be mailed to the Surety on the Performance Bond. If the abandonment, delay, refusal, failure, neglect or default is not cured within seven (7) days of when notice was sent by CITY, CITY may declare a default of the Agreement and notify CONTRACTOR of such declaration of default and terminate the Agreement. The Surety on the Performance Bond shall within ten (10) days of such declaration of default, rectify or cause to be rectified any mismanagement or breach of service in the Agreement and assume the work of CONTRACTOR and proceed to perform services under the Agreement, at its own cost and expense.
- 18.5.1 Upon such declaration of default, all payments remaining due CONTRACTOR at the time of default, less all sums due CITY for damages suffered, or expenses incurred by reason of default, shall be due and payable to Surety. Thereafter the Surety shall receive monthly payments equal to those that would have been paid by the CONTRACTOR had the CONTRACTOR continued to perform the services under the Agreement.

- 18.5.2 CITY may complete the Agreement, or any part thereof, either by day labor, use of a subcontractor, or by re-letting a contract for the same, and procure the equipment and the facilities necessary for the completion of the Agreement, and charge the cost of same to CONTRACTOR and/or the Surety together with the costs incident thereto to such default.
- 18.5.3 In the event CITY completes the Agreement at a lesser cost than would have been payable to CONTRACTOR under this Agreement, if the same had been fulfilled by CONTRACTOR, CITY shall retain such differences. Should such cost to CITY be greater, CONTRACTOR shall pay the amount of such excess to the CITY.
- 18.5.4 Notwithstanding the other provisions in this Article, CITY reserves the right to terminate the Agreement at any time, whenever the service provided by CONTRACTOR fails to meet reasonable standards of the trade after CITY gives written notice to the CONTRACTOR of the deficiencies as set forth in the written notice within fourteen calendar (14) days of the receipt by CONTRACTOR of such notice from CITY.

# ARTICLE 19 BANKRUPTCY

It is agreed that if CONTRACTOR is adjudged bankrupt, either voluntarily or involuntarily, then this Agreement shall terminate effective on the date and at the time the bankruptcy petition is filed.

# ARTICLE 20 MERGER; AMENDMENT

This Agreement constitutes the entire Agreement between CONTRACTOR and CITY, and all negotiations and oral understandings between the Parties are merged herein. This Agreement can be supplemented or amended only by a written document executed by both CONTRACTOR and CITY with the same formality and equal dignity herewith.

# ARTICLE 21 DISPUTE RESOLUTION

21.1 <u>Arbitration</u>. In addition to any other remedy provided hereunder, CITY, at its option, may use arbitration to resolve any controversy or claim arising out of or relating to this Agreement if arbitration is elected by CITY. Any controversy or claim arising out of or relating to this Agreement, or breach thereof, may be settled by arbitration in accordance with the rules of the American Arbitration Association and judgment upon the award rendered by the arbitrators may be entered into by any court having jurisdiction thereof. In the event arbitration is elected by CITY, such controversy or claim shall be submitted to one arbitrator selected from the National Panel of The American Arbitration Association.

### 21.2 Operations During Dispute.

- 21.2.1 In the event that a dispute, if any, arises between CITY and CONTRACTOR relating to this Agreement, performance or compensation hereunder, CONTRACTOR shall continue to render service in full compliance with all terms and conditions of this Agreement as interpreted by CITY regardless of such dispute.
- 21.2.2 CONTRACTOR expressly recognizes the paramount right and duty of CITY to provide adequate maintenance of CITY's Property, and further agrees, in consideration for the execution of this Agreement, that in the event of such a dispute, if any, it will not seek injunctive relief in any court, but will negotiate with CITY for an adjustment on the matter or matters in dispute and, upon failure of said negotiations to resolve the dispute, may present the matter to a court of competent jurisdiction in an appropriate suit therefore instituted by it or by CITY.

# ARTICLE 22 PUBLIC RECORDS

- 22.1 The City of Pembroke Pines is public agency subject to Chapter 119, Florida Statutes. The CONTRACTOR shall comply with Florida's Public Records Law. Specifically, the CONTRACTOR shall:
  - 22.1.1 Keep and maintain public records required by the CITY to perform the service;
  - 22.1.2 Upon request from the CITY's custodian of public records, provide the CITY with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Fla. Stat., or as otherwise provided by law;
  - 22.1.3 Ensure that public records that are exempt or that are confidential and exempt from public record disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and, following completion of the Agreement, CONTRACTOR shall destroy all copies of such confidential and exempt records remaining in its possession after the CONTRACTOR transfers the records in its possession to the CITY; and
  - 22.1.4 Upon completion of the Agreement, CONTRACTOR shall transfer to the CITY, at no cost to the CITY, all public records in CONTRACTOR's possession. All records stored electronically by the CONTRACTOR must be provided to the CITY, upon request from the CITY's custodian of public records, in a format that is compatible with the information technology systems of the CITY.
- 22.2 The failure of CONTRACTOR to comply with the provisions set forth in this Article shall constitute a Default and Breach of this Agreement and the CITY shall enforce the Default in accordance with the provisions set forth in Article 18 of this Agreement.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT:

# CITY CLERK 601 CITY CENTER WAY, 4<sup>th</sup> FLOOR PEMBROKE PINES, FL 33025 (954) 450-1050

mgraham@ppines.com

# ARTICLE 23 MISCELLANEOUS

- 23.1 <u>Ownership of Documents</u>. Reports, surveys, studies, and other data provided in connection with this Agreement are and shall remain the property of CITY, whether or not the project for which they are made is completed.
- 23.2 <u>Legal Representation</u>. It is acknowledged that each party to this agreement had the opportunity to be represented by counsel in the preparation of this Agreement, and accordingly, the rule that a contract shall be interpreted strictly against the party preparing same shall not apply herein due to the joint contributions of both parties.
- 23.3 **Records.** CONTRACTOR shall keep such records and accounts and require any and all subcontractors to keep records and accounts as may be necessary in order to record complete and correct entries as to personnel hours charged to this engagement, and any expenses for which CONTRACTOR expects to be reimbursed. Such books and records will be available at all reasonable times for examination and audit by CITY and shall be kept for a period of ten (10) years after the completion of all work to be performed pursuant to this Agreement. Incomplete or incorrect entries in such books and records will be grounds for disallowance by CITY of any fees or expenses based upon such entries.
- 23.4 <u>Assignments</u>: Amendments. This Agreement, and any interests herein, shall not be assigned, transferred or otherwise encumbered, under any circumstances, by CONTRACTOR without the prior written consent of CITY. For purposes of this Agreement, any change of ownership of CONTRACTOR shall constitute an assignment which requires CITY approval. However, this Agreement shall run to the benefit of CITY and its successors and assigns.
- 23.5 <u>No Contingent Fees.</u> CONTRACTOR warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for CONTRACTOR to solicit or secure this Agreement, and that it has not paid or agreed to pay any person, company, corporation, individual or firm, other than a bona fide employee working solely for



CONTRACTOR any fee, commission, percentage, gift, or other consideration contingent upon or resulting from the award or making of this Agreement. For the breach or violation of this provision, CITY shall have the right to terminate the Agreement without liability at its discretion, to deduct from the contract price, or otherwise recover the full amount of such fee, commission, percentage, gift or consideration.

23.6 <u>Notice.</u> Whenever any party desires to give notice unto any other party, it must be given by written notice, sent by certified United States mail, with return receipt requested, addressed to the party for whom it is intended and the remaining party, at the places last specified, and the places for giving of notice shall remain such until they shall have been changed by written notice in compliance with the provisions of this section. For the present, CONTRACTOR and CITY designate the following as the respective places for giving of notice:

CITY	Charles F. Dodge, City of Pembroke Pin 601 City Center Way Pembroke Pines, Flor	nes
	Telephone No.	
Сору То:	Samuel S. Goren, Cit Goren, Cherof, Dood 3099 East Commercia Fort Lauderdale, Flor Telephone No. Facsimile No.	y & Ezrol, P.A. al Boulevard, Suite 200 ida 33308
CONTRACTOR:		

23.7 **Binding Authority.** Each person signing this Agreement on behalf of either party individually warrants that he or she has full legal power to execute this Agreement on behalf of the party for whom he or she is signing, and to bind and obligate such party with respect to all provisions contained in this Agreement.

- 23.8 **<u>Headings.</u>** Headings herein are for the convenience of reference only and shall not be considered in any interpretation of this Agreement.
- 23.9 **Exhibits.** Each exhibit referred to in this Agreement forms an essential part of this Agreement. The exhibits if not physically attached should be treated as part of this Agreement and are incorporated herein by reference.
- 23.10 **Severability.** If any provision of this Agreement or application thereof to any person or situation shall to any extent, be held invalid or unenforceable, the remainder of this Agreement, and the application of such provisions to persons or situations other than those as to which it shall have been held invalid or unenforceable, shall not be affected thereby, and shall continue in full force and effect, and be enforced to the fullest extent permitted by law.
- 23.11 **Extent of Agreement.** This Agreement represents the entire and integrated agreement between CITY and CONTRACTOR and supersedes all prior negotiations, representations or agreements, either written or oral.
- 23.12 **Waiver.** Failure of CITY to insist upon strict performance of any provision or condition of this Agreement, or to execute any right therein contained, shall not be construed as a waiver or relinquishment for the future of any such provision, condition, or right, but the same shall remain in full force and effect.
- 23.13 <u>Attorney's Fees.</u> In the event that either party brings suit for enforcement of this Agreement, each party shall bear its own attorney's fees and court costs, except as otherwise provided under the indemnification provisions set forth herein above.
- 23.14 **Protection of City Property.** At all times during the performance of this Agreement, CONTRACTOR shall protect CITY's property from all damage whatsoever on account of the work being carried on under this Agreement.
- 23.15 <u>Counterparts and Execution</u>. This Agreement may be executed in multiple originals or counterparts, each of which shall be deemed to be an original and together shall constitute one and the same agreement. Execution and delivery of this Agreement by the Parties shall be legally binding, valid and effective upon delivery of the executed documents to the other party through facsimile transmission, email, or other electronic delivery.
- 23.16 <u>Compliance with Statutes</u>. It shall be the CONTRACTOR's responsibility to be aware of and comply with all statutes, ordinances, rules, orders, regulations and requirements of all local, city, state, and federal agencies as applicable.
- 23.16.1 <u>Compliance with Jessica Lunsford Act</u> CONTRACTOR shall comply with Chapter 1012, Florida Statutes, which requires Level II background screening for individuals whom are vendors performing services at a Florida public school or for a public school district, if applicable.

23.17 <u>Scrutinized Companies.</u> CONTRACTOR, its principals or owners, certify that they are not listed on the Scrutinized Companies that Boycott Israel List, Scrutinized Companies with Activities in Sudan List, Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or is engaged in business operations with Syria. In accordance with Section 287.135, Florida Statutes, as amended, a company is ineligible to, and may not, bid on, submit a proposal for, or enter into or renew a contract with any agency or local governmental entity for goods or services if:
23.17.1 Any amount of, at the time bidding on, submitting a proposal for, or entering into or renewing such contract, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statutes or is engaged in a boycott of Israel; or
23.17.2 One million dollars or more if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company:
23.17.2.1 Is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, Florida Statutes; or
23.17.2.2 Is engaged in business operations in Syria.
23.18 <u>Domestic Partnership.</u> CONTRACTOR certifies that it is aware of the requirements of Section 35.39 of the CITY's Code of Ordinances and certifies that ( <b>check only one box below</b> ):
CONTRACTOR currently complies with the requirements of Section 35.39 of the CITY's Code of Ordinances; or
CONTRACTOR will comply with the conditions of Section 35.39 of the CITY's Code of Ordinances; or
CONTRACTOR will not comply with the conditions of Section 35.39 of the CITY's Code of Ordinances; or
CONTRACTOR does not comply with the conditions of Section 35.39 of the CITY's Code of Ordinances because of the following allowable exemption (check only box below):
CONTRACTOR does not provide benefits to employees' spouses in traditional marriages; or  CONTRACTOR provides an employee the cash equivalent of benefits because CONTRACTOR is unable to provide benefits to employees' Domestic Partners or spouses despite making reasonable efforts to provide them. To meet this exception, CONTRACTOR shall provide a notarized affidavit that it has made reasonable efforts to provide such benefits. The

affidavit shall state the efforts taken to provide such benefits and the amount of the cash equivalent. Case equivalent means the amount of money paid to an employee with a Domestic Partner or spouse rather than providing benefits to the employee's Domestic Partner or spouse. The case

equivalent is equal to the employer's direct expense of providing ber	etits
to an employee's spouse; or	
CONTRACTOR is a religious organization, association, society, or	any
non-profit charitable or educational institution or organization oper	ated,
supervised, or controlled by or in conjunction with a relig	gious
organization, association, or society; or	
CONTRACTOR is a governmental agency.	

- 23.18.1 Except where federal or state law mandates to the contrary, a contractor awarded a contract pursuant to a competitive solicitation shall provide benefits to Domestic Partners and spouses of its employees, irrespective of gender, on the same basis as it provides benefits to employees' spouses in traditional marriages.
- 23.18.2 CONTRACTOR shall provide the City Manager and his/her designee, access to its records for the purpose of audits and/or investigations to ascertain compliance with the provisions of this Article, and upon request shall provide evidence that the CONTRACTOR is in compliance with the provisions of this Article upon the renewal of this AGREEMENT or when the City Manager or his/her designee receives a complaint or has reason to believe CONTRACTOR may not be in compliance with the provisions of this Article. Records shall include but not be limited to providing the City Manager and his/her designee with certified copies of CONTRACTOR's records pertaining to its benefits policies and its employment policies and practices.
- 23.18.3 CONTRACTOR must conspicuously make available to all employees and applicants for employment the following statement:

"During the performance of a contract with the City of Pembroke Pines, Florida, the CONTRACTOR will provide Equal Benefits to its employees with spouses, as defined by Section 35.39 of the City of Pembroke Pines Code of Ordinances, and its employees with Domestic Partners and all Married Couples".

If CONTRACTOR has questions regarding the application of Section 35.39 of the City of Pembroke Pines Code of Ordinances to CONTRACTOR's duties pursuant to this Agreement, contact Human Resources at (954) 954-392-292 or <a href="mailto:drotstein@ppines.com">drotstein@ppines.com</a>.

23.18.4 By executing this Agreement, CONTRACTOR certifies that it agrees to comply with the above and Section 35.39 of the City of Pembroke Pines Code of Ordinances, as may be amended from time to time.



**IN WITNESS OF THE FOREGOING,** the Parties have set their hands and seals the day and year first written above.

# **CITY:** CITY OF PEMBROKE PINES, FLORIDA ATTEST: By: \_\_\_\_ MARLENE D. GRAHAM, CITY CLERK CHARLES F. DODGE, CITY MANAGER APPROVED AS TO FORM: Name: OFFICE OF THE CITY ATTORNEY **CONTRACTOR:** By: \_\_\_\_\_ Title: STATE OF COUNTY OF \_\_\_ The foregoing instrument was acknowledged before me by means of $\square$ physical presence or $\square$ online notarization, this \_\_\_\_\_ day of \_\_\_\_\_ 2020, by \_\_\_\_\_ on behalf of \_\_\_\_\_ \_\_\_\_\_. He/she is personally known to me or has produced as identification. **NOTARY PUBLIC** (Name of Notary Typed, Printed or Stamped) Title or Rank Serial number

# **REFERENCES FORM**

Provide specific examples of similar contracts. References should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. This form should be duplicated for each reference and any additional information that would be helpful can be attached.

Reference Contact Information:	
Name of Firm, City, County or Agency:	
Address:	
City/State/Zip:	
Contact Name: Title:	
E-Mail Address:	
Telephone: Fax:	
Project Information:  Name of Contractor Performing the work:	
Name and location of the project:	
Nature of the firm's responsibility on the project:	
Project duration: Completion (Anticipated) Date:	
Size of project: Cost of project:	
Work for which staff was responsible:	_//
Contract Type:	
The results/deliverables of the project:	

Reference Contact Information:
Name of Firm, City, County or Agency:
Address:
City/State/Zip:
Contact Name: Title:
E-Mail Address:
Telephone: Fax:
Project Information:
Name of Contractor Performing the work:
Name and location of the project:
Nature of the firm's responsibility on the project:
Project duration: Completion (Anticipated) Date:
Size of project: Cost of project:
Work for which staff was responsible:
Contract Type:
The results/deliverables of the project:

Reference Contact Information:
Name of Firm, City, County or Agency:
Address:
City/State/Zip:
Contact Name: Title:
E-Mail Address:
Telephone: Fax:
Project Information:
Name of Contractor Performing the work:
Name and location of the project:
Nature of the firm's responsibility on the project:
Project duration: Completion (Anticipated) Date:
Size of project: Cost of project:
Work for which staff was responsible:
Contract Type:
The results/deliverables of the project:

Reference Contact Information:
Name of Firm, City, County or Agency:
Address:
City/State/Zip:
Contact Name: Title:
E-Mail Address:
Telephone: Fax:
Project Information:
Name of Contractor Performing the work:
Name and location of the project:
Nature of the firm's responsibility on the project:
Project duration: Completion (Anticipated) Date:
Size of project: Cost of project:
Work for which staff was responsible:
Contract Type:
The results/deliverables of the project:

Reference Contact Information:	
Name of Firm, City, County or Agency:	
Address:	
City/State/Zip:	
Contact Name: Title:	
E-Mail Address:	
Telephone: Fax:	
Project Information:	
Name of Contractor Performing the work:	
Name and location of the project:  Nature of the firm's responsibility on the project:	
Project duration: Completion (Anticipated) Date:	
Size of project: Cost of project:	
Work for which staff was responsible:	
Contract Type:	
The results/deliverables of the project:	



# FINAL/PARTIAL RELEASE OF LIEN

### KNOW ALL MEN BY THESE PRESENTS:

That the undersigned, for and in consideration of the payment of the sum of \$ [Payment Amount]	
and other valuable consideration, paid by City of Pembroke Pines, receipt of which is hereby	
acknowledge, hereby releases and quit claims to the said [Contractor Name]	
its successors and assigns, and	

#### City of Pembroke Pines

The owner, all liens, lien rights, claims and demands of any kind whatsoever, which the undersigned now has or might have against the building on premises legally described as:

[Description]
PO #: [PO #]
Invoice #: [Invoice #]

On account of labor performed and/or material furnished for the construction of any improvements thereon. That all labor and materials used by the undersigned in the erection of said improvements have been fully paid for:

Witnesses:			TRACTOR ME OF CONTRACTOR]	
	BY: _			_
Print Name				
Print Name				
STATE OF FLORIDA ) ss:				
COUNTY OF BROWARD )				
ON THIS day	of,	20	_, before me, the undersigne	ed notary public,
personally appeared[Con	ractor's Representative]	as	[Job Title]	of
[Name of Contractor]		_, perso	nally known to me, or who h	nas produced
instrument and who acknowled	ged that (s)he executed the sa	ame and		
IN WITNESS WHEF	EOF, I hereunto set my hand	d and of	ficial seal.	
	NO	TARY F	UBLIC	
My Commission Expires:	Prin	nt or Ty	oe Name	

# Attachment H - Contract Documents Appendix 1

#### **TABLE OF CONTENTS**

# CITY OF PEMBROKE PINES WASTEWATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL REHABILITATION

#### **BID DOUCMENTS**

### **VOLUME 1**

# **TECHNICAL SPECIFICATIONS (DIVISION 13 AND 16)**

### **DIVISION 13 – INSTRUMENTATION AND CONTROLS**

### **DIVISION 16 - ELECTRICAL**

DIVIOIO	MI TO LEEGIMOAL	
16010	Basic Electrical Requirements	16010-1 to 16010-10
16015	Electrical Systems Analysis	16015-1 to 16015-11
16050	Basic Electrical Materials and Methods	16050-1 to 16050-21
16110	Raceways	16110-1 to 16110-17
16120	Conductors	16120-1 to 16120-21
16322	Medium Voltage Transformers Liquid Filled Pad-Mount	16322-1 to 16322-8
16425	Switchboards	16425-1 to 16425-12
16450	Grounding	16450-1 to 16450-7
16485	Variable Frequency Drives	16485-1 to 16485-9
16500	Lighting	16500-1 to 16500-8
16950	Electrical Testing	16950-1 to 16950-17

#### **VOLUME 2**

### **DRAWINGS**

#### **SECTION 13300**

#### INSTRUMENTATION AND CONTROLS

#### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. The Contractor shall furnish, install and place into service operating process instrumentation, control systems and panels including accessories related to the City of Pembroke Pines Waste Water Treatment Plant Effluent Pump Station Electrical Rehabilitation project as shown on plans and specified herein. Instrumentation drawings are as part of E-series Drawings in this project. Refer to appropriate electrical drawings for I&C scope of work.
  - 1. Furnish and install new input/output (I/O) modules in the existing PLC-5 control panel located in the Effluent Pump Station Building Electrical Room. Make all necessary connection, modification, etc. and furnish all necessary terminal block, relays, SPD, etc. for a complete and working PLC system in place.
  - 2. Contractor shall use Hillers Electrical Engineering, Inc for the PLC and SCADA programming task for this project as describes in 1.01.D of this specification. Contractor shall assist Hillers Electrical Engineering, Inc for loop check and scaling verification as well as startup services.
  - 3. Furnish and install all instruments shown on the contract drawings and specified herein. Furnish and install all necessary tubing, valves, connectors, manifolds, supports, stands, hoods and mounting hardware for a complete working system in place.
  - 4. The contractor shall furnish all shop drawings to the instrumentation contractor for systems that interface with the station control system. The instrumentation contractor shall inform the general contractor in writing of the shop drawings necessary for instrumentation and control system coordination.
  - 5. The contractor is responsible for providing a complete working station instrumentation and control system in place.
  - 6. Power supplies, surge suppressors, terminal strips, etc. for all I/O that are to be connected to the new control system must be provided new. The instrument contractor is responsible to provide completed panels that are clean, functional and present a professional workman-like appearance.
  - 7. All wires in control panels must be permanently tagged and shown on the as-built drawings. This includes all spare and abandoned wires and cables. Spare and abandoned cables are to be taped and left coiled in the panels for future use. Cable and wire numbers are to be assigned by the

City of Pembroke Pines Effluent Pump Station Electrical Rehabilitation **Instrumentation and Controls** 

contractor, documented and controlled to prevent duplicate numbers. The contractor shall turn over to the owner, at the project conclusion, a cable and wire list showing assigned numbers and their physical location in the plant.

- 8. See electrical drawings and specifications for additional work required of the instrument contractor as part of this project.
- 9. Furnish updated PLC loop diagram after modification of existing PLC system as required by this project.
- Modify the existing filter local control panel as shown on drawings and as required by the control strategy implementation section of this specification. Field locate actual location to install selector switch, push buttons, indication light, etc. and install accordingly. Make all necessary wiring, terminations, etc. for a complete and functional filter local control panel in place.
- B. Work Includes: Engineering, furnishing, installing, calibrating, adjusting, testing, documenting, starting up, and Owner training for a complete Instrumentation and Control System in place.
  - 1. Major elements are:
    - a. Field Instruments including elements and transmitters.
    - b. Modification of existing PLC-5 Control Panel
    - c. PLC programming as describes in 1.01, A.2.
    - d. SCADA programming as describes in 1.01, A.2.
    - e. Loop check.
    - f. Start-up and testing.
- C. Instrument and Control (I&C) Supplier work scope:
  - 1. For I&C equipment and ancillaries provide the following:
    - a. Completion of detailed design.
    - b. Required Submittals.
    - c. Equipment and ancillaries.
    - d. Instructions, details, and recommendations to, and coordination with, Contractor for proper installation.
    - e. Coordination with package system shop drawings and other disciplines.
    - f. Loop checks.
    - g. Verify readiness for operation.
    - h. Verify the correctness of final power and signal connections.
    - i. Adjusting and calibrating.

- j. Starting up.
- k. Testing and coordination of testing.
- I. Training.
- m. As-built documentation.
- 2. Verify following work not by I&C Supplier is provided:
  - a. Correct type, size, and number of signal wires with their raceways.
  - b. Correct electrical power circuits and raceways.
  - c. Correct size, type, and number of I&C related pipes, valves, fittings, and tubes.
  - d. Correct size, type, materials, and connection of process mechanical piping for in-line primary elements.
- 3. For equipment not provided under I&C Supplier, but directly connected to equipment required by I&C Supplier:
  - a. Obtain from Contractor, manufacturer's information on installation, interface, function, and adjustment.
  - b. Coordinate with Contractor to allow required interface and operation with I&C System.
  - c. For operation and control, verify that installations, interfacing signal terminations, and adjustments have been completed with manufacturer's recommendations.
  - d. Test to demonstrate required interface and operation with I&C System. Examples of items in this category, but not limited to the following:
    - 1) Valve operators, position switches, and controls.
    - 2) Chemical feed pump and feeder speed/stroke controls.
    - 3) Automatic samplers.
    - 4) Motor control centers.
    - 5) Variable speed drive systems.
  - e. Examples of items not in this category:
    - Internal portions of equipment provided under Division 16, Electrical, that are not directly connected to equipment under I&C System.
    - 2) Internal portions of I&C Systems provided as part of package systems and that are not directly connected to equipment provided under I&C System.
- 4. Wiring external to equipment provided by I&C Supplier:
  - a. Special control and communications cable: Provided by I&C Supplier.
- D. Software Engineering work scope:

- Software engineering work shall be performed by the instrumentation and control contractor, unless otherwise noted. The instrumentation and control contractor shall have be responsible to coordinate loop-checks, start-up etc. for a complete working system in place. The following are part of the software engineering scope:
  - a. Correct I/O mapping and scaling.
  - b. Ladder logic implementation defined in control strategies.
  - c. HMI interface graphic screens and mapping.
  - d. Start-up support, including system testing and trouble shooting.
  - e. System training.
  - f. Specifications/documents including: System External Specification, System Internal Specification, I/O Checklist, Site Acceptance Test Plan.

#### 1.02 SINGLE INSTRUMENT SUPPLIER

- A. The Contractor shall assign to the Single Instrument and Control (I&C) supplier full responsibility for the functional operation of all new instrumentation and control systems. The Contractor shall have said supplier perform all engineering necessary in order to select, furnish, program, supervise the installation of, connection, calibrate, and place into operation of all sensors, instruments, alarm equipment, control panels, accessories, and all other equipment as specified herein. The I&C supplier shall have a maintenance office within a 150 mile radius of the project.
- B. The single instrument and controls supplier shall demonstrate his/her ability to successfully complete projects of similar sizes and nature. Provide references (including phone number and contact name) for at least three projects successfully completed in which the following tasks were performed: system engineering, programming, panel assembly, instrumentation installation, documentation (including panel assembly), schematics and wiring diagrams, field testing, calibration and start-up, operator instruction and maintenance training. Provide references (including phone number and contact name) for at least three project s where software engineering (programming) tasks such as ladder logic programming, computer based SCADA system configuration, documentation, field testing, start-up, and operator instruction were performed.
- C. The foregoing shall enable the Contractor and the Owner to be assured that the full responsibility for the requirements of this Section shall reside in an organization which is qualified and experienced in the water treatment and distribution field and its associated process technology on a functional systems basis.
- D. The single I&C supplier shall have a UL approved shop and shall build all panels according to UL 508A. All control panels shall bear a UL 508A label. All control panels shall also meet the requirements of national electrical code article 419 for industrial control panels.

- E. Instrumentation and Controls supplier shall be:
  - 1. C.C. Control Corp.
  - 2. Or Owner approved equal.
- F. The single I&C Supplier shall use Hillers Electrical Engineering for the PLC and SCADA software engineering (PLC programming) task of this project. The task of providing an error-free communication configuration, both the hardware and software task, shall be the sole responsibility of the single I&C Supplier and not the PLC software engineer. There is an on-going SCADA upgrade project that may be in construction phase during this project construction period, the software engineer (Hillers Electrical Engineering) will coordinate with the SCADA upgrade project for all necessary modification of the SCADA screens relating to this project.

#### 1.03 INSTALLATION WORK

A. The I&C contractor is not required to employ the services of the instrument or manufacturer's organization, or any division thereof, to accomplish the physical installation of any elements, instruments, accessories or assemblies specified herein. However, the Contractor shall employ installers who are skilled and experienced in the installation and connection of all elements, instruments, accessories and assemblies; portions of their work shall be supervised or checked as specified in Part 3, herein.

#### 1.04 PREPARATION OF SUBMITTAL OF DRAWINGS AND DATA

- A. It is incumbent upon the Contractor to coordinate the work specified in these Sections so that a complete well I&C system shall be provided and shall be supported by accurate Shop and record Drawings. As a part of the responsibility as assigned by the Contractor, the Single I&C supplier shall prepare and submit through the Contractor, complete organized Shop Drawings, as specified in Part 2.02, herein. Interface between instruments, motor starters, etc. shall be included in his Shop Drawing submittal.
- B. During the period of preparation of this submittal, the Contractor shall authorize direct, informal liaison between his Single I&C supplier and the Engineer for exchange of technical information. As a result of this liaison, the Engineer may authorize certain minor refinements and revisions in the systems as specified informally, but these shall not alter the scope of work or cause increase or decrease in the Contract Price. During this informal exchange, no oral statement by the Engineer shall be construed to give formal approval of any component or method, nor shall any statement be construed to grant formal exception to or variation from these Specifications.

#### 1.05 ADDITIONAL TECHNICAL SERVICES

- A. At no separate additional cost to the Owner, the Contractor shall provide the following services of qualified technical representatives of the Single I&C supplier (See Part 3, herein).
  - 1. To supervise installation and connection of all instruments, elements, and components of every system, including connection of instrument signals to primary measurement elements and to final control elements such as pumps, valves, and chemical feeders.
  - 2. To make all necessary adjustments, calibrations and tests; and
  - 3. To instruct plant operating and maintenance personnel on instrumentation. This time shall be in addition to whatever time is required for other facets of work at the site, and shall be during the Owner's normal working days and hours.
  - 4. To terminate and test all fiber optic cable and effected devices (if applicable).

#### 1.06 GUARANTEE

A. The Contractor shall guarantee all equipment and installation, as specified herein, for a period of one year following the date of completion of the work. To fulfill this obligation, the Contractor shall utilize technical service personnel designated by the Single I&C supplier to which the Contractor originally assigned project responsibility for instrumentation. Services shall be performed within two calendar days after notification by the Owner.

#### 1.07 ADDITIONAL PROVISIONS

- A. The applicable provisions of the following Sections under Electrical Work shall apply to work and equipment specified herein, the same as if stated in full, herein:
  - Codes and Standards
  - 2. Equipment, Materials and Workmanship
  - 3. Testing
  - 4. Grounding
  - 5. Equipment Anchoring
  - 6. Conductor and Equipment Identification
  - 7. Terminal Cabinets and Control Compartments
  - 8. Process Control Devices

#### 1.08 NEWEST MODEL COMPONENTS

A. All meters, instruments, and other components shall be the most recent field proven models marketed by their manufacturers at the time of submittal of Shop Drawings unless otherwise specified to match existing equipment. All technical data publications included with submittals shall be the most recent issue.

#### 1.09 INSPECTION OF THE SITE AND EXISTING CONDITIONS

- A. The instrumentation drawings were developed from past record drawings and information supplied by the Owner.
- B. Before submitting a bid, visit the site and determine conditions at the site and at all existing structures in order to become familiar with all existing conditions and instrumentation and control systems that will, in any way or manner, affect the work required under this Contract. No subsequent increase in Contract cost will be allowed for additional work required because of the Contractor's failure to fulfill this requirement.

#### 1.10 RELATED WORK

- A. Division 16 Electrical
- B. Division 11 Equipment

#### PART 2 - PRODUCTS

#### 2.01 INSTRUMENTATION CRITERIA

#### A. Designation of Components

1. In these Specifications and on the Drawings, all systems, meters, instruments, and other elements are represented schematically, and are designated by numbers, as derived from criteria in Instrument Signal and Automation Society of America Standard ANSI/ISA S5.1-1973. The nomenclature and numbers designated herein and on the Drawings shall be employed exclusively throughout Shop Drawings, data sheets, and similar materials. Any other symbols, designations, and nomenclature unique to the manufacturers standard methods shall not replace these prescribed above, used, herein and on the Drawings.

# B. Signal Characteristics

1. Signals shall be electrical, as indicated herein, and shall vary in direct linear proportion to the measured variable, except as noted. Electrical signals outside control panel(s) shall be 4 to 20 milliamperes DC, except as noted. Signals within enclosures may be 1-5 volts DC.

#### C. Matching Style Appearance and Type

1. All instruments to be panel mounted at the control panels shall have matching style and general appearance. Instruments performing similar functions shall be of the same type, model, or class, and shall be of one manufacturer, where applicable.

#### D. Accuracy and Repeatability

1. The overall accuracy of each instrumentation system or loop shall be as described in the Specifications for that system or loop. Each system's accuracy shall be determined as a probable maximum error; this shall be the square-root of the sum of the squares of certified "accuracies" of certain designated components in each system, expressed as a percentage of the actual span or value of the measured variable. Each individual electronic instrument shall have a minimum accuracy of +0.7 percent of full scale and a minimum repeatability of +0.4 percent of full scale unless otherwise specified. Instruments that do not conform to or improve upon these criteria are not acceptable.

#### E. Signal Isolators, Converters, and Power Supplies

 Signal isolators shall be furnished and installed in each measurement and control loop, wherever required, to insure adjacent component impedance match or where feedback paths may be generated. Signal converters shall be included where required to resolve any signal level incompatibilities. Signal power supplies shall be included, as required by the manufacturer's instrument load characteristics, to insure sufficient power to each loop component.

#### F. Alternative Equipment or Methods

1. Equipment or methods requiring redesign of any project details are not acceptable without prior approval of the Engineer. Any changes inherent to a proposal alternative shall be at no additional cost to the Owner. The required approval shall be obtained in writing by the I&C Subcontractor through the Contractor prior to submittal of Shop Drawings and data. Any proposal for approval of alternative equipment or methods shall include evidence of improved performance, operational advantage and maintenance enhancement over the equipment or method specified, or shall include evidence that a specified component is not available. Otherwise, alternative equipment (other than direct, equivalent substitutions) and alternative methods shall not be proposed.

#### 2.02 DETAILED SYSTEMS DRAWINGS AND DATA

#### A. Content

1. The Contractor shall submit detailed Shop Drawings and data prepared

and organized by the Single I&C supplier designated at the time of bidding. Six submittal sets shall be required. These Drawings and data shall be submitted as a complete, bound package at one time, within 80 calendar days after date of Notice to Proceed and shall include:

- a. Drawings showing definite diagrams for every instrument loop system. These diagrams shall show and identify each component of each loop or system using legend and symbols from ISA Standard S5.4, each having the format of ISA Standard S5.1 as used on the Project Drawing. (Each system or loop diagram shall be drawn on a separate Drawing sheet.)
- b. Data sheets for each component, together with a technical product brochure or bulletin. The data sheets shall show:
  - Component function description used herein and on the Drawings;
  - 2) Manufacturer's model number or other product designation;
  - 3) Project tag number used herein and on the Drawings;
  - 4) Project system loop of which the component is a part;
  - 5) Project location or assembly at which the component is to be installed;
  - 6) Input and output characteristics;
  - 7) Scale range and units (if any) and multiplier (if any);
  - 8) Requirements for electric supply (if any);
  - 9) Requirements for air supply (if any);
  - 10) Materials of component parts to be in contact with, or otherwise exposed to, process media;
  - 11) Calibration curves as required.
  - 12) Special requirements or features.
- c. A complete index shall appear in the front of each bound submittal volume. A separate technical brochure or bulletin shall be included with each instrument data sheet. The data sheets shall be indexed in the submittal by systems or loops, as a separate group for each system or loop. If, within a single system or loop, a single instrument is employed more than once, one data sheet with one brochure or bulletin may cover all identical uses of that instrument in that system. Each brochure or bulletin shall include a list of tag numbers for which it applies. System groups shall be separated by labeled tags.
- d. Drawings showing both schematic and wiring diagrams for control circuits. Complete details on the circuit interrelationship of all devices within and outside each control panel shall be submitted first, using schematic control diagrams. Subsequent to return of this first submittal by the Engineer, piping and wiring diagrams shall be prepared and submitted for review by the Engineer; the diagrams shall consist of component layout Drawings to scale, showing numbered terminals on components together with the unique number of the wire to be connected to each terminal. Piping and wiring diagrams shall show terminal assignments from all primary measurement devices, such as flow meters, and to all final control devices, such as samplers, pumps, valves, and chemical feeders. The Contractor shall furnish all necessary

- equipment supplier's Shop Drawings to facilitate inclusion of this information by the I&C system supplier.
- e. Schematic and wiring diagram criteria shall be followed as established in NEMA Standards Publication ANSI/NEMA 1CS-1-1978, "Industrial Control and Systems."
- f. Assembly and construction Drawings for each control panel and for other special enclosed assemblies for field installation. These Drawings shall include dimensions, identification of all components, surface preparation and finish data, nameplates, and the like. These Drawings also shall include enough other details, including prototype photographs, to define exactly the style and overall appearance of the assembly; a finish treatment sample shall be included.
- g. Installation, mounting and anchoring details for all components and assemblies to be field-mounted, including conduit connection or entry details.
- h. Complete and detailed bills of materials. A master Bill of Materials listing all field mounted devices, control panels and other equipment that shall be shipped to the job site. A Bill of Materials for each control panel listing all devices within the panel.
- Modifications to existing equipment. A complete description of all proposed modifications to existing instrumentation equipment, control panels, control devices, cabinets, etc., shall be submitted with the Shop Drawings complete with detailed Drawings of the proposed modifications.

#### B. Organization and Binding

 The organization of initial Shop Drawing submittal required above shall be compatible to eventual inclusion with the Technical Manuals submittal and shall include final alterations reflecting "as built" conditions. Accordingly, the initial multiple copy Shop Drawing submittal shall be separately bound in 3-ring binders of the type specified under Part 2.03, herein, for the Technical Manuals.

#### 2.03 TECHNICAL MANUALS

- A. Five final sets of technical manuals shall be supplied for the Owner, and one final set shall be supplied to the Engineer, as a condition of acceptance of the project. Each set shall consist of one or more volumes, each of which shall be bound in a standard size, three-ring, loose-leaf, vinyl plastic hard cover binder, suitable for bookshelf storage. Binder ring size shall not exceed 3.0 inches.
- B. Initially, two (2) sets of these manuals shall be submitted to the Engineer, and two sets submitted to the Owner, for review. Coordinate with front end documents for

quantity of submittal requirements and adjust accordingly. Following the Engineer's, and Owner's review, one (1) set shall be returned to the Contractor with comments. The sets shall be revised and/or amended as required and the requisite final sets shall be submitted to the Engineer fifteen (15) days prior to start-up of systems. The Engineer shall distribute the copies to the Owner.

C. In addition to updated Shop Drawing information to reflect actual existing conditions, each set of technical manuals shall include installation, connection, operating, trouble-shooting, maintenance, and overhaul instructions in complete detail. This shall provide the Owner with comprehensive information on all systems and components to enable operation, service, maintenance, and repair. Exploded or other detailed views of all instruments, assemblies, and accessory components shall be included together with complete parts lists and ordering instructions.

#### 2.04 MODIFICATION OF EXISTING PLC CONTROL PANELS

#### A. General:

- 1. Contractor shall modify the existing PLC control panel as shown on drawings and as described in this specification. Modify existing panel to add new signals as shown on drawings, including relays, surge arrestors, terminal block, wiring, etc. as necessary for a complete and function PLC system.
- 2. New control panels shall be furnished and installed under this Contract if shown on drawings. They shall house the instrumentation, control devices, indicating lights, PLC's, alarm chasses, displays, all necessary accessories, wiring and terminal blocks as necessary and as shown on the Drawings and as described herein. Control panel doors shall be equipped with a door latch kit or a fast operating clamp assembly as applicable. 120 volt AC control voltage in a control panel shall be supplied with a line noise suppressing transformer specified elsewhere in this Section. Each control panel shall be properly grounded and as such be provided with a ground terminal block. Control panels shall be properly sized for installation through new and existing entry ways and custom fit for locations as shown on the drawings

#### Construction:

- a. Control Room: Control room panels shall be Nema 12. The enclosures shall be manufactured of 14 gauge steel.
- b. Building interior, non air-conditioned area: Control panels inside a building (not in a control room) shall be Nema 12, 304 stainless steel 14 gauge construction with painted white. Control panels in corrosive areas shall be construed to be outdoors.
- Outdoor: All outdoor control panels shall be NEMA 4X with drip shield kit,
   3 point latch mechanism and 316 stainless steel 14 gauge construction,
   unless otherwise noted on drawings.
- d. Painting: Control panels shall be thoroughly cleaned and sandblasted per SSPC-SP-6 (Commercial Blast) after which surfaces shall receive a

prime coat (Amercoat 185, Koppers 622HB, or equal) 3-mils dry, followed by two (2) or more finish coats (Amercoat 5401, Koppers 501, or equal) 3-mils dry, for a total thickness of the complete system of 6 mils. The finished color of the outside surfaces shall be white, unless otherwise noted or requested by Owner. The inside surfaces shall have a white finish coat.

- 4. Cooling: Control panels shall have sufficient cooling and/or ventilation not to exceed the maximum operating temperature of any of the internal components. Ambient temperature limits shall be 90 degrees F for indoor and 100 degrees F for outdoor control panels. Outdoor control panels with electronic equipment shall be furnished with sun shields around and on top of the control panels.
- 5. UPS: UPS: Control Panels shall be furnished with a UPS to provide power to the PLC microprocessor and all PLC support, interface, and communication equipment for 10 minutes. UPS shall be manufactured by Eaton or APC.
- 6. Power supply units for non-PLC modules: Provide power supply units for 120V to 24VDC and 12VDC as needed and sized accordingly to the load supplied. Power supply units for non-PLC modules shall be Puls or Owner approved equal.

### B. Signal and Control Circuit Wiring

- 1. <u>Wire Type and Sizes</u>: Conductors shall be flexible stranded copper wire; these shall be U.L. listed Type THHN and shall be rated 600 volts. Wire for control signal circuits and alarm input circuits shall be 16 AWG. All instrumentation cables shall be shielded No. 20 AWG minimum with a copper drain wire. All special instrumentation cable such as between sensor and transmitter shall be supplied by the I&C supplier.
- 2. <u>Wire Insulation Colors</u>: Conductors supplying 120 volt AC power on the line side of a disconnecting switch shall have a black insulation for the ungrounded conductor. Grounded circuit conductors shall have white insulation. Insulation for ungrounded 120 volt AC control circuit conductors shall be red. All wires energized by a voltage source external to the control board(s) shall have yellow insulation. Insulation for all DC conductors shall be blue.

#### 3. Wiring Installation:

a. All wires shall be run in plastic wireways except (1) field wiring, (2) wiring run between mating blocks in adjacent sections, (3) wiring run from components on a swing-out panel to components on a part of the fixed structure, and (4) wiring run to panel mounted components. Wiring run from components on a swing-out panels to other components on a fixed panel shall be made up in tied bundles. These shall be tied with nylon wire ties, and shall be

City of Pembroke Pines Effluent Pump Station Electrical Rehabilitation

- secured to panels at both sides of the "hinge loop" so that conductors are not strained at terminals.
- b. Wiring run to control devices on the front panels shall be tied together at short intervals with nylon wire ties and secured to the inside face of the panel using adhesive mounts.
- c. Wiring to rear terminals on panel mount instruments shall be run in plastic wireways secured to horizontal brackets run above or below the instruments in about the same plane as the rear of the instruments.
- d. Shields of shielded instrument cable shall only be grounded on one side of each cable run. The side to be grounded shall always be in the field as applicable.
- e. Care shall be exercised to properly insulate the ungrounded side, to prevent ground loops from occurring.
- f. Conformance to the above wiring installation requirements shall be reflected by details shown on the Shop Drawings for the Engineer's review.
- g. Wires shall be terminated using pin connectors or spade lugs.

#### 4. Wire Marking:

a. Each signal, control, alarm, and indicating circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all Shop Drawings. These numbers shall be marked on all conductors at every terminal using permanently marked heat-shrink plastic. Instrument signal circuit conductors shall be tagged with unique multiple digit numbers. Black and white wires from the circuit breaker panelboard shall be tagged including the one (1) or two (2) digit number of the branch circuit breaker.

#### 5. Terminal Blocks:

a. Terminal blocks shall be molded plastic with barriers and box lug terminals, and shall be rated 15 amperes at 600 volts. White marking strips, fastened securely to the molded sections, shall be provided and wire numbers or circuit identifications shall be marked thereon with permanent marking fluid. Terminal blocks shall be General Electric Type CR 151A1 with mounting rack, equivalent by Cinch-Jones or equal.

#### 2.05 PLC REQUIREMENTS

A. Existing I/O points will be used and no new PLC or I/O modules are needed.

#### 2.06 PROGRAMMABLE LOGIC CONTROLLER SOFTWARE

A. No new PLC software is needed.

#### 2.07 ACCESSORIES

- A. General purpose relays in the control panels shall be plug in type with contacts rated 10 amperes at 120 volts AC. The quantity and type of contacts shall be as shown on the Drawings. Each relay shall be enclosed in a clear plastic heat and shock resistant dust cover with LED indication. Sockets for relays shall have screw type terminals. Relays shall be Potter and Brumfield, Square-D, or equal.
- B. Time delay relays shall be solid-state on-delay or off-delay type with contacts rated for 10 amperes at 120VAC. Units shall include adjustable dial with graduated scale covering the time range in each case. Time delay relays shall be Agastat Series 7000, Omron Series H3, SSAC Type TDM, or approved equal.
- C. Additional slave relays shall be installed when the number or type of contacts shown exceeds the contact capacity of the specified relays and timers.
- D. Switches and indicating lights shall be round, 30.5 mm configuration, heavy duty and corrosion resistant. Legend plate shall be standard size square style laminate with white field and black markings as shown.
- E. Indicating lights shall have LED type, unless otherwise noted. Lens color shall be as noted. All indicating lights shall be push-to-test type. Pushbuttons shall include full guard with flush button and selector switches shall include a black non-illuminated knob on switch, unless otherwise noted. Contact arrangement and configuration shall be as shown.
- F. Devices shall be Eaton Electrical Type E-30, General Electric Type CR104, Square D class 9001 Type SK, Allen-Bradley Bulletin 800 or equal.
- G. Selector switches shall be of the rotary type with the number of positions as shown on the Drawings. Color, escutcheon engravings, contact configurations and the like shall be as shown. Devices shall be Eaton Electrical Type E-24, General Electric Type CR104, or equal.
- H. Circuit breakers shall be single pole, 120 volt, 15 ampere rating or as required to protect wires and equipment and mounted inside the panels as shown.
- I. Nameplates shall be supplied for identification of all field-mounted elements, including flow meters and their transmitters. These nameplates shall identify the instrument, or meter, descriptively, as to function and system. These nameplates shall be fabricated from black-face, white-center, laminated engraving plastic. A nameplate shall be provided for each signal transducer, signal converter, signal

City of Pembroke Pines Effluent Pump Station Electrical Rehabilitation **Instrumentation and Controls** 

isolator, each electronic trip, and the like, mounted inside the control panels. These shall be descriptive, to define the function and system of such element. Adhesives shall be acceptable for attaching nameplates. Painted surfaces must be prepared to allow permanent bonding of adhesives. Nameplates shall be provided for instruments, function titles for each group of instruments and other components mounted on the front of the control panels as shown. These nameplates and/or individual letters shall be fabricated from VI-LAM, Catalog No. 200, manufactured by N/P Company, or equivalent by Formica, or equal. Colors, lettering, style and sizes shall be as shown or as selected by the Engineer.

J. Solenoid Valves, if not otherwise noted, shall be globe valve, directly actuated by solenoid and not requiring minimum pressure differential for operation. Materials shall be brass globe valve bodies and Buna-N valve seats. The size shall be 1/4" normally closed. The coil shall be 115 VAC coil, NEMA 4 solenoid enclosure. Manufacturer shall be ASCO Red Hat, or equal.

#### 2.08 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS) PROTECTION

#### A. General

- TVSS protection shall be provided to protect the electronic instrumentation system from induced surges propagating along the signal and power supply lines. The protection systems shall be such that the protective level shall not interfere with normal operation, but shall be lower than the instrument surge withstand level, and be maintenance free and selfrestoring.
- 2. Instruments shall be housed in a suitable case, properly grounded. Ground wires for all TVSS shall be connected to a good earth ground and where practical, each ground wire run individually and insulated from each other. These protectors shall be mounted within the instrument enclosure or a separate NEMA-4X junction box coupled to the enclosure.

# B. Power Supply

Protection of all 120 VAC instrument power supply lines shall be provided.
Control panels shall be protected by line noise suppressing isolation
transformers and TVSS. Field instruments shall be protected by TVSS.
For control panels, the line noise suppressing isolation transformer shall be
Topaz Series 30 Ultra isolators or approved equal. The suppressor shall
be Edco HSP-121 and U.L. 1449 compliant.

#### C. Analog Signals

 Protection of analog signal lines originating and terminating not in the same building shall be provided by TVSS. For analog signal lines, the TVSS shall be EDCO PC-642. For field mounted two-wire instruments, the TVSS shall be encapsulated in stainless steel pipe nipples and shall be EDCO SS64 series, and U.L. 497B compliant.

City of Pembroke Pines Effluent Pump Station Electrical Rehabilitation **Instrumentation and Controls** 

2. For field mounted four-wire 120VAC instruments, the TVSS shall be in a NEMA 4X polycarbonate enclosure, EDCO SLAC series.

#### 2.09 INSTRUMENTATION AND CONTROL EQUIPMENT SPECIFICATIONS

#### P1. FLOAT SWITCH (FLOAT)

1. Level switches of the direct acting float-operated design shall be comprised of a hermetically sealed, approximately 5 inch diameter plastic casing float, containing microswitches and flexibly supported by means of a heavy neoprene jacket, with three conductor cable a minimum of 20 feet in length. Level switches containing mercury shall be unacceptable. Unless otherwise specified, media specific gravity is 0.95 to 1.05. Microswitches shall be one normally open and one normally closed, 5A-115V AC capacity. Float hangers and supports shall be provided as shown on the installation detail drawings. Float switches shall be as manufactured by Flygt, Anchor Scientific, Zoeller or equal.

#### M1. MOTOR VIBRATION SWITCH AND PROBE

- 1. Electronic vibration switches to provide economical, self-contained, signle-channel vibration protection device. The switch shall be suitable for use in non-hazardous as well as Class I Div 2 hazardous areas.
- 2. Electronic vibration switches shall provide two independent alarm setpoints and corresponding discrete outputs, allowing implementation of ALERT (pre-shutdown) and DANGER (shutdown) levels. A separate 4-20mA proportional output shall be provided but will be for future use in this project.
- Vibration on both switches is monitored in RMS velocity units. The standard configuration consists of an internal accelerometer mounted inside the switch housing, providing completely self-contained functionality. The switch can also be configured to use an external accelerometer as shown on drawings.
- 4. Manufacturer: Metrix Vibration Model 440 or Owner approved equal and SA6200 probe with manufactured supplied cable. Coordinate with manufacturer for the actual recommended probe model and provide accordingly. Vibration switch model 440 will be installed in the VFD unit. Contractor shall provide the unit to VFD supplier (specification 16485) to be installed with the VFD unit. Vibration switch and probes are only required for Effluent Pump No.5 and No.6.

#### 2.10 CONTROL STRATEGY AND LOOP DESCRIPTIONS

- A. No control strategy modification is needed.
- B. The I&C supplier and software programmer shall perform the loop check after the City of Pembroke Pines

  Instrumentation and Controls Effluent Pump Station Electrical Rehabilitation

new signals and existing signals are reconnected to the existing PLC-5 panel. New signals will need I/O mapping in the PLC program. The I&C supplier and software programmer shall also perform the startup service after all signals are connected.

### 2.11 INSTRUMENT LIST

TAG NO.	COMPONENT CODE	COMPONENT TITLE	COMPONENT OPTIONS/RANGE	REMARKS
LSH-EFF01	L1	Effluent Electrical Room Trench High Level Alarm		Field determine mounting high approximately 3" above trench level.
VSH- EFF05A, VSH- EFF05B	M1	Effluent Pump No.5 Upper and Lower Vibration Switch and Probe		2 sets of vibration switch/probe are needed for each pump. Switches will be send to VFD supplier to be installed in the VFD unit.
VSH- EFF06A, VSH- EFF06B	M1	Effluent Pump No.6 Upper and Lower Vibration Switch and Probe		2 sets of vibration switch/probe are needed for each pump. Switches will be send to VFD supplier to be installed in the VFD unit.

## PART 3 - EXECUTION

# 2.12 INSTALLATION, CALIBRATION, TESTING, START-UP AND INSTRUCTION

## A. General:

 Under the supervision of the Single I&C supplier, all systems specified in this Section shall be installed, connected, calibrated and tested, and in coordination with the Engineer and the Owner, shall be started to place the processes in operation. This shall include final calibration in concert with equipment specified elsewhere in these Specifications, including pumps,

City of Pembroke Pines Effluent Pump Station Electrical Rehabilitation **Instrumentation and Controls** 

valves, as well as certain existing equipment.

## B. Testing

- 1. All systems shall be exercised through operational tests in the presence of the Engineer in order to demonstrate achievement of the specified performance. Operational tests depend upon completion of work specified elsewhere in these Specifications. The scheduling of tests shall be coordinated by the Contractor among all parties involved so that the tests may proceed without delays or disruption by incomplete work.
- 2. Check the function of each loop, including set points, alarms, displays, and operator interface. Check all loops. Check data logging, alarm logging, and event logging.
- 3. See section 3.02 supplements for sample "Loop Status Report" and "Functional Acceptance Test Sheet".

## C. Installation and Connection:

- 1. The Contractor shall install and connect all field-mounted components and assemblies under the criteria imposed in Part 1, 1.03, herein. The installation personnel shall be provided with a final reviewed copy of the Shop Drawings and data.
- 2. The instrument process sensing lines and air signal tubing shall, in general, be installed in a similar manner to the installation of conduit specified under Division 16. Individual tubes shall be run parallel and near the surfaces from which they are supported.
- 3. Supports shall be used at intervals of not more than 3 feet of rigid tubing.
- 4. Bends shall be formed with the proper tool and to uniform radii and shall be made without deforming or thinning the walls of the tubing. Plastic clips shall be used to hold individual plastic tubes parallel. Ends of tubing shall be square cut and cleaned before being inserted in the fittings. Bulkhead fittings shall be provided at all panels.
- 5. The Contractor shall have a technical field representative of the I&C supplier to instruct these installation personnel on any and all installation requirements; thereafter, the technical field representative shall be readily available by telephone to answer questions and supply clarification when needed by the installation personnel.
- 6. Where primary elements (supplied by I&C supplier) shall be part of a mechanical system, the I&C supplier shall coordinate the installation of the primary elements with the mechanical system manufacturer.
- 7. Finally, after all installation and connection work has been completed, the

technical field representative shall check it all for correctness, verifying polarity of electric power and signal connections, making sure all process connections are free of leaks, and all such similar details. If the initial inspection finds no deficiencies, the technical field representative shall proceed to the certification to the Contractor. Any completed work that is found to have deficiencies shall have those deficiencies corrected by installation personnel at no additional cost to the Owner. The technical field representative shall then recheck the work after the identified deficiencies are corrected. If the technical field representative finds deficiencies in the follow-up inspection, then remedial action shall be taken by the Contractor at no cost to the Owner. This pattern shall be repeated until the installation is free from defect. The technical field representative shall then certify in writing to the Contractor that for each loop or system that he has inspected is complete and without discrepancies.

8. The field representative of the Single I&C supplier shall coordinate all work required to interface the new equipment and control devices with the existing equipment, including all required modifications to existing equipment and related devices.

### D. Calibration

- All instruments and systems shall be calibrated after installation, in conformance with the component manufacturer's written instructions. This shall provide that those components having adjustable features are set carefully for the specific conditions and applications of this installation, and that the components and/or systems are within the specified limits of accuracy. Defective elements that cannot achieve proper calibration or accuracy, either individually or within a system, shall be replaced. This calibration work shall be accomplished by the technical field representatives of the I&C system supplier who shall certify in writing to the Contractor that for each loop or system all calibrations have been made and that all instruments are ready to operate. See section 3.02 supplements for sample "Instrumentation Calibration Sheet".
- 2. Proof of Conformance The burden of proof of conformance to specified accuracy and performance is on the Contractor using its designated Single I&C supplier. The Contractor's designer shall supply necessary test equipment and technical personnel if called upon to prove accuracy and/or performance, at no separate additional cost to the Owner, wherever reasonable doubt or evidence of malfunction or poor performance may appear within the guarantee period.

# E. Pre-Commissioning:

1. The I&C Supplier shall test each loop (discrete and analog) to determine if it is functioning correctly. The I&C Supplier shall furnish a loop sheet for each loop to be tested. The loop sheet shall represent the actual "as-built" condition of the loop. The I&C Supplier shall perform a field functional loop test which shall be witnessed by the Engineer and Owner. If the loop fails

City of Pembroke Pines Effluent Pump Station Electrical Rehabilitation **Instrumentation and Controls** 

the functional test, the I&C Supplier shall coordinate repairs for the Contractor to correct whatever is wrong with the loop. The I&C Supplier shall retest the loop until it is approved.

2. Each loop shall be tested and approved by Engineer and Owner until all loops have been approved.

# F. Start-up and Instruction

When all systems are assessed by the Contractor to have been successfully carried through complete operational tests with a minimum of simulation, and the Engineer concurs in this assessment, plant start-up by the Owner's operating personnel can follow. When the owner has accepted the system, instruction shall be given by qualified persons who have been made familiar in advance with the systems in accordance with item 3.01.I. All equipment shall be checked during the first year of operation at intervals of three months for a period of not less than one day or as may be required to correct any defects to the satisfaction of the Owner.

# G. Modifications to Existing Facilities

 The Contractor shall make all modifications to existing equipment and control devices that are required to successfully install and integrate all new instrumentation equipment. All costs for any required modification and rehabilitation effort shall be included in the Contractor's original bid amount and no additional payment shall be allowed.

### H. Plant Shutdowns

1. The Single I&C supplier shall carefully examine all work to be performed relative to existing I&C equipment and the installation of new equipment and control devices. Work shall be scheduled to minimize required plant shutdown times.

## Training

- 1. The cost of training programs to be conducted with City's personnel shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the systems being supplied.
- 2. The supplier shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.
- The supplier shall make use of teaching aids, manuals, slide/video presentations, etc. as necessary to provide a complete and valuable training experience. After the training services, such materials shall be delivered to City.
- 4. The training program shall represent a comprehensive program covering all

- aspects of the operation, maintenance, calibration and cleaning procedures for the system.
- 5. All training schedules shall be coordinated with, and at the convenience of the City. Shift training may be required to correspond to the City's working schedule.
- 6. Training shall be performed by qualified representatives of the Instrumentation Control and Monitoring System Integrator. Training shall be specifically tailored to this project and reflect the control system installation and configuration. All training shall be conducted at the job site, unless an alternate location is approved by the City. Training shall be for a minimum of 1 full days and may require multiple classes to accommodate different shifts of operations personnel. Submit training materials and resumes of the training personnel to the City a minimum of two weeks prior to the training session(s) for City approval.

## 2.13 SUPPLEMENTS

- A. Supplements listed below; following "END OF SECTION" is part of this Specification.
  - 1. Instrumentation Calibration Sheet
  - 2. Loop Status Report

**END OF SECTION** 

ı	$\cap \cap P$	$\sim$ $\sim$	 $\sim$	-	$\sim$ D $\pm$

PROJECT NAME:	
PROJECT NO.:	

		FUNC	TIONAL REQUIREM		31 NO.:	
			COMPONENT	STATUS		
TAG NO.	DELIVERE D*	TAG/IDENTIFI - CATION CHECK*	INSTALLATION CHECK	TERMINAT ION WIRING*	TERMINAT ION TUBING*	CALIBRATED*
REMARKS				LOOP READ	) Y FOR STAR	T-UP
				BY		
				DATE		

<sup>\*</sup> INITIAL AND DATE WHEN COMPLETE

COMPONENT				MANUFACTURER: PROJECT											
CODE: NAME:				MODEL: NUMBER: NAME:											
	RANGE	VALUE	E UNIT	S	COMP	JTE			CONTROL						
INDIATE/ CHART			FUNCTIO	NS				ON (DIRECTES (P/I/D)	RECT/REVERSE) //D)						
RECORD SCALE							SWITCH UNIT RANGE (VALUE/UNITS)								
TRANS/ INPUT							DIFFEI RESET	RENTIAL (FI (AUTOMA)	IXED/ADJUSTABLE) TIC/MANUAL)						
CONVERT OUTPUT															
				ANALOG						DIS	DISCRETE				
	RI	EQUIRED		AS CAL	IBRATED			REC	QUIRED		AS CAL	IBRATED	RE MA RKS		
	IN	SCALE	OUT	SCAL E	OUT	SCALE	OUT	NUMBER	TRIP PT	RESET PT	TRIP PT	RESET PT	CO DE		
	C. MODE	SETTINGS: F	)		I		D								
											ATED AND FOR START	O AND			

### **SECTION 16010**

#### BASIC ELECTRICAL REQUIREMENTS

### PART 1 - GENERAL

### 1.01 RELATED SECTIONS

A. Requirements specified within this section apply to all sections in Division 16, ELECTRICAL. Work specified herein shall be performed as if specified in the individual sections.

## 1.02 ELECTRICAL SUBCONTRACTOR QUALIFICATIONS

- A. The electrical subcontractor shall meet or exceed the criteria described below:
  - The electrical subcontractor shall be licensed in the State of Florida.
  - 2. The electrical subcontractor shall have successfully completed electrical construction on three water or wastewater treatment plant related projects within the past six years that shall include installations of medium voltage pad mounted transformers, medium voltage conductors, medium voltage conductor terminations, low voltage switchboards and variable frequency drives.
  - 3. The electrical subcontractor shall have, in their employ, the following full-time employees that will be assigned to perform the electrical work of this contract:
    - a) A minimum of (1) Licensed Master Electrician who is overall responsible for the supervision of personnel performing the construction, installation startup and testing of all electrical related facilities and systems.
    - b) A minimum of (1) Licensed Journeyman Electrician responsible for the daily construction activities and guidance of the electrical contractor's on-site employees. The Licensed Journeyman's primary assignment will be the construction of the electrical facilities of this project until project completion.
  - 4. The electrical subcontractor shall not be involved in any current or pending litigation which may have a material negative impact on the ability to complete the project. The electrical subcontractor shall provide a statement advising all current or pending litigations.

### 1.03 DESIGN REQUIREMENTS

- A. All electronic boards as part of electrical equipment shall meet the atmospheric conditions of the space the equipment is installed in. All electronic boards which are not installed in a conditioned environment shall be fungus-resistant.
- B. All electrical equipment shall be rated for the conditions the equipment is installed in.
- 1.04 STANDARDS, CODES, PERMITS, AND REGULATIONS

- A. Perform all work; furnish and install all materials and equipment in full accordance with the latest applicable rules, regulations, requirements, and specifications of the following:
  - Local Laws and Ordinances.
  - State and Federal Laws.
  - National Electrical Code (NEC).
  - 4. State Fire Marshal.
  - 5. Underwriters' Laboratories (UL).
  - 6. National Electrical Safety Code (NESC).
  - 7. American National Standards Institute (ANSI).
  - 8. National Electrical Manufacturer's Association (NEMA).
  - 9. National Electrical Contractor's Association (NECA) Standard of Installation.
  - 10. Institute of Electrical and Electronics Engineers (IEEE).
  - 11. Insulated Cable Engineers Association (ICEA).
  - 12. Occupational Safety and Health Act (OSHA).
  - 13. National Electrical Testing Association (NETA).
  - 14. American Society for Testing and Materials (ASTM).
  - 15. Florida Building Code, including Broward County amendments.
- B. Conflicts, if any, which may exist between the above items, will be resolved at the discretion of the Engineer.
- C. Wherever the requirements of the Specifications or Drawings exceed those of the above items, the requirements of the Specifications or Drawings govern. Code compliance is mandatory. Construe nothing in the Contract Documents as permitting work not in compliance with these codes.
- D. Obtain all permits and pay all fees required by any governmental agency having jurisdiction over the work. Arrange all inspections required by these agencies. On completion of the work, furnish satisfactory evidence to the Engineer that the work is acceptable to the regulatory authorities having jurisdiction.
- 1.05 ELECTRICAL COORDINATION
  - A. Work Provided Under this Contract:

- 1. Perform demolition of electrical power equipment and electrical distribution systems as described in drawings and the specifications, complete.
- 2. Provide and install the complete electrical power distribution systems described in the drawings and specifications, complete in place.
- 3. Provide and install all electrical equipment as described in the drawings and the specifications including medium voltage transformers, medium voltage conductors, switchboards, panelboards, low voltage conductors, disconnect switches, raceway, variable frequency drives (VFDs), surge protective devices, etc. complete in place.
- 4. Provide and install new lighting and convenience power systems as described in the drawings and the specifications, complete in place.
- 5. Provide and install all new underground conduit duct banks and wiring described in drawings and the specifications, complete in place.
- 6. Provide and install new expansion coupling for each exposed conduit between Effluent Pump Station Electrical Building and Effluent Pump Building as required by NEC codes, indicated or not on drawings.
- 7. Provide all miscellaneous electrical including switches, terminations, fittings, wiring, conduit, junction boxes, etc. not expressly described or specified in the drawings and specifications but obviously necessary, for a complete working system in place.
- 8. Provide and install new grounding systems as described in the drawings and Specification 16450, complete in place.
- 9. Preform an Electrical Systems Analysis per Specification 16015.
- 10. Provide all modifications to the existing PLC-5 as described in drawings, for a complete working system in place. Refer to specification 13300 for additional requirements.
- 11. The Contractor shall provide a detailed proposed sequence of construction as a submittal and get approval in writing, by the Owner and Engineer. Proposed sequence of construction shall also include duration of each shutdown, temporary equipment locations, and duration of each phase, if any. Incorporate all comments by Engineer and Owner into the sequence of construction until the proposed sequence of construction is approved. Where temporary power is required, the Contractor shall provide and install all necessary temporary power distribution equipment, generators, noise abatement systems through critical silencers, wires, raceway supports, etc. for a complete and working temporary power system in place. All cost associated with temporary power system shall be included in the bid price. See construction constraints and suggested construction sequence.
- B. Temporary Power:

- 1. Provide temporary power for all office trailers and for all construction areas. Coordinate with local power and telephone utility for temporary construction power and telephone service during construction.
- 2. Provide temporary power systems as described in the drawings and specifications to facilitate operations during construction. Temporary power systems shall include but not be limited to all temporary generators, cables/conductors, fuel, maintenance and temporary barricades. Provide the following generator sizes as part of the temporary power systems at each identified location during construction:
  - a. Panel PDP at East Transfer Pump Station 100KW, 480V, 3 phase
  - b. Panel MDP-1 and MDP-2 at East Blower Room 400KW, 480V, 3 phase
  - c. MCC-2 at Old Control Building 20KW, 480V, 3 phase
  - d. MCC-5 at Sludge Building 30KW, 480V, 3 phase
  - e. MCC-7 at Headworks Building 30KW, 480V, 3 phase
  - f. Panel H at Control Building 250KW, 480V, 3 phase
  - g. Panel MDP-1 and MDP-2 at West Blower Room 600KW, 480V, 3 phase
  - h. Panel PP1 at West Main Electrical Building 30KW, 277/480V, 3 phase
  - i. Panel LP1 at West Main Electrical Building 30KW, 120/208V, 3 phase
  - j. Panel PP1 at West Transfer Pump Station 150KW, 480V, 3 phase

### C. Construction Constraints:

- 2. All shutdowns, including durations, shall be coordinated with the City a minimum of two week prior to any construction related activity. Contractor shall complete as much construction related activities as possible prior to any shutdowns to limit their durations to the greatest extent possible.
- 3. Shutdowns of West Main Switchboard and East Main Switchboard shall be approved by the City and be done during the Plant's normal working hours for a maximum duration of eight (8) hours or otherwise dictated by Plant Staff. Temporary power systems as described in 1.05(B) shall be provided during shutdowns to maintain the operation of the Plant.
- 4. Lighting systems, programmable logic controllers (PLCs) and instruments shall remain in operation at all times.
- 5. Effluent Pumps:
  - a. Only one Effluent Pump, may be taken out of operation at any one time.
- 6. Site:
- a. Contractor shall maintain access for plant personnel and vehicular traffic throughout Plant.

- b. When trenching for conduit installation, the Contractor shall be limited to a maximum of 500ft area at any one time that shall be restored and inspected by the Engineer and City before being allowed to proceed to the next work area.
- c. The Contractor shall hand-dig all new underground routes to verify all existing utility crossings prior to utilizing mechanical digging equipment and shall be responsible for any damage to existing utilities.

# D. Suggested Construction Sequence:

- 1. To facilitate the installation of the new electrical power distribution equipment in the Effluent Pump Station Electrical Building, the medium voltage power distribution conduit ductbank and medium voltage transformers from the existing West Main Electrical Building to the Effluent Pump Station Electrical Building is to be constructed first:
  - a. Install the new medium voltage conduit ductbank, new medium voltage conductors and two medium voltage pad mount transformers.
  - b. Install new low voltage conductors between new medium voltage pad mounted transformer and existing West Main Electrical Building Switchboard via new conduit ductbank and cable tray.
  - c. Modify existing West Main Electrical Building Switchboard for addition of new fused switch. Provide all temporary power systems as required per 1.05(C).
- 2. Effluent Pump Station Electrical Building: This work assumes new medium voltage transformers are installed and operational.
  - a. Install new VFDs No. 5 and 6 in temporary locations within Effluent Pump Station Electrical Building and install temporary conduit and conductor systems between new VFDs and existing switchboard/PLC. Install new pump No. 6 disconnect switch and pump No. 5 and 6 conduit and conductor systems between temporary VFD and pump.
  - b. After new VFDs No.5 and 6 are operational, demolish the existing VFDs No. 5 and 6, existing pump No. 6 disconnect switch and existing No. 6 conduit and conductor systems between Effluent Pump Station Electrical Building and pump.
  - c. Install new Switchboard EPS and new conductor systems between new switchboard and new pad mounted transformer MV-T-2.
  - d. After new Switchboard EPS has been energized and is operational, install temporary conduit and power conductor systems to new VFDs No. 5 and 6 in temporary locations.

