



FLORIDA DEPARTMENT OF VETERANS' AFFAIRS

Honoring those who served U.S.

**STATE OF FLORIDA
DEPARTMENT OF VETERANS' AFFAIRS**

INVITATION TO BID (ITB)

**FDVA-ITB-20-006B
"POWER SYSTEM AUTOMATION"**

SUBMIT ALL INQUIRIES IN WRITING TO:

**NICK SCIRE, FCCM
PURCHASING ANALYST
FLORIDA DEPARTMENT OF VETERANS' AFFAIRS
MARY GRIZZLE STATE OFFICE BUILDING
11351 ULMERTON ROAD, SUITE 311-K
LARGO, FLORIDA 33778-1630**

EMAIL: PURCHASINGLARGO@FDVA.STATE.FL.US



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**SECTION 'I'
 INTRODUCTION**

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1. Issuing Office.

a) The sole points of contact with the Florida Department of Veterans' Affairs (FDVA), for purposes of this solicitation, are the Contracting Administrator or Purchasing Officer as identified below:

Primary Contact	Alternate Contact
Nick Scire Purchasing Analyst, FCCM Mary Grizzle State Office Building Florida Department of Veterans' Affairs 11351 Ulmerton Road, Suite 311-K Largo, FL 33778-1630 Telephone: (727) 518-3202, Ext. 5558 E-mail: PurchasingLargo@FDVA.STATE.FL.US	Scott Gerke Purchasing Officer Mary Grizzle State Office Building Florida Department of Veterans' Affairs 11351 Ulmerton Road, Suite 311-K Largo, FL 33778-1630 Telephone: (727) 518-3202, Ext. 5557 E-mail: PurchasingLargo@FDVA.STATE.FL.US

b) Respondents to this solicitation or persons acting on their behalf may not contact, between the release of the solicitation and the end of the 72-hour period following the agency posting the notice of intended award, excluding Saturdays, Sundays, and state holidays, any employee or officer of the executive or legislative branch concerning any aspect of this solicitation, except in writing to the procurement officer or as provided in the solicitation documents. Violation of this provision may be grounds for rejecting a response. FDVA shall not be bound by any information from whatever source that is not expressly contained within this solicitation and any issued addendum.

2. Purpose and Scope. FDVA invites interested Contractors to submit bids in accordance with this solicitation. The purpose of this solicitation is to establish an Agreement for Contractor provision of all vehicles, trailers, storage containers, dumpsters, labor, services, equipment, tools, materials, parts, and supplies required for the Power System Automation for the Baldomero Lopez State Veterans' Nursing Home, located at 6919 Parkway Blvd, Land O' Lakes Florida 34639. (Pasco County) For further details, see Section III "Statement of Work".

FDVA anticipates that the Agreement shall commence on Wednesday September, 25th 2019, with no renewals. FDVA requires specified services to be completed to the full satisfaction and acceptance of FDVA and any applicable authorities having jurisdiction, within one-hundred-twenty calendar days (120) from the date of Agreement's full execution.

3. Mandatory Pre-Bid Meeting and On-Site Visit. A mandatory pre-bid meeting and on-site visit will be held at the location, date, and time specified below. Contractor failure to attend this mandatory pre-bid meeting and on-site visit shall disqualify Contractor from submitting a bid and any consideration. This

opportunity allows Contractors to tour the site, ask questions, and seek clarifications about this solicitation. Drawings will be available at the mandatory pre-bid meeting and on-site visit. FDVA may answer questions at the mandatory pre-bid meeting and on-site visit or defer them to a later date as identified in the Timeline below.

This will be the only on-site visit conducted and allowed for this solicitation. Contractors are encouraged to invite knowledgeable representatives from all anticipated sub-contractors to attend the mandatory pre-bid meeting and on-site visit. Each Contractor bidding must satisfy themselves as to the exact nature and existing conditions of the site and the requirements of this solicitation. Failure to do so will not relieve the successful Contractor of its obligation to carry out the provisions of the executed Agreement.

**Location: Baldomero Lopez State Veterans' Nursing Home
 6919 Parkway Blvd
 Land O' Lakes, FL 34639 (Pasco County)**

Date and Start Time: Thursday, August 29th, 2019, at 10:00 AM (local time)

Check In/Sign In: Home's Front Entrance Reception Desk

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in public meetings related to this solicitation is asked to advise FDVA at least five (5) business days before the meeting by contacting the FDVA Primary Contact at the email address provided above. If you are hearing or speech impaired, please contact Florida Relay Services at 1-800-955-8771 (TDD) or 1-800-955-8770 (Voice).

4. Timeline. It is the Contractors responsibility to monitor the State of Florida Vendor Bid System (VBS) for any updates or changes regarding this solicitation. The below dates and times are subject to change without notice:

EVENT	EVENT DATE
Issue Invitation To Bid (ITB).	Tuesday, August 13th, 2019
Mandatory Pre-Bid Meeting and On-Site Visit (<u>Begin 10:00 AM Local Time</u>).	Thursday, August 29th, 2019
Respondents Written Questions Due (<u>By 3:00 PM Local Time</u>).	Friday, August 30th, 2019
"Anticipated" Posting of FDVA Response to Respondent Questions.	Wednesday, September 4th, 2019
Bid Due Date/Time and Opening (<u>By 3:00 PM Local Time</u>).	Friday, September 13th, 2019
"Anticipated" Posting of FDVA Notice of Intent to Award.	Wednesday, September 18th, 2019
"Anticipated" Execution of Agreement / Contract Commencement	Wednesday, September 25th, 2019

5. Public Meeting Agendas.

- a) Mandatory Pre-Bid Meeting and Onsite Visit (Reference above "Timeline"):
 - 1) Opening Remarks and Introductions.
 - 2) Overview of Solicitation.
 - 3) Question and Answer.
 - 4) On-Site Visit.
 - 5) Question and Answer.
 - 6) Public Comment Opportunity.
 - 7) Closing Remarks and Adjournment.
- b) Bid Opening Meeting (Reference above "Timeline"):
 - 1) Opening Remarks and Introductions.
 - 2) Bid Opening and Tabulation (Announcement of Company Name and Total Bid Price).
 - 3) Public Comment Opportunity.
 - 4) Closing Remarks and Adjournment.

6. Terms and Conditions.

- a) The State of Florida's General Contract Conditions are outlined in Form PUR 1000, which is a downloadable document incorporated into this Invitation to Bid (ITB) by reference. Any terms and conditions set forth in this ITB document take precedence over Form PUR 1000 where applicable. https://www.dms.myflorida.com/content/download/2933/11777/PUR_1000.pdf
- b) The State of Florida's General Instructions to Respondents are outlined in Form PUR 1001, which is a downloadable document incorporated into this Invitation to Bid (ITB) by reference. Any terms and conditions set forth in this ITB document take precedence over Form PUR 1001 where applicable. https://www.dms.myflorida.com/content/download/2934/11780/PUR_1001.pdf

If you are unable to access Forms PUR 1000 or PUR 1001, you may contact the FDVA Primary Contact at the email address provided above to obtain a copy of these documents. If you are hearing or speech impaired, please contact Florida Relay Services at 1-800-955-8771 (TDD) or 1-800-955-8770 (Voice).

7. **Protest.** Any protest concerning this solicitation shall be made in accordance with Section 120.57(3) and 287.042(2), Florida Statutes and Chapter 28-110 of the Florida Administrative Code. Questions to FDVA Primary or Alternate Contact shall not constitute formal notice of a protest. It is FDVA intent to ensure that specifications are written to obtain the best value for the State of Florida, ensure competitiveness, fairness, necessity and reasonableness in the solicitation process, and meet FDVA requirements.
 - a) Section 120.57(3)(b), Florida Statutes and Section 28-110.003, Florida Administrative Code: Requires that a notice of protest of the solicitation documents shall be made within seventy-two hours after the posting of the solicitation.
 - b) Section 120.57(3)(a), Florida Statutes: Requires the following statement to be included in the solicitation: "Failure to file a protest within the time prescribed in Section 120.57(3), Florida Statutes, shall constitute a waiver of proceedings under Chapter 120, Florida Statutes".
 - c) Section 28-110.005, Florida Administrative Code: Requires the following statement to be included in the solicitation: "Failure to file a protest within the time prescribed in Section 120.57(3), Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under Chapter 120, Florida Statutes".

Any protest concerning FDVA decision must be timely received by FDVA Agency Clerk at: Florida Department of Veterans' Affairs, Office of the General Counsel - Agency Clerk, The Capitol, Suite 2105, 400 South Monroe Street, Tallahassee, FL 32399-0001.

SECTION "II"
RESPONDENT INSTRUCTIONS**CONTENTS:**

- 1. Cost Incurred.**
- 2. Respondent Registration.**
- 3. Florida Secretary of State Registration.**
- 4. Form W-9 Requirement.**
- 5. State of Florida Vendor Bid System (VBS).**
- 6. Florida Veteran Business Enterprise Opportunity Act.**
- 7. Certified Minority Business Enterprises (CMBE).**
- 8. Respondent Questions and FDVA Addendum.**
- 9. Qualifications.**
- 10. Bid Guidelines.**
- 11. Sealed Bid.**
- 12. Submission of Bid.**
- 13. Withdrawal of Bid.**
- 14. Modification of Bid.**
- 15. Bid Opening.**
- 16. Rights of FDVA.**

1. Cost Incurred. All expenses involved with Respondent preparation and submission of its bid to FDVA, or any work performed in connection therewith, shall be born solely by the Respondent. No payment will be made for any bids received, or for any other effort required of, or made by Respondent or the successful Contractor.

2. Respondent Registration. Respondent must be fully registered with the State of Florida's "My Florida Market Place" procurement system by the bid opening due date and time as provided in the Timeline. Respondent must register on-line at website <https://vendor.myfloridamarketplace.com>. Respondent failure to do so may result in the Respondent being considered non-responsive and prevent the awarded Contractor from transacting any business with FDVA. For assistance, Respondent shall contact the State of Florida Vendor Help Desk at 866-352-3776.

3. Florida Secretary of State Registration. Respondent, whether a domestic or foreign entity, must register with the Florida Secretary of State (Florida Department of State, Division of Corporations), as well as secure and include its certificate of authority with its sealed submitted bid, by the bid opening due date and time as provided in the Timeline. Respondent failure to do so may result in the Respondent being considered non-responsive. Further, awarded Contractor must maintain its registration and certificate of authority with the Florida Secretary of State (Department of State, Division of Corporations) for the life of the Agreement. Failure to do so will prevent the awarded Contractor from transacting any business with FDVA. For assistance, Respondent shall access the Florida Department of State, Division of Corporations website <http://search.sunbiz.org>.

4. Form W-9 Requirement. Respondent must register and submit its electronic Form W-9 to the State of Florida Department of Financial Services (DFS). Respondent failure to do so, by the bid opening due date and time as provided in the Timeline, may result in the Respondent being considered non-responsive and prevent the awarded Contractor from transacting any business with FDVA. The Internal Revenue Service (IRS) receives and validates all Respondent Form W-9 information. To view compliance instructions and submit Form W-9, Respondent must access website <https://flvendor.myfloridacfo.com/>. For assistance, Respondent shall contact the State of Florida Vendor Form W-9 Help Desk at 850-413-5519.

5. State of Florida Vendor Bid System (VBS). Respondent must register on-line via <http://www.myflorida.com/apps/vbs>, for electronic notification of solicitations from the State of Florida's

Vendor Bid System (VBS). Respondent failure to do so may result in the Respondent being considered non-responsive. The State of Florida and FDVA are not under any obligation and do not guarantee that vendors will receive electronic notifications concerning the posting of notices, addendum, intent to award; as well as withdrawal, cancellation, or close of solicitations. Vendors are solely responsible for monitoring the State of Florida Vendor Bid System (VBS) for new or changing information concerning solicitations. For assistance, Respondent shall contact the State of Florida Vendor Help Desk at 866-352-3776 or via email address vendorhelp@myflorida.com.

6. Florida Veteran Business Enterprise Opportunity Act. In accordance with the Florida Veteran Business Enterprise Opportunity Act, Section 295.187, Florida Statutes, a state agency, when considering two or more bids for the procurement of commodities or contractual services, at least one of which is from a certified veteran business enterprise, which are equal with respect to all relevant considerations, including price, quality, and service, shall award such procurement or contract to the certified veteran business enterprise. Notwithstanding Section 287.057(11), Florida Statutes, if a veteran business enterprise entitled to the vendor preference under this section and one or more businesses entitled to this preference or another vendor preference provided by law submit bids for procurement of commodities or contractual services which are equal with respect to all relevant considerations, including price, quality, and service, the state agency shall award the procurement or contract to the business having the smallest net worth. Information on certification procedures for vendor preference programs is available from the Office of Supplier Diversity (OSD) website <http://osd.dms.state.fl.us>, by phone at 850-487-0915, or via email at OSDHelp@dms.myflorida.com.

7. Certified Minority Business Enterprises (CMBE). Respondents are encouraged to seek the participation of certified minority business enterprises (CMBE). Information on CMBE procedures and programs is available online from the Office of Supplier Diversity (OSD) website <http://osd.dms.state.fl.us> by phone at 850-487-0915 or via email at OSDHelp@dms.myflorida.com.

8. Respondent Questions and FDVA Addendum. No negotiations, decisions, or actions will be initiated or executed by a Respondent as a result of oral discussions with any FDVA or State of Florida employee. Only Respondent written questions, which are signed by persons authorized to contractually bind the Respondent, will be recognized by FDVA as duly authorized expression on behalf of the Respondent. Respondent written questions must be submitted via email (in e-mail body or attached MS Word document), by the deadline as provided in the solicitation's Timeline, to the Primary Contact Person in Section I of this solicitation. FDVA reserves the right to issue addendum(s) to solicitations, only those communications will be considered as a duly authorized expression on behalf of FDVA. Addendum(s) will contain FDVA clarifications or responses to Respondent questions, as well as details that identify formal changes to the solicitation. In accordance with the solicitation's Timeline, FDVA addendum shall be published on the State of Florida Vendor Bid System (VBS). If no written inquiries are submitted by a Respondent, all conditions and requirements specified within the solicitation shall be deemed accepted and understood by the Respondent. Each Respondent is solely responsible for monitoring the State of Florida Vendor Bid System (VBS) for new or changing information concerning all solicitations.

9. Qualifications. Award of the Agreement, in all respects of this solicitation and any issued addendum, shall be made to the Respondent whose bid is determined to be the lowest responsive, responsible bid, a determination that shall be made solely at the discretion of FDVA. The Respondent affirms and declares that Respondent has:

- a) The capacity to do business within the State of Florida.
- b) The necessary abilities, staff, experience, facilities, equipment, materials, and financial resources, at the present time, to complete the requirements of the Agreement in a satisfactory manner and within the required time.
- c) All federal, state and local registrations, licenses, certifications, and permits legally required to perform and complete the services as called for herein; including but not limited to any other related agreements.

- d) The intention, commitment, and means to comply with all federal, state and local codes, laws, ordinances, rules, regulations, guidelines, and requirements that could affect the provision of required services in any manner.
- e) No arrearage to the State of Florida upon debt or Agreement, nor default as surety or otherwise, upon any obligation to the State of Florida.
- f) Present good standing with the State of Florida and is not on the state's lists of ineligible contractors.
- g) No member, officer, or employee of FDVA who during his or her tenure or for two (2) years thereafter shall have any interest, direct or indirect, in the Agreement or the proceeds thereof.
- h) Respondent is of lawful age and that no other person, contractor, or corporation has any interest in the bids or Agreement proposed to be entered into.
- i) Respondent has thoroughly examined all available drawings and specifications, schedules, instructions, the solicitation, and addendum; as well as made all investigations necessary to thoroughly inform themselves regarding facilities for delivery of services as required by the solicitation. No plea of ignorance by the Respondent of conditions that exist, or that may hereafter exist as a result of failure or omission on the part of the Respondent to make the necessary examinations and investigations, or failure to fulfill in every detail the requirements of the solicitation, will be accepted as a basis for varying the requirements of FDVA or compensation to the successful Contractor.

10. Bid Guidelines. Respondent's bid must follow the format, structure, and sequence as required by this solicitation.

- a) Respondents are advised that all FDVA solicitations and agreements are subject to all legal requirements as provided under Florida law.
- b) Respondents are advised that exceptions to any terms or conditions contained in this solicitation must be identified in its written questions and submitted via email (by the deadline as provided in the Timeline; to the Primary Contact Person specified in Section 1 of this solicitation). Failure to do so may lead FDVA to declare any such term or condition as non-negotiable. Respondent's desire to take exception to a non-negotiable term will not disqualify it from consideration for award.
- c) If no request for clarification is submitted by Respondent, all conditions and requirements specified within the Agreement shall be deemed accepted and understood by Respondent.
- d) FDVA objects to and shall not consider any additional terms or conditions submitted by a Respondent, including any appearing in documents attached as part of a Respondent's bid. In submitting its bid, a Respondent agrees that any additional terms or conditions, whether submitted intentionally or inadvertently, shall have no force or effect.
- e) Prices shall be Respondent net, delivered prices, F.O.B. Destination. All pricing must be in United States dollars (i.e. \$1.00, USD). FDVA does not pay local, state, or federal taxes; including recovery fees, sales tax, or excise tax. FDVA tax-exempt certificate will be available upon request.