- e. After new VFDs No.5 and 6 have been energized and are operational, demolish existing effluent pump No. 4 VFD, isolation transformer, pump disconnect switch and conduit and conductor systems between existing Switchboard EPS and pump. Install new pump No. 4 VFD, pump disconnect switch and conduit and conductor systems between new Switchboard EPS and pump.
- f. After effluent pump No.4 has been energized and is operational, demolish existing effluent pump No. 3 VFD, isolation transformer, pump disconnect switch and conduit and conductor systems between existing Switchboard EPS and pump. Install new pump No. 3 VFD, pump disconnect switch and conduit and conductor systems between new Switchboard EPS and pump.
- g. After effluent pump No.3 has been energized and is operational, demolish existing effluent pump No. 2 VFD, isolation transformer, pump disconnect switch and conduit and conductor systems between existing Switchboard EPS and pump. Install new pump No. 2 VFD, pump disconnect switch and conduit and conductor systems between new Switchboard EPS and pump.
- h. After effluent pump No.2 has been energized and is operational, demolish existing effluent pump No. 1 VFD, isolation transformer, pump disconnect switch and conduit and conductor systems between existing Switchboard EPS and pump. Install new pump No. 1 VFD, pump disconnect switch and conduit and conductor systems between new Switchboard EPS and pump.
- i. Install new Panel E2, and conduit and conductor systems between new Switchboard EPS and Panel E2. Install new conduit and conductor systems between new Panel E2 and existing transformer TR-E. Transition existing Panel E2 loads to new Panel E2. After all new and existing loads have been transitioned to the new Panel E2, demolish the existing Panel E2.
- j. After all existing loads have been removed/transitioned to the new Switchboard EPS, demolish the existing Switchboard EPS.
- k. After existing Switchboard EPS has been demolished, relocate the effluent pump No. 5 VFD and demolish the existing pump disconnect switch and conduit and conductor systems between Effluent Pump Station Electrical Building and pump. Install new pump No. 5 VFD, pump disconnect switch and conduit and conductor systems between new Switchboard EPS and pump.
- I. After effluent pump No.5 has been energized and is operational, relocate the effluent pump No. 6 VFD. Install new pump No. 6 VFD and conduit and conductor systems between new Switchboard EPS and pump.
- d. Install new low voltage conductors between new Switchboard EPS and existing East Main Electrical Building Switchboard via

new/existing conduit ductbank and new cable tray. Provide all temporary power systems as required per 1.05(C).

### 1.06 SUBMITTALS

- A. Electrical equipment submittals shall be made by specification section. Submit one package per specification section and do not group multiple specification sections under one submittal package.
- B. Quality Control Submittals:
  - Voltage Field Test Results.
  - 2. Voltage Balance Report.
  - 3. Equipment Line Current Report.
  - 4. Factory test certification and reports for all major electrical equipment.
  - Site test certification and reports as specified in other Division 16, ELECTRICAL sections.
  - 6. Provide a conduit plan for power, instrumentation and control conduits, both interior and exterior, showing routing, size and stub up locations for buried or in slab conduits, including on exterior process facilities.
  - 7. As part of the electrical submittal, the contractor shall provide a minimum of ½"=1'-0" scaled layout of the electrical equipment in each electrical room, or major electrical equipment in a mechanical room, showing sizes of all equipment and their spatial relationships to other equipment in the space. Non-electrical equipment shall be approved before finalizing the electrical layout in mechanical rooms. Layout shall demonstrate compliance with code requirements for working space about equipment. Layout shall depict actual sizes of existing equipment facilities as well as actual dimensions of equipment to be furnished by the contractor.
- B. With each equipment submittal, the following information shall be provided for all electrical equipment:
  - 1. A copy of each specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check-marks ( $\sqrt$ ) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation.

## 1.07 ENVIRONMENTAL CONDITIONS

- A. All chemical rooms and areas shall be designated as corrosive.
- B. All indoor chemical and process equipment areas shall be considered wet locations.
- C. Electrical equipment in rooms or areas designated as Classified by NFPA 70 (national electrical code) as Division 1 or Division 2 shall meet all requirements set forth for that classification as described in NEC article 500.

# 1.08 INSPECTION OF THE SITE AND EXISTING CONDITIONS

- A. The Electrical Drawings were developed from past record drawings and information supplied by the Owner. Verify all scaled dimensions prior to submitting bids.
- B. Before submitting a bid, visit the site and determine conditions at the site and at all existing structures in order to become familiar with all existing conditions and electrical system which will, in any way or manner, affect the work required under this Contract. No subsequent increase in Contract cost will be allowed for additional work required because of the Contractor's failure to fulfill this requirement.
- C. Submit a request for shut down to the Owner for 5 working days in advance and for review and approval. Carry out any work involving the shutdown of the existing services to any piece of equipment now functioning in existing areas at such time as to provide the least amount of inconvenience to the Owner. Do such work when directed by the Engineer.
- D. After award of Contract, locate all existing underground utilities at each area of construction activity. Protect all existing underground utilities during construction. Pay for all required repairs without increase in Contract cost, should damage to underground utilities occur during construction.

### 1.09 RESPONSIBILITY

- A. The Contractor shall be responsible for:
  - Complete systems in accordance with the intent of these Contract Documents.
  - 2. Coordinating the details of facility equipment and construction for all Specification Divisions which affect the work covered under Division 16, ELECTRICAL.
  - 3. Furnishing and installing all incidental items not actually shown or specified, but which are required by good practice to provide complete functional systems.

### 1.10 INTENT OF DRAWINGS

- A. Electrical plan Drawings show only general location of equipment, devices, and raceway, unless specifically dimensioned. The Contractor shall be responsible for the proper routing of raceway, subject to the approval of the Engineer.
- B. All electrical equipment sizes and characteristics have been based on manufacturer EATON. If the Contractor chooses to and is allowed to substitute, the Contractor shall be

responsible for fitting all the equipment in the available space as shown on the Drawings.

## PART 2 - PRODUCTS

## 2.01 GENERAL

A. Provide materials and equipment listed by UL wherever standards have been established by that agency.

## B. Equipment Finish:

- 1. Provide manufacturers' standard finish and color, except where specific color is indicated.
- 2. If manufacturer has no standard color, provide equipment with ANSI No. 61, light gray color.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Electrical Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. Install work in accordance with NECA Standard of Installation, unless otherwise specified.

## 3.02 LOAD BALANCE

- A. Drawings and Specifications indicate circuiting to electrical loads and distribution equipment.
- B. Balance electrical load between phases as nearly as possible on switchboards, panel boards, motor control centers, and other equipment where balancing is required.
- C. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

#### 3.03 CHECKOUT AND STARTUP

# A. Voltage Field Test:

- 1. Check voltage at point of termination of power company supply system to project when installation is essentially complete and is in operation.
- 2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.

a. Submit Voltage Field Test Report within 5 days of test.

## B. Equipment Line Current Tests:

- 1. Check line current in each phase for each piece of equipment.
- 2. Make line current check after equipment start up and is in service.
- 3. If any phase current for any piece of equipment is above rated nameplate current, prepare Equipment Line Phase Current Report that identifies cause of problem and corrective action taken.

# C. Startup:

1. Demonstrate satisfactory operation of all 480V electrical equipment. Participate with other trades in all startup activities.

## 3.04 RUBBER MATS

A. A three foot wide rubber mat shall be furnished and installed on the floor and in front of each switchboard, MCC, VFD and control panel assembly. The mat shall be long enough to cover the full length of each line-up. The mat shall be 1/4 inch thick with beveled edges, canvas back, solid type with corrugations running the entire length of the mat. The mat shall be guaranteed extra quality, free from cracks, blow holes, or other defects detrimental to their mechanical or electrical strength. The mat shall meet OSHA requirements and the requirements of ANSI/ASTM D-178 J6-7 for Type 2, Class 2 insulating matting.

- END OF SECTION -

### SECTION 16015

### **ELECTRICAL SYSTEMS ANALYSIS**

## PART 1 - GENERAL

### 1.01 SCOPE OF WORK

- A. The requirements of this specification shall apply to the modified and new electrical distribution system installed under this project. The end result shall be a fully protected, and properly coordinated, system with proper arc flash safety labels and personal protective equipment recommendations.
- B. Contractor shall furnish short-circuit and protective device coordination studies as described herein. The study results shall be presented in a draft study that shall be submitted for review prior to submittal of power distribution equipment for this project. The final study document shall be submitted after start up and shall include all adjustments made during start-up.
- C. The contractor shall furnish an Arc Flash Hazard Analysis Study with Arc Flash Labels per NFPA 70E Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D. Arc Flash labels shall be provided for all switchboards, VFDs and panelboards installed, modified or repowered under this project as shown on plans. Affix arc flash label on new and modified electrical equipment before start-up during construction.
- D. Labels shall be constructed on UV resistance, wet rated and be suitable for the environment for which the label will reside in.

### 1.02 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
  - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. IEEE 141 Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
    - b. IEEE 241 Recommended Practice for Electric Power Systems in Commercial Buildings
    - c. IEEE 242: Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
    - d. IEEE 399: Recommended Practice for Industrial and Commercial Power System Analysis.
    - e. IEEE 1015 Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems

- f. IEEE 1584-2018: Guide for Performing Arc Flash Hazard Calculations.
- 2. American National Standards Institute (ANSI):
  - a. C57.12.00, Standard General Requirements for Liquid-immersed Distribution, Power, and Regulating Transformers.
  - b. ANSI C37.13 Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
  - c. ANSI C37.010 Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
  - d. ANSI C 37.41 Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories
  - e. ANSI C37.5 Methods for Determining the RMS Value of a Sinusoidal Current Wave and Normal-Frequency Recovery Voltage, and for Simplified Calculation of Fault Currents
- 3. National Fire Protection Association:
  - a. NFPA 70E: Electrical Safety In The Workplace, Chapter 1.
  - b. NFPA 70: National Electrical Code.
- 4. Occupational Safety & Health Administration (OSHA):
  - a. 29-CFR, Part 1910, sub part S.

### 1.03 SUBMITTALS

A. Shop drawings: the results of the short circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a preliminary and final summary report. Submit an electronic copy of the complete preliminary and final study reports. The preliminary short circuit and device coordination study report shall be submitted within 30 days of notice to proceed and shall be a basis for approval of all other electrical equipment in the power distribution system. The contractor is expected to review the results of the preliminary short circuit and device coordination study report against all other applicable shop drawings, including industrial control panels, prior to shop drawing submittal to coordinate appropriate fault duty ratings of all electrical equipment. The final short circuit and device coordination study report shall incorporate all comments from shop drawing submittals, all adjustments made during start-up and include the arc-flash hazard analysis. The contractor shall ensure proper arc-flash warning labels are applied to all appropriate electrical equipment installed under this contract when the final study has been approved. The new arc-flash warning labels shall be similar format to the existing label as much as possible. Provide two electronic copies in CD, or DVD, media in additional to the hard copies in the final report. Provide in CD, or DVD, copies of the native study files used to perform the study analysis, including all applicable databases, one line diagrams, TCC curves and results files.

# 1.04 QUALITY ASSURANCE

- A. Short circuit, protective device coordination, and arc flash studies shall be prepared by the manufacturer furnishing the electrical power distribution equipment or a professional electrical engineer registered in the State of Florida, hired by the manufacturer, in accordance with IEEE 242 and IEEE 399.
- B. Manufacturer shall have unit responsibility for the equipment and protective device coordination.

### 1.05 SEQUENCING AND SCHEDULING

- A. An initial, complete short circuit and arc flash study must be submitted and reviewed before Engineer will approve Shop Drawings for distribution panelboards, breakers, MCC'S, switchboard, VFD'S, SSRVS'S, manufactured industrial control panels and circuit breaker panelboard equipment. Failure to do so will delay the approval of major equipment submittals.
- B. The short circuit, protective device coordination and arc flash studies shall be updated prior to Project Substantial Completion. Utilize characteristics of as-installed equipment actual wire run lengths and materials.

## PART 2 - PRODUCTS

#### 2.01 GENERAL

- A. Contractor shall furnish all field data as required for the power system studies. The Engineer performing the short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to eliminate unnecessary delays and assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.
- B. Source combination may include present and future utility supplies, motors, and generators.
- C. Load data utilized may include existing and proposed loads obtained from Contract Documents provided by Owner or Contractor.
- D. Equipment and component titles used in the studies shall be identical to the equipment and component titles shown on the Drawings.
- E. Perform studies using digital computer with a software package such as SKM Power\*Tools for Windows™ DAPPER™, CAPTOR™ and ARC FLASH™, or approved equal.
- F. Perform complete fault calculations for all busses on utility and generator power sources. Perform load flow and voltage drop studies for major feeders and loads with long feeder

runs. Analysis shall include expected fault currents at industrial control panels manufactured in accordance with UL 508A and NEC article 409.

- G. Fault source combinations shall include large motors, large transformers, utility and generator.
- H. Utilize proposed and existing load data for the study obtained from Contract Documents and field survey. Coordinate with local power utility for available fault currents from utility services.
- I. Existing Equipment:
  - 1. Include fault contribution of existing motors, services, generators and equipment, as appropriate, in the study.
  - 2. Obtain required existing equipment data from the field and FPL.
- J. Provide a comprehensive report document containing the short circuit, device coordination and arc flash studies. As a minimum the report structure shall contain the following:
  - 1. Executive Summary.
  - 2. Methodology.
  - 3. One Line Diagram(s).
  - 4. Short Circuit Analysis.
  - 5. Short Circuit Analysis Results/Conclusions/Recommendations.
  - 6. Device Coordination Analysis.
  - 7. Recommended protective devices settings.
  - 8. Arc Flash Analysis.
  - 9. Arc Flash PPE recommendations.

# 2.02 SHORT CIRCUIT STUDY

### A. General:

- 1. Use cable impedances based on copper conductors. Use actual conductor impedances if know. If unknown, use typical conductor impedances based on IEEE Standards 141, latest edition.
- 2. Use bus impedances based on copper bus bars.
- 3. Use cable and bus resistances calculated at 25 degrees C.

- 4. Use 600-volt cable reactances based on use of typical data of conductors to be used in this project.
- 5. Use transformer impedances 92.5 percent of "nominal" impedance based on tolerances specified in ANSI C57.12.00.

### B. Provide:

- 1. Calculation methods and assumptions.
- 2. Selected base per unit quantities.
- 3. One-line diagrams annotated with results of short circuit analysis including:
  - a. Three phase, line-to-line and single line to ground faults.
  - b. Equipment Short Circuit Rating.
- 4. Source impedance data, including electric utility system and motor fault contribution characteristics.
- 5. DAPPER™ Short circuit report, demand load report, load flow report and input data reports.
- 6. Results, conclusions, and recommendations.
- C. Calculate short circuit interrupting and momentary (when applicable) duties for an assumed symmetrical three-phase bolted fault, bolted line-to-ground fault, and bolted line-to-line fault at each:
  - 1. Electric utility's supply termination point.
  - 2. Main breakers, generator breakers and feeder breakers.
  - 3. Low voltage switchgear, switchboard and/or distribution panelboard.
  - 4. Unit substations.
  - 5. Motor control centers.
  - 6. Standby generator.
  - 7. Automatic Transfer Switch (if applicable).
  - 8. All branch circuit panelboards.
  - 9. Variable Frequency Drives and Solid State Reduced Voltage Starters.
  - Industrial control panels manufactured in accordance with UL 508A and NEC article 409.

- 11. Other significant locations throughout the system.
- 12. Future load contributions as shown on one-line diagram.

## D. Protective Device Evaluation:

- 1. Evaluate equipment and protective devices and compare to short circuit ratings Verify all equipment, main breakers, ATS, and protective devices are applied within their ratings.
- 2. Adequacy of switchgear, switchboards, motor control centers, unit substations and panelboard bus bar bracing to withstand short-circuit stresses
- 3. Adequacy of transformer windings to withstand short-circuit stresses
- 4. Cable and busway sizes for ability to withstand short-circuit heating besides normal load currents.
- 5. Notify Owner in writing, of existing, circuit protective devices improperly rated for the calculated available fault current
- E. Through the General Contractor, furnish expected fault currents for industrial control panels, constructed and installed under other divisions and specifications of this contract, to the panel builder for his coordination with meeting the requirements of UL 508A and NEC article 409.

### 2.03 PROTECTIVE DEVICE COORDINATION STUDY

- A. Proposed protective device coordination time-current curves for distribution system, graphically displayed on log-log scale paper. Time Current Curve plots from SKM CAPTOR™ program are acceptable.
- B. Each curve sheet to have title and one-line diagram with legend identifying the specific portion of system associated with time-current curves on that sheet.
- C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.
- D. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- E. Perform device coordination on time-current curves for low voltage distribution system(s).
- F. Provide Individual protective device time-current characteristics on log-log paper or software generated graphs.
- G. Plot Characteristics on Curve Sheets:
  - 1. Electric utility's relays or protective device (if applicable).

- 2. Electric utility's fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands (if applicable).
- 3. Medium voltage equipment relays (if applicable).
- 4. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
- Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands.
- 6. Transformer full-load current, magnetizing inrush current, and ANSI transformer withstand parameters.
- 7. Transformer damage curves.
- 8. Conductor damage curves.
- 9. ANSI transformer with stand parameters.
- 10. Significant symmetrical and asymmetrical fault currents.
- 11. Ground fault protective devices and settings (if applicable).
- 12. Pertinent motor starting characteristics and motor damage points.
- 13. Pertinent generator short circuit decrement curve and generator damage point.
- 14. Circuit breaker panelboard main breakers, where appropriate.
- 15. Motor circuit protectors for major motors
- H. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.
- I. Primary Protective Device Settings for Delta-Wye Connected Transformer:
  - 1. Secondary Line-to-Ground Fault Protection: Primary protective device operating band within the transformer's characteristics curve, including a point equal to 58 percent of ANSI C57.12.00 withstand point.
  - 2. Secondary Line-To-Line Faults: 16 percent current margin between primary protective device and associated secondary device characteristic curves.
- J. Separate medium voltage relay characteristics curves from curves for other devices by at least 0.4-second time margin.

# 2.04 ARC FLASH ANALYSIS

A. Perform incident energy calculations in accordance with IEEE 1584-2018 Guide for Performing Arc Flash Hazard Calculations for all equipment analyzed in the short circuit

- study. Tabular results and recommended labels from SKM ARC FLASH $^{\text{TM}}$  are acceptable.
- B. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model.
- C. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, bussway and unit substations, variable frequency drives, and industrial control panels) where work could be performed on energized parts.
- D. The Arc-Flash Hazard Analysis shall include all medium voltage and low voltage locations in 480 volt, 240 volt and 208 volt systems. Arc-Flash Hazard Analysis on low voltage systems 120V and below is not required.
- E. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering incident energy value of 1.2 cal/cm2.
- F. The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume a minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
- G. Arc flash computation shall include both line and load side of main breaker calculations, where necessary.
- H. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2018 section B.1.2.
- I. Furnish recommendations for Personal Protective Equipment, in accordance with OSHA standards, and proper labels to be located on the electrical equipment in accordance with NEC Article 110.16.
- J. Use manufacturer data for: enclosure type; gap between exposed conductors or buss way; grounding type; number of phases and connection; and working distance.

## 2.05 TABULATIONS

### A. Input Data:

- 1. Utility three-phase and line-to-ground available contribution with associated X/R ratios.
- 2. Short circuit reactances of rotating machines and associated X/R ratios.
- 3. Cable type, construction, size, quantity per phase, length, impedance and conduit type.
- 4. Bus data, including impedance.

5. Transformer primary & secondary voltages, winding configurations, kVA rating, impedance, and X/R ratio.

### B. Short Circuit Data:

- 1. Source fault impedance and generator contributions.
- 2. X to R ratios.
- 3. Asymmetry factors.
- 4. Motor contributions.
- 5. Short circuit kVA.
- 6. Symmetrical and asymmetrical fault currents.

# C. Recommended Protective Device Settings:

- 1. Phase and ground relays:
  - a. Relay name.
  - b. Device number.
  - c. Description.
  - d. TCC catalog number.
  - e. Short circuit ratings.
  - f. Current transformer ratio.
  - g. Current tap.
  - h. Time dial setting (as applicable).
  - i. Instantaneous pickup setting (as applicable).
  - j. Ground fault setting (as applicable).
  - k. Specialty, non-overcurrent device settings.
  - I. Recommendations on improved relaying systems, if applicable
- 2. Circuit Breakers:
  - a. Breaker name.
  - b. Breaker Description.

- c. Model number.
- d. TCC catalog number.
- e. Short circuit rating.
- f. Frame/Sensor rating.
- g. Adjustable pickups and time delays (long time, short time, ground).
- h. Adjustable time-current characteristic.
- i. Adjustable instantaneous pickup.
- j. Recommendations on improved trip systems, if applicable
- 3. Motor Circuit Protectors (MCP):
  - a. MCP name.
  - b. MCP Description.
  - c. Model number.
  - d. TCC catalog number.
  - e. Short circuit rating.
  - f. Frame/Sensor rating.
  - g. Instantaneous settings.
- 4. Fuses:
  - a. Fuse name.
  - b. Fuse Description.
  - c. Model number.
  - d. TCC catalog number.
  - e. Short circuit rating.
  - f. Fuse rating.
- D. Incident energy and flash protection boundary calculations.
  - 1. Arcing fault magnitude

- 2. Device clearing time
- Duration of arc
- 4. Arc flash boundary
- 5. Working distance
- 6. Incident energy
- 7. Hazard Risk Category
- 8. Recommendations for arc flash energy reduction

## 2.06 STUDY ANALYSES

- A. Written Summary:
  - 1. Scope of studies performed.
  - 2. Explanation of bus and branch numbering system.
  - 3. Prevailing conditions.
  - 4. Selected equipment deficiencies.
  - 5. Results of short circuit and coordination studies.
  - 6. Comments or suggestions.
- B. Suggest changes and additions to equipment rating and/or characteristics.
- C. Notify Engineer in writing of existing circuit protective devices improperly rated for new fault conditions.

## PART 3 – EXECUTION

## 3.01 GENERAL

- A. Adjust relay and protective device settings according to values established by coordination study.
- B. Make minor modifications to equipment as required to accomplish conformance with the short circuit and protective device coordination studies.
- C. Notify Engineer in writing of any required major equipment modifications.

## **END OF SECTION**

### **SECTION 16050**

#### BASIC ELECTRICAL MATERIALS AND METHODS

## PART 1 - GENERAL

### 1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI):
    - a. C62.11, Standard for Metal-Oxide Surge Arrestors for AC Circuits.
    - b. Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
    - c. C57, Standard General Requirements for Dry Type Distribution and Power Transformers
  - 2. American Society for Testing and Materials (ASTM):
    - a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
    - b. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
    - c. A570, Standard Specification for Steel, Sheet, and Strip, Carbon, Hot-Rolled, Structural Quality.
  - 3. Federal Specifications (FS):
    - a. W-C-596, Connector, Receptacle, Electrical.
    - W-S-896E, Switches, Toggle, Flush Mounted.
  - 4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.
  - 5. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. AB 1, Molded Case Circuit Breakers and Molded Case Switches.
    - c. ICS 2, Industrial Control Devices, Controllers, and Assemblies.
    - d. KS 1, Enclosed Switches.
    - e. LA I, Surge Arrestors.
    - f. PB 1, Panelboards
    - g. ST 20, Dry-Type Transformers for General Applications.
    - h. WD I, General Requirements for Wiring Devices.
    - NEMA Standard TP-1-2002.

- 6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
- 7. Underwriters Laboratories, Inc. (UL):
  - a. 67, Standard for Panelboards.
  - b. 98, Standard for Enclosed and Dead-Front Switches.
  - c. 198C, Standard for Safety High-Interrupting-Capacity Fuses, Current-Limiting Types.
  - d. 198E, Standard for Class Q Fuses.
  - e. 486E, Standard for Equipment Wiring Terminals.
  - f. 489, Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures.
  - g. 508, Standard for Industrial Control Equipment.
  - h. 810, Standard for Capacitors.
  - i. 943, Standard for Ground-Fault Circuit Interrupters.
  - j. 1059, Standard for Terminal Blocks.
  - k. 1561, Standard for Dry-Type General-Purpose and Power Transformers.

## 1.02 SUBMITTALS

## A. Shop Drawings:

- 1. Device boxes for use in hazardous areas.
- 2. Junction and pull boxes used at, or below, grade.
- Hardware.
- 4. Terminal junction boxes.
- 5. Panelboards and circuit breaker data.
- 6. Fuses.
- 7. Contactors.
- 8. Transformers.
- 9. All other miscellaneous material part of this project.
- 10. Wire pulling compound.

## B. Quality Control Submittals:

1. Test Report: Sound test certification for dry type power transformers (0 to 600-volt, primary).

### 1.03 QUALITY ASSURANCE

- A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.
- B. Hazardous Areas: Materials and devices shall be specifically approved for hazardous areas of the class, division, and group shown and of a construction that will ensure safe performance when properly used and maintained.

## 1.04 SPARE PARTS

- A. Furnish, tag, and box for shipment and storage of the following spare parts:
  - 1. Fuses, 0 to 600 Volts: Six (3) of each type and each current rating installed.

## PART 2 – PRODUCTS

### 2.01 OUTLET AND DEVICE BOXES

- A. Cast Metal:
  - 1. Box: Cast ferrous metal.
  - 2. Cover: Gasketed, weatherproof, cast ferrous metal, with stainless steel screws.
  - 3. Hubs: Threaded.
  - 4. Lugs (Cast Mounting) Manufacturer:
    - a. Crouse-Hinds; Type FS or FD.
    - b. Appleton; Type FS or FD.

#### B. Cast Aluminum:

- 1. Material:
  - a. Box: Cast, copper-free aluminum.
  - b. Cover: Gasketed, weatherproof, cast copper-free aluminum with stainless steel screws.
- 2. Hubs: Threaded.
- 3. Lugs: Cast mounting.
- 4. Manufacturers:
  - a. Crouse-Hinds; Type FS-SA or FD-SA.
  - b. Appleton; Type FS or FD.

## C. Nonmetallic:

- 1. Box: PVC.
- 2. Cover: PVC, weatherproof, with stainless steel screws.
- 3. Manufacturer: Carlon; Type FS or FD, with Type E98 or E96 covers.

### 2.02 JUNCTION AND PULL BOXES

- A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.
- B. Large Sheet Steel Box: NEMA 250, Type 1.
  - 1. Box: Code-gauge, galvanized steel.
  - 2. Cover: Full access, screw type.
  - 3. Machine Screws: Corrosion-resistant.
- C. Large Cast Metal Box: NEMA 250, Type 4.
  - 1. Box: Cast malleable iron, hot-dip galvanize finished, with drilled and tapped conduit entrances.
  - 2. Cover: Hinged with screws.
  - 3. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
  - 4. Manufacturers, Surface Mounted Type:
    - a. Crouse-Hinds; Series W.
    - b. O.Z./Gedney; Series Y.
  - 5. Manufacturers, Recessed Type:
    - a. Crouse-Hinds; Type WJBF.
    - b. O.Z./Gedney; Series YR.
- D. Large Stainless Steel Box: NEMA 250, Type 4X.
  - 1. Box: 14-gauge, ASTM A240, Type 316 stainless steel.
  - Cover: Hinged with screws.
  - 3. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
  - 4. Manufacturers:
    - a. Hoffman Engineering Co.
    - b. Robroy Industries.
- E. Large Steel Box: NEMA 250, Type 4.

- 1. Box: 12-gauge steel, with white enamel painted interior and gray primed exterior, over phosphated surfaces, with final ANSI Z55.1, No. 61 gray enamel on exterior surfaces.
- Cover: Hinged with screws.
- 3. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
- Manufacturers:
  - a. Hoffman Engineering Co.
  - b. Robroy Industries.

# F. Large Nonmetallic Box:

- 1. NEMA 250, Type 4X.
- 2. Box: High-impact, fiberglass-reinforced polyester or engineered thermoplastic, with stability to high heat.
- 3. Cover: Hinged with screws.
- 4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
- 5. Conduit hubs and mounting lugs.
- Manufacturers:
  - a. Crouse-Hinds; Type NJB.
  - b. Carlon; Series N, C, or H.
  - c. Robroy Industries.

### G. Concrete Box:

- 1. Box: Rebar reinforced, cast concrete.
- 2. Cover: H20-44 traffic rated cast iron.
- Cover Marking: ELECTRICAL, TELEPHONE, SIGNAL, CONTROL or as shown.
- 4. Manufacturers:
  - a. Brooks Products Inc.; No. 36/36T.
  - b. Qwikset; W 17.

# 2.03 WIRING DEVICES

- A. Receptacle, Single and Duplex:
  - 1. NEMA WD 1 and FS W-C-596.

- 2. Specification grade, two-pole, three-wire grounding type with screw type wire terminals suitable for No. 10 AWG.
- 3. High strength, thermoplastic base color.
- 4. Color:
  - a. Office Areas: Ivory.
  - b. Other Areas: Brown.
- 5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
- 6. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.
- 7. Manufacturers:
  - a. Bryant.
  - b. Leviton.
  - c. Hubbell.
  - d. Pass and Seymour.
  - e. Sierra.
  - f. Arrow Hart.
- B. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.
  - 1. Color: Ivory.
  - 2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
  - 3. Size: For 2-inch by 4-inch outlet boxes.
  - 4. Standard Model: NEMA WD 1 with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
  - 5. Feed-Through Model: NEMA WD 1, with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
  - 6. Manufacturers:
    - a. Pass and Seymour.

- b. Bryant.
- c. Leviton.
- d. Hubbell.
- e. Arrow Hart.

# C. Receptacle, Special-Purpose:

- 1. Rating and number of poles as indicated or required for anticipated purpose.
- 2. Matching plug with cord-grip features for each special-purpose receptacle.

## 2.04 DEVICE PLATES

- A. General: Sectional type plates not permitted.
- B. Metal:
  - 1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.
  - 2. Finish: ASTM A167, Type 302/304, satin.
  - 3. Mounting Screw: Oval-head, finish matched to plate.

# C. Cast Metal:

- 1. Material: Malleable ferrous metal, with gaskets.
- 2. Screw: Oval-head stainless steel.

# D. Engraved:

- 1. Character Height: 3/16 inch.
- 2. Filler: Black.

## E. Weatherproof:

- 1. For Receptacles: Gasketed, cast metal or stainless steel, with individual cap over each receptacle opening.
- 2. Mounting Screw: Stainless steel.
  - a. Cap Spring: Stainless steel.
  - b. Manufacturers:

- 1) Bryant
- 2) Hubbell
- 3) Pass and Seymour
- 4) Crouse-Hinds
- 3. For Switches: Gasketed, cast metal incorporating external operator for internal switch.
  - a. Mounting Screw: Stainless steel.
  - b. Manufacturers:
    - 1) Crouse-Hinds; DS-181 or DS-185.
    - 2) Appleton; FSK-LVTS or FSK-IVS.

### 2.05 LIGHTING AND POWER DISTRIBUTION PANELBOARD

- A. NEMA PB I, NFPA 70, and UL 67, including panelboards installed in motor control equipment.
- B. Panelboards and Circuit Breakers: Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- C. Short-Circuit Current Equipment Rating: Fully rated; series connected unacceptable.
- D. Rating: If not otherwise shown in plans. Applicable to a system with available short-circuit current of 25,000 amperes rms symmetrical at 208Y/120 or 120/240 volts and 65,000 amperes rms symmetrical at 480Y/277 volts.
- E. Where ground fault interrupter circuit breakers are indicated or required by code: 5 mA trip, 10,000 amps interrupting capacity circuit breakers.
- F. Cabinet: As shown on plans.
- G. Bus Bar:
  - 1. Material: Copper, full sized throughout length.
  - Provide for mounting of future circuit breakers along full length of bus regardless
    of number of units and spaces shown. Machine, drill, and tap as required for
    current and future positions.
  - 3. Neutral: Insulated, rated 100 percent of phase bus bars with at least one terminal screw for each branch circuit.
  - 4. Ground: Copper, installed on panelboard frame, bonded to box with at least one terminal screw for each circuit.

- 5. Lugs and Connection Points:
  - a. Suitable for either copper or aluminum conductors.
  - b. Solderless main lugs for main, neutral, and ground bus bars.
  - Sub-feed or through-feed lugs as shown.
- 6. Bolt together and rigidly support bus bars and connection straps on molded insulators.

### H. Circuit Breakers:

- 1. NEMA AB 1 and UL 489.
- 2. Thermal-magnetic, quick-make, quick-break, molded case, of the indicating type showing ON/OFF and TRIPPED positions of operating handle.
- 3. Non-interchangeable, in accordance with NFPA 70.
- 4. Locking: Provisions for handle padlocking, unless otherwise shown.
- 5. Type: Bolt-on circuit breakers in all panelboards.
- 6. Multi-pole circuit breakers designed to automatically open all poles when an overload occurs on one pole.
- 7. Do not substitute single-pole circuit breakers with handle ties for multipole breakers.
- 8. Do not use tandem or dual circuit breakers in normal single-pole spaces.
- 9. Ground Fault Interrupter:
  - a. Equip with conventional thermal-magnetic trip and ground fault sensor rated to trip in 0.025 second for a 5-milliampere ground fault (UL 943, Class A sensitivity).
  - b. Sensor with same rating as circuit breaker and a push-to-test button.

#### I. SPD

1. Provide external surge protective device (SPD). Provide breaker for SPD.

## J. SURGE PROTECTIVE DEVICE (SPD)

- 1. This section describes the material and installation requirements for surge protective devices (SPD) for switchboards, panelboards, and motor control centers for the protection of all AC electrical circuits.
- 2. SPD shall be listed and component recognized in accordance with UL 1449 and UL 1283.
- 3. SPD shall be installed and warranted by and shipped from the electrical distribution equipment manufacturer's factory.

- 4. SPD shall provide surge current diversion paths for all modes of protection; L-L, L-N, L-G, N-G in WYE systems, and L-L, L-G in DELTA systems.
- 5. SPD shall be modular in design. Each module shall be fused with a surge rated fuse.
- 6. A UL approved disconnect switch shall be provided as a means of disconnect in the switchboard device only.
- 7. SPD shall meet or exceed the following criteria:
  - a. Maximum surge current capability (single pulse rated) shall be:
    - 1. Switchboards 300kA
    - 2. Panelboards 150kA
    - Motor control centers 80kA
  - b. UL 1449 Listed and Recognized Component Suppression Voltage Ratings shall not exceed the following:

<u>Voltage</u>	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>	
208Y/120	<del>400</del> √	400√	<del>400</del> √	
480Y/277	800V	800V	800V	

- 8. SPD shall have a minimum EMI/RFI filtering of -50dB at 100kHz with an insertion ration of 50:1 using MIL STD. 220A methodology.
- 9. SPD shall be provided with 1 set of NO/NC dry contacts.
- 10. SPD shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if transients destroy them during the warranty period. Warranty will be the responsibility of the electrical distribution equipment manufacturer.

## K. Manufacturers:

- 1. Eaton.
- 2. Or approved equal

## 2.06 NONFUSED DISCONNECT SWITCH, INDIVIDUAL, 0 TO 600 VOLTS

- A. NEMA KS 1.
- B. Quick-make, quick-break, motor rated, load-break, heavy-duty (HD) type with external markings clearly indicating ON/OFF positions.
- C. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- D. Enclosure: NEMA 250, Type 12, industrial use, 4X 316 stainless steel outdoors, wet locations and corrosive areas, unless otherwise shown.

- E. Interlock: Enclosure and switch to prevent opening cover with switch in the ON position and capable of being locked in the OPEN position.
- F. Auxiliary contacts where indicated in the drawings.
- G. Disconnect switches shall be furnished with a factory installed internal barrier kit that helps prevent accidental contact with live parts and provides "finger-safe" protection when the door of the enclosed switch is open.
- H. Manufacturers:
  - 1. Eaton.
  - 2. Or approved equal
- 2.07 FUSE, 0 TO 600 VOLTS
  - A. Current-limiting, with 200,000 ampere rms interrupting rating.
  - B. Provide to fit mountings specified with switches and features to reject Class H fuses.
  - C. Motor and Transformer Circuits, 0- to 600-Volt:
    - 1. Amperage: 0 to 600.
    - 2. UL 198E, Class RK-1, dual element, with time delay.
    - Manufacturers:
      - a. Bussmann; Type LPS-RK.
      - b. Littlefuse; Type LLS-RK.
  - D. Motor and Transformer Circuits, 0- to 250-Volt:
    - 1. Amperage: 0 to 600.
    - 2. UL 198E, Class RK-1, dual element, with time delay.
    - 3. Manufacturers:
      - a. Bussmann; Type LPN-RK.
      - b. Littlefuse; Type LLN-RK.
  - E. Feeder and Service Circuits, 0- to 600-Volt:
    - 1. Amperage: 0 to 600.
    - 2. UL 198E, Class RK-I, dual element, with time delay.
    - 3. Manufacturers:
      - a. Bussmann; Type LPS-RK.
      - b. Littlefuse; Type LLS-RK.

- F. Feeder and Service Circuits, O- to 250-Volt:
  - 1. Amperage: 0 to 600.
  - 2. UL 198E, Class RK-I, dual element, with time delay.
  - Manufacturers:
    - a. Bussmann; Type LPN-RK.
    - b. Littleluse; Type LLN-RK.
- G. Feeder and Service Circuits, 0- to 600-Volt:
  - 1. Amperage: 601 to 6,000.
  - 2. UL 198C, Class L, double O-rings and silver links.
  - Manufacturers:
    - a. Bussmann; Type KRP-C.
    - b. Littlefuse; Type KLPC.

## 2.08 TERMINAL JUNCTION BOX

- A. Cover: Hinged, unless otherwise shown.
- B. Terminal Blocks: Provide separate connection point for each conductor entering or leaving box.
  - 1. Spare Terminal Points: 25 percent.
- C. Interior Finish: Paint with white enamel or lacquer.
- 2.09 TERMINAL BLOCK (0 TO 600 VOLTS)
  - A. UL 486E and UL 1059.
  - B. Size components to allow insertion of necessary wire sizes.
  - C. Capable of termination of all control circuits entering or leaving equipment, panels, or boxes.
  - D. Screw clamp compression, dead front barrier type, with current bar providing direct contact with wire between the compression screw and yoke.
  - E. Yoke, current bar, and clamping screw of high strength and high conductivity metal.
  - F. Yoke shall guide all strands of wire into terminal.
  - G. Current bar shall ensure vibration-proof connection.
  - H. Terminals:

- 1. Capable of wire connections without special preparation other than stripping.
- 2. Capable of jumper installation with no loss of terminal or rail space.
- 3. Individual, rail mounted.
- I. Marking system allowing use of preprinted or field-marked tags.
- J. Manufacturers:
  - 1. Weidmuller.
  - 2. Ideal.
  - Electrovert.

### 2.10 NAMEPLATES

- A. Material: Laminated plastic.
- B. Attachment Screws: Stainless steel.
- C. Color: White, engraved to a black core.
- D. Engraving:
  - 1. Pushbuttons/Selector Switches: Name of drive controlled on one, two, or three lines, as required.
  - 2. Panelboards: Panelboard designation, service voltage, and phases.
- E. Letter Height:
  - Pushbuttons/Selector Switches: 1/8 inch.
  - 2. Panelboards: 1/4 inch.

## 2.11 SUPPORT AND FRAMING CHANNELS

- A. Material:
  - 1. ASTM A167, Type 316 stainless steel. Use 316 stainless steel rods, nuts and bolts to attach or anchor to the concrete slab or wall.
- B. Finish:
  - 1. ASTM A167, Type 316 stainless steel.
- C. Inserts: Continuous.
- D. Beam Clamps: Gray cast iron for non-corrosive areas and FRP (fiberglass) for corrosive/chemical areas.

## E. Manufacturers:

- 1. B-Line.
- Unistrut.
- Or approved equal.

## PART 3 - EXECUTION

### 3.01 GENERAL

A. Install equipment in accordance with NECA 5055.

### 3.02 OUTLET AND DEVICE BOXES

A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.

### B. Size:

- 1. Depth: Minimum 2 inches, unless otherwise required by structural conditions. Box extensions not permitted.
  - a. Hollow Masonry Construction: Install with sufficient depth such that conduit knockouts or hubs are in masonry void space.
- 2. Ceiling Outlet: Minimum 4-inch octagonal sheet steel device box, unless otherwise required for installed fixture.
- 3. Switch and Receptacle: Minimum 2-inch by 4-inch sheet steel device box.

#### C. Locations:

- 1. Drawing locations are approximate.
- 2. To avoid interference with mechanical equipment or structural features, relocate outlets as directed by ENGINEER.
- 3. Light Switch: Install on lock side of doors.
- 4. Light Fixture: Install in symmetrical pattern according to room layout unless otherwise shown.

## D. Mounting Height:

- General:
  - Measured to centerline of box.

- b. Where specified heights do not suit building construction or finish, mount as directed by ENGINEER.
- 2. Light Switch: 48 inches above floor.
- 3. Thermostat: 54 inches above floor.
- 4. Convenience Receptacle:
  - a. General Interior Areas: 15 inches above floor.
  - b. General Interior Areas (Counter Tops): Install device plate bottom or side flush with top of splash back, or 6 inches above countertops without splash back.
  - c. Industrial Areas, Workshops: 48 inches above floor.
  - d. Outdoor, All Areas: 24 inches above finished grade.
- 7. Special-Purpose Receptacle: 54 inches above floor or as shown.
- E. Install plumb and level.
- F. Flush Mounted:
  - 1. Install with concealed conduit.
  - 2. Install proper type extension rings or plaster covers to make edges of boxes flush with finished surface.
  - 3. Holes in surrounding surface shall be no larger than required to receive box.
- G. Support boxes independently of conduit by attachment to building structure or structural member.
- H. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws threaded into steelwork.
- I. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
- J. Provide plaster rings where necessary.
- K. Boxes embedded in concrete or masonry need not be additionally supported.
- L. Install stainless steel mounting hardware in industrial areas.

- M. Boxes Supporting Fixtures: Provide means of attachment with adequate strength to support fixture.
- N. Box Type (Steel Raceway System):
  - 1. Exterior Locations:
    - a. Exposed Raceways: Cast metal.
    - b. Concealed Raceways: Cast metal.
    - c. Concrete Encased Raceways: Cast metal.
    - d. Class I, II, or III Hazardous Areas: Cast metal.
  - 2. Interior Dry Locations:
    - a. Exposed Rigid Conduit: Cast metal.
    - d. Concrete Encased Raceways: Cast metal.
    - e. Lighting Circuits, Ceiling: Cast metal.
    - f. Class I, II, or III Hazardous Areas: Cast metal.
  - 3. Interior Wet Locations:
    - a. Exposed Raceways: Cast metal.
    - b. Concealed Raceways: Cast metal.
    - c. Concrete Encased Raceways: Cast metal.
    - d. Lighting Circuits, Ceiling: Cast metal.
    - f. Class I, II, or III Hazardous Areas: Cast metal.
- O. Box Type (Rigid Aluminum Raceway System): Cast aluminum.
- P. Box Type (Nonmetallic Raceway System):
  - 1. Corrosive Locations: Nonmetallic.
  - 2. Exposed Raceways: Nonmetallic.
  - 3. Concealed Raceways: Nonmetallic.
  - 4. Concrete Encased Raceways: Nonmetallic.

- A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs
- B. Install pull boxes where necessary in raceway system to facilitate conductor installation.
- C. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.
- D. Use outlet boxes as junction and pull boxes wherever possible and allowed by applicable codes.
- E. Installed boxes shall be accessible.
- F. Do not install on finished surfaces.
- G. Install plumb and level.
- H. Support boxes independently of conduit by attachment to building structure or structural member.
- I. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws or welded threaded studs on steelwork.
- J. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
- K. Boxes embedded in concrete or masonry need not be additionally supported.
- L. At or Below Grade:
  - 1. Install boxes for below grade conduits flush with finished grade in locations outside of paved areas, roadways, or walkways.
  - 2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
  - 3. Obtain ENGINEER'S written acceptance prior to installation in paved areas, roadways, or walkways.
  - 4. Use boxes and covers suitable to support anticipated weights.

### M. Flush Mounted:

- 1. Install with concealed conduit.
- 2. Holes in surrounding surface shall be no larger than required to receive box.
- 3. Make edges of boxes flush with final surface.
- N. Mounting Hardware:
  - 1. All Areas: Stainless steel.

### O. Location/Type:

- 1. Finished, Indoor, Dry: NEMA 250, Type 1.
- 2. Unfinished, Indoor, Dry: NEMA 250, Type 12.
- 3. Unfinished, Indoor and Outdoor, Wet and Corrosive: NEMA 250, Type 4X.
- 4. Unfinished, Indoor and Outdoor, Wet, Dust, or Oil: NEMA 250, Type 13.
- 5. Unfinished, Indoor and Outdoor, Hazardous: NEMA 250, Type 7 and Type 9, where indicated.
- 6. Underground Conduit: Concrete Encased.
- 7. Corrosive Locations: Nonmetallic.
- 8. Receptacles: Install in accordance with manufacturer's instructions.

## 3.04 WIRING DEVICES

## A. Switches:

- 1. Mounting Height: See Paragraph OUTLET AND DEVICE BOXES.
- 2. Install with switch operation in vertical position.
- 3. Install single-pole, two-way switches such that toggle is in up position when switch is on.

### B. Receptacles:

- 1. Install with grounding slot down except where horizontal mounting is shown, in which case install with neutral slot up.
- 2. Ground receptacles to boxes with grounding wire only.
- 3. Weatherproof Receptacles:
  - a. Install in cast metal box.
  - b. Install such that hinge for protective cover is above receptacle opening.
- 4. Ground Fault Interrupter: Install feed-through model at locations where ground fault protection is specified for "downstream" conventional receptacles.
- 5. Special-Purpose Receptacles: Install in accordance with manufacturer's instructions.

## 3.05 DEVICE PLATES

- A. Securely fasten to wiring device; ensure a tight fit to the box.
- B. Flush Mounted: Install with all four edges in continuous contact with finished wall surfaces without use of mats or similar materials. Plaster fillings will not be acceptable.
- C. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.
- D. Install with alignment tolerance to box of 1/16 inch.
- E. Engrave with designated titles.
- F. Types (Unless Otherwise Shown):
  - 1. Office: Stainless Steel.
  - 2. Exterior: Weatherproof.
  - 3. Interior:
    - a. Flush Mounted Boxes: Stainless Steel.
    - b. Surface Mounted, Cast Metal Boxes: Cast metal.
    - c. Surface Mounted, Sheet Steel Boxes: Stainless Steel.
    - d. Surface Mounted, Nonmetallic Boxes: Plastic.

## 3.06 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCH

- A. Heavy-Duty, Oil tight Type: Locations (Unless Otherwise Shown): Non-hazardous, indoor, dry locations, including motor control centers, control panels, and individual stations.
- B. Heavy-Duty, Watertight, and Corrosion-Resistant Type:
  - 1. Locations (Unless Otherwise Shown): Non-hazardous, outdoor, or normally wet areas.
  - 2. Mounting: NEMA 250, Type 4X enclosure.

### 3.07 TERMINAL JUNCTION BOX

- A. Install in accordance with Paragraph JUNCTION AND PULL BOXES.
- B. Label each block and terminal with permanently attached, non-destructible tag.

- C. Do not install on finished outdoor surfaces.
- D. Location:
  - 1. Finished, Indoor, Dry: NEMA 250, Type 1.
  - 2. Unfinished, Indoor, Dry: NEMA 250, Type 12.
  - 3. Unfinished, Indoor and Outdoor, Wet and Corrosive: NEMA 250, Type 4X.
  - 4. Unfinished, Indoor and Outdoor, Wet, Dust, or Oil: NEMA 250, Type 13.
- 3.08 NONFUSED DISCONNECT SWITCH, INDIVIDUAL, 0 TO 600 VOLTS
  - A. All disconnect switches shall be mounted five (5) feet above the floor, at the equipment height where appropriate, or where shown otherwise.
- 3.09 DRY TYPE TRANSFORMER (0- TO 600-VOLT PRIMARY)
  - A. Load external vibration isolator such that no direct transformer unit metal is in direct contact with mounting surface.
  - B. Provide moisture proof, flexible conduit for electrical connections.
  - C. Connect voltage taps to achieve (approximately) rated output voltage under normal plant load conditions.
  - D. Provide wall brackets for single-phase units, 15 to 167-1/2 kVA, and three-phase units, 15 to 112 kVA.
- 3.10 LIGHTING AND POWER DISTRIBUTION PANELBOARD
  - A. Install securely, plumb, in-line and square with walls.
  - B. Install top of cabinet 6 feet above floor unless otherwise shown.
  - C. Provide typewritten circuit directory for each panelboard.
- 3.11 SUPPORT AND FRAMING CHANNEL
  - A. Furnish zinc-rich primer; paint cut ends prior to installation, where applicable.
  - B. Install where required for mounting and supporting electrical equipment and raceway systems.

# **END OF SECTION**

### **SECTION 16110**

#### **RACEWAYS**

## PART 1 - GENERAL

### 1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
  - 1. American Association of State Highway and Transportation Officials (AASHTO): Division I, Standard Specifications for Highway Bridges, Fourteenth Edition.
  - 2. American National Standards Institute (ANSI):
    - a. C80.1, Rigid Steel Conduit-Zinc Coated.
    - b. C80.3, Electrical Metallic Tubing-Zinc Coated.
    - c. CS0.5, Rigid Aluminum Conduit.
    - d. C80.6, Intermediate Metal Conduit (IMC)-Zinc Coated.
  - 3. American Society for Testing and Materials (ASTM):
    - A123 El, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.
    - b. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
  - 4. National Electrical Contractor's Association, Inc. (NECA): 5055, Standard of Installation.
  - 5. National Electrical Manufacturers Association (NEMA):
    - a. RN 1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
    - b. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
    - c. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.
    - d. TC 6, PVC and ABS Plastic Utilities Duct for Underground Installation.
    - e. VE 1, Metallic Cable Tray Systems.
  - 6. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC)
  - 7. Underwriters Laboratories, Inc. (UL):
    - a. 1, Standard for Safety Flexible Metal Conduit.
    - b. 6, Standard for Safety Rigid Metal Conduit.
    - c. 360, Standard for Safety Liquid-Tight Flexible Steel Conduit.
    - d. 514B, Standard for Safety Fittings for Conduit and Outlet Boxes.
    - e. 514C, Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
    - f. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.
    - g. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPF Conduit.
    - h. 797, Standard for Safety Electrical Metallic Tubing.

- i. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.
- j. 1242, Standard for Safety Intermediate Metal Conduit.
- k. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

### 1.02 SUBMITTALS

## A. Shop Drawings:

- 1. Manufacturer's Literature:
  - a. PVC Schedule 40 conduit.
  - b. Rigid Aluminum conduit.
  - c. Flexible metal, liquid-tight conduit.
  - d. Flexible, nonmetallic, liquid-tight conduit.
  - e. Conduit fittings.
  - f. Wireways.
- 2. Cable Tray Systems:
  - a. Dimensional drawings, calculations, and descriptive information.
  - b. NEMA load/span designation and how it was selected.
  - c. Support span length and pounds-per-foot actual and future cable loading at locations, with safety factor used.
  - d. Location and magnitude of maximum simple beam deflection of tray for loading specified.
  - e. Layout drawings and list of accessories being provided.
- 3. Conduit Layout:
  - a. Plan and section type, showing arrangement and location of conduit and duct bank required for:
    - 1) Low and medium voltage feeder and branch circuits.
    - 2) Instrumentation and control systems.
    - 3) Communications systems.
    - 4) Empty conduit for future use.
  - b. Site plan scale not greater than 1 inch equals 20 feet.
    - 1) Equipment and machinery proposed for bending metal conduit.
    - 2) Method for bending PVC conduit less than 30 degrees.

## 1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

### PART2 - PRODUCTS

### 2.01 CONDUIT AND TUBING

- A. PVC Schedule 40 and 80 Conduit:
  - 1. Meet requirements of NEMA TC 2 and UL 651.
  - 2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90 degrees C insulated conductors.

- 3. Have smooth Interior and grey color.
- B. Rigid Aluminum Conduit
  - 1. Meets requirements of UL 514B
  - 2. Type: Threaded, copper-free. Set screw fittings not permitted.
- C. Flexible Metal, Liquid-Tight Conduit:
  - 1. UL 360 listed for 105 degrees C insulated conductors.
  - 2. Material: Galvanized steel, with an extruded PVC jacket.
- D. Flexible, Nonmetallic, Liquid-Tight Conduit:
  - 1. Material: PVC core with fused flexible PVC jacket.
  - 2. UL 1660 listed for:
    - a. Dry Conditions: 80 degrees C insulated conductors.
    - b. Wet Conditions: 60 degrees C insulated conductors.
  - Manufacturers:
    - a. Carlon; Carflex or X-Flex.
    - b. T & B; Xtraflex LTC or EFC.

## 2.02 FITTINGS

- A. PVC Conduit and Tubing:
  - 1. Meet requirements of NEMA TC-3.
  - 2. Type: PVC, slip-on.
- B. Rigid Aluminum Conduit:
  - 1. General:
    - a. Meet requirements of UL 514B.
    - b. Type: Threaded, galvanized. Set screw fittings not permitted.
  - 2. Bushing:
    - a. Material: Cast Aluminum with integral insulated throat, rated for 150 degrees C.
    - b. Manufacturers:
      - 1) O.Z./Gedney; Type AB.
  - 3. Grounding Bushing:
    - Material: Cast Aluminum with integral insulated throat rated for 150 degrees C, with solderless lugs.
    - b. Manufacturers:

- 1) Appleton; Series GIB.
- 2) O.Z. Gedney; Type ABLG.
- Conduit Hub:
  - a. Material: Cast Aluminum with insulated throat.
  - b. Manufacturers:
    - 1) O.Z. Gedney; Series CHA.
    - 2) T & B; Series 370AL.
- Conduit Bodies:
  - a. Material: Cast Aluminum, sized as required by NFPA 70.
  - b. Manufacturers:
    - 1) Appleton; Form 85 threaded Unilets.
    - 2) Crouse-Hinds; Mark 9 or Form 7-SA threaded condulets.
    - 3) Killark; Series O Electrolets.
- 6. Couplings: As supplied by conduit manufacturer.
- 7. Conduit Sealing Fitting Manufacturers:
  - a. Appleton; Type EYF-AL or EYM-AL.
  - b. Crouse-Hinds; Type EYS-SA or EZS-SA.
  - c. Killark; Type EY or EYS.
- 8. Drain Seal Manufacturers:
  - a. Appleton; Type EYDM-A.
  - b. Crouse-Hinds; Type EYD-SA or EZD-SA.
- 9. Drain/Breather Fitting Manufacturers:
  - a. Appleton; Type ECDB.
  - b. Crouse-Hinds; ECD.
- 10. Expansion Fitting Manufacturers:
  - a. Deflection/Expansion Movement:
    - 1) Steel City; Type DF-A
  - b. Expansion Movement Only:
    - 1) Steel City; Type AF-A
- 11. Cable Sealing Fittings:
  - To form watertight non-slip cord or cable connection to conduit.
  - b. For Conductors with OD of 1/2 Inch or Less: Neoprene bushing at connector entry.
  - c. Manufacturers:
    - 2) Appleton; CG-S.
- C. Flexible Metal, Liquid-Tight Conduit:
  - 1. Metal insulated throat connectors with integral nylon or plastic bushing rated for 105 degrees Celsius.
  - 2. Insulated throat and sealing O-rings.

- 3. Long design type extending outside of box or other device at least 2 inches.
- 4. Manufacturer: T & B; Series 5300.
- D. Flexible, Nonmetallic, Liquid-Tight Conduit: Meet requirements of UL 514B.
  - 1. Type: One-piece fitting body, complete with lock nut, O-ring, threaded ferrule, sealing ring, and compression nut.
  - Manufacturers:
    - a. Carlon; Type LT.
    - b. Kellems; Polytuff.
    - c. T & B; LT Series.
- E. Watertight Entrance Seal Device:
  - 1. New Construction:
    - a. Material: Oversized sleeve, malleable iron body with sealing ring, pressure ring, grommet seal, and pressure clamp.
    - b. Manufacturer: O.Z./Gedney; Type FSK or WSK, as required.
  - 2. Gored-Hole Application:
    - a. Material: Assembled dual pressure disks, neoprene sealing ring, and membrane clamp.
    - b. Manufacturer: O.Z./Gedney; Series CSM.
- F. Hazardous Locations: Approved for use in the atmosphere involved.
  - 1. Manufacturer: Crouse-Hinds; Type ECGJH.

### 2.03 WIREWAYS

- A. Meet requirements of UL 870.
- B. Type: Stainless Steel, with hinged cover.
- C. Rating: Outdoor raintight if outdoor, and indoor if indoor.
- D. Finish: Don not paint stainless steel wireways.
- E. Manufacturers:
  - 1. Square D.
  - 2. B-Line Systems, Inc.
- 2.04 CABLE TRAYS
  - A. Meet requirements of NEMA VE 1.

- B. Type: Ladder of welded construction.
- C. Material: Copper-free aluminum alloy 6063-T6 finish.
- D. Cover: Louvered, minimum 0.40-inch thick aluminum.
- E. Barrier Strip: Vertical, solid type, with horizontal fittings and strip clamps.
- F. Fittings of same cross-sectional tray area, and hardware of same material as cable tray.
- G. Tray Grounding: Conform to NFPA 70 and NEMA VE 1.
- H. Provide next higher NEMA VE 1 class designation than required for support of designed span length.
- I. Design Loads: Use working load adequate for actual cable installed plus 50 percent additional weight allowance for future cables plus 200-pound concentrated static load applied between side rails at midspan, with safety factor of 2 in accordance with NEMA VE 1, Table 3-1.
- J. Expansion Joints: NEMA VE 1 for 50 degrees F maximum temperature variation.
- K. Furnish Cable Tray with no sharp edges, burrs, or weld projections.
- L. Manufacturers:
  - 1. B-Line Systems, Inc.
  - 2. Square-D.
  - 3. P. W. Industries.

### 2.05 PRECAST MANHOLES AND HANDHOLES

- A. Concrete Strength: Minimum, 3,000 psi compressive, in 28 days.
- B. Loading: AASHTO Division 1, H-20 in accordance with ASTM C857.
- C. Access: Provide cast concrete 6- or 12-inch risers and access hole adapters between top of manhole and finished grade at required elevations.
- D. Drainage:
  - 1. Slope floors toward drain points, leaving no pockets or other non-draining areas.
  - 2. Provide drainage outlet or sump at low point of floor constructed with a heavy, cast iron, slotted or perforated hinged cover, and 4-inch minimum outlet and outlet pipe.
- E. Raceway Entrances:
  - 1. Provide on all four sides.
  - 2. For raceways to be installed under this Contract, provide knockout panels or precast individual raceway openings.
  - 3. At entrances where raceways are to be installed by others, provide minimum 12-inch high by 24-inch wide knockout panels for future raceway installation.

### F. Embedded Pulling Iron:

- 1. Material: 3/4-inch diameter stock, fastened to overall steel reinforcement before concrete is placed.
- 2. Location:
  - a. Wall: Opposite each raceway entrance and knockout panel for future raceway entrance.
  - b. Floor: Centered below manhole or handhole cover.

### G. Cable Racks:

- 1. Arms and Insulators: Adjustable, of sufficient number to accommodate cables for each raceway entering or leaving manhole, including spares.
- Wall Attachment:
  - a. Adjustable inserts in concrete walls. Bolts or embedded studs not permitted.
  - b. Insert Spacing: Maximum 3-foot on center entire inside perimeter of manhole.
  - c. Arrange so that spare raceway ends are clear for future cable installation.

### H. Manhole Frames and Covers:

- 1. Material: Machined cast iron.
- 2. Cover Type: Indented, solid top design, with two drop handles each.
- 3. Cover Loading: AASHTO Division I, H-20.
- 4. Cover Designation: Cast, on upper side, in integral letters, minimum 2 inches in height, appropriate titles:
  - a. Above 600 Volts: ELECTRIC HV.
  - b. 600 Volts and Below: ELECTRIC LV.
  - c. TELEPHONE.

#### I. Handhole Frames and Covers:

- 1. Material: Steel, hot-dipped galvanized.
- 2. Cover Type: Solid, bolt-on, of checkered design.
- 3. Cover Loading: H-20.
- 4. Cover Designation: Burn by welder, on upper side in integral letters, minimum 2 inches in height, appropriate titles:
  - a. 600 Volts and Below: ELECTRIC LV.
  - b. TELEPHONE.
- J. Hardware: Steel, hot-dip galvanized.
- K. Furnish knockout for ground rod in each handhole and manhole.

### L. Manufacturers:

- U.S. Precast.
- 2. Brooks Products, Inc.
- 3. Penn-Cast Products, Inc.
- 4. Concrete Conduit Co.
- Associated Concrete Products, Inc.
- 6. Utility Vault Co.
- 7. Pipe,Inc.

## 2.06 ACCESSORIES

## A. Duct Bank Spacers:

- 1. Type: Nonmetallic, interlocking, for multiple conduit sizes.
- Suitable for all types of conduit.
- 3. Manufacturer: Underground Device, Inc.; Type WUNPEECE.

### B. Identification Devices:

- 1. Raceway Tags:
  - a. Material: Permanent, nylon.
  - b. Shape: Round.
  - c. Raceway Designation: Pressure stamped, embossed, or engraved.
  - d. Tags relying on adhesives or taped-on markers not permitted.
- 2. Warning Tape:
  - a. Material: Polyethylene, 4-mil gauge.
  - b. Color: Red.
  - c. Width: Minimum 6-inch.
  - d. Designation: Warning on tape that electric circuit is located below tape.
  - e. Manufacturers:
    - 1) Blackburn, Type RT.
    - 2) Griffolyn Co.
- 3. Buried Raceway Marker:
  - a. Material: Sheet bronze, consisting of double-ended arrows, straight for straight runs and bent at locations where runs change direction.
  - b. Designation: Incise to depth of 3/32 inch, ELECTRIC CABLES. in letters 1/4-inch high.
  - c. Minimum Dimension: 1/4-inch thick, 10 inches long, and 3/4-inch wide.

## C. Raceway Coating:

- 1. Material: Bitumastic or plastic tape coating.
- 2. Manufacturers:
  - a. Koppers bitumastic: No. 505.
  - b. Scotchwrap; No. 51, plastic tape.

# D. Wraparound Duct Band:

- 1. Material: Heat-shrinkable, cross-linked polyolefin, precoated with hot-melt adhesive.
- 2. Manufacturer: Raychem; Type TWDB.

## PART 3 - EXECUTION

## 3.01 GENERAL

- A. Conduit and Tubing sizes shown are based on the use of copper conductors.
- B. All installed Work shall comply with NECA 5055.
- C. Crushed or deformed raceways not permitted.
- D. Maintain raceway entirely free of obstructions and moisture.
- E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.
- F. Aluminum Conduit: Do not install in direct contact with concrete.
- G. Sealing Fittings: Provide drain seal in vertical raceways where condensate may collect above sealing fitting.
- H. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.
- I. Group raceways installed in same area.
- J. Proximity to Heated Piping: Install raceways minimum 12 inches from parallel runs.
- K. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.
- L. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.
- M. Block Walls: Do not install raceways in same horizontal course with reinforcing steel.
- N. Install watertight fittings in outdoor, underground, or wet locations.
- O. Paint threads, before assembly of fittings, of galvanized conduit with zinc-rich paint or liquid galvanizing compound.
- P. All metal conduit to be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.
- Q. Do not install raceways in concrete equipment pads, foundations, or beams.
- R. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.
- S. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.
- 3.02 INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE

- A. Minimum cover 1-1/2 inches, unless otherwise noted.
- B. Provide support during placement of concrete to ensure raceways remain in position.
- C. Floor Slabs:
  - Outside diameter of conduit not to exceed one-third of the slab thickness.
  - 2. Separate conduit by minimum six times conduit outside diameter, except at crossings.

#### 3.03 CONDUIT APPLICATION

- A. Diameter: Minimum 3/4 inch.
- B. Exterior, Exposed:
  - Rigid Aluminum Conduit all other areas.
- C. Interior, Exposed:
  - 1. Rigid Aluminum Conduit all other areas.
- D. Direct Earth Burial: Schedule 40 PVC
- E. Direct Buried With Concrete Slab On Top PVC Schedule 40.
- F. Concrete-Encased Raceways Schedule 40 PVC
- G. Under Slabs-On-Grade Schedule 40 PVC

### 3.04 CONNECTIONS

- A. For motors, wall or ceiling mounted fans and unit heaters, dry type transformers, electrically operated valves, instrumentation, and other equipment where flexible connection is required to minimize vibration:
  - 1. Conduit Size 4 Inches or Less: Flexible metal, liquid-tight conduit.
  - Conduit Size Over 4 Inches: Nonflexible.
  - 3. Corrosive Areas: Flexible, nonmetallic, liquid or PVC-coated metallic, liquid-tight.
  - 4. Length: 18-inch minimum, 60-inch maximum, of sufficient length to allow movement or adjustment of equipment.
- B. Lighting Fixtures in Dry Areas: Flexible metal, liquid-tight conduit.
- C. Outdoor Areas, Process Areas Exposed to Moisture, and Areas Required to be Oiltight and Dust-Tight: Flexible metal, liquid-tight conduit.

- D. Transition from Underground or Concrete Embedded to Exposed: Rigid Aluminum Conduit.
- E. Under Equipment Mounting Pads Schedule 40 PVC
- F. Exterior Light Pole Foundations Schedule 40 PVC

## 3.05 PENETRATIONS

- A. Make at right angles, unless otherwise shown.
- B. Notching or penetration of structural members, including footings and beams, not permitted.
- C. Fire-Rated Walls, Floors, or Ceilings: Fire-stop openings around penetrations to maintain fire-resistance rating.
- D. Apply single layer of wraparound duct band to all metallic conduit in contact with concrete floor slabs to a point 2 inches above concrete surface.
- E. Concrete Walls, Floors, or Ceilings (Aboveground): Provide nonshrink grout dry-pack, or use watertight seal device.

## F. Entering Structures:

- General: Seal raceway at the first box or outlet with minimum 2 inches thick expandable plastic compound to prevent the entrance of gases or liquids from one area to another.
- 2. Concrete Roof or Membrane Waterproofed Wall or Floor:
  - a. Provide a watertight seal.
  - b. Without Concrete Encasement: Install watertight entrance seal device on each side.
  - c. With Concrete Encasement: Install watertight entrance seal device on the accessible side.
  - d. Securely anchor malleable iron body of watertight entrance seal device into construction with one or more integral flanges.
  - e. Secure membrane waterproofing to watertight entrance seal device in a permanent, watertight manner.
- 3. Heating, Ventilating, and Air Conditioning Equipment:
  - a. Penetrate equipment in area established by manufacturer.
  - b. Terminate conduit with flexible metal conduit at junction box or condulet attached to exterior surface of equipment prior to penetrating equipment.
  - c. Seal penetration with silicone type sealant as specified.
- 4. Corrosive-Sensitive Areas:
  - a. Seal all conduit passing through chlorine and ammonia room walls.

- b. Seal all conduit entering equipment panel boards and field panels containing electronic equipment.
- c. Seal penetration with silicone type sealant as specified.
- 5. Existing or Precast Wall (Underground): Core drill wall and install a watertight entrance seal device.
- 6. Nonwaterproofed Wall or Floor (Underground, without Concrete Encasement):
  - a. Provide Schedule 40 galvanized pipe sleeve, or watertight entrance seal device.
  - b. Fill space between raceway and sleeve with an expandable plastic compound on each side.

### 7. Manholes and Handholes:

- a. Metallic Raceways: Provide insulated grounding bushings.
- b. Nonmetallic Raceways: Provide bell ends flush with wall.
- c. Install such that raceways enter as near as possible to one end of wall, unless otherwise shown.

### 3.06 SUPPORT

- A. Support from structural members only, at intervals not exceeding NFPA 70 requirements, and in any case not exceeding 10 feet. Do not support from piping, pipe supports, or other raceways.
- B. Multiple Adjacent Raceways: Provide ceiling trapeze. For trapeze-supported conduit, allow 40 percent extra space for future conduit.
- C. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:
  - Wood: Wood screws.
  - 2. Hollow Masonry Units: Toggle bolts.
  - 3. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
  - 4. Steelwork: Machine screws.
- D. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.

### 3.07 BENDS

- A. Install concealed raceways with a minimum of bends in the shortest practical distance.
- B. Make bends and offsets of longest practical radius.

- C. Install with symmetrical bends or cast metal fittings.
- D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.
- E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.
- F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.

### G. PVC Conduit:

- 1. Bends 30-Degree and Larger: Provide factory-made elbows.
- 2. 90-Degree Bends: Provide rigid aluminum elbows.
- 3. Use manufacturer's recommended method for forming smaller bends.
- H. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

### 3.08 EXPANSION/DEFLECTION FITTINGS

- A. Provide on all raceways at all structural expansion joints, and in long tangential runs.
- B. Provide expansion/deflection joints for 50 degrees Fahrenheit maximum temperature variation.
- C. Install in accordance with manufacturer's instructions.

### 3.09 PVC CONDUIT

- A. Solvent Welding:
  - 1. Provide manufacturer recommended solvent; apply to all joints.
  - 2. Install such that joint is watertight.

### B. Adapters:

- 1. PVC to Metallic Fittings: PVC terminal type.
- 2. PVC to Rigid Metal Conduit or IMC: PVC female adapter.
- C. Belied-End Conduit: Bevel the unbelled end of the joint prior to joining.

# 3.10 WIREWAYS

A. Install in accordance with manufacturer's instructions.

B. Locate with cover on accessible vertical face of wireway, unless otherwise shown.

#### 3.11 CABLE TRAYS

- A. Install in accordance with Application Information Section of NEMA VE 1.
- B. Provide accessories as necessary for a complete system.
- C. Install such that joints are not made at support brackets.
- D. Install horizontal section support brackets between support point and quarter point of tray span.
- E. Provide ceiling trapeze for all horizontal cable tray.
- F. Install support within 2 feet on each side of expansion joints and within 2 feet of fitting extremity.
- G. Provide expansion joints in accordance with NEMA VE 1 for 50 degrees F maximum temperature variation.
- H. Install horizontal tray level, plumb, straight, and true to line or grade within a tolerance of 1/8 inch in 10 feet and within a cumulative maximum of 1/2 inch.
- I. Install vertical tray plumb within a tolerance of 1/8 inch in 10 feet.
- J. Install without exposed raw edges.
- K. Maintain 9-inch vertical separation between multi-tiered trays having a common support, and at all crossover locations.
- L. Provide bonding jumper at each expansion joint and adjustable connection.
- M. Ground Conductor: Provide properly sized clamps for each section, elbow, tee, cross, and reducer.

# 3.12 TERMINATION AT ENCLOSURES

- A. Cast Metal Enclosure: Provide manufacturer's premolded insulating sleeve inside metallic conduit terminating in threaded hubs.
- B. Sheet Metal Boxes, Cabinets, and Enclosures:
  - 1. Flexible Metal Conduit: Provide two screw type, insulated, malleable iron connectors.
  - 2. Flexible, Nonmetallic Conduit: Provide nonmetallic, liquid-tight strain relief connectors.
  - 3. Rigid Aluminum Conduit:

- a. Provide one lock nut each on inside and outside of enclosure.
- b. Install grounding bushing.
- c. Provide bonding jumper from grounding bushing to equipment ground bus or ground pad; if neither ground bus nor pad exists, connect jumper to lag bolt attached to metal enclosure.
- d. Install insulated bushing on ends of conduit where grounding is not required.
- e. Provide insulated throat when conduit terminates in sheet metal boxes having threaded hubs.
- 4. PVC Schedule 40 Conduit: Provide PVC terminal adapter with lock nut.
- C. Motor Control Center, Switchboard, Switchgear, and Free-Standing Enclosures: Terminate conduit entering bottom with grounding bushing; provide a grounding jumper extending to equipment ground bus or grounding pad.

### 3.13 UNDERGROUND RACEWAYS

- A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or pull box to the next, or from a high point between them, depending on surface contour.
- B. Cover: Maintain minimum 2-foot cover above conduit and concrete encasement, unless otherwise shown.
- C. Make routing changes as necessary to avoid obstructions or conflicts.
- D. Couplings: In multiple conduit runs, stagger so that couplings in adjacent runs are not in same transverse line.
- E. Union type fittings not permitted.

# F. Spacers:

- 1. Provide preformed, nonmetallic spacers, designed for such purpose, to secure and separate parallel conduit runs in a trench or concrete encasement.
- 2. Install at intervals not greater than that specified in NFPA 70 for support of the type conduit used, but in no case greater than 10 feet.
- G. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.
- H. Installation with Other Piping Systems:
  - 1. Crossings: Maintain minimum 12-inch vertical separation.
  - 2. Parallel Runs: Maintain minimum 12-inch separation.
  - 3. Installation over valves or couplings not permitted.

I. Metallic Raceway Coating: At couplings and joints and along entire length, apply wraparound duct band with one-half tape width overlap to obtain two complete layers.

### J. Concrete Encasement:

1. Concrete Color: Gray, dust top of concrete ductbank with powdered red concrete dye before concrete sets and trowel dry onto top of ductbank.

### K. Backfill:

1. Do not backfill until inspected by Engineer.

### 3.14 MANHOLES AND HANDHOLES

- A. Excavate, shore, brace, backfill, and final grade back to original state.
- B. Do not install until final raceway grading has been determined.
- C. Install such that raceways enter at nearly right angles and as near as possible to one end of wall, unless otherwise shown.
- D. Grounding: As specified in Section 16450, GROUNDING.
- E. Identification: Field stamp covers with manhole or handhole number as shown. Stamped numbers to be i-inch minimum height.

## 3.15 EMPTY RACEWAYS

- A. Provide permanent, removable cap over each end.
- B. Provide PVC plug with pull tab for underground raceways with end bells.
- C. Provide nylon pull cord.
- D. Identify, as specified in Paragraph IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

### 3.16 IDENTIFICATION DEVICES

## A. Raceway Tags:

- 1. Identify origin and destination.
- 2. Install at each terminus, near midpoint, and at minimum intervals of every 50 feet of exposed Raceway, whether in ceiling space or surface mounted.
- 3. Provide nylon strap for attachment.
- B. Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of runs.

# C. Buried Raceway Markers:

- 1. Install at grade to indicate direction of underground raceways.
- 2. Install at all bends and at intervals not exceeding 100 feet in straight runs.
- 3. Embed and secure to top of concrete base, sized 14 inches long, 6 inches wide, and 8 inches deep; top set flush with finished grade.

## 3.17 PROTECTION OF INSTALLED WORK

- A. Protect products from effects of moisture, corrosion, and physical damage during construction.
- B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.
- C. Touch up painted conduit threads after assembly to cover nicks or scars.
- D. Touch up damage to coating on PVC-coated conduit with patching compound approved by manufacturer.

**END OF SECTION** 

### **SECTION 16120**

#### **CONDUCTORS**

## PART 1 - GENERAL

#### 1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI): 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems above 600V.
  - 2. American Society for Testing and Materials (ASTM):
    - a. A167, Standard Specification for Stainless and Heat Resisting Chromium-Nickel-P1ated Steel Plate, Sheet, and Strip.
    - b. B3, Standard Specification for Soft or Annealed Copper Wire.
    - c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
    - d. B263, Standard Test Method for Determination of Cross- Sectional Area of Stranded Conductors.
  - 3. Association of Edison Illuminating Companies (AEIC):
    - a. CS 5, Cross-linked Polyethylene Insulated Shielded Power Cables Rated 5 Through 35 kV.
    - b. CS 6, Ethylene- Propylene-Rubber-Insulated Shielded Power Cables Rated 5 Through 69 kV.
  - 4. Insulated Cable Engineer's Association, Inc. (ICEA): T-29-250, Procedure for Conducting Vertical Cable Tray Flame Test with a Theoretical Heat Input of 210,000 Btu/hour.
  - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 48, Standard Test Procedures and Requirements or High-Voltage Alternating Current Cable Terminations.
    - b. 404, Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V through 46,000V and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V through 500,000V.
  - 6. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.
  - 7. National Electrical Manufacturers' Association (NEMA):
    - a. CC 1, Electric Power Connectors for Substations.

- b. WC 3, Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- c. WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- d. WC 7, Crosslinked-Thermosetting-Polyethylene-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- e. WC 8, Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- f. WC 55, Instrumentation Cables and Thermocouple Wire.
- 8. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
- 9. Underwriters Laboratories, Inc. (UL):
  - a. 13, Standard for Safety Power-Limited Circuit Cables.
  - b. 44, Standard for Safety Rubber-Insulated Wires and Cables.
  - c. 62, Standard for Safety Flexible Cord and Fixture Wire.
  - d. 486A, Standard for Safety Wire Connector and Soldering Lugs for Use with Copper Conductors.
  - e. 486B, Standard for Safety Wire Connectors and Soldering Lugs for Use with Aluminum Conductors.
  - f. 510, Standard for Safety Insulating Tape.
  - g. 854, Standard for Safety Service-Entrance Cables.
  - h. 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air Handling Spaces.
  - i. 1072, Standard for Safety Medium-Voltage Power Cables.
  - j. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
  - k. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

## 1.02 SUBMITTALS

## A. Shop Drawings:

- 1. Wire and cable descriptive product information.
- 2. Wire and cable accessories descriptive product information.
- B. Quality Control Submittals:
  - Certified Factory Test Report for conductors 600 volts and below.
  - 2. Certified Factory Test Report per AEIC CS6, including AEIC qualification report for conductors above 600 volts.

## 1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

## PART 2 - PRODUCTS

## 2.01 CONDUCTORS 600 VOLTS AND BELOW

- A. Conform to applicable requirements of NEMA WC 3, WC 5, and WC 7.
- B. Conductor Type:
  - 1. 120- and 277-Volt Lighting, No. 10 AWG and Smaller: Stranded copper.
  - 2. 120-Volt Receptacle Circuits, No. 10 AWG and Smaller: Stranded copper.
  - 3. All Other Circuits: Stranded copper.
- C. Insulation: Type THHN/THWN for No.6 AWG and smaller. XHHW for No.4 AWG and larger or installations in wet location.
- D. Direct Burial and Aerial Conductors and Cables:
  - 1. Type USE/RHH/RHW insulation, UL 54 listed, Type RHW-2/USE-2.
  - 2. Conform to physical and minimum thickness requirements of NEMA WC3.
- E. Flexible Cords and Cables:
  - 1. Type SOW-A50 with ethylene propylene rubber insulation in accordance with UL 62.
  - 2. Conform to physical and minimum thickness requirements of NEMA WC 8.
- F. Cable Tray Conductors and Cables: Type TC.

## 2.02 600-VOLT RATED CABLE

### A. General:

- 1. Type: TC, meeting requirements of UL 1277, including Vertical Tray Flame Test at 20,000 Btu/hr, and NFPA 70, Article 340, or UL 13 Listed Power Limited Circuit Cable meeting requirements of NFPA 70, Article 725.
- 2. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.
- 3. Suitable for installation in open air, in cable trays, or conduit.

- 4. Minimum Temperature Rating: 90 degrees C dry locations, 75 degrees C wet locations.
- 5. Overall Outer Jacket: PVC, flame-retardant, sunlight- and oil-resistant.

## B. Wire and Connectors:

- 1. Cable shall be rated for 600 volts and shall meet the requirements below:
  - a. Conductors shall be stranded
  - b. All wire shall be brought to the job in unbroken packages and shall bear the data of manufacturing; not older than 12 months.
  - c. Type of wire shall be XHHW or THWN, rated 75 degrees C suitable for wet locations except where required otherwise by the drawings.
  - d. No wire smaller than No. 12 gauge shall be used unless specifically indicated.
  - e. Conductor metal shall be copper.
  - f. All conductors shall be megger tested after installation and insulation must be in compliance with the Insulated Power Cable Engineers Association Minimum Values of Insulation Resistance.

## C. Type I-Multiconductor Control Cable:

#### Conductors:

- a. No. 14 AWG, seven-strand copper.
- b. Insulation: 15-mil PVC with 4-mil nylon.
- c. UL 1581 listed as Type THHN/THWN rated VW-I.
- d. Conductor group bound with spiral wrap of barrier tape.
- e. Color Code: Provide in accordance with NEMA WC 5, Method 1, and Sequence K-2.
- 2. Cable: Passes the ICEA T-29-520 210,000 Btu/hr Vertical Tray Flame Test.

### Cable Sizes:

No. of Conductors	Max. Outside Diameter (inches)	Jacket Thickness (mils)
3	0.41	45
5	0.48	45
7	0.52	45

12	0.72	60
19	00.83	60
25	1.00	60
37	1.15	80

## 4. Manufacturers:

- a. Okonite Co.
- b. Rome Cable.
- c. Southwire.

# D. Type 2-Multiconductor Power Cable:

## 1. Conductors:

- a. Class B stranded, coated copper.
- b. Insulation: Chemically crosslinked ethylene-propylene with Hypalon jacket.
- c. UL 1581 listed as Type EPR, rated VW-1.
- d. Color Code: Conductors, size No. 8 AWG and smaller, colored conductors, NEMA WC5 Method 1, color 5 per Article POWER CONDUCTOR COLOR CODING. Conductors, size No. 6 AWG and larger, NEMA WC5, Method 4.
- 2. Cable pass the ICEA T-29-520 210,000 Btu/hr Vertical Tray Flame Test.

## 3. Cable Sizes:

Conductor	Minimum	No. of	Max. Outside	Nominal Jacket
Size	Ground Wire	Conductors	Diameter	Thickness (Mils)
	Size		(Inches)	
12	12	2	0.42	45
		3	0.45	45
		4	0.49	45
10	10	2	0.54	60
		3	0.58	60
		4	0.63	60
8	10	3	0.66	60
		4	0.72	
6	8	3	0.74	60
		4	0.81	
4	6	3	0.88	60
		4	0.97	80
2	6	3	1.01	80

		4	1.11	
1/0	6	3	1.22	80
		4	1.22 1.35	
2/0	4	3	1.32	80
		4	1.32 1.46	
4/0	4	3	1.56 1.78	80
		4	1.78	

## 4. Manufacturers:

- a. Okonite Co.
- b. Rome Cable.
- c. Southwire
- E. Type B-No. 16 AWG, Twisted, Shielded Pair, Instrumentation Cable: Single pair, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.
  - 1. Outer Jacket: 45-mil nominal thickness.
  - 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage.
  - 3. Dimension: 0.31-inch nominal OD.
  - 4. Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8
    - b. 20 AWG, seven-strand tinned copper drain wire.
    - c. Insulation: 15-mil nominal PVC.
    - d. Jacket: 4-mil nominal nylon.
    - e. Color Code: Pair conductors black and red.
  - 5. Manufacturers:
    - a. Okonite Co.
    - b. Rome Wire Corp.
    - c. Belden.

- F. Type B1-No. 16 AWG, Twisted, Shielded Triad Instrumentation Cable: Single triad, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.
  - 1. Outer Jacket: 45-mil nominal.
  - 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer, overlapped to provide 100 percent coverage.
  - 3. Dimension: 0.32-inch nominal OD.
  - Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
    - b. 20 AWG, seven-strand, tinned copper drain wire.
    - c. Insulation: 15-mil nominal PVC.
    - d. Jacket: 4-mil nylon.
    - e. Color Code: Triad conductors black, red, and blue.
  - Manufacturers:
    - a. Okonite Co.
    - b. Rome Wire Corp.
    - c. Belden.
- G. Type B2-No. 18 AWG, Multi-Twisted, Shielded Pairs with a Common, Overall Shield Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable, meeting NEMA WC 55 requirements.
  - 1. Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8
    - b. Tinned copper drain wires.
    - c. Pair drain wire size AWG 20, group drain wire size AWG 18.
    - d. Insulation: 15-mil PVC.
    - e. Jacket: 4-mil nylon.
    - f. Color Code: Pair conductors black and red with red conductor numerically printed for group identification.

- g. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer.
- 2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.

# 3. Cable Sizes:

Number of Pairs	Maximum Outside Diameter (inches)	Nominal Jacket Thickness (mils)
4	0.50	45
8	0.68	60
12	0.82	60
16	0.95	80
24	1.16	80
36	1.33	80
50	1.56	80

- 4. Manufacturers:
  - a. Okonite Co.
  - b. Rome Wire Corp.
  - c. Belden.
- H. Type B3-No. 18 AWG, Multi-twisted Pairs with a Common Overall Shield Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable meeting NEMA WC 55.
  - 1. Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8.
    - b. Tinned copper drain wire size 18 AWG
    - c. Insulation: 15-mil nominal PVC.
    - d. Jacket: 4-mil nylon.
    - e. Color Code: Pair conductors black and red, with red conductor numerically printed for group identification.
  - 2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.
  - Cable Sizes:

Number Of Pairs	Maximum Outside Diameter (inches)	Nominal Jacket Thickness (mils)
4	0.46	45
8	0.63	60
12	0.75	60
16	0.83	60
24	1.06	80
36	1.21	80
50	1.42	80

# 4. Manufacturers:

- a. Okonite Co.
- b. Rome Wire Corp.
- c. Belden.
- I. Ethernet Cat. 6e UTP Cable (Copper):
  - 1. Section applies to all Ethernet Cable (Copper) except for Fiber Optic cable.
  - Conductor Physical Characteristics: 4 twisted pairs (8 conductors), 23 AWG solid bare Copper with Polyolefin Insulation. Overall Nominal Diameter: 0.235 inch. Operating Temperature Range: -20'C to +75'C. Model Number – 7881A, Belden Inc. Provide green color to match the City's standard Ethernet Cables.
  - 3. NEC/UL specification CMR, UL444, UL verified category 6.
  - Manufacturer:
    - a. Belden Inc.
    - b. Or approved equal.
- J. Flexible Variable Frequency Drive (VFD) Output Power Unarmored Cable:
  - 1. Section applies to power cables routed between the output of VFD's and motor terminals.
  - 2. Cable shall be rated for 2kV/1000 volts type MC-HL and shall meet the requirements below:
    - a. Conductors shall be soft annealed tinned copper flexible strand.
    - b. All wire shall be brought to the job in unbroken packages and shall bear the data of manufacturing; not older than 12 months.

- c. Type of wire shall be XHHW or RHW rated 75 degrees C suitable for wet locations. Insulation shall be Polyrad XT-125 Irradiated Cross-linked Polyolefin (XLPO).
- d. No wire smaller than No. 12 gauge shall be used unless specifically indicated.
- e. Cable construction shall consist of three insulated current-carrying phase conductors and three bare ground conductors or insulated ground conductors, symmetrically placed between the phase conductors, and beneath a tinned copper braid with aluminum/polyester tape with overall Polyethylene Sheath/jacket.
- f. Cable shall be UL listed and shall have UL mark.
- 3. Each ground conductor size (circular mil area) shall be one-third (1/3) of the NEC required size (circular mil area) for a single ground conductor. If one third of the required circular mil area does not correspond to a standard size (circular mil area) of construction, the next largest size of standard construction shall be us All conductors shall be megger tested after installation and insulation must be in compliance with the Insulated Power Cable Engineers Association Minimum Values of Insulation Resistance. Continuous aluminum sheath shall meet the grounding requirements of NEC 250.122.

### Manufacturers:

- a. Southwire.
- b. Belden.
- c. General Cable.
- e. Or Approved Equal.

# 2.03 CONDUCTORS ABOVE 600 VOLTS

# A. EPR Insulated Cable:

- 1. Extrusion: Single-pass, triple-tandem, of conductor screen, insulation, and insulation screen.
- 2. Type: 5 kV, shielded, UL 1072, Type MV-105.
- 3. Conductors: Copper, concentric lay Class B round stranded in accordance with ASTM B3, ASTM B8, and ASTM B263.
- 4. Conductor Screen: Extruded, semiconducting ethylene-propylene rubber in accordance with NEMA WC 8 and AEIC CS 6.
- 5. Insulation: 133 percent insulation level, ethylene-propylene-rubber (EPR) containing no polyethylene in accordance with NEMA WC 8, and AEIC CS 6.

- 6. Insulation Thickness: 115 mils, 5 kV, nominal.
- 7. Insulation Screen: Thermosetting, semiconducting ethylene-propylene rubber (EPR), extruded directly over insulation in accordance with NEMA WC 8, and AEIC CS 6.
- 8. Metallic Shield: Uncoated, copper shielding tape helically applied with 17-1/2 percent minimum overlap.
- 9. Jacket: Extruded polyvinyl chloride (PVC) compound applied over the metallic shield in accordance with NEMA WC 8.
- 10. Operating Temperature: 105 degrees C continuous normal operations, 140 degrees C emergency operating conditions, and 250 degrees C short-circuit conditions.
- 11. Cable Tray Applications: Rated for use in cable trays.
- 12. Manufacturers:
  - a. Okonite Co.
  - b. Pirelli Wire and Cable.
  - c. Southwire.

# 2.04 GROUNDING CONDUCTORS

- A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or THHN/THWN, insulation.
- B. Direct Buried: Bare tinned stranded copper.
- 2.05 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW
  - A. Tape:
    - 1. General Purpose, Flame Retardant: 7-mil, vinyl plastic, Scotch Brand 33, rated for 90 degrees C minimum, meeting requirements of UL 510.
    - 2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.
    - Arcs and Fireproofing:
      - a. 30-mil, elastomer
      - b. Manufacturers and Products:
        - 1) Scotch; Brand 77, with Scotch Brand 69 glass cloth tape binder.

2) Plytnount; Plyarc 30, with Plymount Plyglas glass cloth tape binder.

# B. Identification Devices:

- 1. Sleeve: Permanent, PVC, yellow or white, with legible machine-printed black markings.
- 2. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.
- 3. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.
- 4. Each signal, control, alarm, and indicating circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all Shop Drawings. These numbers shall be marked on all conductors at every terminal using permanently marked heat-shrink plastic. Instrument signal circuit conductors shall be tagged with unique multiple digit numbers. Black and white wires from the circuit breaker panelboard shall be tagged including the one (1) or two (2) digit number of the branch circuit breaker.

# C. Connectors and Terminations:

- 1. Nylon, Self-Insulated Crimp Connectors:
  - a. Manufacturers and Products:
    - 1) Thomas & Betts; Sta-Kon.
    - 2) Burndy; Insulink.
    - 3) ILSCO.
- 2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:
  - a. Manufacturers and Products:
    - 1) Thomas & Betts; Sta-Kon.
    - 2) Burndy; Insulink.
    - 3) ILSCO.

# D. Cable Lugs:

- 1. In accordance with NEMA CC I.
- 2. Rated 600 volts of same material as conductor metal.
- 3. Insulated, Locking-Fork, Compression Lugs:

- a. Manufacturers and Products:
  - 1) Thomas & Betts; Sta-Kon.
  - 2) ILSCO; ILSCONS.
- 4. Un-insulated Crimp Connectors and Terminators:
  - a. Manufacturers and Products:
    - 1) Square D; Versitide.
    - 2) Thomas & Betts; Color-Keyed.
    - 3) ILSCO.
- 5. Un-insulated, Bolted, Two-Way Connectors and Terminators:
  - a. Manufacturers and Products:
    - 1) Thomas & Betts; Locktite.
    - 2) Burndy; Quiklug.
    - 3) ILSCO.
- E. Cable Ties: Nylon, adjustable, self-locking, and reusable.
  - Manufacturers and Product: Thomas & Betts; TY-RAP.
- F. Heat Shrinkable Insulation: Thermally stabilized, cross-linked polyofin.
  - 1. Manufacturers and Product: Thomas & Betts; SHRINK-KON.

# 2.06 ACCESSORIES FOR CONDUCTORS ABOVE 600 VOLTS

- A. Molded Splice Kits:
  - 1. Components necessary to provide insulation, metallic shielding and grounding systems, and overall jacket.
  - 2. Capable of making splices that has a current rating equal to, or greater than the cable ampacity, conforming to IEEE 404.
  - 3. 25 kV class, with compression connector, EPDM molded semiconductive insert, peroxide-cured EPDM insulation, and EPDM molded semiconductive outer shield.
  - 4. Pre-molded splice shall be re-jacketed with a heat shrinkable adhesive-lined sleeve to provide a waterproof seal.

### Manufacturers:

- a. Elastimold.
- b. Cooper industries.

# B. Heat Shrinkable Splice Kits:

- 1. Components necessary to provide insulation, metallic shielding and grounding systems, and overall jacket.
- 2. Capable of making splices that has a current rating equal to, or greater than the cable ampacity, conforming to IEEE 404.
- 3. 25 kV class, with compression connector, splice insulating and conducting sleeves, stress-relief materials, shielding braid and mesh, and abrasion-resistant heat shrinkable adhesive-lined re-jacketing sleeve to provide a waterproof seal.

### Manufacturers:

- a. Raychem.
- b. 3M Co.

# C. Termination Kits:

- 1. Capable of terminating a 25 kV, single-conductor, polymeric-insulated shielded cables plus a shield ground clamp.
- 2. Capable of producing a termination with a current rating equal to, or greater than, the cable ampacity, meeting Class 1 requirements of IEEE 48.
- 3. Capable of accommodating any form of cable shielding or construction without the need for special adapters and/or accessories.

### Manufacturers:

- a. Raychem.
- b. 3M Co.

# D. Bus Connection Insulation:

- 1. Heat shrinkable tubing, tape, and sheets of flexible crosslinked polymeric material formulated for high dielectric strength.
- 2. Tape and sheet products to have coating to prevent adhesion to metal surfaces.
- 3. Insulating materials to be removable and reusable.

4. Manufacturer: Raychem.

# E. Cable Lugs:

- 1. In accordance with NEMA CCI.
- 2. Rated 25 kV of same material as conductor metal.
- 3. Manufacturers and Products, Uninsulated Crimp Connectors and Terminators:
  - a. Square D; Versitide.
  - b. Thomas & Betts; Color-Keyed.
  - c. ILSCO.
- 4. Manufacturers and Products, Uninsulated, Bolted, Two-Way Connectors and Terminators:
  - a. Thomas & Betts; Locktite.
  - b. Burndy; Quiklug.
  - c. JLSCO

# 2.07 PULLING COMPOUND

- A. Nontoxic, non-corrosive, noncombustible, nonflammable, wax-based lubricant; UL listed.
- B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.
- C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.
- D. Manufacturers and Products:
  - 1. Ideal Co.; Yellow 77.
  - 2. Polywater, Inc.
  - 3. Cable Grip Co.

### 2.08 WARNING TAPE

- A. As specified in Section 16110, RACEWAYS.
- 2.09 SOURCE QUALITY CONTROL
  - A. Conductors 600-Volts and Below: Test in accordance with UL 44 and 854 Standards.

### PART 3 - EXECUTION

### 3.01 GENERAL

- A. Conductor installation to be in accordance with NECA 5055.
- B. Conductor and cable sizing shown is based on copper conductors, unless noted otherwise.
- C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.
- D. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.
- E. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals.
- F. Bundling: Where single conductors and cables in manholes, hand holes, vaults, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 18 inches on center.
- G. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.
- H. Concrete-Encased Raceway Installation: Prior to installation of conductors, pull through each raceway a mandrel approximately 1/4-inch smaller than raceway inside diameter.

### 3.02 POWER CONDUCTOR COLOR CODING

- A. Conductors 600 Volts and Below:
  - 1. No. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering an area 1-1/2 to 2 inches wide.
  - 2. No. 8 AWG and Smaller: Provide colored conductors.
  - 3. Colors: (Unless local Authority Having Jurisdiction has different requirements)

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts	Grounded Neutral	White
Single-Phase, Three-Wire	One Hot Leg	Black
	Other Hot Leg	Red
208Y/120 Volts	Grounded Neutral	White

Three-Phase, Four-Wire	Phase A	Black		
	Phase B	Red		
	Phase C	Blue		
240/120 Volts	Grounded Neutral	White		
Three-Phase, Four-Wire	Phase A	Black		
Delta, Center Tap	High (wild) Leg	Orange		
Ground on Single-Phase	Phase C	Blue		
480Y/277 Volts	Grounded Neutral	Gray		
Three-Phase, Four-Wire	Phase A	Brown		
	Phase B	Purple		
	Phase C	Yellow		
NOTE: Phase A, B, C implies direction of positive phase rotation				

4. Tracer: Outer covering of white with an identifiable colored strip other than green in accordance with NFPA 70.

### 3.03 CIRCUIT IDENTIFICATION

- A. Circuits Appearing in Circuit Schedules: identify power, instrumentation, and control conductor circuits, using circuit schedule designations, at each termination and in accessible locations such as manholes, hand holes, panels, switchboards, motor control centers, pull boxes, and terminal boxes.
- B. Circuits Not Appearing in Circuit Schedules:
  - Assign circuit name based on device or equipment at load end of circuit.
  - 2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.

# C. Method:

- 1. Conductors No. 3 AWG and Smaller: Identify with sleeves.
- 2. Cables, and Conductors No. 2 AWG and Larger:
  - a. Identify with marker plates.
  - b. Attach marker plates with nylon tie cord.
- 3. Taped-on markers or tags relying on adhesives not permitted.
- D. Each signal, control, alarm, and indicating circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all contractor as-built drawings. These numbers shall be marked on all conductors at every terminal using permanently marked heat-shrink plastic. Instrument signal circuit conductors shall be tagged with unique multiple digit numbers.

# 3.04 CONDUCTORS 600 VOLTS AND BELOW

- A. Install 10 AWG or 12 AWG conductors for branch circuit power wiring in lighting and receptacle circuits.
- B. Do not splice incoming service conductors and branch power distribution conductors No. 6 AWG and larger unless specifically indicated or approved by ENGINEER.
- C. Connections and Terminations:
  - 1. Install wire nuts only on solid conductors.
  - 2. Install nylon self-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 6 AWG and smaller.
  - 3. Install un-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.
  - 4. Install un-insulated, bolted, two-way connectors and terminators for power circuit conductors No. 4/0 AWG and larger.
  - 5. Install un-insulated bolted two-way connectors for motor circuit conductors No. 12 and larger.
  - 6. Tape insulates all un-insulated connections.
  - 7. Place no more than one conductor in any single-barrel pressure connection.
  - 8. Install crimp connectors with tools approved by connector manufacturer.
  - 9. Install terminals and connectors acceptable for type of material used.
  - 10. Compression Lugs
    - a. Attach with a tool specifically designed for purpose.
    - b. Tool shall provide complete controlled crimp and shall not release until crimp is complete.
    - c. Do not use plier-type crimpers.
- D. Do not use soldered mechanical joints.
- E. Splices and Terminations:
  - 1. Indoors: Use general purpose, flame retardant tape.
  - 2. Outdoors: Use flame retardant, cold- and weather-resistant tape.
- F. Cap spare conductors and conductors with UL listed end caps.

- G. Cabinets, Panels, and Motor Control Centers:
  - 1. Remove surplus wire, bridle and secure.
  - 2. Where conductors pass through openings or over edges in sheet metal, remove bums, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.

# H. Control and Instrumentation Wiring:

- 1. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.
- 2. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.
- 3. Locate splices in readily accessible cabinets or junction boxes using terminal strips.
- 4. Where connections of cables installed under this section are to be made under Division 13, leave pigtails of adequate length for bundled connections.

### 5. Cable Protection:

- a. Under Infinite Access Floors: May be installed without bundling.
- b. All Other Areas: Install individual wires, pairs, or triads in flex conduit under the floor or grouped into bundles at least 1/2-inch in diameter.
- c. Maintain integrity of shielding of instrumentation cables.
- d. Ensure grounds do not occur because of damage to jacket over the shield.
- 6. The following test shall be performed on instrumentation and control system cables. All tests shall be end-to-end test of installed cables with the ends supported in free air, not adjacent to any ground object. All test data shall be recorded on forms acceptable to the Engineer. Complete records of all tests shall be made and delivered to the Engineer.
  - a. Continuity tests shall be performed by measuring wire/shield loop resistances of signal cable as the wires, taken one at a time, are shorted to the channel shield. No loop resistance measurement shall carry by more than +2 ohms from the calculated average loop resistance valve.
  - b. Insulation resistance tests shall be performed by using a 500-volt megohmeter to measure the insulation resistance between each channel wire and channel shield, between individual channel shields in a multichannel cable, between each individual channel and the overall cable shield in multi-channel cable, between each wire and ground, and

between each shield and ground. Values of resistance less than 10 megohms shall be unacceptable.

- I. Extra Conductor Length: For conductors to be connected by others, install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.
- J. Variable Frequency Drive (VFD) Output Power Cable:
  - 1. Furnish and install VFD rated cable as describes in 2.02.I of this specification for all VFD applications.
  - 2. Install cables in raceway.
  - 3. Terminate the three ground conductors together at the motor and at the ground bus of the VFD.

### 3.05 CONDUCTORS ABOVE 600 VOLTS

- A. Do not splice unless specifically indicated or approved by the ENGINEER.
- B. Make joints and terminations with splice and termination kits, in accordance with kit manufacturer's instructions
- C. Install splices or terminations as continuous operation in accessible locations under clean, dry conditions.
- D. Single Conductor Cable Terminations: Provide heat shrinkable stress control and outer non-tracking insulation tubing, high relative permittivity stress relief mastic for insulation shield cutback treatment, and a heat-activated sealant for environmental sealing, plus a ground braid and clamp.
- E. Install terminals or connectors acceptable for type of conductor material used.
- F. Provide outdoor rain skirts for all riser pole and outdoor switchgear terminations.
- G. Provide shield termination and grounding for all terminations.
- H. Provide necessary mounting hardware, covers, and connectors.
- I. Where elbow connectors are specified, install in accordance with manufacturer's instructions.
- J. Connections and Terminations:
  - 1. Install un-insulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.
  - 2. Install un-insulated, bolted, two-way connectors and terminators for power circuit conductors No. 4/0 AWG and larger.

- 3. Install un-insulated, bolted, two-way connectors for motor circuit conductors No. 12 and larger.
- 4. Insulate bus connections with heat shrinking tubing, tape, and sheets.
- 5. Make all bus connections removable and reusable in accordance with manufacturer's instructions.
- K. Give 2 working days' notice to ENGINEER prior to making splices or terminations.

# 3.06 CONDUCTOR ARC AND FIREPROOFING

- A. Install arc and fireproofing tape on 5 kV cables throughout their entire exposed length in manholes, hand holes, vaults, cable trays, junction boxes, and other indicated locations.
- B. Wrap conductors of same circuit entering from separate conduit together as a single cable.
- C. Follow tape manufacturer's installation instructions.
- D. Secure tape at intervals of 5 feet with bands of tape binder. Each tape band shall consist of a minimum of two wraps directly over each other.

# 3.07 UNDERGROUND DIRECT BURIAL CABLE

- A. Install in trench as required.
- B. Warning Tape: Install approximately 12 inches above cable, aligned parallel to, and within 12 inches of centerline of the run.

### 3.08 FIELD QUALTTY CONTROL

A. In accordance Section 16950, ELECTRICAL TESTING.

**END OF SECTION** 

### **SECTION 16322**

### MEDIUM VOLTAGE TRANSFORMERS - LIQUID FILLED PAD-MOUNT

### PART 1 -- GENERAL

# 1.01 THE REQUIREMENT

- A. The Contractor shall furnish, install, and test liquid filled, pad-mount transformers for power distribution systems as specified herein, as indicated on the Drawings, and as required to complete the electrical installations.
- B. All equipment specified in this Section shall be furnished by the transformer manufacturer who shall be responsible for the suitability and compatibility of all included equipment.
- C. Transformers shall be feed-through type with LBOR (Load Break Oil Rotary) switch or radial feed with LB (Load Break) switch only as shown on one line diagrams in contract documents for electrical system configuration.

# 1.02 CODES AND STANDARDS

- A. The liquid filled pad-mount transformer shall comply with the following codes and standards:
  - 1. American National Standards Institute (ANSI):
    - a. ANSI C57.12.00-Latest Revision, General Requirements for Liquid Immersed Distribution, Power, and Regulating Transformers.
    - b. ANSI C57.12.28-Latest Revision, Switchgear and Transformers, Pad mounted Equipment -Enclosure Integrity.
    - c. ANSI C57.12.26-Latest Revision, Standard for Transformers, Pad mounted, Compartmental Type, Self Cooled Three Phase Distribution Transformer for Use with Separable Insulated High Voltage Connectors, High Voltage 34,500 Grd./y 19,920 Volts and Below: 2500 kVA and Smaller.
    - d. ANSI C57.12.90-Latest Revision, Test Code for Liquid-Immersed Distribution Power, and Regulating Transformers and Guide for Short Circuit Testing of Distribution and Power Transformers.
    - e. ANSI/IEEE 386-1985, Separable Insulated Connectors for Power Distribution Systems Above 600 Volts.
  - 2. Institute of Electrical and Electronic Engineers (IEEE)
  - 3. National Electrical Code (NEC)
  - 4. National Electrical Manufacturers Association (NEMA)
    - a. NEMA 210

# 1.03 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions, the Contractor shall obtain from the equipment manufacturer and submit the following:

- 1. Shop Drawings
- 2. Operation and Maintenance Manuals
- 3. Spare Parts List
- 4. Special Tools List
- 5. Reports of Certified Shop Tests
- B. Each submittal shall be identified by the applicable specification section.

### 1.04 SHOP DRAWINGS

- A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.
- B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.
- C. Shop drawings shall include but not be limited to:
  - 1. Product data sheets.
  - 2. Sample equipment nameplate diagram.
  - 3. Drawings showing clearly marked overall dimensions for each transformer. Drawings shall show conduit stub-up area locations.
  - 4. Weight of each transformer.
  - 5. Proof of ISO 9001 registration
- D. The submittal information shall reflect the specific equipment identification name/number as indicated on the Drawings.
- E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items that the Contractor intends to provide are acceptable and shall be submitted.

### 1.05 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions.

# 1.06 TOOLS, SUPPLIES AND SPARE PARTS

A. The transformers shall be furnished with all special tools necessary to disassemble, service, repair and adjust the equipment. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor.

The Contractor shall furnish the following minimum spare parts for each transformer.

No. Required

Description

1 set

Primary fuses of each size provided.

- B. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.
- D. Spare parts lists, included with the Shop Drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size shall have the same parts number.

### 1.07 IDENTIFICATION

A. Each transformer shall be identified with the identification name/number indicated on the Drawings. A nameplate shall be securely affixed in a conspicuous place on each transformer. Nameplates shall be as specified in Specification 16050, "Basic Electrical Materials and Methods".

#### PART 2 -- PRODUCTS

# 2.01 MANUFACTURERS

- A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.
- B. All transformer manufacturers shall be registered as an ISO 9001 quality manufacturer. The manufacturer shall supply documentation to attest to this registration.
- C. Transformers shall be by
  - 1. Eaton (Cooper Power).
  - 2. Schneider Electric (Square D).
  - 3. General Electric Company.
  - 4. ABB.

### 2.02 PAD-MOUNT TRANSFORMERS

A. Pad-mount transformers shall be of a compact design. The transformer kVA rating shall be as indicated on the Drawings. All units shall be a pad mounted compartmental type, which when assembled shall be an integral unit for mounting on a pad. All units shall be designed to comply with the short circuit capability requirements of ANSI C57.12.00.

- B. The average temperature rise of the windings, measured by the resistance method, shall be 55°/65° C when the transformer is operated at rated kVA output in a 40°C ambient. The transformers shall be capable of being operated at rated load in a 30°C average, 40°C maximum ambient, as defined by ANSI C57.12.00 without loss of service life expectancy. Primary bushings shall be rated 200 or 600 amperes as required for each specific transformer capacity.
- C. Coolant and insulating fluid shall be less flammable/high fire point, Envirotemp FR3, as defined per the NEC. The transformer shall be furnished and installed in accordance with the latest edition of Article 450 of the NEC and in accordance with the requirements of the testing and listing agency of the liquid. All transformer liquid shall be bulk tested for polychlorinated biphenyls (PCBs) per ASTM D 4059 and certified, upon request, as having no detectable level of PCB.
- D. The high voltage windings shall be rated 4.16kV and 60 kV BIL unless indicated otherwise on the Drawings for use on a solidly grounded system and shall have two (2) 2-1/2% full capacity taps above and below rated voltage. Nominal impedance shall be 5.75%, or as required to comply with United States Department of Energy (DOE) 2016 Energy Efficiency Standards.
- E. The low voltage windings shall be rated 480/277 VAC and 30 kV BIL unless indicated otherwise on the Drawings. Transformers shall be designed for either step up or step-down use.
- F. Low voltage neutrals shall be connected internally to the secondary neutral lugs and brought out to an insulated low voltage neutral spade type bushing with an externally removable ground strap. The low voltage neutral shall be a fully insulating bushing. A ground pad shall be provided on the outer surface of the tank with one or more removable ground straps suitably sized for the short circuit rating of the transformer provided and connected between the neutral bushing and the ground pad.
- G. High voltage and low voltage windings shall be aluminum.
- H. The transformer and associated terminal compartments shall be so designed and constructed as to be tamper resistant. There shall be no screws, bolts, or other fastening devices which are externally removable. Transformers shall be suitable for outdoor installation without a fence or other area enclosure. Full height, air filled incoming and outgoing terminal compartments with hinged doors shall be located side by side separated by a steel barrier, with the incoming (primary) compartment on the left. The lift-off doors shall be equipped with stainless steel hinges to allow the doors to be removed and door stops to hold the doors open if not removed while working in the compartments. The incoming compartment shall be accessible only after the door to the outgoing (secondary) compartment has been opened. To facilitate making connections and permit cable pulling, the doors shall be removable. Removable door sill on compartments shall be provided to permit rolling or skidding of unit into place over conduit "stub-ups" in foundation.
- I. Locking provisions shall be provided in accordance with Paragraph 7 of ANSI C57.12.26-Latest Revision utilizing a captive penta-head bolt. Enclosure security shall conform with Paragraph 4 of ANSI C57.12.20-Latest Revision.

- J. The high voltage incoming line compartment shall be dead-front, shall enclose the high voltage bushings, and provide for cabling from below. Externally clamped deadfront primary bushings shall be universal bushing wells with dead front, "feed thru" inserts. The compartment shall have a hinged door with a fastening device which is accessible only through the low voltage compartment and makes possible the use of a single padlock.
- K. The Contractor shall furnish dead front elbow cable terminators. Elbow terminators shall be load-break at sizes less than 600A.
- L. Furnish a load break, gang operated, liquid immersed switch that is externally operable from the high voltage compartment through the use of a distribution hot-stick. Switch shall be the 2-position sectionalizing type for use on a loop feed system. Switch shall be capable of feeding transformer from one set of bushings, second set of bushings, isolating transformer, or feed-through. Liquid-immersed switch shall carry ampere rating as required for the application.
- M. Primary fusing for transformers under 1000kVA shall be provided with an oil immersed drawout expulsion BAY-O-NET Dual Sensing type Fuse in series with an ELSP type current limiting backup fuse designed to protect the transformer in the event of secondary or internal faults, or overload conditions. The BAY-O-NET fuse shall be replaceable and hook stick operable. Primary fusing for transformers equal to or greater than 1000kVA shall be provided with an oil immersed, current sensing cartridge type weak link fuse designed to protect the transformer in the event of secondary or internal faults, or overload conditions.
- N. 5 kV distribution class lightning arresters for surge protection shall be provided. For radial feed systems, three (3) arresters shall be provided. For loop feed systems, six (6) arresters shall be provided. Arresters shall be mounted in the high voltage compartment. Surge arrester rating shall be per the IEEE C62.22.
- O. The low voltage incoming line compartment shall be live-front, shall be arranged for cabling from below, and shall contain 3-spade type externally clamped bushings for phase connections and 1-spade type bushing for neutral and/or ground connection. Low voltage bushings shall be supported with an insulating material in a manner designed to counteract any downward forces resulting from the connection of multiple cables to the bushings. Any manufacturer not supplying these supports will have the transformer returned to them at their expense for reworking. Spades shall be of appropriate length with standard NEMA hole spacing or as required. The low voltage door shall have a 3-point latch (top, bottom, middle) to discourage unauthorized entry.
- P. The transformer shall be designed to be capable of withstanding short circuits without damage on any winding, at a magnitude of fault current equal to the full rated voltage divided by the per unit impedance with full voltage maintained on all windings connected to the external source of power.
- Q. The internal high-voltage leads of the transformer shall be adequately insulated and mechanically secured. Connection to the coil conductors shall be made by a process ensuring avoidance of damage to the coil insulation.

- R. All high-voltage phase leads shall be installed rigidly and spaced to provide dielectric and mechanical strength and ensure absolute phase isolation.
- S. All high and low voltage windings shall be secured in place by use of B-stage epoxy pattern paper. The epoxy shall be thermally cured under pressure to ensure the bonding of conductor and paper.
- T. Core laminations shall be annealed, free of burrs, and furnished with a heat-resistant insulating coating. All core sections shall be grounded to the core clamp.
- U. Bolted connections will be acceptable only from lead to bushing connection. All other connections shall be welded or adequately crimped.
- V. The transformer shall be of all welded sealed-tank construction or sufficient strength to withstand a pressure of 7 psi without permanent distortion. The domed cover to aid water run-off shall be welded and the fastenings tamperproof. The transformer shall remain effectively sealed for a top liquid temperature range of -30°C to 105°C. When required, cooling panels will be provided on the back and sides of the tank.
- W. Lifting provisions shall be permanently attached and arranged on the tank to provide a distributed, balanced lift in a vertical direction for the completely assembled transformer.
- X. Terminal designations shall be as defined by ANSI C57.12.70. The high and low voltage terminal designations shall be indicated on the tank wall with oil resistant yellow paint or decals. A permanently marked diagrammatic instruction nameplate shall be located inside the low voltage compartment and be in accordance with all provisions contained in ANSI C57.12.26, Paragraph 7.4.
- Y. The inside base of the transformer sill shall have a flange for anchoring the cabinet to the pad.
- Z. Tank grounding provisions shall be as stated in ANSI standards. The grounding provisions shall be capped before painting the unit. The unit shall be shipped with the caps in place.
- AA. The transformer shall be equipped with an externally operated, padlockable tap changer. The tap changer shall be designed for de-energized operation. The operating handle shall give permanent visual indication of the voltage position and have a provision for securing it at the desired position. The tap changer shall be marked for de-energized operation and the handle shall be easily accessible and located inside the high-voltage compartment. By operating the handle, all three phases shall be operated simultaneously. Tap position shall be clearly marked and a locking mechanism provided to prevent accidental operation.
- AB. Furnish each transformer with the following accessories:
  - 1. A liquid level indicator.
  - 2. A dial type liquid temperature gauge.
  - 3. An oil drain valve located in the primary compartment with a built-in sampling device.

- 4. A 1-inch NPT upper plug (or cap) for filling and pressure testing.
- 5. A pressure vacuum gauge.
- 6. A pressure relief valve.
- 7. An automatic pressure relief device (self-resealing w/indicator).
- 8. A key-interlock to high voltage door.
- 9. Alarm contacts for accessory gauges.
- 10. Hot stick for operating the internal switches and pulling fuses.
- AC. All transformers shall be coated with a primer and finish coat to provide a tough, non-chalking weather resistant finish. The finish coat shall be ANSI green. The paint thickness shall be a minimum of 2.5 mils.
- AD. The transformers shall be provided with the following labels, designed for outdoor application, permanently affixed to the front of each unit.
  - kVA Rating label
     (Shall be centered 4-6 inches above the Secondary Voltage decal).
  - Secondary Voltage label
     (Shall be centered 4-6 inches above the Danger Hazardous Voltage decal)

### PART 3 -- EXECUTION

### 3.01 INSTALLATION

- A. The transformers shall be furnished and installed as shown on the Drawings and as recommended by the equipment manufacturer.
- B. Prior to final completion of the work, all metal surfaces of the transformer shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.
- C. Adjust primary taps such that the secondary voltage is within two (2) percent of rated voltage.

# 3.02 TESTING

- A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 1. The following tests are required:
  - 1. Witnessed Shop Tests
    - a. None required.
  - 2. Certified Shop Tests and Reports
    - Submit description of proposed testing methods, procedures, and apparatus.
    - b. Submit notarized and certified copies of all test reports.
    - c. The transformers shall be given routine factory tests in accordance with the requirements of the ANSI and NEMA standards. Temperature rises may be certified from basic design. The tests shall be:
      - Resistance measurements of all windings on the rated voltage connection of each unit and at the tap extremes of one unit only of a given rating.
      - ii. Ratio tests on the rated voltage connection and on all tap connections.

- iii. Polarity and phase-relation tests on the rated voltage connections.
- iv. No-load loss at rated voltage on the rated voltage connection.
- v. Exciting current at rated voltage on the rated voltage connection.
- vi. Impedance and load loss at rated current on the rated voltage connection of each unit and on the tap extremes of one unit only of a given rating.
- vii. Applied potential test.
- viii. Induced potential tests.

# 3. Field Tests

a. Field tests shall be performed in accordance with the requirements specified in the General Conditions, Division 1, and NETA Acceptance Testing Standard, latest edition.

**END OF SECTION** 

### **SECTION 16425**

### **SWITCHBOARDS**

# PART 1 - GENERAL

### 1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, and test a UL 891 indoor switchboard configured in a main-tie-main arrangement with group mounted distribution sections associated with each main breaker. The switchboard shall be as shown on the drawings and shall allow for top and bottom entry connection of feeder conductors to each main breaker and top and bottom exit for feeder circuits from the group mounted distribution sections. The tie breaker shall be between the two main breakers.

### 1.02 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI): Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
  - 2. American Society for Testing and Materials (ASTM): A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel-Plated Steel Plate, Sheet, and Strip.
  - 3. National Electrical Manufacturers Association (NEMA):
    - AB 1. Molded-Case Circuit Breakers and Molded-Case Switches.
    - b. PB 2, Deadfront Distribution Switchboards.
    - c. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 4. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC)
  - 5. Underwriters Laboratories (UL):
    - a. 489, Standard for Safety Molded-Case Circuit Breakers and Circuit Breaker Enclosures.
    - b. 891, Standard for Safety Dead-front Switchboards.
    - c. 1025, Standard for Safety Electric Air Heaters.
    - d. 1561, Standard for Safety Dry-Type General Purpose and Power Transformers.
  - 6. Uniform Building Code (UBC): Section 2312, Earthquake Requirements.

### 1.03 SUBMITTALS

- A. Shop Drawings:
- B. Descriptive product information.
  - 1. Itemized Bill-of-Material,
  - 2. Dimensional drawings.
  - 3. Operational description.
  - 4. Anchoring instructions and details.
  - 5. One-line, three-line, and control schematic drawings.
  - 6. Connection and interconnection drawings.
  - 7. Circuit Breakers: Copies of time-current characteristics.
  - 8. Ground Fault Protection: Relay time-current characteristics.
  - 9. Bus data.
  - 10. Incoming line section equipment data.
  - 11. Transformer section equipment data.
  - 12. Conduit entrance locations.
- C. Quality Control Submittals:
  - 1. Manufacturer's installation instructions.
  - 2. Certified Factory Test Report.
  - 3. Operation and Maintenance Manual.
  - 4. Manufacturer's Certification of Proper Installation.

### 1.04 UL COMPLIANCE

A. Products manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL Listing Mark.

# 1.05 SPARE PARTS

- A. Furnish, tag, and box for shipment and storage the following spare parts:
  - 1. Fuses: One complete set of spare fuses of each current rating, both power and control.
  - 2. Lights: One complete set of spare indicating lights.

- 3. Paint: One pint, to match enclosure exterior finish in color and quality.
- 4. Indicating Lamp Pullers: Two each.
- 5. Indicating Lamp Resistors and Sockets: Two each.

### 1.06 WARRANTY

A. All equipment furnished under this section shall be warranted for on site parts and labor by the contractor and the equipment manufacturers for a period of two (2) years after completion of startup.

# PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Eaton.
- B. Schneider Electric (Square D).
- C. General Electric.
- D. No approved equal.

### 2.02 GENERAL

- A. Equipment suitable for 480-volt, three-phase, three-wire, solid grounded-wye electrical system having an available short-circuit current at line terminals as shown on the Drawings.
- B. Switchboard shall be service entrance rated where indicated on the drawings.
- C. Comply with NEMA PB 2 and UL 891.
- D. Switchboard and all it's major components to be manufactured and assembled by a single manufacturer in order to achieve standardization for appearance, operation and maintenance, spare parts replacement, and manufacturer's services. No assembler of electrical components manufactured by others shall be allowed.
- E. Lifting lugs on all equipment and devices weighing over 100 pounds.
- F. Operating Conditions:
  - 1. Ambient Temperature: Maximum 40 degrees C.
  - 2. Equipment shall be fully rated without derating for the above operating conditions.

# 2.03 STATIONARY STRUCTURE

A. Type: NEMA PB 2 construction, dead front, completely metal enclosed, self-supporting.

B. Sections bolted together to form one rigid assembly capable of being moved into position and bolted directly to the floor without use of floor sills.

# 2.04 ENCLOSURE

- A. Equipment Finish: Baked enamel applied over a rust-inhibiting phosphate base coating.
  - 1. Color:
    - a. Exterior: ANSI Z55.1, manufacturer's standard.
    - b. Interior: White.
    - c. Unpainted Parts: Plated for corrosion resistance.
- B. Indoor Enclosure: NEMA 250, Type 1:
  - 1. Rear, full-height, bolt on panels for each enclosure section.
  - 2. Cable Termination Access: Padlock provision.
  - 3. Front Accesses:
    - a. Service line and load terminations, internal devices, device and bolted bus connections, and protective device removal, serviceable from the front only.
    - b. Sections aligned across the back to permit placement flush against wall.
    - c. Working Space: As required by NFPA 70.
  - 4. Transition sections as required or shown.
  - 5. Side and Top Covers: Removable, captive, screw-on plates with formed edges on each side.
  - 6. Front Cover: Hinged door with formed edges.

### 2.05 BUSWORK

- A. Material: Phase non-insulated silver-plated copper throughout entire length of sufficient cross section to limit temperature rise at rated current to 65 degrees C over 40 degrees C ambient.
- B. Bus Arrangement: A-B-C, left-to-right, top-to-bottom, and front-to-rear, as viewed from front.
- C. Brace for short-circuit currents 65,000 amperes rms symmetrical, minimum.
- D. Main Horizontal Bus: Non-tapered, continuous current rating as shown.

- E. Neutral Bus: Where specified on plans shall be continuous current rating as shown.
- F. Ground Bus: A copper ground bus (minimum 1/4 x 2 inches) shall be furnished firmly secured to each vertical section structure.
- G. Bus Connections and Joints: Bolted with Belleville washers.
- H. Extend each bus entire length of switchboard.

### 2.06 PROTECTIVE DEVICES

### A. Molded-Case Circuit Breakers:

- 1. Branch Feeder Protective Devices unless noted otherwise: Group mounted, suitable for use with 75 degree C wire at full 75 degree C ampacity when mounted in switchboard.
- 2. Arrangement: Fully rated branch feeder with selectivity and coordination with main breaker(s).
- 3. Breakers 225-Ampere Frame and Above: Continuously adjustable magnetic pickups five to ten times trip rating.
- 4. Interrupting Rating: As shown.
- 5. Breakers 2,000- through 4,000-Ampere Frame: UL 489 listed and labeled 100 percent application in accordance with NFPA 70.

#### B Insulated Case Breakers:

- Feeder breakers as noted on plans and main/tie/transfer breakers shall be insulated case, 600-volt, 3-phase, and 60-HZ, as described in this section. All breakers shall be supplied with, but not be limited to, a minimum of the following features:
  - a. All breakers shall be UL listed for application in their intended enclosure.
  - b. Breakers shall be two-step stored energy type and be fully capable of operation at 100% of the maximum continuous ampere rating.
  - c. Breakers shall be equipped with anti-pump devices.
  - d. Breakers shall have a minimum symmetrical interrupting capacity at rated voltage as shown on the drawings.
  - e. Each breaker shall include the following dry contact outputs for connection to the SCADA system:
    - i. Open Status.
    - ii. Closed Status.

- iii. Tripped Status.
- 2. All breakers shall be "trip-free" when removed from their housing and interlocked to prevent removal when in the closed position.
- 3. Circuit breaker(s) shall have power terminals to accommodate either cable or bolted bus connections.
- 4. Provide a fixed instantaneous (High Level Selective Override) Circuit on breaker(s). The circuit shall have a defeatable instantaneous adjustment to allow the breaker to remain closed for up to 30 cycles during overcurrent below the rms symmetrical short time withstand ratings. The circuit shall instantaneously trip when current levels exceed applicable withstand ratings.
- 5. Circuit breaker(s) shall utilize a glass reinforced insulating material providing high electric strength. Current carrying components shall be completely isolated from the handle and the accessory mounting area. Breaker(s) shall have common tripping of all poles and shall be trip free. The circuit breaker shall be UL Listed for reverse connection without requiring special construction or labeling. The breaker(s) shall have quick-make, quick-break contacts with a maximum 5-cycle closing time. All circuit breakers shall be equipped with electrical accessories as noted on the drawings.
- 6. Circuit breaker(s) shall be factory sealed and shall have a date code on the face of the circuit breaker. Poles shall be labeled with respective phase designations.
- 7. Breaker faceplate shall indicate rated ampacity. Breaker faceplate shall indicate UL and IEC certification standards with applicable voltage systems and corresponding AIC ratings.
- 8. Each circuit breaker shall be equipped with a push-to-trip button to mechanically operate the circuit breaker tripping mechanism.
- 9. All circuit breakers shall be equipped with electrical accessories as noted on the drawings.
- 10. Breakers shall be manually operated unless electrically operated is indicated on the drawings. The breaker control faceplate shall include color-coded visual indicators to indicate contact OPEN and CLOSED positions as well as mechanism CHARGED and DISCHARGED positions. Manual control pushbuttons on the breaker's face shall be provided for "opening" and "closing" the breaker.
- 11. All breakers shall be provided with a two-step stored energy mechanism providing a maximum of 5 cycle closing and have multiple charge-close provisions, providing the following sequence: charge-close-recharge-open-close-open. At all times the breakers shall be capable of opening after closure without a recharging operation. A charge/discharge indicator shall be visible at all times. All energy required for closing the breakers shall be completely stored and held in readiness pending a release to close action. Manually

- operated breakers shall be convertible to electrical operation by insertion of an internally mounted motor operator without voiding the UL Label.
- 12. Electrically operated breakers shall be complete with OPEN/CLOSE pushbuttons on the breaker face plus red and green indicating lights to indicate breaker contact position.
- 13. Each circuit breaker shall be electrically operated to permit remote CHARGE, CLOSE, and OPEN capabilities. Electrically operated circuit breaker shall be equipped with charge contact switch for remote indication of mechanism charge status.
- 14. A selective override circuit shall be provided on breakers having short time adjustments but without instantaneous adjustments that will allow selectively up to its RMS symmetrical short-time rating.
- 15. Lockout provision shall be provided for opening and closing the breakers.
- 16. The insulated case breakers shall have high-endurance characteristics being capable of no-load full-interruptions at rated current equal to or exceeding UL endurance ratings for molded case breakers without maintenance.
  - a. Long-time pickup.
  - b. Long-time delay.
  - c. Instantaneous pickup with short time for feeders.
  - d. Short-time pickup for main and feeders.
  - e. Short-time delay for main and feeders with I2T function, and IN-OUT switch.
  - f. Ground fault pickup.
  - g. Ground fault delay with I2T function.
- C. Phase Current Sensors:
  - 1. Single-ratio type.
  - 2. Fixed, mounted on breaker frame.
  - 3. Molded epoxy construction.
  - 4. One toroidal type for each phase.
- D. Portable Test Set: AC/DC static, full function unit for checking programmer's timecurrent characteristics of programmer.
- E. Where indicated on the drawings, furnish integral alternate maintenance switch that, when selected, will override the instantaneous setting of the associated breaker and

force the setting to minimum (fastest acting). The setting shall remain until the normal mode is selected on the switch where the original instantaneous settings shall be restored.

# 2.08 CONTROL WIRING

- A. Control, Instrumentation, and Power/Current Circuits: NFPA 70, Type SIS, single-conductor, Class B, stranded copper, rated 600 volts.
- B. Transducer Output/Analog Circuits: Shielded cable rated 600 volts, 90 degrees C minimum.
- C. Conductor Lugs: Pre-insulated, self-locking, spade-type, with reinforced sleeves.
- D. Identification: Individually, with permanent wire markers at each end.
- E. Enclose in top and vertical steel wiring troughs, and front-to-rear in nonmetallic wiring troughs.
- F. Splices: Not permitted in switchboard wiring.

### 2.09 TERMINAL BLOCKS

- A. Enclosed in steel wiring troughs.
- B. Rated 600 volts, 30 amperes minimum, one-piece barrier type with strap screws.
- C. Shorting type for current transformer leads.
- D. Provide terminal blocks for:
  - 1. Conductors connecting to circuits external to switchboard.
  - 2. Internal circuits crossing shipping splits.
  - 3. Equipment parts requiring replacement and maintenance.
- E. Spare Terminals: Not less than 20 percent.
- F. Group terminal blocks for external circuit wiring leads.
- G. Maintain 6-inch minimum space between columns of terminal blocks.
- H. Identification: Permanent, for each terminal and columns of terminal blocks.
- I. Manufacturer: General Electric; Type EB-5.

# 2.10 IDENTIFICATION

- A. Nameplates:
  - 1. Master:

- a. Deep-etched aluminum, with manufacturer's name and model number.
- b. Riveted to main vertical section.
- 2. Circuit Breaker Cubicles and Door-Mounted Device:
  - a. Engraved, acrylic.
  - b. Color: White with black.
  - c. Characters: Block-type, 1/4-inch high.
  - d. Size: Manufacturer's standard.
  - e. Inscription: As shown on one-line diagram.
  - f. Blank plates for future spaces.
  - g. Attachment Screws: Self-tapping.

# B. Section Identification:

- 1. Stamped metallic, riveted to each vertical section.
- 2. Furnish master nameplate giving switchboard designation, voltage, ampere rating, short-circuit rating, manufacturer's name, general order number, and item number.
- Size: Manufacturer's standard.

# C. Cubicle Labels:

- 1. Nonmetallic, applied inside each cubicle compartment.
- 2. Device serial number, rating, and description.
- D. Metering Instruments: Meter type identified on meter face below pointer or dial.
- E. Control Switches: Deep etched, aluminum escutcheon plate.
- F. Relays and Devices:
  - 1. Stamped metallic, riveted to instrument case.
  - 2. Manufacturer's name, model number, relay type, and rating data.
- G. Switchboard Sign:
  - 1. One sign on front of switchboard.
  - 2. Engraved, acrylic.

- 3. Size: Manufacturer's standard.
- 4. Color: Red with white.
- 5. Characters: Gothic-type, I-inch high.
- 6. Inscription: DANGER/HIGH VOLTAGE/KEEP OUT.
- 7. Attachment: Four rivets each sign.

### 2.11 POWER METER/ POWER MONITORING SYSTEM

- A. Power meter shall be multi-function 3 phase solid state unit with ability to connect to either a 3-phase, 4-wire wye or 3-phase, 3-wire delta circuits. Solid-state device with LED displays.
- B. Direct voltage input up to 600 volts ac.
- C. Current input via current transformer with 5-ampere secondary.
- D. Programmable current and potential transformer ratios.
- E. Programmable limits to activate up to four alarms.
- F. Selectable voltage measurements; line-to-line or line-to-neutral, and wye or delta.
- G. Simultaneous Display:
  - 1. Volts, three-phase.
  - 2. Amperes, three-phase.
  - 3. Kilowatts.
  - 4. Kilowatt-hours.
  - Power factor.
  - 6. Frequency.
  - 7. kW demand, with programmable period intervals.
  - 8. kVA, kVAR, kVARh.
  - 9. Ground leakage mA.
  - 10. THD.
  - 11. K-factor.
- H. Voltage Rating: 95 to 135 volts, ac.
- I. Individual voltage, current, and kW 4-20 mA output. KYZ pulse output representing units of energy.
- J. Power meter shall have memory storage capacity minimum of 512MB. Display shall be minimum 3.77" x 3.77" or larger.
- K. Power meter shall communicate over Ethernet TCP/IP communications protocol for future connection to the plant SCADA system.
- L. Manufacturers:

- 1. Cutler-Hammer.
- 2. Square D.
- 3. GE.
- 3. Or Owner approved equal.

# 2.12 SURGE PROTECTION DEVICE

A. Refer to Section 16050, "Basic Electrical Materials and Methods".

# 2.13 FACTORY TESTING

A. Perform performance tests in accordance with UL 891 and production tests in accordance with NEMA PB-2.

# **PART 3 - EXECUTION**

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations.
- B. Secure to mounting pads with anchor bolts of sufficient size and number adequate for specified seismic conditions.
- C. Install plumb and in longitudinal alignment with pad or wall.
- D. Coordinate terminal connections with installation of secondary feeders.

# 3.02 FIELD QUALITY CONTROL

A. In accordance with Section 16950, "Electrical Testing."

# 3.03 MANUFACTURERS' SERVICES

- A. Furnish manufacturer's representative for the following services at jobsite, for minimum person-days listed below, travel time excluded:
  - 1. 2 person-days for installation assistance, final adjustment, and initial energization of equipment.
  - 2. 1 person-day for functional and performance testing.
  - 3. 1 person-day for adjustment of relay settings.
- B. Furnish startup services and training of OWNER's personnel at such times as requested by OWNER.
  - 1. The manufacturer's qualified representative shall conduct the training.

- 2. The cost of training programs to be conducted with Owner's personnel shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.
- 3. The supplier shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.
- 4. The supplier shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to Owner.
- 5. The training program shall represent a comprehensive program covering all aspects of the operation, maintenance and cleaning procedures for the system.
- 6. All training schedules shall be coordinated with, and at the convenience of the Owner. Shift training may be required to correspond to the Owner's working schedule.
- 7. Training shall be a minimum of two (2) session four (4) hours in length.

# 3.04 RUBBER MATS

A. A three foot wide rubber mat shall be furnished and installed on the floor and in front of each switchboard, MCC, VFD and control panel assembly. The mat shall be long enough to cover the full length of each line-up. The mat shall be 1/4 inch thick with beveled edges, canvas back, solid type with corrugations running the entire length of the mat. The mat shall be guaranteed extra quality, free from cracks, blow holes, or other defects detrimental to their mechanical or electrical strength. The mat shall meet OSHA requirements and the requirements of ANSI/ASTM D-178 J6-7 for Type 2, Class 2 insulating matting.

**END OF SECTION** 

# SECTION 16450

#### **GROUNDING**

# PART 1 - GENERAL

# 1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
  - 1. American National Standards Institute (ANSI): C2, National Electrical Safety Code (NESC).
  - 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

### 1.02 SUBMITTALS

- A. Shop Drawings:
  - Product Data:
    - a. Exothermic weld connectors.
    - b. Mechanical connectors.

# 1.03 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

# PART 2 - PRODUCTS

# 2.01 GROUND ROD

- A. Material: Copper clad.
- B. Diameter: 3/4 inch.
- C. Length: 20 feet.

# 2.02 GROUND CONDUCTORS

A. As specified in Section 16120, CONDUCTORS.

# 2.03 CONNECTORS

A. Exothermic Weld Type:

- 1. Outdoor Weld: Suitable for exposure to elements or direct burial.
- 2. Indoor Weld: Utilize low-smoke, low-emission process.
- 3. Manufacturers:
  - a. Erico Products, Inc.; Cadweld and Cadweld Exolon.
  - b. Thermoweld.
  - c. Approved equal.
- B. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.
  - Manufacturers:
    - a. Burndy Corp.
    - b. Thomas and Betts Co.
    - c. Approved equal.

# 2.04 GROUNDING WELLS:

- A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.
- B. Manufacturers:
  - 1. Christy Co.; No. G5.
  - 2. Lightning and Grounding Systems, Inc.; I-R Series
  - 3. Approved equal.

# PART 3 - EXECUTION

### 3.01 GENERAL

- A. Grounding shall be in compliance with NFPA 70 and ANSI C2.
- B. Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.
- C. Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

- D. Bond together system neutrals, service equipment enclosures, exposed non-current-carrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.
- E. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.

## F. Shielded Control Cables:

- 1. Ground shield to ground bus at power supply for analog signal.
- 2. Expose shield minimum I inch at termination to field instrument and apply heat shrink tube.
- 3. Do not ground control cable shield at more than one point.

## 3.02 WIRE CONNECTIONS

- A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment grounding conductor connected at both ends to non-current-carrying grounding bus.
- C. Connect ground conductors to raceway grounding bushings.
- D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.
- E. Connect enclosure of equipment containing ground bus to that bus.
- F. Bolt connections to equipment ground bus.
- G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.
- H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

### 3.03 MOTOR GROUNDING

- A. Extend equipment ground bus via grounding conductor installed in motor feeder raceway; connect to motor frame.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to non-current carrying grounding bus.

- C. Motors Less Than 10 hp: Furnish compression, spade-type terminal connected to conduit box mounting screw.
- D. Motors 10 hp and above: Tap motor frame or equipment housing; furnish compression, one-hole, lug type terminal connected with minimum 5/16-inch brass threaded stud with bolt and washer.
- E. Circuits 20 Amps or Above: Tap motor frame or equipment housing; install solderless terminal with minimum 5/16-inch diameter bolt.
- F. All existing VFD motors shall have an AEGIS SCR motor shaft ground ring installed.

## 3.04 GROUND RODS

- A. Install full length with conductor connection at upper end.
- B. Install with connection point below finished grade, unless otherwise shown.

#### 3.05 GROUNDING WELLS

- A. Install inside buildings, asphalt, and paved areas.
- B. Install riser ring and cover flush with surface.
- C. Place 9 inches crushed rock in bottom of each well.

### 3.06 CONNECTIONS

### A. General:

- 1. Above grade Connections: Use either exothermic weld or mechanical-type connectors.
- 2. Below grade Connections: Install exothermic weld type connectors.
- 3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
- 4. Notify ENGINEER prior to backfilling ground connections.

## B. Exothermic Weld Type:

- 1. Wire brush or file contact point to bare metal surface.
- 2. Use welding cartridges and molds in accordance with manufacturer's recommendations.

- 3. Avoid using badly worn molds.
- 4. Mold to be completely filled with metal when making welds.
- 5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.

# C. Mechanical Type:

- 1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
- 2. Install in accordance with connector manufacturer's recommendations.
- 3. Do not conceal mechanical connections.

## 3.07 METAL STRUCTURE GROUNDING

- A. Ground metal sheathing and exposed metal vertical structural elements to grounding system.
- B. Bond electrical equipment supported by metal platforms to the platforms.
- C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

### 3.08 MANHOLE AND HANDHOLE GROUNDING

- A. Install one ground rod inside each.
- B. Ground Rod Floor Protrusion: 4 to 6 inches above floor.
- C. Make connections of grounding conductors fully visible and accessible.
- D. Connect all non current-carrying metal parts, and any metallic raceway grounding bushings to ground rod with No. 6 AWG copper conductor.

### 3.09 TRANSFORMER GROUNDING

- A. Bond neutrals of transformers within buildings to system ground network, and to any additional indicated grounding electrodes.
- B. Bond neutrals of substation transformers to substation grounding grid and system grounding network.
- C. Bond neutrals of pad-mounted transformers to four locally driven ground rods and buried ground wire encircling transformer and system ground network.

## 3.10 SURGE PROTECTION EQUIPMENT GROUNDING

A. Connect surge arrestor ground terminals to equipment ground bus.

## 3.11 INSTRUMENT GROUND - SURGE SUPPRESSION

A. Connect all instrument surge protection with #6 insulated copper ground wire (in conduit where above grade) to closest plant ground system

### 3.12 BONDING

- A. Bond to Main Conductor System:
  - 1. All roof mounted ventilators, fans, air handlers, masts, flues, cooling towers, handrails, and other sizeable metal objects.
  - 2. Roof flashing, gravel stops, insulation vents, ridge vents, roof drains, soil pipe vents, and other small metal objects if located within 6 feet of main conductors or another grounded object.
  - 3. Provide air terminals as required.
- B. Bond steel columns or major framing members to grounding system per National Electrical Code.
- C. Bond each main down conductor to grounding system.

#### 3.13 GROUNDING SYSTEM

- A. Grounding Conductor:
  - 1. Completely encircle well and building structure.
  - 2. Bury minimum 30" below finished grade.
  - 3. Minimum 2 feet distance from foundation walls.
- B. Interconnect ground rods by direct-buried copper cables.
- C. Connections:
  - 1. Install ground cables continuous between connections.
  - 2. Exothermic welded connections to ground rods, cable trays, structural steel, handrails, and buried and non-accessible connections.
  - 3. Provide bolted clamp type mechanical connectors for all exposed secondary connections.

- 4. Use bolded offset parapet bases or through-roof concealed base assemblies for air terminal connections.
- 5. Provide interconnections with electrical and telephone systems and all underground water and metal pipes.
- 6. Provide electric service arrestor ground wire to building water main.

# 3.14 FIELD QUALITY CONTROL

A. As specified in Section 16950, ELECTRICAL TESTING.

**END OF SECTION** 

### **SECTION 16485**

### VARIABLE FREQUENCY DRIVES

# PART 1 - GENERAL

### 1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment and incidentals required, and install, place in operation and field test variable frequency drive(s) (VFD's).
- B. The variable frequency drive shall be a space vector Pulse-Width Modulated (PWM) design. Modulation methods which incorporate "gear-changing" techniques are not acceptable. The final responsibility of distributor or packager modifications to a third-party standard product will reside with the VFD manufacturer. The VFD manufacturer shall have overall responsibility for the drives. All drives shall be supplied by one manufacturer. The VFD shall be manufactured within the United States of America to alleviate concerns of future serviceability and parts availability.
- C. VFD below 100HP shall be six (6) pulse units with 5% input line reactor and output reactor/output filter. VFD 100HP and above shall be eighteen (18) pulse with output reactor/output filter.
- D. VFD for 100HP Pump No.1 shall be sized for future 200HP motor and set overloads for a 100HP motor.
- E. Provide upper and lower vibration monitors in VFDs No. 5 and 6 as described in drawings, complete in place.

### 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 16 – Electrical

#### 1.03 QUALITY ASSURANCE

- A. The entire VFD system as described in section 2.01B shall be factory assembled and system tested by the VFD manufacturer to assure a properly coordinated system.
- B. Codes: Provide equipment in full accordance with the latest applicable rules, regulations, and standards of:
  - 1. Local Laws and Ordinances.
  - 2. State and Federal Laws.
  - 3. National Electric Code (NEC).
  - 4. Underwriters Laboratories (UL).
  - 5. American National Standards Institute (ANSI).
  - 6. National Electrical Manufacturers Association (NEMA).
  - 7. Institute of Electrical and Electronics Engineers (IEEE).

- C. The complete drive system shall be UL listed.
- D. Acceptable Manufacturers:
  - 1. Eaton.
  - 3. Square D.
  - 3. Allen-Bradley.
  - 4. Danfoss.
  - 5. No approved equal.

#### 1.04 SUBMITTALS

- A. Submittals shall be custom prepared by the VFD manufacturer for this specific application.
- B. Submittal information shall include, but not be limited to:
  - 1. Equipment dimensions, including stub-up locations, shipping splits and shipping weights.
  - 2. Catalog cuts of major components.
  - 3. Spare parts list, per Paragraph 3.03.
  - 4. Certifications, including:
    - a. Warranty, per section 1.05.
    - b. Efficiencies, per section 2.02.A.1.