11. Sealed Bid. Respondent's bid including all forms required by this solicitation, as provided by FDVA (in their original format), must be fully executed and submitted in a sealed envelope; one (1) sealed original copy and two (2) individually sealed duplicate copies. All three (3) individually sealed envelopes must then be placed in one (1) outer package (size appropriate envelope or box) and sealed. Each of the three (3) individually sealed envelopes and the outer package shall be clearly labeled as provided on the title page of this solicitation, including Respondent name and address, solicitation number and title, and the bid opening due date and time as provided in the Timeline. Further, it is the Respondent's responsibility to clearly identify on the outer packaging of each sealed bid any vendor preference certifications that are applicable to its bid. Respondent failure to provide sealed bid in the manner specified above may result in the bid being considered non-responsive.

12. Submission of Bid. By submitting a bid, each Respondent certifies that it satisfies all criteria specified in the solicitation and any issued addendum. Respondent may not submit more than one bid.

- a) Respondent is solely responsible for ensuring that its bid is submitted in accordance with the solicitation and any issued addendum.

b) Respondent shall submit its bid by mail (i.e. USPS, FedEx, or UPS) or in person (i.e. "by hand"? to the attention of the Primary Contact Person specified in Section I of this solicitation. **FDVA shall reject any bid submitted electronically (i.e. via e-mail).**

c) Respondent is solely responsible for ensuring that its bid is received, by the Primary Contact Person specified in Section I of this solicitation, prior to the bid opening due date and time as provided in the Timeline.

13. Withdrawal of Bid. Respondent bid may be withdrawn, provided that Respondent's written request to withdraw is e-mailed to and received by the Primary Contact Person specified in Section I of this solicitation prior to the bid opening due date and time as provided in the Timeline. Bids may not be withdrawn within sixty (60) business days following the bid opening due date and time as provided in the Timeline.

14. Modification of Bid. Respondent may withdraw, modify, and re-submit its bid, provided the re-submitted bid is received, by the Primary Contact Person specified in Section I of this solicitation, prior to the bid opening due date and time as provided in the Timeline. Respondent re-submitted bid shall be rejected if received, by the Primary Contact Person specified in Section I of this solicitation, after the bid opening due date and time as provided in the Timeline.

15. Bid Opening. **FDVA shall reject any bid received after the bid opening due date and time as provided in the Timeline.** Bids, received in accordance with the solicitation and any issued addendum, will be opened immediately after the bid opening due date and time as provided in the Timeline. The bid opening shall be performed at the Florida Department of Veterans' Affairs (FDVA), Mary Grizzle State Office Building, 11351 Ulmerton Road, Suite 311-K, Largo, FL 33778-1630. The public may attend the bid opening. FDVA may choose not to announce prices or release other materials pursuant to Section 119.071, Florida Statutes. Sealed bids, proposals, or replies received by FDVA pursuant to a competitive solicitation shall be exempt from public disclosure until FDVA provides notice of an intended decision, or until 30 days after the opening of bids, proposals, or final replies, whichever occurs earlier.

16. Rights of FDVA. In addition to all other rights of FDVA under Florida law, FDVA specifically reserves the following rights at its sole discretion:

- a) FDVA reserves the right to select the bid it believes is in the best interest of the State of Florida and FDVA.
- b) FDVA reserves the right to add, change, and delete any requirements of the solicitation.
- c) FDVA reserves the right to reject a bid, with or without cause, as nonresponsive, not responsible, not qualified, or not capable.
- d) FDVA reserves the right to withdraw, re-issue, or cancel the solicitation with or without cause.
- e) FDVA reserves the right to remedy or waive technical errors, immaterial errors, informalities, and irregularities in the solicitation and Respondent bid.
- f) FDVA reserves the right to reject a bid if pricing is inconclusive, incomplete, not submitted, or if pricing is not submitted in the format as originally provided in the solicitation.
- g) FDVA reserves the right to request any necessary clarifications or supporting documentation.
- h) FDVA reserves the right to reject any bid received after bid opening due date and time as provided in the Timeline.
- i) FDVA reserves the right to reject any bid submitted electronically (i.e. via e-mail).
- j) FDVA reserves the right to reject a bid if Respondent misstates or conceals any material fact in its bid.
- k) FDVA reserves the right to reject a bid that fails to include any information required by the solicitation in the specified sequence.
- l) FDVA reserves the right to accept and award the Agreement by item, by group, in the aggregate, or by location.

SECTION "III"
STATEMENT OF WORK

CONTENTS

- 1. General.**
- 2. Project Launch Meeting.**
- 3. Authorities Having Jurisdiction.**
- 4. Permits, Licenses, and Fees.**
- 5. Contractor Qualifications.**
- 6. Project Management.**
- 7. Safety and Security.**
- 8. Hours of Operation.**
- 9. Project Schedule.**
- 10. Service Interruptions or Shut-Down.**
- 11. Parking, Staging, and Storage.**
- 12. Damage to State Property.**
- 13. Alteration of State Property.**
- 14. Disconnection, Removal, Reinstallation of State Items and Equipment.**
- 15. Site Work.**
- 16. Inspection and Commissioning.**
- 17. Warranty.**
- 18. FDVA Final Acceptance.**

1. General. Contractor shall provide all vehicles, trailers, storage containers, dumpsters, labor, services, equipment, tools, materials, parts, and supplies required for the Lopez Power System Automation, for the Baldomero Lopez State Veterans' Nursing Home, located at 6919 Parkway Blvd, Land O' Lakes, Florida, 34639. (Pasco County) FDVA requires specified services to be completed to the full satisfaction and acceptance of FDVA and any applicable authorities having jurisdiction, within one-hundred-twenty calendar days (120) from the date of Agreement's full execution.

2. Project Launch Meeting. Contractor shall schedule and conduct an on-site, post-award project launch ("pre-construction") meeting with FDVA Contract Manager, within fifteen (15) business days from the date of Agreement's full execution. The purpose of the meeting is to establish lines of communications, verify contact persons, initiate project scheduling, and discuss other relative project topics. Prior to commencement of work, Contractor shall provide FDVA Contract Manager with a written copy of all key contact information, to include but not limited to Contractor contact names, telephone numbers (office, cell, and emergency), and email addresses where Contractor Project Manager or designee can be reached during the hours of operation (Monday through Friday, between the hours of 8:00 am and 5:00 pm), as well as outside the hours of operation.

3. Authorities Having Jurisdiction. FDVA is licensed by the Agency for Health Care Administration (AHCA) and regularly inspected by AHCA, United States Department of Veterans' Affairs (USDVA), Centers for Medicare and Medicaid Services (CMS), and State of Florida Fire Marshall. Contractor shall reference, adhere to, and comply with Environmental Protection Agency (EPA), Volusia County requirements, Florida Building Code, International Building Code, Americans with Disabilities Act (ADA), Life Safety Code, National Electrical Code (NEC), Underwriters Laboratories (UL), National Fire Protection Association (NFPA), as well as all other applicable local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction.

4. Permits, Licenses, and Fees. Contractor shall be responsible for scheduling, applying, paying for, and securing all applicable permits, licenses, variances, inspections, approvals, exemptions, certifications, tagging, and permissions required by local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction; including but not limited to necessary notification and coordination with applicable authorities having jurisdiction. Contractor must submit all applicable documentation specified above, as well as that of agents and their

employees, subcontractors and their employees, and all other persons performing any work under the Agreement, to FDVA Contract Manager for verification within fifteen (15) business days from date of fully executed Agreement. Failure of Contractor to provide documentation will prevent commencement of all work until Contractor provides satisfactory evidence to FDVA Contract Manager for verification or may result in termination of Agreement.

5. Contractor Qualifications. Licensed Contractor shall have the necessary experience, facilities, equipment, materials, ability, and financial resources to perform the required services. Licensed Contractor must have no less than five (5) years documented experience in the engaged field(s). As applicable, all Contractor personnel, agents, representatives, subcontractors and their employees, and all other persons performing services or inspections in performance of the Agreement shall be licensed, certified, and manufacturer's factory authorized to remove, install, maintain, and repair engaged materials, parts, and supplies; utilize, maintain, and repair the engaged equipment and tools; inspect the engaged materials, parts, supplies, equipment, and tools; and properly dispose of all project related waste. Contractor must submit all applicable licenses, certifications, and authorizations to FDVA Contract Manager for verification within fifteen (15) business days from date of fully executed Agreement. Failure of Contractor to provide documentation will prevent commencement of all work until Contractor provides satisfactory evidence to FDVA Contract Manager for verification or may result in termination of Agreement.

6. Project Management. Contractor shall provide sufficient personnel to perform the requirements of the executed Agreement and assume responsibility for managing the Contractor's project team for the life of the Agreement. Contractor shall be responsible for the successful completion of the Agreement, including the work of Contractor staff, as well as agents and their employees, subcontractors and their employees, and all other persons performing any work under the Agreement.

a) **Contractor Project Manager:** Prior to commencement of work, Contractor shall appoint a project manager who will be FDVA's primary point of contact. Contractor's Project Manager will oversee schedules, coordinate activities, report on progress, notify FDVA of any changes or adverse events, and as required meet with FDVA Contract Manager (on-site at SVNH). Contractor will be responsible for developing and maintaining a detailed project schedule and for reporting progress against the schedule on a daily basis to FDVA Contract Manager. Contractor's Project Manager does not have the authority to make any changes to the Agreement. In the absence of Contractor's Project Manager, Contractor will appoint a designee to act on behalf of Contractor's Project Manager.

b) **FDVA Contract Manager:** Prior to commencement of work, FDVA will appoint a Contract Manager who will be the Contractor's primary contact. FDVA Contract Manager, in consultation with SVNH Administrator, will be solely responsible for contract management, monitoring performance, certifying that requirements are met, and that invoicing is in accordance with the Agreement. FDVA Contract Manager will represent FDVA requirements, review and approve Contractor deliverables, provide operating insight, resolve on-site issues, and make decisions regarding alternate configuration choices. FDVA Contract Manager does not have the authority to make any changes to the Agreement. In the absence of FDVA Contract Manager, FDVA will appoint a designee to act on behalf of FDVA Contract Manager.

c) **FDVA SVNH Administrator:** SVNH Administrator is accountable for their respective SVNH's operation, including but not limited to oversight of all FDVA residents, staff, property, activities, programs, and events; as well as fiscal, administrative, clinical, risk management, quality assurance, and regulatory functions. SVNH Administrator does not have the authority to make any changes to the Agreement. In the absence of SVNH Administrator, FDVA will appoint an on-site designee to act on behalf of the SVNH Administrator.

d) **FDVA Contracting Administrator:** FDVA Contracting Administrator, located at FDVA Headquarters

in Largo, FL will be responsible for administering the terms and conditions of the Agreement, issuing all modifications (amendment or change order), and exercising any extension or termination. In the absence of FDVA Contracting Administrator, FDVA Purchasing Officer will act on behalf of FDVA Contracting Administrator.

7. Safety and Security.

a) Check In: Prior to commencement of daily work, Contractor will sign in at SVNH loading dock entrance and then check in with FDVA Contract Manager to acknowledge Contractors commencement of work, as well as to ensure that FDVA activities in the work area are curtailed and that FDVA resident, staff, and visitor property is removed from the work area.

b) Health Insurance Portability and Accountability Act (HIPAA): Contractor must comply with all requirements of the Health Insurance Portability and Accountability Act (HIPAA). Any violation of requirements shall result in termination of the Agreement and all remedies available by law shall become available to FDVA.

c) Jobsite Security: Contractor is responsible for continuously maintaining a safe and secure job site. Contractor shall ensure that adequate safeguards are implemented for the project. Contractor shall wear easily identifiable ID badges or uniforms. Contractor is restricted to the immediate work area; Contractor must obtain SVNH Administrator and FDVA Contract Manager approval prior to accessing any other FDVA area.

d) Safety Inspection: Contractor is responsible for continuously maintaining a safe job site; Contractor shall ensure that adequate safeguards are implemented for the project. A daily safety inspection will be performed by both Contractor and FDVA Contract Manager or designee to ensure all safety precautions have been taken to protect the health and welfare of all FDVA and Contractor staff, as well as SVNH residents and any visitors.

e) Jobsite Safety: Contractor shall ensure that FDVA staff, residents, and any visitors remain at a safe distance and are not in the work area. All labor, services, equipment, tools, materials, parts, and supplies, as well as preparation and application methods will conform to "best practice" methodologies of the engaged field. Vehicles, trailers, storage containers, dumpsters, equipment, tools, materials, parts, and supplies must not be left unattended for any reason, at any time. Contractor shall be compliant with OSHA and all other applicable local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction.

f) Material Safety Data: Contractor shall provide a copy of the material safety data sheets (MSDS) for all materials and supplies used on-site to FDVA Contract Manager. The MSDS shall remain on file with FDVA Contract Manager as it provides valuable safety and adverse reaction information. Note: All materials and supplies must be no or low volatile organic compound (VOC) and shall be approved for use in skilled nursing/long-term healthcare and foodservice environments.

g) Personal Protection and Safety Equipment: As applicable, proper personal protection and safety equipment shall be worn by Contractor personnel, agents, representatives, subcontractors and their employees, and all other persons performing work under the Agreement.

h) Respiratory Protection Program (RPP): Prior to Contractor performing any work which may introduce dust, fumes, materials, or other substance into the conditioned spaces of the SVNH, Contractor shall notify FDVA Contract Manager of such conditions and implement preventative vapor barrier measures (i.e. visqueen polyethylene plastic sheeting, temporary walls, etc.) and masking. Contractor shall have a RPP in compliance with all applicable local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, and requirements. Prior to commencement of work, Contractor will provide a copy of Contractor's RPP to FDVA Contract Manager.

i) Work Area Protective Measures: Contractor shall provide all necessary protective measures needed to prevent damage to any property, including but not limited to all nearby surfaces, landscaping, vehicles, and persons. This may require masking, erection of windscreens, barriers, roping-off, posting signs/devices (to include but not limited to notice of warning and caution), or other protective measures in any area where work is being performed. Protection of all work areas and any adjacencies is the sole responsibility of the Contractor.

j) Cleanup: Contractor must ensure that the project jobsite is kept clean and safe on a daily basis. Contractor shall be responsible for the immediate cleanup of any project related spills and excess materials, including but not limited to all equipment, tools, materials, parts, supplies, debris, pallets, and empty containers. Notwithstanding safety concerns, all protective measures must be immediately removed after each given work area has been completed. Contractor shall immediately notify FDVA Contract Manager of any excessive spills so that FDVA staff, residents, and visitors can be warned and kept away from the area. Should a spill require bio-exclusion techniques, the Contractor shall secure requisite services to perform such services. All adjacencies, walls, windows,

doors, gutters, and floors (entryway, sidewalk, walkway, patio, landing, and parking areas) shall be inspected and cleaned to original condition until Contractor secures FDVA Contract Manager's full acceptance and approval.

k) Non-regulated and Regulated Waste Disposal Services: State Veterans Nursing Home (SVNH) dumpsters will not to be used for disposal of any project related waste. Contractor shall be solely responsible for the proper disposal and subsequent dumping of all waste resulting from the performance of the Agreement, in accordance with all applicable local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, and requirements, as well as any applicable authorities having jurisdiction. Unless written prior approval of FDVA Contract Manager states otherwise, all waste resulting from the requirements of the Agreement shall be removed via assigned hallway paths to SVNH's loading and unloading dock. Any waste removal shall not involve the rest of the Home.

l) Check Out: Upon completion of daily work, prior to physically leaving SVNH, Contractor shall notify FDVA Contract Manager that Contractor staff has completed work and confirm that all safety and security measures have been performed.

8. Hours of Operation. Given the nature and dynamics of the SVNH, time is of the essence in the performance of the Agreement. All services shall be performed Monday through Friday, between the hours of 8:00 am and 5:00 pm; any work to be scheduled and performed outside of these dates and times shall require prior written approval of FDVA Contract Manager.

9. Project Schedule. Within fifteen (15) business days, from the date of Agreement's execution, Contractor must provide a project schedule to FDVA Contract Manager for approval. Project schedule shall be an effective framework tool for project management. At minimum, Contractor will update the project schedule on a weekly basis. Project schedule will consist of project planning, design approvals, weekly work details, milestones, as well as a dated timeline for mobilization and full project completion for the project. Contractor shall adhere to the project schedule. Unless prior written approval has been granted by FDVA Contract Manager, all work shall be scheduled with FDVA Contract Manager at least seventy-two (72) hours prior to performance.

10. Service Interruptions or Shut-Down. Any potential service interruptions or shut-down of existing services shall be as brief as possible and must be scheduled for times other than normal operating hours, whenever possible. Contractor must secure prior written approval of FDVA Contract Manager by no later than seventy-two (72) hours prior to interruptions in service or shutdown of existing services. Operations of existing systems shall be continuous during work periods. Mechanical systems serving building spaces shall remain active during work periods so as not to cause any disruption to other building spaces. **Note:** FDVA reserves the right to suspend Contractor work due to any AHCA, USDVA, CMS, or other authority having jurisdiction inspection or survey, with no penalty assessed to Contractor. Further, FDVA shall consider suspension of Contractor work due to weather conditions, as well as materials, parts, and supplies application requirements with no penalty assessed to Contractor.

11. Parking, Staging, and Storage. On-site parking, staging, and storage of Contractor vehicles, trailers, storage containers, dumpsters, equipment, tools, materials, parts, and supplies is not permitted unless prior written approval is granted by FDVA Contract Manager. FDVA assumes no liability for damage to or loss of Contractor vehicles, trailers, storage containers, dumpsters, equipment, tools, materials, parts, and supplies (regardless whether pre-staged, staged, stored or otherwise). Contractor is fully responsible for all deliveries, unloading and storage, movement of Contractor staff and commodities, and return shipping necessary to perform the requirements of the Agreement. Public health and safety related to Contractor vehicles, trailers, storage containers, dumpsters, deliveries, unloading, storage, movement of Contractor staff and commodities, return shipping of any equipment, tools, materials, parts, and supplies, as well as all work performed under the Agreement shall be the sole responsibility of Contractor. Upon completion of the project, Contractor will remove all Contractor vehicles, trailers, storage containers, dumpsters, equipment, and tools, as well as remaining materials, parts, and supplies from SVNH property.