#### 1.05 WARRANTY

A. All equipment furnished under this section shall be warranted for on site parts and labor by the contractor and the equipment manufacturers for a period of five (5) years after completion of startup.

## PART 2 - PRODUCTS

- 2.01 Material and Equipment
  - A. Any modifications to a standard product required to meet this specification shall be performed by the VFD manufacturer only. Distributor or system integrator changes to the VFD manufacturer's product are specifically disallowed.
  - B. The VFD system shall consist of a power factor correction / harmonic filter unit, input rectifier-grade phase-shifting transformer, 6 or 18 pulse converter section as appriopriate per 1.01C, output inverter and control logic section, harmonic filtering unit, input line reactor, and output filter. All components listed including power factor correction / harmonic filter shall be integral to the VFD lineup, factory wired and tested as a complete system. The entire VFD system shall meet the requirements of NEC article 409, IEEE 519 and UL 508A for fault current withstand ratings as indicated on the project electrical drawings.
  - C. Input circuit breaker, interlocked with the enclosure door, with through-the-door handle to provide positive disconnect of incoming AC power and shall be capable of being locked in the open position.

D. VFD system shall maintain a 0.95 minimum true power factor throughout the entire speed range.

### 2.02 VARIABLE FREQUENCY DRIVES

### A. Ratings

- 1. The drive system shall be 96% efficient at full load and full speed and 95.5% efficient at 51% load and 80% speed. Losses to be utilized in drive system efficiency calculation shall include input transformer, harmonic filter and power factor correction if applicable, VFD converter and output filter if applicable. Auxiliary controls, such as internal VFD control boards, cooling fans or pumps, shall be included in all loss calculations. The VFD rating shall be 110% rated for the actual full load current of the motor.
- 2. Rated Input Power: 480 Volts 60 Hz, +10%, -5% at rated load, 3-phase.
  - a. Voltage Dip Ride-Through: VFD shall be capable of sustaining continued operation with a 40% dip in nominal line voltage. Output speed may decline only if current limit rating of VFD is exceeded.
  - b. Power Loss Ride-through: VFD shall be capable of a minimum 3 cycle power loss ride-through without fault activation.
- 3. Output Power: As required by motors supplied.
- 4. Ambient Temperature Range: 0 to 40°C.
- 5. Elevation: Up to 3300 feet (1000 meters) above MSL without derating.
- 6. Atmosphere: Non-condensing relative humidity to 95%.
- 7. AC Line Frequency Variation: +/- 3 Hertz.
- 8. Power Unit Rating Basis: 110% rated current continuous, 150% rated current for one minute, at rated temperature.

### B. Construction

- 1. The controller shall produce an adjustable AC voltage/frequency output. It shall have an output voltage regulator to maintain correct output V/Hz ratio despite incoming voltage variations.
- 2. The controller shall have a continuous output current rating of 100% of motor nameplate current.
- 3. The converter section shall be 6 or 18 pulse minimum utilizing diodes.
- 4. The inverter output shall be generated by IGBTs. Pulse Width Modulation strategy will be of the space vector type implemented to generate a sine-coded output voltage. The VFD shall not induce excessive power losses in the motor. The worst-case RMS motor line current measured at rated speed, torque and voltage shall not exceed 1.05 times the rated RMS motor current for pure sine wave operation. The inverters shall be able to sustain 1600 volt surges.
- 5. The controller(s) shall be suitable for use with any standard NEMA-B squirrel-cage induction motor(s) having a 1.0 Service Factor or with existing standard NEMA-B squirrel-cage induction motor(s) with nameplate data as shown on the plans. Provide drives with dV/dT output filters manufactured by Trans-Coil type KLC. At any time in the future, it shall be possible to substitute any standard motor (equivalent horsepower, voltage and RPM) in the field.
- 6. The control logic section shall be fully digital and not require analog adjustment pots or fixed selector resistors. A power failure will not necessitate a reload of any drive parameter or configuration.
- 7. Minimum Starting Speed: When called to operate, the VFD shall immediately ramp to a minimum speed. The minimum speed shall be adjustable but initially set at

60% of maximum speed. The 4-20 MA speed signal from the PLC and potentiometer on the front of the drive shall modulate the signal between the minimum speed setpoint and the maximum output speed of the drive; i.e., at the 4 MA signal, the VFD shall run at the minimum speed. At the 20 MA signal, the VFD shall run at full speed. The potentiometer shall also adjust speed between the minimum speed setpoint and the maximum running speed. Below the minimum speed setpoint, the potentiometer shall have no effect.

8. All 6-pulse VFD's shall be provided with 5% input line reactors.

### C. Basic Features

- 1 The door of each power unit shall include: a keypad with a manual speed device, "CONTROL POWER ON" light, "AVAILABLE" light, "VFD RUNNING" light, "MOTOR OVER TEMPERATURE" light, "VFD FAIL" light, and "RESET" pushbutton. All lights shall be LED type. See electrical drawings for VFD control wiring diagrams and adjust VFD indication lights, switches, etc. accordingly.
- 2. The VFD shall include a customer selectable automatic restart feature. When enabled, the VFD shall automatically attempt to restart after a trip condition resulting from instantaneous overcurrent, overvoltage, out of saturation or overload. For safety, the drive shall shut down and require manual reset and restart if the automatic reset/restart function (programmable for up to 3 attempts) is not successful within a customer programmable time period. Auto-Restart shall be programmable to allow for individual fault selection.
- 3. A door-mounted membrane keypad with integral 2-line minimum, 24-character LCD display shall be furnished, capable of controlling the VFD and setting drive parameters. The keypad shall include the following features:
  - a. The digital display must present all diagnostic message and parameter values in English engineering units when accessed, without the use of codes.
  - b. The digital keypad shall allow the operator to enter exact numerical settings in English engineering units. A user menu written in plain English (rather than codes) shall be provided in software in nonvolatile memory as a guide to parameter setting and resettable in the field through the keypad. Multiple levels of password security shall be available to protect drive parameters from unauthorized personnel. The drive set up parameters must be able to be transferred to new boards to reprogram spare boards.
  - c. The following digital door-mounted keypad indications may be selectively displayed:
    - 1) Speed demand in percent.
    - 2) Output current in amperes.
    - 3) Output Frequency in hertz.
    - 4) Input voltage.
    - 5) Output voltage.
    - 6) Total 3-phase KW.
    - 7) Kilowatt hour meter
    - 8) Elapsed time running meter.
    - 9) RPM.
    - 10) DC bus voltage.

- d. VFD shall have Ethernet TCP/IP communication port in addition to the hard-wired signals shown on drawings. Ethernet TCP/IP communication port is for future use.
- e. VFD parameters, fault log and diagnostic log shall be downloadable via the RS-232, RS-422, or RS-485 port.
- 4. Refer to the VFD wiring diagram in the drawings for remote signals and alarms.

#### D. Enclosure

- All VFD components shall be factory mounted and wired on a dead front, grounded, NEMA-1 enclosure. If a free-standing enclosure is provided, it shall be suitable for mounting on a concrete housekeeping pad. Maximum enclosure dimensions for various VFD sizes shall be as follows:
  - a. 200 HP (18-pulse): 48"W x 32"D x 90"H
  - b. 300 HP (18-pulse): 60"W x 32"D x 90"H
- E. Protective Features and Circuits: The controller shall include the following alarms and protective features:
  - 1. Instantaneous overcurrent and overvoltage trip.
  - 2. Undervoltage and power loss protection.
  - 3. Power unit overtemperature alarm and protection. Upon sensing an overtemperature condition, the VFD is to automatically trip.
  - 4. Electronic motor inverse time overload protection.
  - 5. Responsive action to motor winding temperature detectors or thermostatic switches. A dry contact (NC) input to the VFD is required.
  - 6. When power is restored after a complete power outage, the VFD shall be capable of catching the motor while it is still spinning and restoring it to proper operating speed without the use of an encoder.
  - 7. The VFD shall be protected from damage due to the following, without requiring an output contactor:
    - a. Three-phase short circuit on VFD output terminals.
    - b. Loss of input power due to opening of VFD input disconnecting device or utility power failure during VFD operation.
    - c. Loss of one (1) phase of input power.
  - 8. The VFD shall continue to operate at a reduced capacity under a single-phase fault condition.
  - 9. The VFD shall be able to withstand the following fault conditions without damage to the power circuit components:
    - a. Failure to connect a motor to the VFD output.
    - b. VFD output open circuit that may occur during operation.
    - c. VFD output short circuit that may occur during operation.
  - 10. Provide input line reactors (5% impedance) when no 12 or 18 pulse transformers are supplied or required.
  - 11. Three phase lightning and surge protection across the line input at each VFD.
  - 12. Provide 120V motor heater power that is active when the motor is off and is off when the motor is active.
  - 13. Provide 120V power for future that is inactive when the motor is off and is on when the motor is active.
- F. Parameter Settings

- The following system configuring settings shall be provided and field adjustable, without exception, through the keypad/display unit. Except for Motor Nameplate Data, all parameters must be adjustable while the processor is on-line and the drive is running.
  - a. Motor Nameplate Data.
    - 1) Motor frequency.
    - 2) Number of poles.
    - 3) Full load speed.
    - 4) Motor volts.
    - 5) Motor full load amps.
    - 6) Motor HP.
    - 7) Current limit, max.
  - b. VFD Configuration Parameters.
    - 1) Independent accelerate/decelerate rates.
    - 2) Max/Min speed (frequency).
    - 3) Catch-a spinning load selection.
    - 4) No load boost.
    - 5) Full load boost.
    - 6) Volts/Hertz ratio.
    - 7) Overspeed trip.
    - 8) Overload trip curve selection.
    - 9) Overload trip time selection.
  - c. Automatic VFD Control.
    - 1) PID utilizing an internal or external setpoint.
    - 2) Three selectable critical speed avoidance bands with programmable bandwidths.
    - 3) Auto start functions: On/Off, Delay On/Off. Operable from a 4-20mA signal or from the PID output, command, or feedback signal.
    - 4) Speed Profile: Programmable entry and exit points.
    - 5) Programmable loss of signal control: Stop, maintain last speed, or default to preselected setpoint.
- 2. All drive setting adjustments and operation parameters shall be stored in a parameter log which lists allowable maximum and minimum points as well as the present set values. This parameter log shall be accessible via a RS-232, RS-422, or RS-485 serial port as well as on the keypad display.

### G. Input/Output Features

- 1. Two programmable analog inputs: VFD speed in, spare.
- 2. Three programmable analog outputs: VFD speed output, Drive (output) current in Amps, spare.
- 3. Two programmable digital inputs: Run, Reset.
- 4. Ten programmable digital outputs: VFD fault, VFD running, VFD in hand, 6 spare.
- 5. System Program providing built-in drive control or application specific configuration capability.
- 6. Four fixed outputs: Fail, Running, Available, In Hand.
- 7. One fixed input: Start/Stop.

## H. Diagnostic Features and Fault Handling

 The VFD shall include a comprehensive microprocessor based digital diagnostic system that monitors its own control functions and displays faults and operating conditions.

- A "Fault Log" shall be accessible via a RS-232, RS-422, or RS-485 serial link as well as line-by-line on the keypad display. The "FAULT LOG" shall record, store, display and output to a serial port upon demand, the following for the 64 most recent events:
  - a. Date and time of day.
  - b. Type of fault.
  - c. All faults and events shall be stored and displayed in English, not fault codes.
- 3. A "HISTORIC LOG" shall record, store, and output to a RS-232, RS-422, or RS-485 serial link port upon demand, the following selectable control variables at 1 msec. intervals for the 58 intervals immediately preceding and the 20 intervals immediately following a fault trip:
  - a. Torque demand.
  - b. Torque command.
  - c. Torque feedback.
  - d. Torque error.
  - e. Torque maximum.
  - f. Current demand.
  - g. Peak current.
  - h. Motor current.
  - i. DC bus voltage.
  - j. Line voltage.
  - k. Velocity demand.
  - I. Velocity reference.
  - m. PI min/max limit.
  - n. Boost.
  - o. VFD mode (Auto/Manual).

## PART 3 - EXECUTION

### 3.01 FACTORY TESTING

- A. The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.
  - 1. All printed circuit boards shall be functionally tested via automatic test equipment prior to unit installation.
  - 2. After all tests have been performed, each VFD shall undergo a burn-in test. The drive shall be burned in at 100% inductive or motor load without an unscheduled shutdown.
  - 3. After the burn-in cycle is complete, each VFD shall be put through a motor load test before inspection and shipping.
- B. The manufacturer shall provide three (3) certified copies of factory test reports.

### 3.02 START-UP FIELD SERVICE

A. Provide the services of a qualified manufacturer's employed Field Service Engineer to assist the Contractor in installation and start-up of the equipment specified under this section. Field Service personnel shall be factory trained with periodic updates and have experience with the same model of VFD on the job site. Sales representatives will not be acceptable to perform this work. The manufacturer's service representative shall provide technical direction and assistance to the Contractor in general assembly of the equipment, installation as specified in manufacturer's installation instructions, wiring, application dependent adjustments, and verification of proper VFD operation.

- B. The Contractor under the technical direction of the manufacturer's service representative shall perform the following minimum work.
  - 1. Inspection and final adjustments.
  - 2. Operational and functional checks of VFD and spare parts.
  - 3. The contractor shall certify that he has read the drive manufacturer's installation instructions and has installed the VFD in accordance with those instructions.
- C. The Contractor shall provide three (3) copies of the manufacturer's field startup report before final payment is made.

### 3.03 TRAINING

- A. The manufacturer's qualified representative shall conduct the training.
- B. The cost of training programs to be conducted with Owner's personnel shall be included in the Contract price. The training and instruction, insofar as practicable, shall be directly related to the system being supplied.
- C. The supplier shall provide detailed manuals to supplement the training courses. The manuals shall include specific details of equipment supplied and operations specific to the project.
- D. The supplier shall make use of teaching aids, manuals, slide/video presentations, etc. After the training services, such materials shall be delivered to Owner.
- E. The training program shall represent a comprehensive program covering all aspects of the operation, maintenance and cleaning procedures for the system.
- F. All training schedules shall be coordinated with, and at the convenience of the Owner. Shift training may be required to correspond to the Owner's working schedule.
- G. Training shall be a minimum of two (2) session four (4) hours in length.

## 3.04 SPARE PARTS

- A. The following spare parts shall be furnished:
  - 1. Three of each type of fuse rated 460V or less.
  - 2. One keypad assembly.

## 3.05 RUBBER MATS

A. A three foot wide rubber mat shall be furnished and installed on the floor and in front of each switchboard, MCC, VFD and control panel assembly. The mat shall be long enough to cover the full length of each line-up. The mat shall be 1/4 inch thick with beveled edges, canvas back, solid type with corrugations running the entire length of the mat. The mat shall be guaranteed extra quality, free from cracks, blow holes, or other defects detrimental to their mechanical or electrical strength. The mat shall meet OSHA requirements and the requirements of ANSI/ASTM D-178 J6-7 for Type 2, Class 2 insulating matting.

**END OF SECTION** 

## **SECTION 16500**

#### LIGHTING

## PART 1--GENERAL

## 1.01 THE REQUIREMENT

A. The Contractor shall furnish and install lighting fixtures, and accessories for all lighting systems, complete and operable, all in accordance with the requirements of the Contract Documents.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

Electrical General Provisions.

## 1.03 REFERENCES

- A. Without limiting the generality of other requirements of these specifications, all work hereunder shall conform to the applicable requirements of the referenced portions of the following documents, to the extent that the requirements therein are not in conflict with the provisions of this Section:
  - 1. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
  - 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
  - 3. Underwriters Laboratories, Inc. (UL):
  - 4. 595, Standard for Safety Marine-Type Electric Lighting Fixtures.
  - 5. 844, Standard for Safety Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.
  - 6. 924, Standard for Safety Emergency Lighting and Power Equipment.

#### 1.04 SUBMITTALS

- A. The Contractor shall submit the following in accordance with the requirements of the Section entitled "Submittals."
  - 1. Shop drawings and catalog data:
    - a. Interior Luminaires:
      - Catalog data sheets and pictures.
      - 2) Luminaire finish and metal gauge.
      - 3) Lens material, pattern, and thickness.

- 4) Candle power distribution curves in two or more planes.
- 5) Candle power chart 0 to 90 degrees.
- 6) Lumen output chart.
- 7) Average maximum brightness data in foot-lamberts.
- 8) Coefficients of utilization for zonal cavity calculations.
- 9) Mounting or suspension details.
- 10) Heat exchange and air handling data.

#### b. Exterior Luminaires:

- 1) Catalog data sheets and pictures.
- 2) Luminaire finish and metal gauge.
- 3) Lens material, pattern, and thickness.
- 4) IES lighting classification and isolux diagram.
- 5) Fastening details to wall or pole.
- 6) For light poles, submit wind loading, complete dimensions, and finish.

### c. Photocells:

- 1) Voltage, and power consumption.
- 2) Capacity.
- Contacts and time delay.
- 4) Operating levels.
- 5) Enclosure type and dimensions.
- 6) Temperature range.
- 2. Complete literature for each fixture substitution. Photoelectric data shall include coefficients of utilization, average brightness, candle power distribution curves, and lumen output chart. Substitutions for specified fixtures shall be based upon quality of construction, light distribution, appearance, and maintenance. Other makes of fixtures than those specified will be approved by the Engineer provided they are judged equal in all respects to the type specified
- 3. For exterior pole mounted applications, submit calculations signed and

sealed by a professional structural engineer registered in the State of Florida, certifying that the outdoor pole and fixture installation, including pole, fixture, base and installation method will meet the appropriate wind loading criteria given by the Florida Building Code for the wind zone in which the assembly will be installed.

### 1.05 UL COMPLIANCE

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

## 1.06 QUALITY ASSURANCE

- A. Exterior lighting system operation shall be demonstrated during the hours of darkness to indicate that fixtures are properly focused, photo cell operation is correct, and that fixture switching functions as intended. Similar requirements shall apply to interior lighting. Through demonstration, the Contractor shall also verify that panel schedules properly indicate the lighting systems connected to each circuit.
- B. Lighting demonstration shall occur within 2 weeks prior to project acceptance.
- C. Lighting fixtures shall be stored in their original cartons from the manufacturers until the time of installation. Fixtures poles shall be stored on blocks above grade until the time of installation.

## 1.07 CLEANUP

- A. Fixture lenses, diffusers and reflects shall be cleaned just prior to the time specified for the system demonstrations.
- B. Fixture trim, including poles and support brackets, where finish has been damaged, shall be refinished.

### PART 2--PRODUCTS

### 2.01 FIXTURES - GENERAL

A. All fixtures shall be pre wired with leads for connection to building circuits.

### 2.02 EXTERIOR FIXTURES

- A. Exterior fixtures and pole assemblies, in combination with their method of installation, shall be capable of meeting the wind loading criteria for the wind zone of installation as defined in the Florida Building Code. The wind loading requirement shall apply to the entire assembly including foundation (or base) and earthen materials used to secure the foundation or base. The calculation required under section 1.04.A.3 shall include this analysis.
- B. Exterior fixtures shall have corrosion resistant hardware and hinged doors or lens retainer. Fixtures specified to be furnished with integral photo electrical control

shall be of the fixture manufacturer's standard design.

#### 2.03 LUMINAIRES

- A. Specific requirements relative to execution of Work of this section are located in the Luminaire Schedule on Drawings.
- B. Soffit Installations:
  - UL Labeled: SUITABLE FOR DAMP LOCATIONS.
- C. Exterior Installations:
  - 1. UL Labeled: SUITABLE FOR WET LOCATIONS.
  - 2. When factory-installed photocells are provided, entire assembly shall have UL label.
- D. Emergency Lighting:
  - 1. Power Pack: Self-contained, 120-volt transformer, inverter/charger, sealed nickel cadmium battery, and indicator switch in accordance with UL 924.
  - 2. Lighted push-to-test indicator.
  - 3. Capable of providing full illumination for 1-1/2 hours in emergency mode.
  - 4. Capable of full recharge in 24 hours, automatically upon resumption of normal line voltage.
  - 5. Capable of protecting against excess charging and discharging.
- E. LED Driver
  - a. Voltage Range (120-277) +/- 10%
  - b. Current .35 Add (+/-5%)
  - c. Frequency 50/60Hz
  - d. Power Factor >90% at full load
  - e. THD < 20% at full load
  - f. Load regulation: +/- 1% from no load to full load
  - g. Output ripple < 10%
  - h. Output should be isolated
  - i. Case temperature: rated for -40 degrees through +80 degrees

- j. Overheat protection, self-limited short circuit protection and overload protected
- k. Primary fused
- I. Life rating not less than 50,000 hours
- m. 0-10V dimming where indicated on drawings
- n. Internal surge arrester

# F. Lighting Control

- Photocell:
  - a. Automatic ON/OFF switching photo control.
  - b. Housing: Self-contained, die-cast aluminum, unaffected by moisture, vibration, or temperature changes.
  - c. Setting: ON at dusk and OFF at dawn.
  - d. Time delay feature to prevent false switching.
  - e. Field adjustable to control operating levels.
  - f. Manufacturers:
    - 1) Tork.
    - 2) Paragon.

## G. Poles

- 1. Rating (with Luminaire): Shall meet Florida Building Code and ASCE 7-98 requirements for wind zone of installation.
- 2. Material: As shown on drawings.

# PART 3--EXECUTION

# 3.01 LIGHTING FIXTURES

- A. Lighting fixtures shall be furnished in accordance with the Fixture Schedule.
- B. Lighting fixtures shall be installed plumb and square with building and wall intersections. Pendant mounted fixtures which are mounted from sloping ceilings shall be suspended by ball hangers. Fixtures installed in machinery rooms shall be located after machines have been installed. In all cases, fixture locations shall be coordinated with work of other trades to prevent obstruction of light from the fixtures. Fixtures shall be installed in accordance with the architectural reflected ceiling drawings. Unless otherwise indicated, fixtures shall be centered

- on ceiling tiles. All fixtures and outlets shall be rigidly supported from the building structure or rigid conduit.
- C. Recessed fixtures shall be installed tight to the ceiling and shall be provided with auxiliary safety supports attached directly to the building structure. Said safety supports shall consist of #10 AWG soft drawn galvanized wires.

## 3.02 LUMINAIRES

#### A. General:

- 1. Install in accordance with manufacturer's recommendations.
- 2. Provide proper hangers, pendants, and canopies as necessary for complete installation.
- 3. Provide additional ceiling bracing, hanger supports, and other structural reinforcements to building and to concrete pole bases required to safely mount.
- 4. Install plumb and level.
- 5. Mounting heights shown for wall mounted or pendant mounted luminaires are measured from bottom of luminaire to finished floor or finished grade, whichever is applicable.
- 6. Install each luminaire outlet box with galvanized stud.

#### B. Pendant Mounted:

- 1. Provide swivel type hangers and canopies to match luminaires, unless otherwise noted.
- 2. Space single-stem hangers on continuous-row luminaires nominally 48 inches apart.
- 3. Provide twin-stem hangers on single luminaires.

# C. Pole Mounted:

- 1. Provide precast concrete base or pre-cast concrete pole as described in the drawings.
- 2. Provide branch circuit in-line fuses in pole base handhole.

## D. Swinging Type:

1. Provide, at each support, safety cable capable of supporting four times the vertical load from the structure to the luminaire.

## E. Finished Areas:

- 1. Install symmetrically with tile pattern.
- 2. Locate with centerlines either on centerline of tile or on joint between adjacent tile runs.
- 3. Install recessed luminaires tight to finished surface such that no spill light will show between ceilings and sealing rings.
- 4. Combustible Low Density Cellulose Fiberboard: Provide spacers and mount luminaires 1-1/2 inches from ceiling surface, or use fixtures suitable for mounting on low density ceilings.
- 5. Junction Boxes:
  - a. Flush and Recessed Luminaires: Locate minimum 1 foot from luminaire.
  - b. In concealed locations, install junction boxes to be accessible by removing luminaire.
- 6. Wiring and Conduit:
  - a. Provide wiring of temperature rating required by luminaire.
  - b. Provide flexible steel conduit.
  - c. Provide plaster frames when required by ceiling construction.
- 7. Independent Supports:
  - a. Provide each recessed luminaire with two safety chains or two No.
     12 soft-annealed galvanized steel wires of length needed to secure luminaire to building structure independent of ceiling structure.
  - b. Tensile strength of chain or wire, and method of fastening to structure shall be adequate to support weight of luminaire.
  - c. Fasten chain or wire to each end of luminaire.
- F. Unfinished Areas: Locate luminaires to avoid either conflict with other building systems or blockage of luminaire light output.
  - 1. Fixture Suspension: Provide 1/4-inch threaded steel hanger rods. Scissor type hangers not permitted.
  - 2. Attachment to Steel Beams: Provide flanged beam clips and straight or angled hangers.
- G. Lighting Control
  - 1. Outdoor Luminaires: Photocells will switch lights ON and OFF.

- H. Cleaning Following Construction
  - 1. Remove all labels and other markings, except UL listing mark.
  - 2. Wipe luminaires inside and out to remove construction dust.
  - 3. Clean luminaire plastic lenses with anti-static cleaners only.
  - 4. Touch up all painted surfaces of luminaires and poles with matching paint ordered from manufacturer.

## 3.03 COORDINATION

A. The Contractor shall coordinate lighting fixture locations with all other disciplines. In case light fixtures are covered by pipe or other equipment, fixtures shall be moved with no cost to the Owner to provide for lighting level on the floor as indicated.

**END OF SECTION** 

### SECTION 16950

#### **ELECTRICAL TESTING**

# PART1 - GENERAL

### 1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
  - 1. American National Standards Institute (ANSI):
    - a. C2, National Electrical Safety Code.
    - b. C37.20.1, Metal-Enclosed Low Voltage Power Circuit Breaker Switchgear.
    - c. C37.20.2, Metal-Clad and Station-Type Cubicle Switchgear.
    - d. C37.20.3, Metal-Enclosed Interrupter Switchgear.
    - e. C62.33, Standard Test Specifications for Varistor Surge-Protective Devices.
  - 2. Institute of Electrical and Electronics Engineers (IEEE):
    - a. 43, Recommended Practice for Testing Insulating Resistance of Rotating Machinery.
    - b. 48, Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminators.
    - c. 81, Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
    - d. 95, Recommended Practice for Insulation Testing of Large AC Rotating Machinery with High Direct Voltage.
    - e. 118, Standard Test Code for Resistance Measurement.
    - f. 400, Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. AB 4, Guideline for Inspection and Preventive Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications.

- b. PB 2, Deadfront Distribution Switchboards.
- c. WC 7, Cross-Linked-Thermosetting-Polyethylene- Wire and Cable for the Transmission and Distribution of Electrical Energy.
- d. WC 8, Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- 4. International Electrical Testing Association (NETA): ATS, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- 5. National Fire Protection Association (NFPA):
  - a. 70, National Electrical Code (NEC).
  - b. 70E, Standard for Electrical Safety Requirements for Employee Workplaces.

#### 1.02 SUBMITTALS

- A. Administrative Submittals: Submit 30 days prior to performing inspections or tests:
  - 1. Schedule for performing inspection and tests.
  - 2. List of references to be used for each test.
  - 3. Sample copy of equipment and materials inspection form(s).
  - 4. Sample copy of individual device test form.
  - 5. Sample copy of individual system test form.
- B. Quality Control Submittals: Submit within 30 days after completion of test:
  - 1. Test or inspection reports and certificates for each electrical item tested.
- C. Contract Closeout Submittals:
  - 1. Operation and Maintenance Data:
    - After test or inspection reports and certificates have been reviewed by ENGINEER and returned, insert a copy of each in operation and maintenance manual.

## 1.03. QUALITY ASSURANCE

A. Testing Firm Qualifications:

- 1. Corporately and financially independent organization functioning as an unbiased testing authority.
- 2. Professionally independent of manufacturers, suppliers, and installers, of electrical equipment and systems being tested.
- 3. Employer of engineers and technicians regularly engaged in testing and inspecting of electrical equipment, installations, and systems.
- Supervising engineer accredited as Certified Electrical Test Technologist by National Institute for Certification of Engineering Technologists (NICET), or International Electrical Testing Association and having a minimum of 5 years testing experience on similar projects.
- 5. Technicians certified by NICET or NETA.
- 6. Assistants and apprentices assigned to project at ratio not to exceed two certified to one noncertified assistant or apprentice.
- 7. Registered Professional Engineer to provide comprehensive project report outlining services performed, results of such services, recommendations, actions taken, and opinions.
- 8. In compliance with OSHA Title 29, Part 1907 criteria for accreditation of testing laboratories or a full Member Company of International Electrical Testing Association.
- B. Test equipment shall have an operating accuracy equal to, or greater than, requirements established by NETA ATS.
- C. Test instrument calibration shall be in accordance with NETA ATS.

### 1.04 SEQUENCING AND SCHEDULING

- A. Perform inspection and electrical tests after equipment has been installed.
- B. Perform inspection and electrical tests on existing cryogenic compressor motors.
- C. Perform tests with apparatus de-energized whenever feasible.
- D. Inspection and electrical tests on energized equipment are to be:
  - 1. Scheduled with ENGINEER prior to de-energization.
  - 2. Minimized to avoid extended period of interruption to the operating plant equipment.
- E. Notify ENGINEER at least 24 hours prior to performing tests on energized electrical equipment.

# PART 2 -- PRODUCTS (NOT USED)

## PART 3 -- EXECUTION

### 3.01 GENERAL

- A. Tests and inspection shall establish that:
  - 1. Electrical equipment is operational within industry and manufacturer's tolerances.
  - 2. Installation operates properly.
  - 3. Equipment is suitable for energization.
  - 4. Installation conforms to requirements of Contract Documents and NFPA 70, NFPA 70E, and ANSI C2.
- B. Perform inspection and testing in accordance with NETA ATS, industry standards, and manufacturer's recommendations.
- C. Adjust mechanisms and moving parts for free mechanical movement.
- D. Adjust adjustable relays and sensors to correspond to operating conditions, or as recommended by manufacturer.
- E. Verify nameplate data for conformance to Contract Documents.
- F. Realign equipment not properly aligned and correct unlevelness.
- G. Properly anchor electrical equipment found to be inadequately anchored.
- H. Tighten accessible bolted connections, including wiring connections, with calibrated torque wrench to manufacturer's recommendations, or as otherwise specified.
- I. Clean contaminated surfaces with cleaning solvents as recommended by manufacturer.
- J. Provide proper lubrication of applicable moving parts.
- K. Inform ENGINEER of working clearances not in accordance with NFPA 70.
- L. Investigate and repair or replace:
  - 1. Electrical items that fail tests.
  - 2. Active components not operating in accordance with manufacturer's instructions.
  - 3. Damaged electrical equipment.

### M. Electrical Enclosures:

- 1. Remove foreign material and moisture from enclosure interior.
- 2. Vacuum and wipe clean enclosure interior.
- 3. Remove corrosion found on metal surfaces.
- 4. Repair or replace, as determined by ENGINEER, door and panel sections having dented surfaces.
- 5. Repair or replace, as determined by ENGINEER, poor fitting doors and panel sections.
- 6. Repair or replace improperly operating latching, locking, or interlocking devices.
- 7. Replace missing or damaged hardware.
- 8. Finish:
  - a. Provide matching paint and touch up scratches and mars.
  - b. If required due to extensive damage, as determined by ENGINEER, refinish the entire assembly.
- N. Replace fuses and circuit breakers that do not conform to size and type required by the Contract Documents.
- O. Replace transformer insulating oil not in compliance with ASTM D923.

#### 3.02 SWITCHGEAR AND SWITCHBOARD ASSEMBLIES

- A. Visual and Mechanical Inspection:
  - 1. Insulator damage and contaminated surfaces.
  - 2. Proper barrier and shutter installation and operation.
  - 3. Proper operation of indicating devices.
  - 4. Improper blockage of air-cooling passages.
  - 5. Proper operation of drawout elements.
  - 6. Integrity and contamination of bus insulation system.
  - 7. Check Door and Device Interlocking System By:
    - a. Closure attempt of device when door is in OFF or OPEN position.

- b. Opening attempt of door when device is in ON or CLOSED position.
- 8. Check Key Interlocking Systems For:
  - a. Key captivity when device is in ON or CLOSED position.
  - b. Key removal when device is in ON or CLOSED position.
  - c. Closure attempt of device when key has been removed.
  - d. Correct number of keys in relationship to number of lock cylinders.
  - e. Existence of other keys capable of operating lock cylinders.
    - Destroy duplicate sets of keys.
- 9. Check Nameplates for Proper Identification Of:
  - a. Equipment title and tag number with latest one-line diagram.
  - b. Pushbutton.
  - c. Control switch.
  - d. Pilot light.
  - e. Control relay.
  - f. Circuit breaker.
  - g. Indicating meter.
- 10. Verify that fuse and circuit breaker ratings, sizes, and types conform to those specified.
- 11. Check bus and cable connections for high resistance by low resistance ohmmeter and calibrated torque wrench thermographic survey applied to bolted joints.
  - a. Ohmic value to be zero.
  - b. Bolt torque level in accordance with NETA ATS, Table 10. 1, unless otherwise specified by manufacturer.
  - c. Thermographic survey temperature gradient of 2 degrees C, or less.
- 12. Check Operation and Sequencing of Electrical and Mechanical Interlock Systems By:

- a. Closure attempt for locked open devices.
- b. Opening attempt for locked closed devices.
- c. Key exchange to operate devices in OFF-NORMAL positions.
- 13. Verify performance of each control device and feature.

# 14. Control Wiring:

- a. Compare wiring to local and remote control and protective devices with elementary diagrams.
- b. Proper conductor lacing and bundling.
- c. Proper conductor identification.
- d. Proper conductor logs and connections.
- 15. Exercise active components.
- 16. Perform phasing check on double-ended equipment to ensure proper bus phasing from each source.

### B. Electrical Tests:

- Insulation Resistance Tests:
  - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 7.1.1.
  - b. Each phase of each bus section.
  - c. Phase-to-phase and phase-to-ground for 1 minute.
  - d. With switches and breakers open.
  - e. With switches and breakers closed.
  - f. Control wiring except that connected to solid state components.
  - g. Insulation resistance values equal to, or greater than, ohmic values established by manufacturer.

# 2. Overpotential Tests:

- a. Applied ac or dc voltage and test procedure in accordance with ANSI C37.20.3 and NEMA PB 2.
- b. Each phase of each bus section.

- c. Phase-to-phase and phase-to-ground for 1 minute.
- d. Test results evaluated on a pass/fail basis.
- 3. Current Injection Tests:
  - a. For entire current circuit in each section.
  - b. Secondary injection for current flow of 1 ampere.
  - c. Test current at each device.
- 4. Control Wiring:
  - a. Apply secondary voltage to control power and potential circuits.
  - b. Check voltage levels at each point on terminal boards and each device terminal.
- 5. Operational Test:
  - Initiate control devices.
  - b. Check proper operation of control system in each section.

#### 3.03 DRY TYPE TRANSFORMERS

- A. Visual and Mechanical Inspection:
  - 1. Physical and insulator damage.
  - 2. Proper winding connections.
  - 3. Bolt torque level in accordance with NETA ATS, Table 10.1, unless otherwise specified by manufacturer.
  - 4. Defective wiring.
  - 5. Proper operation of fans, indicators, and auxiliary devices.
  - 6. Removal of shipping brackets, fixtures, or bracing.
  - 7. Free and properly installed resilient mounts.
  - 8. Cleanliness and improper blockage of ventilation passages.
  - 9. Verify that tap-changer is set at correct ratio for rated output voltage under normal operating conditions.
  - 10. Verify proper secondary voltage phase-to-phase and phase-to-ground after energization and prior to loading.

## B. Electrical Tests:

- 1. Insulation Resistance Tests:
  - a. Applied megohmmeter dc voltage in accordance with NETA ATS, Table 7.2.3 for each:
    - 1) Winding-to-winding.
    - 2) Winding-to-ground.
  - b. Ten minute test duration with resistances tabulated at 30 seconds, 1 minute, and 10 minutes.
  - c. Results temperature corrected in accordance with NETA ATS, Table 7.2.4.
  - d. Temperature corrected insulation resistance values equal to, or greater than, ohmic values established by manufacturer.
  - e. Insulation resistance test results to compare within 1 percent of adjacent windings.
- 2. Perform tests and adjustments for fans, controls, and alarm functions as suggested by manufacturer.

## 3.04 LOW VOLTAGE CABLES, 600 VOLTS MAXIMUM

- A. Visual and Mechanical Inspection:
  - 1. Inspect Each Individual Exposed Power Cable No. 6 and Larger For:
    - a. Physical damage.
    - b. Proper connections in accordance with single-line diagram.
    - c. Cable bends not in conformance with manufacturer's minimum allowable bending radius where applicable.
    - d. Color coding conformance with specifications.
    - e. Proper circuit identification.
  - 2. Mechanical Connections For:
    - a. Proper lug type for conductor material.
    - b. Proper lug installation.
    - c. Bolt torque level in accordance with NETA ATS, Table 10. 1, unless otherwise specified by manufacturer.

- 3. Shielded Instrumentation Cables For:
  - a. Proper shield grounding.
  - b. Proper terminations.
  - c. Proper circuit identification.
- 4. Control Cables For:
  - a. Proper termination.
  - b. Proper circuit identification.
- 5. Cables Terminated Through Window Type CT's: Verify that neutrals and grounds are terminated for correct operation of protective devices.
- B. Electrical Tests for Conductors No. 6 and Larger:
  - Insulation Resistance Tests:
    - a. Test each conductor with respect to ground and to adjacent conductors per IEEE 118 procedures for 1 minute.
    - b. Evaluate ohmic values by comparison with conductors of same length and type.
    - c. Investigate values less than 50 megohms.
    - d. Utilize 1,000VDC megohmmeter for 600V insulated conductors.
  - 2. Continuity test by ohmmeter method to ensure proper cable connections.

## 3.05 MEDIUM VOLTAGE CABLES, 25KV MAXIMUM

- A. Visual and Mechanical Inspection:
  - 1. Inspect Each Individual Exposed Cable For:
    - a. Physical damage plus jacket and insulation condition.
    - b. Proper connections in accordance with single-line diagram.
    - c. Proper shield grounding.
    - d. Proper cable support.
    - e. Proper cable termination.

- f. Cable bends not in conformance with manufacturer's minimum allowable bending radius.
- g. Proper are and fireproofing in common cable areas.
- h. Proper circuit and phase identification.
- 2. Mechanical Connections For:
  - a. Proper lug type for conductor material.
  - b. Proper lug installation.
  - c. Bolt torque level in accordance with NETA ATS, Table 10. 1, unless otherwise specified by manufacturers.
- 3. Conductors Terminated Through Window Type CTs: Verify that neutrals and grounds are terminated for correct operation of protective devices.

### B. Electrical Tests:

- Insulation Resistance Tests:
  - a. Utilize 5,000-volt megohmmeter for 5kV and a 10,000-volt megohmmeter for 25 kV conductors.
  - b. Test each cable individually with remaining cables and shields grounded.
  - c. Test each conductor with respect to ground and to adjacent conductors in accordance with IEEE 118 procedures for 1 minute.
  - d. Evaluate ohmic values by comparison with conductors of same length and type.
  - e. Investigate values less than 50 megohms.
- 2. Shield Continuity Tests:
  - a. By ohmmeter method on each section of conductor.
  - b. Investigate values in excess of 10 ohms per 1,000 feet of conductors.
- 3. High Potential dc Tests:
  - a. In accordance with NEMA WC 8 for EPR insulated conductors.
  - b. Each conductor section tested with:

- 1) Splices and terminations in-place but disconnected from equipment.
- 2) Remaining conductors and shields grounded in accordance with IEEE 400.
- c. Apply maximum dc test voltage as per manufacturer's recommendation.
- d. Measure only the leakage current associated with conductor.
- e. Utilize guard ring or field reduction sphere to suppress corona at disconnected terminations.
- f. Maximum test voltage shall not exceed limits for terminators specified in IEEE 48 or manufacturer's specifications.
- g. Apply test voltage in a minimum of five equal increments until maximum acceptable test voltage is reached.
  - 1) Increments not to exceed ac voltage rating of conductor.
  - 2) Record dc leakage current at each step after a constant stabilization time consistent with system charging current.
- h. Raise conductor to specified maximum test voltage and hold for 15 minutes, or as specified by conductor manufacturer. Record do leakage current at 30 seconds and 1 minute and at 1-minute intervals, thereafter.
- i. Immediately following test, ground conductor for adequate time period to drain insulation stored charge.
- j. Test results evaluated on a pass/fail basis.

### 3.06 MOLDED AND INSULATED CASE CIRCUIT BREAKERS

- A. General: Inspection and testing limited to circuit breakers rated 70 amperes and larger and to motor circuit protector breakers rated 50 amperes and larger.
- B. Visual and Mechanical Inspection:
  - 1. Proper mounting.
  - 2. Proper conductor size.
  - 3. Feeder designation according to nameplate and one-line diagram.
  - Cracked casings.
  - Connection bolt torque level in accordance with NETA ATS, Table 10.1.

- 6. Operate breaker to verify smooth operation.
- 7. Compare frame size and trip setting with circuit breaker schedules or one-line diagram.
- 8. Verify that terminals are suitable for 75 degrees C rated insulated conductors.

## C. Electrical Tests:

- 1. Insulation Resistance Tests:
  - a. Utilize 1,000-volt dc megohmmeter for 480- and 600-volt circuit breakers and 500-volt dc megohmmeter for 240-volt circuit breakers.
  - b. Pole-to-pole and pole-to-ground with breaker contacts opened for 1 minute.
  - Pole-to-pole and pole-to-ground with breaker contacts closed for 1 minute.
  - d. Test values to comply with NETA ATS, Table 10.2.
- Contact Resistance Tests:
  - a. Contact resistance in microhms across each pole.
  - b. Investigate deviation of 50 percent or more from adjacent poles and similar breakers.
- 3. Primary Current Injection Test to Verify:
  - a. Long-time minimum pickup and delay.
  - b. Short-time pickup and delay.
  - c. Ground fault pickup and delay.
  - d. Instantaneous pickup by run-up or pulse method.
  - e. Trip characteristics of adjustable trip breakers shall be within manufacturer's published time-current characteristic tolerance band, including adjustment factors.
  - f. Trip times shall be within limits established by NEMA AB 4, Table 5-3.
  - g. Instantaneous pickup value shall be within values established by NEMA AB 4, Table 5-4.

## 3.07 INSTRUMENT TRANSFORMERS

- A. Visual and Mechanical Inspection:
  - 1. Visually Check Current, Potential, and Control Transformers For:
    - a. Cracked insulation.
    - b. Broken leads or defective wiring.
    - c. Proper connections.
    - d. Adequate clearances between primary and secondary circuit wiring.
  - 2. Verify Mechanically That:
    - a. Grounding and shorting connections have good contact.
    - b. Withdrawal mechanism and grounding operation, when applicable, operate properly.
  - 3. Verify proper primary and secondary fuse sizes for potential transformers.
- B. Electrical Tests:
  - 1. Current Transformer Tests:
    - a. Insulation resistance test of transformer and wiring-to-ground at 1,000 volts dc for 30 seconds.
    - b. Polarity test.
  - 2. Potential Transformer Tests:
    - a. Insulation resistance test at test voltages in accordance with NETA ATS, Table 7.1.1 for 1 minute on:
      - 1) Winding-to-winding.
      - 2) Winding-to-ground.
    - b. Polarity test to verify polarity marks or H1-X1 relationship as applicable.
  - 3. Insulation resistance measurement on instrument transformer shall not be less than that shown in NETA ATS, Table 7.1.1.
- 3.08 METERING

### A. Visual and Mechanical Inspection:

- 1. Verify meter connections in accordance with appropriate diagrams.
- 2. Verify meter multipliers.
- 3. Verify that meter types and scales conform to Contract Documents.
- 4. Check calibration of meters at cardinal points.
- 5. Check calibration of electrical transducers.

### 3.09 GROUNDING SYSTEMS

### A. Visual and Mechanical Inspection:

- Equipment and circuit grounds in motor control centers, panelboards, switchboards, and switchgear assemblies for proper connection and tightness.
- 2. Ground bus connections in motor control centers, panelboards, switchboards, and switchgear assemblies for proper termination and tightness.
- 3. Effective transformer core and equipment grounding.
- 4. Accessible connections to grounding electrodes for proper fit and tightness.
- 5. Accessible exothermic-weld grounding connections to verify that molds were fully filled and proper bonding was obtained.

#### B. Electrical Tests:

- Fall-Of-Potential Test:
  - a. In accordance with IEEE 81, Section 8.2.1.5 for measurement of main ground system's resistance.
  - b. Main ground electrode system resistance to ground to be no greater than 5 ohms.

### 2. Two-Point Direct Method Test:

- a. In accordance with IEEE 81, Section 8.2. 1.1 for measurement of ground resistance between main ground system, equipment frames, and system neutral and derived neutral points.
- b. Equipment ground resistance shall not exceed main ground system resistance by 0.50 ohm.

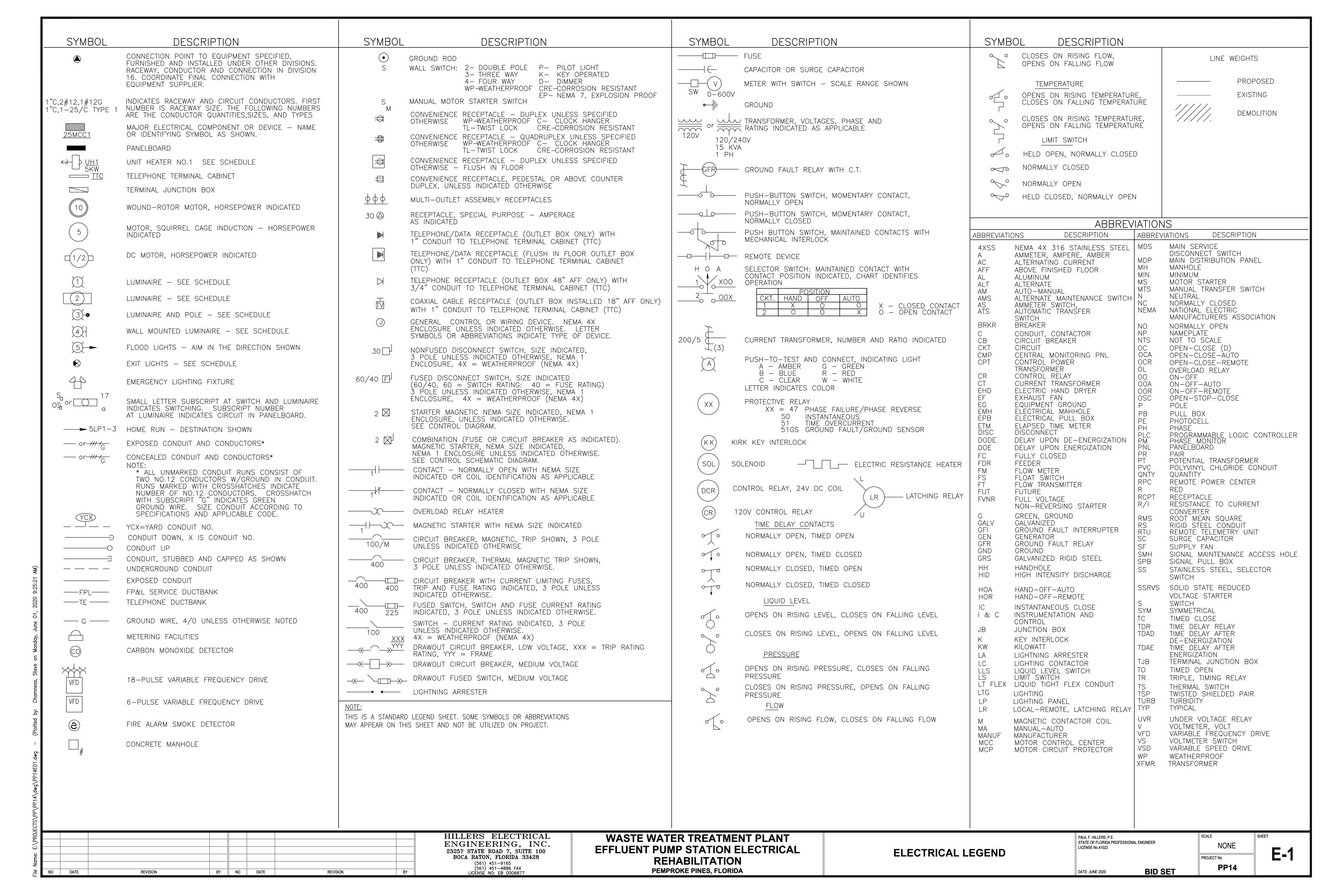
### 3.10 THERMOGRAPHIC SURVEY

- A. Provide a thermographic survey of connections associated with incoming service conductors, bus work, and branch feeder conductors No. 2 and larger at each:
  - 1. Medium voltage switchgear and transformer.
  - 2. Switchboard.
  - 3. Low voltage motor control center.
  - 4. Panelboard.
- B. Provide a thermographic survey of feeder conductors No. 2 and larger terminating at:
  - 1. Motors rated 30 horsepower and larger.
  - 2. Medium and low voltage disconnect switches.
  - Transfer switches.
  - 4. Engine-generators.
- C. Remove necessary enclosure metal panels and covers prior to performing survey.
- D. Perform with equipment energized during periods of maximum possible loading.
- E. Do not perform survey on equipment operating at less than 20 percent of rated connected operating load.
- F. Utilize Thermographic Equipment Capable Of:
  - 1. Detecting emitted radiation.
  - 2. Converting detected radiation to visual signal.
  - 3. Detecting 1 degree C temperature difference between subject area and reference point of 30 degrees C.
- G. Temperature Gradients Of:
  - 1. 3 degrees C to 7 degrees C indicates possible deficiency that warrants investigation.
  - 2. 7 degrees C to 15 degrees C indicates deficiency that is to be corrected as time permits.
  - 3. 16 degrees C and above indicates deficiency that is to be corrected immediately.

- H. Provide Written Report Of:
  - 1. Areas surveyed and the resultant temperature gradients.
  - 2. Locations of areas having temperature gradients of 3 degrees C or greater.
  - 3. Cause of heat rise and actions taken to correct the cause of heat rise.
  - 4. Detected phase unbalance.

**END OF SECTION** 

# Appendix 2



- 1. THE SCOPE OF WORK SHALL BE AS DESCRIBED IN SPECIFICATIONS AND SHOWN ON THE DRAWINGS.
- 2. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR TO INSTALL THE ELECTRICAL SYSTEMS AS DESCRIBED IN THE DRAWINGS AND SPECIFICATIONS. ITEMS NOT SHOWN BUT OBVIOUSLY NECESSARY FOR COMPLETION OF THE WORK SHALL BE INCLUDED.
- 3. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE 2014 NATIONAL ELECTRICAL CODE (NFPA 70), 2018 NATIONAL ELECTRICAL SAFETY CODE (NFPA 70E), 2018 LIFE SAFETY CODE (NFPA 101), CITY OF PEMBROKE PINES CODES AND 2017 FLORIDA BUILDING CODE WITH BROWARD COUNTY AMENDMENTS.
- 4. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS, INSPECTIONS AND APPROVALS AND TO INCLUDE ALL FEES AS PART OF THE BID IF NOT OTHERWISE NOTED.
- 5. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ENGINEER AND OWNER AS PER SPECIFICATION 16010.
- 6. THE CONTRACTOR SHALL VISIT THE SITE OF THE PROJECT AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS. NO ALLOWANCE WILL BE MADE FOR EXISTING CONDITIONS OR FAILURE OF THE CONTRACTOR TO OBSERVE THEM.
- 7. ALL EQUIPMENT AND MATERIAL SHALL BE UNUSED AND U.L. LISTED. ALL REFERENCES TO A PARTICULAR MANUFACTURER ARE GIVEN ON AN "APPROVED EQUAL" BASIS.
- 8. THE CONTRACTOR IS RESPONSIBLE TO TEST ALL SYSTEMS INSTALLED OR MODIFIED UNDER THIS PROJECT AND REPAIR OR REPLACE ALL DEFECTIVE WORK
  TO THE SATISFACTION OF THE ENGINEER AND OWNER.
- 9. ALL EQUIPMENT FURNISHED AND INSTALLED BY THE CONTRACTOR SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIAL AND QUALITY FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE.
- 10. ALL CONDUCTORS SHALL BE COPPER. NO ALUMINUM ALLOWED UNLESS SPECIFICALLY INDICATED ON DRAWINGS.
- 11. SHOP DRAWINGS SHALL BE SUBMITTED FOR ALL ELECTRICAL & CONTROL EQUIPMENT AND MATERIAL.
- 12. ALL CONTROL PANELS SHALL BE CONSTRUCTED BY A UL 508A APPROVED PANEL VENDOR AND SHALL BEAR A UL 508A LABEL ON THE PANEL.
- 13. THE DRAWINGS ARE NOT INTENDED TO SHOW THE EXACT LOCATION OF CONDUIT RUNS. THESE ARE TO BE COORDINATED WITH THE OTHER TRADES AND EXISTING CONDITIONS SO THAT CONFLICTS ARE AVOIDED PRIOR TO INSTALLATIONS.
- 14. ALL LOCATIONS OF EQUIPMENT, PANELS ETC. ARE SHOWN FOR ILLUSTRATION PURPOSES. CONTRACTOR SHALL VERIFY AND COORDINATE EXACT LOCATION AND SIZE WITH ALL SUBCONTRACTORS, EQUIPMENT SUPPLIERS AND EXISTING CONDITIONS PRIOR TO ANY INSTALLATION AND THEN INSTALL AS SUCH WITH CORRESPONDING CONDUIT STUB-UPS.
- 15. REFER TO OTHER DISCIPLINE DRAWINGS FOR COORDINATION OF ALL DRAWINGS. ANY CONFLICTS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION AND MOVEMENT OF CONDUITS OR OTHER ELECTRICAL EQUIPMENT SHALL BE ACCOMPLISHED WITHOUT ANY ADDITIONAL COST FOR THE OWNER.
- 16. LOCATIONS OF HANDHOLES AND IN-GROUND PULL BOXES ARE APPROXIMATE. CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH EXISTING AND/OR NEW AND EXISTING CONDUIT AND ADJUST ACCORDINGLY.
- 17. NOT ALL CONDUITS SHOWN ON RISER AND ONE—LINE DIAGRAMS ARE SHOWN ON BUILDING LAYOUT. CONTRACTOR SHALL SUPPLY ALL CONDUITS AND WIRE AS SHOWN ON RISER AND ONE—LINE DIAGRAMS IN ADDITION TO THOSE ON PLAN VIEWS.
- 18. ALL CIRCUITS SHALL BE IDENTIFIED IN JUNCTION BOXES, PULL BOXES, CONTROL PANELS, PANELBOARDS, LIGHTING POLES, CONTROLLERS AND SERVICE POINTS. IDENTIFICATION SHALL MATCH PANELBOARD SCHEDULES.
- 19. EXPOSED RUNS OF CONDUITS SHALL BE INSTALLED WITH RUNS PARALLEL OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS OR INTERSECTIONS OF VERTICAL PLANES AND CEILINGS, WITH RIGHT ANGLE TURNS CONSISTING OF SYMMETRICAL BENDS OR PULL BOXES AS INDICATED ON THE DRAWINGS. BENDS AND OFFSETS SHALL BE AVOIDED WHERE POSSIBLE.
- 20. INSTRUMENTATION IS LOW VOLTAGE SIGNALS SUCH AS 4-20MA, TELEPHONE COMMUNICATION, FIRE ALARM COMMUNICATION. POWER CONDUIT SHALL ONLY CROSS INSTRUMENTATION CONDUIT PERPENDICULARLY AT RIGHT ANGLES WITH 6" SEPARATION.
- 21. CONDUCTOR PULLING TENSIONS SHALL NOT EXCEED MANUFACTURER'S RECOMMENDATION. CONTRACTOR SHALL INSTALL PULL BOXES TO MEET MANUFACTURER'S REQUIREMENTS.
- 22. MINIMUM DISTANCE ALLOWED BETWEEN POWER CONDUITS AND INSTRUMENTATION CONDUITS SHALL BE:

 VOLTAGE
 DISTANCE

 4160V
 3 FT

 480V
 2 FT

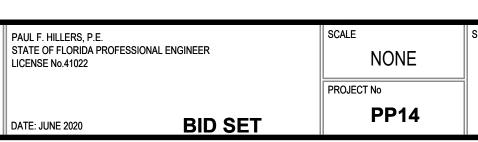
 120V
 1 FT

- 23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONDUIT AND WIRING INSTALLATION FOR ALL VENDOR PROVIDED EQUIPMENT (PACKAGE SYSTEMS). IF THE SHOP DRAWINGS DIFFER FROM THE DESIGNED FACILITIES, THE CONTRACTOR SHALL REDESIGN THE FACILITIES AND SUBMIT THE REVISED DESIGN FOR THE ENGINEER'S APPROVAL ALONG WITH THE SHOP DRAWINGS. THERE SHALL BE NO ADDITIONAL COST TO THE OWNER FOR THE REDESIGN NOR FOR ANY ADDITIONAL CONDUITS AND WIRING. DURING SUBMITTAL THE CONTRACTOR SHALL VERIFY ALL SUPPLIED BREAKER SIZES FOR ALL PACKAGED SYSTEMS SUCH AS HVAC, EXHAUST FANS, MIXERS, CHEMICAL PUMPS ETC. AND MODIFY ALL BREAKERS IN MCC'S AND PANELBOARDS ACCORDINGLY WITHOUT ANY ADDITIONAL COST TO THE OWNER.
- 24. ALL EXCAVATIONS FOR CONDUITS, HANDHOLES, AND IN-GROUND PULLBOXES NEAR EXISTING PIPING, CONDUIT AND EQUIPMENT SHALL BE HAND EXCAVATED AND COORDINATED WITH ENGINEER AND OWNER.
- 25. MINIMUM DEPTH FROM TOP OF DUCTBANKS OR CONDUITS TO FINISHED GRADE SHALL BE 24" UNLESS OTHERWISE NOTED.
- 26. COLORED WARNING TAPE 6" WIDE SHALL BE INSTALLED 8" BELOW FINISHED GRADE DIRECTLY ABOVE ALL UNDERGROUND YARD CONDUITS ACCORDING TO THE FOLLOWING SCHEDULE:

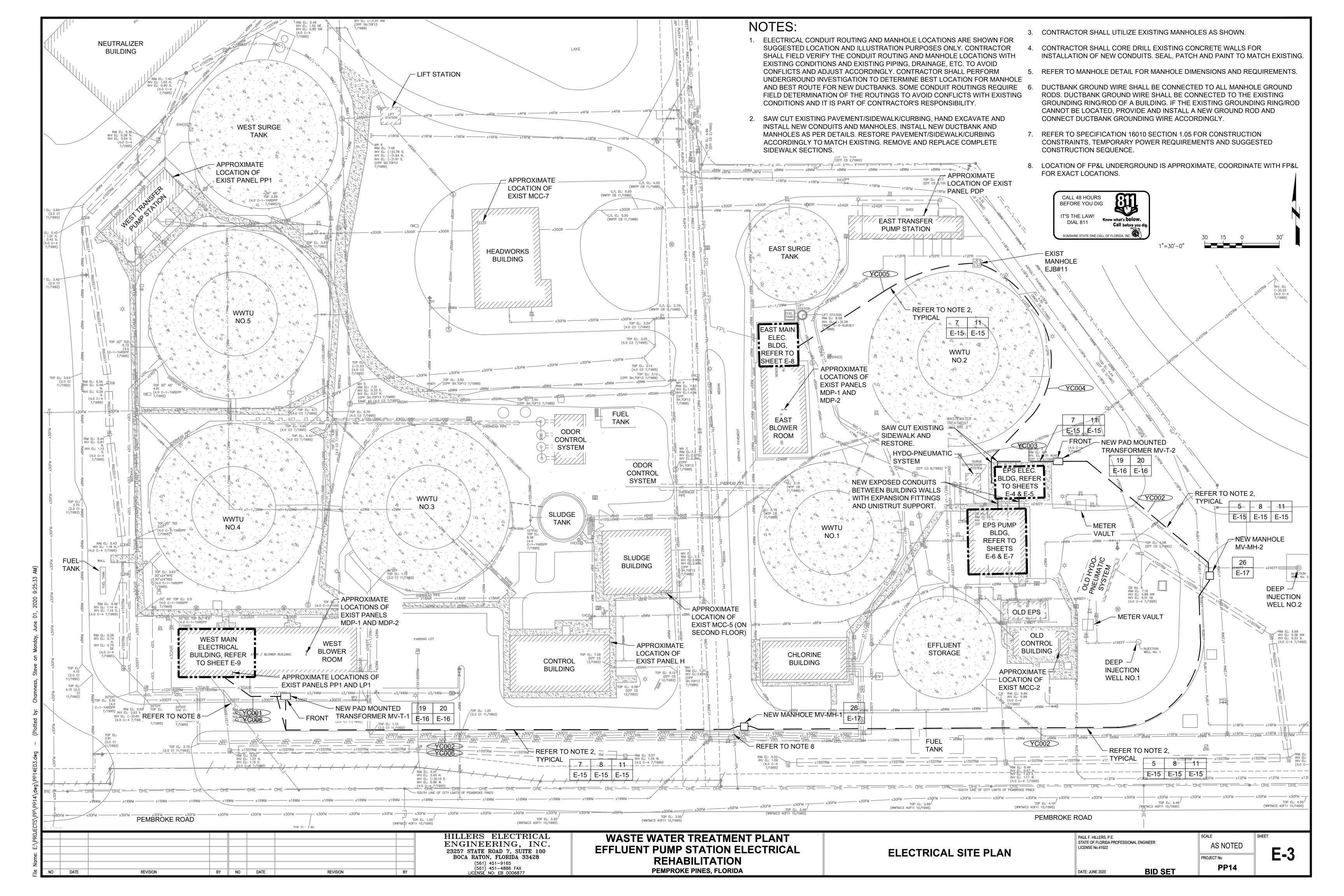
POWER: RED ALL OTHER CONDUITS: GREEN

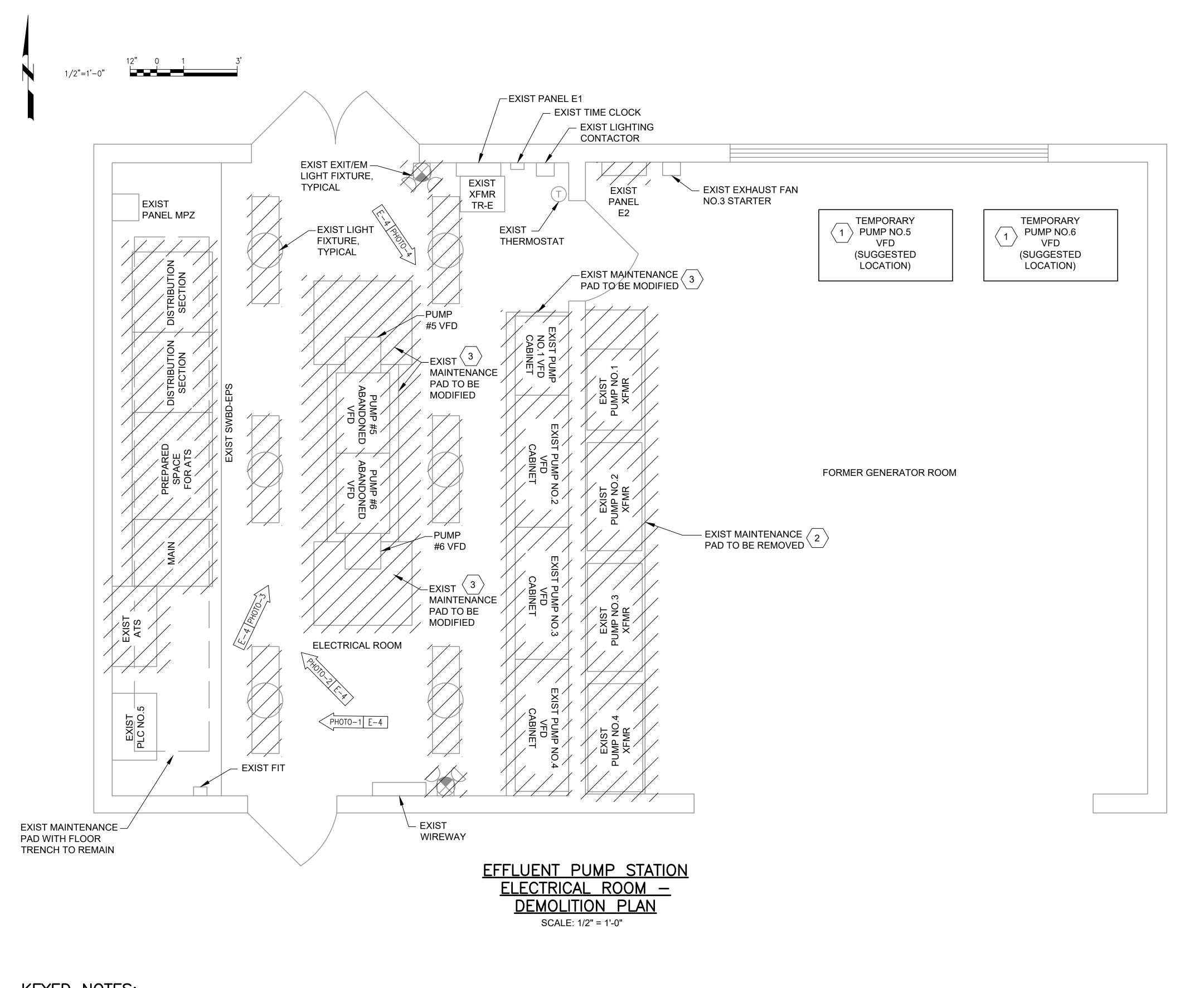
- 27. CONTRACTOR SHALL RESTORE SIDEWALKS, ROADWAYS, SOD AND SPRINKLER SYSTEM PIPING TO MATCH EXISTING, AFTER THE COMPLETION OF THE CONDUIT AND PULLBOX INSTALLATION.
- 28. GROUNDING SHALL BE INSTALLED IN ACCORDANCE WITH NEC, ARTICLE 250. THE GROUNDING SYSTEM TEST SHALL NOT EXCEED A 48 HOUR SPAN DRY RESISTANCE OF 10 OHMS. ADDITIONAL GROUNDING TO MEET THIS REQUIREMENT SHALL BE INSTALLED AT NO EXTRA COST TO THE OWNER. GROUNDING AND BONDING CONNECTIONS SHALL NOT BE PAINTED. ALL GROUNDING CONNECTIONS SHALL BE EXOTHERMIC UNLESS SPECIFICALLY INDICATED OTHERWISE.
- 29. AN EQUIPMENT GROUND WIRE SIZED PER NEC SHALL BE PULLED IN ALL ELECTRICAL CONDUITS, POWER AND CONTROL, WHETHER OR NOT INDICATED ON THE PLANS.
- 30. ALL ENCLOSURES, TJB, WIREWAY, PULL BOXES ETC. SHALL CONTAIN A GROUNDING BUS. CONNECT ALL RACEWAY BONDS TO THIS BUS VIA GROUNDING BUSHING AND EXTEND BONDING JUMPER FROM THIS BUS TO THE ENCLOSURE.

- 31. PRIMARY BUILDING GROUNDING SHALL BE AN EMBEDDED GRID OF MINIMUM #4/O AWG BARE TINNED COPPER WIRE INSTALLED IN THE FOUNDATION AND AROUND THE BUILDING PERIMETER TO FORM A COMPLETE LOOP. SECONDARY GROUND CONNECTIONS TO ALL METAL EQUIPMENT, HAND RAILS, STRUCTURAL STEEL, CONCRETE PADS, REBAR ETC. SHALL HAVE A MINIMUM #4 STRANDED BARE TINNED COPPER CONDUCTOR BONDED USING APPROVED LUGS OR EXOTHERMIC CONNECTIONS. ALL EQUIPMENT GROUNDING CONDUCTORS PENETRATING CONCRETE SLABS OR FINISHED GRADE SHALL HAVE A 72" CONDUCTOR PIGTAIL AT EACH LOCATION FOR CONNECTION TO EQUIPMENT.
- 32. GROUND SURROUNDING YARD FENCE AND ALL YARD LIGHTING FIXTURES WITH MINIMUM #4 STRANDED BARE TINNED COPPER CONDUCTORS BELOW GRADE TO SITE GROUNDING GRID PER NFPA 54/70.
- 33. ALL CONCRETE ENCASED DUCTBANKS SHALL CARRY A MINIMUM #4/O AWG BARE TINNED COPPER GROUND WIRE, OVER THE ENTIRE LENGTH, WHICH SHALL BE CONNECTED TO THE SITE GROUNDING GRID AND GROUND RODS LOCATED CONNECTING HANDHOLES OR IN—GROUND PULL BOXES.
- 34. CONTRACTOR SHALL CORE DRILL EXISTING CONCRETE WALLS, FLOORS, HANDHOLES AND IN-GROUND PULL BOXES FOR CONDUIT PENETRATIONS. SEAL PENETRATIONS WITH NON-SHRINK GROUT OR APPROPRIATE FIRE RATED DEVICES WHERE APPLICABLE.
- 35. ALL CONDUITS PENETRATING RATED FIRE WALLS OR RATED FIRE FLOORS SHALL BE INSTALLED WITH U.L. APPROVED DEVICES TO MAINTAIN THE FIRE RATING OF THE WALL OR FLOOR PENETRATED.
- 36. PROVIDE CONDUIT DUCT SEAL AT ALL CONDUIT ENDS.
- 37. ALL SPARE CONDUITS SHALL BE SEALED WITH A CAP AT BOTH ENDS AND A PULL STRING INSTALLED WITH IDENTIFICATION ON BOTH ENDS.
- 38. ALL RECEPTACLES SHALL BE INSTALLED 18" AFF UNLESS OTHERWISE NOTED. LIGHT SWITCHES SHALL BE MOUNTED 48" AFF UNLESS OTHERWISE NOTED.
- 39. ALL RECEPTACLES WITHIN 6' OF A SINK SHALL BE GFI.
- 40. FLEXIBLE CONDUITS SHALL BE USED TO TERMINATE ALL MOTORS AND OTHER VIBRATING EQUIPMENT AND SHALL BE BETWEEN 18" AND 3' IN LENGTH.
- 41. ELECTRICAL PULL BOXES SHALL BE SUPPLIED WITH TRAFFIC-RATED COVER MARKED "ELECTRICAL" OR "SIGNAL", UNLESS OTHERWISE NOTED.
- 42. TYPEWRITTEN PANEL SCHEDULES SHALL BE INSTALLED IN EACH PANELBOARD, AND TYPEWRITTEN TERMINAL BLOCK SCHEDULES IN EACH CONTROL CABINET.
- 43. ALL SPD'S SHALL BE INTEGRAL TO THE EQUIPMENT SHOWN AND SUPPLIED AS ONE UNIT AND ONE U.L. ENTITY.
- 44. AS PART OF THE ELECTRICAL SUBMITTAL, CONTRACTOR SHALL PROVIDE A LAYOUT OF THE ELECTRICAL ROOM SHOWING SIZES OF ALL EQUIPMENT AND THEIR SPATIAL RELATIONSHIPS.
- 45. ALL MATERIAL IN DESIGNATED CORROSIVE AREAS SHALL BE NEMA 4X STAINLESS STEEL OR NON-METALLIC.
- 46. CONTRACTOR SHALL BALANCE PANELBOARD LOADS AT THE END OF THE PROJECT AND ADJUST PANELBOARD SCHEDULE ACCORDINGLY.
- 47. ALL CONDUITS INSTALLED IN CONCRETE SLABS, WALLS, ETC. SHALL HAVE A MINIMUM OF 2" CONCRETE COVER ON ALL SIDES.
- 48. ALL ENCLOSURES THAT ARE EXTERIOR AND/OR IN NON-AIRCONDITIONED SPACES, SUCH AS PANELBOARDS, DISCONNECT SWITCHES, CONTROL PANELS, JUNCTION BOXES & ETC., SHALL BE NEMA 4X, 316 STAINLESS STEEL UNLESS OTHERWISE NOTED.
- 49. ALL REFERENCES TO 4X, NEMA 4X, OR NEMA 4X STAINLESS STEEL SHALL BE CONSTRUED AS MEANING NEMA 4X 316 STAINLESS STEEL.
- 50. CONTRACTOR SHALL PROVIDE TO THE OWNER WITHIN 30 DAYS AFTER THE DATE OF SYSTEM ACCEPTANCE RECORD DRAWINGS DEPICTING THE COMPLETED INSTALLATION AS INSTALLED INCLUDING A SINGLE LINE DIAGRAM OF THE BUILDING ELECTRICAL DISTRIBUTION AND FLOOR PLANS INDICATING THE LOCATION AND AREA SERVED BY ALL INSTALLED DISTRIBUTIONS PER THE FLORIDA BUILDING CODE—ENERGY CONSERVATION C405.6.4.1.
- 51. CONTRACTOR SHALL PROVIDE TO THE OWNER OPERATING AND MAINTENANCE MANUALS (O&M MANUALS) FOR ALL EQUIPMENT PER THE FLORIDA BUILDING CODE-ENERGY CONSERVATION C405.6.4.2. THE MANUALS SHALL INCLUDE:
  - 51.1. SUBMITTAL DATA STATING EQUIPMENT RATING AND SELECTED OPTIONS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE.
  - 51.2. O&M MANUALS FOR EACH PIECE OF EQUIPMENT REQUIRING MAINTENANCE.
- 51.3. REQUIRED ROUTINE MAINTENANCE ACTIONS SHALL BE CLEARLY IDENTIFIED. NAMES AND ADDRESSES OF AT LEAST ONE QUALIFIED SERVICE AGENCY
- 52. BRANCH AND FEEDER CONDUCTORS ARE SIZED FOR MAXIMUM VOLTAGE DROP OF 5 PERCENT COMBINED AT DESIGN LOAD PER THE FLORIDA BUILDING CODE —ENERGY CONSERVATION—C405.6.3.
- 53. CITY HAS FIRST RIGHT TO SALVAGE OF EQUIPMENT/MATERIAL DEMOLISHED/REMOVED UNDER THIS PROJECT. THE CONTRACTOR SHALL DELIVER ALL CITY SALVAGED EQUIPMENT/MATERIAL TO A SITE SPECIFIED BY THE CITY. ANY MATERIAL REFUSED BY THE CITY SHALL BE DISPOSED OF BY THE CONTRACTOR.
- 54. AS PART OF THE WORK OF THIS CONTRACT THE CONTRACTOR SHALL INVESTIGATE ALL UNDERGROUND DUCTBANKS AND RACEWAYS DESCRIBED IN THE DRAWINGS TO VERIFY CABLE ROUTING FOR REMOVAL AND REPLACEMENT OF CABLES IN EXISTING RACEWAYS. CONTRACTOR SHALL DOCUMENT ANY DEVIATIONS OR MISSING MANHOLES AND PULL BOXES DISCOVERED DURING THE INVESTIGATION.
- 55. CONTRACTOR SHALL PERFORM UNDERGROUND INVESTIGATIONS (SOFT DIGS, GROUND PENETRATING RADAR, ETC.) IN AREAS OF PROPOSED NEW DUCTBANKS TO IDENTIFY POSSIBLE INTERFERENCES NOT SHOWN ON DRAWINGS.
- 56. DRAWINGS WERE DEVELOPED FROM AVAILABLE AS-BUILT INFORMATION FURNISHED BY THE OWNER AS BEST INFORMATION AVAILABLE. ENGINEER ASSUMES NO LIABILITY AS TO THE ACCURACY OF FACILITIES THAT ARE NOT READILY OBSERVABLE AND THE CONTRACTOR IS CAUTIONED TO PERFORM ITS OWN INVESTIGATION OF FACILITIES IN AREAS OF THE WORK TO DETERMINE AND AVOID INTERFERENCES TO THE GREATEST EXTENT POSSIBLE.
- 57. DRAWINGS THAT ILLUSTRATE EXISTING STRUCTURES, PIPING, ELECTRICAL AND EQUIPMENT ARE BASED UPON RECORD DRAWINGS AVAILABLE UPON REQUEST FOR GENERAL INFORMATIONAL PURPOSES ONLY. LOCATION, SIZE, AND ALIGNMENT OF EXISTING FACILITIES HAVE BEEN DETERMINED FROM AVAILABLE RECORDS. THIS INFORMATION IS FURNISHED AS A GUIDE FOR THE CONTRACTOR. THE ENGINEER AND THE OWNER DO NOT GUARANTEE THE ACCURACY OF THIS DATA. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR DETERMINING THE LOCATION AND PROTECTING ALL TYPES OF UTILITIES AND STRUCTURES ENCOUNTERED DURING THE COURSE OF OPERATION ON THIS PROJECT. FIELD OBSERVATIONS INDICATE THAT FIELD CONDITIONS DO NOT FULLY MATCH THE ABOVE REFERENCED RECORD DRAWINGS.
- 58. THE ELECTRICAL CONTRACTOR SHALL SUBMIT FOR APPROVAL A MINIMUM OF 1/4"=1"-0" SCALED LAYOUT OF EXPOSED CONDUIT ROUTING AND CONDUIT SUPPORTS BEFORE INSTALLATION.
- 59. CONTRACTOR SHALL MAINTAIN THE OPERATIONS OF THE PLANT AS OUTLINED IN THE CONSTRUCTION CONSTRAINTS OF SPECIFICATION SECTION 16010.



**E-2** 



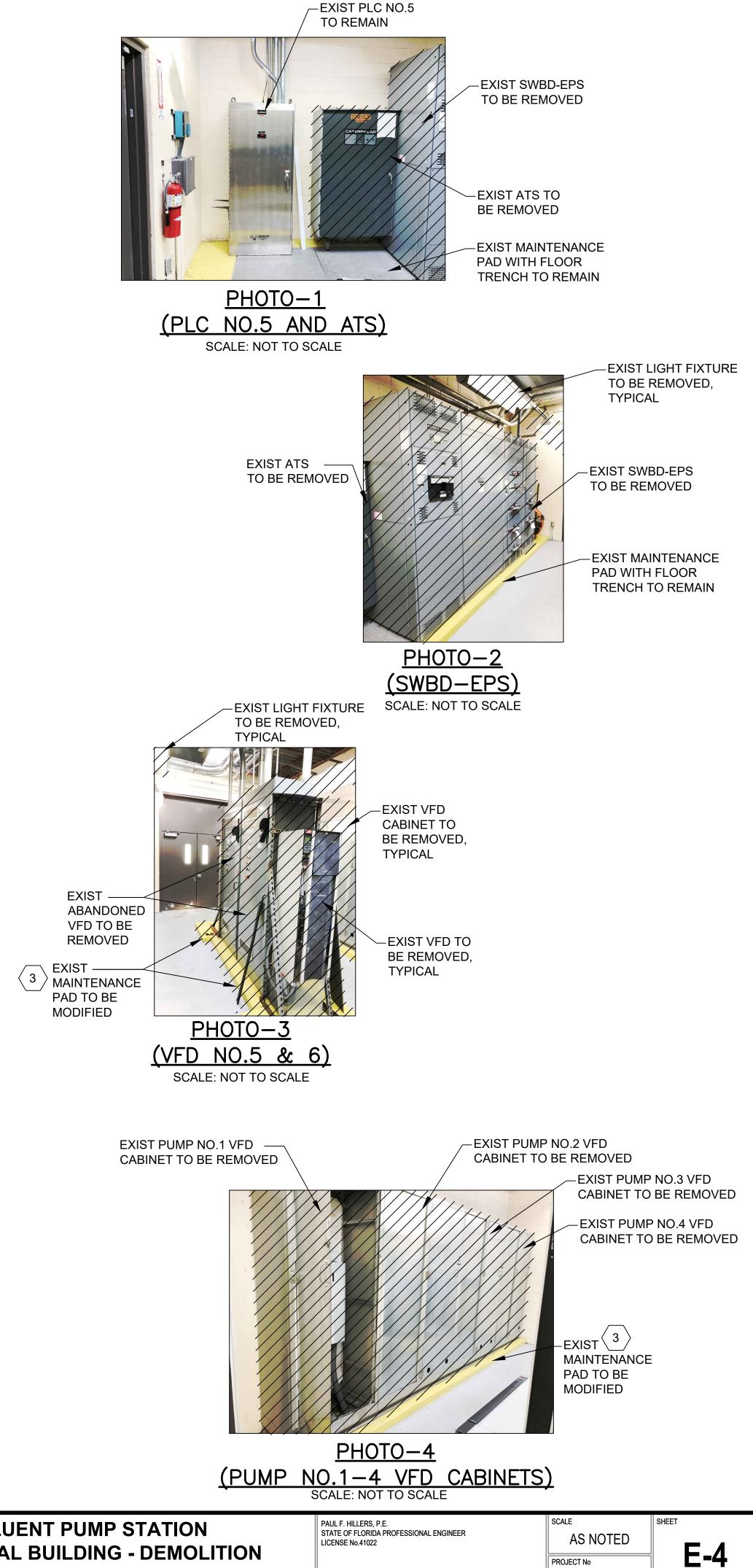


### **KEYED NOTES:**

- CONTRACTOR SHALL PROVIDE AND INSTALL A NEW PUMP NO. 5 VFD AND NEW PUMP NO. 6 VFD TO TEMPORARY OPERATE THE PUMPS NO. 5 & 6 DURING CONSTRUCTION, REFER TO SHEETS E-11 AND E-13 FOR TEMPORARY CONDUIT AND CONDUCTOR REQUIREMENTS.
- CONTRACTOR SHALL SAWCUT/CHIP OUT AND REMOVE THE EXISTING CONCRETE MAINTENANCE PAD FOR PUMP ISOLATION TRANSFORMERS. GRIND SMOOTH THE AREA AND PAINT FLOOR TO MATCH EXISTING. PAINT SHALL BE A SERIES 287 ENVIRO-POX SEMIGLOSS, COORDINATE WITH OWNER FOR PAINT COLOR.
- CONTRACTOR SHALL SAWCUT/CHIP OUT AND MODIFY EXISTING CONCRETE MAINTENANCE PAD FOR NEW EQUIPMENT IN ELECTRICAL ROOM. IN AREAS TO BE REMOVED, GRIND SMOOTH AND PAINT FLOOR TO MATCH EXISTING. PAINT SHALL BE A SERIES 287 ENVIRO-POX SEMIGLOSS, COORDINATE WITH OWNER FOR PAINT COLOR.

### **NOTES:**

- 1. REFER TO SPECIFICATION 16010 SECTION 1.05 FOR CONSTRUCTION CONSTRAINTS AND SUGGESTED CONSTRUCTION SEQUENCE.
- 2. EXISTING LIGHT FIXTURES, EMERGENCY LIGHTS, SWITCHES, ETC. AND ASSOCIATED CONDUITS/WIRES SHALL BE REMOVED. PROVIDE AND INSTALL NEW LIGHTING SYSTEM COMPLETE IN PLACE AS SHOWN ON OTHER DRAWINGS AND AS DESCRIBES IN SPECIFICATIONS.



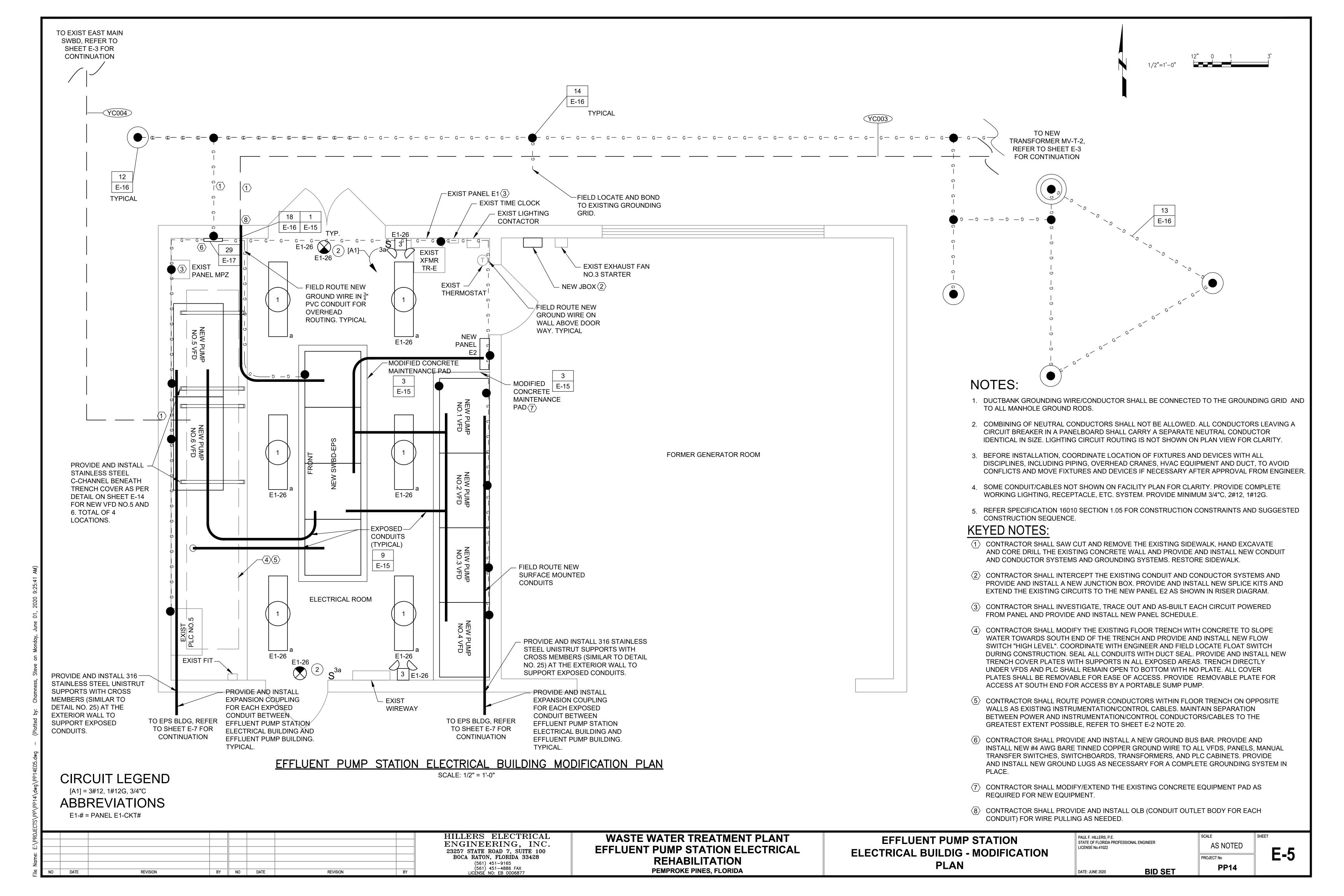
HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 BY NO DATE REVISION REVISION

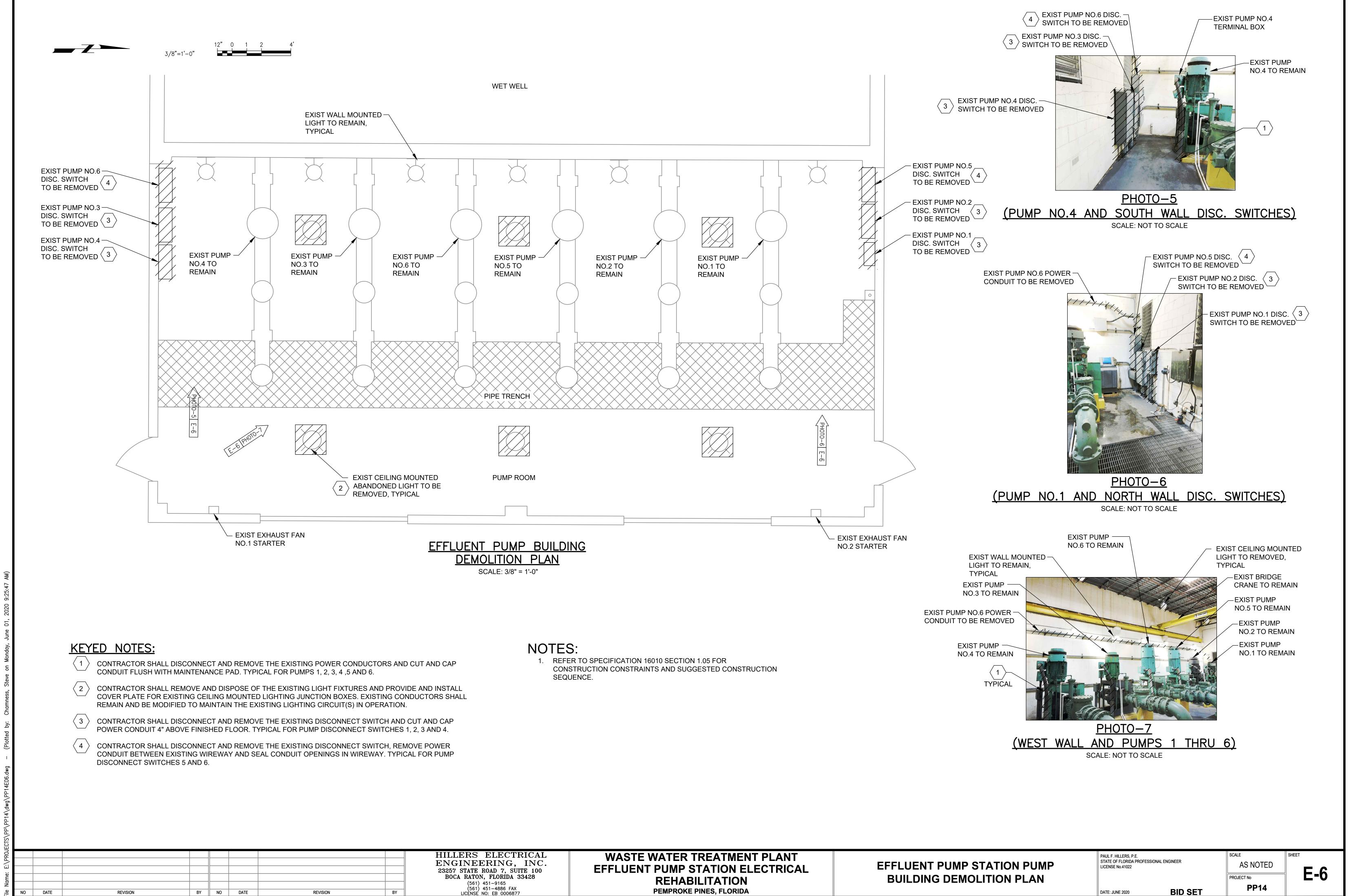
**WASTE WATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL REHABILITATION** PEMPROKE PINES, FLORIDA

**EFFLUENT PUMP STATION ELECTRICAL BUILDING - DEMOLITION PLAN** 

**BID SET** DATE: JUNE 2020

PP14



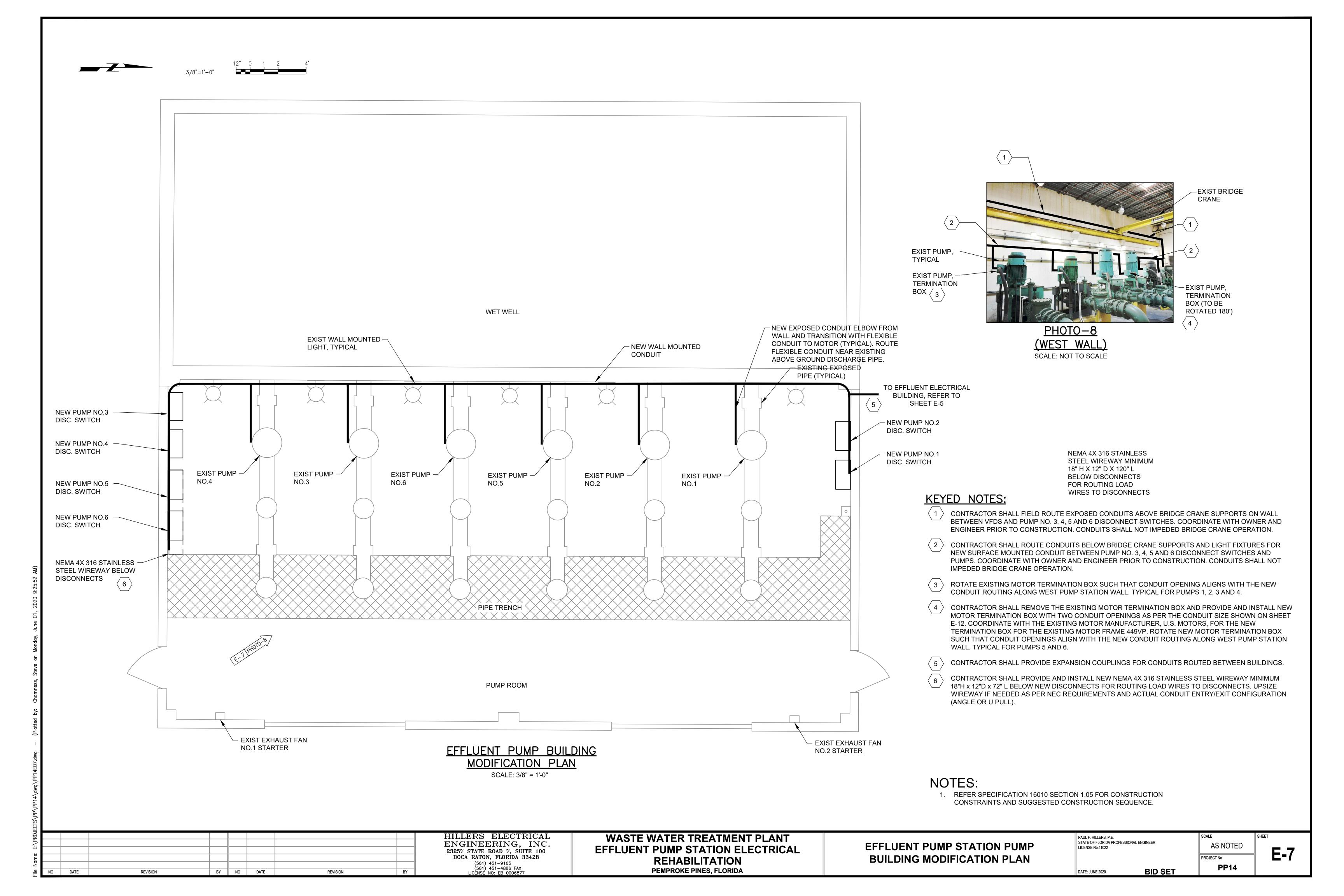


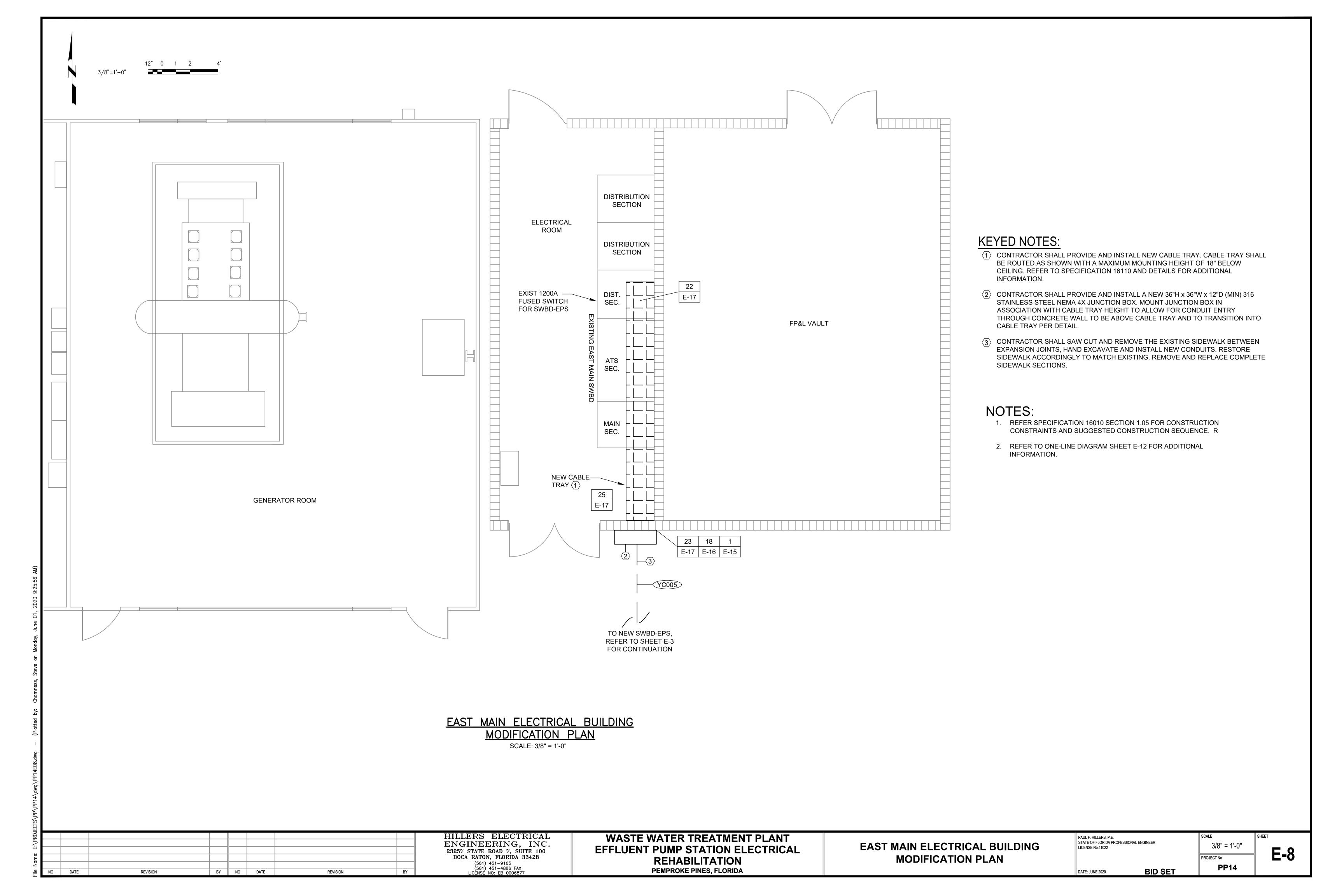
REVISION

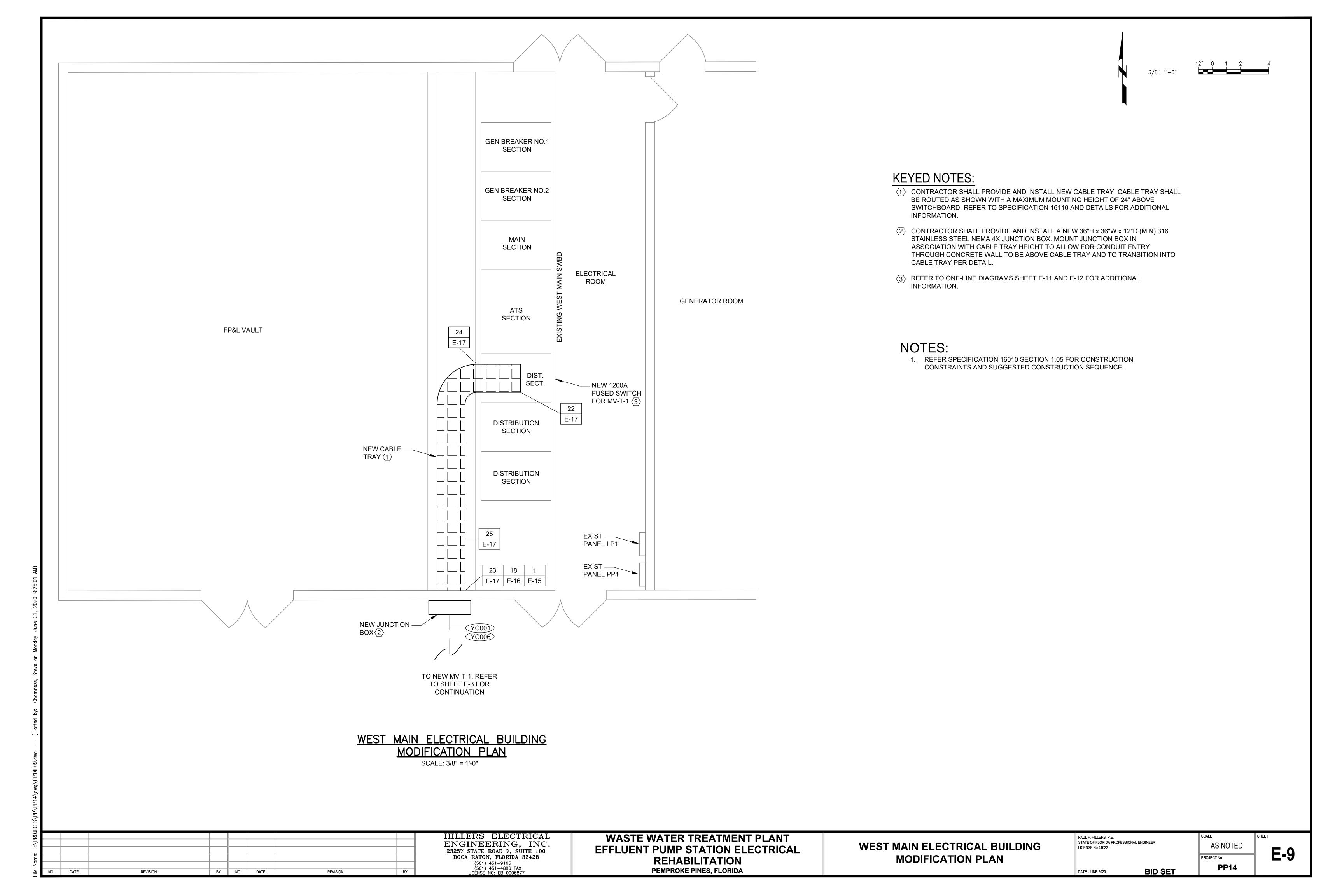
BY NO DATE

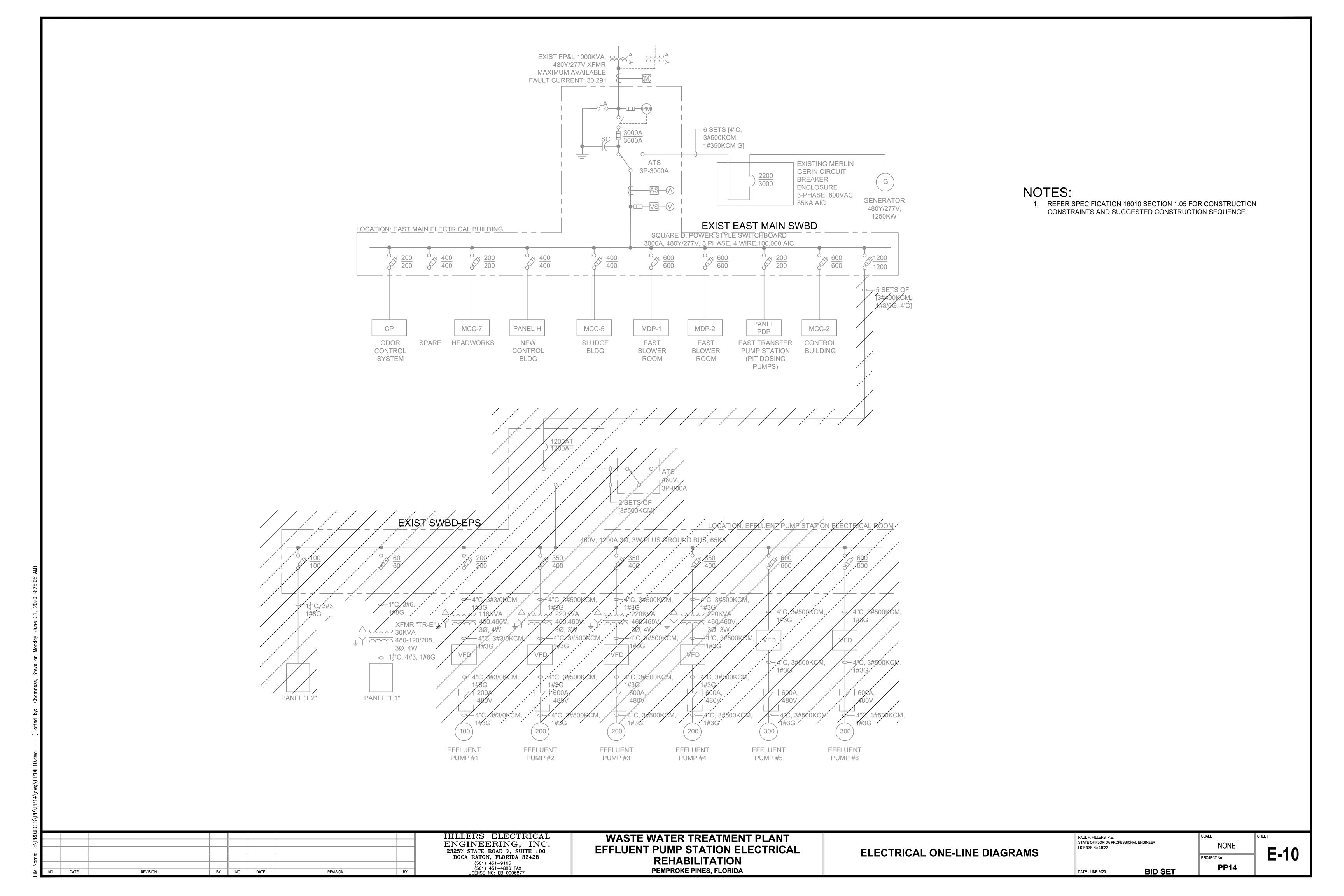
REVISION

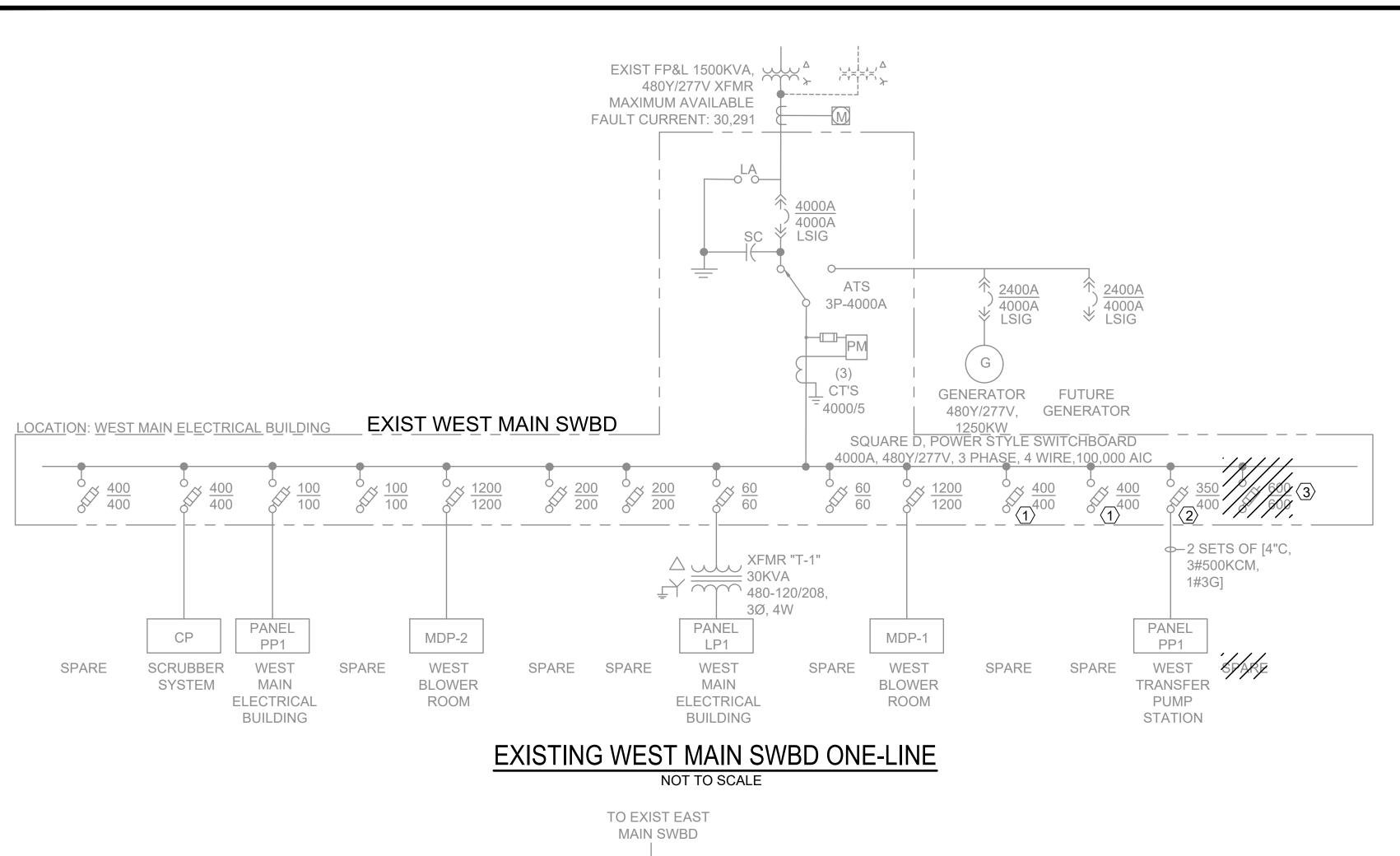
DATE: JUNE 2020

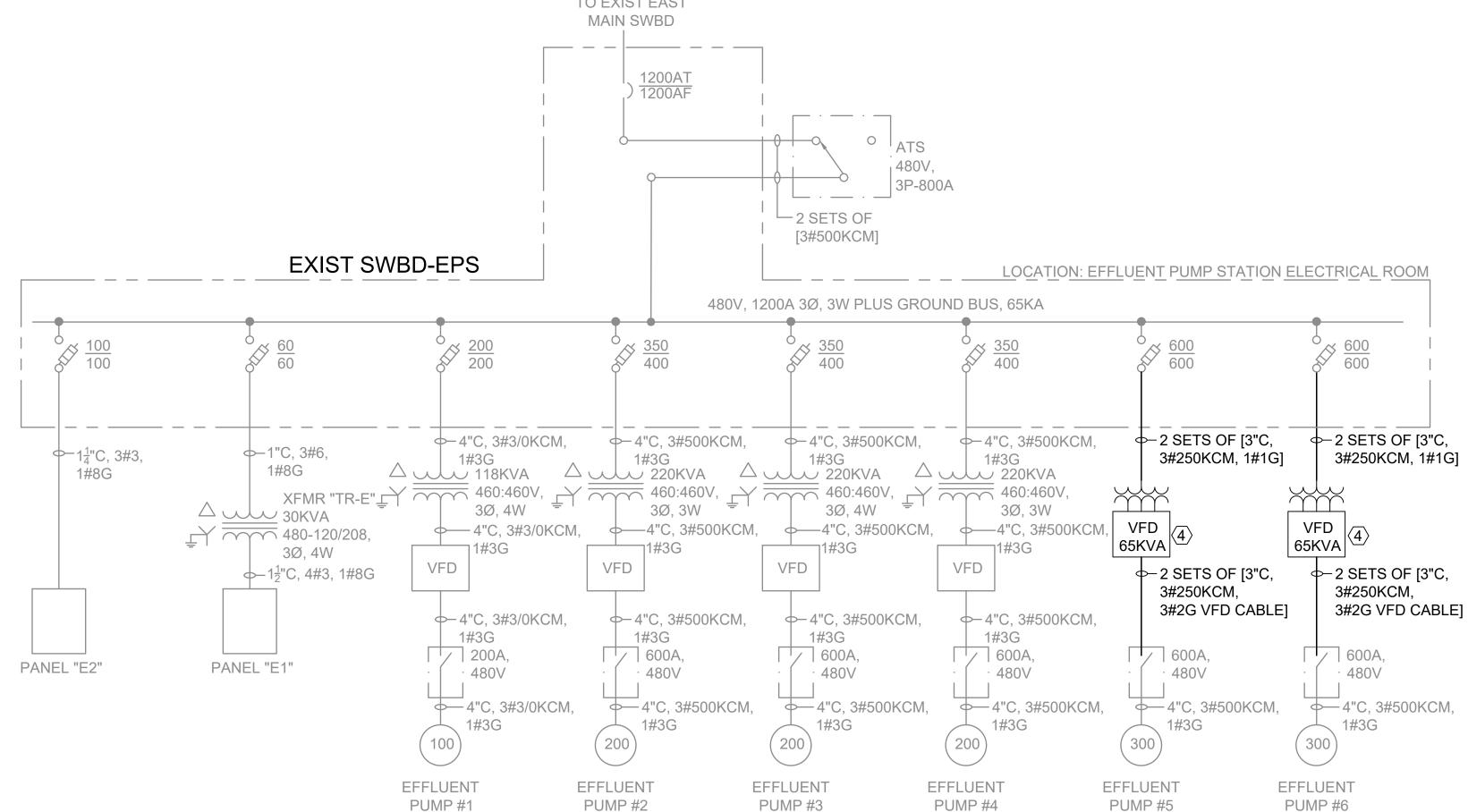












## EXISTING SWBD-EPS ONE-LINE - TEMPORARY POWER

NOT TO SCALE

**EXISTING BLANK COVER PLATES** TO BE REMOVED **EXISTING FUSED** SWITCHES TO BE RELOCATED (1) - EXISTING FUSED SWITCH TO BE RELOCATED  $\langle \overline{2} \rangle$ - EXISTING FUSED SWITCH TO BE REMOVED  $\langle \overline{3} \rangle$ 

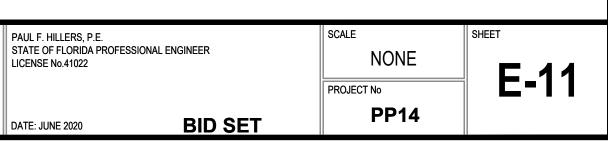
### PHOTO-1 (WEST MAIN SWBD) NOT TO SCALE

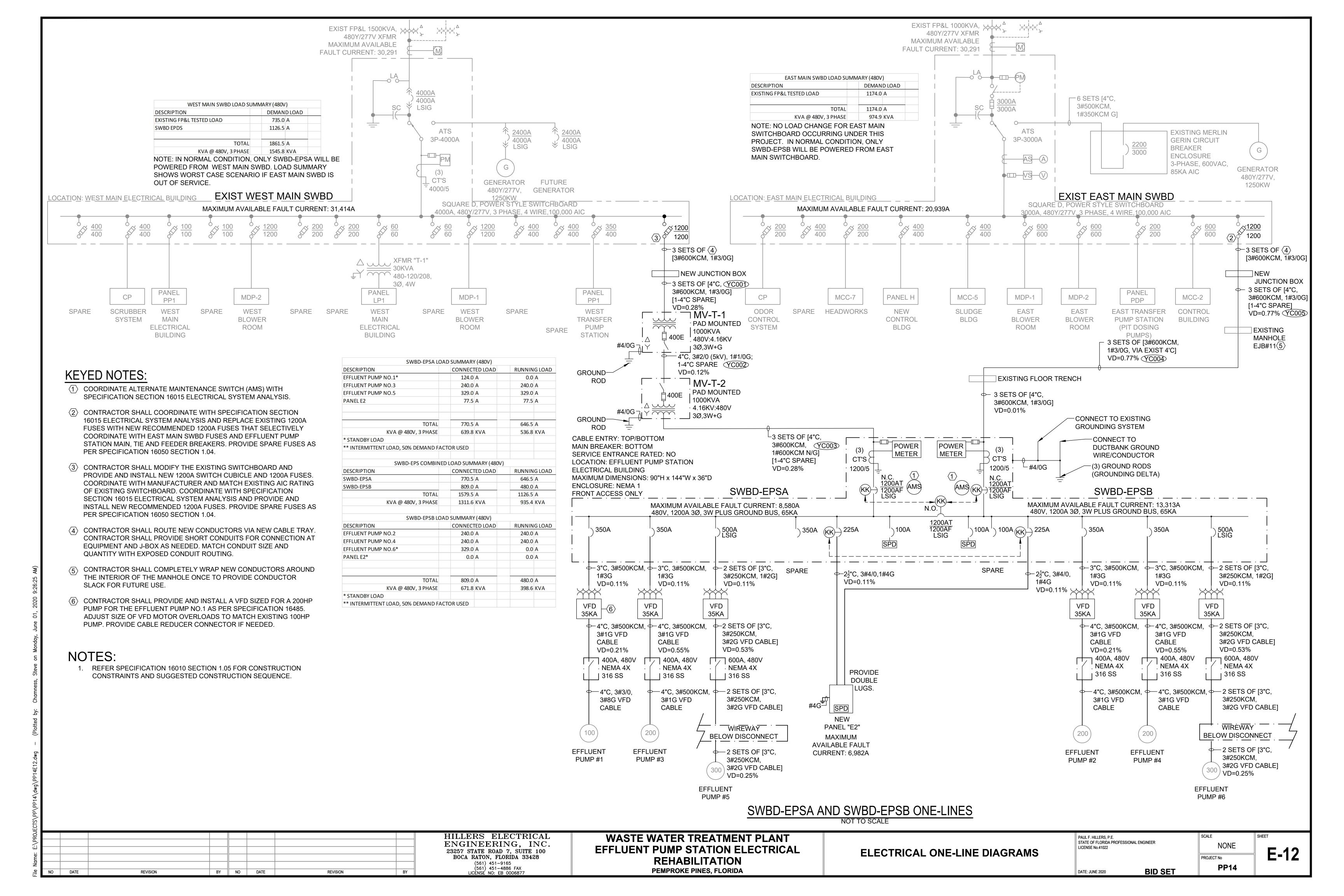
### **KEYED NOTES:**

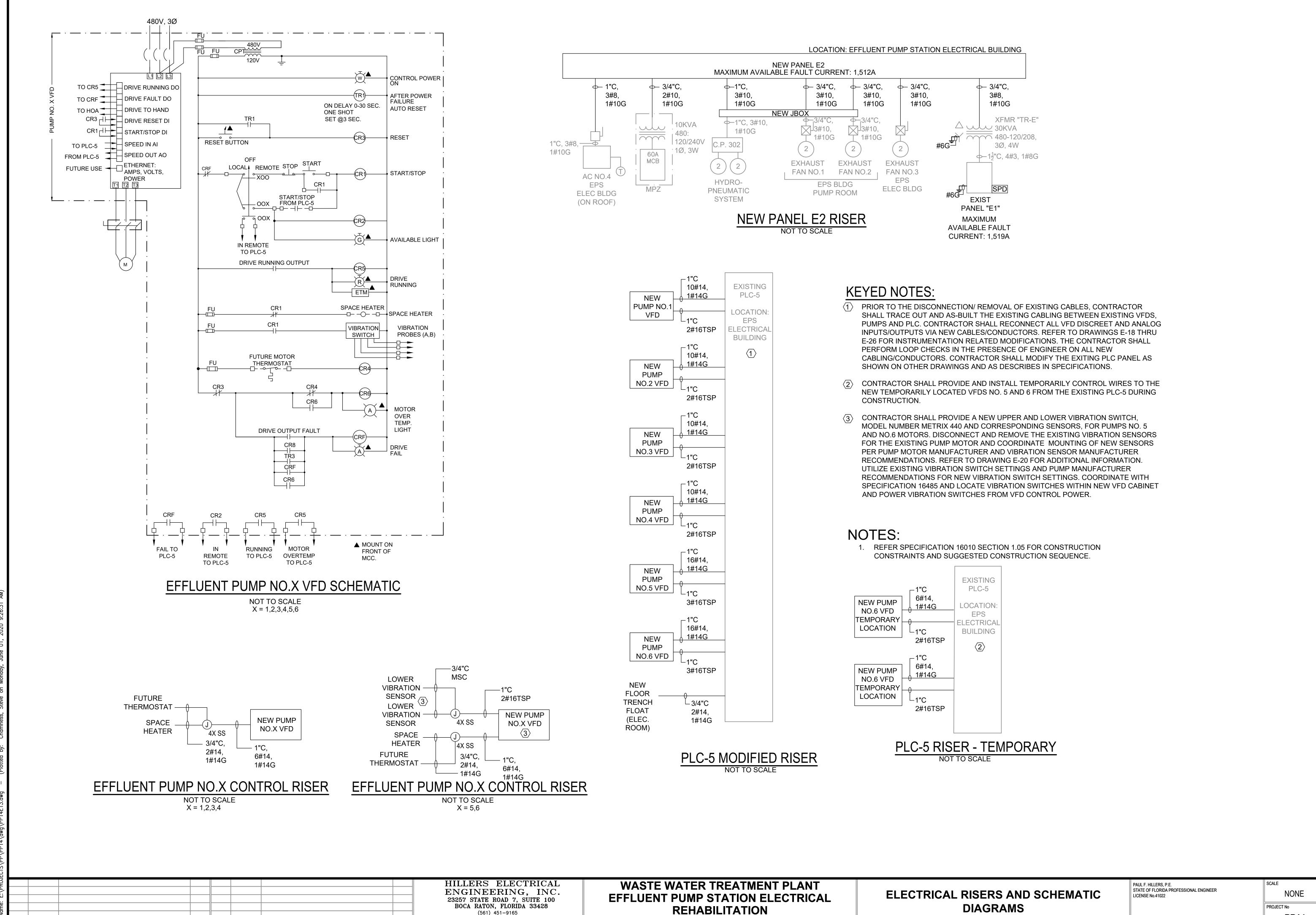
- (1) CONTRACTOR SHALL RELOCATE THE TWO SPARE 400A FUSED SWITCHES UPWARDS TO FACILITATE INSTALLATION OF NEW 1200A FUSED SWITCH.
- $\langle 2 
  angle$  CONTRACTOR SHALL RELOCATE THE EXISTING WEST TRANSFER PUMP STATION 400A FUSED SWITCH UPWARDS TO FACILITATE THE NEW 1200A FUSED SWITCH CONTRACTOR SHALL ADJUST EXISTING CONDUCTORS AS NECESSARY TO FACILITATE CONNECTION TO THE RELOCATED SWITCH.
- (3) CONTRACTOR SHALL REMOVED THE EXISTING SPARE 600A FUSED SWITCH AND PREPARE SPACE FOR NEW 1200A FUSED SWITCH. DELIVER SWITCH TO OWNER FOR SALVAGE.
- (4) CONTRACTOR SHALL TEMPORARILY POWER THE NEW TEMPORARILY LOCATED VFDS NO. 5 AND 6 FROM THE EXISTING SWITCHBOARD DURING CONSTRUCTION. PRIOR TO THE REMOVALE OF THE EXISTING SWITCHBOARD, CONTRACTOR SHALL TEMPORARILY POWER NO.5 AND 6 FROM THE NEW SWITCHBOARD TO MAINTAIN OPERATION DURING CONSTRUCTION.

### NOTES:

1. REFER SPECIFICATION 16010 SECTION 1.05 FOR CONSTRUCTION CONSTRAINTS AND SUGGESTED CONSTRUCTION SEQUENCE.







PEMPROKE PINES, FLORIDA

(561) 451-9165

BY NO DATE

REVISION

REVISION

(561) 451-4886 FAX LICENSE NO: EB 0006877

E-13 PP14

**BID SET** 

DATE: JUNE 2020

					NEW	PAN	IEL "E2"	SCHI	EDULE					
В	US AMI	PS	CIDCUIT NAME				BUS				CIDCUIT NAME		BUS AMI	PS
Α	В	С	CIRCUIT NAME	POLES	AIVIPS		АВС		AIVIPS	POLES	CIRCUIT NAME	Α	В	С
20.1			XFMR-TR-E	3	45	1		2	20	1	SPARE			
	19.5			1		3	-	4	30	2	MPZ		20.8	
		14.9	1	1		5		6						20.8
3.4			EXHAUST FAN NO.1	3	20	7	<del>-   -   -  </del>	8	20	3	C.P. 302 HYDRO PANEL	7		
	3.4			I		9	$\exists + +$	10					7	
		3.4		I		11	╫┿	12						7
3.4			EXHAUST FAN NO.2	3	20	13	╊╂┼	14	30	3	SPARE			
	3.4			1		15		16			I			
		3.4				17	<del></del>	18			I			
3.4			EXHAUST FAN NO.3	3	20	19	╗╬┼┼┼	20	20	3	SPARE			
	3.4			1		21	$\exists + + +$	22						
		3.4				23	_++-	24						
20			AC NO.4	3	40	25	┸	26	20	3	SPARE			
	20			1		27	_++-	28			I			
		20	1	1		29	┵	30						
			SPARE	3	40	31	╧	32	20	3	SPARE			
						33	_++-	34						
						35	_ <del>         </del>	36						
			SPARE	3	20	37	<del>-                                      </del>	38	30	3	SPD			
			I			39	_++	40						
			1			41	<b>—</b>	42						

TOTAL AMPS: BUS A 57.3 BUS B 77.5 BUS C 72.9 KVA 64.3

10171271111101	50071	07.0	5005	77.19	5000	, 2.5	11111					
RATED VOLTAGE	_	120/208		277/480		120/240	Branch Poles: 🗖 12	□18 □30	<b>■</b> 42 □	84	Switchboard: □	
RATED AMPS	r100	■225	□400	□1000		Cabinet:	■Surface	□Flush				
NEUTRAL BUS	<b>■</b> 100%	<b>150%</b>	□200%	■GROU	ND BUS	■H	INGED DOOR	■KEYED DOO	R LATCH	LOCATION: EFFLUEN	IT PUMP STATION ELECTRIC BLDG	
CIRCUIT BREAKER	(BOLT IN)	) BRANCH	DEVICES	■SPD	Enclosur	е Туре	■Nema 1	□Ne	ema 3R	□Nema 4X		
☐ MAIN LUGS	ONLY	MAIN 225	5 AMPS	■BREAKER	□■ _		TO BE 0	GFI				
PANEL BOARD MU	JST BE RA	TED TO IN	TERRUPT A	4 SHORT C	IRCUIT OF	<u>42</u> ,000 A	MPS SYMETRICAL					
APPROVED MF'RS	SEE SPEC	IFICATION	1			COPPER BL	JSSES	MAIN LUGS:		SET SIZE:		

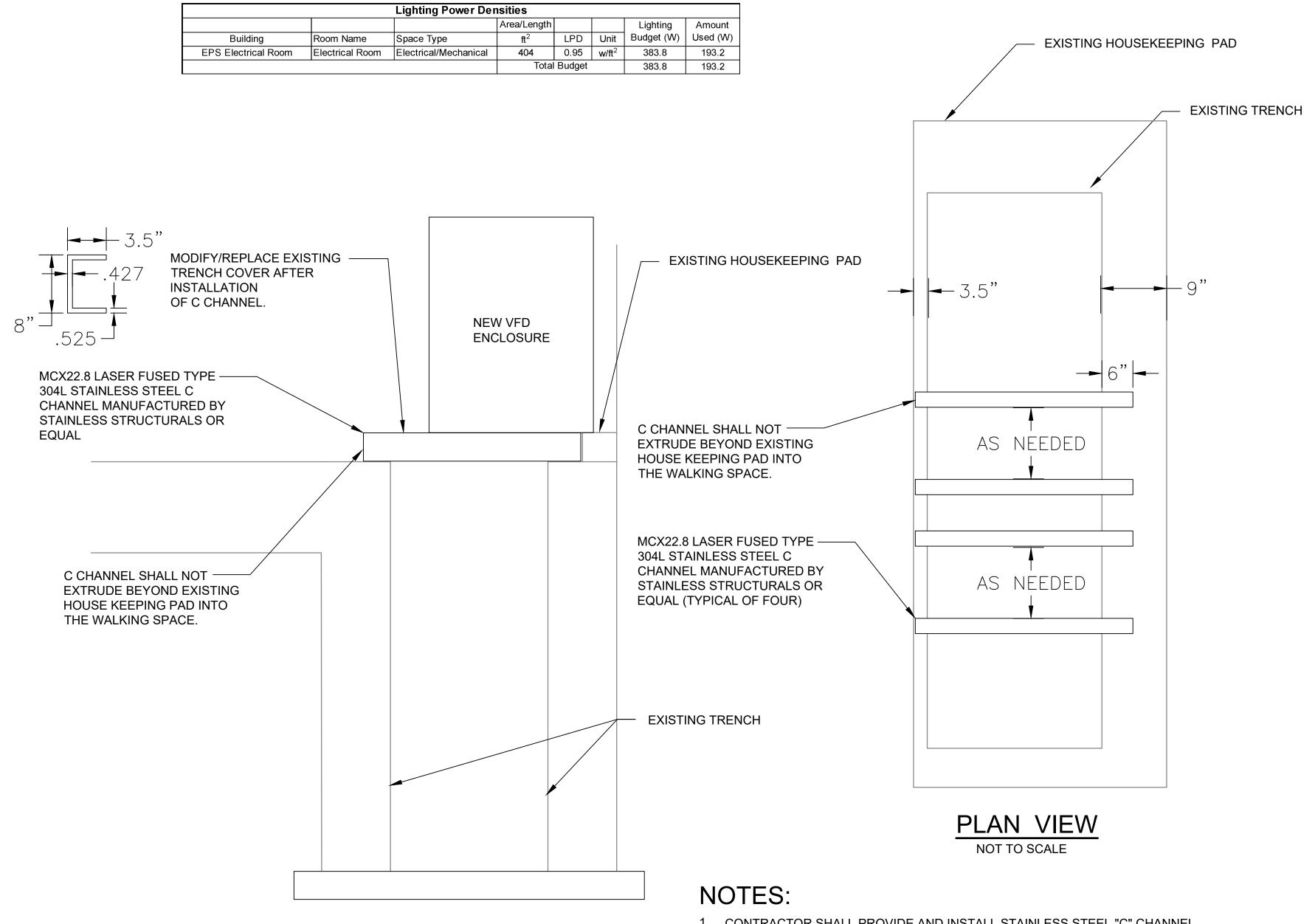
				E	(ISTIN	G PA	NEL "E	1" SC	HEDU	LE				
ВІ	JS AMP	S	CIRCUIT NAME	POLES	ΔΙΜΡς		BUS		ΔΜΡς	POLES	CIRCUIT NAME	В	US AMI	PS
Α	В	С	CINCOTI NAIVIE	TOLLS	AIVII 3		АВС	_	AIVII 3	TOLLS	CINCOTT WAIVE	Α	В	С
7.2			EFFL. PMP-SUMP PUMP 1/3HP	1	20	1		2	20	1	LIGHTING (PUMP BLDG)	8		
	7.2		METER VLT-SUMP PUMP 1/3HP	1	20	3		4	20	1	RECEPTACLES (PUMP BLDG)		5	
		1	CP-1	1	20	5	-	6	20	1	RECEPTACLES (PUMP BLDG)			5
1			CP-2	1	20	7		8	20	1	OUTDOOR LGTS (PUMP BLDG)	4		
	1		CP-3	1	20	9	$\mathbb{H}$	10	20	1	SPARE			
		1	CP-4	1	20	11		12	20	1	SPARE			
1			CP-5	1	20	13		14	20	1	CP-300	3		
	1		CP-6	1	20	15		16	20	1	CP-301		1	
		1	CP-11	1	20	17		18	20	1	CP-303			1
1			CP-12	1	20	19	1	20	20	1	CP-400	1		
	1		CP-13	1	20	21		22	20	1	CP-401		1	
		1	CP-14	1	20	23		24	20	1	LIGHTING (PUMP BLDG)			8
1			CP-15	1	20	25		26	20	1	ELEC ROOM LIGHTING	1.78		
	5		PLC-5 CONTROL PANEL	1	20	27		28	20	1	LIGHTING		7.4	
		8.3	LIGHTING (WALKWAY)	1	20	29		30	20	1	EMERGENCY LIGHTING			5
8.3			LIGHTING (ROADWAY)	1	20	31		32	20	1	RECEPTACLES	9		
	8.3		LIGHTING (ROADWAY)	1	20	33	]++-	34	20	1	LIGHTING (OUTDOOR)		6	
			SPARE	1	20	35	1	36	20	1	LIGHTING (HYDRO-PNEUMATIC)			3
			SPD	3	30	37	<del>                                     </del>	38	20	1	TIME CLOCK AND LGT. CONTACTOR	0.2		
						39		40	20	1	FIRE ALARM PANEL		1	
						41	$\vdash$	42	20	1	SPARE			

TOTAL AMPS: BUS A 46.5 BUS B 44.9 BUS C 34.3 KVA 16.7

			, , , , , , , , , , , , , , , , , , , ,	0 0 000							
RATED VOLTAGE	11	120/208		277/480		120/240	Branch Poles: 🗖 12	□18 □30	<b>42</b>	□84	Switchboard:
RATED AMPS	<b>100</b>	<b>2225</b>	<b>400</b>	<b>1000</b>		Cabinet:	■Surface	□Flush			
NEUTRAL BUS	<b>■</b> 100%	<b>150%</b>	<b>200%</b>	■GROU	ND BUS	■HI	INGED DOOR	■KEYED DOC	R LATCH	H LOCATION: EFFLUEN	IT PUMP STATION ELECTRICAL BUILDING
CIRCUIT BREAKER (	BOLT IN)	BRANCH	DEVICES	□SPD	Enclosur	е Туре	■Nema 1		ema 3R	□Nema 4X	
☐ MAIN LUGS (	ONLY	MAIN 10	0 AMPS ■	BREAKER			TO BE GF	:[			
PANEL BOARD MUST BE RATED TO INTERRUPT A SHORT CIRCUI				RCUIT OF	_10,000 AN	MPS SYMETRICAL					
EXISTING MF'RS: SO	QUARE D					COPPER BU	ISSES	SUBFEED LU	GS		

		YARD CONDUIT SCHEDULE	
NUMBER	CONDUIT FROM	CONDUIT TO	REMARKS
YC001	EXIST WEST MAIN SWBD @ WEST MAIN ELEC. BLDG	NEW TRANSFORMER MV-T-1	REFER TO SHEET E-12
YC002	NEW TRANSFORMER MV-T-1	NEW TRANSFORMER MV-T-2	REFER TO SHEET E-12
YC003	NEW TRANSFORMER MV-T-2	NEW SWBD-EPS @ EPS ELECTRICAL BUILDING	REFER TO SHEET E-12
YC004	EXIST MANHOLE EJB#11	NEW SWBD-EPS @ EPS ELECTRICAL BUILDING	REFER TO SHEET E-12
YC005	EXIST EAST MAIN SWBD @ EAST MAIN ELEC. BLDG	EXIST MANHOLE EJB#11	REFER TO SHEET E-12
YC006	EXIST WEST MAIN ELEC. BLDG	NEW MANHOLE MV-MH-1	2 SPARE 4"C

	LIGHT FIXTURE SCHEDULE												
FIXTURE NUMBER	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMPS	INPUT WATTS	MOUNTING	MOUNTING HEIGHT						
1	4' LED WRAPAROUND	METALUX	4WNLED-LD4-40SL-F-UNV-L840-CD1	LED	32.2W	STEM	10						
2	EXIT LIGHT (SINGLE/DOUBLE FACE, RED LETTERS)	ISOLITE	RL-EM-R-WH-UN-SD-120	LED	3.2W	SURFACE	OVER DOOR						
3	LOCATION EMERGENCY LIGHT	ISOLITE	BUG-6-WH-SD	LED	6W	SURFACE	8.5'						



**ELEVATION VIEW** 

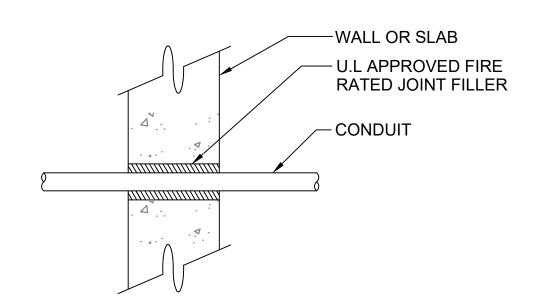
NOT TO SCALE

 CONTRACTOR SHALL PROVIDE AND INSTALL STAINLESS STEEL "C" CHANNEL SUPPORTS TO SPAN THE EXISTING TRENCH FOR VFD INSTALLATION. CONTRACTOR SHALL MODIFY EXISTING HOUSEKEEPING PAD TO EMBED "C" CHANNEL AND GROUT IN-PLACE.