12. Damage to State Property. FDVA Contract Manager and Contractor shall conduct a daily inspection of the work area to verify if any potential for damage exists or if actual pre-existing/existing damage to State property has occurred. Contractor must immediately report any pre-existing or Contractor caused damage of State property to FDVA Contract Manager, along with written explanation of damage, recommended remedy, as well as photographic evidence of damage and proof of mutually accepted, eventual resolution. With prior written approval of FDVA Contract Manager, Contractor shall immediately repair, replace, or restore any State property damaged by Contractor, at a minimum, to the condition that existed immediately prior to the time of damage. All repairs, parts, or replacement of damaged property shall be like original quality, color, and design, in accordance with manufacturer's specifications and warranty, as well as all applicable permits, licenses, variances, inspections, approvals, exemptions, certifications, tagging, and permissions required by local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction. Upon completion of project, FDVA Contract Manager and Contractor will conduct a final inspection of the work area. Any Contractor caused damage to any communications, fire service, utility-owned, and municipality-owned property or equipment, is the sole responsibility of the Contractor, including but not limited to remedy, cost and penalty thereof, in accordance with manufacturer's specifications and warranty, as well as all applicable permits, licenses, variances, inspections, approvals, exemptions, certifications, tagging, and permissions required by local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction.

13. Alteration of State Property. No alteration to State property shall be made without a prior fully executed contract amendment or change order. Any alteration must be in accordance with manufacturer's specifications and warranty, as well as all applicable local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction. Any Contractor alterations to any communications, fire service, utility-owned, and municipality-owned property or equipment, is the sole responsibility of the Contractor, including but not limited to remedy, cost and penalty thereof, in accordance with manufacturer's specifications and warranty, as well as all applicable permits, licenses, variances, inspections, approvals, exemptions, certifications, tagging, and permissions required by local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction.

14. Disconnection, Removal, and Reinstallation of State Items and Equipment. With FDVA Contract Manager prior written approval, in accordance with manufacturer's specifications and warranty, Contractor will provide for the disconnection, removal, and reinstallation of any and all mounted, fastened in place, plumbed, and electrical equipment, or any and all other items necessary to perform the requirements of the Agreement. If necessary, Contractor shall take pictures and measurements to ensure items and equipment are replaced to their original position(s).

15. Site Work.

See Exhibit A
 Entitled "Scope of Work"

Section#	
26 0000	General Electrical Requirements.
26 0519	Low-Voltage Electrical Power Conductors and Cable.
26 0526	Grounding and Bonding for Electrical Systems.
26 0533	Raceway and Boxes for Electrical Systems.
26 0543	Underground Ducts and Raceways for Electrical Systems.
26 0543.13	Excavation and Backfill.
26 0553	Electrical Systems Identification.
26 3623	Transfer Switches.

16. Inspection and Commissioning. Once Contractor ascertains complete provision of all required work, Contractor shall provide for, schedule, and conduct an inspection of the work area with FDVA Contract Manager, as well as applicable engineers and authorized manufacturer's representatives. During inspection, FDVA Contract Manager and Contractor will develop a punch list of any deficiencies identified and prepare a schedule indicating completion dates for correction. Once Contractor has corrected all deficiencies, upon subsequent FDVA Contract Manager approval of Contractor's inspection and correction of all punch list deficiencies, FDVA Contract Manager will proceed with FDVA Final Acceptance process.

17. Warranty. Contractor shall warrant that all work is of highest quality, free from all defects whatsoever, in compliance with manufacturer's specifications and warranty guidelines, as well as applicable local, state, federal codes, laws, ordinances, rules, regulations, guidelines, and requirements. During the warranty period, any defective condition or Contractor damaged item will be repaired or replaced and retested until in compliance with written manufacturer's specifications and warranty guidelines, as well as applicable local, state, federal codes, laws, ordinances, rules, regulations, guidelines, and requirements. Contractor will present FDVA Contract Manager with written warranty which provides:

- a) At minimum, One (1) year manufacturer's warranty on all materials and supplies from date of FDVA Final Acceptance. Date of shipment warranty shall not supersede the One (1) year warranty.
- b) At minimum, One (1) year Contractor warranty on all labor and workmanship from date of FDVA Final Acceptance.

18. FDVA Final Acceptance. FDVA Final Acceptance shall be certified upon Contract Manager's receipt and approval of the following closeout requirements:

- a) Contractor completion of required work.
- b) Contractor provision of project documentation, as issued by Contractor, Manufacturer(s), and authorities having jurisdiction (i.e. any applicable project drawings, product data, inspections, approvals, exemptions, certifications, and permissions).
- c) Contractor provision of all warranty documentation.
- d) Contractor removal of all Contractor vehicles, trailers, storage containers, dumpsters, equipment, tools, materials, parts, and supplies.
- e) Contractor proper removal and disposal of all project related waste.
- f) Contractor provision of invoicing in accordance with the Agreement.

SECTION "IV"
GENERAL AGREEMENT ("DRAFT")

THIS AGREEMENT is made on this _____ day of _____, 2019, by and between State of Florida, Department of Veterans' Affairs ("**FDVA**"), with its principal business location at Mary Grizzle State Office Building, 11351 Ulmerton Road, Suite 311-K, Largo, FL 33778-1630 and _____ ("**Contractor**"), with its principal business location at _____
Each referred to as a "party" or collectively "parties".

WHEREAS, FDVA issued Invitation to Bid (ITB) No. **FDVA-ITB-20-006B** on Tuesday, August 13th 2019 for contractor provision of all labor, services (including design-build), equipment, tools, materials, parts, and supplies necessary for the Lopez Power System Automation, for FDVA's Baldomero Lopez State Veterans' Nursing Home located at 6919 Parkway Blvd, Land O' Lakes, Florida, 34639, For further details, see Section III "Statement of Work".

WHEREAS, Contractor submitted a Response (Bid) to the ITB on _____, 2019; and

WHEREAS, FDVA awarded the ITB Submittal to Contractor and the parties wish to set forth the terms and conditions of their agreement.

NOW THEREFORE, the parties in consideration of the mutual benefits and promises set forth herein, the adequacy of which is acknowledged by the parties, agree as follows:

1.1 DOCUMENTS:

1.1.1 The contract documents, including without limitation all exhibits attached hereto and incorporated herein by this reference, sets forth the entire agreement between the parties with respect to the subject matter hereof and supersedes all previous written or oral agreements or representations between the parties with respect hereto.

1.1.2 To the extent of any conflict between the contract documents, this Agreement and any amendments shall control:

- Then FDVA ITB and all Addendum (attached hereto as Exhibit A);
- Then Contractor's Bid (attached hereto as Exhibit B);
- Then FDVA Purchase Order; and
- Then any other exhibits as required.

All of the foregoing are incorporated herein by reference and are made a part of this Agreement.

2.1 GENERAL DESCRIPTION OF SERVICES:

2.1.1 Contractor shall provide all labor, services (including design-build), equipment, tools, materials, parts, and supplies necessary for the Lopez Power System Automation, for FDVA's Baldomero Lopez State Veterans' Nursing Home located at 6919 Parkway Blvd, Land O' Lakes, Florida 34639, as set forth in the Agreement.

2.1.2 Contractor shall complete the tasks as outlined in the ITB and any issued addendum, as well as all services and work not mentioned, but necessary for Contractor to complete the work outlined in the Contract Documents.

2.1.3 Contractor is responsible for securing any and all licenses, permits, special variances, inspections, approvals, exemptions, and permissions required to complete the work called for by the Contract Documents, including coordinating and notifying any agencies, prior to, during, and after the work, which require such communication(s).

3.1 TERM OF SERVICE:

3.1.1 The term of this Contract shall commence on the date of the Agreement's full execution, with no renewals. FDVA requires specified services to be completed to the full satisfaction and acceptance of FDVA and any applicable authorities having jurisdiction, within one-hundred and twenty (120) calendar days from the date of Agreement's full execution.

3.1.2 Termination of this Contract shall be governed by the provisions specified in incorporated Form PUR 1000, Item No. 22 "Termination for Convenience" and Item No. 23 "Termination for Cause".

4.1 CONTRACT SUM AND TERMS OF PAYMENT:

4.1.1 In consideration of Contractor's faithful performance of the covenants in this Agreement and its completion and delivery of the statement of work as outlined in the Contract Documents, to the full satisfaction and acceptance of FDVA and any applicable authorities having jurisdiction; FDVA agrees to pay or cause to be paid a total contract sum not to exceed \$TBD, as set forth in Contractor's Bid. The State's performance and obligation to pay under the Agreement is contingent upon an annual appropriation by the State of Florida Legislature.

4.1.2 It is agreed that Contractor's expenses, including but not limited to all costs related to travel and lodging, printing and photocopying, long distance telephone calls and facsimiles, and overnight delivery services, are included in the sum listed in 4.1.1 above.

4.1.3 FDVA does not pay any excise or sales tax and shall provide to the Contractor sales tax exemption information, where appropriate.

4.1.4 During the performance of the services under this Agreement, FDVA shall have the right, by written instrument, to make changes in, omissions from, or to require additions to the services called for by the Contract Documents. Contractor must receive prior written approval from FDVA before beginning any additional services related to the work under the Contract Documents. In the event that FDVA provides prior written approval for additional services, then, upon completion of such additional services, Contractor shall be entitled to compensation for the additional services rendered at the rate(s) or price(s) set forth in the Bid, or as otherwise mutually agreed upon by the parties in writing. If Contractor performs additional services without first receiving prior written approval from FDVA, Contractor shall not be entitled to compensation for the unapproved services.

4.1.5 Vendors have the option to receive payments by direct deposit. With direct deposit, your money will be available to you when your financial institution opens for business on the payment date. Banks, savings and loan associations, and credit unions are eligible to accept such deposits. With direct deposit there can be only one financial institution's account information on file for one federal tax identification number (SSN or FEIN). Payments cannot be sent to two or more financial institutions. If you are interested in this option to receive your payments in a more efficient method of payment, please complete the Direct Deposit Authorization form located at website <https://www.myfloridacfo.com/division/AA/Forms/DFS-A1-26E.docx> and follow the instructions on the form. If you need assistance completing the form, please call the Direct Deposit Section at (850) 413-5572 or email at DirectDeposit@MyFloridaCFO.com. Also, Vendors can obtain the remittance information contained on the remittance advice by accessing the "Vendor Payment History" link located on the State of Florida Vendor Website: <https://fvendor.myfloridacfo.com/>.

5.1 DELIVERABLES:

5.1.1 The deliverable, as defined in the agreement, is for the Lopez Power System Automation.

6.1 PERFORMANCE MEASURES:

6.1.1 Performance measures will be based on the quality and timeliness of the deliverables as determined solely by FDVA.

7.1 INVOICING AND PAYMENT:

7.1.1 Invoicing: Contractor shall submit invoicing to the attention of FDVA Contract Manager. FDVA Contract Manager shall be responsible for monitoring Contractor performance of the Agreement and

certifying invoices for payment. Invoices shall be submitted in detail sufficient for a proper pre-audit and post-audit thereof, including all supporting documentation. Invoices shall specify Contractor's Federal Employer Identification Number (FEIN), FDVA Agreement number, FDVA purchase order number, actual period of service, specific line item description(s), as well as reflect the service location name and address. Invoices must reflect Contractor's net, delivered prices (F.O.B. destination) and be in United States Dollars (USD). Contractor invoicing shall be in accordance with and not exceed the sum specified in the Agreement.

7.1.2 Payment: FDVA is unable to pay in advance for any vehicles, trailers, storage containers, dumpsters, labor, services, equipment, tools, materials, parts, and supplies (whether pre-staged, staged, stored or otherwise). Payments shall only be issued for actual Contractor completed work; work which has been certified as accepted and approved by FDVA Contract Manager and any applicable authorities having jurisdiction. FDVA payment shall be made in accordance with Section 215.422, Florida Statutes, which states Contractor's rights and State Agency's responsibilities concerning interest penalties and time limits for payment of invoices.

8.1 FINANCIAL CONSEQUENCES:

8.1.1 Pursuant to Section 287.058(1)(h), Florida Statutes, in the event of delay in the provision of required services, not subject to unavoidable delays, FDVA must recover its actual costs which it estimates at this time to be in the amount of \$1,166.67 per each calendar day that the Contractor has failed to provide the required services in accordance with the Agreement. FDVA reserves the right to increase this amount if the actual financial consequences to FDVA caused by Contractor's delay are higher. Deductions must be made from monies due or which may be due to the Contractor. The burden of proof of unavoidable delay shall rest with the Contractor. Contractor shall submit written notice requesting extension of time to FDVA Contract Manager for determination. FDVA, at its sole discretion, may approve extensions of the project completion date if delay is attributable to circumstances that are beyond the control of the Contractor. If FDVA approves extension of time, a change order must be used to incorporate the extension in the executed Agreement.

8.1.2 Contractor shall be solely responsible for the correction of all applicable deficiencies, tags, and citations; and will be liable for payment of any monetary fine, or reimbursement of per diem lost, if such fine or per diem lost is the result of any deficiency that is found by a licensure or certification entity and that is attributable to the Contractor.

9.1 BACKGROUND SCREENING:

9.1.1 In accordance with Section 435, Florida Statutes, for the life of the Agreement, Contractor shall be responsible for scheduling, applying and paying for, and securing Level 2 background screening for all Contractor personnel, agents, representatives, subcontractors and their employees, and all other persons performing services in performance of the Agreement. Upon completion of Level 2 background screening, Contractor shall secure evidence of such completion and provide to FDVA Contract Manager. Prior to commencement of work, FDVA Contract Manager and SVNH Administrator will review each Level 2 background screening's result and exercise exclusive judgment as to acceptability in accordance with State of Florida requirements. Evidence will be maintained on file at the service location.

10.1 EMPLOYMENT ELIGIBILITY VERIFICATION (E-Verify):

10.1.1 Pursuant to the State of Florida Executive Order Number 11-116 the U.S. Department of Homeland Security's E-Verify system to obtain and verify the employment eligibility of all persons employed during the term of the Agreement by the Contractor to perform employment duties within Florida within three (3) business days after the date of hire; and all persons (including subcontractors) assigned by Contractor to perform work pursuant to the Agreement with FDVA within ninety (90) calendar days after the date the Agreement is executed or within thirty (30) days after such persons are assigned to perform work pursuant to the Agreement, whichever is later. The State of Florida shall consider Contractor's employment of an unauthorized or undocumented alien to be a *prima facie* violation of Section 274A(e) of the Immigration and Nationalization Act. Such violation shall be grounds for immediate termination of the Agreement.

11.1 INSURANCE REQUIREMENTS:

11.1.1 Within fifteen (15) business days, from date of fully executed agreement, Contractor must obtain the below specified insurance coverage and provide certificate of insurance to FDVA Contract Manager.

FDVA acceptance of Contractor's certificate of insurance shall not be construed as relieving Contractor from liability or obligation assumed under the Agreement or as imposed by law.

11.1.2 Insurer must be authorized to do business in and be eligible to write policies in the State of Florida, as well as maintain a minimum rating of "A" as assigned by AM Best. Certificate of insurance will specify that coverage is not subject to cancellation, non-renewal, material change, or reduction unless thirty (30) calendar days' notice is given to FDVA. Certificate of insurance shall include the license and registration numbers of the Florida resident agent, as well as list FDVA as additionally insured (excluding worker's compensation insurance). Contractor insurance coverages shall include the following:

Commercial General Liability Requirements:

- Premises Operations.
- Produces and Completed Operations.
- Blanket Contractual Liability.
- Personal Injury Liability.
- Expanded Definition of Property Damage.
- Professional Liability.
- Minimum limits shall be \$1,000,000.00, each occurrence, combined single limit.

Excess Liability:

- Umbrella form.
- Minimum limits shall be \$3,000,000.00 each occurrence, combined single limit.

Workers Compensation:

- Workers compensation insurance for all Contractor employees connected to this Agreement.
- Limits sufficient to meet Chapter 440, Florida Statutes.
- If Contractor has been approved by the State of Florida's Department of Labor as an authorized self-insurer (self-insurance fund) for Workers' Compensation, FDVA shall recognize and honor such status. Contractor shall be required to submit to FDVA Contract Manager a letter of authorization issued by the State of Florida's Department of Labor, certificate of insurance providing details on Contractor's excess insurance program, and Contractor's financial statements.

Vehicle Liability Insurance:

- Liability coverage to include any auto, all owned autos, non-owned autos, hired autos, and scheduled autos.
- Minimum limits shall be at \$1,000,000, each occurrence, combined single limit.
- If split limits are given, minimum limits shall be \$500,000 per person; \$1,000,000 per occurrence; \$500,000 property damage.

11.1.3 Contractor failure to provide insurance coverage, as specified above, shall prevent commencement of all work until Contractor provides satisfactory evidence of insurance coverage to FDVA Contract Manager or may result in termination of Agreement. Further, Contractor failure to maintain insurance coverage for the life of the Agreement shall result in suspension of all work until such insurance coverage has been reinstated or replaced, and satisfactory evidence of insurance coverage has been provided to FDVA Contract Manager or may result in termination of Agreement. Additionally, Contractor failure to obtain, provide satisfactory evidence of, and maintain insurance coverages shall not extend deadlines and FDVA shall impose financial consequences as if work had commenced as scheduled or not been suspended.