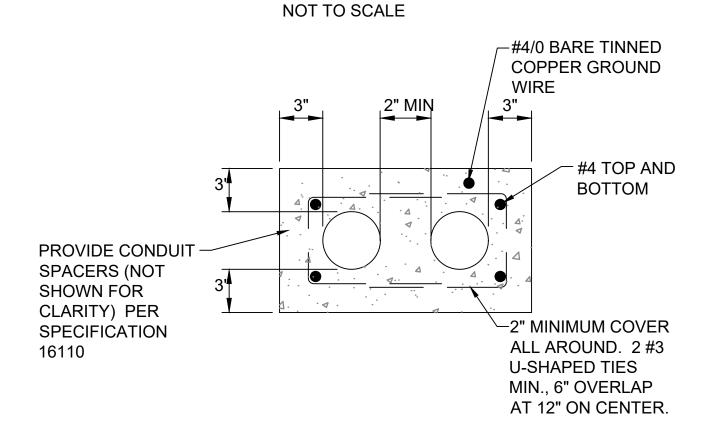
# EFFLUENT PUMP STATION ELECTRIC ROOM VFD SUPPORT DETAIL

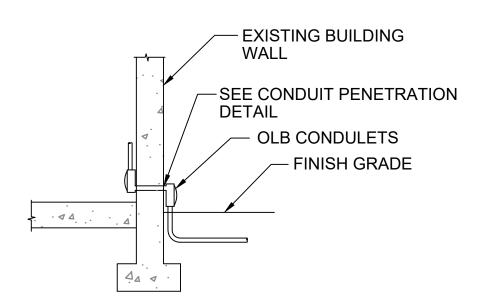
NOT TO SCALE

)JECTS						
:\PRC		HINICALNI HIHI BUNICA UNICI	WASTE WATER TREATMENT PLANT		PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGINEER	SCALE SHEET
ne: E		23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428	FFLUENT PUMP STATION ELECTRICAL	ELECTRICAL SCHEDULES	LICENSE No.41022	PROJECT No.
Nar		(561) 451-9165 (561) 451-4886 FAX	REHABILITATION PEMPROKE PINES, FLORIDA		DATE: JUNE 2020 BID SET	PP14
Ë L	NO DATE REVISION BY NO DATE REVISION BY	LICENSE NO: EB 0006877	PEMPRORE PINES, FLORIDA		DATE: JUNE 2020 BID SE I	

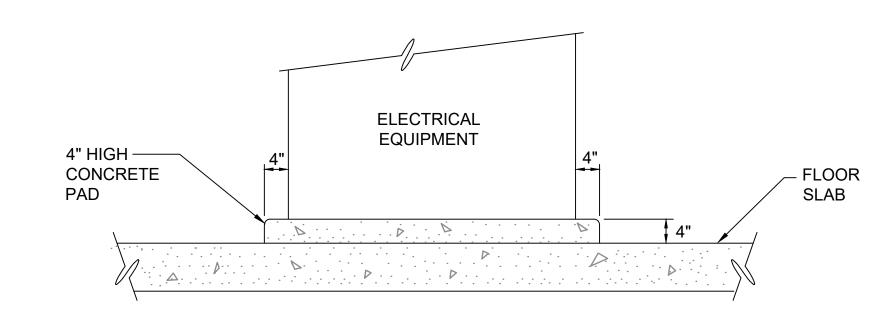


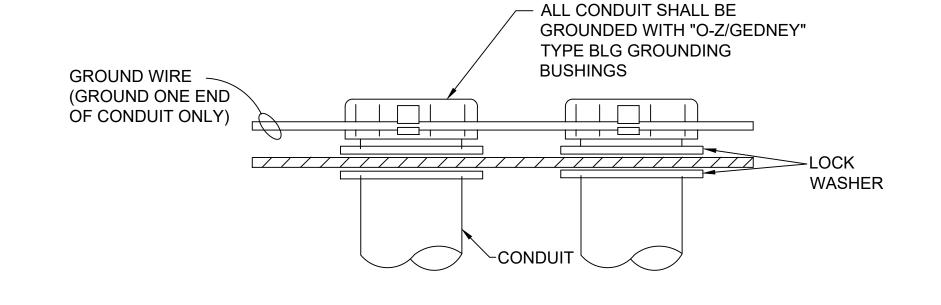








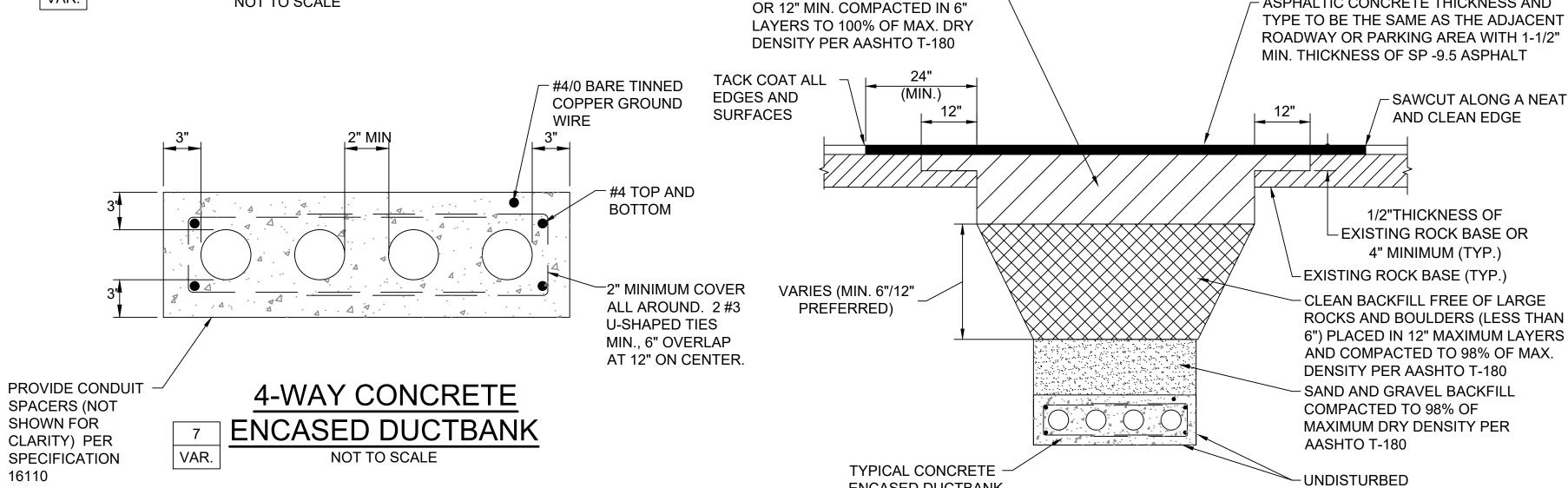




CONDUIT GROUNDING NOT TO SCALE

- ASPHALTIC CONCRETE THICKNESS AND





LIMEROCK BASE TWICE THE

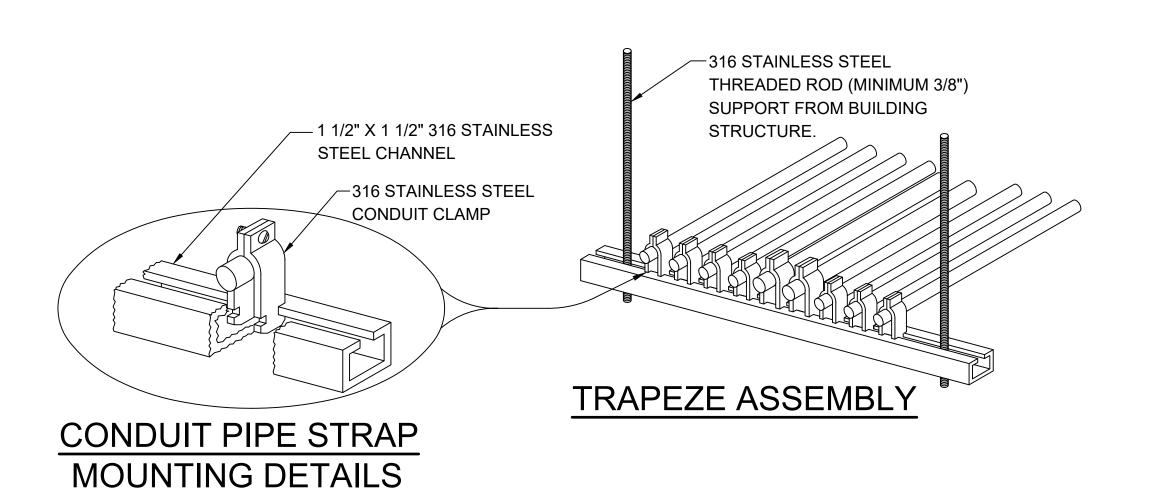
THICKNESS OF ADJACENT BASE

### MATERIAL PAVEMENT RESTORATION FOR LOCAL ROADS AND PARKING LOTS NOT TO SCALE

### 2-WAY CONCRETE **ENCASED DUCTBANK** VAR. NOT TO SCALE

### **DUCTBANK NOTES:**

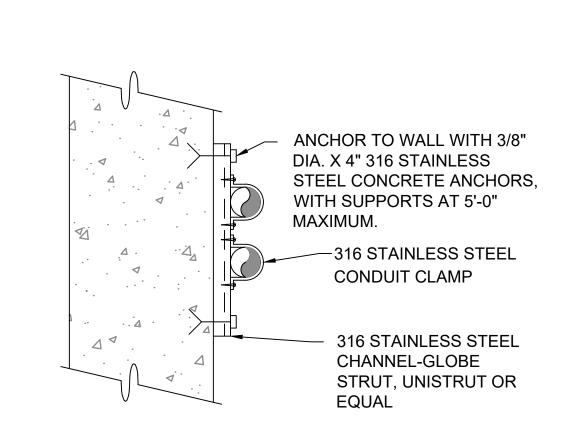
- CONCRETE ENCASE DUCTBANK DETAILS SHOW CENTERLINE SPACES AS TYPICAL WITH 4 INCH CONDUIT SPACERS. CENTERLINE SPACING WILL DIFFER IF SMALLER CONDUIT SPACERS ARE USED. ONLY ONE CONDUIT PER SPACER IS ALLOWED.
- 2. HORIZONTALLY STAGGER THE ARRANGEMENT USING DETAIL NO.11



CONDUIT SUPPORT DETAIL

NOT TO SCALE

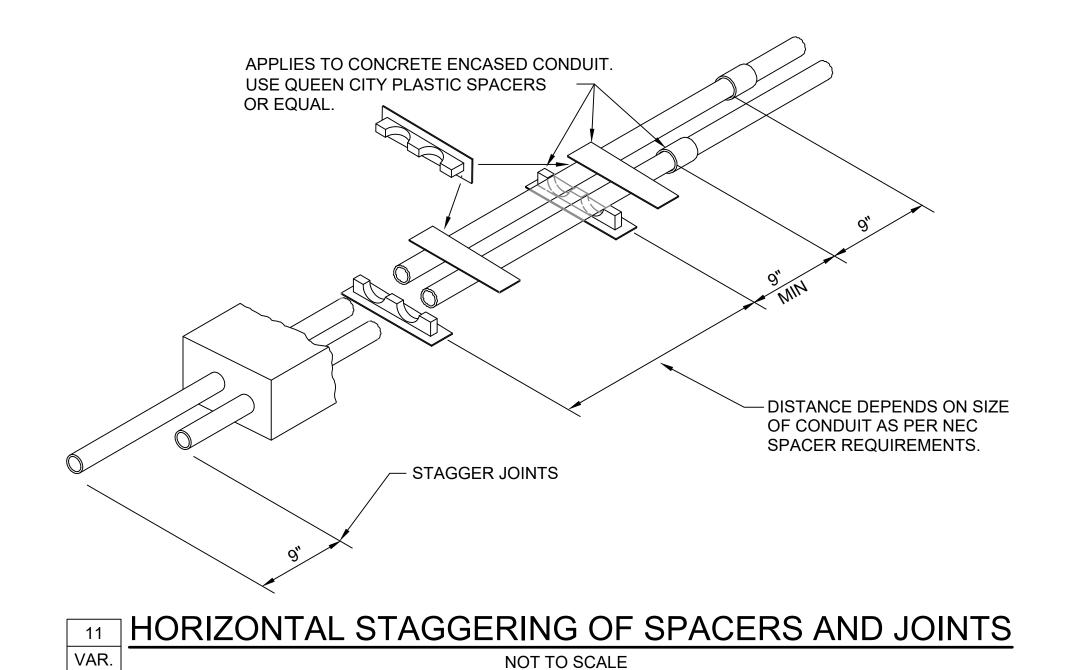
BY NO DATE



**CONDUIT SUPPORT ON WALL** VAR. NOT TO SCALE

## **CONDUIT SUPPORT NOTES:**

- THIS DETAIL TYPICAL FOR BOTH VERTICAL AND HORIZONTAL MOUNTING
- CHANNEL AND ALL SUPPORT DEVICES TO BE 316 STAINLESS STEEL
- CHANNELS TO BE SPACED 5' MAXIMUM.



**ENCASED DUCTBANK** 

(561) 451-4886 FAX LICENSE NO: EB 0006877

REVISION

**WASTE WATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL** REHABILITATION PEMPROKE PINES, FLORIDA

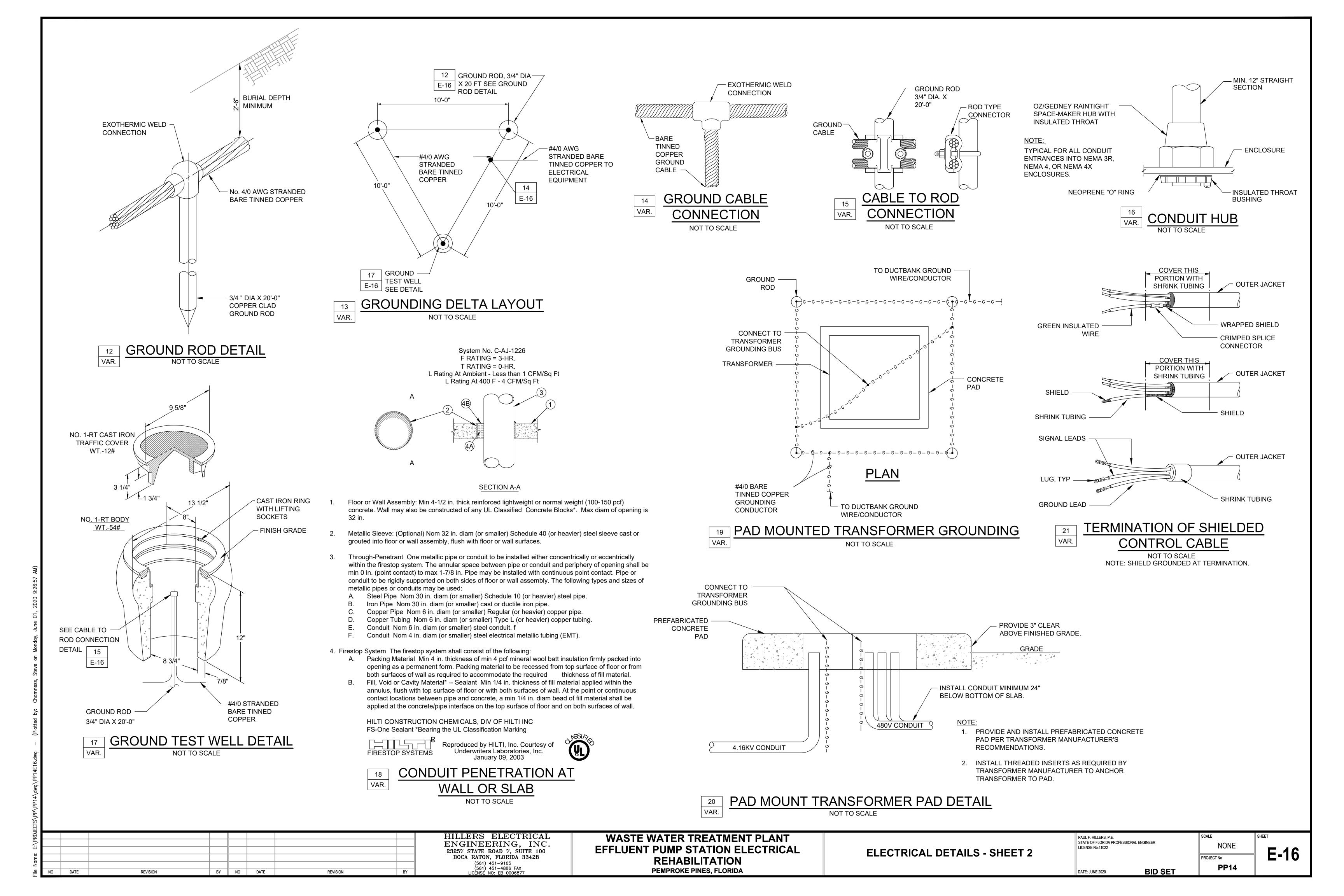
**ELECTRICAL DETAILS - SHEET 1** 

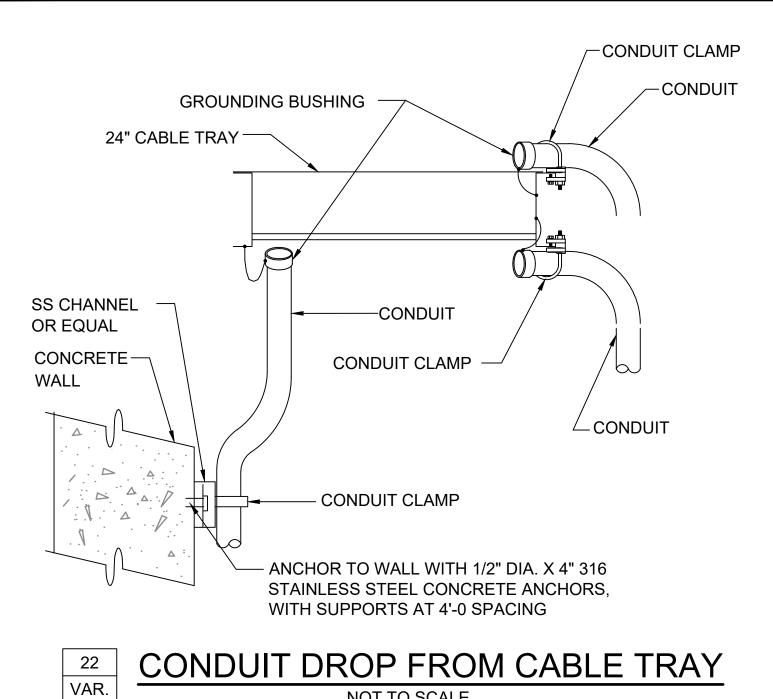
PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGINEER NONE LICENSE No.41022 E-15 PROJECT No PP14 **BID SET** DATE: JUNE 2020

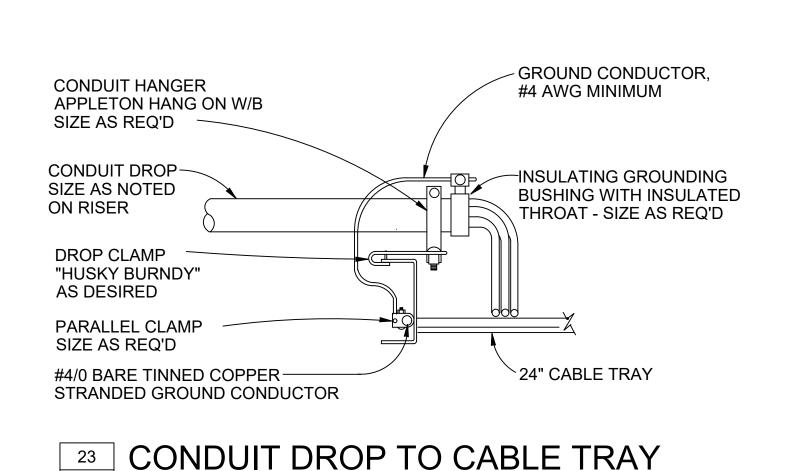
VAR.

REVISION

HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428

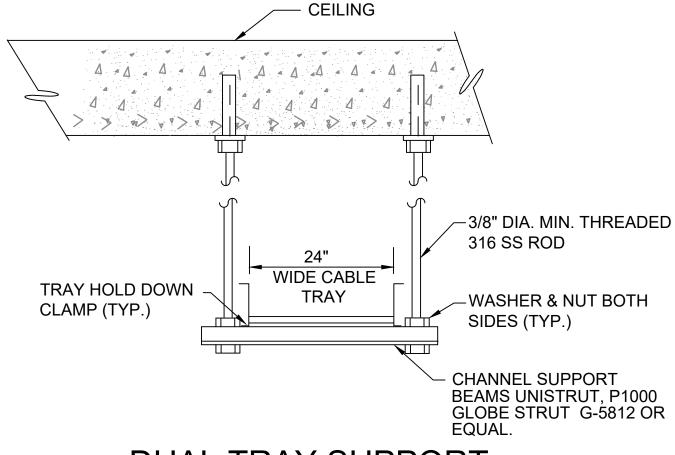






NOT TO SCALE

NOTE: ALL HARDWARE SHALL BE 316 STAINLESS STEEL.





INSIDE FACE OF

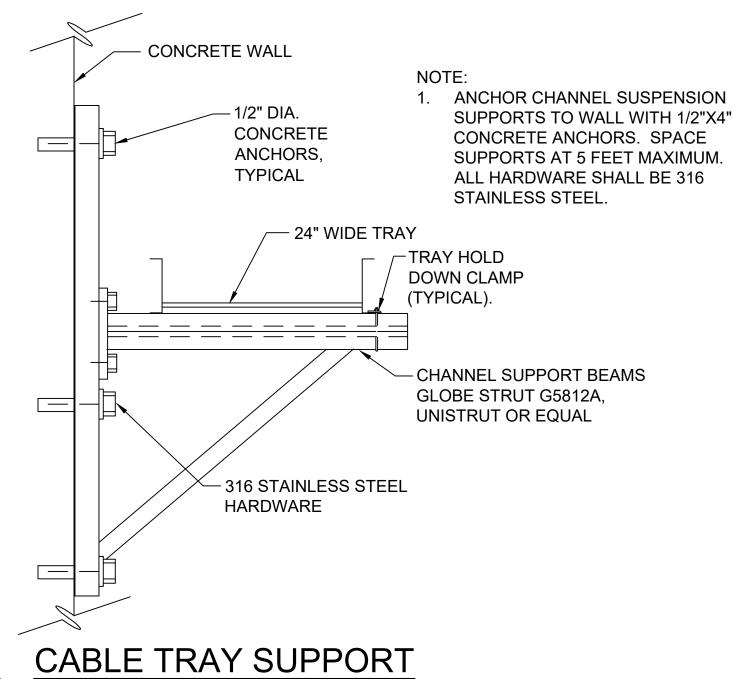
MANHOLE WALL

PVC END BELL

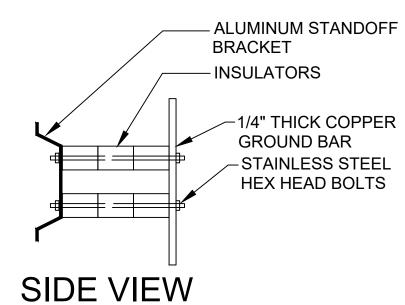
VAR.

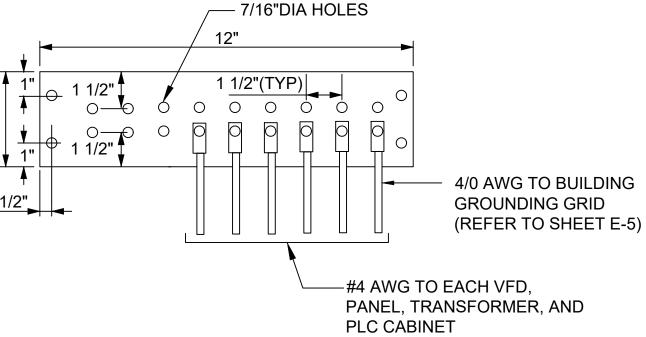
HANDHOLE/

NOTE: ALL HARDWARE SHALL BE 316 STAINLESS STEEL







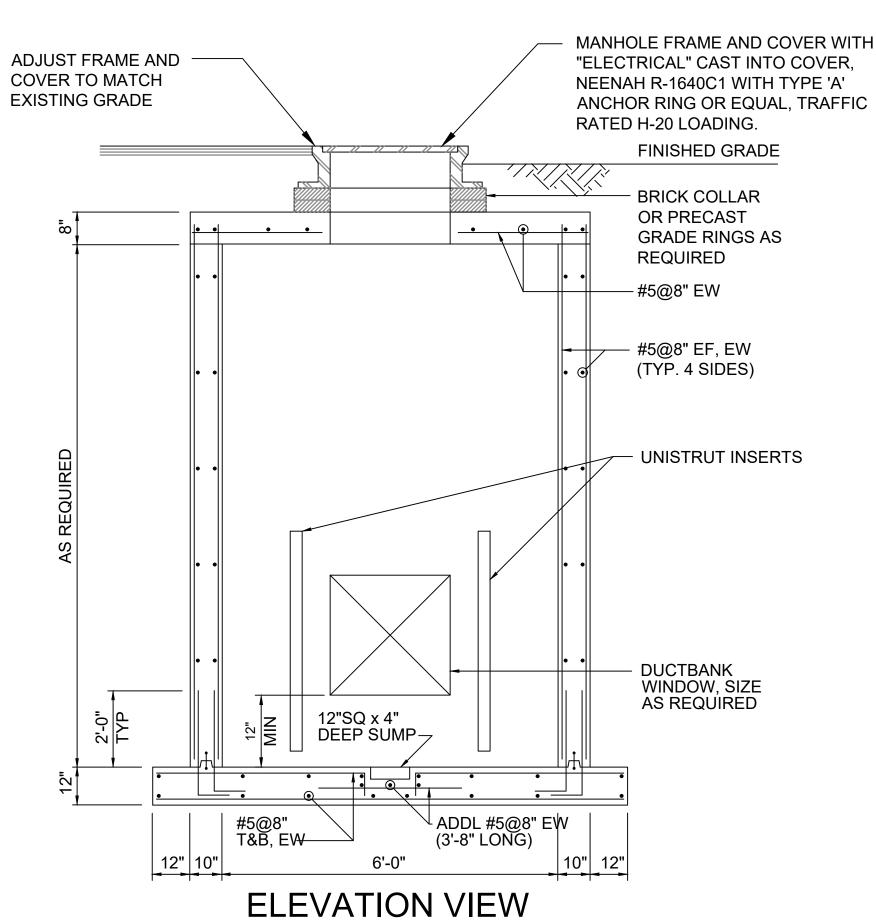


# **ELEVATION VIEW**



VAR.

NOT TO SCALE NOTE: ALL HARDWARE SHALL BE 316 STAINLESS STEEL.

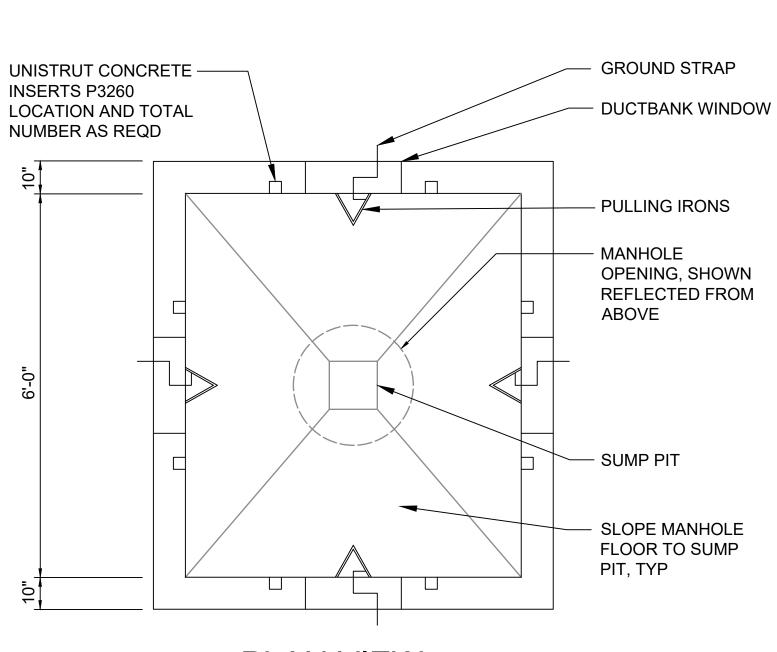


### NOTES FOR ALL MANHOLES: 1. HEAVY DUTY NON-METALLIC CABLE RACKS & ARMS ON ALL FOUR WALLS. CABLE RACK, API CR24-B OR EQUAL

CABLE HOOKS, API RA08 OR EQUAL

ARM LOCK, API HDL OR EQUAL

- PULLING-IN-IRONS INSTALL OPPOSITE CONDUIT ENTRANCE. POSITION BELOW LEVEL OF CONDUIT ENTRANCE. HUBBART & CO. CATALOG 9119 OR EQUAL.
- 3. CONTRACTOR SHALL PROVIDE REQUIRED END BELL LOCATIONS TO MANHOLE MANUFACTURER BEFORE MANUFACTURING.
- 4. ALL MANHOLES SHALL BE H-20 TRAFFIC RATED.
- 5. THE HEIGHT OF CONDUIT ENTRANCES SHALL BE COORDINATED BY THE CONTRACTOR TO ACCOMMODATE OTHER UTILITIES IN THE AREA.
- CONTRACTOR SHALL COORDINATE CONDUIT ENTRY REQUIREMENTS WITH SITE PLAN, PRIOR TO ORDERING MANHOLES
- GROUND ROD, 3/4"X20'-0, COPPER CLAD.



## AS REQD CONDUIT PLAN VIEW CONDUIT-

VAR.

NOTE: ALL MOUNTING HARDWARE SHALL

MEDIUM VOLTAGE **ELECTRICAL MANHOLE** 26 VAR. NOT TO SCALE

- GROUT TO FULL WALL THICKNESS AROUND PIPES AT KNOCKOUTS,

25 VAR.

OUTSIDE FACE

OF HANDHOLE/

**PVC CONDUIT** 

MANHOLE WALL

WIRING DEVICE OR ELECTRICAL WALL OR **EQUIPMENT SIZE** COLUMN - FOR CONTROL STATIONS MOUNT @ 4'-0" ABOVE FLOOR FLOOR OR-PLATFORM

**CONDUIT MANHOLE** 

**ENTRANCE DETAIL** 

NOT TO SCALE

WALL OR COLUMN MOUNTED DEVICE VAR. NOT TO SCALE

BE STAINLESS STEEL.

BY NO DATE REVISION REVISION

HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 (561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877

**WASTE WATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL REHABILITATION** PEMPROKE PINES, FLORIDA

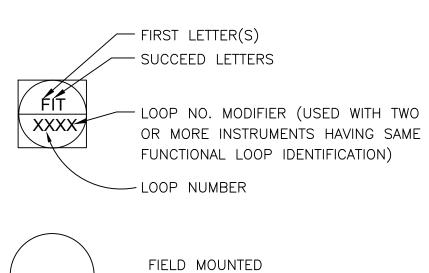
**ELECTRICAL DETAILS - SHEET 3** 

PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGINEER NONE LICENSE No.41022 PROJECT No **PP14** DATE: JUNE 2020

E-17 **BID SET** 

		IDENTIFICATIO	N LETTERS		
	FIRST LETTER		SUCCE	EDING LETTER	
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
Α	ANALYSIS		ALARM	USER'S CHOICE	USER'S CHOICE
В	BURNER, COMBUSTION		USER'S CHOICE		
С	CONDUCTIVITY			CONTROL	(CLOSED)
D	DENSITY	DIFFERENTIAL			,
E	VOLTAGE (EMF)		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	GAUGE	,	GLASS, VIEWING DEVICE		
H	HAND (MANUAL)				HIGH
<u>''</u>	CURRENT (ELECTRICAL)		INDICATE		Tildii
<u>'</u> J	POWER	SCAN	1110,112		
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
М	MOISTURE	MOMENTARY			MIDDLE INTERMEDIATE
N	USER'S CHOICE	(NORMALLY)	USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
0	USER'S CHOICE	,	ORIFICE, RESTRICTION		(OPEN)
Р	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
Т	TORQUE, TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL	UNCLASSIFIED	
Χ	UNCLASSIFIED	X AXIS	UNCLASSIFIED		UNCLASSIFIED
Υ	EVENT, STATE, OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

### **INSTRUMENT IDENTIFICATION**



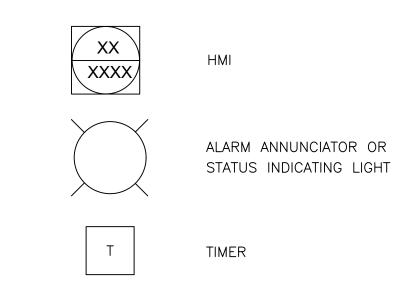


REAR OF PANEL MOUNTED INSTRUMENT



MOTOR STATUS/CONTROL WITH INTERLOCKS (OFTEN LOCATED IN MCC)





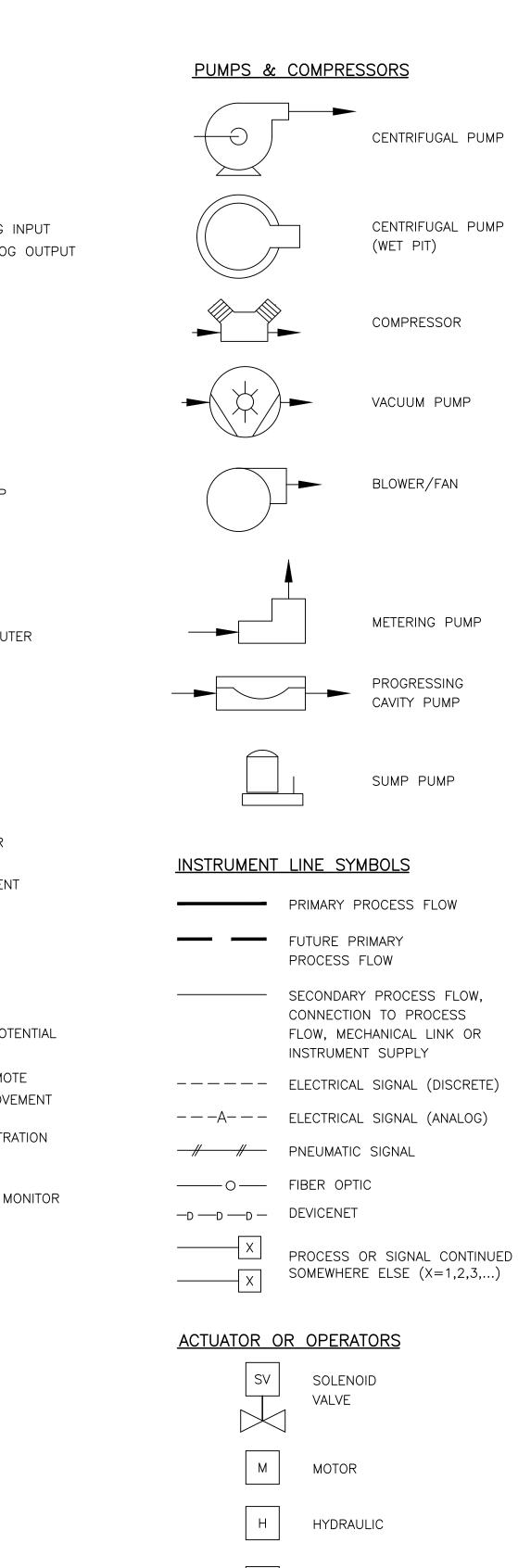
### NOTES:

- 1. COMPONENTS AND PANELS SHOWN WITH A DIAMOND (

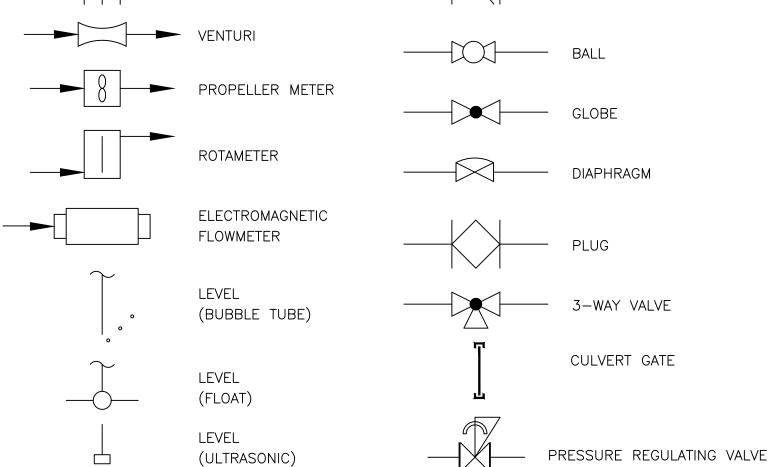
  ) ARE TO BE PROVIDED UNDER SECTION "INSTRUMENTATION & CONTROLS".
- 2. COMPONENTS AND PANELS SHOWN WITH A DOUBLE ASTERISK (\*\*) ARE TO BE PROVIDED AS PART OF A PACKAGED OR MECHANICAL SYSTEM.
- 3. COMPONENTS AND PANELS SHOWN WITH A TRIANGLE (lacktriangle) ARE EXISTING.
- 4. COMPONENTS AND PANELS SHOWN WITH A HEXAGON ( ) ARE EXISTING TO BE MODIFIED AND/OR RELOCATED.
- 5. COMPONENTS AND PANELS SHOWN WITH A SQUARE ( $\blacksquare$ ) ARE FUTURE.
- 6. DURING SHOP DRAWING PREPARATION, THE CONTRACTOR SHALL FIELD VERIFY ALL THE EXISTING ANALOG AND DISCRETE POINTS FOR DETAILED INTERFACE AND INCLUDE IT AS PART OF SUBMITTAL.
- 7. THE SINGLE INSTRUMENT & CONTROL SUPPLIER SHALL HAVE A U.L. APPROVED
- 8. ALL PROCESS TUBING AND ISOLATION VALVES SHALL BE 1/4"- 316 S.S., UNLESS OTHERWISE NOTED ON OTHER DRAWINGS.
- 9. ALL CONTROL PANELS SHALL BE FURNISHED AND INSTALLED WITH A 1P-15A CIRCUIT BREAKER.
- 10. SEE MECHANICAL PLANS AND SPECIFICATIONS FOR EQUIPMENT NUMBERS. 11. NO ELECTRICAL CONDUITS, INSTRUMENTS, OR PANEL SHALL BE MOUNTED ON HANDRAIL.

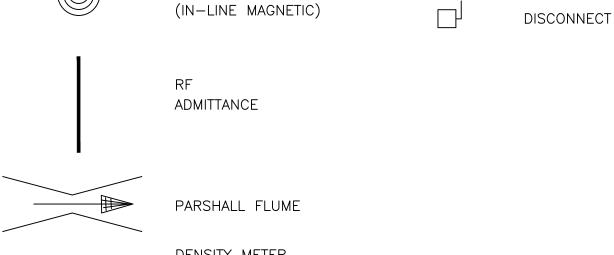
### **INSTRUMENT ABBREVIATION** ACCELATOR AUTO-TEST BFP BELT FILTER PRESS CL2 CHLORINE CLW CLEARWELL COM COMMON COND CONDUCTIVITY CP CONTROL PANEL DI, AI DISCRETE INPUT, ANALOG INPUT DO, AO DISCRETE OUTPUT, ANALOG OUTPUT D.O. DISSOLVED OXYGEN DR DISTANCE RELAY EFFL EFFLUENT EΡ ELECTRICAL PANEL ES EMERGENCY STOP ETM ELAPSED TIME METER FD CHEMICAL FEEDER FIL FILTER FIS FLOW INDICATING SWITCH FRS FORWARD-REVERSE-STOP GEN GENERATOR HLO HIGH-LOW-OFF HLOR HIGH-LOW-OFF-REMOTE HOA HAND-OFF-AUTO HOR HAND-OFF-REMOTE HOTC HAND-OFF-TIMER-COMPUTER H/L HIGH/LOW HSP HIGH SERVICE PUMP IND INDICATION INFL INFLUENT JOCKEY PUMP LOR LOCAL-OFF-REMOTE LOS LOCK-OUT-STOP LPU LINE PROTECTION UNIT MCC MOTOR CONTROL CENTER MCP MAIN CONTROL PANEL MISCELLANEOUS EQUIPMENT M.G. MILLION GALLON MOA MANUAL-OFF-AUTO MOV MOTOR OPERATED VALVE OCA OPEN-CLOSE-AUTO OPEN-CLOSE 00 ON-OFF ORP OXIDATION REDUCTION POTENTIAL OSC OPEN-STOP-CLOSE OSCR OPEN-STOP-CLOSE-REMOTE PAFM POWER APPLIED FOR MOVEMENT PRES PRESSURE РΗ HYDROGEN ION CONCENTRATION RES RESTORE REF REFERENCE RF (ADMITTANCE) LEVEL MONITOR REMOTE I/O PANEL R/L REMOTE/LOCAL RSP REMOTE SETPOINT SURGE ARRESTER SEC SECONDARY SLAKER SONIC FLOWMETER SETPOINT START/STOP STEP STORAGE SUS SUSPENDED SOLIDS SOLID STATE REDUCED VOLTAGE STARTER TD THERMAL DISPERSION TRANSFER PUMP TURB TURBIDITY

VFD

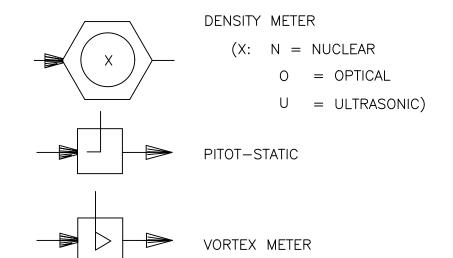


# **INSTRUMENTATION LEGEND** VALVES & GATES **PRIMARY ELEMENTS** ORIFICE PLATE





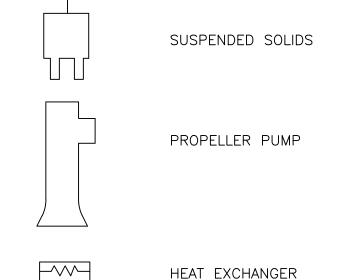
**ELECTRICAL DEVICES** 



ULTRASONIC

FLOWMETER

 $\overline{\mathcal{C}}$ 



<u>FUATOR OR</u>	<u>OPERATORS</u>
SV	SOLENOID VALVE
М	MOTOR
Н	HYDRAULIC
Р	PNEUMATIC

D DATE REVISION BY NO DATE REVISION	BY	
		1
		41
		1

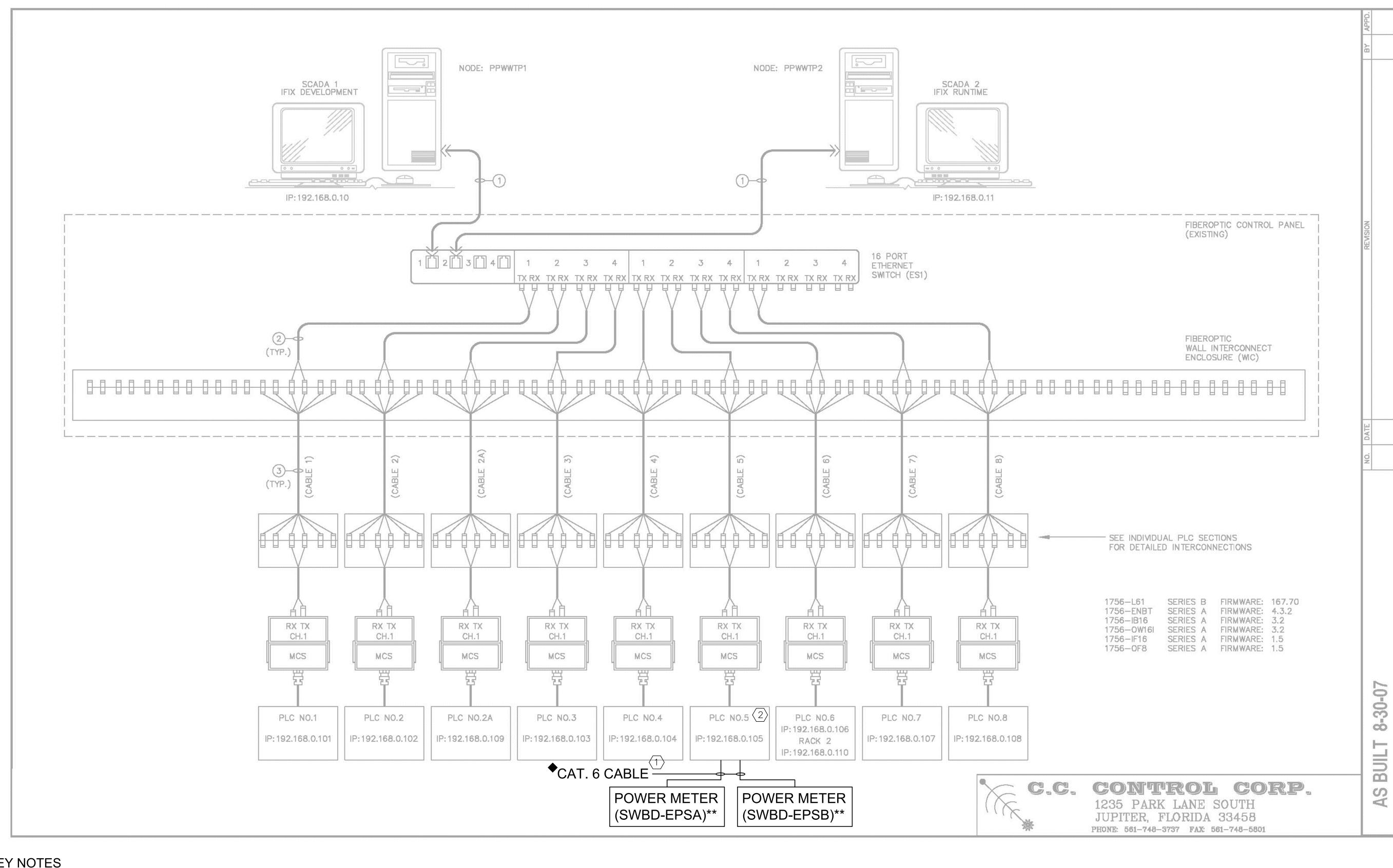
HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 (561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877

**WASTE WATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL** REHABILITATION PEMPROKE PINES, FLORIDA

VARIABLE FREQUENCY DRIVE

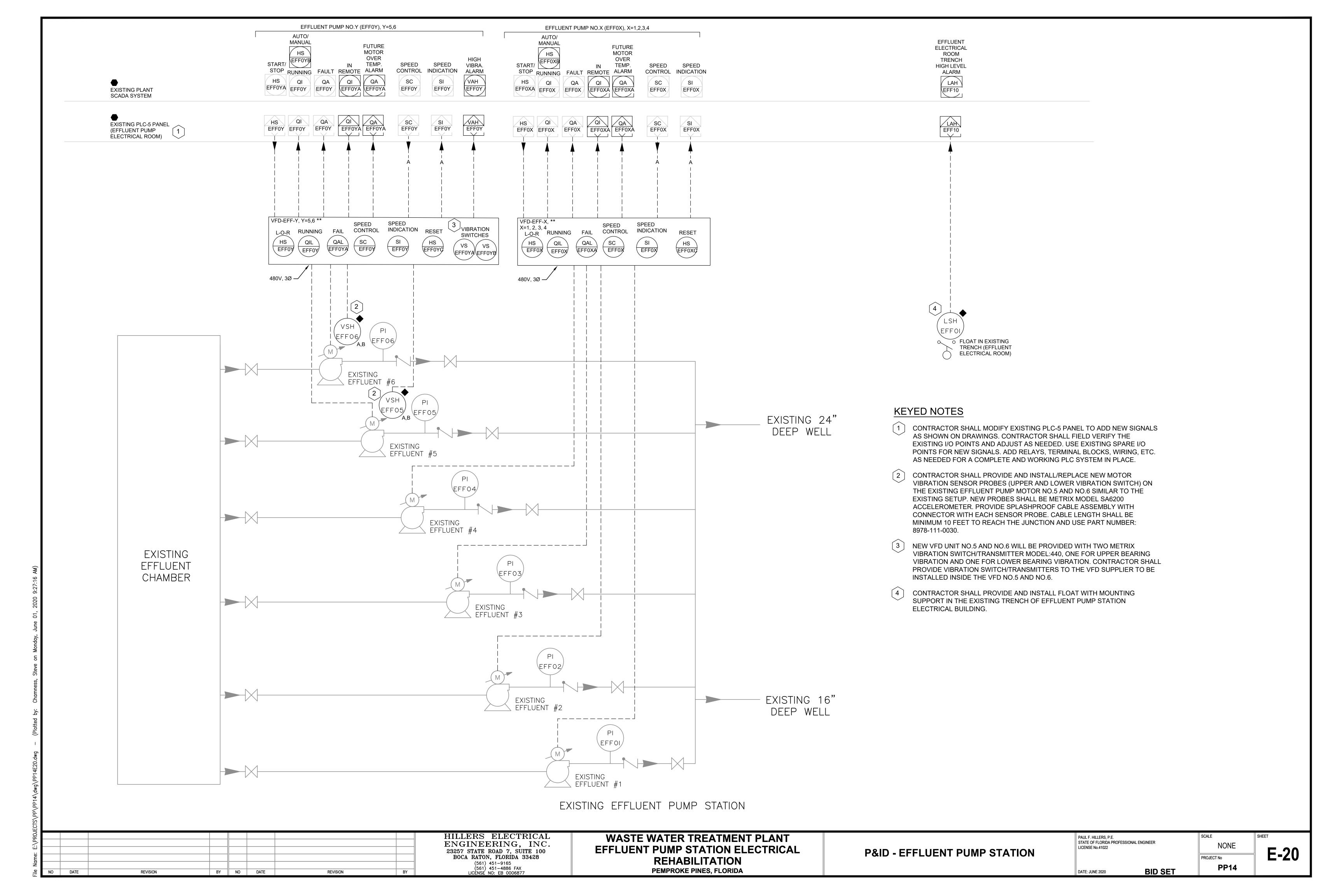
**INSTRUMENTATION LEGEND AND SYMBOLS** 

PAUL F. HILLERS, P.E.
STATE OF FLORIDA PROFESSIONAL ENGINEER NONE LICENSE No.41022 E-18 PROJECT No PP14 **BID SET** DATE: JUNE 2020



- CONTRACTOR SHALL PROVIDE AND INSTALL NEW CAT-6 ETHERNET CABLE FROM NEW POWER METERS TO THE EXISTING PLC-5 PANEL. EACH CABLE SHALL BE PROVIDED WITH MINIMUM OF 5 FEET EXTRA INSIDE THE PLC-5 PANEL FOR FUTURE CONNECTION. THE INTEGRATION OF POWER METER INTO THE PLANT SCADA SYSTEM AND ADDING NEW ETHERNET SWITCH IN THE PLC-5 PANEL IS NOT PART THIS PROJECTION.
- REFER TO OTHER INSTRUMENTATION DRAWINGS FOR ADDITIONAL MODIFICATIONS RELATING TO THE EXISTING PLC-5 PANEL AND PERFORM ACCORDINGLY.

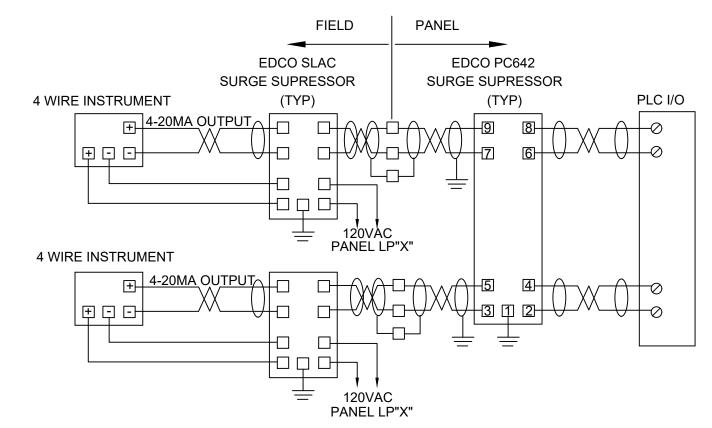
DECTS					"	
Na Page 1	HILLERS ELECTRICAL ENGINEERING, INC.	WASTE WATER TREATMENT PLANT		PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGIN LICENSE No.41022	NEER SCALE	
	23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428	EFFLUENT PUMP STATION ELECTRICAL REHABILITATION	COMMUNICATION BLOCK DIAGRAM	LIGHNOL NO.41022	PROJECT No	E-19
NO DATE REVISION BY NO DATE REVISION BY	(561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877	PEMPROKE PINES, FLORIDA		DATE: JUNE 2020	BID SET PI	14



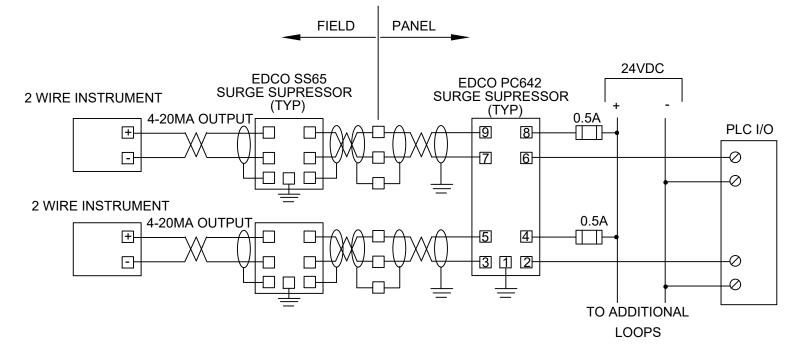
EXISTING PLC-5 CONTROL PANEL (WITH DOOR OPEN) NOT TO SCALE

EXISTING I/O POINTS TO BE REUSED: PLC-5:R1/S2/DI00: EFFLUENT PUMP NO.4 RUNNING PLC-5:R1/S2/DI01: EFFLUENT PUMP NO.4 FAIL PLC-5:R1/S2/DI02: EFFLUENT PUMP NO.3 RUNNING PLC-5:R1/S2/DI03: EFFLUENT PUMP NO.3 FAIL PLC-5:R1/S2/DI10: EFFLUENT PUMP NO.5 RUNNING PLC-5:R1/S2/DI11: EFFLUENT PUMP NO.5 FAIL PLC-5:R1/S2/DI13: EFFLUENT PUMP NO.6 RUNNING PLC-5:R1/S2/DI14: EFFLUENT PUMP NO.6 FAIL PLC-5:R1/S3/DI00: EFFLUENT PUMP NO.2 RUNNING PLC-5:R1/S3/DI01: EFFLUENT PUMP NO.2 FAIL PLC-5:R1/S3/DI02: EFFLUENT PUMP NO.1 RUNNING PLC-5:R1/S3/DI03: EFFLUENT PUMP NO.1 FAIL PLC-5:R1/S4/DO00: EFFLUENT PUMP NO.4 START/STOP PLC-5:R1/S4/DO01: EFFLUENT PUMP NO.3 START/STOP PLC-5:R1/S4/D002: EFFLUENT PUMP NO.2 START/STOP PLC-5:R1/S4/D003: EFFLUENT PUMP NO.1 START/STOP PLC-5:R1/S4/D004: EFFLUENT PUMP NO.5 START/STOP PLC-5:R1/S4/DO05: EFFLUENT PUMP NO.6 START/STOP PLC-5:R1/S5/AI04: EFFLUENT PUMP NO. 5 SPEED FEEDBACK PLC-5:R1/S5/AI07: EFFLUENT PUMP NO. 6 SPEED FEEDBACK PLC-5:R1/S7/AI00: EFFLUENT PUMP NO. 4 SPEED FEEDBACK PLC-5:R1/S7/AI01: EFFLUENT PUMP NO. 3 SPEED FEEDBACK PLC-5:R1/S7/AI04: EFFLUENT PUMP NO. 2 SPEED FEEDBACK PLC-5:R1/S7/AI05: EFFLUENT PUMP NO. 1 SPEED FEEDBACK PLC-5:R1/S9/AO00: EFFLUENT PUMP NO. 4 SPEED CONTROL PLC-5:R1/S9/AO01: EFFLUENT PUMP NO. 3 SPEED CONTROL PLC-5:R1/S9/AO02: EFFLUENT PUMP NO. 2 SPEED CONTROL PLC-5:R1/S9/AO03: EFFLUENT PUMP NO. 1 SPEED CONTROL PLC-5:R1/S9/AO06: EFFLUENT PUMP NO. 5 SPEED CONTROL PLC-5:R1/S9/AO07: EFFLUENT PUMP NO. 6 SPEED CONTROL

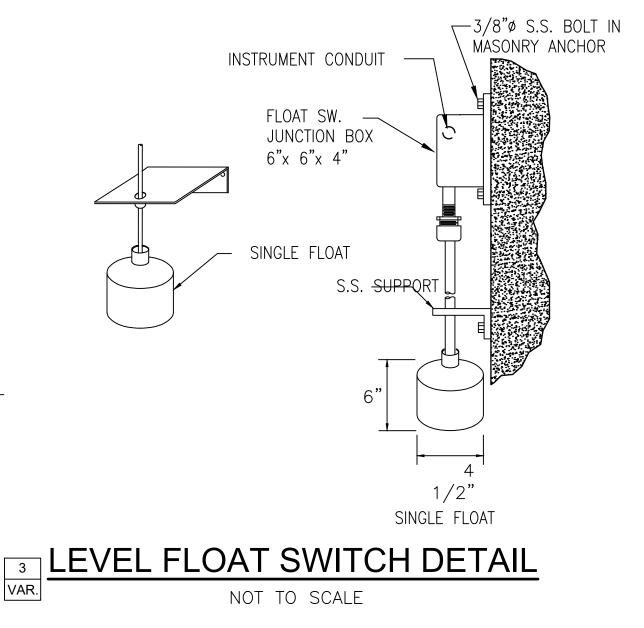
NEW I/O SIGNALS USING EXISTING I/O POINTS: PLC-5:R1/S2/DI04: EFFLUENT PUMP NO.5 IN REMOTE PLC-5:R1/S2/DI05: EFFLUENT PUMP NO.5 MOTOR OVER TEMP. ALARM PLC-5:R1/S2/DI12: EFFLUENT PUMP NO.6 IN REMOTE PLC-5:R1/S2/DI15: EFFLUENT PUMP NO.6 MOTOR OVER TEMP. ALARM PLC-5:R1/S3/DI04: EFFLUENT PUMP NO.4 IN REMOTE PLC-5:R1/S3/DI05: EFFLUENT PUMP NO.4 MOTOR OVER TEMP. ALARM PLC-5:R1/S3/DI06: EFFLUENT PUMP NO.3 IN REMOTE PLC-5:R1/S3/DI07: EFFLUENT PUMP NO.3 MOTOR OVER TEMP. ALARM PLC-5:R1/S3/DI09: EFFLUENT PUMP NO.2 IN REMOTE PLC-5:R1/S3/DI10: EFFLUENT PUMP NO.2 MOTOR OVER TEMP. ALARM PLC-5:R1/S3/DI11: EFFLUENT PUMP NO.1 IN REMOTE PLC-5:R1/S3/DI12: EFFLUENT PUMP NO.1 MOTOR OVER TEMP. ALARM PLC-5:R1/S3/DI13: EFFLUENT PUMP NO.5 HIGH VIBRATION ALARM PLC-5:R1/S3/DI14: EFFLUENT PUMP NO.6 HIGH VIBRATION ALARM PLC-5:R1/S3/DI15: EFFLUENT ELEC ROOM TRENCH HIGH LEVEL ALARM



# TYPICAL 4 WIRE INSTRUMENT ISOLATOR



2 TYPICAL 2 WIRE INSTRUMENT ISOLATOR



BY NO DATE REVISION REVISION

HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428

- PLC IO SLOTS,

NEW & EXISTING

I/O POINTS LISTED

POSSIBLE LOCATIONS FOR SURGE ARRESTORS

IF NEEDED

REFER TO

**WASTE WATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL REHABILITATION** PEMPROKE PINES, FLORIDA

**EXISTING PLC-5 PANEL MODIFICATION** 

PAUL F. HILLERS, P.E.
STATE OF FLORIDA PROFESSIONAL ENGINEER LICENSE No.41022 **BID SET** DATE: JUNE 2020

PROJECT No PP14

E-21

- (1) CONTRACTOR SHALL FIELD IDENTIFY AND VERIFY THE EXISTING I/O POINTS ASSOCIATED WITH THE EFFLUENT VFD UNITS BEFORE DISCONNECTING THEM AND LABEL THEM AS NEEDED. RECONNECT EXISTING SIGNALS TO NEW/REPLACEMENT VFD UNITS SIMILAR TO EXISTING.
- CONTRACTOR SHALL USE EXISTING SPARE I/O POINTS AS SHOWN ON DRAWINGS FOR NEW SIGNALS. MODIFY EXISTING SPARE I/O POINTS AS NEEDED, INCLUDING ADDING RELAYS, SURGE ARRESTORS, TERMINAL BLOCKS, WIRING, ETC. FOR A COMPLETE AND FUNCTIONAL I/O SYSTEM IN PLACE.

Name: E:\PROJE		HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 (561) 451-9165	WASTE WATER TREATMENT PLANT EFFLUENT PUMP STATION ELECTRICAL REHABILITATION	IO LOOP DIAGRAMS - SHEET 1	PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGINEER LICENSE No.41022	NONE SHEET  PROJECT No SHEET  PROJECT No SHEET
NO NO	NO DATE REVISION BY NO DATE F	REVISION BY LICENSE NO: EB 0006877	PEMPROKE PINES, FLORIDA		DATE: JUNE 2020 BID SET	PP14

CONTRACTOR SHALL FIELD IDENTIFY AND VERIFY THE EXISTING I/O POINTS ASSOCIATED WITH THE EFFLUENT VFD UNITS BEFORE DISCONNECTING THEM AND LABEL THEM AS NEEDED. RECONNECT EXISTING SIGNALS TO NEW/REPLACEMENT VFD UNITS SIMILAR TO EXISTING.

HILLERS ELECTRICAL **WASTE WATER TREATMENT PLANT** PAUL F. HILLERS, P.E.
STATE OF FLORIDA PROFESSIONAL ENGINEER ENGINEERING, INC. NONE **EFFLUENT PUMP STATION ELECTRICAL** LICENSE No.41022 **E-23 IO LOOP DIAGRAMS - SHEET 2** 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 PROJECT No **REHABILITATION** (561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877 PP14 PEMPROKE PINES, FLORIDA **BID SET** DATE: JUNE 2020 REVISION BY NO DATE REVISION

CONTRACTOR SHALL FIELD IDENTIFY AND VERIFY THE EXISTING I/O POINTS ASSOCIATED WITH THE EFFLUENT VFD UNITS BEFORE DISCONNECTING THEM AND LABEL THEM AS NEEDED. RECONNECT EXISTING SIGNALS TO NEW/REPLACEMENT VFD UNITS SIMILAR TO EXISTING.

HILLERS ELECTRICAL **WASTE WATER TREATMENT PLANT** PAUL F. HILLERS, P.E.
STATE OF FLORIDA PROFESSIONAL ENGINEER ENGINEERING, INC. NONE **EFFLUENT PUMP STATION ELECTRICAL** LICENSE No.41022 E-24 **IO LOOP DIAGRAMS - SHEET 3** 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 PROJECT No **REHABILITATION** (561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877 PP14 PEMPROKE PINES, FLORIDA **BID SET** DATE: JUNE 2020 REVISION BY NO DATE REVISION

CONTRACTOR SHALL FIELD IDENTIFY AND VERIFY THE EXISTING I/O POINTS ASSOCIATED WITH THE EFFLUENT VFD UNITS BEFORE DISCONNECTING THEM AND LABEL THEM AS NEEDED. RECONNECT EXISTING SIGNALS TO NEW/REPLACEMENT VFD UNITS SIMILAR TO EXISTING.

HILLERS ELECTRICAL **WASTE WATER TREATMENT PLANT** PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGINEER ENGINEERING, INC. NONE **EFFLUENT PUMP STATION ELECTRICAL** LICENSE No.41022 E-25 **IO LOOP DIAGRAMS - SHEET 4** 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 PROJECT No **REHABILITATION** (561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877 PP14 PEMPROKE PINES, FLORIDA **BID SET** DATE: JUNE 2020 REVISION BY NO DATE REVISION

CONTRACTOR SHALL FIELD IDENTIFY AND VERIFY THE EXISTING I/O POINTS ASSOCIATED WITH THE EFFLUENT VFD UNITS BEFORE DISCONNECTING THEM AND LABEL THEM AS NEEDED. RECONNECT EXISTING SIGNALS TO NEW/REPLACEMENT VFD UNITS SIMILAR TO EXISTING.

HILLERS ELECTRICAL ENGINEERING, INC. 23257 STATE ROAD 7, SUITE 100 BOCA RATON, FLORIDA 33428 WASTE WATER TREATMENT PLANT PAUL F. HILLERS, P.E. STATE OF FLORIDA PROFESSIONAL ENGINEER LICENSE No.41022 NONE **EFFLUENT PUMP STATION ELECTRICAL** E-26 **RELAY WIRING REHABILITATION** (561) 451-9165 (561) 451-4886 FAX LICENSE NO: EB 0006877 PP14 PEMPROKE PINES, FLORIDA **BID SET** REVISION BY NO DATE REVISION DATE: JUNE 2020



Frank C. Ortis MAYOR 954-450-1020 fortis@ppines.com

Iris A. Siple
VICE MAYOR
DISTRICT 3
954-450-1030
isiple@ppines.com

Jay D. Schwartz COMMISSIONER DISTRICT 2 954-450-1030 jschwartz@ppines.com

Thomas Good, Jr. COMMISSIONER DISTRICT 1 954-450-1030 tgood@ppines.com

Larissa Chanzes
COMMISSIONER
DISTRICT 4
954-450-1030
Ichanzes@ppines.com

Charles F. Dodge CITY MANAGER 954-450-1040 cdodge@ppines.com July 7, 2020

### Addendum # 1 City of Pembroke Pines IFB #PSUT-20-06

"Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation"

### 1. REVISED

The following section has been revised to the solicitation document:

### 1.7.1 MANDATORY PRE-BID MEETING / SITE VISIT

There will be a mandatory scheduled pre-bid meeting on July 7, 2020 at 9:00 a.m. Meeting location will be at the Wastewater Treatment Facility located at 13955 Pembroke Road, Pembroke Pines, FL 33029.

#### SECTION 01015

#### **GENERAL REQUIREMENTS**

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. This Section provides for miscellaneous provisions applicable to the Work.

#### 1.02 RELATED SECTIONS

- A. Section 01300 Submittals
- B. Section 01301 Schedule of Valves
- C. Section 01310 Construction Schedules
- D. Section 01340 Shop Drawings, Working Drawings and Samples
- E. Section 01380 –Construction Photographs
- F. Section 01381 Audio Video Preconstruction Record
- G. Section 01590 Field Offices
- H. Section 01700 Project Close Out
- I. Section 01720 Project Record Drawings
- J. Section 01730 Operation and Maintenance Manuals
- K. Other Related Sections.

### 1.03 TERMINOLOGY

- A. Throughout the Contract Documents, the following definitions apply:
  - Owner The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
  - 2. Work The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

#### 1.04 SAFETY

- A. All work shall be done in a safe manner and in strict compliance with all requirements of the Federal Occupational Safety and Health Act (OSHA), The Florida Trench Safety Act and all other State and local safety and health regulations.
- B. The Contractor shall comply promptly with such safety regulations as may be prescribed by the Owner or the local authorities having jurisdiction and shall, when so directed, properly correct any unsafe conditions created by, or unsafe practices

on the part of, his employees. In the event of the Contractor's failure to comply, the Owner may take the necessary measures to correct the conditions or practices complained of, and all costs thereof will be deducted from any monies due. Failure of the Owner to direct the correction of unsafe conditions or practices shall not relieve the Contractor of his responsibilities.

#### 1.05 APPLICABLE CODES

A. The Contractor shall comply with the applicable standards codes and specifications governing the Contract Documents whether City, County, State or Federal. The Contractor is obligated to notify the Owner and Engineer of any deficiency contained in the Contract Documents immediately upon discovery. Where conflicts exist in such, the more stringent shall govern.

#### 1.06 APPLICABLE PERMITS AND LICENSES

A. The Contractor shall abide by all permit conditions, whether, general, specific, limited or otherwise. A copy of all applicable permits and licenses, with the exception of City permits obtained by the Contractor, are attached hereto and made a part of the Contract Documents.

### 1.07 PUBLIC BID DISCLOSURE ACT 218.80 FS

- A. All the local governmental entity permits or fees are to be disclosed, including, but not limited to, all license fees, permit fees, impact fees, or inspection fees, payable by the contractor to the unit of government that issued the bidding documents or other governmental agency,
- B. Contractor shall obtain all necessary permits from City of Pembroke Pines Building Department. The cost for these permits is accounted for in the Permitting Allowance found in the Bid Form.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

### 3.01 PRE-CONSTRUCTION RESPONSIBILITIES

A. Upon receipt of the Notice To Proceed, the Contractor shall arrange for a Pre-Construction meeting. The meeting shall be held with a minimum of one weeks' notice and shall include the Engineer, the Owner and Representatives

#### 3.02 TEMPORARY UTILITIES

- A. The Contractor shall be responsible to arrange for and supply all temporary utilities including, but not limited to, water, sewer and electricity.
- B. The cost of temporary utilities shall be considered incidental to the cost of the Work and is therefore included in the Bid.

#### 3.03 UNDERGROUND LOCATING SERVICE

A. Prior to underground construction, the Contractor is required by the Underground Facility Damage Prevention and Safety Act, Chapter 556 FS to contact Sunshine 811, for the location of underground utilities.

### 3.04 HURRICANE PREPAREDNESS PLAN

A. Should the performance of the Work occur during Hurricane Season, within thirty days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures that the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning. The plan shall detail these measures with specific action items defining responsible personnel.

#### 3.05 INCLEMENT WEATHER

A. In the event of inclement weather, or whenever Engineer shall direct; Contractor will cause Subcontractors to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of Work or materials shall have been damaged or injured by reason of failure on the part of Contractor or any Subcontractor to so protect the Work, such Work and materials shall be removed and replaced at the expense of the Contractor.

#### 3.06 PRESERVATION AND RESTORATION

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this project. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

### 3.07 PROTECTION OF WORK AND MATERIAL

- A. During the progress of the work and up to the date of final payment, the Contractor shall be solely responsible for the care and protection of all work and materials covered by the Contract.
- B. All work and materials shall be protected against damage, injury or loss from any cause whatsoever, and the Contractor shall make good any such damage or loss at his own expense. Protection measures shall be subject to the approval of the Owner and Engineer.

#### 3.08 CONTRACTOR USE OF PREMISES

- A. Contractor shall have limited use of the premises for construction operations, including limited use of the site. The Contractor's use of the premises is further limited to the Owner's right to perform construction operations with its own forces or to employ separate Contractors on portions of the project.
- B. The Contractor shall be responsible for coordinating his daily activities in conjunction with any Contractors presently working within the vicinity of this project.
- C. Confine operations to areas within rights-of-way and easements.
- D. Keep existing driveways and entrances serving the premises clear and available to the Owner, Residents and the Owner's employees at all times.
  - 1. Do not use these areas for parking or storage of materials.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

### 3.09 ENVIRONMENTAL PROTECTION

- A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
  - 1. Adjustment of existing utilities
- B. The Contractor shall raise or lower all manholes, valve boxes, etc. to finished grade. The cost of these adjustments shall be considered incidental to the cost of the Work and is therefore included in the Bid.

### 3.10 EXISTING IRRIGATION

A. All existing irrigation systems within the area of the Work shall be restored to original condition or better and adjusted to finished grade. The cost of repairs and/or adjustment to existing irrigation shall be considered incidental to the cost of the Work and is therefore included in the Bid.

### 3.11 DEWATERING

- A. In accordance with SFWMD criteria contained in 40E-2.061 F.A.C., a dewatering permit is not required provided the following provisions are met:
  - Maximum daily pumpage is less than 5 million gallons (MG) and a maximum total project pumpage of less than 100 MG over a one year period;
  - All discharge shall remain on the project site;
  - 3. No dewatering shall occur to a depth below elevation 0.0 feet NGVD within 1,000 feet of saline water, except when dewatering water with a chloride concentration of greater than 1,000 milligrams per liter;
  - 4. No dewatering shall occur within 100 feet of a wastewater treatment plant rapid-rate land application system permitted under Part IV of Chapter 62-610, F.A.C.;
  - 5. No dewatering shall occur within 1,000 feet of a known landfill or contamination; and,
  - 6. No dewatering shall occur within 1,000 feet of a freshwater wetland unless dewatering activities are completed within 60 days.
  - 7. All dewatering operations are subject to the Permit Conditions in Section 5.0 of the SFWMD APPLICANT'S HANDBOOK FOR WATER USE PERMIT APPLICATIONS (07-16-2014), including responsibility for mitigating any harm that may occur as a result of the dewatering to existing legal uses, off-site land uses, or natural resources.
- B. The Contractor shall apply for a dewatering permit through the SFWMD if any of the above conditions cannot be met.

C. The Contractor shall apply for a dewatering permit through the BCEPGMD if the project is in proximity to a known environmentally contaminated site.

### 3.12 DEMOLITION

- A. Limits of demolition which may be shown in the Contract Documents are general in nature. Actual limits of demolition shall be as determined by the field conditions in conformance with the requirements of the Work.
- B. All sidewalks within the limits of construction which are not ADA compliant (cross-slopes which exceed 2% and/or running slopes which exceed 5% and/or changes in level of 1/4" or greater) shall be demolished and reconstructed to meet these requirements.
- C. When sidewalk tie-ins exist outside the limits of construction which are not ADA compliant, the Contractor shall replace those sections as directed by the Owner.

**END OF SECTION** 

### **PROJECT MEETINGS**

### PART 1 - GENERAL

#### 1.1 REQUIREMENTS INCLUDED

- A. The Owner shall schedule and administer the pre-bid conference, preconstruction conference, periodic construction progress meetings, and specially called meetings throughout the progress of the Work. The Owner or the Engineer shall:
  - 1. Prepare agenda for meetings.
  - 2. Distribute written notice of each meeting four (4) days in advance of the meeting date.
  - 3. Make physical arrangements for meetings.
  - 4. Preside at meetings.
  - 5. Record minutes of the meeting.
  - 6. Reproduce and distribute written copies of the meeting minutes within seven (7) days after the meeting to the meeting participants and to parties affected by decisions made at the meeting.
- B. Representatives of Contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. The Engineer (if applicable) shall attend meetings to ascertain that the Work is expedited consistent with the Contract Documents and the construction schedule.

## 1.2 RELATED REQUIREMENTS

- A. Instructions to Bidders of the Contract Documents.
- B. Section 01300: Submittals.
- C. Section 01310: Construction Schedules.
- D. Section 01700: Contract Close-out.
- F. Other Related Sections.

# 1.3 PRE-CONSTRUCTION MEETING

- A. Schedule within sixty (60) days of the effective date of the Agreement.
- B. Location: A central site convenient for all parties, designated by the Owner.
- C. Attendees:
  - 1. Owner's Representative(s).
  - 2. Engineer and its professional sub-consultants (if applicable).

- Resident Project Representative.
- 4. Contractor's Superintendent.
- 5. Contractor's Project Manager.
- 6. Major subcontractors.
- 7. Major suppliers.
- 8. Other parties as appropriate and as approved by the Owner.

# D. Suggested Agenda:

- 1. Distribution and discussion of:
  - a. List of major subcontractors and suppliers.
  - b. Projected schedules (shop drawing submittal, material and equipment procurement, construction progress).
- 2. Critical work sequencing.
- 3. Major material and equipment deliveries and priorities.
- 4. Project Coordination:
  - a. Designation of responsible personnel.
  - b. Coordination and scheduling of concurrent projects.
- 5. Procedures and Processing of:
  - a. Field decisions.
  - b. Proposal requests.
  - c. Contractor requests for information.
  - d. Submittals.
  - e. Change Orders, Field Orders and Work Directives.
  - f. Applications for Payment.
- 6. Adequacy for distribution of Contract Documents.
- 7. Procedures for maintaining Record Documents.
- 8. Use of premises:
  - a. Office, work and storage areas.
  - b. Owner's requirements.
- 9. Construction facilities, controls and construction aids.
- 10. Temporary utilities.
- 11. Safety and first-aid procedures.
- 12. Security procedures.
- 13. Housekeeping procedures.
- 14. Miscellaneous.

## 1.4 PROGRESS MEETINGS

- A. Schedule one (1) meeting per month or as required.
- B. Hold meetings as required by the progress of the Work.
- Location of the meetings: Construction Site or other site as directed by the Owner.
- D. Attendees:
  - 1. Engineer and its professional consultants, as needed.
  - 2. Subcontractors, suppliers and others as appropriate to the agenda.
- E. Suggested Agenda:
  - 1. Review and approval of previous meeting minutes.
  - 2. Review of Work progress since previous meeting.

- 3. Field observations, problems and conflicts.
- 4. Problems which impede the construction schedule.
- 5. Review of off-site fabrication and delivery schedules.
- 6. Corrective measures and procedures to regain the projected schedule.
- 7. Revisions to the Construction Schedule.
- 8. Progress scheduled during the succeeding work period.
- 9. Coordination of schedules.
- 10. Review of submittal schedules.
- 11. Maintenance of quality standards.
- 12. Pending changes and substitutions.
- 13. Review proposed changes for:
  - a. Effect on the construction schedule and on the completion date.
  - b. Effect on other contracts relating to this project.
- 14. Review of record drawings.
- 15. Other business.

### 1.5 EMERGENCY MEETINGS

A. May be called by the Owner, Engineer or Contractor with a minimum of three (3) hours notice to resolve conditions of an emergency nature.

# PART 2 - PRODUCTS

(Not used)

# PART 3 - EXECUTION

(Not used)

#### SUBMITTALS

## PART 1-GENERAL

## 1.1 REQUIREMENTS INCLUDED

- A. Submit to the Owner, shop drawings, project data, samples and miscellaneous work-related submittals required by the Specification Sections. Individual submittal requirements are specified in applicable sections of these Contract Documents.
- B. The Owner's and Engineer's review is for general conformance with the design concept and the Contract Documents.
- C. Miscellaneous submittals related directly to the Work (non-administrative) include warranties, guarantees, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, overrun stock, and similar information, devices and materials applicable to the Work and not defined as shop drawings, product data or samples.

## 1.2 RELATED REQUIREMENTS

- A. Section 01200 Project Meetings.
- B. Section 01310 Construction Schedules.
- C. Section 01340 Shop Drawings.
- D. Section 01700 Project Close Out
- E. Section 01720 Record Drawings
- F. Other Related Sections.

### 1.3 SCHEDULE

- A. Prepare and submit with the Construction Schedule, a separate schedule listing dates for submission and review of shop drawings, project data and samples that will be needed for each product or piece of equipment.
- B. Coordinate and prepare the delivery and processing of submittals with the performance of the Work so that the Work is not delayed by submittals. Coordinate and sequence different categories of submittals for the same Work, and for interfacing units of Work, so that one is not delayed for coordination with another.
- C. No extension of time will be allowed because of the Contractor's failure to properly coordinate and sequence submittals.
- D. Do not proceed with purchasing, fabrication and delivery of Work related to a submittal until the submittal procedure is successfully complete.

# PART 2 - PRODUCTS

### 2.1 SHOP DRAWINGS

A. Original drawings, prepared by a Contractor, subcontractor, supplier or distributor which illustrate some portion of the Work and showing fabrication, layout, setting or erection details, diagrams, performance curves, data sheets, schedules, templates,

- patterns, reports, calculations, instructions, dimensions, measurements and other similar information not in standard printed form applicable to other projects.
- B. Provide information prepared by a qualified detailer showing dimensions and notes based on field measurements, identifying materials and products in the work shown, indicating compliance with standards and special coordination requirements.
- C. Identify details by reference to sheet and detail numbers shown on the Contract Drawings.
- D. Review laying schedule for Owner furnished materials.

### 2.2 PROJECT DATA

- A. Includes standard printed information on materials, products and systems not customprepared for this project. Collect the required data into one (1) submittal for each material, product or system; and mark each copy to show which choices and options are applicable to the project.
- B. Manufacturer's standard schematic drawings and standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked, and special coordination requirements:
  - Modify drawings to delete information which is not applicable to the project.
  - 2. Supplement standard information to provide additional information applicable to the project.
- C. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
  - 1. Clearly mark each copy to identify pertinent materials, products or models.
  - 2. Show dimensions and clearances required.
  - 3. Show performance characteristics and capacities.
  - 4. Show wiring diagrams and controls.

### 2.3 SAMPLES

- A. Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed Work is judged.
- B. Office samples of sufficient size and quantity to clearly illustrate:
  - 1. Functional characteristics of products or materials, with integrally related parts and attachment devices.
  - 2. Full range of color samples.
- C. Field samples and mock-ups:
  - 1. Erect at the project site at a location acceptable to the Owner.
  - 2. Construct each sample or mock-up complete, including work of all trades required in finished work.

## 2.4 WARRANTIES

A. Refer to individual sections of these Specifications for specific general requirements on the submittal of warranties, guarantees, product/workmanship bonds, and maintenance agreements which are uniquely prepared and executed for the project.

## PART 3-EXECUTION

## 3.1 CONTRACTOR RESPONSIBILITIES

- A. Review shop drawings, project data and samples for compliance with these Specifications prior to submission.
- B. Verify:
  - Field measurements.
  - Field construction criteria.
  - 3. Catalog numbers and similar data.
- C. Coordinate each submittal with requirements of the Work and of the Contract Documents.
- D. The Contractor's responsibility for errors and omissions in submittals is not relieved by the Engineer's review of submittals.
- E. The Contractor's responsibility for deviations in submittals from the requirements of the Contract Documents is not relieved by the Owner's review of submittals, unless the Owner or the gives written acceptance of specific deviations.
- F. Notify the Owner, in writing at the time of submission, of deviations in submittals from the requirements of the Contract Documents.
- G. Begin no Work requiring submittals until return of submittals with the Owner's stamp and initials or signature indicating review and approval.

## 3.2 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least fourteen (14) days before dates reviewed submittals will be needed.
- B. Submit the number of copies of shop drawings, project datum and samples which the Contractor requires for distribution plus four (4) copies which will be retained by the Owner. Electronic submittals in PDF format may be submitted if acceptable to the Engineer.
- C. Accompany submittals with a transmittal letter, in duplicate, containing:
  - Date of submission.
  - 2. Project title and number.
  - 3. Contractor's name and address.
  - 4. The number of each shop drawing, project datum and sample submitted.
  - 5. Notification of any deviations from the Contract Documents.
  - 6. Other pertinent data.
- D. Submittals must include:
  - 1. Date of submittal and revision dates.
  - 2. Project title and number.
  - The names of:

- a. Engineer (if applicable).
- b. Contractor.
- c. Subcontractor (if applicable).
- d. Supplier.
- e. Manufacturer.
- f. Separate detailer, when pertinent.
- 4. Identification of products or materials.
- 5. Relation to adjacent structures or materials.
- 6. Field dimensions, clearly identified as such.
- 7. Specification Section Number.
- 8. Applicable standards, such as ASTM number or Federal Specifications.
- 9. A blank space, 4" X 4", for the Owner's stamp.
- 10. Identification of deviations from the Contract Documents.
- 11. Contractor's stamp, initialed or signed, certifying as to review of the submittal, verification of field measurements and compliance with the Contract Documents.

# 3.3 RESUBMISSION REQUIREMENTS

- A. Shop Drawings:
  - Revise initial drawings as required and resubmit as specified for initial submittal.
  - 2. Indicate on drawings any changes made other than those requested by the Owner.
- B. Project Data and Samples:
  - 1. Submit new datum and samples as required for initial submittal.

### 3.4 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute copies of Shop Drawings and project datum which carry the Owner's stamp to:
  - 1. Other prime Contractors.
  - 2. Subcontractors.
  - 3. Suppliers.
  - 4. Fabricators.
  - Contractor's file.
  - Job site file.
  - 7. Record documents file.
- B. Distribute samples as directed.

### SCHEDULE OF VALUES

## PART 1 – GENERAL

### 1.1 REQUIREMENTS INCLUDED

A. This Section defines the process whereby the Schedules of Values (lump sum price breakdown) shall be developed and incorporated into the project schedule. Upon request of the Engineer, the Contractor shall support the Schedule of Values with data that shall substantiate their correctness. The Schedule of Values, unless objected to by the Engineer, may be used for the lump sum portions of the Work as the basis for Payment Applications.

### 1.2 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. The Contractor shall type Schedule of Values on 8 ½" x 14" white paper. The Contractor's standard forms and automated printout shall be considered for approval by the Engineer upon the Contractor's request. The Contractor shall identify the Schedule of Values with:
  - Title of Project and Location.
  - Engineer and Owner's Project numbers.
  - 3. Date of Submission
- B. The Schedule of Values shall list the installed value of the components of the Work in sufficient detail to serve as a basis for computing values for partial payments during construction.
- C. The Contractor shall identify each line with the numbers and title of the respective major section of the Specifications.
- D. For each major line item, the Contractor shall list sub-values of major products or operations under the item.
- E. For the various portions of the Work:
  - 1. Each item shall include a directly proportional amount of the Contractor's overhead profit.
  - 2. For items on which partial payments will be requested for stored materials, the Schedule of Values shall conform to the requirements of the General Conditions of these Contract Documents.
- F. The sum of each item of the lump sump breakdown shall equal the lump sum in the Proposal. All lump sum values listed in the Schedule of Values times the sum of the unit price shall equal the Total Contract Price.

### 1.3 PRELIMINARY SCHEDULE OF VALUES

A. The Contractor shall submit a preliminary Schedule of Values for the major components of the Work at the Preconstruction conference.

#### 1.4 DETAILED SCHEDULE OF VALUES

- A. The Contractor shall prepare and submit a detailed Schedule of Values to the Engineer within 30 days from the date of Notice to Proceed. The detailed Schedule of Values shall be based on the accepted preliminary Schedule of Values for major Work components.
- B. The Contractor and Engineer shall meet and jointly review the detailed Schedule of Values within 35 days from the date of Notice to Proceed. The value allocations and extent of detail shall be reviewed to determine any necessary adjustments to the values. Any adjustment deemed necessary to the value allocation or level of detail shall be made by the Contractor and a revised detailed Schedule of Values shall be submitted within 60 days from the date of Notice to Proceed.

## 1.5 CHANGES TO SCHEDULE OF VALUE

- A. Changes to the CPM Schedule, which add activities not included in the original schedule but included in the original Work (schedule omissions) shall have values assigned as approved by the Engineer. Other activity values shall be reduced to provide equal value adjustment increases for added activities as approved by the Engineer.
- B. In the event that the Contractor and Engineer agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values; increases and equal decreases to values for activities may be made.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

#### CONSTRUCTION SCHEDULES

## PART 1-GENERAL

## 1.1 REQUIREMENTS INCLUDED

- A. Within ten (10) days, unless otherwise approved by Owner, after receipt of written Notice of Award of the Contract, prepare and submit to the Engineer/Owner an estimated construction progress schedule for the Work, with sub-schedules of related activities essential to its progress.
- B. Submit revised progress schedules on the 7th of each month, unless otherwise agreed by the Engineer's/Owner. The schedule shall show work completed as of the 30th of each month.

## 1.2 RELATED REQUIREMENTS

- General Conditions of the Contract Documents.
- B. Section 01010: Summary of Work.
- C. Section 01200: Project Meetings.
- D. Section 01300: Submittals.
- E. Section 01310: Construction Schedule
- F. Other Related Sections.

## 1.3 FORM OF SCHEDULES

- A. Prepare schedules in the form acceptable to the Engineer/Owner.
- B. Format of Listings: The chronological order of the start of each item of Work.

## 1.4 CONTENT OF SCHEDULES

- A. Construction Progress Schedule:
  - 1. Show the complete sequence of construction by activity. Include dates for beginning and completing the following:
    - a. Mobilization
    - b. Placement of Equipment and Materials Orders.
    - c. Submission of Shop Drawings.
    - d. Delivery of Equipment and Materials, including Owner furnished materials.

- e. Installation of wiring, raceways, supports, instrumentation, terminations.
- f. Record Drawings.
- g. Clean-up and Completion.
- B. For submittals, shop drawings, product data and samples show:
  - The dates for Contractor's submittals.
  - 2. The dates reviewed submittals will be required from the Engineer/Owner.
- C. Provide sub-schedules to clearly and satisfactorily define critical portions of the prime schedule.

## 1.5 PROGRESS REVISIONS

- A. Indicate the progress of each activity to the date of submission.
- B. Show changes occurring since submission of the previous months schedule:
  - 1. Major changes in scope.
  - 2. Activities modified since previous submission.
  - 3. Revised projections of progress and completion.
  - 4. Other identifiable changes.
- C. Provide a narrative report as needed to define:
  - 1. Problem areas, anticipated delays and the projected impact on the schedule.
  - 2. Corrective action recommended and its effect.
  - 3. The effect of changes on schedules of other prime contractors.

#### 1.6 SUBMISSIONS

- A. Submit initial schedules within twenty (20) days of the effective date of the Agreement.
  - 1. The Engineer/Owner will review schedules and return one (1) reviewed copy within ten (10) days after receipt.
  - 2. If required, resubmit a corrected schedule within ten (10) days after return of review copy.
- B. Scheduling shall be prepared in a horizontal bar chart format on paper not smaller than  $\frac{1}{2}$  x  $\frac{14}$ .

- C. With each application for payment, submit:
  - 1. A written description and explanation of any changes in the schedule since the last submission.
  - 2. Three (3) copies each of the construction progress schedule and the shop drawing submittal schedule.

## 1.7 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to
  - 1. Job site file.
  - Subcontractors.
  - 3. Other concerned parties.
- B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedule.

# PART 2 - PRODUCTS

Not used.

# PART 3 - EXECUTION

Not used.

## SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

# PART 1-GENERAL

### 1.1 REQUIREMENTS INCLUDED

A. Submit shop drawings, product data and samples required by the Contract Documents.

### 1.2 RELATED REQUIREMENTS

- A. Section 01015 General Requirements
- B. Section 01300 Submittals.
- C. Section 01310 Construction Schedule.
- D. Section 01700 Contract Close-out.
- E. Other Related Sections.

#### 1.3 SHOP DRAWINGS

- A. Submit Approved Materials list (Section 01015) with selected materials circled. For materials not listed provide shop drawings as stated in this Section.
- B. Drawings shall be presented in a clear and thorough manner.
  - 1. Details shall be identified by reference to sheet and detail and schedule as shown on the Contract Documents.
- C. Minimum sheet size: 8-1/2" X 11". Maximum sheet size: 24" X 36".
- D. Designate in the construction schedule, or in a separate coordinating schedule, the dates for submission and the dates that reviewed shop drawings, product data and samples are needed.
- E. Electronic submittals are acceptable in PDF format

### 1.4 PRODUCT DATA

- A. Preparation:
  - 1. Clearly mark each copy to identify pertinent products or models.
  - 2. Show performance characteristics and capacities.
  - 3. Show dimensions and clearances required.
  - 4. Show wiring or piping diagrams and controls.
- B. Manufacturer's standard schematic drawings and diagrams:
  - 1. Modify drawings and diagrams by deleting information not applicable to the Work.

2. Supplement standard information to provide information specifically applicable to the Work.

### 1.5 SAMPLES

- A. Office samples shall be of sufficient size and quantity to clearly illustrate:
  - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
  - 2. Full range of color, texture and pattern.

### 1.6 CONTRACTOR RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission.
- B. Determine and verify:
  - 1. Field measurements.
  - 2. Field construction criteria.
  - 3. Catalog numbers and similar data.
  - 4. Conformance with the Specifications.
- C. Coordinate each submittal with requirements of the Work and of the Contract Documents.
- D. Notify the Owner in writing, at the time of submission, of any deviations in the submittals from the requirements of the Contract Documents.
- E. Begin no fabrication or work requiring approved submittals until return of submittals by the Owner.

## 1.7 SUBMISSION REQUIREMENTS

- A. Make submittals in such sequence as to cause no delay in the Work.
- B. Number of submittals required:
  - 1. Shop Drawings: Submit the number of copies which the Contractor requires, plus four (4), which will be retained by the Owner, but not more than eight (8) total.
  - 2. Product Data: Submit the number of copies which the Contractor requires, plus four (4), which will be retained by the Owner, but no more than eight (8) total.
  - 3. Samples: Submit the quantity stated in each specification section.
  - C. Submittals shall contain:
    - 1. The date of submission and the dates of any previous submissions.
    - 2. The project title and number.
    - 3. Contract identification.
    - 4. The names of:
      - a. Contractor.
      - b. Supplier.

- c. Manufacturer.
- 5. Identification of the product, with the specification section number.
- 6. Field dimensions, clearly identified as such.
- 7. Relation to adjacent or critical features of the Work or materials.
- 8. Applicable standards, such as ASTM or Federal Specification numbers.
- 9. Identification of deviations from the Contract Documents.
- 10. Identification of revisions on re-submittals.
- 11. An 8" X 3.5" blank space for Contractor, Engineer (if applicable) and Owner stamps.
- 12. The Contractor's stamp initialed or signed, certifying as to review of the submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with the requirements of the Work and of the Contract Documents.
- 13. Stamps shall be no smaller than 1-1/2" X 3", or larger than 2" x 3-1/2", and shall be laid out as follows:

# (CONTRACTOR'S NAME)-(CONTRACTOR'S PROJECT NUMBER) Owner's Project Name Owner's Project Number

DATE:SPEC. DIV. NO.:	INEER'S PROJECT NUMBER)  SUBMITTAL NO.: PARA. NO.: REVIEWED BY:
(OWNER'S NAME) - (OWNER	R'S PRO IECT NI IMBER)
DATE:	SUBMITTAL NO.:
SPEC. DIV. NO.:	PARA. NO.:
DRAWING NO.:	REVIEWED BY:

## 1.8 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in the submittals noted by the Owner or the Engineer and resubmit unless otherwise noted.
- B. Shop Drawings and Product Data:
  - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
  - 2. Indicate any changes which are made other than those requested by the Engineer.
- C. The Owner will review one (1) re-submittal for each shop drawing or product data. All costs of reviewing additional re-submittals shall be at the Contractor's expense and shall be reflected in the final Change Order.
- D. Samples: Submit new samples as required for initial submittal.

## 1.9 DISTRIBUTION

A. Distribute shop drawings and copies of product data which carry the Owner's stamp and the Engineer's stamp (if applicable):

- 1. Shop Drawings:
  - a. Four (4) copies to the Owner.
  - b. Three (3) copies (maximun) to the Contractor.
- 2. Product Data:
  - a. Four (4) copies to the Owner.
  - b. Three (3) copies (maximum) to the Contractor.
- 3. Distribute samples as directed by the Owner.

# 1.10 OWNER'S DUTIES

- A. Review submittals within twenty-one (21) days, or in accordance with the schedule.
- B. Affix stamp and initials or signature, and indicate the status of the submittal.
- C. Return submittals to the Contractor for distribution, or for resubmission.

PART 2 - PRODUCTS Not used.

PART 3 - EXECUTION Not used.

### CONSTRUCTION PHOTOGRAPHS

## PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. The Contractor shall employ a professional photographer to take digital construction record photographs for pre-construction conditions periodically during course of Work and post-construction.

## 1.02 RELATED SECTIONS

- A. Section 01381 Audio/Video Pre-construction Record
- B. Section 01720 Project Record Documents
- C. Other Related Sections.

# 1.03 PHOTOGRAPHY REQUIRED

- A. View and Quantities Required:
  - 1. Take a minimum of 24 images of the site and adjacent property at the following intervals:
    - a. Pre-construction
    - b. Monthly, or other interval, at the cut-off date in accordance with Applications for Payment.
    - c. At construction events or discoveries as directed by the Owner or Engineer.
    - d. At post-construction.
- B. Aerial photography shall be required in addition to ground level images for items out of sight of ground level photography.
- C. Photograph from locations to adequately illustrate condition of construction and state of progress.
- D. At successive periods of photography, take at least one photograph from the same overall view as previously.
- E. Consult with the Owner and Engineer at each period of photography for instructions concerning views required.

## PART 2 - PRODUCTS

## 2.01 CAMERA REQUIREMENT

- A. A Digital Single Lens Reflex (DLSR) is required.
- B. Point and shoot, mobile phones and disposal cameras are not acceptable.

### 2.02 PHOTOGRAPHS

- A. The minimum file size is 6.0 megapixels per image.
- B. All images shall be color and in RGB format.

- C. Acceptable file formats include:
  - 1. Tagged Information File Format (TIFF)
  - 2. Joint Photographic Experts Group 2000 (JPEG2000)
  - 3. Digital Negative (DGN)
- D. Unacceptable file formats include:
  - 1. Bitmap (BMP)
  - 2. Graphics Interchange Format (GIFF)
  - 3. Portable Network Graphic (PNG)
  - 4. RAW format.

### 2.03 METADATA

- A. Each image must contain descriptive metadata as follows:
  - 1. Name of Project
  - Orientation of View
  - 3. Date and time of image
  - 4. Name and address of photographer
  - 5. Photographer's numbered identification of image.
  - 6. Meaningful and descriptive filenames unique to each image.

## 2.04 COPYRIGHT

A. No copyrighted photographs will be accepted.

## 2.05 EDITING

A. Images shall not be edited in any way.

## 2.06 TECHNIQUE

- A. Factual presentation
- B. Magnification commensurate with the level of detail required.
- C. Correct image and focus
  - 1. High resolution and sharpness
  - 2. Maximum depth-of-field
  - 3. Minimum distortion

## 2.07 DELIVERY OF IMAGES

- A. Deliver electronic image file to the Owner and Engineer to accompany each Application for Payment or as directed.
- B. Electronic file storage media shall be a durable, commercial quality USB memory device of sufficient capacity to store the intended contents.
- C. Electronic file storage media shall be labeled and identified by project title and project number.
- D. The photographer shall keep electronic copies for a minimum of two years from

Owner acceptance.

# PART 3 - EXECUTION (NOT USED)

## AUDIO/VIDEO PRE-CONSTRUCTION RECORD

## PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. The Contractor shall provide a continuous color video with audio of the entire project prior to construction and at Owner acceptance.

### 1.02 RELATED SECTIONS

- A. Section 01380 Construction Photographs
- B. Other Related Sections.

### 1.03 SCHEDULE REQUIRED

- A. Video recordings shall not be made more than 30 days prior to construction. No construction shall begin prior to review and approval of the videos by the Engineer and the Owner.
- B. Videos not conforming to the Specifications shall be resubmitted at no additional charge.

## 1.04 PROFESSIONAL VIDEOGRAPHERS

A. The Contractor shall engage the services of a professional videographer. The color audio-visual tapes shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-visual documentation.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. The finished product shall be a bright, sharp, clear picture free of distortion and show sufficient detail acceptable to the Owner and Engineer.
- B. All videos shall be color and in RGB format.
- C. The Contractor shall furnish to the Engineer and the Owner two (2) copies each of the electronic file, which becomes a project record document.
- D. Electronic file storage media shall be a durable, commercial quality USB memory device or compact disc of sufficient capacity to store the intended contents.
- E. Electronic file storage media shall be labeled and identified by project title and project number.
- F. The videographer shall keep electronic copies for a minimum of two years from Owner acceptance.

## 2.02 METADATA

- A. Each video must contain descriptive metadata as follows:
  - 1. Name of Project
  - 2. Direction and road names

- 3. Date and time of image
- 4. Name and address of videographer
- 5. Meaningful and descriptive filenames unique to each image.

### 2.03 COPYRIGHT

A. No copyrighted videos will be accepted.

## 2.04 EDITING

A. Videos shall not be edited in any way other than metadata per Section 2.02.

# PART 3 - EXECUTION

- A. The video recording shall show all surface features located within the construction zone. These features shall include, but not be limited to, roadways, sidewalks, outside of houses (front and sides), driveways, culverts, walls, fences, and landscaping.
- B. Where station numbering is used, coverage shall begin at the lowest station number and be continuous until the highest station number is reached. Otherwise, the entire length of the project shall be documented including each plan sheet.
- C. Provide magnification (zoom) where appropriate to properly display details germane to the subject matter.
- D. Maintain camera speed slow enough to achieve detail acceptable to the Owner and Engineer.
  - 1. Videos with unacceptable camera speed will not be accepted.
  - 2. Videographer shall be responsible to meet all traffic laws at the time of video including all necessary and appropriate safety measures.

### FIELD OFFICES

# PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Furnish, install, and maintain temporary field offices for the Engineer and the Contractor during entire construction period.
- B. Furnish, install and maintain storage and Work sheds needed for construction.
- C. At completion of Work, remove field offices, sheds, and contents.

### 1.02 RELATED SECTIONS

- A. Section 01015 General Requirements
- B. Other Sections as applicable.

## 1.03 OTHER REQUIREMENTS

A. Prior to installation of offices, consult with the Engineer and Owner regarding the location, access and related facilities.

## 1.04 REQUIREMENTS FOR FACILITIES

#### A. Construction:

- 1. Structurally sound, weathertight, with floors raised above ground.
- 2. Temperature transmission resistance: Compatible with occupancy and storage requirements.
- 3. At Contractor's option, portable or mobile buildings may be used.
  - a. Mobile trailers, when used, shall be modified for office use.
  - b. Do not use mobile trailers for living quarters.

# B. Office for the Engineer:

- 1. A separate space for the sole use of designated occupants, with secure entrance doors and one key per occupant.
- 2. Area: 150 sq. ft. minimum, with minimum dimension 8 feet.
- Air Conditioned
- 4. 120V, electric outlet
- 5. Desk & Chair reference table
- 6. Plan rack
- 7. Telephone
- 8. Internet Connection

- C. Contractor's Office and Facilities:
  - 1. Size: As required for general use and to provide space for project meetings.
  - 2. Lighting and temperature control: As specified for the Engineer's office.
  - 3. Telephone: One direct line instrument.
  - 4. Racks and files for Project Record Documents.
  - 5. Other furnishings: Contractor's option.
  - 6. Sanitary Facilities
  - 7. FAX Machine, if appliable.
  - 8. Copier Machine
- D. The Contractor shall make all provisions and pay all installations and other costs for the Engineer's construction office in order to provide telephone service, power service, exterior lights, and any local code and OSHA requirements. With the exception of charges for long distance and toll calls, the Contractor shall pay all monthly charges for the various services provided to the Engineer's office throughout the construction period.

## 1.05 USE OF PERMANENT FACILITIES

A. Permanent facilities shall not be used for field offices or for storage.

## PART 2 - PRODUCTS

### 2.01 MATERIALS, EQUIPMENT, FURNISHINGS

A. May be new or used, but must be serviceable, adequate for required purpose, and must not violate applicable codes or regulations.

### PART 3 - EXECUTION

## 3.01 PREPARATION

A. Fill and grade sites for temporary structures to provide surface drainage.

## 3.02 INSTALLATION

- A. Construct temporary field offices on proper foundations, provide connections for utility service.
  - 1. Secure portable or mobile buildings when used.
  - 2. Provide steps and landings at entrance doors.
- B. Locate construction office facilities at the location approved by the Owner within the Project.

### 3.03 MAINTENANCE AND CLEANING

A. Provide periodic maintenance and cleaning for temporary structures, furnishings, equipment, and services.

# 3.04 REMOVAL

- A. Remove temporary field offices, contents, and services at a time when no longer needed.
- B. Remove foundations and debris; grade site to required elevations and clean the area.

## PROJECT CLOSE OUT

## PART 1 – GENERAL

#### 1.1 DESCRIPTION OF REQUIREMENTS:

A. Definitions: Close out is defined to include the general requirements near the end of the Contract Time, which is between Substantial Completion and final acceptance of the Contract.

### 1.2 RELATED REQUIREMENTS:

A. Section 01720: Record Drawings

## 1.3 PREREQUISITES FOR SUBSTANTIAL COMPLETION:

- A. General: Prior to requesting Owner's inspection for certification of substantial completion, as required by the General Conditions (for either the entire work or portions thereof), and in addition to complying with all Division 1 General Requirements of these Contract Documents, the Contractor shall complete the following and list known exceptions in request:
  - 1. Submit last progress-payment request, with sworn statement showing percent completion of the work, complete with associated warranty of title releases, consents and supports.
  - 2. Submit statement showing changes to the Contract Sum.
  - 3. Obtain and submit occupancy permits, operating certificates, final inspection/test certificates, and similar releases enabling Owner's full and unrestricted use of the work and access to services and utilities.
  - 4. Submit signed and sealed record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey and similar final record information.
  - 5. Provide all contractually required operational and maintenance manuals, training and start-up services.
  - 6. Deliver tools, spare parts, extra stocks of materials, and similar physical items to Owner.

### 1.4 PREREQUISITES FOR FINAL ACCEPTANCE:

- A. General: Prior to requesting Owner's final inspection for certification of final acceptance and final payment, as required by the General Conditions, complete the following and list known exceptions (if any) in request:
  - 1. Submit final payment request with final warranty of title, consent of surety for final

payment, final releases and supports not previously submitted and accepted. Include certificates of insurance for products and completed operations.

- 2. Submit updated final statement, accounting for additional charges to the Contract Sum.
- 3. Complete the final cleaning.
- 4. Submit certified copy of Owner's final punch-list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, endorsed and dated by the Owner's.
- 5. Submit final meter readings for utilities, measured record of stored fuel, and similar data as of the time of substantial completion or when Owner's take possession of and responsibility for corresponding elements of the work.
- 6. Submit special guarantees, warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
- 7. Change over utilities to the owners name, if applicable.
- 8. Touch-up and otherwise repair and restore marred exposed finishes.

### 1.5 RECORD DOCUMENTS SUBMITTALS:

A. General: General requirements for record documents are indicated in individual sections of these specifications. The specific submittal requirements are indicated in Section 01720. Do not use record documents for construction purposes; protect from deterioration and loss in a secure fire-resistive location; provide access to record documents for the Engineer's or Owner's inspection during normal working hours.

## 1.6 FINAL CLEANING:

- A. Clean project site, including landscape, development areas of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains, petrochemical spills and other foreign deposits. Rake grounds which are neither planted nor paved, to a smooth, even-textured surface.
- B. Time of Final Cleaning: Following Owner's certification of "Substantial Completion," and immediately before his "Final Acceptance" inspection.
- C. Removal of Protection: Except as otherwise indicated or requested by Owner's, remove temporary protection devices and facilities which were installed during the course of the work to protect previously completed work during the remainder of the construction period.
- D. Compliances: Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site, or bury debris or excess materials, or discharge volatile or other harmful or dangerous materials into drainage systems; remove waste materials from the site and dispose of in a lawful manner.

E. Where extra materials of value remaining after completion of the associated work have become the Owner's property, dispose or store at the site as directed by the Owner.

PART 2 - PRODUCTS: NOT USED

PART 3 - EXECUTION: NOT USED

### PROJECT RECORD DRAWINGS

## PART 1 -- GENERAL

# 1.01 THE REQUIREMENT

- A. The Contractor shall keep and maintain, at the job site, one record copy of all drawings, specifications, addenda, change orders, and other modifications to the Contract, Engineer's field orders or written instructions, approved shop drawings, samples, construction photographs, detailed progress schedule and field test records.
- B. The Contractor shall mark the drawings to indicate all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawing markups shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master record drawing markups of the Contractor's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the Work.
- C. Project record drawing markups shall be maintained and updated by the Contractor on a month-to-month basis.
- D. Record drawing markups shall be accessible to the Engineer at all times during the construction period.
- E. Periodic payments shall not be processed prior to Engineer's review and acceptance of record drawing markups development for the pay period submitted.
- F. Final payment will not be acted upon until the Contractor has prepared and delivered record drawing markups to the Engineer. Said up-to-date record drawing markups shall be in the form of a set of prints 24 x 36 inch in size with carefully plotted information overlaid in red ink.
- G. Upon substantial completion of the Work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawing markups to the Engineer conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings showing the reported location of the Work. The information submitted by the Contractor and incorporated by the Engineer into the Record Drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and shall bear the costs resulting from the correction of incorrect data furnished to the Engineer.

### 1.02 RELATED REQUIREMENTS

- A. Section 01300: Submittals
- B. Section 01700: Project Closeout.

### 1.03 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with the progress of construction.
- C. Legibly mark drawings to record actual construction in red ink
  - 1. Incorporate changes made by Field Order, Change Order, or Construction Change Directive.
  - 2. Incorporate details generated during the construction phase not shown on the original Contract Drawings.

### 1.04 SUBMITTAL

- A. Prior to Final Completion, submit Record Documents to the Engineer.
- B. Accompany submittal with a transmittal letter in duplicate, containing:
  - 1. Date.
  - 2. Project title and number.
  - 3. Contractor's name and address.
  - 4. Title and number of each record document.
  - 5. Signature of Contractor or its authorized representative.

# PART 2 – PRODUCTS (NOT USED)

## PART 3 – EXECUTION (NOT USED)

#### OPERATION AND MAINTENANCE MANUALS

## PART 1 – GENERAL

### 1.01 THE REQUIREMENT

A. The Contractor shall furnish and deliver operation and maintenance manuals, including instructions, technical bulletins, and any other printed matter such as diagrams, prints or drawings, containing full information required for the proper operations, maintenance, and repair of all Contractor furnished equipment. Also included shall be a spare parts diagram and complete spare parts list. Operation and Maintenance manuals shall be in accordance with the requirements of this section.

### 1.02 SUBMITTALS

- A. Written operations and maintenance instructions are required for all equipment items supplied for this project. The amount of detail shall be commensurate with the complexity of the equipment item. Pictorial cuts of equipment are required for operator reference in servicing.
- B. In accordance with the provisions of Section 01300 Submittals, submit the following:
  - 1. Draft: Submit three draft copies of manufacturer's O&M Data not later than shipment of product. Draft O&M Data shall include binding. The Engineer will review and return two copies with comments.
  - 2. Interim: Revise the manufacturer's O&M Data based upon Engineer's comments and manufactured product. Submit four copies of the manufacturer's O&M Data within 30 days after product shipment and before product is placed in service.
  - 3. Final: Revise the manufacturer's O&M Data based upon completed installation and any deficiencies noted during instruction of Owner's personnel or Engineer. Submit six copies of the complete, final O&M Data. Submit final O&M Data not more than 30 days after final inspection and startup.

## 1.03 FORMAT AND CONTENTS

- A. Each operations and maintenance manual shall contain the following information:
  - 1. Storage instructions and requirements (short term and long term)
  - 2. Installation instructions
  - 3. Assembly and erection drawings/details
  - 4. Dimensional drawings
  - 5. Wiring diagrams including all control and lightning systems

- 6. Equipment data summary table
- 7. Equipment preventative maintenance data summary
- 8. Manufacturer's operating manual/instructions including equipment start-up, normal operation, shutdown, and emergency operation
- 9. Manufacturer's maintenance instructions including equipment calibration and adjustment, preventive and repair maintenance, and lubrication instructions
- 10. Trouble shooting guide
- 11. Parts diagram/list
- 12. Spare parts list (these are parts that the manufacturer recommends having readily available for use during preventative maintenance or are normal wear items)
- 13. Recommended lubricant types (lubrication schedule shall be included with the preventative maintenance data summary)
- 14. Tools list (any tools that will be required for preventative maintenance, disassembly, or re-assembly of the equipment)
- 15. Single line schematic
- 16. List of electrical relay settings and control and alarm contact settings.
- 17. Applicable software (if required)
- 18. Software manuals (if required)
- 19. Warranty
- 20. Contact information for the contractor, manufacturer, manufacturer's representative and nearest service representative
- B. Any equipment that contains multiple components (for example a pump and motor), the above information shall be provided for each component.
- C. For valve operation and maintenance manuals, provide one valve schedule giving valve number, location, fluid, and fluid destination for each valve installed. Group all valves in same piping systems together in the schedule. Obtain a sample of the valve numbering system from the Owner, if applicable.
- D. All operation and maintenance manual material shall be printed on 8-1/2"x11" or 11"x17" paper.
- E. Each manual shall be bound together in appropriate three-ring binders. Each binder shall be provided with front cover with the following information, as a minimum:

- 1. Project name
- 2. Date (Month / Year)
- 3. Equipment name
- 4. Applicable specification section
- 5. Manufacturer's name
- 6. Contractor's name
- F. Each manual shall also be provided with the binder edge cover that contains, at a minimum, the project name, date and equipment name.
- G. Each manual shall be divided into sufficient sections to facilitate ease of use and reference of the manual. Sections shall be identified using heavy section dividers with reinforced holes and numbered plastic index tabs; tabs with section titles shall be acceptable. A detailed table of contents shall be provided. At a minimum, the following sections shall be provided:
  - 1. Equipment technical data summary
  - 2. Storage / installation instructions
  - 3. Operation instructions
  - 4. Maintenance instructions
  - 5. Dimensional/assembly drawings, diagrams, and parts lists
  - 6. Wiring drawings and diagrams
  - 7. Contact information
  - 8. Warranty
- H. All operating and maintenance material that comes bound by the equipment manufacturer shall be left in its original bound state. Cross-reference the appropriate sections of the Contractor's operations and maintenance manual to the manufacturers' bound manuals.
- I. Label binders Volume 1, 2, and so on, where more than one binder is required. Include the table of contents for the entire set, identified by volume number, in each binder.
- J. When manufacturer's manuals and diagrams contain information applicable to multiple models or configurations, the information not applicable to this specific installation shall be stricken.

- K. The final operations and maintenance manual shall reflect the most current edition of the shop drawing accepted by the Engineer. Any field changes or modifications shall also be included.
- L. All O&M manuals shall also be furnished in an electronic file format. All manuals and drawings for the vendor provided equipment, sub-system or system shall be in Adobe Portable Document Format (PDF). They shall be PDF formatted text and graphics or PDF Searchable Image. There shall be links from all Table of Contents entries to the actual occurrence in the body of the manual. Bookmarks shall be created for all linked Table of Contents entries. This requirement applies to all equipment to be furnished on this project.

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

(NOT USED)

### SITE PREPARATION

### PART 1 - GENERAL

### 1.01 DESCRIPTION

- A. Section covers clearing, grubbing, stripping and demucking of the construction site, complete as specified herein.
- B. Clear and demuck the area within the limits of construction as required, including drainage easements.

## 1.02 RELATED SECTIONS

- A. Section 02221 Trenching, Bedding, and Backfill
- B. Other Sections as applicable.

# PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION

## 3.01 CLEARING

A. The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Engineer shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, so as to provide for the safety of employees and others. Clearing for structures shall consist of topsoil and vegetation removal. Clearing for pipelines shall consist of vegetation removal.

# 3.02 GRUBBING

A. Grubbing shall consist of the complete removal of all stumps, roots larger than 1½ inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

### 3.03 STRIPPING

A. In areas so designated, top soil, not muck shall be stockpiled. Topsoil stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all work is in place shall be disposed of by the Contractor.

### 3.04 DEMUCKING

A. When encountered, organic material (muck) shall be excavated and removed.

This material may be stockpiled temporarily but must be disposed of as directed by the Engineer or the Owner.

## 3.05 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by shipping such material and debris and disposing such material to a suitable location as required by the Engineer or the governmental agencies. Disposal by deep burial will not be permitted. The cost of disposal of material (including hauling) shall be considered a subsidiary obligation of the Contractor, the cost of which shall be included in the contract prices.

## 3.06 PRESERVATION OF TREES

A. Those trees which are designated by the Engineer or as shown on the drawings for preservation shall be carefully protected from damage. The Contractor shall erect such barricades, guards, and enclosures as may be considered necessary by them for the protection of the trees during all construction operations.

### 3.07 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

- A. The Contractor shall exercise extreme care to avoid necessary disturbance of developed private property as applicable. Trees, shrubbery, gardens, lawn and other landscaping, which in the opinion of the Engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.
- B. All soil preparation procedures and replanting operations shall be under the supervision of nurseryman experienced in such operations.
- C. Improvements to the land such as fences, walls, outbuildings, etc., which of necessity must be removed shall be replaced with equal quality materials and workmanship.
- D. The Contractor shall clean up the construction site across developed private property directly after construction is complete upon approval of the Engineer.

## 3.08 PRESERVATION OF PUBLIC PROPERTY

A. The appropriate paragraphs of Articles 3.06 and 3.07, of these specifications shall apply to the preservation and restoration of all damaged areas of public lands, rights-of-way, easements, etc.

#### **EARTHWORK**

## PART 1 - GENERAL

## 1.01 DESCRIPTION

- A. Earthwork operations necessary to achieve the Work including, but not limited to, excavation of soil, grading, removal and replacement of unsuitable soil, fill, backfill, embankment and compaction more specifically described as follows:
  - 1. Earthwork operations generally consist of excavation and embankment of soil materials from the existing elevations to the proposed elevations.
  - 2. Embankment necessary to achieve the proposed elevations may consist of in situ soils, whether classified as suitable or unsuitable, or imported suitable soil material. All imported soil material for embankment is to be included in the Contract price.
  - Soil material categorized as sub-grade is to be imported suitable soil.
     The Owner reserves the right to decline imported sub-grade material should in-situ suitable material be encountered and may seek a credit for imported, placed and compacted sub-grade per the Unit Price Schedule.
  - 4. Where unsuitable soil materials are encountered under or around sidewalks, pipes, exfiltration trenches, or structural elements, the Owner reserves the right to specify removal and replacement of unsuitable soil with imported suitable soil. All imported suitable soil material for placement under of around structural elements shall be included in the Contractor's Price.

### 1.02 RELATED SECTIONS

- A. Section 02100 Site Preparation
- B. Section 02210 Finish Grading
- C. Other Sections as applicable.

#### 1.03 REFERENCES

- A. FDOT Standard Specifications for Road and Bridge Construction
- B. FDOT Design Standards
- C. ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- D. AASTHO M-145 Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

## 1.04 PROJECT CONDITIONS

- A. Locate existing underground utilities in areas of work. Provide adequate means of support and protection during earthwork operations.
- B. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
- C. Do not interrupt existing utilities serving occupied facilities.
- D. Use of Explosives: If the use of explosives is necessary for the execution of the Work, and the use of explosives is allowed by local government, the Contractor shall conduct their blasting operations in conformance with these specifications and all applicable state and local codes and regulations.
  - 1. The contractor shall obtain a testing laboratory to perform pre- and postblasting surveys of all nearby structures at no cost to the Owner.
- E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

## PART 2 - PRODUCTS

### 2.01 SOIL MATERIALS

- A. Satisfactory or Suitable Soil Materials: ASTM D2487 soil classification groups GW, GP, GP-GM, and SW.
- B. Unsatisfactory or Unsuitable Soil Materials: ASTM D2487 soil classification groups GM, GC, SW, SM, SC, CL, ML, OL, CH, MH, OH, and PT.
- C. Satisfactory and unsatisfactory soil materials for roadway embankment, including pipe trench backfill under roadways, shall meet the requirements as defined in AASHTO M-145 soil classification groups and FDOT index 505.
- D. Satisfactory materials encountered during excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.
- E. Sub-base material
  - 1. Satisfactory materials may be Select, Structural, or Common fill.
- F. Select or Structural Fill
  - 1. Select or Structural fill material shall be a satisfactory soil material, well graded, consisting of a minimum of 60 percent clean medium fine grain

sized quartz sand, free of organic, deleterious and/or compressible percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressed material. Rock in excess of one inch in diameter shall not be permitted.

#### G. Common Fill

 Common fill material shall be a satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2 1/2 inches in diameter.

## H. Course Aggregate

1. Course aggregate, or gravel, shall be used for rock bedding, drainage rock or as otherwise depicted in the Drawings. Unless otherwise noted, course aggregate shall consist of washed and graded crushed limerock meeting FDOT specification 901, size number 57 or approved equal.

### I. Sand

- 1. Where specified, sand, clean sand, silica sand or other nomenclature shall refer to silica sand meeting FDOT specification 902-2.
- J. Satisfactory or suitable soil materials shall free of muck, clay, rock, or gravel larger than 2-1/2 inches in any dimension, debris, trash, waste, frozen materials, broken concrete, masonry, rubble, vegetable or other similar materials or deleterious matter. Materials of this nature encountered during the excavation which, in the opinion of the Engineer, is not suitable for reuse shall be stockpiled for disposal as unsuitable materials.
- K. Material substitutions may be permitted if accompanied by a Geotechnical Engineer's report substantiating the proposed substitution which is approved by the Engineer and is at no cost to the Owner.

### PART 3 - EXECUTION

### 3.01 EXCAVATION

- A. The contractor shall perform trench excavations in accordance with applicable trench safety standards and is responsible to determine any safety or safety related standards that apply to the Project. The Owner and Engineer are not responsible to review and/or assess safety precautions, programs and costs, and the means, methods, techniques or technique adequacy, reasonableness of cost, sequences, and procedures of any safety precaution, including, but not limited to, compliance with any and all requirements of Florida Trench Safety Act.
- B. Excavation is Unclassified, and includes excavation to sub-grade elevations indicated, regardless of character of materials and obstructions encountered.
- C. Unauthorized Excavation: Removal of materials beyond indicated sub-grade elevations or dimensions without specific direction. Unauthorized excavation, as

well as remedial work directed by Engineer, shall be at Contractor's expense.

#### D. Additional Excavation

1. Where unsuitable soil materials are encountered under or around structural elements, the Owner reserves the right to specify removal and replacement of unsuitable soil with imported suitable soil.

# E. Stability of Excavations

- 1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction.
- 2. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
- 3. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

# F. Shoring and Bracing

- 1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
- Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

## G. Dewatering

- 1. The bottom of the excavations shall be firm and dry and, in all respects, acceptable to the Engineer.
- 2. Prevent surface water and sub-surface or ground water from flowing into excavations. Do not allow water to accumulate in excavations.
- 3. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- 4. The Contractor shall obtain all dewatering permits as required from agencies having jurisdiction
- H. Stockpile satisfactory excavated materials where directed, until required for embankment, backfill or fill. Place, grade, and shape stockpiles for proper drainage.
- I. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide minimum 6 in. clearance on each side of pipe or conduit.
  - 1. Excavate trenches to depth indicated or required for indicated flow lines and invert elevations.
  - 2. Where rock is encountered, carry excavation 6 in. below scheduled elevation and backfill with a 6 in. layer of crushed stone or gravel prior to

- installation of pipe.
- For pipes or conduit 5 in. or less, excavate to indicate depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
- 4. For pipes or conduit 6 in. or larger, tanks and other work indicated to receive sub-base, excavate to sub-base depth indicated, or, if not otherwise indicated, to 6 in. below bottom of work to be supported.
- 5. Except as otherwise indicated, excavate for exterior water-bearing piping so top of piping is minimum 3'-6" below finished grade.
- 6. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
- J. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Engineer.

## 3.02 COMPACTION

- A. Areas to be compacted shall be moistened and compacted by either rolling, tamping or any other approved method by the Engineer in order to obtain the desired density.
- B. Hydraulic compaction will require a Geotechnical engineers' recommendation, observation, and certification at the Contractors expense.
- C. The Contractor shall inspect all compacted areas prior to further construction operations to ensure that satisfactory compaction has been obtained.
- D. All sub-grade shall be compacted as stated in the FDOT Standard Specifications for Road and Bridge Construction.
- E. All embankment shall be compacted by proof-rolling to achieve 95% of AASHTO T-99.
- F. All soil beneath structures shall be compacted to 98% of AASHTO T-180.
- G. Hydraulic compaction shall be permitted if accompanied by a geotechnical engineers' report substantiating the proposed methods. The geotechnical engineers report shall be submitted to the Engineer prior to any work and shall be at no cost to the Owner.
- H. The frequency of testing shall be as stated in the FDOT Standard Specifications for Road and Bridge Construction.
- I. All earthwork testing shall be at the expense of the Contractor unless otherwise stated in the Contract Documents.
- J. The Contractor shall instruct the testing laboratory to forward copies of all test reports to the Engineer.

K. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

## 3.03 EMBANKMENT, BACKFILL, AND FILL

- A. Place specified soil material in layers required to achieve proposed elevations:
  - 1. Place materials in layers of 8 inches loose depth for material compacted by heavy compaction equipment and 4 in. in loose depth for material compacted by hand operated tampers.
  - 2. Place materials in layers of 12 inches loose depth for material compacted by proof rolling equipment.
  - 3. Under grassed areas, use satisfactory or unsatisfactory excavated or imported soil material if approved by the Engineer.
  - 4. Under walks and pavements, use sub-base material, or satisfactory excavated or borrow material, or combination of both. Place shoulders along edges of sub-base course to prevent lateral movement with satisfactory excavated or borrow material.
  - 5. Under steps, use sub-base material.
  - 6. Under building slabs, use drainage fill material.
  - 7. Under piping and conduit, use sub-base material where sub-base is indicated under piping or conduit; shape to fit bottom 90 degrees of cylinder.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
  - 1. Acceptance of construction below finish grade including waterproofing and perimeter insulation.
  - 2. Inspection, testing, approval, and recording locations of underground utilities.
  - 3. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
- C. Remove all trash, roots, vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.
- D. When existing ground surface has a density less than that specified for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.
- E. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

F. Place backfill and fill materials evenly adjacent to structures, without wedging against structures or displacement of piping or conduit. Compaction equipment used within 10 ft. of buried walls and soil supported structures shall not exceed 2000 lbs.

#### 3.04 GRADING

- A. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding and as follows:
  - 1. Finish to within not more than 0.10 ft. above or below required sub-grade elevations.
  - 2. Walks: Shape surface to line, grade, and cross-section, with finish surface not more than 0.10 ft. above or below required sub-grade elevation.
  - 3. Pavements: Shape surface to line, grade, and cross-section, with finish surface 1/2 in. above or below required sub-grade elevation.
  - 4. Sod: Where sod abuts pavement, sidewalks, etc., finish surface below as required to accommodate thickness of sod as not to prohibit drainage.
- B. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to 1/2 in. below required elevation.

#### 3.05 QUALITY CONTROL

- A. Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Contractor will engage soil testing and inspection service for quality control testing during earthwork operations.
- C. Allow testing service to inspect and approve sub-grades and fill layers before further construction work is performed.
- D. If in opinion of Engineer, based on testing service reports and inspection, subgrade or fills which have been placed below specified density, provide additional compaction and testing at no additional expense to Owner.

#### 3.06 CLEANING AND PROTECTION

- A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Remove excess excavated and waste materials, including unacceptable excavated material, trash, and debris, and legally dispose of it at no cost to the Owner.

# **END OF SECTION**

#### SECTION 02210

#### FINISH GRADING

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. Provide all labor, materials, necessary equipment or services to complete the Finish Grading work, as indicated on the Contract Documents.

#### 1.02 RELATED SECTONS

- A. Section 02200 Earthwork
- B. Other Sections as applicable.

### 1.03 SITE INSPECTION

A. The Contractor shall visit the site and acquaint themselves with all existing conditions. The Contractor shall be responsible for their own subsurface investigations, as necessary, to satisfy requirements of this Section. All subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the Engineer or Owner's Representative.

## 1.04 EXISTING CONTOURS

- A. The existing elevations shown on the Drawings are approximate only. The contractor is responsible for grading to meet existing elevations as required.
- B. The contours and elevations established under contract will be the finished grades shown. The Contractor under this Contract shall perform the work for construction using the finished grades previously established and making whatever corrections and/or repairs to grades to make them consistent with the requirements of the drawings and specifications.

### 1.05 UTILITIES

- A. Before starting site operations, verify that the earlier contractors have disconnected all temporary utilities which might interfere with the fine grading work.
- B. Locate all existing, active utility lines traversing the site and determine the requirements for their protection. Preserve in operating condition all active utilities adjacent to or transversing the site that are designated to remain.
- C. Observe rules and regulations governing respective utilities in working under requirements of this section. Adequately protect utilities from damage, remove or relocate as indicated, specified or required. Remove, plug or cap inactive or abandoned utilities encountered in excavation. Record location of active utilities.

### 1.06 QUALITY ASSURANCE

- A. Requirements of all applicable building codes and other public agencies having jurisdiction upon the work.
- B. Primary emphasis should be given to the aesthetic appearance and functioning of berms and swales, as directed by the Engineer or Owner's Representative. The Contractor shall employ skilled personnel and any necessary equipment to ensure that finish grading is smooth, aesthetically pleasing, drains well, and is ideal for receiving sod and plant materials.
- C. As-build survey drawings of all finished grading are to be submitted to the Engineer for review prior to landscape installation or agency certifications.

#### PART 2 - MATERIALS

#### 2.01 TOP SOIL

- A. In areas to receive turf, rough grade shall be a minimum of 2 inches below finished grades.
- B. Rough grade fill is to be fine, compacted, satisfactory fill material, with no rocks larger than 2-inches.
- C. Both surface and subsurface, both before and after fill operations, shall be checked to confirm that percolation/compaction levels meet the needs of the proposed planting for that area.

## PART 3 - EXECUTION

## 3.01 EXCAVATION

- A. Excavate where necessary to obtain subgrades, percolation, and surface drainage as required.
- B. All unsatisfactory soil materials are to be removed and replaced with satisfactory soil materials.

- C. Remove entirely any existing obstructions after approval by the Engineer or Owner's Representative.
- D. Remove from site and dispose of debris and excavated material not required.

#### 3.02 GRADING

- A. The Contractor shall establish finished grades as shown on the Engineers grading plans, and as directed by Engineer and/or Owner's Representative, including areas where the existing grade has been disturbed by other work.
- B. Finished grading shall be smooth, aesthetically pleasing, drain well and ready to receive sod and other plant material to full satisfaction of Engineer and Owner's Representative.
- C. Finish grading accuracy is to be within 1/10 foot of specified elevations.
- D. Finish grading is to be performed using hand raking throughout and shall remove all objectionable material and rocks greater than 1 inch in diameter.
- E. A finish grading inspection is required prior to sod placement.

#### 3.03 COMPACTION

- A. Compact each layer of fill in designated areas with approved.
  - 1. In landscaped areas, compaction shall not exceed 85% of maximum density and no less than 75%.
  - 2. In landscaped areas which are sloped at 1:4 or steeper, compaction shall not exceed 90% of maximum density and no less than 85%.
- B. No backfill shall be placed against any masonry or other exposed building surface until permission has been given by the Owner's Representative, and in no case until the masonry has been in place seven days.
- C. Compaction in limited areas shall be obtained using mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than four inches thick. The hand tampers used shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent any wedging action against masonry, or other exposed building surfaces.

#### 3.04 CORRECTION OF GRADE

- A. Bring to required grade levels areas where settlement, erosion, or other grade changes occur. Adjust grades as required to carry drainage away from buildings and to prevent ponding around the buildings and on pavements.
- B. All soil surfaces shall have sufficient percolation and surface drainage to support grasses and plant material.
- C. Contractor shall be responsible for stabilizing grades by approved methods prior to landscaping and shall be responsible for correction of grades as mentioned

above, and cleanup of any wash outs or erosion.

**END OF SECTION** 

#### SECTION 02221

## TRENCHING, BEDDING, AND BACKFILL

### PART 1 - GENERAL

### 1.01 DESCRIPTION

A. Furnish labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, fill, grading, and slope protection required to complete the electrical ductbank shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to, manholes, vaults, duct conduit, pipe, roadways, paving, bedding, backfilling, fill, required borrow; grading, disposal of surplus and unsuitable materials, and all related work such as sheeting, bracing, and dewatering

#### 1.02 RELATED SECTIONS

- A. Section 01340 Shop Drawings, Working Drawings, and Samples
- B. Section 02100 Site Preparation
- C. Section 02200 Earthwork
- D. Section 02401 Dewatering
- E. Other Sections as applicable.

### 1.03 REFERENCES

- A. FDOT Standard Specifications for Road and Bridge Construction
- B. FDOT Design Standards
- C. ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- D. AASTHO M-145 Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

### 1.04 JOB CONDITIONS

- A. The Contractor shall examine the site and review the available test borings or undertake their own soil borings prior to submitting their bid, taking into consideration all conditions that may affect their work. The Owner and Engineer will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the available test borings were made.
- B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
  - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Engineer and the Owner of such piping or utility immediately for directions.
  - 2. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

- 3. Demolish and completely remove from site existing underground utilities indicated on the drawings to be removed.
- C. Protection of Persons and Property: Contractor shall barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
  - 1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

## PART 2 - PRODUCTS

#### 2.01 MATERIALS

- A. Satisfactory Soil Materials: ASTM D2487 soil classification groups GW, GP, SW, and SP.
- B. Unsatisfactory Soil Materials: ASTM D2487 soil classification groups GM, GC, SM, SC, CL, ML, OL, CH, MH, OH, and PT.
- C. Satisfactory and unsatisfactory soil materials for roadway embankment, including pipe trench backfill under roadways, shall meet the requirements as defined in AASHTO M-145 soil classification groups and FDOT index 505.
- D. Satisfactory materials encountered during excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for legal disposal at the cost of the Contractor as unsuitable materials.

#### E. Sub-base material

1. Refer to roadway section and/or specifications.

#### F. Select or Structural Fill

 Select or Structural fill material shall be a satisfactory soil material, well graded, consisting of a minimum of 60 percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressible percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressed material. Rock in excess of 1 inch in diameter shall not be permitted.

#### G. Common Fill

 Common fill material shall be a satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2 1/2 inches in diameter.

### H. Course Aggregate

 Course aggregate, or gravel, shall be used for rock bedding, drainage rock or as otherwise depicted in the Drawings. Unless otherwise noted, course aggregate shall consist of washed and graded crushed limerock meeting FDOT specification 901, size number 57 or approved equal.

## I. Sand

1. Where specified, sand, clean sand, silica sand, or other nomenclature

shall refer to silica sand meeting FDOT specification 902-2.

- J. Satisfactory soil materials shall free of muck, clay, rock, or gravel larger than 2-1/2 inches in any dimension, debris, trash, waste, frozen materials, broken concrete, masonry, rubble, vegetable or other similar materials or deleterious matter. Materials of this nature encountered during the excavation which, in the opinion of the Engineer, is not suitable for reuse shall be stockpiled for disposal as unsuitable materials.
- K. Material substitutions may be permitted if accompanied by a Geotechnical Engineer's report substantiating the proposed substitution which is approved by the Engineer and is at no cost to the Owner.

#### PART 3 - EXECUTION

### 3.01 GENERAL

- A. All excavation, backfill, and grading necessary to complete the work shall be made by the Contractor and the cost thereof shall be included in the Contract price.
- B. Material shall be furnished as required from off-site sources and hauled to site.
- C. The Contractor shall take all necessary precautions to maintain the work area in a safe and workable condition.
- D. The Contractor shall protect their work at all times by flagging, marking, lighting, and barricading. It shall also be the Contractor's responsibility to preserve and protect all above and underground structures, pipe lines, conduits, cables, drains, or utilities which are existing at the time they encounter them. Failure of the Drawings to show the existence of these obstructions shall not relieve the Contractor from this responsibility. The cost of repair of damage which occurs to these obstructions during or as a result of construction shall be borne by the Contractor without additional cost to the Owners.

#### 3.02 DEWATERING

- A. The bottom of the excavations shall be firm and dry and, in all respects, acceptable to the Engineer.
- B. Prevent surface water and sub-surface or ground water from flowing into excavations. Do not allow water to accumulate in excavations.
- C. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
- D. The Contractor shall obtain all dewatering permits as required from agencies having jurisdiction

#### 3.03 TRENCH EXCAVATION

A. Excavation for all trenches required for the installation of pipes shall be made to the depths indicated on the Drawings. Excavate trench to provide minimum of 30-inch clear cover over the pipe bell unless otherwise noted on the Drawings. Excavate in such manner and to such widths as will give suitable room for laying the pipe within the trenches, for bracing and supporting and for pumping and drainage facilities. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and indicated on the Drawings.

- B. Rock shall be removed to a minimum 8-inches clearance around the bottom and sides of all the pipe or ducts being laid.
- C. Where pipe is to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench remains undisturbed.
- D. Where the pipes or ducts are to be laid directly on the trench bottom the lower part of the trenches shall not be excavated to the trench bottom by machinery. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe can evenly and uniformly supported along its entire length on undisturbed material or bedding rock. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barrel only.
- E. The bottom of the excavations shall be firm and dry and, in all respects, acceptable to the Engineer. Excavate any organic soil material from the bottom of the trench and replace with rock bedding, at least 6 inches thick.

### 3.04 TRENCH PROTECTION

- A. The Contractor shall perform trench excavations in accordance with applicable trench safety standards and is responsible to determine any safety or safety related standards that apply to the Project. The Owner and Engineer are not responsible to review and/or assess safety precautions, programs and costs, and the means, methods, techniques or technique adequacy, reasonableness of cost, sequences, and procedures of any safety precaution, including, but not limited to, compliance with any and all requirements of Florida Trench Safety Act.
- B. The Contractor shall construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing piping, and foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids form, they shall be immediately filled and compacted.
- C. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of any pipe, and no wood sheeting shall be cut off at a level lower than 1 foot above the top of any pipe unless otherwise directed by the Engineer. If during the progress of the work the Engineer decides that additional wood sheeting should be left in place, the Engineer may direct the Contractor in writing. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by the Engineer for an alternate method of removal.
- D. All sheeting and bracing not left in place, shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. All voids left or caused by withdrawal of sheeting shall immediately be refilled with sand or rammed with tools especially adapted to that purpose, by watering or otherwise as may be directed.
- E. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on their part to issue such orders, and their failure to exercise their right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned

by negligence or otherwise growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

#### 3.05 PIPE INTERFERENCES AND ENCASEMENT

- A. The contractor shall abide by the following schedule of criteria concerning interferences with other utilities.
  - 1. In no case shall there be less than 0.5 feet between any two pipe lines and structures.
  - 2. Class I Concrete Encasement: Wherever there is more than 0.5 foot, but not less than 1.5-foot clearance between water mains or water services, then a concrete encasement shall be provided in accordance with the typical detail as shown on the Drawings.
  - 3. Class II Concrete Encasement: Wherever there is more than 0.5 foot, but less than 1.0-foot clearance between any two pipe lines, or between pipe lines and structures, then a concrete encasement shall be provided in accordance with the typical detail as shown on the Drawings.
- B. The Engineer shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion and to avoid conflicts.

#### 3.06 BACKFILLING

- A. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Engineer.
- B. Perform backfill in lifts and compact as specified in the Drawings.
- C. Backfilling over pipes shall begin as soon as practical after the pipe has been laid, jointed, and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- D. Backfilling over ducts shall begin not less than three days after placing concrete encasement.
- E. All backfilling shall be prosecuted expeditiously as detailed on the Drawings.
- F. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of pipe.
- G. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.
- H. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.
- In areas where unsuitable soil is discovered in the pipe bedding, the unsuitable soil shall be removed and stockpiled for disposal by the contractor. Suitable soils shall be substituted at a depth as directed by the Engineer. If gravel is required by the Engineer as suitable bedding, the gravel shall be wrapped in filter fabric prior to backfill operations.
- J. Gravel bedding shall not be used under any circumstances as a drain for ground water.

- K. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least 1 foot above the bottom of the pipes:
  - 1. Place structural fill in such areas for a distance of not less than 3 feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.
  - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

### 3.07 COMPACTION

- Perform compaction and compaction tests as specified in the Drawings.
- B. Hydraulic compaction shall be permitted if accompanied by a Geotechnical Engineer's report substantiating the proposed methods. The Geotechnical Engineer's report shall be prepared and submitted to the Engineer prior to any work and shall be at no cost to the Owner.

### 3.08 GRADING

- A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades, and elevations shown or as directed by the Engineer and shall be made in such manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.
- B. If at the time of excavation, it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.
- C. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 2 1/2 inches in their greatest dimensions will not be permitted in the top 6 inches of the subgrade line of all fills or embankments.
- E. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Engineer.
- F. In cut, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as specified by the Engineer.
- G. No grading is to be done in areas where there are existing pipe lines that may be uncovered or damaged until such lines which must be maintained are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.
- H. The Contractor shall replace all pavement cut or otherwise damaged during the

progress of the work as specified elsewhere herein or as shown on the Drawings.

### 3.09 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. All surplus and unsuitable excavated material shall be disposed of at the Contractor's cost in one of the following ways as directed by the Engineer.
  - 1. Transport to soil storage area on Owner's property and stockpile or spread as directed by the Engineer.
  - 2. Transport from Owner's property and legally dispose of. Any permit required for the hauling and disposing of this material beyond Owner's property shall be obtained prior to commencing hauling operations. Copies of all required permits shall be provided to the Engineer.
- B. Suitable excavated material may be used for fill if it meets the specifications for common fill and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

**END OF SECTION** 

THIS PAGE LEFT INTENTIONALLY BLANK

#### SECTION 02430

### SODDING

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. Provide all labor, materials, necessary equipment and services to complete the turfgrass Sodding work, as indicated on the drawings, or as needed, and as specified herein or both.

### 1.02 RELATED SECTONS

- A. Section 02200 Earthwork
- B. Section 02210 Finish Grading
- C. Other Related Sections

#### 1.03 QUALITY ASSURANCE

- A. Standards: Federal Specifications (FS) 0-F-241c (1), Fertilizers, Mixed, Commercial.
- B. Requirements or Regulatory Agencies: Conform to the requirements of the State Department of Agriculture.

### 1.04 JOB CONDITIONS

- A. Begin installation of turfgrass sod after preceding related work is accepted.
- B. Environmental Requirements:
  - Install turfgrass sod during months acceptable to the Landscape Architect.
  - 2. Do not install turfgrass sod on saturated soil.
- C. Protection: Erect signs and barriers against vehicular traffic on areas prepared for sod.

## 1.05 GUARANTEE

- A. Guarantee turfgrass sod for period of twelve months after date of Final Approval.
- B. Replacement turfgrass sod under this guarantee shall be guaranteed for twelve months from the date of installation.
- C. Repair damage to other plants during turfgrass sod replacement at no cost to the Owner.

#### PART 2 - PRODUCTS

### 2.01 TURFGRASS SOD

- A. Turfgrass Sod Species: Refer to species indicated on approved landscape plans.
  - 1. Turfgrass Producers International Grade: Premium Grade Turfgrass Sod.
- B. All turfgrass sod shall conform to the following requirements:

- 1. Furnish in pads that are not stretched, broken, or torn.
  - Turfgrass Sod pads shall be 18x24 inches in size (plus or minus 5%) with a 1-1/2 inch thickness (excluding top growth and thatch).
     Broken and torn or uneven ends will not be accepted.
- 2. Uniformly mowed height when harvested:
  - a. Turfgrass Sod 2 inches in height.
- 3. Thatch: Maximum 1/2 inch uncompressed.
- 4. Inspected and found free of diseases, nematodes, pests, and pest larvae, by entomologist of State of Florida Department of Agriculture.
- 5. Weeds:
  - a. Free of horse grass, nut grass or other objectionable weeds or weed seeds.
- 6. Uniform in green color, leaf texture, and density.

### 2.02 WATER

A. Free of substances harmful to plant growth, objectionable odor or staining agents.

### 2.03 FERTILIZER

- A. FS 0-F-241c(1), Grade A or B.
- B. The Chemical designation for slow release granular fertilizer with minor trace elements in addition to 12% Nitrogen, 8% Phosphorous, and 8% Potassium (Lesco or approved equal) shall have at least 50% of the nitrogen from a non-water-soluble organic source for all plantings except on lake banks.
- C. Apply and distribute by methods and rates as recommended by manufacturer.
- D. All State, County, and Municipal governmental regulations must be met including any licensing or certification requirements for uses and/or applications.

### 2.04 HERBICIDES

- A. As recommended by the State of Florida Department of Agriculture.
- B. Post-emergent Herbicide: Roundup as manufactured by Monsanto Corp. or approved equal.
- C. Pre-emergent Herbicide: Ron Star or approved equal.
- D. When next to an aquatic water body, an approved aquatic herbicide or approved equal must be utilized that will meet the State, County or Municipal requirements.
- E. All State, County and municipal governmental regulations must be met including any licensing or certification requirements for uses or applications.

#### PART 3 - EXECUTION

#### 3.01 INSPECTION

A. Verify that excavation for turfgrass sod is 4 inches below finish grade and approved Planting/Top Soil Mix to depth of 2 or more inches for turfgrass sod (2

inches)to meet finish grade.

B. Water dry soil to depth of 6 inches 48 hours before turfgrass sodding.

### 3.02 INSTALLATION

- A. All areas to be turfgrass sodded shall receive finish grading per Section 02210.
- B. Transplant turfgrass sod within 48 hours after harvesting.
- C. Turfgrass Sod coverage must provide 100% coverage at Final Approval.
- D. Begin turfgrass sodding at bottom of slopes. When installing turfgrass sod adjacent to a water body, install turfgrass sod to the waterline.
- E. Lay first row of turfgrass sod in straight line with long dimension of pads parallel to slope contours.
- F. Butt side and end joints. Ensure that joints are tight, thereby eliminating the need to patch and/or top-dress to eliminate gaps.
- G. Stagger end joints in adjacent rows.
- H. Do not stretch or overlap rows.
- I. Water turfgrass sod immediately after transplanting.
- J. Top dressing for turfgrass sodded areas may be clean sand(sterilized), mined from fresh water sources. Sand mined from salt water is unacceptable. Sand shall be free from construction debris, weeds, turfgrass sod, biodegradable materials, noxious pests and diseases and other deleterious materials.

### 3.03 LAWN ESTABLISHMENT

A. Maintenance of sodded areas shall begin immediately after so installation and shall continue until final approval. Maintenance shall consist of protecting, watering, weeding, cutting, fertilizing, repairing eroded area and re-sodding dead and or damaged turfgrass sod.

## B. Watering:

- 1. Keep turfgrass sod moist during first week after planting.
- 2. After first week, supplement rainfall to produce a total of 2 inches per day until final acceptance.
- 3. It is the contractors' responsibility to water all plant material.

### C. Mowing:

- 1. Maintain turfgrass sod between 2 inches and 2-1/2 inches in height. When turfgrass sod reaches 3 inches in height, mow to 2 inches in height.
- 2. Do not cut off more than 40% of grass leaf in single mowing.
- 3. Remove all turfgrass sod clippings throughout.
- D. Re-turfgrass sod areas which in the opinion of the Landscape Architect is required to establish a uniform stand of turfgrass sod.
- E. Weed Eradication:
  - 1. Apply specified or approved equal post-emergent herbicide per

- manufacture's rate and method of application to all areas to receive sod.
- 2. Apply specified or approved equal pre-emergent herbicide before sodding and between second and third mowing, per manufacturer's rate and method of applications.
- 3. Verify that the herbicide and applicant technique will not damage sod prior to application, and replace all damaged sod and any other landscaping due to herbicide at no cost to the owner.
- F. Fertilizer: Apply fertilizer uniformly at manufacturer's recommended rate 30 days after turfgrass sodding and at three-month intervals thereafter. Water in to avoid "burning" or damaging turfgrass sod.
- G. Establishment period shall extend until final acceptance by the Owner according to the conditions of the Contract.

### 3.04 CLEANING

- A. Immediately clean spills from paved and finished surface areas.
- B. Remove debris and excess materials from project site.
- C. Dispose of protective barricades and warning signs at termination of lawn establishments.

**END OF SECTION** 

#### SECTION 03300

#### CAST-IN-PLACE CONCRETE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The Contractor shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, all in accordance with the requirements of the Contract Documents.
- B. The requirements in this section shall apply to the following types of concrete:
  - 1. <u>Class A Concrete</u>: Normal weight concrete used at all non-water-bearing structures, unless otherwise noted.
  - 2. <u>Class B Concrete</u>: Normal weight concrete with pea-rock aggregate. Class B concrete shall be used only at locations indicated on the Drawings.
  - 3. <u>Class C Concrete</u>: Normal weight concrete used in electrical/instrumentation ductbanks, pipe encasements and sidewalks.
  - 4. <u>Flowable Fill</u>: Lean concrete proportioned without the use of coarse aggregate primarily for use as pipe backfill. Flowable fill shall be utilized only at locations indicated on the Drawings.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300 Submittals
- B. Other related sections.
- 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS
  - A. Without limiting the generality of other requirements of these Specifications, all work specified herein shall conform to or exceed the requirements of the Florida Building Code (FBC) and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.
  - B. Codes and Standards
    - 1. The Building Code, as referenced herein, shall be the Florida Building Code.
  - C. Federal Specifications
    - 1. UU-B-790A (Int.Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).