12.1 PERFORMANCE AND PAYMENT BOND:

12.1.1 Within fifteen (15) business days, from date of fully executed agreement, Contractor must obtain the below specified performance and payment bond and provide FDVA Contract Manager with original bond and power of attorney (for the attorney providing the bond); as well as a certified copy of the recorded bond (Charlotte County), including properly executed and recorded power of attorney (for the attorney providing the bond). Note: See ITB solicitation affixed Form "8" Performance and Payment Bond (draft: State of Florida/FDVA approved language).

12.1.2 Bond will remain in effect for the life of the Agreement and be from a surety company which:

- Is at minimum rated "A -" (excellent) and Class "IV" (financial size category), as reported in the most current Best Key Rating Guide, published by A.M. Best Company, with the required amount not to exceed ten (10) percent of its surplus to policyholder;

- Holds a currently valid Certificate of Authority, issued by the State of Florida, Department of Financial Services, Office of Insurance Regulation, authorizing it to write surety bonds in the State of Florida;
- Holds a Certificate of Authority issued by the United States Department of Treasury under Sections 9304 to 9308 of Title 31 of the United States Code;
- Is fully compliant with the provisions of the State of Florida Insurance Code; and
- Has at least twice the minimum surplus and capital required by the State of Florida Insurance Code at the time the subject solicitation was issued.
- Bond shall be accompanied by a duly authenticated power of attorney evidencing that the person executing the bond in behalf of the surety company had the authority to do so on the date of the bond. Further, bond shall state in its front page:
 - Contractor's name, principle business address, and phone number;
 - Surety company name;
 - FDVA's full name (Florida Department of Veterans' Affairs), as beneficiary;
 - Agreement number as assigned by FDVA;
 - General description of the required commodity or project; and
 - Reflect bond amount equal to 100% of the Agreement's full value.

12.1.3 Contractor failure to provide bond, as specified above, will prevent commencement of all work until Contractor provides satisfactory evidence of bond to FDVA Contract Manager or may result in termination of Agreement. Further, Contractor failure to maintain bond for the life of the Agreement will result in suspension of all work until such bond has been reinstated or replaced, and satisfactory evidence of bond has been provided to FDVA Contract Manager or may result in termination of Agreement. Additionally, Contractor failure to obtain, provide satisfactory evidence of, and maintain bond will not extend deadlines and FDVA will impose financial consequences as if work had commenced as scheduled or not been suspended.

12.1.4 Bond will provide that the surety company pay losses suffered by FDVA directly to FDVA, including losses for material breaches based on violations of Florida public records law through failure to produce public records or improper disclosure of confidential or exempt structural documents as described in the Agreement. In the event of termination of the Agreement by Contractor prior to full performance, Contractor agrees that FDVA damages shall be considered to be for the full amount of the bond. FDVA need not prove the damage amount in exercising its right of recourse against the bond.

12.1.5 In the event of material change or cancellation of the bond, Contractor must provide a substitute bond naming FDVA as the payee to FDVA Contract Manager within five (5) business days thereafter. If the surety company for any bond provided by Contractor is declared bankrupt, becomes insolvent, has its right to do business in the State of Florida terminated, or ceases to meet the requirements imposed by the Agreement, the Contractor shall provide a substitute bond within five (5) business days thereafter to the FDVA Contract Manager. Both the substitute surety company and bond shall be subject FDVA's sole approval.

13.1 APPLICABLE LEGAL STANDARDS:

13.1.1 Contractor shall comply with all local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction that, in any manner, could bear on the provision of services under the Contract Documents.

13.1.2 As between the parties, Contractor shall obtain and maintain at its own expense all licenses, permits, approvals, and regulatory authority required by law with respect to Contractor's operation and provision of services as contemplated in the Contract Documents, and FDVA shall obtain and maintain at its own expense all licenses, permits, approvals, and regulatory authority required by law with respect to FDVA's use of the services contemplated in the Contract Documents. Unless specified otherwise in the Contract Documents, each party will give all notices, pay all fees, and comply with all local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction relating to its performance obligations specified in this Agreement.

13.1.3 If the Contractor provides services in a manner that it knows is contrary to any local, state, and federal codes, laws, ordinances, rules, regulations, guidelines, requirements, and any applicable authorities having jurisdiction, or that the Contractor should have known was contrary to the same, the Contractor shall assume full responsibility for such services and shall bear all attributable costs.

13.1.4 If the contract sum is for \$1 million dollars or more, and the Contractor is subsequently placed on the Scrutinized Companies with Activities in Sudan List or Scrutinized Companies with Activities in Iran Petroleum Energy Sector List, or has been found to have submitted a false certification representing that Contractor has not been placed on these lists, or is engaged in business operations in Cuba or Syria, then FDVA may terminate this agreement, pursuant to section 287.135, Florida Statutes and section 215.473, Florida Statutes.

14.1 **NOTICES:**

14.1.1 All notices required under the Contract shall be delivered by certified mail, return receipt requested, by reputable air courier service, or by personal delivery to the agency designee identified in the original solicitation, or as otherwise identified by the Customer. Notices to the Contractor shall be delivered to the person who signs the Contract. Either designated recipient may notify the other, in writing, if someone else is designated to receive notice.

15.1 **MODIFICATION:**

15.1.1 The Contract contains all the terms and conditions agreed upon by the parties, which terms and conditions shall govern all transactions between the Customer and the Contractor. The Contract may only be modified or amended upon mutual written agreement of the Customer and the Contractor. No oral agreements or representations shall be valid or binding upon the Customer or the Contractor. No alteration or modification of the Contract terms, including substitution of product, shall be valid or binding against the Customer. The Contractor may not unilaterally modify the terms of the Contract by affixing additional terms to product upon delivery (e.g., attachment or inclusion of standard preprinted forms, product literature, "shrink wrap" terms accompanying or affixed to a product, whether written or electronic) or by incorporating such terms onto the Contractor's order or fiscal forms or other documents forwarded by the Contractor for payment. The Customer's acceptance of product or processing of documentation on forms furnished by the Contractor for approval or payment shall not constitute acceptance of the proposed modification to terms and conditions.

16.1 **SUCCESSORS AND ASSIGNS:**

16.1.1 The Contractor shall not sell, assign or transfer any of its rights, duties or obligations under the Contract, or under any purchase order issued pursuant to the Contract, without the prior written consent of the Customer; provided, the Contractor assigns to the State any and all claims it has with respect to the Contract under the antitrust laws of the United States and the State. In the event of any assignment, the Contractor remains secondarily liable for performance of the contract, unless the Customer expressly waives such secondary liability. The Customer may assign the Contract with prior written notice to Contractor of its intent to do so.

17.1 **RIGHT TO INSPECT and AUDIT:**

17.1.1 **Right to Inspect and Audit:** In accordance with Article I, Section 24, Florida State Constitution and Chapter 119, Florida Statutes, FDVA, its duly authorized representatives, federal and state auditors, and other persons shall have the right to inspect and audit any facilities, commodities, services, materials, records, papers, documents, drawings, books, and electronic storage media of Contractor and subcontractor(s) which FDVA and its duly authorized representatives deem relevant to the purposes of this Agreement.

- All information requested to be delivered, for purposes of inspection and audit, shall be furnished to FDVA and its duly authorized representatives within three (3) business days from date of FDVA provision of notice.
- At its sole discretion, without notice, FDVA and its duly authorized representatives may conduct audits at any location during normal business days and hours.
- If an audit has been initiated and audit findings have not been resolved, the information shall be retained until resolution of the audit findings.
- The rights of access must not be limited to the required retention periods but shall be provided for as long as the records are retained and deemed relevant to the Agreement by FDVA and its duly authorized representatives.
- Under the Agreement, Contractor shall be solely responsible for all storage, maintenance, preparation, duplication, transfer, delivery, and disposal; as well as any associated costs or fees.

- Contractor's failure to provide retention of and access to the above detailed, as well as any violation of Chapter 119, Florida Statutes will be sufficient grounds for immediate termination of the Agreement. Further, under Florida law, noncompliance remedies may include criminal prosecution and civil actions.

17.1.2 **Inspector General:** Pursuant to Section 20.055(5), Florida Statutes, every state officer, employee, agency, special district, board, commission, contractor and subcontractor corporation, partnership, or person must understand, cooperate, and comply with the inspector general in any investigation, audit, inspection, review, or hearing.

17.1.3 **Chief Financial Officer:** Pursuant to Section 287.136, Florida Statutes, after execution of a contract, the Chief Financial Officer shall perform audits of the executed contract document and contract manager's records to ensure that adequate internal controls are in place for complying with the terms and conditions of the contract and for the validation and receipt of goods and services.

18.1 **PUBLIC RECORDS:**

18.1.1 Article 1, section 24, Florida Constitution, guarantees every person access to all public records, and Section 119.011, Florida Statutes, provides a broad definition of public record. All responses to a competitive solicitation are public records unless exempt by law.

18.1.2 In accordance with Florida Statute 215.985, the State of Florida Department of Financial Services (DFS) has implemented the web-based Florida Accountability Contract Tracking System (FACTS). All State of Florida contracts are considered public records and shall be published to FACTS for public access. Published records include but are not limited to contract document images, financial information, and audit findings. Online public access is available via <https://facts.fdfs.com>.

18.1.3 Any respondent claiming that its response to a competitive solicitation contains information that is exempt from the public records law such as a "trade secret," shall clearly segregate and mark that information, and provide the specific statutory authority for such exemption. If under contract, it is expressly understood that a Contractor's refusal to comply with this provision shall constitute a breach of contract.

18.1.4 Pursuant to the provisions of Section 119.0701, Florida Statutes, Contractor shall:

- Keep and maintain public records required by the public agency to perform the service.
- Upon request from the public agency's custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time and at a cost that does not exceed the costs provided for under Florida's public records law.
- Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the Contractor does not transfer the records to the public agency.
- Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of the Contractor or keep and maintain public records required by the public agency to perform the service. If the Contractor transfers all public records to the public agency upon completion of the contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.
- Notwithstanding these provisions, a request to inspect or copy public records relating to a public agency's contract for services must be made directly to the public agency. Therefore, if the contractor receives a request to inspect or copy public records, the Contractor shall immediately contact the agency's Custodian of Public Records for disposition.
- Contractor's failure to provide retention of and access to public records, as well as any violation of Chapter 119, Florida Statutes will be sufficient grounds for immediate termination of the Agreement. Further, under Florida law, noncompliance remedies may include criminal prosecution and civil actions.

18.1.5 Pursuant to Section 119.0701, Florida Statutes, **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 CONTRACT, CONTACT FLORIDA DEPARTMENT OF VETERANS' AFFAIRS, CUSTODIAN OF PUBLIC RECORDS, 11351 ULMERTON ROAD, SUITE 311-K, LARGO, FL 33778-1630, PHONE NUMBER: (727) 518-3202, EXTENSION NUMBER 5594, E-MAIL ADDRESS: PUBLICRECORDSREQUEST@FDVA.STATE.FL.US.**

19.1 CLOSING:

19.1.1 In the event any portion of the Contract Documents shall be declared by any court of competent jurisdiction to be invalid or unenforceable, the parties agree that such invalid or unenforceable portion shall be severable and the Contract Documents shall be treated as though that portion had never been part of the Contract Documents.

19.1.2 The headings of the sections of this Agreement and capitalizations are for the purpose of convenience only and shall not be deemed to expand or limit the provisions contained in such sections.

19.1.3 Both parties to this Agreement represent and warrant that they are authorized to enter into this Agreement without the consent and joinder of any other party and that the parties executing this Agreement have full power and authority to bind their respective parties to the terms hereof.

19.1.4 Contractor understands and agrees it shall be bound by all the terms and conditions of this Agreement, as well as such terms and conditions set forth in Invitation to Bid (ITB) Number FDVA-ITB-20-006B and any issued addendum.

19.1.5 This Agreement shall be governed by the laws of the State of Florida, and the parties stipulate any matter, action or proceeding, which is the subject of this Contract, shall be held in the State courts of Leon County, Florida or the U.S. District Court for the Northern District of Florida, Tallahassee Division, located in Leon County, Florida.

IN WITNESS WHEREOF, the parties hereto have made and executed this Agreement on _____, 2019.

Contractor:	State of Florida Department of Veterans' Affairs:
Signature: _____	Signature: _____
Print Name: _____	Print Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

Corporate Secretary Attestation:	As approved to form and legality by:
Signature: _____	Signature: _____
Print Name: _____	Print Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

**FORM "1"
 BIDDER'S ACKNOWLEDGMENT**

**SOLICITATION NO.: FDVA-ITB-20-006B
 SOLICITATION TITLE: POWER SYSTEM AUTOMATION
 SOLICITATION ISSUED: TUESDAY, AUGUST 13TH 2019**

BID DUE DATE AND TIME: IN ACCORDANCE WITH THE SOLICITATION TIMELINE (SOLICITATION SECTION "I") AND RESPONDENT INSTRUCTIONS (SOLICITATION SECTION "II"). RESPONDENT BIDS MUST BE DELIVERED PRIOR TO 3:00 PM LOCAL TIME, ON FRIDAY, SEPTEMBER 13TH, 2019. BIDS SHALL NOT BE WITHDRAWN WITHIN SIXTY (60) BUSINESS DAYS AFTER SUCH DATE AND TIME.

DELIVERY OF BID: IN ACCORDANCE WITH THE SOLICITATION TIMELINE (SOLICITATION SECTION "I") AND RESPONDENT INSTRUCTIONS (SOLICITATION SECTION "II"). RESPONDENT BID MUST BE DELIVERED TO: NICK SCIRE, PURCHASING ANALYST, FLORIDA DEPARTMENT OF VETERANS AFFAIRS, MARY GRIZZLE STATE OFFICE BUILDING, 11351 ULMERTON ROAD, SUITE 311-K, LARGO, FL 33778-1630.

SPECIAL NOTICE TO RESPONDENT: A MANDATORY PRE-BID AND ON-SITE MEETING HAS BEEN SCHEDULED FOR THIS SOLICITATION. DETAILS ARE PROVIDED IN SOLICITATION SECTION "I".

CONTRACTOR NAME:	
MAILING ADDRESS (PHYSICAL STREET):	PHONE:
CITY / STATE / ZIP CODE:	FAX:
FEDERAL TAX ID NUMBER:	E-MAIL ADDRESS:

FORM	SUBMITTALS CHECKLIST (ALL FORMS BELOW MUST BE INCLUDED WITH RESPONDENT'S BID)	CHECK OFF BOX
FORM 1	BIDDER'S ACKNOWLEDGMENT	
FORM 2	BID FORM	
FORM 3	CONTRACTOR REFERENCES	
FORM 4	ADDENDUM ACKNOWLEDGMENT	
FORM 5	ATTESTATION OF NO CONFLICT	
FORM 6	DRUG-FREE WORKPLACE CERTIFICATION	
FORM 7	NON-COLLUSION AFFIDAVIT	

BY SIGNING THIS DOCUMENT, I CERTIFY UNDER PENALTY OF PERJURY, THAT I AM DULY AUTHORIZED TO LEGALLY BIND THE RESPONDENT TO THE TERMS, CONDITIONS, PROVISIONS, AND REQUIREMENTS EXPRESSED IN THE SUBJECT SOLICITATION, ANY PUBLISHED ADDENDUM, AND THIS BID DOCUMENT. THIS CERTIFICATION IS MADE UNDER THE LAWS OF THE STATE OF FLORIDA.

PRINT NAME & TITLE OF AUTHORIZED REPRESENTATIVE:	
SIGNATURE OF AUTHORIZED REPRESENTATIVE:	DATE:

FORM "2"
BID FORM

CONTRACTOR MUST INCLUDE THIS FORM FULLY EXECUTED, IN THE PROVIDED FORMAT, WITH RESPONSE TO THIS SOLICITATION. FAILURE TO FULLY EXECUTE AND SUBMIT THIS FORM MAY RESULT IN CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

SOLICITATION NO.: FDVA-ITB-20-006B

SOLICITATION TITLE: **POWER SYSTEM AUTOMATION**

INVITATION TO BID (ITB) DESCRIPTION: CONTRACTOR SHALL PROVIDE ALL VEHICLES, TRAILERS, STORAGE CONTAINERS, DUMPSTERS, LABOR, SERVICES, EQUIPMENT, TOOLS, MATERIALS, PARTS, AND SUPPLIES REQUIRED TO ACHIEVE SPECIFIED POWER SYSTEM AUTOMATION FOR THE BALDOMERO LOPEZ STATE VETERANS' NURSING HOME, LOCATED AT 6919 PARKWAY BIVD, LAND O' LAKES FLORIDA 34639, (BROWARD COUNTY) AS SET FORTH IN THE AGREEMENT.

CONTRACTOR TOTAL PROJECT BID PRICE SHALL BE INCLUSIVE OF ALL REQUIREMENTS AND RELATED COSTS AS STATED IN THIS SOLICITATION AND ANY ADDENDUM ISSUED PRIOR TO BID OPENING DUE DATE AND TIME. TOTAL PROJECT BID PRICE MUST BE IN NUMERICAL U.S. DOLLARS. RESPONSES SUCH AS SYMBOLS, ABBREVIATIONS, "ESTIMATE", "PENDING", "TBD", "TBA", AND THE LIKE THEREOF WILL RESULT IN RESPONDENT BID BEING CONSIDERED NON-RESPONSIVE AND REJECTED.

CONTRACTOR TOTAL PROJECT BID PRICE: \$ _____.