#### D. Commercial Standards

. . . . . .

1.	ACI 214	Recommended Practice for Evaluation of Strength Test Results of Concrete.

- 2. ACI 301 Specifications for Structural Concrete for Buildings.
- ACI 305 Hot Weather Concreting.
- 4. ACI 306 Cold Weather Concreting.
- 5. ACI 309 Recommended Practice for Consolidation of Concrete
- 6. ACI 315 Details and Detailing of Concrete Reinforcement.
- 7. ACI 318 Building Code Requirements for Reinforced Concrete.
- 8. ACI 347 Recommended Practice for Concrete Formwork.
- 9. ACI 350 Environmental Engineering Concrete Structures.
- 10. ASTM C 31 Methods of Making and Curing Concrete Test Specimens in the Field.
- 11. ASTM C 33 Specification for Concrete Aggregates.
- 12. ASTM C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- 13. ASTM C 88 Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.
- 14. ASTM C 94 Specification for Ready-Mixed Concrete.
- 15. ASTM C 114 Method for Chemical Analysis of Hydraulic Cement.
- 16. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregate.
- 17. ASTM C 143 Test Method for Slump of Portland Cement Concrete.
- 18. ASTM C 150 Specification for Portland Cement.
- 19. ASTM C 156 Test Method for Water Retention by concrete Curing Materials.
- 20. ASTM C 157 Test Method for length Change of Hardened Cement Mortar and Concrete.
- 21. ASTM C 192 Method of Making and Curing concrete Test Specimens in the Laboratory.
- 22. ASTM C 227 Standard Test Method for Potential Alkali Reactivity of Cement Aggregate Combinations (Mortar-Bar Method).
- 23. ASTM C 260 Specification for Air-Entraining Admixtures for Concrete.
- 24. ASTM C 289 Standard Test Method for Potential Reactivity of Aggregates

### (Chemical Method).

- 25. ASTM C 494 Specification for Chemical Admixtures For Concrete.
- 26. ASTM C 586 Standard Test Method for Potential Alkali Reactivity of Carbonate Rocks for Concrete Aggregates (Rock Cylinder Method).
- 27. ASTM C 618 Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
- ASTM D 1751 Specification for preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- 29. ASTM D 6103 Standard Test Method for Flow Consistency of Controlled Low Strength Material
- 30. ASTM E11 Specification for Wire-Cloth Sieves for Testing Purposes.
- 31. ASTM E 119 Method for Fire Tests of Building Construction and Materials.

#### 1.04 QUALITY CONTROL

## A. Compressive Strength

- 1. Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. At least one set of test specimens shall be made for each placement in excess of five cubic yards, or for each fifty (50) cubic yards of concrete placed, or for each 5000 square feet of surface area for slabs or walls, whichever is greater.
- 2. Samples of freshly mixed concrete shall be obtained in accordance with ASTM C 172, and compression test specimens for concrete shall be made in accordance with ASTM C 31. Specimens shall consist of at least five 6-inch diameter by 12-inch high cylinders, or eight 4-inch diameter by 8-inch high cylinders. Each cylinder shall be identified by a tag attached to the side of the cylinder.
- 3. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the specimens made in any four consecutive working days and to protect the specimens from falling over, being jarred or otherwise disturbed during the period of initial curing. The box shall be erected, furnished and maintained by the Contractor. Such box shall be equipped to provide the moisture and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C31. Such box shall be located in an area free from vibration such as pile driving and traffic of all kinds. No concrete requiring inspection shall be delivered to the site until such storage curing box has been provided. Specimens shall

- remain undisturbed in the curing box until ready for delivery to the testing laboratory but not less than sixteen hours
- 4. Compression test shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at 7 days and 2 at 28 days. For 4x8 cylinders, three test cylinders will be tested at 7 days and three at 28 days. The remaining cylinders will be held to verify test results, if needed.

### B. Consistency

- Consistency of the concrete will be checked by the Engineer by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for delays, material or labor costs due to such eventualities.
- 2. Slump tests shall be made in accordance with ASTM C 143. Slump tests shall be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

#### C. Air Content

- 1. Samples of freshly mixed concrete will be tested for entrained air content by the Engineer in accordance with ASTM C 231.
- 2. Air content tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

#### D. Evaluation and Acceptance of Concrete

- Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 215 and ACI 318, Chapter 5 "Concrete Quality Mixing and Placing", and as specified herein.
- 2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected.
- 3. All concrete which fails to meet the ACI requirements and these specifications, is subject to removal and replacement at the cost of the Contractor. Additional testing may also be required to verify compressive strength of concrete. Additional testing shall involve extraction and testing of concrete cores in accordance with ASTM C 42. Engineer shall determine locations where concrete cores shall be taken. Nondestructive test methods shall not be used to verify strength of in-place concrete.

### PART 2 -- PRODUCTS

### 2.01 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished and stored for the work shall comply with the requirements of ACI 301, as applicable.
- C. Materials for concrete shall conform to the following requirements:
  - 1. Cement shall be standard brand portland cement conforming to ASTM C 150 for Type II. Portland cement shall contain not more than 0.60 percent alkalies. The term "alkalies" referred to herein is defined as the sum of the percentage of sodium oxide and 0.658 times the percentage of potassium oxide (Na<sub>2</sub>0 + 0.658 K<sub>2</sub>0). These oxides shall be determined in accordance with ASTM C 114. A single brand of cement shall be used throughout the Work, and prior to its use, the brand shall be acceptable to the Engineer. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the Engineer if requested regarding compliance with these Specifications.
  - 2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.
  - 3. Aggregates shall be obtained from pits acceptable to the Engineer, shall be non-reactive, and shall conform to the FBC and ASTM C 33. Maximum size of coarse aggregate shall be as specified in Article 2.04, Paragraph B of this Section. Lightweight sand for fine aggregate will not be permitted.
    - a. Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock or a combination thereof. The coarse aggregates shall be prepared and handled in two or more size groups for combined aggregates with a maximum size not greater than 1 inch. When the aggregates are proportioned for each batch of concrete the two size groups shall be combined.
    - b. Fine aggregates shall be manufactured sand that is hard and durable.
    - c. Combined aggregates shall be well graded from coarse to fine sizes, and shall be uniformly graded between screen sizes to produce a concrete that has optimum workability and consolidation characteristics. Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.
    - d. When tested in accordance with "Potential Reactivity of Aggregates (Chemical Method)" (ASTM C 289), the ratio of silica released to reduction in alkalinity shall not exceed 1.0.
    - e. When tested in accordance with "Organic Impurities in Sands for Concrete" (ASTM C 40), the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

- f. When tested in accordance with "Resistance to Abrasion of Small size Coarse Aggregate by Use of the Los Angeles Machine" (ASTM C 131), the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.
- g. When tested in accordance with "Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate" (ASTM C 88), the loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using sodium sulfate.

#### 2.02 ADMIXTURES

- A. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent. Air-entraining agent shall be Sika AER by Sika Corp., MB-VR by Master Builders, Darex AEA by Grace, AEA-92S by Euclid Chemical Company, or equal.
- B. Admixtures shall be required at the Engineer's discretion or, if not required, may be added at the Contractor's option to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at the Contractor's expense. The use of an admixture shall be subject to acceptance by the Engineer. Concrete containing an admixture shall be first placed at a location determined by the Engineer. If the use of an admixture is producing an inferior end result, the Contractor shall discontinue use of the admixture. Admixtures specified herein shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, be non-toxic after 30 days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.
  - 1. Water reducing admixture shall conform to ASTM C 494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are "Eucon Series" by the Euclid Chemical Company, "Pozzolith Series" by BASF, and "Plastocrete Series" by Sika Corporation.
  - 2. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G. The use of high range water reducer is mandatory for Class A2 concrete. The high range water reducer shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are "Eucon 37" or Plastol 5000 by the Euclid Chemical Company, "Rheobuild 1000 or Glenium Series" by BASF, and "Daracem 100 or Advaflow Series" by W.R. Grace.
  - 3. A non-chloride, non-corrosive accelerating admixture shall be used when air temperature at time of placement is expected to be consistently below 40 degrees Fahrenheit as specifically approved by the Engineer. The admixture shall conform to ASTM C 494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated

- corrosion test method such as that using electrical potential measures. Acceptable products are "Accelguard 80/90 or NCA" by the Euclid Chemical Company and "Daraset" by W.R. Grace.
- 4. A water reducing retarding admixture shall be used when air temperature at time of placement is expected to be consistently above 90 degrees Fahrenheit as specifically approved by the Engineer. The admixture shall conform to ASTM, Type D and shall not contain more than 0.05% chloride ions. Acceptable products are "Eucon NR or Eucon Retarder 100" by the Euclid Chemical Company, "Pozzolith Retarder" by BASF, and "Plastiment" by Sika Corporation.
- 5. The Contractor shall submit certification from each admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned.
- 6. <u>Prohibited Admixtures</u>: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
- 7. <u>Certification</u>: Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to Mix design review by the Engineer.

#### 2.03 ACCESSORIES

- A. Epoxy adhesives shall be the following products for the applications specified to be used in strict accordance with manufacturer's recommendations.
  - For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32
    Hi-Mod, LPL Epoxy Adhesive, as manufactured by Sika Chemical Corporation;
    Concresive 1001-LPL, as manufactured by Adhesive Engineering Company; or
    equal.
  - 2. For bonding hardened concrete or masonry to steel, Colma-Dur Gel, Sikadur Hi-Mod Gel, or equal.

### 2.04 CONCRETE MIX

A. Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the qualities specified. The exact proportions in which these materials are to be used for different parts of the work will be determined by the Contractor. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. Mix designs with more than 41 percent of sand of the total weight of fine and coarse aggregate shall not be used for Class A Concrete. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the Owner. All changes shall be subject to review by the Engineer.

- B. The proportions of cement, aggregates, admixtures and water used in the concrete shall be based on tests of grading and moisture content of materials, slump of concrete mixture, strength of concrete and the following factors:
  - 1. Class A Concrete (Normal weight concrete used at all non-water bearing structures, unless noted otherwise).

Minimum cementitous materials

content, per cubic yard

without flyash added: 611 lbs.

Maximum water-cementitous

materials ratio, by weight

0.45

Slump range 3 inches to 4 inches with water reducing

admixture

Coarse Aggregate #57 per ASTM C33

Compressive strength 4,000 psi

at 28 days - F'c

Air Content 3% ± 1%

2. Class B Concrete (At locations shown on the Drawings).

Minimum cementitous materials 517 lbs.

content, per cubic yard

Maximum water-cementitous

0.50

materials ratio, by weight

Slump, maximum 5 inches

Compressive strength at 28 days - 4,000 psi

F'c

Coarse Aggregate Pearock

Air Content 3% + 1%

3. Class C Concrete (Sidewalks, pipe encasements in the dry, thrust blocks and electrical duct banks)

Minimum cementitous materials 500 lbs.

content, per cubic yard

Maximum water-cementitous

materials ratio, by weight

0.60

Slump, maximum 5 inches

Compressive strength at 28 days - 3,000 psi

F'c

Coarse Aggregate #57 per ASTM C33

Air Content 3% + 1%

4. Flowable Fill (In lieu of pipe bedding, select backfill)

Minimum cementitous materials

100 lbs.

content, per cubic yard

Maximum water-cementitous materials ratio, by weight

5.0

Flowability, minimum 8 inches

Compressive strength at 28 days -

50-150 psi

none

F'c

Coarse aggregate

Fine aggregate limestone screenings

C. Class A concrete, unless noted otherwise on the Drawings, shall be air entrained concrete. A water reducing admixture may be added to the mix at the Contractor's option.

D. The mix proportions used shall be changed subject to the limitation specified herein, whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish and the Contractor shall be entitled to no additional compensation because of such changes.

## 2.05 CONSISTENCY

A. The quantity of water entering into a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation, and which can be compacted by the vibratory methods herein specified to give the desired density, impermeability and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143.

#### 2.06 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall be used meeting the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.
- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one-half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first.

- Upon delivery from the truck concrete temperature shall not exceed 90 degrees Fahrenheit.
- C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type. The counters shall be actuated at the time of starting mixers at mixing speeds.
- D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

## PART 3 -- EXECUTION

#### 3.01 PROPORTIONING AND MIXING

- A. Proportioning of the concrete mix shall be based on the results of field experience or laboratory trial mixes in conformance with Section 5.3, "Proportioning on the Basis of Field Experience and/of Trial Mixtures" of ACI 318. When trial mixes are used they shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301; provided, that the maximum slump for any concrete shall not exceed the limits specified in this Section of the Specifications.
- B. When field experience records are inadequate to confirm the quality of a proposed concrete mix in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318, or when required by the Engineer, an independent testing laboratory designated by the Contractor and acceptable to the Engineer shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PART 2 -- PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the City.
- C. An independent testing laboratory shall observe the preparation of the trial batch, and they shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C 31 in addition to conducting slump (ASTM C 143), air content (C 231) and unit weight (C 138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C 39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No.\_\_\_\_\_\_, Product\_\_\_\_\_\_." If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch

testing required shall be performed at no additional cost to the City. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

- D. Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301 Specifications.
- E. Retempering of concrete or mortar which has partially hardened will not be permitted.

### 3.02 PREPARATION

- A. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. A vapor barrier specified in Section 07190 entitled "Vapor Barrier" shall be placed. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the Engineer. The Contractor shall notify the Engineer not less than two working days prior to Concrete Placement, allowing one day for review and any corrective measures which are required.

### C. Joints in Concrete

- 1. Concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond and a bonding agent shall be placed.
- 2. After the surfaces have been prepared all approximately horizontal construction joints shall be covered with a layer of mortar approximately one-inch thick. The mortar shall have the same proportions of cement and sand as the regular concrete mixture. The water-cement ratio of the mortar in place shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in the manner hereinafter specified. The mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface. Wire brooms shall be used where possible to scrub the mortar into the surface. Concrete shall be placed immediately upon the fresh mortar.

## D. Placing Interruptions

When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent work; provided that construction joints shall be made only where acceptable to the Engineer. Cold joints will be sufficient cause for rejection of the work.

#### E. Embedded Items

 No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcing steel, and preparation of surfaces involved in the placing have been completed and accepted by the Engineer at least four hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.

- 2. All inserts or other embedded items shall conform to the requirements herein.
- F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the Engineer before any concrete is placed. Accuracy of placement is the responsibility of the Contractor.
- G. All anchor bolts called for on the drawings shall be cast-in-place in the concrete. Drilled, impact, adhesive or other types of anchors shall not be substituted for anchor bolts unless otherwise shown on the Drawings. Anchor bolts shall conform to the requirements set forth in Section 05050 entitled "Metal Fastening".

## H. Casting New Concrete Against Old

- 1. Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting (exposing aggregate) prior to the application of an epoxy bonding agent.
- I. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater, except where shown on the Drawings to be placed by the tremie method, nor shall the Contractor allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the Engineer.

#### J. Corrosion Protection

- Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.
- 2. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- 3. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.
- 4. The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

#### 3.03 PLACING CONCRETE

A. Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.

## B. Non-Conforming Work or Materials

 Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the Contractor.

#### C. Unauthorized Placement

1. No concrete shall be placed except in the presence of duly authorized representative of the Engineer. The Contractor shall notify the Engineer at least 24 hours in advance of placement of any concrete.

#### D. Placement in Wall Forms

- 1. Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies.
- 2. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.

### E. Casting New Concrete Against Old

1. An epoxy adhesive bonding agent shall be applied to set surfaces of construction joints according to the manufacturer's written recommendations.

## F. Conveyor Belts and Chutes

1. All ends of chutes, hopper gates, and all other points of concrete discharge throughout the Contractor's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the Engineer. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency

will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

#### G. Placement in Slabs

1. Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

# H. Temperature of Concrete

1. The temperature of concrete when it is being placed shall be not more than 90 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees Fahrenheit, the Contractor shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The Contractor shall be entitled to no additional compensation on account of the foregoing requirements. During summer months concrete pours shall be scheduled in the morning or early part of the day when temperatures are cooler.

# I. Pumping Equipment

- 1. Pumping equipment and procedures if used shall conform to the recommendations contained in the report of ACI Committee 304 on Placing Concrete by Pumping Methods, ACI 304.2R. The specified slump shall be measured at the point of discharge. The loss of slump in pumping shall not exceed 1-1/2 inches.
- J. The order of placing concrete in all parts of the work shall be acceptable to the Engineer. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 7 days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the 2 adjacent wall panels have cured at least 14 days.
- K. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.

- L. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- M. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- N. Concrete in walls shall be internally vibrated and at the same time, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

#### 3.04 CONCRETE FINISHING

A. Concrete finishes are specified in Section 03350 entitled "Concrete Finishes".

#### 3.05 CURING AND PROTECTION

A. Curing is specified in Section 03370 entitled "Concrete Curing".

# 3.06 CONCRETE IN COLD WEATHER

A. Cold weather concreting procedures shall be in accordance with the requirements of ACI 306

# 3.07 CONCRETE IN HOT WEATHER

A. Hot weather concreting procedures shall conform to the requirement of ACI 305.

# 3.08 PLACING CONCRETE UNDERWATER (TREMIE CONCRETE)

A. Placing concrete underwater will be permitted only when shown on the Drawings. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved method. Care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. The consistency of the concrete shall be regulated to prevent segregation of materials. The method of depositing concrete shall be regulated

- such that the concrete enters the mass of the previously place concrete from within, displacing water with a minimum disturbance to the surface of the concrete.
- B. Tremie shall consist of a tube having a diameter of not less than 10 inches and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported to permit free movement of the discharge and over the entire top surface of the work and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be entirely sealed at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the placement has been completed.

# 3.09 PLACING CONCRETE UNDER PRESSURE (PUMPING)

- A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. To obtain the least line resistance, the layout of the pipeline system shall contain a minimum number of bends with no change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.
- B. No aluminum parts shall be in contact with the concrete during the entire placing of concrete under pressure at any time.
- C. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a recognized testing laboratory proving the proposed mix meets all requirements. In addition, at the Contractor's option, an actual pumping test under field conditions may be performed prior to use of the accepted mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used; the same pump and operator shall be present and the pipe and pipe layouts will reflect the maximum height and distance contemplated.
- D. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the Pumping operation and proceed with the placing of concrete using conventional methods.
- E. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.
- F. The minimum diameter of the hose (conduits) shall be four inches.
- G. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.

# 3.10 ORDER OF PLACING CONCRETE

- A. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall be have cured at least seven days before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two adjacent wall panels have cured at least 14 days.
- B. The surface of the concrete shall be level whenever a run of concrete is stopped.

# 3.11 DEFECTIVE CONCRETE

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until reviewed by the Engineer. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the Contractor at its own expense.
- B. Defective surfaces to be repaired as specified in Article 3.11, Paragraph A of this Section, shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32-inch depth of the surface film from all hard portions. The material used for repair proposed shall be acceptable to the Engineer.
- C. Holes left by tie-rod cones shall be repaired in an acceptable manner with dry-packed cement grout or premixed patching material as accepted by the Engineer.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of Article 3.04 or 3.05 of this Section, as applicable, using acceptable methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.
- E. Prior to backfilling, all cracks that may have developed shall be "vee'd" and filled with sealant conforming to the requirements of Section 03732 entitled, "Concrete Repairs". This repair method shall be done on the faces of members in contact with fill.

# 3.12 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade,

or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the Contractor's expense. This stipulation includes concrete experiencing cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the Engineer. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the Engineer, unless other means or repair are deemed necessary and approved by the Engineer.

# 3.13 CONCRETE SEALER

A. Contractor shall apply a sealer to the top surface of all finished concrete floor slabs and equipment pads which are to remain unpainted and not intended to be immersed unless stated otherwise. Sealer shall be as specified in Specification Section 03350 entitled "Concrete Finishes".

- END OF SECTION -

#### SECTION 03700

# MODIFICATIONS AND REPAIR TO EXISTING CONCRETE

# PART 1 - GENERAL

# 1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to cut, repair, demolish, excavate or otherwise modify parts of existing structures or appurtenances as shown on the Drawings, or as needed, and as specified herein as necessary to complete the work under this Contract.

#### 1.02 RELATED WORK

- A. Section 03300.
- B. Other Related Sections.

#### 1.03 GENERAL

- A. No existing structure or concrete shall be shifted, cut, removed, or otherwise altered until authorization is given by the Engineer.
- B. When removing materials or portions of existing structures and when making openings in existing structures, the Contractor shall take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, nor to damage the structures or contents by falling of flying debris. Unless otherwise permitted, line drilling will be required in cutting existing concrete.

# PART 2 - PRODUCTS

# 2.01 MATERIALS

- A. Epoxy Bonding Compound:
  - The epoxy bonding compound shall be furnished in two components for combining immediately prior to use in accordance with the manufacturer's written instructions and as stipulated in these Specifications.
  - 2. The components of the epoxy resin system shall conform to the following requirements.
    - a. Component A Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A condensation type, containing suitable viscosity control agents and having an apoxide equivalent of 180-200.
    - b. Component B Component B shall be primarily a reaction product of an alkyl glycidyl ether and a polyfunctional aliphatic amine

containing suitable viscosity agents modified with 2, 4, 6 tri (dimethylamino-methyl) phenol.

- c. The component ratio of B:A shall be 1:1 by volume.
- d. The resultant compound shall be polysulfide free.

## PROPERTIES OF MIXED COMPONENTS

 2.1 Solids Content
 - 100% by weight

 2.2 Pot Life
 - 20-30 min @ 73F

 2.3 Tack-Free Time (thin film)
 - 3-5 hrs @ 73F

2.4 Final Cure ASTM D-695

(75% ultimate strength) - 3 days @ 73F

2.5 Initial Viscosity (A+B) - 2400-3200 cps min at 73F

- 5300 PSI min at

- 700 PSI min @ 28

2.6 Color Mixed - Straw

# 4. PROPERTIES OF CURED MATERIAL

3.1 Neat Material
3.1.1 Tensile Strength

(ASTM D-638) days 73F cure
3.1.2 Tensile Elongation - 4.8% @ 14 days,
(ASTM D-638 modified) 73F cure

3.1.3 Compressive Strength (ASTM D-695)

 (ASTM D-695)
 days 73F cure

 3.1.4 Compressive Modulus
 - 250,000 PSI min @

 (ASTM D-695)
 28 days 73F cure

 3.1.5 Water Pick Up
 - 1.0% max.(ASTM D-570)

3.1.6 Bond Strength - 1500 PSI min 14
(Plastic to Hardened) days, 73F cure

3.1.7 Deflection Temperature - 180F min.

(ASTM D-1525)

 Epoxy bonding compound shall be Sikadur Hi-Mod as manufactured by Sika Chemical Corp., Lyndhurst, N.J., or equal as manufactured by W.R. Grace Co., Cambridge, MA or Adhesive Engineering Co., Lawrence, MA or approved equal.

# PART 3 - EXECUTION

#### 3.01 INSTALLATION

A. Field measurements shall be taken in the required buildings and at the required yard structures to determine the amount of concrete to be removed and/or repaired and the amount of patching to be done.

#### 3.02 CONSTRUCTION METHODS

- A. Where new concrete is to be made integral with existing concrete, either of the following methods as noted, shown or specified in Contract Drawings shall be used by the Contractor:
  - 1. Bonding to a saturated surface.
  - 2. Bonding by using a bonding agent.

3. Use of anchor bolts, expansion bolts or dowels in connecting concrete.

#### 3.03 MODIFYING OR REPAIRING EXISTING CONCRETE

- A. Remove concrete to the depths shown or required. Roughen contact surfaces by chipping, sandblasting, scarifying or other approved methods. Thoroughly clean the surface removing loose particles and dust.
- B. Cut off projecting reinforcement when required to provide at least 1 inch cover. Where shown, reinforcement shall be bent across cut face and covered with new concrete.
- C. Thoroughly wash the roughened concrete surfaces and keep the surfaces saturated for at least 6 hours before placing new concrete. All free water shall be removed prior to placing the concrete. An epoxy bonding compound as specified may be used in lieu of saturating surface for 6 hours.
- D. Cement mortar, where required, shall be placed to a thickness slightly in excess of the finished surface and shall be steel-trowel-finished, flush with the adjacent surface.
- E. When the finish surface is not specified to be coated the color of new concrete in the exposed surfaces shall match the color of the existing adjoining concrete as closely as possible.
- F. Cement mortar shall consist of 1 part Portland cement and two parts of sand by volume. No accelerating admixtures shall be employed in surface treatment. Where shown on the Drawings, a non-shrink grout, shall be used for patching and filling.

# 3.04 CONNECTIONS, NEW CONCRETE TO EXISTING CONCRETE

- A. The Contractor shall drill 1 1/2 inch holes for dowels. The drilled hole shall first be filled with epoxy bonding compound, then dowels shall be inserted by tapping. These holes shall be blown clear of loose particles and dust prior to installing epoxy bonding compound. Where shown on the Drawings, expansion bolts shall be installed in place of bonded dowels.
- B. Unless otherwise noted on the Drawings, No. 5 dowels set 12 inches into the concrete, and projecting 12 inches, 24 inches on center shall be used.
- C. Where it is necessary to expose existing reinforcement, the reinforcing rods shall be cleaned by wire brushing and new reinforcement shall be hooked into existing reinforcement and lapped or welded as directed. Reinforcing rods shall have at least 3/4 inch clearance around each bar.
- D. All mixing and application of the epoxy shall be done in strict accordance with the printed instructions of the approved manufacturer. The Contractor shall submit to the Engineer, when requested, evidence indicating that the proposed applicators

are fully qualified to perform the work and any proposed applicator found to be not qualified shall, be removed forthwith by the Contractor.

# E. Preparation of Concrete Surfaces:

- 1. Surfaces must be clean and sound. Surfaces may be dry, damp, or wet, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials by mechanical abrasion methods such as sandblasting.
- If the concrete surfaces are sound and it is only necessary to remove laitance, grease or dust, the Contractor may, with the prior written approval of the Engineer, forego sandblasting and wash the concrete with a degreasing and etching chemical applied in accordance with the manufacturer's (ProSoCo, Inc., Kansas City, Kansas, Sure-Klean Degresser & Etch, or approved equal) written instructions and as stipulated in these Specifications hereinafter.
- 3. Degreasing and Etching Chemical:
  Color: Water White; Flash Point: Above 150 Deg.F; Weight/gallon: 9.0 lbs.;
  Composition and Materials: A blend of organic and inorganic acids with a special solvent system incorporating wetting agents for emulsification.
- 4. Application of degrease and etching compound. Pre-wet concrete surfaces with clean water. Brush concentrated cleaner onto concrete surface. Let stand 3 to 4 minutes and reapply, brushing stained areas vigorously. Rinse off with fresh water applied at a minimum pressure of 800 psi and a minimum volume of five gallons per minute.

# F. Proportioning/Mixing/Applying Epoxy Compound:

- Volumetric ratio of bonding compound is 1:1 (B:A). To mix, proportion 1 part B and 1 part A into clean pail. Mix thoroughly for 3 minutes with a steel mixing paddle on low-speed (400 to 600 rpm) drill until blend is a uniform straw color. Mix only that amount of epoxy that can be used in 30 minutes at 73 degrees F.
- 2. Application for Bonding:
  - a. The area to be overlaid shall be covered with one coat of the epoxy compound applied with long-nap paint rollers, brushes, brooms or by spray. The rate of application shall be 80 sq. ft./gal. maximum or smooth concrete (20 mils). As the concrete increases in roughness, the rate of coverage decreases proportionally.
  - b. While the epoxy compound is still tacky (3-5 hrs. at 73oF) place the concrete. If the bonding compound should harden before the concrete is placed, apply a fresh coat over the hardened coat and proceed.
- 3. Application for Grouting: To prepare a grout to anchor bolts or level base plates, mix the epoxy compound with granules recommended and supplied by the epoxy manufacturer. The amount granules used should be the maximum amount possible while still maintaining a pourable consistency. The ratio should be approximately 1:1-1/2 by loose volume (Granules). See technical data on anchor bolt grouting and grouting base plates published by the manufacturer.
- 4. Limitations:

- a. Do not thin the epoxy bonding compound. Solvents will prevent proper cure.
- b. Use only oven-dry granules to avoid encapsulation of moisture. Exposure to temperatures (after cure) above 180 degrees F (dry) and 120 degrees F (wet) not recommended.

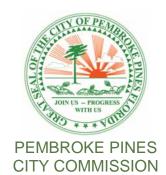
# G. WEATHER LIMITATIONS

1. The epoxy compound shall be placed only when both the concrete surface temperature and the ambient temperature is 40 degrees F and rising.

# H. SAFETY

1. The Contractor shall require applicators to wear protective clothing, gloves, goggles and barrier creams.

**END OF SECTION** 



Frank C. Ortis MAYOR 954-450-1020 fortis@ppines.com

Iris A. Siple
VICE MAYOR
DISTRICT 3
954-450-1030
isiple@ppines.com

Jay D. Schwartz COMMISSIONER DISTRICT 2 954-450-1030 jschwartz@ppines.com

Thomas Good, Jr. COMMISSIONER DISTRICT 1 954-450-1030 tgood@ppines.com

Larissa Chanzes COMMISSIONER DISTRICT 4 954-450-1030 Ichanzes@ppines.com

Charles F. Dodge CITY MANAGER 954-450-1040 cdodge@ppines.com July 15, 2020

# Addendum # 2 City of Pembroke Pines IFB #PSUT-20-06

"Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation"

Attached to this addendum you will find the following changes to Attachment H - Contract Documents / Appendix 1 -PBP WWTP Effluent PS Electrical Rehabilitation Bid Set Specifications.pdf

# 1. REVISED TABLE OF CONTENTS

Attached: Revised Table of Contents

# 2. BID DOCUMENTS

Attached: Bid Documents – Division 1, 2 & 3

Date: Tuesday July 7, 2020 at 9:00 a.m.

Meeting Location: Wastewater Treatment Facility located at 13955 Pembroke Road, Pembroke Pines, FL 33029

PRE-BID ATTENDANCE SHEET				
Company Name:  Representative Printed Name:  What ton- Snith. Inc  Signature  Signature  Phone Number.	22			
750 Morrae Rd, Sinfard Phone Number (407) 321-8416				
Company Name:  What Snith Inc  Representative Printed Name:  Derex Peters  envestate. 10-				
750 Marioe Pd. Sarford, FL V. 1 407-321-841	٥'			
Company Name:  Sepresentative Printed Name:  Sepresentative Printe	FLA.com			
511 NE 42 00 STOAKland PKK 1 1 954 270 6836				
AFCS  Company Name:	o.com			
3814 NW 126 AVE CORAL SPRENCYS FL. Got The 954 512 325	6			
Company Namie:  AFCS  Address:  AGGRESS:  Address:  Company Namie:  Femal:  FERRY DAVGHERTY  Phone Number:  Phone Number:	Com			
3814 NW/26for (S. FL /308-215	57			
6) Dyanlectric FL Autoria Gutiervez Gutiervez Gutiervez	a-Flow			
25016W 160Are 6,500 Distribution 954-624-0000				
Company Name PS Regrefentative Burited Name PS GROUP TO THE PS	2			
" Address 1000 Clint Moore stelo4 Borge Signature Alejandro Hengidis ahernandis Dep	511.45m			
Empresentative Printed Name:  Signature    Company Name: Typower   Company Name:   Empresentative Printed Name:   Empresenta	erinc-com			
5913 NW 31 AV. FU 33379 Signature 954 - 627 - 820				

#### WAIVER AND RELEASE OF LIABILITY

As a participant and by signing this PRE-BID ATTENDANCE SHEET, I hereby waive, release, and indemnify the City of Pembroke Pines, its officers, agents, employees, commission, insurers and volunteers (collectively, the "City") from any and all claims, liability, injury, causes of action, suits, demands and/or damage of whatever kind, (collectively, "Claims") made by myself or any party on my behalf whether caused in whole or in part by any negligence of the City, or otherwise, in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims that may be incurred in connection with my participation in the above-referenced site visit for the above mentioned project. By signing this form and as a participant in this PRE-BID MEETING / SITE VISIT, I affirm that I am physically able to participate in the City of Pembroke Pines's PRE-BID MEETING / SITE VISIT. By signing this form I affirm that I am waiving and releasing the Claims described above. This Waiver and Release shall be binding upon myself, and my respective successors, heirs, assigns, executors, administrators, spouse and next of kin. I affirm that I am aware of the current recommendations from the CDC, the State of Florida, Broward County, and the City related to Covid-19 and agree to abide by those recommendations as applicable to any activity related to this site visit.

Meeting Location: Wastewater Treatment Facility located at 13955 Pembroke Road, Pembroke Pines, FL 33029 Date: Tuesday July 7, 2020 at 9:00 a.m. PRE-BID ATTENDANCE SHEET David . Fray ( A) Town. COM Company Name Du 2) silmore leas @ hillensoe com 227 Hillers Electrical Engineering allan Ohsimiami. com marrena 786 493 3996 Phone Number:
305 900 7006

E-mail:
706-329-0159 yeared conserved active.com Nelson Alvaneb maetinez @ micenginealing schuices.com.
305 766 4691 WAIVER AND RELEASE OF LIABILITY

As a participant and by signing this PRE-BID ATTENDANCE SHEET, I hereby waive, release, and indemnify the City of Pembroke Pines, its officers, agents, employees, commission, insurers and volunteers (collectively, the "City") from any and all claims, liability, injury, causes of action, suits, demands and/or damage of whatever kind, (collectively, "Claims") made by myself or any party on my behalf whether caused in whole or in part by any negligence of the City, or otherwise, in connection with my participation in the above-referenced site visit for the above mentioned project. By signing participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims that may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims that may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims that may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims, may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims, may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims, may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims, may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims, may be incurred in connection with my participation in the above-referenced program/activity. I hereby further hold the City of Pembroke Pines's PRE-BID MEETING / SITE VISIT, By signing this form I affire

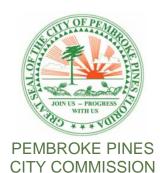
Date: Tuesday July 7, 2020 at 9:00 a.m.

Meeting Location: Wastewater Treatment Facility located at 13955 Pembroke Road, Pembroke Pines, FL 33029

The III	PRE-BID ATTENDANCE SHEET					
all a	EDWWO 5 FLICTURE CORP	Representative Printed Name:  THOUGH As For	E-mail: TF=XVPEECQADLGOM			
1)	EDWARDS ELECTRIC CORP Address: 7231 Southand BLVD C 2 WRB		TF=XVPEECPADL 60 M Phone Number: 561-722-9648			
	Company Name:	Representative Printed (ame:				
2)	Address:	Jag Materia	Phone Number:			
	Company Name:	Representative Printed Name:	E-mail:			
3)	Address:	Signature	Phone Number:			
	Company Name:	Representative Printed Name:	E-mail:			
4)	Address:	Signature	Phone Number:			
	Company Name:	Representative Printed Name:	E-mail:			
5)	Address:	Signature	Phone Number:			
	Company Name:	Representative Printed Name:	E-mail:			
6)	Address:	Signature	Phone Number:			
	Company Name:	Representative Printed Name:	E-mail:			
7)	Address:	Signature	Phone Number:			
	Company Name:	Representative Printed Name:	E-mail:			
8)	Address:	Signature	Phone Number:			

#### WAIVER AND RELEASE OF LIABILITY

As a participant and by signing this PRE-BID ATTENDANCE SHEET, I hereby waive, release, and indemnify the City of Pembroke Pines, its officers, agents, employees, commission, insurers and volunteers (collectively, the "City") from any and all claims, liability, injury, causes of action, suits, demands and/or damage of whatever kind, (collectively, "Claims") made by myself or any party on my behalf whether caused in whole or in part by any negligence of the City, or otherwise, in connection with my participation in the above-referenced program/activity. I hereby further hold the City harmless from any and all Claims that may be incurred in connection with my participation in the above-referenced site visit for the above mentioned project. By signing this form and as a participant in this PRE-BID MEETING / SITE VISIT, I affirm that I am physically able to participate in the City of Pembroke Pines's PRE-BID MEETING / SITE VISIT. By signing this form I affirm that I am waiving and releasing the Claims described above. This Waiver and Release shall be binding upon myself, and my respective successors, heirs, assigns, executors, administrators, spouse and next of kin. I affirm that I am aware of the current recommendations from the CDC, the State of Florida, Broward County, and the City related to Covid-19 and agree to abide by those recommendations as applicable to any activity related to this site visit.



Frank C. Ortis MAYOR 954-450-1020 fortis@ppines.com

Iris A. Siple
VICE MAYOR
DISTRICT 3
954-450-1030
isiple@ppines.com

Jay D. Schwartz COMMISSIONER DISTRICT 2 954-450-1030 jschwartz@ppines.com

Thomas Good, Jr. COMMISSIONER DISTRICT 1 954-450-1030 tgood@ppines.com

Larissa Chanzes
COMMISSIONER
DISTRICT 4
954-450-1030
Ichanzes@ppines.com

Charles F. Dodge CITY MANAGER 954-450-1040 cdodge@ppines.com

# **NOTICE**

Due to the COVID-19 Coronavirus health alert, bid openings for this project will be live-streamed from the City Clerk's Office, in the City Hall Administration Building, 4th Floor Conference Room located at 601 City Center Way, Pembroke Pines, Florida, 33025 at **2:30 PM on the bid due date.** 

While recognizing the importance of public accessibility to the bid openings, due to COVID-19, in the abundance of caution, the City is requesting that interested parties utilize live streaming as a safe way for vendors and the public to view the bid opening process in lieu of attending the meeting in person, as the City will not be opening up the physical location for public access.

**City offices are closed to the public,** due to the COVID-19 Coronavirus Pandemic, however the public is invited to attend the meeting virtually via the Cisco Webex Meetings platform.

Cisco Webex Meeting Number: 717 019 586
 Join by Phone Number: +1-408-418-9388

The public may download the **Cisco Webex Meetings app** from <a href="https://www.webex.com/downloads.html/">https://www.webex.com/downloads.html/</a>, to view and listen to the meeting, however please make sure to mute your phone/microphone/device's audio and camera as the <a href="public may attend the meeting but will not be allowed to comment or participate in the proceedings.">public may attend the meeting but will not be allowed to comment or participate in the proceedings.</a>

If any member of the public requires additional information about this meeting or has any questions about how to access the meeting, please contact:

Danny Benedit, Procurement Department City of Pembroke Pines 8300 South Palm Drive, Pembroke Pines, FL 33025 954-518-9022 purchasing@ppines.com





Welcome eduncan@ppines.com | Logout

Need assistance? Contact us

Home

Search

Source

**Contracts** 

**Tools** 







#### Vendor view of bid

Chat | Bid Comments | Documents | Attachments | Items | Addendums

Bid #PSUT-20-06 - Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation 🕟 IFB 🚯 🗐

Time Left Bid has ended.

**Bid Started** Jun 23, 2020 7:08:56 PM EDT **Notifications** Report (Bidder Activity)

**Bid Ended** This bid closed on Jul 28, 2020 2:00:00 PM EDT # of suppliers that viewed 116 **(View)** 

**Agency Information** City of Pembroke Pines, FL (view agency's bids) Q & A

Questions & Answers

Questions: 2

Q&A Deadline: Jul 14, 2020 8:30:00 PM EDT

**Bid Classifications Classification Codes** 

**Required Vendor** Qualifications

PP-SWORN, PP-LOCAL, PP-VOSB, PP-DRUGFREE, PP-SCRUTINIZED, PP-W9, PP-VENDORINFO, PP-EQUAL, PP-LBTR

**Bid Regions** Regions

**Bid Contact** see contact information Pre-Bid Conference(s) Jul 7, 2020 9:00:00 AM EDT

Attendance is mandatory

Location: There will be a mandatory scheduled pre-bid meeting on July 7, 2020 at 9:00 a.m. Meeting location will be at the Wastewater Treatment

Facility located at 13955 Pembroke Road, Pembroke Pines, FL 33029.

<u>Transcript</u> Attendance

**Copy Bid** Click here to copy the bid and relist it as a new bid Click here to change the rules for this bid. **View Rules** 

**Best and Final Offer:** Create

#### Approval

View Approval Flow View Approval Flow

**Approval Status** Approved

#### **Bid Comments**

**Contract Duration** One Time Purchase **Contract Renewal** Not Applicable **Prices Good for** 90 days **Budgeted Amount** \$0.00 (change) Expected Expenditure \$1,992,800.00

**Standard Disclaimer** Bids/proposals must be submitted electronically

> Please note vendors should be registered on BidSync under the name of the organization that they are operating as and it should match the organization name on the documents that they are submitting and utilizing when responding to the solicitation.

The vendor must provide the necessary information on the BidSync website and upload all of the requested documents listed in the PROPOSAL REQUIREMENTS section of this solicitation. Unless otherwise specified, the City requests for vendors to upload their documents as one (1) PDF document in the order that is outline in the bid package.

The City recommends for proposers to submit their proposals as soon as they are ready to do so. Please allow ample time to submit your proposals on the BidSync website. Proposals may be modified or withdrawn prior to the deadline for submitting Proposals. BidSync Support is happy to help you with submitting your proposal and to ensure that you are submitting your proposals correctly, but we ask that you contact their support line at 1-800-990-9339 with ample time before the bid closing date and time.

PLEASE DO NOT SUBMIT ANY PROPOSALS VIA MAIL, E-MAIL OR FAX.

However, please note that any required Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked â□□BID SECURITYâ□□ (with the Solicitation Number and Title) and sent to the City of Pembroke Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, FL 33025.

# City of Pembroke Pines, #PSUT-20-06 - Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation

**Bid Comments** 

The City of Pembroke Pines is seeking proposals from qualified firms to furnish all labor, materials, equipment, services and incidentals for the electrical rehabilitation of the effluent pump station located at the Wastewater Treatment Plant, 13955 Pembroke Road, Pembroke Pines, FL 33029.

Documents		Soloet All   So	elect None   Dow	unload Colocted
Documents		Select All   Se	rect None   Dow	mioad Selected
Rehabilitation.pdf [do		2. Attachment A - Contact Information Form		
3. Attachmer	3. Attachment B - Non-Collusive Affidavit [download] 4. Attachment C - Proposers Qualifications Statement [download]			lload]
5. Attachmer	nt D - Sample Insurance Certificate.pdf [download]	6. Attachment E - Specimen Contract.pdf	download]	
7. Mattachmer	☐ 7. ② Attachment F - References Form [download] ☐ 8. ② Attachment G - Standard Release of Lien,pdf [download]			
<b>⊞</b> Attachment H -	⊞			
	9. Addendum 1.pdf [download] Pre Bid Attendance Sheet.pdf [download]			
Addendum # 2				
	ddendum 2,pdf [download]	2. Revised Table of Contents - Addendu	ı <u>m 2.pdf</u> [download	<u>d</u> ]
□ 3. <u>Bi</u>	d Documents – Division 1,23 - Addendum 2.pdf [download]			
☐ 11. 🚮 <u>Notice o</u>	f Virtual Bid Opening,pdf [download]			
		🗐 = Included in Bid Packet	= Excluded f	from Bid Packet
Items				
Item	Title		Offers	
PSUT-20-0601-01	Mobilization/Demobilization		Υ	<u>Info</u>
PSUT-20-0601-02 All Work Associated with the Electrical Rehab of the Effluent Pump Station		Υ	Info	
			<del></del>	
PSUT-20-06-01-03 Cost to provide Insurance		Y	<u>Info</u>	
PSUT-20-0601-04	PSUT-20-0601-04 Cost to Provide Payment and Performance Bond		Υ	<u>Info</u>
Addendum #1 - Made	On Jul 7, 2020 7:15:53 AM EDT			
New Documents	Addendum 1.pdf			
New Bocamenes	/ ddchddii i i pai			
Pre-Bid Conference	Changes Pre-Bid Conference information has changed. Please	e review all Pre-Bid Conferences.		
Addendum #2 - Made	On Jul 15, 2020 10:11:58 AM EDT			
New Documents	Addendum 2.pdf			
new bocaments	Revised Table of Contents - Addendum 2.pdf			
	Bid Documents – Division 1,2 3 - Addendum 2.pdf			
Change Made On Jul 7	7, 2020 2:50:00 PM EDT			
New Documents	Pre Bid Attendance Sheet.pdf			
New Documents	r re bio Atteridance Sneet.pui			
Change Made On Jul 2	23, 2020 6:02:21 PM EDT			
New Documents	Notice of Virtual Bid Opening.pdf			

Contractor Advertisements		View All Ads
	There are no advertisements on this solicitation.	

Questions? Contact a BidSync representative: 800-990-9339 or email: support@bidsync.com

Home Bid Search Bids Orders Tools Support Privacy Logout

Copyright © 1999-2018 - BidSync - All rights reserved.



Welcome eduncan@ppines.com | Logout



Home Search Source Contracts Tools

Go to Bid Information View Printable

# Question and Answers for Bid #PSUT-20-06 - Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation

Create New Question Question Deadline: Jul 14, 2020 8:30:00 PM EDT **Overall Bid Questions** Question 1 Please confirm that an EC license holder can submit a proposal as the prime contractor and that a GC license s not required. (Submitted: Jul 7, 2020 12:09:07 PM EDT) edit Answer Yes, EC license holder can submit a proposal as the prime contractor. The EC is required to hire licensed sub-contractors for work not performed by the EC. (Answered: Jul 14, 2020 10:06:55 AM EDT) Add to Answer: Question 2 The specifications indicate that we are to contact Hillers Engineering for programming of the I&C system. Is this to be carried by the contractor or by the owner since Hillers is the EOR? (Submitted: Jul 14, 2020 2:18:15 PM EDT) III edit Answer By the Contractor. (Answered: Jul 15, 2020 3:00:28 PM EDT) Add to Answer: Submit

Questions? Contact a BidSync representative: 800-990-9339 or email: support@bidsync.com

Home Bid Search Bids Orders Tools Support Privacy Logou

in 🗸 f

Copyright © 1999-2018 - BidSync - All rights reserved.

# **Edwards Electric Corp.**

**Bid Contact Tyrone A Fox** 

tfoxvpeec@aol.com Ph 561-683-7066 Fax 561-683-8115

Address 7231 Southern Blvd., Suite C-2 West Palm Beach, FL 33413

Qualifications PP-DRUGFREE PP-EQUAL PP-LBTR PP-LOCAL PP-SCRUTINIZED PP-SWORN PP-VENDORINFO PP-VOSB

PP-W9

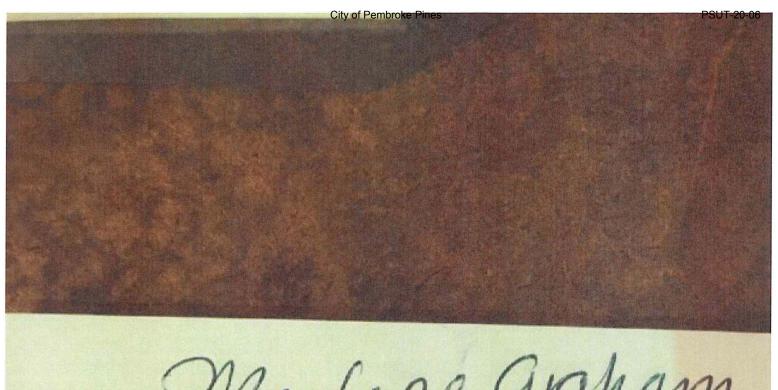
Item#	Line Item	Notes	Unit Price	Qty/Unit		Attch.	Docs
PSUT-20-0601-01	Mobilization/Demobilization	Code: Supplier	First Offer - \$50,000.00	1 / each	\$50,000.00	Y	Y
		Notes: Please see attached copy of Bid Bond delivered to City of Pembroke Pines on 7/14/20.					
PSUT-20-0601-02	All Work Associated with the Electrical Rehab of the Effluent Pump Station	Supplier Product Code:	First Offer - \$1,309,000.00	1 / each	\$1,309,000.00		Y
PSUT-20-0601-03	Cost to provide Insurance	Supplier Product Code:	First Offer - \$46,000.00	1 / each	\$46,000.00		Υ
				1 / each	1.50%		

# Edwards Electric Corp.

Item: Mobilization/Demobilization

# Attachments

20028-bond-071420.pdf



Marlere Graham
Received City Clerk

CIT I CHERONE PINES

20 JUL 14 AM 10: 32

# Edwards Electric Corp.

# LETTER OF TRANSMITTAL

Industrial Electrical Contractors 7231 SOUTHERN BLVD., Suite C-2 WEST PALM BEACH, FLORIDA 33413 Phone 561-683-7066 Fax 561-683-8115 DATE: **July 13, 2020** EST NO. **20028** 

RE: WWTP Effluent Pump Station Electrical Rehabilitation

To: City of Pembroke Pines
City Clerk's Office - 4th Floor
601 City Center Way
Pembroke Pines, FL. 33025

ATTN: WE TRANSMIT: SUBMITTAL DATA SPARE PARTS **RE-SUBMITTAL DATA PLANS** RECORD DRAWINGS **SPECIFICATIONS** O&M'S CONFIRMATION X **CERTIFICATION / TEST DATA BID BOND** COPIES **SPECIFICATION** DESCRIPTION 1.5.5 Proposal Security (Bid Bond) THESE ITEMS ARE HEREBY TRANSMITTED AS CHECKED BELOW: APPROVED AS SUBMITTED SUBMIT FOR APPROVAL RESUBMIT FOR APPROVAL APPROVED AS NOTED X AS REQUIRED **REVISE & RESUBMIT** FOR REVIEW and COMMENT MAKE CORRECTIONS NOTED REMARKS: Bid Security - IFB# PSUT-20-06 Edwards Electric Corp. COPIES:

BY: <u>Cyrone A. Sox</u> Vice President

# **Document A310<sup>TM</sup> - 2010**

Conforms with The American Institute of Architects AIA Document 310

# **Bid Bond**

CONTRACTOR:

(Name, legal status and address)

Edwards Electric Corp. 7231 Southern Boulevard, C-2 West Palm Beach, FL 33413

OWNER:

(Name, legal status and address)

City of Pembroke Pines 601 City Center Way Pembroke Pines, FL 33025 SURETY:

(Name, legal status and principal place of business)

Western Surety Company

151 N. Franklin Street Chicago, IL 60606

**Mailing Address for Notices** 

Same as above

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

(Seal)

**BOND AMOUNT: 5%~** 

Five Percent of Amount Bid

PROJECT:

(Name, location or address, and Project number, if any)

Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation- Project no. PSUT-20-06

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this

28th

day of July, 2020.

(Witness)

Wings Gicelle Palon

Edwards Electric Corp.

(Principal)

(Title)

Western Surety Company

(C. A. H.)

By:

(Title) Charles D. Nielson , Attorney-in-Fact

Surety Phone No. 312-822-5000

# Western Surety Company

# POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Laura D Mosholder, John R Neu, Charles J Nielson, Brett M Rosenhaus, Kevin R Wojtowicz, Mary C Aceves, Charles D Nielson, , David R Hoover, Individually

of Miami Lakes, FL, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

#### - In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 7th day of December, 2016.



WESTERN SURETY COMPANY

Paul T. Bruflat, Vice President

State of South Dakota County of Minnehaha

**s**:

On this 7th day of December, 2016, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires

June 23, 2021



J. Mohr, Notary Public

p. 6

#### CERTIFICATE



WESTERN SURETY COMPANY

J. Nelson, Assistant Sceretary

Form F4280-7-2012

#### **Authorizing By-Law**

# ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the shareholders of the Company.

Section 7. All bonds, policies, undertakings, Powers of Attorney, or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, and Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or agents who shall have authority to issue bonds, policies, or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile.





- e. Proposals by corporations should be executed in the corporate name by the President or other corporate officer accompanied by evidence of authority to sign. The corporate address and state of incorporation must also be shown.
- f. Proposals by partnerships should be executed in the partnership name and signed by a partner whose title and the official address of the partnership must be shown.

#### 1.5.2 Attachment B: Non-Collusive Affidavit

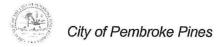
# 1.5.3 Attachment C: Proposer's Qualifications Statement

#### 1.5.4 Attachment F: References Form

a. Complete Attachment F: References Form, preferably where the team was the same. References should be from the last five years and should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. As part of the proposal evaluation process, the City may conduct an investigation of references, including a record check or consumer affairs complaints. Proposers' submission of a proposal constitutes acknowledgment of the process and consent to investigate. The City is the sole judge in determining Proposers qualifications.

# 1.5.5 Proposal Security (Bid Bond Form or Cashier's Check)

- a. Each Proposal should be accompanied by a certified or cashier's check or by a Bid Bond made payable to the City of Pembroke Pines on an approved form, duly executed by the Proposer as principal and having as surety thereon a surety company acceptable to CITY and authorized to write such Bond under the laws of the State of Florida, in an amount not less than five percent (5%) of the amount of the base Proposal price.
- b. Contingency is not to be counted in the total amount the proposal security is based on.
- c. Proposers must submit a scanned copy of their bid security (bid bond form or cashier's check) with their bid submittal through BidSync.
- d. Proposers should also submit their original bid security (bid bond form or cashier's check) at time of the bid due date, or they may be deemed as nonresponsive.
- e. The original Bid Bond or Cashier's Check should be in a sealed envelope, plainly marked "BID SECURITY IFB # PSUT-20-06 Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation" and sent to the City of



Pembroke Pines, City Clerk's Office, 4th Floor, 601 City Center Way, Pembroke Pines, Florida, 33025.

f. Please see SECTION 4 - SPECIAL TERMS & CONDITIONS of this IFB for additional information.

# 1.6 VENDOR REGISTRATION AND QUALIFICATION DOCUMENTS

The City has implemented a new process that is intended to make the bidding process easier for vendors that bid on multiple City projects. This process will require vendors to complete and submit the following standard forms and documents at any time prior to bidding on a project. In addition, the vendors will be able to utilize these same forms without the need to re-fill and resubmit the forms each time they bid on a City project.

Furthermore, please make sure to update this information on an as-needed basis so that all pertinent information is accurate, such as local business tax receipts, and any other relevant information.

These forms will be found under the "Vendor Registration" group of "Qualifications" on the BidSync website for the City of Pembroke Pines. Please note that the BidSync website requires bidders to complete all of these qualifications prior to being able to submit questions on any bids, therefore, please make sure to complete this information as soon as possible.

The following documents can be completed prior to the bidding process through the BidSync website and do not need to be attached to your submittal as the BidSync website will automatically include it.

# 1.6.1 Vendor Information Form

# 1.6.2 Form W-9 (Rev. October 2018)

a. Previously dated versions of this form will delay the processing of any payments to the selected vendor.

# 1.6.3 Sworn Statement on Public Entity Crimes Form

# 1.6.4 Local Vendor Preference Certification

- a. If claiming Local Pembroke Pines Vendor Preference, business must attach a current business tax receipt from the City of Pembroke Pines
- b. If claiming Local Broward County Vendor Preference, business must attach a current business tax receipt from Broward County or the city within Broward County where the business resides.

p. 9

# Supplier: Edwards Electric Corp.

# **CONTACT INFORMATION FORM**

IN ACCORDANCE WITH PSUT-20-06 titled "Wastewater Treatment Plant Effluent Pump Station Electrical Rehabilitation" attached hereto as a part hereof, the undersigned submits the following:

# A) Contact Information

The Contact information form shall be electronically signed by one duly authorized to do so, and in case signed by a deputy or subordinate, the principal's properly written authority to such deputy or subordinate must accompany the proposal. This form must be completed and submitted through www.bidsync.com as part of the bidder's submittal. The vendor must provide their pricing through the designated lines items listed on the BidSync website.

# **COMPANY INFORMATION:**

**COMPANY: Edwards Electric Corp.** 

STREET ADDRESS: 7231 Southern Blvd., Suite C-2

CITY, STATE & ZIP CODE: West Palm Beach, FL. 33413

# PRIMARY CONTACT FOR THE PROJECT:

NAME: Tyrone A. Fox TITLE: Vice President

E-MAIL: tfoxvpeec@aol.com

TELEPHONE: 5616837066 FAX: 5616838115

# **AUTHORIZED APPROVER:**

NAME: Tyrone A. Fox TITLE: Vice President

E-MAIL: tfoxvpeec@aol.com

TELEPHONE: 5616837066 FAX: 5616838115

SIGNATURE: dodger11

# B) Proposal Checklist

Did you make sure to submit the following items, as stated in section 1.5 "Proposal Requirements" of the bid package?

Attachment A - Contact Information Form	Yes 🗹
Attachment B - Non-Collusive Affidavit	Yes 🗹
Attachment C - Proposer's Completed Qualification Statement	Yes 🗹
Attachment F - References Form	Yes 🗹

Did you make sure to update the following documents found under the "Vendor Registration" group of "Qualifications" on the BidSync website for the City of Pembroke Pines?

Vendor Information Form	Yes 🗹
Form W-9 (Rev. October 2018)	Yes 🗹
Sworn Statement on Public Entity Crimes Form	Yes 🗹
Local Vendor Preference Certification	Yes 🗹
Local Business Tax Receipts	Yes 🗹
Veteran Owned Small Business Preference Certification	Yes 🗹
Equal Benefits Certification Form	Yes 🗹
Vendor Drug-Free Workplace Certification Form	Yes 🗹
Scrutinized Company Certification	Yes 🗹

# C) Sample Proposal Form

The following sample price proposal is for information only. The vendor must provide their pricing through the designated lines items listed on the BidSync website.

# **Base Option:**

Item #	Item Description	Total Cost
1)	Mobilization/Demobilization	<b>Price to be Submitted</b>
		Via BidSync
2)	All Work Associated with the Electrical Rehabilitation of the Effluent Pump Station including, but not limited to, all general appurtenances; electrical systems; equipment; modifications to existing electrical and instrumentation and control systems; temporary systems; testing; startup services; site investigations; site restoration; construction sequencing requirements; preparation and submittal of shop drawings; and other related work required, but not necessarily defined, for a complete and operable system in	Price to be Submitted Via BidSync
2)	accordance with the Contract Documents.  Cost to provide Insurance	Price to be Submitted
3)	Cost to provide insurance	Via BidSync
4)	Additional Cost to provide a Payment & Performance Bond in the form of a <b>Percent</b> of the total contract	Price to be Submitted Via BidSync
	amount.	

# Supplier: Edwards Electric Corp.



Attachment B

# **NON-COLLUSIVE AFFIDAVIT**

BIDDER is the **Officer**,

(Owner, Partner, Officer, Representative or Agent)

BIDDER is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

Such Bid is genuine and is not a collusive or sham Bid;

Neither the said BIDDER nor any of its officers, partners, owners, agents, representative, employees or parties in interest, including this affidavit, have in any way colluded, conspired, connived or agreed, directly or indirectly, with any other BIDDER, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted; or to refrain from bidding in connection with such Contract; or have in any manner, directly or indirectly, sought by agreement or collusion, or communications, or conference with any BIDDER, firm, or person to fix the price or prices in the attached Bid or any other BIDDER, or to fix any overhead, profit, or cost element of the Bid Price or the Bid Price of any other BIDDER, or to secure through any collusion conspiracy, connivance, or unlawful agreement any advantage against (Recipient), or any person interested in the proposed Contract;

The price of items quoted in the attached Bid are fair and proper and are not tainted by collusion, conspiracy, connivance, or unlawful agreement on the part of the BIDDER or any other of its agents, representatives, owners, employees or parties in interest, including this affidavit.

Printed Name/Signature Tyrone A. Fox

Title Vice President

Name of Company Edwards Electric Corp.

# Supplier: Edwards Electric Corp.



Attachment C

# PROPOSER'S QUALIFICATIONS STATEMENT

PROPOSER shall furnish the following information. Failure to comply with this requirement will render Bid non-responsive and shall cause its rejection. Additional sheets shall be attached as required.

PROPOSER'S Name and Principal Address:

Edwards Electric Corp. 7231 Southern Blvd, Suite C-2 West Palm Beach, FL. 33413

PROPOSER'S License Number: EC-0001100

(Please attach certificate of status, competency, and/or state registration.)

Number of years your organization has been in business 58

State the number of years your firm has been in business under your present business name 58

State the number of years your firm has been in business in the work specific to this solicitation: 58

Names and titles of all officers, partners or individuals doing business under trade name:

Kenneth L. Groves - President Tyrone A. Fox - Vice President Daniel Hayward - Vice President

IF USING A FICTITIOUS NAME, SUBMIT EVIDENCE OF COMPLIANCE WITH FLORIDA FICTITIOUS NAME STATUTE.

Under what former name has your business operated? Include a description of the business. Failure to include such information shall be deemed to be intentional misrepresentation by the City and shall render the proposer non-responsive.

**NONE** 

At what address was that business located?

N/A

Name, address, and telephone number of surety company and agent who will provide the required bonds on this contract:

Nielson, Hoover & Associates 8000 Governors Square Blvd., Suite 101 Miami Lakes, FL. 33016 305-722-2663

Have you ever failed to complete work awarded to you. If so, when, where and why?

NO

Have you personally inspected the proposed WORK and do you have a complete plan for its performance? **YES** 

Will you subcontract any part of this WORK? If so, give details including a list of each sub-contractor(s) that will perform work in excess of ten percent (10%) of the contract amount and the work that will be performed by each subcontractor(s).

#### NONE

The foregoing list of subcontractor(s) may not be amended after award of the contract without the prior written approval of the Contract Administrator, whose approval shall not be reasonably withheld.

List and describe all bankruptcy petitions (voluntary or involuntary) which have been filed by or against the Proposer, its parent or subsidiaries or predecessor organizations during the past five (5) years. Include in the description the disposition of each such petition.

# **NONE**

List and describe all successful Bond claims made to your surety (ies) during the last five (5) years. The list and descriptions should include claims against the bond of the Proposer and its predecessor organization(s).

#### NONE

List all claims, arbitrations, administrative hearings and lawsuits brought by or against the Proposer or its predecessor organizations(s) during the last (10) years. The list shall include all case names; case, arbitration or hearing identification numbers; the name of the project over which the dispute arose; and a description of the subject matter of the dispute.

# **NONE**

List and describe all criminal proceedings or hearings concerning business related offenses in which the Proposer, its principals or officers or predecessor organization(s) were defendants.

# **NONE**

Are you an Original provider sales representative distributor, broker, manufacturer other, of the commodities/services proposed upon? If other than the original provider, explain below.

# **Original Provider**

Have you ever been debarred or suspended from doing business with any governmental agency? If yes, please explain:

# NO

Describe the firm's local experience/nature of service with contracts of similar size and complexity, it the previous three (3) years:

1. Project Name: Sawgrass Wastewater Treatment Plant Reuse / EEC Job No.891

**Contract Amount: \$ 2,375,000** 

Owner: City of Sunrise / Phone No. 954-746-6000

Consultant Engineer: Brown and Caldwell / Phone No. 954-200-7615

Owner Contact: Mike Brandao / Cardinal Contractors / Phone No. 561-809-1285

Description of Project: Furnish and install electrical equipment rated for 480V power supply.

**Date Completed: September / 2018** 

2. Project Name: Pump Station 106 Upgrade / EEC Job No.900

Contract Amount: \$ 683,055

Owner: City of Hialeah / Phone No. 305-883-5800

Consultant Engineer: Hazen and Sawyer / Phone No. 305-443-4001

Owner Contact: Mike Graham / Kiewit Infrastructure South Co. / Phone No. 786-229-4589 Description of Project: Furnish and install electrical equipment rated for 480V power supply.

Date Completed: March / 2019

3. Project Name: Largo WWRF / EEC Job No.906

**Contract Amount: \$ 6,362,663** 

Owner: City of Largo / Phone No. 727-587-6700

Consultant Engineer: Bailey Engineering / Phone No. 954-448-7930

Owner Contact: Scott Woodrow / Kiewit Infrastructure South Co. / Phone No. 704-512-8699 Description of Project: Furnish and install electrical equipment rated for 480V power supply.

**Date Started: February / 2019** 

4. Project Name: Wellington WWTF / EEC Job No.910

**Contract Amount: \$ 2,587,216** 

Owner: Village of Wellington / Phone No. 561-791-4000

Consultant Engineer: Kimley-Horn / Phone No. 561-845-0665

Owner Contact: Greg Williams / Wharton-Smith / Phone No. 561-345-1858

Description of Project: Furnish and install electrical equipment rated for 480V power supply.

Date Started: June / 2019

7/27/20 EEC

**CURRENT JOB LIST** 

#### EEC JOB NO. JOB NAME GC ENGINEER

891 Sawgrass WWTP Reuse Cardinal Brown and Caldwell

896 Southern Blvd. Bridge Johnson Bros. AECOM

905 Andrews Ave Bridge Kiewit Hardesty & Hanover

906 Largo WWRF Kiewit Bailey Engineering

910 Wellington WWTF Wharton-Smith Kimley Horn

911 Brickell Ave Bridge Seacoast Transvstems

912 Pump Station 221 RF Environmental CDM Smith

913 PBC WTP 3,9 & 11 Cardinal Calvin Giordano

914 PBC WTP 8 Cardinal Calvin Giordano

915 SFWMD S-40, S-41 & S-44 Harry Pepper R.J. Behar & Co.

916 Loxahatchee Bridge Scott Bridge TranSystems Corp.

917 PBC SRWRF Blowers Cardinal Calvin Giordano

The PROPOSER acknowledges and understands that the information contained in response to this Qualification Statement shall be relied upon by CITY in awarding the contract and such information is warranted by PROPOSER to be true. The discovery of any omission or misstatement that materially affects the PROPOSER's qualifications to perform under the contract shall cause the CITY to reject the Bid, and if after the award, to cancel and terminate the award and/or contract.

Edwards Electric Corp. (Company Name)

**Tyrone A. Fox** (Printed Name/Signature)

# Supplier: Edwards Electric Corp.

# **REFERENCES FORM**

Provide specific examples of similar contracts. References should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. This form should be duplicated for each reference and any additional information that would be helpful can be attached.

**Reference Contact Information:** 

Name of Firm, City, County or Agency: Cardinal Contractors

Address: 10405 Technology Terrace

City/State/Zip: Lakewood Ranch, FL. 34211

Contact Name: Mike Brandao Title: Vice President

E-Mail Address: mbrandao@prim.com

Telephone: 561-809-1285 Fax: 941-377-8542

**Project Information:** 

Name of Contractor Performing the work: **Edwards Electric Corp.** 

Name and location of the project: Sawgrass WWTP Reuse

14150 NW 8TH Street Sunrise, FL. 33325

Nature of the firm's responsibility on the project: **Electrical Subcontractor** 

Project duration: 639 Days Completion (Anticipated) Date: Sept / 2018

Size of project: Cost of project: 2,375,000

Work for which staff was responsible: Furnish and install labor, materials, tools and equipment for the electrical work generally described on the Electrical Drawings and defined in Division 16.

Contract Type: **Subcontract** 

The results/deliverables of the project: Complete

# **REFERENCES FORM**

Provide specific examples of similar contracts. References should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. This form should be duplicated for each reference and any additional information that would be helpful can be attached.

**Reference Contact Information:** 

Name of Firm, City, County or Agency: Kiewit Infrastructure South Inc.

Address: 444 Brickell Ave

City/State/Zip: Miami, FL. 33131

Contact Name: Scott Woodrow Title: Project Manager

E-Mail Address: **Scott.Woodrow@kiewit.com** 

Telephone: **704-512-8699** Fax:

**Project Information:** 

Name of Contractor Performing the work: Edwards Electric Corp.

Name and location of the project: Largo Wastewater Reclamation Facility

5100 150th Ave North Clearwater, FL. 33760

Nature of the firm's responsibility on the project: **Electrical Subcontractor** 

Project duration: 660 Days Completion (Anticipated) Date: Oct / 2020

Size of project: Cost of project: 6,362,663

Work for which staff was responsible: Furnish and install labor, materials, tools and equipment for the electrical work generally described on the Electrical Drawings and defined in Division 16.

Contract Type: Subcontract

The results/deliverables of the project: Completion Scheduled for Oct / 2020

# REFERENCES FORM

Provide specific examples of similar contracts. References should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. This form should be duplicated for each reference and any additional information that would be helpful can be attached.

**Reference Contact Information:** 

Name of Firm, City, County or Agency: **Kiewit Infrastructure South Inc.** 

Address: **450 Dividend Drive** 

City/State/Zip: Peachtree City, GA 30269

Contact Name: Mike Graham Title: Vice President

E-Mail Address: Mike.Graham@kiewit.com

Telephone: 786-229-4589 Fax: 770-487-0005

**Project Information:** 

Name of Contractor Performing the work: Edwards Electric Corp.

Name and location of the project: Pump Station 106 Upgrade

3400 West 10th Ave Hialeah, FL 33012

Nature of the firm's responsibility on the project: Electrical Subcontractor

Project duration: 270 Days Completion (Anticipated) Date: March / 2019

Size of project: Cost of project: 683,055

Work for which staff was responsible: Furnish and install labor, materials, tools and equipment for the electrical work generally described on the Electrical Drawings and defined in Division 16.

Contract Type: Subcontract

The results/deliverables of the project: Complete

# REFERENCES FORM

Provide specific examples of similar contracts. References should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. This form should be duplicated for each reference and any additional information that would be helpful can be attached.

**Reference Contact Information:** 

Name of Firm, City, County or Agency: Wharton-Smith

Address: 125 W. Indiantown Road, Suite 201

City/State/Zip: Jupiter, FL. 33458

Contact Name: Greg Williams Title: Vice President

E-Mail Address: gwilliams@whartonsmith.com

Telephone: 561-748-5956 Fax: 561-748-5958

**Project Information:** 

Name of Contractor Performing the work: Edwards Electric Corp.

Name and location of the project: Wellington Wastewater Treatment Facility

11860 Pierson Road Wellington, FL. 33414

Nature of the firm's responsibility on the project: **Electrical Subcontractor** 

Project duration: 600 Days Completion (Anticipated) Date: Dec / 2020

Size of project: Cost of project: 2,587,216

Work for which staff was responsible: Furnish and install labor, materials, tools and equipment for the electrical work generally described on the Electrical Drawings and defined in Division 16.

Contract Type: **Subcontract** 

The results/deliverables of the project: Completion Scheduled for Dec / 2020

#### REFERENCES FORM

Provide specific examples of similar contracts. References should be capable of explaining and confirming your firm's capacity to successfully complete the scope of work outlined herein. This form should be duplicated for each reference and any additional information that would be helpful can be attached.

#### **Reference Contact Information:**

Name of Firm, City, County or Agency: RF Environmental Services, Inc.

Address: 4840 NE 11th Ave

City/State/Zip: Oakland Park, FL. 3334

Contact Name: Thad Buckley Title: President

E-Mail Address: thad@rfeswater.com

Telephone: 954-605-6711 Fax:

# **Project Information:**

Name of Contractor Performing the work: Edwards Electric Corp.

Name and location of the project: Broward County Master Pump Station 221

**1961 NE 48TH Street** 

Pompano Beach, FL. 33064

Nature of the firm's responsibility on the project: Electrical Subcontractor

Project duration: 420 Days Completion (Anticipated) Date: Oct / 2020

Size of project: Cost of project: 412,500

Work for which staff was responsible: Furnish and install labor, materials, tools and equipment for the electrical work generally described on the Electrical Drawings and defined in Division 16.

Contract Type: **Subcontract** 

The results/deliverables of the project: Completion Scheduled for Dec / 2020