PROJECT COMPLETION: FDVA REQUIRES SPECIFIED SERVICES TO BE COMPLETED TO THE FULL SATISFACTION AND ACCEPTANCE OF FDVA AND ANY APPLICABLE AUTHORITIES HAVING JURISDICTION, WITHIN ONE-HUNDRED -TWENTY (120) CALENDAR DAYS FROM THE DATE OF AGREEMENT'S FULL EXECUTION.

CONTRACTOR ESTIMATED TIME FOR COMPLETION _____ CALENDAR DAYS.

CONTRACTOR'S NAME: _____

MAILING ADDRESS (PHYSICAL STREET): _____

CONTRACTOR'S FEDERAL I.D. #: _____

TELEPHONE #: _____

FAX #: _____ E-MAIL: _____

PERSON TO CONTACT AFTER AWARD: _____

ACKNOWLEDGEMENT: AS THE PERSON AUTHORIZED TO SIGN ON BEHALF OF THE CONTRACTOR, I CERTIFY THAT I HAVE READ AND AGREE TO ABIDE BY ALL TERMS AND CONDITIONS OF THIS SOLICITATION, AND THAT THIS BID IS MADE IN ACCORDANCE WITH ALL REQUIREMENTS OF THE SOLICITATION AND ANY ISSUED ADDENDUM.

AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

FORM "3"
CONTRACTOR REFERENCES

CONTRACTOR MUST INCLUDE THIS FORM FULLY EXECUTED, IN THE PROVIDED FORMAT, WITH RESPONSE TO THIS SOLICITATION. FAILURE TO FULLY EXECUTE AND SUBMIT THIS FORM MAY RESULT IN CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

CONTRACTOR'S NAME: _____

MAILING ADDRESS (PHYSICAL STREET): _____

TELEPHONE #: _____

FAX #: _____ **E-MAIL:** _____

HOW LONG IN PRESENT LOCATION: _____

AUTHORIZED SIGNATURE: _____ **DATE:** _____

PRINT AUTHORIZED NAME: _____ **TITLE:** _____

IN THE FOLLOWING BELOW PROVIDED SPACES, CONTRACTOR SHALL LIST ANY NAMES UNDER WHICH IT OPERATED DURING THE PAST FIVE (5) YEARS:

THE FOLLOWING INFORMATION IS REQUIRED IN ORDER TO PROPERLY EVALUATE CONTRACTOR'S RESPONSE TO THIS SOLICITATION. CONTRACTOR MUST PROVIDE FOUR (4) VERIFIABLE CLIENT REFERENCES IN THE ENGAGED INDUSTRY. REFERENCES LISTED MUST BE FOR COMMODITIES OR SERVICES SIMILAR IN NATURE TO THAT REQUIRED BY THIS SOLICITATION.

THE SAME CLIENT MAY NOT BE LISTED FOR MORE THAN ONE (1) REFERENCE AND CONFIDENTIAL CLIENTS SHALL NOT BE INCLUDED. SUBCONTRACTORS LISTED AS REFERENCES WILL NOT BE ACCEPTED. ENTITIES HAVING AN AFFILIATION WITH THE CONTRACTOR (I.E. CURRENTLY PARENT, SUBSIDIARY HAVING COMMON OWNERSHIP, HAVING COMMON DIRECTORS, OFFICERS OR AGENTS OR SHARING PROFITS OR LIABILITIES) WILL NOT BE ACCEPTED AS REFERENCES.

IN THE EVENT THE CONTRACTOR HAS HAD A NAME CHANGE SINCE THE TIME SIMILAR COMMODITIES OR SERVICES WERE PERFORMED FOR A LISTED REFERENCE, THE NAME UNDER WHICH THE CONTRACTOR OPERATED AT THAT TIME MUST ALSO BE PROVIDED ADJACENT TO THE SPACE PROVIDED FOR CONTRACTOR NAME.

REFERENCES SHOULD BE AVAILABLE FOR CONTACT DURING NORMAL BUSINESS HOURS: 8:00 AM TO 5:00 PM LOCAL TIME. FDVA WILL ATTEMPT TO CONTACT EACH REFERENCE TWO (2) TIMES. IN THE EVENT THE REFERENCE CANNOT BE REACHED, FDVA WILL REQUEST CONTRACTOR TO PROVIDE AN ALTERNATE REFERENCE WITHIN ONE (1) BUSINESS DAY. CONTRACTOR FAILURE TO PROVIDE ALTERNATE REFERENCE WITHIN THE REQUIRED TIME MAY RESULT IN THE CONTRACTOR BEING CONSIDERED NON-RESPONSIVE. FDVA WILL NOT ATTEMPT TO CORRECT AGED OR INCORRECTLY SUPPLIED INFORMATION.

ADDITIONALLY, FDVA RESERVES THE RIGHT TO CONTACT CLIENTS OTHER THAN THOSE IDENTIFIED BY THE CONTRACTOR IN ORDER TO OBTAIN ADDITIONAL INFORMATION REGARDING CONTRACTOR PAST PERFORMANCE. ANY INFORMATION OBTAINED AS A RESULT OF SUCH CONTACT MAY BE USED TO DETERMINE WHETHER OR NOT THE CONTRACTOR IS A "RESPONSIBLE CONTRACTOR", AS DEFINED IN SECTION 287.012 (24), FLORIDA STATUTES.

REFERENCE NUMBER 1:

CONTRACTOR NAME: _____

CLIENT NAME: _____

PHYSICAL STREET ADDRESS: _____

PRIMARY CONTACT NAME: _____

PRIMARY CONTACT PHONE NUMBER: _____

PRIMARY CONTACT EMAIL ADDRESS: _____

CONTRACT PERFORMANCE PERIOD: _____

LOCATION OF SERVICES: _____

BRIEF DESCRIPTION OF SIMILAR COMMODITIES OR SERVICES PROVIDED BY CONTRACTOR TO THIS CLIENT:

REFERENCE NUMBER 2:

CONTRACTOR NAME: _____

CLIENT NAME: _____

PHYSICAL STREET ADDRESS: _____

PRIMARY CONTACT NAME: _____

PRIMARY CONTACT PHONE NUMBER: _____

PRIMARY CONTACT EMAIL ADDRESS: _____

CONTRACT PERFORMANCE PERIOD: _____

LOCATION OF SERVICES: _____

BRIEF DESCRIPTION OF SIMILAR COMMODITIES OR SERVICES PROVIDED BY CONTRACTOR TO THIS CLIENT:

REFERENCE NUMBER 3:

CONTRACTOR NAME: _____

CLIENT NAME: _____

PHYSICAL STREET ADDRESS: _____

PRIMARY CONTACT NAME: _____

PRIMARY CONTACT PHONE NUMBER: _____

PRIMARY CONTACT EMAIL ADDRESS: _____

CONTRACT PERFORMANCE PERIOD: _____

LOCATION OF SERVICES: _____

BRIEF DESCRIPTION OF SIMILAR COMMODITIES OR SERVICES PROVIDED BY CONTRACTOR TO THIS CLIENT:

REFERENCE NUMBER 4:

CONTRACTOR NAME: _____

CLIENT NAME: _____

PHYSICAL STREET ADDRESS: _____

PRIMARY CONTACT NAME: _____

PRIMARY CONTACT PHONE NUMBER: _____

PRIMARY CONTACT EMAIL ADDRESS: _____

CONTRACT PERFORMANCE PERIOD: _____

LOCATION OF SERVICES: _____

BRIEF DESCRIPTION OF SIMILAR COMMODITIES OR SERVICES PROVIDED BY CONTRACTOR TO THIS CLIENT:

FORM "4"
ADDENDUM ACKNOWLEDGMENT

CONTRACTOR MUST INCLUDE THIS FORM FULLY EXECUTED, IN THE PROVIDED FORMAT, WITH RESPONSE TO THIS SOLICITATION. FAILURE TO FULLY EXECUTE AND SUBMIT THIS FORM MAY RESULT IN CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM IF ANY ADDENDUM HAS BEEN PUBLISHED ON THE STATE OF FLORIDA VENDOR BID SYSTEM (VBS).

CONTRACTOR'S FAILURE TO ACKNOWLEDGE BELOW ANY PUBLISHED ADDENDUM MAY RESULT IN THE CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

ADDENDUM NO: _____ DATED: _____ ADDENDUM NO.: _____ DATED: _____

ADDENDUM NO.: _____ DATED: _____ ADDENDUM NO.: _____ DATED: _____

CONTRACTOR'S NAME: _____

MAILING ADDRESS (PHYSICAL STREET): _____

TELEPHONE #: _____

FAX #: _____ E-MAIL: _____

ACKNOWLEDGEMENT: AS THE PERSON AUTHORIZED TO SIGN ON BEHALF OF THE CONTRACTOR, I ACKNOWLEDGE RECEIPT OF THE ISSUED ADDENDUM TO THIS SOLICITATION.

AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

FORM "5"
ATTESTATION OF NO CONFLICT

CONTRACTOR MUST INCLUDE THIS FORM FULLY EXECUTED, IN THE PROVIDED FORMAT, WITH RESPONSE TO THIS SOLICITATION. FAILURE TO FULLY EXECUTE AND SUBMIT THIS FORM MAY RESULT IN CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

ALL CONTRACTOR PERSONNEL, AGENTS, REPRESENTATIVES, SUBCONTRACTORS AND THEIR EMPLOYEES, AND ALL OTHER PERSONS THAT TOOK PART IN THE PROCUREMENT PROCESS ARE REQUIRED TO DISCLOSE IF THEY HAVE ANY CONFLICT OF INTEREST REGARDING SOLICITATION NO. FDVA-ITB-20-006B.

CONTRACTOR'S NAME: _____

MAILING ADDRESS (PHYSICAL STREET): _____

TELEPHONE #: _____

FAX #: _____ E-MAIL: _____

ACKNOWLEDGMENT: EACH UNDERSIGNED INDIVIDUAL HEREBY ATTESTS THAT THEY TOOK PART IN THE PROCUREMENT PROCESS FOR THE ABOVE SPECIFIED SOLICITATION AND THAT THEY HAVE NO CONFLICT OF INTEREST.

1. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

2. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

3. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

4. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

5. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

6. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

7. AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

FORM "6"
DRUG-FREE WORKPLACE CERTIFICATION

CONTRACTOR MUST INCLUDE THIS FORM FULLY EXECUTED, IN THE PROVIDED FORMAT, WITH RESPONSE TO THIS SOLICITATION. FAILURE TO FULLY EXECUTE AND SUBMIT THIS FORM MAY RESULT IN CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

SECTION 287.087, FLORIDA STATUTES, PROVIDES THAT WHERE IDENTICAL (TIE) RESPONSES ARE RECEIVED, PREFERENCE SHALL BE GIVEN TO A BID RECEIVED FROM A RESPONDENT THAT CERTIFIES IT HAS IMPLEMENTED A DRUG-FREE WORKFORCE PROGRAM. PLEASE REVIEW THE BELOW, SIGN, AND RETURN THIS FORM TO CERTIFY RESPONDENT'S IMPLEMENTATION OF A DRUG-FREE WORKPLACE PROGRAM AS FOLLOWS:

1. PUBLISH A STATEMENT NOTIFYING EMPLOYEES THAT THE UNLAWFUL MANUFACTURE, DISTRIBUTION, DISPENSING, POSSESSION, OR USE OF A CONTROLLED SUBSTANCE IS PROHIBITED IN THE WORKPLACE AND SPECIFYING THE ACTIONS THAT WILL BE TAKEN AGAINST EMPLOYEES FOR VIOLATION OF SUCH PROHIBITION.
2. INFORM EMPLOYEES ABOUT THE DANGERS OF DRUG ABUSE IN THE WORKPLACE, THE COMPANY'S POLICY OF MAINTAINING A DRUG-FREE WORKPLACE, ANY AVAILABLE DRUG COUNSELING, REHABILITATION AND EMPLOYEE ASSISTANCE PROGRAMS AND THE PENALTIES THAT MAY BE IMPOSED UPON EMPLOYEES FOR DRUG ABUSE VIOLATIONS.
3. GIVE EACH EMPLOYEE ENGAGED IN PROVIDING THE GOODS OR SERVICES REQUIRED IN THIS SOLICITATION A COPY OF THE STATEMENT SPECIFIED ABOVE IN SECTION 1.
4. IN THE STATEMENT SPECIFIED ABOVE IN SECTION 1, NOTIFY EMPLOYEE(S) AS A CONDITION OF PROVIDING THE GOODS OR SERVICES REQUIRED IN THIS SOLICITATION, THAT EMPLOYEE(S) WILL ABIDE BY THE TERMS OF THE STATEMENT AND WILL NOTIFY COMPANY OF ANY CONVICTION OF, OR PLEA OF GUILTY OR NOLO CONTENDERE TO, ANY VIOLATION OF CHAPTER 893 OR OF ANY CONTROLLED SUBSTANCE LAW OF THE UNITED STATES AND ANY STATE, FOR A VIOLATION OCCURING IN THE WORKPLACE NO LATER THAN FIVE (5) CALENDAR DAYS AFTER SUCH CONVICTION.
5. IMPOSE A SANCTION ON, OR REQUIRE THE SATISFACTORY PARTICIPATION IN A DRUG ABUSE ASSISTANCE OR REHABILITATION PROGRAM IF SUCH IS AVAILABLE IN THE EMPLOYEE'S COMMUNITY BY ANY EMPLOYEE WHO IS SO CONVICTED.
6. MAKE A GOOD FAITH EFFORT TO CONTINUE TO MAINTAIN A DRUG-FREE WORKPLACE THROUGH IMPLEMENTATION OF A DRUG-FREE WORKPLACE PROGRAM.

ACKNOWLEDGMENT: AS THE PERSON AUTHORIZED TO SIGN ON BEHALF OF THE CONTRACTOR, I CERTIFY THAT THIS COMPANY FULLY COMPLIES WITH THE ABOVE REQUIREMENTS. I FURTHER UNDERSTAND THAT THE SUBMISSION OF A FALSE CERTIFICATION MAY RESULT IN TERMINATION OF THE AGREEMENT, AND SUBJECT THE CONTRACTOR TO CIVIL PENALTIES, ATTORNEY'S FEE'S AND COSTS, PURSUANT TO FLORIDA LAW.

CONTRACTOR'S NAME: _____

MAILING ADDRESS (PHYSICAL STREET): _____

TELEPHONE #: _____

FAX #: _____ E-MAIL: _____

AUTHORIZED SIGNATURE: _____ DATE: _____

PRINT AUTHORIZED NAME: _____ TITLE: _____

FORM "7"
NON-COLLUSION AFFIDAVIT

CONTRACTOR MUST INCLUDE THIS FORM FULLY EXECUTED, IN THE PROVIDED FORMAT, WITH RESPONSE TO THIS SOLICITATION. FAILURE TO FULLY EXECUTE AND SUBMIT THIS FORM MAY RESULT IN CONTRACTOR BEING CONSIDERED NON-RESPONSIVE.

STATE OF _____ COUNTY OF _____

CONTRACTOR'S NAME: _____

MAILING ADDRESS (PHYSICAL STREET): _____

I STATE THAT I AM AUTHORIZED TO MAKE THIS AFFIDAVIT ON BEHALF OF THE CONTRACTOR, AND ITS OWNER, DIRECTORS, AND OFFICERS. I AM THE PERSON RESPONSIBLE IN MY FIRM FOR THE PRICE(S) AND THE AMOUNT(S) OF THIS RESPONSE AND THE PREPARATION OF THE RESPONSE TO SOLICITATION NO. FDVA-ITB-20-006B. I STATE THAT:

1. THE PRICE(S) AND AMOUNT(S) OF THIS RESPONSE HAVE BEEN ARRIVED AT INDEPENDENTLY AND WITHOUT CONSULTATION, COMMUNICATION OR AGREEMENT WITH ANY OTHER FIRM OR PERSON.
2. NEITHER THE PRICE(S) NOR THE AMOUNT(S) OF THIS RESPONSE, AND NEITHER THE APPROXIMATE PRICE(S) NOR APPROXIMATE AMOUNT(S) OF THIS RESPONSE, HAVE BEEN DISCLOSED TO ANY OTHER FIRM OR PERSON AND THEY WILL NOT BE DISCLOSED BEFORE RESPONSE OPENING.
3. NO ATTEMPT HAS BEEN MADE OR WILL BE MADE TO INDUCE ANY OTHER FIRM OR PERSON TO REFRAIN FROM SUBMITTING A RESPONSE FOR THIS SOLICITATION, OR TO SUBMIT A PRICE(S) HIGHER THAT THE PRICE(S) IN THIS RESPONSE, OR TO SUBMIT ANY INTENTIONALLY HIGH OR NONCOMPETITIVE PRICE(S) OR OTHER FORM OF COMPLEMENTARY RESPONSE.
4. THE RESPONSE IS MADE IN GOOD FAITH AND NOT PURSUANT TO ANY AGREEMENT OR DISCUSSION WITH, OR INDUCEMENT FROM, ANY OTHER FIRM OR PERSON TO SUBMIT A COMPLEMENTARY OR OTHER NONCOMPETITIVE RESPONSE.
5. THE NAMED CONTRACTOR, ITS AFFILIATES, SUBSIDIARIES, OFFICERS, DIRECTOR, AND EMPLOYEES ARE NOT CURRENTLY UNDER INVESTIGATION, BY ANY GOVERNMENTAL AGENCY AND HAVE NOT IN THE LAST THREE YEARS BEEN CONVICTED OR FOUND LIABLE FOR ANY ACT PROHIBITED BY STATE OR FEDERAL LAW IN ANY JURISDICTION, INVOLVING CONSPIRACY OR COLLUSION WITH RESPECT TO SUBMITTING A RESPONSE ON ANY PUBLIC CONTRACT.

I STATE THAT I, AND THE NAMED CONTRACTOR, UNDERSTAND AND ACKNOWLEDGE THAT THE ABOVE REPRESENTATIONS ARE MATERIAL AND IMPORTANT, AND WILL BE RELIED ON BY THE STATE OF FLORIDA FOR WHICH THIS RESPONSE IS SUBMITTED. I UNDERSTAND AND MY FIRM UNDERSTANDS ANY MISSTATEMENT IN THIS AFFIDAVIT IS AND SHALL BE TREATED AS FRAUDULENT CONCEALMENT FROM THE STATE OF FLORIDA OF THE TRUE FACTS RELATING TO THE SUBMISSION OF RESPONSE FOR THE AGREEMENT.

AUTHORIZED SIGNATURE

PRINTED NAME AND TITLE

SWORN TO AND SUBSCRIBED BEFORE ME ON THIS _____ DAY OF _____ 2019.

SIGNATURE OF NOTARY

STATE OF _____

PRINT, TYPE OR STAMP COMMISSIONED NAME OF NOTARY PUBLIC _____

PERSONALLY KNOWN OR PRODUCED IDENTIFICATION: _____

TYPE OF IDENTIFICATION PRODUCED: _____

**FORM "8"
PERFORMANCE AND PAYMENT BOND ("DRAFT")**

PERFORMANCE AND PAYMENT BOND

(Statutory Bond for Performance and Payment pursuant to Section 255.05, Florida Statutes)

BOND NO. (Enter Bond Number)

BY THIS BOND, We, _____, a state of _____ Corporation, with a principal address of _____ (Telephone No. _____) as Principal and _____, a state of _____ corporation, as Surety, are bound to the State of Florida, Owner, and Department of Veterans' Affairs ("FDVA"), as State of Florida's Contracting Public Entity, with an address at 11351 Ulmerton Road, Suite 311-K, Largo, Florida 33778-1630, in the sum of \$TBD, for payment of which we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally in connection with the performance of the Contract No.: FDVA-ITB-20-006B, dated _____, 2019, and titled "Power System Automation" in order to furnish all labor, services (including design-build), equipment, tools, materials, parts, and supplies necessary for the Lopez Power System Automation to achieve the requirements of Agreement at the following service location:

**Baldomero Lopez State Veterans' Nursing Home
6919 Parkway Blvd
Land O' Lakes Florida 34639**

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the Contract No. FDVA-ITB-20-006B dated _____, 2019, including amendments thereto, if any, between Principal and Owner for the installation of "Power System Automation" as described above, the contract being made a part of this bond by reference, at the times and in the manner prescribed in the contract; and
2. Promptly makes payments to all claimants, as defined in Section 255.05(1), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the work provided for in the contract; and
3. Pays Owner any and all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Principal under the contract; and
4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.

Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05(2) and (10), Florida Statutes. This instrument shall be construed in all respects as a statutory law bond of the State of Florida, pursuant to Section 255.05, Florida Statutes. Any changes in or under the contract documents and compliance or noncompliance with any formalities connected with the contract or the changes does not affect Surety's obligation under this bond.

BOND NO. _____

IN WITNESS WHEREOF, the above parties have executed this instrument this _____ day of _____, 2019, the name and corporate seal of each corporate party being hereto affixed and these premises duly signed by its undersigned representative, pursuant to authority of its governing body.

PRINCIPAL: _____

ATTEST:

Signature

Signature

Corporate / Print Name and Title

Corporate Secretary

WITNESSES:

SURETY: _____

ATTEST:

Attorney-in-Fact (Signature)

Signature

Print Name

Corporate Secretary

Name and Address of Registered Agent:

WITNESSES:

Telephone No: _____

STATE OF _____; COUNTY OF _____

Before me this day personally appeared _____ who, being duly sworn, deposes and says that he/she is the Attorney-in-Fact for the _____ (corporate surety) and that this person has been authorized by _____ (corporate surety) to execute the foregoing bond.

Signature of Affiant: _____

Sworn to / affirmed and subscribed before me this _____ day of _____, 2019, by

_____, who is personally known to me, or who has produced

_____ as identification.

NOTARY PUBLIC, STATE OF _____ (Signature)

Print Name: _____

(Seal)

Commission No. _____

Commission Expires:

Exhibit A
"Scope of Work"

Section#

26 0000	General Electrical Requirements
26 0519	Low-Voltage Electrical Power Conductors and Cable
26 0526	Grounding and Bonding for Electrical Systems
26 0533	Raceway and Boxes for Electrical Systems
26 0543	Underground Ducts and Raceways for Electrical Systems
26 0543.13	Excavation and Backfill
26 0553	Electrical Systems Identification
26 3623	Transfer Switches



FLORIDA DEPARTMENT
OF VETERANS' AFFAIRS

Baldomero Lopez State Veterans Nursing Home Power System Automation

6919 Parkway Boulevard
Land O' Lakes, Florida 34639



100% CONSTRUCTION DOCUMENTS

AHCA CLIENT CODE/FILE-PROJECT SUB NUMBER: 35/35960936-105-4

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DIVISION 26 - ELECTRICAL

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SECTION 26 0000

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Intent of drawings and Specifications is to obtain complete systems tested, adjusted, and ready for operation.
- B. Except as otherwise defined in greater detail, the terms "provide", "furnish" and "install" as used in Division 26 Contract Documents shall have the following meanings:
 - 1. "Provide" or "provided" shall mean "furnish and install".
 - 2. "Furnish" or "furnished" does not include installation.
 - 3. "Install" or "installed" does not include furnishing.
- C. Include incidental details not usually shown or specified, but necessary for proper installation and operation.
- D. Check, verify and coordinate work with drawings and specifications prepared for other trades. Include modifications, relocations or adjustments necessary to complete work or to avoid interference with other trades.
- E. Included in this Contract are electrical connections to equipment provided by others. Refer to Architectural, Mechanical, Plumbing, and final shop drawings for equipment being furnished under other sections for exact locations of electrical outlets and various connections required.
- F. Information given herein and on drawings is as exact as could be secured but is not guaranteed. Do not scale drawings for dimensions.
- G. Where architectural features govern location of work, refer to Architectural Drawings.
- H. Perform work in "neat and workmanlike" manner as defined in ANSI/NECA 1, Standard Practices for Good Workmanship in Electrical Contracting.

1.02 RELATED WORK

- A. Utility Services:
 - 1. Include costs for temporary service, temporary routing of service or other requirements of a temporary nature associated with utility service.
- B. Continuity of Service:
 - 1. No service shall be interrupted or changed without permission from Architect and Owner. Obtain written permission before work is started.
 - 2. When interruption of services is required, Architect, Owner and other concerned parties shall be notified and shall determine a time.
- C. Demolition:
 - 1. Perform required demolition to accomplish new work.
 - a. Remove abandoned wiring to source of supply.
 - b. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
 - c. Disconnect abandoned outlets and remove devices.
 - d. Remove abandoned outlets if conduit servicing them is abandoned and removed.

- e. Provide blank cover for abandoned outlets that are not removed.
 - f. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
 - g. Disconnect and remove abandoned luminaries. Remove brackets, stems, hangers, and other accessories.
 - h. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
2. Accomplish work in neat workmanlike manner to minimize interference; annoyance or inconvenience such work might impose on Owner or other Contractors.
 3. Unless otherwise noted, remove from premises materials and equipment removed in demolition work.
 4. Equipment noted to be removed and turned over to Owner, shall be delivered to Owner at place and time Owner designates.
 5. Where materials are to be turned over to Owner or reused and installed by Contractor, it shall be Contractor's responsibility to maintain condition of materials and equipment equal to that existing before work began. Repair or replace damaged materials or equipment at no additional cost to Owner.
 6. Where demolition work interferes with Owner's use of premises, schedule work through Architect, Owner and with other Contractors to minimize inconvenience to Owner. Architect must approve schedule before Contractor begins such work.

D. Cleaning and Repair

1. Clean and repair existing materials and equipment that remain or are to be reused.
2. Panelboards.
 - a. Clean exposed surfaces and check tightness of electrical connections.
 - b. Replace damaged circuit breakers and provide closure plates for vacant positions.
 - c. Provide typed circuit directory showing revised circuiting arrangement.
3. Luminaires:
 - a. Remove existing luminaries for cleaning.
 - b. Use mild detergent to clean exterior and interior surfaces; rinse with clean water and wipe dry.
 - c. Replace lamps and broken electrical parts.

E. Concrete Work:

1. Provide cast-in-place concrete as required by Contract Documents unless otherwise noted.
2. Provide anchor bolts, metal shapes and templates to be cast in concrete or used to form concrete as required for anchoring and supporting electrical equipment.

F. Painting:

1. Furnish equipment with factory applied prime finish unless otherwise specified.
2. If factory finish on equipment furnished by Contractor is damaged in shipment or during construction, refinish equipment to satisfaction of Architect.
3. Furnish one can of touch up paint for each final factory-applied finish coat of product.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Rules and regulations of Federal, State and local authorities and utility companies, in force at time of execution of Contract shall become part of this specification.

1.04 REFERENCE STANDARDS

- A. Agencies or publications referenced herein refer to the following:
1. AEIC Association of Edison Illuminating Companies

2. ANSI American National Standards Institute
3. ASME American Society of Mechanical Engineers
4. ASTM American Society for Testing and Materials
5. BICSI Building Industry Consulting Services International
6. EIA Electronic Industries Association
7. FBC Florida Building Code (2017)
8. FAC Florida Administrative Code
9. ICEA Insulated Cable Engineers Association
10. IEEE Institute of Electrical & Electronics Engineers
11. NECA National Electrical Contractors Association
12. NEMA National Electrical Manufacturers Association
13. NESC National Electrical Safety Code
14. NETA National Electrical Testing Association
15. NFPA National Fire Protection Association
 - a. NFPA 70 National Electrical Code (2014)
 - b. NFPA 72 National Fire Alarm Code (2013)
 - c. NFPA 99 Standard for Health Care Facilities (2015)
 - d. NFPA 110 Emergency and Standby Power Systems (2013)
16. NIST National Institute of Standards & Technology
17. OSHA Occupational Safety and Health Administration
18. TIA Telecommunications Industries Association
19. UL Underwriters Laboratories, Inc.

B. Work shall be in accordance with latest edition of codes, standards or specifications unless noted otherwise.

1.05 LISTING

- A. Install materials bearing UL label or UL listing, unless UL label or listing is not available for that type of material.
- B. Other nationally recognized testing agencies, acceptable to AHJ, are approved.

1.06 ENCLOSURES

- A. Typical NEMA Enclosures and Usage
 1. NEMA 1 - Indoors. Falling dirt.
 2. NEMA 2 - Indoors. Falling dirt. Falling liquids. Light splashing.
 3. NEMA 3 - Outdoors. Sleet, snow, rain. Windblown dust.
 4. NEMA 3X - Same as NEMA 3 plus corrosion resistant.
 5. NEMA 3S - Same as NEMA 3 plus mechanism operable when ice covered.
 6. NEMA 3SX - Same as NEMA 3S plus corrosion resistant.
 7. NEMA 3R - Outdoors. Rain, snow, sleet.
 8. NEMA 3RX - Same as NEMA 3R plus corrosion resistant.
 9. NEMA 4 - Indoors. Falling dirt. Falling and light splashing liquids. Flying dust, lint and fibers. Hose down.
 10. NEMA 4X - Same as NEMA 4 - Indoors plus corrosion resistant.
 11. NEMA 4 - Outdoors. Rain, sleet, snow. Wind-blown dust. Hose down.
 12. NEMA 4X - Same as NEMA 4 - Outdoors plus corrosion resistant.

13. NEMA 5 - Indoors. Falling Dirt. Falling Liquids. Settling dust, lint and fibers.
14. NEMA 6 - Indoors. Falling dirt. Falling and light splashing liquids. Flying dust, lint and fibers. Hose down. Temporary submersion.
15. NEMA 6P - Same as NEMA 6 - Indoors plus corrosion resistant. Prolonged submersion.
16. NEMA 6 - Outdoors. Rain, snow, sleet. Windblown dust. Hose down. Temporary submersion.
17. NEMA 6P - Same as NEMA 6 - Outdoors plus corrosion resistant. Prolonged Submersion.
18. NEMA 7 - Indoors. Class I, Division 1 or 2, Groups A, B, C or D. (Flammable gas).
19. NEMA 9 - Indoors. Class II, Division 1 or 2. Groups E, R, or G. (Combustible dust).
20. NEMA 12 - Indoors. Falling Dirt. Falling liquids. Flying dust, lint and fibers. Oil or coolant seepage.
21. NEMA 13 - Same as NEMA 12 plus oil or coolant spraying or splashing.

1.07 SUBMITTALS

A. Shop Drawings (Product Data):

1. Note that for satisfying submittal requirements for Division 26, "Product Data" is usually more appropriate than true "Shop Drawings" as defined in Division 01. However, the expression "Shop Drawings" is generally used throughout Specification.
2. Submit shop drawings for equipment and systems as requested in respective specification sections. Submittals which are not requested may not be reviewed.
3. Specifically mark general catalog sheets and drawings to indicate specific items submitted and its correlation to specific designation for product in drawings.
4. Specifically indicate proper identification of equipment by name and/or number, as indicated in specification and shown on drawings.
5. When manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item. Clearly mark and note submittal accordingly.
6. Submit complete record of required components when luminaires, equipment and items specified include accessories, parts and additional items under one designation.
7. Include wiring diagrams for electrically powered or controlled equipment.
8. Submit electrical equipment room layouts drawn to scale, including equipment, raceways, accessories and required working clearances. Submit electrical equipment room layouts concurrently with electrical distribution equipment submittals.
9. Where submittals cover products containing non-metallic materials, include "Material Safety Data Sheet" (MSDS) from manufacturer stating physical and chemical properties of components and precautionary considerations required.
10. Submit shop drawings or product data as soon as practicable after signing contracts. Submittals must be approved before installation of materials and equipment.
11. Submittals that are not complete, not permanent, or not properly checked by Contractor, will be returned without review.

B. Certificates and Inspections:

1. Obtain and pay for inspections required by authorities having jurisdiction and deliver certificates approving installations to Owner unless otherwise directed.

C. Operation and Maintenance Manuals:

1. Upon completion of work but before final acceptance of system, submit to Architect for approval, 3 copies of operation and maintenance manuals in loose-leaf binders. If "one copy" is larger than 2" thick or consists of multiple volumes, submit only one set initially for review. After securing approval, submit 3 copies to Owner.
2. Organize manuals by specification section number and furnish table of contents and tabs for each piece of equipment or system.

3. Manuals shall include the following:
 - a. Copies of shop drawings
 - b. Manufacturer's operating and maintenance instructions. Include parts lists of items or equipment, with component exploded views and part numbers. Where manufacturer's data includes several types or models, designate applicable type or model.
 - c. CD ROM's of O&M data with exploded parts lists where available
 - d. Phone numbers and addresses of local parts suppliers and service companies
 - e. Internet/WEB page addresses where applicable
 - f. Wiring diagrams
 - g. Start up and shut down procedure
 - h. Factory and field test records
 - i. Additional information, diagrams or explanations as designated under respective equipment or systems specification section
4. Instruct Owner's representative in operation and maintenance of equipment. Instruction shall include complete operating cycle on all apparatus.
5. Furnish O&M manuals and instructions to Owner prior to request for final payment.

D. Record Documents:

1. Use designated set of prints of Contract Documents as prepared by Architect to mark-up for record drawing purposes.

1.08 JOB CONDITIONS

A. Building Access:

1. Arrange for necessary openings in building to allow for admittance of all apparatus.

B. Coordination:

1. Equipment provided under other Divisions of these specifications.
 - a. Motors
 - b. Electrically powered equipment
 - c. Electrically controlled equipment
 - d. Starters, where specified
 - e. Variable frequency drives, where specified
 - f. Control devices, where specified
 - g. Temperature Control wiring
2. Provide the following devices required for control of motors or electrical equipment, unless noted otherwise:
 - a. Starters
 - b. Disconnect devices
 - c. Control devices:
 - 1). Pushbuttons
 - 2). Pilot lights
 - 3). Contacts
 - d. Conduit, boxes and wiring for Power wiring
3. Connect and wire equipment complete and ready to operate according to wiring diagrams furnished by various trades.
4. Wire starters or other similar control devices furnished by others.
5. This contractor's drawings and/or specifications show number and hp rating of motors furnished by others, together with their actuating devices. Should any change in size, hp rating, voltage, or means of control be made to any motor or other electrical equipment after

Contracts are awarded, Contractor responsible for change shall immediately notify this Contractor. Additional costs due to these changes shall be responsibility of Contractor initiating change.

6. Equipment and wiring shall be selected and installed for conditions in which it will be required to perform. (i.e., general purpose, weatherproof, rain tight, explosion proof, dust tight, or any other special type as required.)
7. Comply with local utility motor starting requirements and provide starters for motors furnished by others as specified herein or under various trade sections of those specifications.

C. Cutting and Patching:

1. Perform cutting and patching required for complete installation of systems, unless otherwise noted. Patch and restore work cut or damaged to original condition. This includes openings remaining from removal or relocation of existing system components.
2. Provide materials required for patching unless otherwise noted.
3. Do not pierce beams or columns without permission of Architect and then only as directed. If openings are required through walls or floors where no sleeve has been provided, hole shall be core drilled to avoid unnecessary damage and structural weakening.
4. Where alterations disturb lawns, paving, walks, etc., replace, repair or refinish surfaces to condition existing prior to commencement of work. This may include areas beyond construction limits.

D. Housekeeping and Cleanup:

1. As work progresses or as directed by Architect, periodically remove waste materials from building and leave area of work broom clean. Upon completion of work, remove tools, scaffolding, broken and waste materials, etc. from site.

1.09 WARRANTY

- A. Refer to technical sections for warranty requirement for each system.
 1. Where no warranty requirements are called out, warrant for 1 year after final acceptance by Owner equipment, materials, and workmanship to be free from defect.
- B. Repair, replace, or alter systems or parts of systems found defective at no extra cost to Owner.
- C. In any case, wherein fulfilling requirements of any guarantee, if this contractor disturbs any work guaranteed under another contract, this contractor shall restore such disturbed work to condition satisfactory to Architect and guarantee such restored work to same extent as it was guaranteed under such other contract.
- D. Warranty shall include labor, material, and travel time.

PART 2 - EXECUTION

2.01 GENERAL

- A. Verify elevations and dimensions prior to installation of materials.

2.02 DELIVERY, STORAGE, AND HANDLING

- A. Store products in clean, dry space.
- B. Maintain factory wrapping or provide cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle in accordance with manufacturer's written instructions.

- D. Handle carefully to avoid damage to components, enclosure, and finish. Lift only with lugs provided for the purpose.
- E. Provide supplemental heat if required to prevent moisture contamination.

2.03 FLOOR, WALL, ROOF AND CEILING OPENINGS

- A. Coordinate location of openings, chases, furred spaces, etc. with appropriate Contractors. Provide sleeves and inserts that are to be built into structure during progress of construction.
- B. Remove temporary sleeves, if used to form openings, prior to installation of permanent materials. Utilize minimum 24 ga galvanized sheet metal for permanent sleeves unless otherwise noted.
- C. Provide Schedule 40 carbon steel pipe with integral water stop for steel sleeves required below grade or to exterior.
- D. Submit to Structural Engineer for review and approval size and location of core-drilled holes prior to execution.
- E. Submit product data and installation details for penetrations of building structure. Include schedule indicating penetrating materials, (steel conduit, PVC conduit, cables, cable tray, etc.), sizes of each, opening sizes and sealant products intended for use.
- F. Where penetrations of fire-rated assemblies are involved, seal penetrations with appropriate firestopping systems as specified in Section 26 0593 - Electrical Systems Firestopping.
- G. Provide 2" clearance around penetration openings intended for raceways and cables. Where fire resistant penetrations are required, size openings in accordance with written recommendations of firestopping systems manufacturer.
- H. Seal non fire-rated floor penetrations with non-shrink grout equal to Embecco by Master Builders, or urethane caulk, as appropriate.
- I. Seal non-rated wall openings with urethane caulk.
- J. Where penetrations occur through exterior walls into building spaces, use steel sleeves with integral water stop, similar to type "WS" wall sleeves by Thunderline Corporation. Seal annular space between sleeves and pipe with "Link-Seal" modular wall and casing seals by Thunderline Corporation, or sealing system by another manufacturer approved as equal by Engineer. Sealing system shall utilize Type 316 stainless steel bolts, washers and nuts.
- K. Finish and trim penetrations as shown on details and as specified.
- L. Provide chrome or nickel plated escutcheons where raceways pass through walls, floors or ceilings and are exposed in finished areas. Size escutcheons to fit raceways for finished appearance. Finished areas shall not include mechanical/electrical rooms, janitor's closets, storage rooms, etc., unless suspended ceilings are specified.

2.04 EQUIPMENT ACCESS

- A. Install raceways, junction and pull boxes, and accessories to permit access to equipment for maintenance. Relocate raceways or accessories to provide maintenance access at no additional cost to Owner.
- B. Install equipment with sufficient maintenance space for removal, repair or changes to equipment. Provide ready accessibility to equipment and wiring without moving other future or installed equipment.

- C. Access doors in walls, chases, or inaccessible ceilings will be provided under Division 08 - Access Doors and Frames, unless otherwise indicated. Access doors for equipment shall provide access for servicing, repairs and/or maintenance.
- D. Provide necessary coordination and information to the Trade Contractor under Division 08 - Access Doors and Frames. This information shall include required locations, sizes and rough-in dimensions.
- E. Provide access doors in walls, chases or inaccessible ceilings for equipment requiring access for servicing, repairs and maintenance, unless otherwise noted. Access frames and doors shall be as manufactured by Milcor, Incorporated, or similar, of style applicable to surface. Provide access doors used in fire-rated construction with UL label. Provide steel, prime-coated access doors in dry locations. Provide stainless steel access doors for use in ceramic tile walls, toilet rooms, locker rooms, and in areas subject to excessive moisture. Provide access doors of sufficient size to allow complete maintenance. Coordinate location of access doors with General Contractor and rough-in equipment accordingly.
- F. Locate electrical outlets and equipment to fit details, panels, decorating or finish at space. Architect reserves right to make minor position changes of outlet locations before work has been installed.
- G. Verify door swings before installing room light switch boxes. Install boxes on latch side of door unless otherwise noted

2.05 EQUIPMENT SUPPORTS

- A. Provide supporting steel not indicated on drawings as required for installation of equipment and materials including angles, channels, beams, hangers, etc.
- B. Provide steel shell with plug type concrete anchors for attaching equipment to concrete. Plastic, rawhide or anchors using lead are not allowed.
- C. Do not support equipment or luminaires from metal roof decking.

2.06 SUPPORT PROTECTION

- A. In occupied areas, mechanical and electrical rooms and areas requiring normal maintenance access, guard certain equipment to protect personnel from injury.
- B. Provide minimum 1/2" thick Armstrong Armaflex insulation or similar product applied with Armstrong 520 adhesive on lower edges of equipment, including bus duct, cable tray, pull boxes and electrical supporting devices suspended less than 7 ft above floors, platforms or catwalks in these areas.
- C. Protect threaded rods or bolts at supporting elements as described above. Trim threaded rods or bolts such that they do not extend beyond supporting element.

2.07 LEAD SHIELDING

- A. Wherever installation of this contractor's equipment destroys radiological integrity of wall, floor, or ceiling, this contractor shall be responsible to provide suitable lead shielding to restore that integrity. Coordinate these requirements with General Contractor.

2.08 ELECTRICAL SYSTEMS IDENTIFICATION

- A. Refer to Section 26 0553 – Electrical Systems Identification.

2.09 ACCEPTANCE TESTING

- A. Contractor shall engage testing and inspection agency to perform acceptance tests. Equipment to be tested is noted as "Testing by Testing Agency" in technical specification sections.
- B. Contractor shall perform acceptance testing. Equipment to be tested is noted as "Testing by Electrical Contractor" in technical specification sections.
- C. When testing is to be witnessed by Architect/Engineer or Inspector, notify them at least 10 days prior to testing date.
- D. When equipment or systems fail to meet minimum test requirements, replace or repair defective work or materials as necessary and repeat inspection and test until equipment or systems meet test requirements. Make repairs with new materials.
- E. Contractor is responsible for certifying in writing equipment and system test results. Certification shall include identification of portion of system tested, date, time, test criteria and name and title of person signing test certification documents.
- F. Maintain copies of certified test results, including those for any failed tests, at project site. At completion of project, include copies of test records and certifications in O&M Manuals.

2.10 START-UP

- A. Systems and equipment shall be started, tested, adjusted, and turned over to Owner ready for operation. This includes "Owner-Furnished, Contractor-Installed" (OFICI) and "Contractor-Furnished, Contractor-Installed" (CFCI) systems and equipment.
- B. Follow manufacturer's pre-start-up checkout, start-up, trouble shooting and adjustment procedures.
- C. Contractor shall provide services of technician/mechanic knowledgeable in start-up and checkout of types of systems and equipment on project.
- D. Provide start-up services by manufacturer's representative where specified or where Contractor does not have qualified personnel.
- E. Coordinate start-up with all trades.

2.11 CLEANING

- A. Clean systems after installation is complete.
- B. Vacuum debris from panelboards, switchboards, motor starter and disconnect switch enclosures, junction boxes and pull boxes two weeks before energization and again prior to completion.
- C. Where louvers are provided in switchgear or transformer enclosures, vacuum louvers free of dust and dirt.
- D. Clean luminaire lenses and lamps at time of installation and clean lens exteriors just prior to final inspection.
- E. Thoroughly clean equipment of stains, paint spots, dirt and dust. Remove temporary labels not used for instruction or operation.

END OF SECTION

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SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0543.16 - Cable in Duct System
- B. Section 26 0553 - Electrical Systems Identification

1.02 REFERENCE

- A. Work under this section is subject to requirements of Contract Documents including General Conditions, Supplementary Conditions.

1.03 DESCRIPTION

- A. Section includes conductors and cables rated 600V and less, connectors, splices, and terminations rated 600V and less, sleeves and sleeve seals for cables.
- B. Conductor and conduit sizes in these contract documents are based on copper wire, and only copper wire shall be used.

1.04 REFERENCE STANDARDS

- A. ASTM B 1 – Standard Specification for Hand-Drawn Copper Wire.
- B. ASTM B 8 – Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
- C. NEMA WC 70 – Non-Shielded Power Cable 2000 V or less for the Distribution of Electrical Energy (ICEA S-95-658).
- D. NFPA 70 – National Electrical Code.
- E. NFPA 99 – Health Care Facilities Code
- F. NFPA 110 – Standard for Emergency and Standby Power Systems
- G. UL 44 – Thermoset-Insulated Wires and Cables.
- H. UL 83 – Thermoplastic-Insulated Wires and Cables.
- I. UL 486A-486B – Wire Connectors.
- J. UL 486C – Splicing Wire Connectors.
- K. UL 486D – Standard for Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
- L. UL 486E – Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.
- M. UL 1569 – Standard for Metal-Clad Cables.

1.05 SUBMITTALS

- A. **Product Data:** For each type of product indicated.
- B. **Manufacturer's Installation Instructions:** Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation.
- C. **Test Reports:** Indicate field test and inspection procedures and interpret test results and corrective action taken for compliance with specification requirements.
- D. **Closeout Submittals:**
 - 1. **Project Record Documents:**
 - a. Record actual locations of components and circuits.
 - 2. **Operation and Maintenance Data:**
 - a. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.

1.06 QUALITY ASSURANCE

- A. **Regulatory Requirements:**
 - 1. Comply with NFPA 70 for components and installation.
 - 2. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.
- B. **Wire and cable boxes and reels shall bear the date of manufacture.**
 - 1. Date of manufacture shall not precede contract date by more than one year.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space. Protect from dirt, fumes, water, corrosive substances, and construction debris.

1.08 WARRANTY

- A. Refer to Section 26 0000 – General Electrical Requirements for general warranty requirements.
- B. Manufacturer shall provide standard 1 yr warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of final acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Alcan Products Corporation; Alcan Cable Division
- B. General Cable Corporation
- C. Southwire Company
- D. Approved equal

2.02 DESCRIPTION

- A. **NEMA WC 70; single copper conductor insulated wire; 600 V rated insulation; 90°C maximum operating temperature for dry and wet or damp locations.**
 - 1. Thermoplastic-insulated wires and cables: NEMA WC 5, UL 83; Type THHN.

2. Thermoset-insulated wires and cables: NEMA WC 3, UL 44; Type XHHW-2 and SO.
- B. Metal-clad cable, Type MC; UL 1569:**
1. Impervious, corrugated, continuous, seam welded metal sheath.
 2. Single grounding conductor.
 3. Listed for cable tray use

2.03 REMOTE CONTROL AND SIGNAL CIRCUITS

- A. Class 1**
1. Copper conductor, single insulated wire.
 2. Insulation type THHN rated 90°C, 600 V insulation class.
 3. Type XHHW for ambient temperature less than 32°F.
 4. UL 83 listed, ASTM B 1 for solid conductors; ASTM B 8 for stranded conductors.
- B. Classes 2 and 3**
1. Copper conductor, multiple twisted conductors covered with an overall non-metallic jacket unless otherwise noted.
 2. Insulation type XLEP, rated 105°C, 300 V insulation class.
 3. UL listed for use in space in which circuits will be installed.

2.04 CONNECTORS, SPLICES, AND TERMINALS

- A. Manufacturers:**
1. AFC Cable Systems, Inc.
 2. Hubbell Power Systems, Inc.
 3. O-Z/Gedney; EGS Electrical Group LLC.
 4. 3M; Electrical Products Division
 5. Tyco Electronics Corp.
 6. Approved equal
- B. Description: UL 486A-486B, UL 486C, UL 486D, UL 486E; factory-fabricated connectors, splices, and terminals of size, ampacity rating, material, type, and class for application and service indicated.**

2.05 TERMINATIONS

- A. Compression set, bolted or screw type lug, or direct to bolted or screw type terminal.**

2.06 PLASTIC CABLE TIES

- A. Nylon or approved; locking type; metallic ties not permitted**

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUCTORS AND CABLES

- A. Install conductors in a raceway system, unless otherwise specified or indicated.**
- B. Install conductors only after:**
1. Building interior is enclosed and weather tight
 2. Mechanical work likely to damage conductors has been completed
 3. Raceway installation is complete and supported

- C. Pull conductors into raceway at same time.
- D. Neatly train and lace conductors inside boxes, equipment, and panelboards.
- E. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- F. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- G. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- H. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible. Protect exposed cables from damage.
- I. Support cables above accessible ceiling from structure. Do not rest cable on ceiling panels.
- J. Do not support cables and conductors to the exterior of raceways.
- K. Identify and color-code conductors and cables according to Section 26 0553 - Electrical Systems Identification.
- L. Wiring at Outlets: Install conductor at each outlet, with minimum 12" of slack.
- M. Limit conduit fill to a maximum of 9 current-carrying conductors.
- N. Install stranded conductors where conductors terminate in crimp type lugs. Do not place bare stranded conductors directly under screws.

3.02 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid or stranded for #10 AWG and smaller; stranded for #8 AWG and larger.
- B. Branch Circuits: Copper. Solid or stranded for #10 AWG and smaller; stranded for #8 AWG and larger.
- C. Minimum conductor sizes shall be as follows:
 1. #12 AWG – Branch circuits of any kind.
 2. #14 AWG – Fire alarm system.
 3. #16 AWG – Remote control and signal systems.
- D. Branch wiring length limitations:
 1. 208Y/120 V circuits over 100' in length: Increase wire size one size for each 100' of length. Increase conduit size as required.
 2. 480Y/277 V circuits over 150' in length: Increase wire size one size for each 150' of length. Increase conduit size as required.

3.03 CONDUCTOR INSULATIONS AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, rated 90°C for wet locations, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, rated 90°C for wet locations, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, rated 90°C for wet locations, single conductors in raceway.

- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN rated 90°C for dry and wet or damp locations, single conductors in raceway.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN, rated 90°C for dry and wet or damp locations, single conductors in raceway.
- F. Motor Circuit Branch Wiring and Associated Control Wiring: Type THHN, rated 90°C for dry and damp locations, single conductors in raceway, stranded.
- G. Branch Circuits Single Conductors In Raceway: 90°C rated conductors sized at 75°C rating for connection to equipment and devices.
- H. Metal-clad cable, Type MC, use for the following:
 - 1. Recessed and semi-recessed lighting fixtures only.
- I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.04 REMOTE CONTROL AND SIGNAL CIRCUITS

- A. Sizing – #16 AWG minimum.
- B. Installation:
 - 1. Install cables in cable tray and cable rings.
 - 2. Provide protection for exposed cables where subject to damage.
 - 3. Support cables above accessible ceilings; do not rest on ceiling tiles.
 - 4. Use suitable cable fittings and connectors.

3.05 CONNECTORS, SPLICES, AND TERMINALS

- A. Connectors:
 - 1. Except where equipment is furnished with bolted or screw type lug, use compression set pressure connectors with insulating covers. Use compression tools and die compatible with connectors being installed.
 - 2. Use bolt or compression-set type with application of insulating tape, pre-stretched or heat-shrinkable insulating tubing for splices and taps of #8 AWG conductors and larger. Install with hydraulic compression tool.
 - 3. Use pre-insulated "twist-on" connectors with integral spring for splices and taps of #10 AWG conductors and smaller.
 - 4. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
 - 5. Terminate aluminum conductors with tin-plated, aluminum-bodied compression connectors only.
 - 6. Install suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
- B. Splices:
 - 1. Splice wires and cable only in accessible locations such as within junction boxes.
 - 2. Make splices to carry full capacity of conductors with no perceptible temperature rise.
 - 3. Make below-grade splices in manholes and handholes watertight with pre-stretched or heat-shrinkable insulating tubing, or resin-filled insulator.
 - 4. Use electrical tape to build up insulation level equivalent to cable insulation and cover with not less than two half-lapped layers of plastic electrical tape, for joints, taps, and splices of #1 AWG conductors and larger.

5. Plastic snap-on splice insulators are not allowed.
6. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
7. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Terminals:

1. Insulate ends of spare conductors with electrical tape and identify spare circuit number where appropriate.
2. Eye type crimped terminal for removable screw type terminal. Forked torque terminal when screw terminal cannot be removed.
3. Train wires to eliminate fanning of strands, crimp with proper tool and die.
4. Torque screw termination per manufacturer's recommended values.

3.06 FIELD QUALITY CONTROL

- A. Test 600 volt conductors and cables per requirements in Sections 26 0812 – Power Distribution Acceptance Tests and 26 0813 – Power Distribution Acceptance Test Tables.
- B. Interpret test results in writing and submit to Engineer.
- C. Replace conductors and cables that are found defective, at no expense to Owner.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0543 - Ducts and Raceways for Electrical Systems
- B. Section 26 0812 - Power Distribution Acceptance Tests
- C. Section 26 0813 - Power Distribution Acceptance Test Tables

1.02 REFERENCE

- A. Work under this Section is subject to requirements of Contract Documents including General Conditions and Supplementary Conditions.

1.03 DESCRIPTION

- A. Section includes methods and materials for grounding systems and equipment, as required by State Codes, NFPA 70, applicable portions of other NFPA codes, as indicated herein, plus the following special applications:
 - 1. Common ground bonding with lightning protection system.
- B. Maximum resistance to ground shall be less than 25 ohms.
- C. Refer to Grounding Riser Diagram.

1.04 REFERENCE STANDARDS

- A. TIA-607-B – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
- B. ASTM B 3 – Specification for Soft or Annealed Copper Wire
- C. ASTM B 8 – Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft
- D. ASTM B 33 – Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes
- E. IEEE C2 – National Electrical Safety Code (ANSI)
- F. IEEE 857 – Standard for Qualifying Permanent Connections Used in Substation Grounding
- G. NETA MTS – Maintenance Testing Specifications
- H. NFPA 70 – National Electrical Code
- I. NFPA 70B – Recommended Practice for Electrical Equipment Maintenance
- J. NFPA 780 – Lightning Protection Systems
- K. UL 96 – Lightning Protection Components
- L. UL 467 – Grounding and Bonding Equipment

1.05 TELECOMMUNICATIONS GROUNDING SYSTEM DEFINITIONS

- A. **Grounding Equalizer (GE):** Conductor that interconnects elements of telecommunications grounding infrastructure.
- B. **Telecommunications Bonding Backbone (TBB):** Conductor that interconnects telecommunications main grounding busbar (TMGB) to telecommunications grounding busbar (TGB).
- C. **Telecommunications Bonding Conductor:** Conductor that interconnects telecommunications bonding infrastructure to building's service equipment (power) ground.
- D. **Telecommunications Grounding Busbar (TGB):** Interface to building telecommunications grounding system, common point of connection for telecommunications system and equipment to ground and located in telecommunications room or equipment room.
- E. **Telecommunications Main Grounding Busbar (TMGB):** Busbar placed in convenient and accessible location and bonded by means of bonding conductor for telecommunications to building service equipment (power) ground.

1.06 SUBMITTALS

- A. **Product Data:** For each type of product indicated.
- B. **Other Informational Submittals:** Plans showing dimensioned as-built locations of grounding features, including the following:
 - 1. Test wells
 - 2. Ground rods
 - 3. Ground rings
 - 4. Grounding arrangements and connections for separately derived systems
 - 5. Grounding for sensitive electronic equipment
- C. **Field Quality-Control Test Reports:**
 - 1. Indicate field test and inspection procedures and interpret test results and corrective action taken for compliance with specification requirements.
 - 2. Test reports of resistance to earth. Each test report shall include:
 - a. Date of test, soil moisture content, and soil temperature
 - b. Test operator
 - c. Instrument or other test equipment used
 - d. Electrode designation or location
 - e. Ground impedance in ohms
 - f. Assumptions made - if required
- D. **Closeout Submittals:**
 - 1. **Operation and Maintenance Manuals:** Include the following:
 - a. Instructions for periodic testing and inspection of grounding features at test wells and grounding connections for separately derived systems based on NFPA 70B.
 - 1) Instructions to perform tests to determine if ground resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if they do not.
 - 2) Include recommended testing intervals.

1.07 QUALITY ASSURANCE

- A. **Regulatory Requirements:**

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70.
2. Comply with UL 467 for grounding and bonding materials and equipment.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products in clean, dry space. Protect from dirt, fumes, water, corrosive substances, and construction debris.

1.09 WARRANTY

- A. Refer to Division 01 and Section 26 0000 – General Electrical Requirements for general warranty requirements.
- B. Manufacturer shall provide standard 1 yr written warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of substantial completion.

PART 2 - PRODUCTS

2.01 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction, insulation color: green.
- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
 4. Bonding Cable: 28 kcmil, 14 strands of #17 AWG conductor, 1/4" in diameter.
 5. Bonding Conductor: #4 AWG or #6 AWG, stranded conductor.
 6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8" wide and 1/16" thick.
 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8" wide and 1/16" thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 1. #4 AWG minimum, soft-drawn copper.
 2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir or cypress or cedar.
- D. Grounding Bus: Horizontal rectangular bars of annealed copper, 1/4" by 2" in cross section; with insulators.

2.02 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Electro-tin plated copper or copper alloy, bolted pressure-type, with at least two bolts.
 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Compression Connectors: Irreversible type.

2.03 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel 3/4" in diameter by 10 ft in length.

B. Chemical-Enhanced Grounding Electrodes: 300 series stainless steel tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.

1. Termination: Factory-attached #4/0 AWG bare conductor at least 48" long.
2. Backfill Material: Electrode manufacturer's recommended material.

2.04 GROUNDING SYSTEM BUSBARS

A. Material: Copper

1. 1/4" thick

B. Pre-drilled

1. 3/8" diameter
2. Hole spacing per ANSI Joint Standard TIA-607-B
3. Hole pattern shall accommodate two-hole lugs

C. Insulators and stand-off brackets shall electrically isolate busbar from wall or other mounting surface.

D. Provide busbars listed by nationally recognized testing laboratory.

E. Size:

1. Main Ground Busbar (MGB) – 20" x 4" (minimum)

2.05 GROUNDING SYSTEM CONDUCTORS

A. Material: Stranded copper

B. Provide insulated bonding conductors.

1. Green Jacket or Black Jacket marked with Green Tape or Green adhesive labels per NEC Guidelines.

C. Size:

1. Bonding Conductor (MGB to Grounding Electrode): #3/0 AWG.

2.06 GROUNDING SYSTEM CONNECTIONS

A. Mechanical Connectors:

1. Connector Body:
 - a. High-strength, high-conductivity cast copper alloy
 - b. 2-bolt type
2. Bolts, nuts, washers, and lock-washers: 300 series stainless steel
 - a. Supplied as part of connector body
 - b. Split-bolt connector types are not allowed.
3. Connector:
 - a. Meet or exceed UL 467
 - b. Clearly marked with catalog number, conductor size, and manufacturer

B. Compression Connectors:

1. Connector Body: Pure wrought copper.

2. Conductivity shall be no less than 99% by IACS Standards.
3. Connector:
 - a. Meet or exceed performance requirements of IEEE 837, latest revision.
 - b. Filled with an oxide-inhibiting compound.
 - c. Clearly marked with manufacturer, catalog number, conductor size, and required compression tool settings.
4. Connection shall be irreversible.

2.07 TELECOMMUNICATIONS BUSBARS

- A. Material: Copper
 1. 1/4" thick
- B. Pre-drilled
 1. 3/8" diameter
 2. Hole spacing per ANSI Joint Standard TIA-607-B
 3. Hole pattern shall accommodate two-hole lugs
- C. Insulators and stand-off brackets shall electrically isolate busbar from wall or other mounting surface.
- D. Provide busbars listed by nationally recognized testing laboratory.
- E. Size:
 1. Telecommunications Main Ground Busbar (TMGB) – 20" x 4" (minimum)
 2. Telecommunications Grounding Busbar (TGB) – 12" x 2" (minimum)

2.08 TELECOMMUNICATIONS GROUNDING CONDUCTORS

- A. Material: Stranded copper
- B. Provide insulated bonding conductors.
 1. Green Jacket or Black Jacket marked with Green Tape or Green adhesive labels per NEC Guidelines.
- C. Size:
 1. Bonding Conductor for Telecommunications (BCT; TMGB to Grounding Electrode): #3/0 AWG.
 2. Telecommunications Bonding Backbone (TBB; TMGB to TGB): #3/0 AWG.

2.09 TELECOMMUNICATIONS GROUNDING CONNECTIONS

- A. Mechanical Connectors:
 1. Connector Body:
 - a. High-strength, high-conductivity cast copper alloy
 - b. 2-bolt type
 2. Bolts, nuts, washers, and lock-washers: 300 series stainless steel
 - a. Supplied as part of connector body
 - b. Split-bolt connector types are not allowed.
 3. Connector:
 - a. Meet or exceed UL 467
 - b. Clearly marked with catalog number, conductor size, and manufacturer

- B. **Compression Connectors:**
 - 1. **Connector Body:** Pure wrought copper.
 - 2. **Conductivity** shall be no less than 99% by IACS Standards.
 - 3. **Connector:**
 - a. Meet or exceed performance requirements of IEEE 837, latest revision.
 - b. Filled with an oxide-inhibiting compound.
 - c. Clearly marked with manufacturer, catalog number, conductor size, and required compression tool settings.
 - 4. Connection shall be irreversible.

PART 3 - EXECUTION

3.01 APPLICATIONS

- A. **Conductors:** Install solid conductor for #8 AWG and smaller, and stranded conductors for #6 AWG and larger, unless otherwise indicated.
- B. **Underground Grounding Conductors:** Install bare tinned-copper conductor. #2/0 AWG.
 - 1. Bury at least 24" below grade.
 - 2. **Ductbank Grounding Conductor:** Bury 12" above ductbank when indicated as part of ductbank installation.
- C. **Isolated Grounding Conductors:** Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. **Grounding Bus:** Install in electrical and communications rooms, in rooms housing service equipment.
 - 1. Install bus on insulated spacers 1", minimum, from wall; 6" above finished floor.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor, and connect to horizontal bus.
- E. **Conductor Terminations and Connections:**
 - 1. **Pipe and Equipment Grounding Conductor Terminations:** Bolted connectors
 - 2. **Underground Connections:** Welded connectors, except at test wells and as otherwise indicated
 - 3. **Connections to Ground Rods at Test Wells:** Bolted connectors
 - 4. **Connections to Structural Steel:** Welded connectors

3.02 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. **Pad-Mounted Transformers and Switches:** Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with transformer and switches by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than #2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6" from the foundation.

3.03 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with feeders and branch circuits.

1. Install a single insulated equipment ground conductor for each branch circuit conduit originating from panelboards.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
1. Feeders and branch circuits
 2. Lighting circuits
 3. Receptacle circuits
 4. Single-phase motor and appliance branch circuits
 5. Three-phase motor and appliance branch circuits
 6. Flexible raceway runs
 7. Armored and metal-clad cable runs
 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
 9. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
 10. Imaging Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying imaging equipment.
- C. Air-Duct Equipment Circuits: Install a separate insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping. Ground ductwork of fans serving flammable liquid storage rooms or fume hoods. Install continuous ground around any flexible connections in this ductwork system. Bond lower end of exhaust ducts, vent stacks, etc., which pass through roof.
- D. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.
- E. Duplex receptacles of any amperage: Install separate jumper between grounding terminal on device and metallic box.
- F. Size of equipment grounding conductors for branch circuits: As indicated in NEC-70, except minimum size shall be #12 AWG.
- G. Size of branch panel feeder originating at switchboards/switchgear: As indicated in NEC-70, except in no instance smaller than #8 AWG.
- H. Signal and Communication Equipment: For alarm and other communication equipment (see Telecommunications Grounding System Installation section below for voice and data systems), install #4 AWG minimum grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4" x 2" x 12" grounding bus or as indicated on drawings.
 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- I. Install grounding conductor from each standby-emergency generator to grounding electrode system. Provide flexible jumper between base and isolated generator.
- J. Install equipment grounding conductor from secondary side of each transformer to grounding electrode system as required for separately derived system.
- K. Install grounding for service entrance equipment room consisting of ground bus, ground conductors, and 5/8" x 10'-0" copperweld grounding rods arranged as indicated on drawings.

1. Ground bus shall be horizontal 1/4" x 2" copper bar. Bolt to wall at 10' intervals with 1" stand-offs at each bus support.
 2. Install No. #6 AWG copper grounding conductor from ground bus to each ground rod.
- L. Install grounding conductor to luminaires hanging from conduit swivel hangers.
- M. **Metal Poles Supporting Outdoor Lighting Fixtures:** Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors to pole base. Grounding Conductor: Same size as phase conductors, but not smaller than #10 AWG.
1. Install at each pole or standard a concealed driven 1/2" x 8'-0" ground rod, ground clamp and No. 3 stranded copper conductor concealed and attached to pole and base.

3.04 SEQUENCING, SCHEDULING

- A. Permanently attach service grounds before permanent building service is energized.
- B. Permanently attach equipment grounds prior to energizing equipment.

3.05 INSTALLATION

- A. **Connections:** Exposed and visible for inspection at all times. Do not install insulation over ground connections.
- B. Identify all grounding conductors by system and room number of termination at building grounding electrode point.
- C. **Grounding Conductors:** Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- D. **Common Ground Bonding with Lightning Protection System:** Comply with NFPA 780 and UL 96A when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- E. **Ground Rods:** Drive rods until tops are 2" below finished floor or final grade, unless otherwise indicated.
 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 2. For grounding electrode system, install at least 3 rods spaced at least one rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- F. **Test Wells:** Ground rod driven through drilled hole in bottom of handhole. Handholes shall be at least 12" deep, with cover.
 1. **Test Wells:** Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- G. **Bonding Straps and Jumpers:** Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 1. **Bonding to Structure:** Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. **Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports:** Install so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
- H. Grounding and Bonding for Piping:
1. **Metal Water Service Pipe:** Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end. Water pipe, by itself, is not an adequate grounding electrode and must be supplemented by another electrode system. Bond system together.
 2. **Water Meter Piping:** Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- I. **Bonding Interior Metal Ducts:** Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned copper bonding jumper to bond across flexible duct connections to achieve continuity.
- J. **Grounding for Steel Building Structure:** Install as indicated on drawings.
- K. Bond steel columns at bases using copper conductor to column footing rebar. Size as indicated on drawings.
- L. Make grounding connections on surface that has been cleaned of paint, dirt, oil, etc., so that connections are bare metal to bare metal contact.
- M. Make grounding connections tight with UL listed grounding devices, fittings, bushings, etc.
- N. **Ground Ring:** Install a grounding conductor, electrically connected to building structure ground rod and as indicated on drawings, extending around the perimeter of building.
1. Install tinned-copper conductor #2 AWG for ground ring and for taps to building steel.
 2. Bury ground ring not less than 24" from building foundation and 30" below grade.
- O. **Concrete-Encased Grounding Electrode:** Fabricate according to NFPA 70, using a minimum of 20' of bare copper conductor not smaller than #4 AWG or one or more bare or zinc galvanized or other electrically conductive steel reinforcing bars or rods.
1. If concrete foundation is less than 20' long, coil excess conductor within base of foundation.
 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.
- P. **Equipment Grounding Conductor:** Terminate in panelboard at green wire ground bus.
- Q. **Multiple Conductors on Single Lug:** Not permitted. Terminate each grounding conductor on its own terminal lug.
- R. **Flexible Metallic Conduit, Non-Metallic Rigid Conduit, or Liquid Tight Flexible Conduit:** Install green wire grounding conductor with phase conductors in conduit.

3.06 TELECOMMUNICATIONS BONDING AND GROUNDING SYSTEM INSTALLATION

- A. Provide required elements and miscellaneous hardware necessary to establish Telecommunication Bonding and Grounding Infrastructure as specified.

- B. Install products in accordance with manufacturer's instructions. Install Compression Connectors with compression, tool-and-die system, as recommended by manufacturer of connectors.
- C. Telecommunications Bonding Conductor, Telecommunications Bonding Backbone (TBB), and Grounding Equalizer (GE): Compression or Exothermic type connections.
- D. Locate TGBs and TMGB per drawings.
- E. Telecommunications Bonding Backbone (TBB) shall be continuous and not interrupted by Telecommunications Grounding Busbars (TGB).
 - 1. TGBs shall be bonded to TBB via tap off of TBB. Exception: "last" TGB on TBB (e.g., furthest from TMGB).
- F. Insulate busbars from their support.
- G. Coordinate with Sections 27 1000, 27 1100, 27 1300 and 27 1500.

3.07 FIELD QUALITY CONTROL

- A. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 1. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
- B. Interpret test results in writing and submit to Engineer.
- C. Inspect completed system by commissioning authority, prior to backfilling.

END OF SECTION

SECTION 26 0533
RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0519 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 26 0526 – Grounding and Bonding for Electrical Systems
- C. Section 26 0553 – Electrical Systems Identification

1.02 REFERENCE

- A. Work under this section is subject to requirements of Contract Documents including General Conditions and Supplementary Conditions.

1.03 DESCRIPTION

- A. Section includes raceways, fittings, wireways, wall ducts, indoor service poles, outlet boxes, pull and junction boxes, floor boxes, tap boxes and raceway seals.

1.04 REFERENCE STANDARDS

- A. ANSI/NECA 1 – Standard Practices for Good Workmanship in Electrical Contracting
- B. ANSI C80-1 – Rigid Steel Conduit-Zinc Coated (GRS)
- C. ANSI C80-3 – Electrical Metallic Tubing-Zinc Coated (EMT)
- D. ASTM A 53/A 53M – Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- E. BICSI TDMM – Telecommunications Distribution Methods Manual, Latest Edition
- F. ETL PVC-001 – PVC-Coated Conduit
- G. NEMA 250 – Enclosures for Electrical Equipment (1000 V Maximum)
- H. NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
- I. NEMA OS 1 – Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports
- J. NEMA OS 2 – Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports
- K. NEMA RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- L. NEMA TC 2 – Electrical Polyvinyl Chloride (PVC) Conduit
- M. NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
- N. NEMA TC 13 – Electrical Nonmetallic Tubing (ENT)
- O. NFPA 70 – National Electrical Code

- P. TIA-569-B – Commercial Building Standard for Telecommunications Pathways and Spaces
- Q. UL 1 – Flexible Metal Conduit
- R. UL 6 – Electrical Rigid Metallic Conduit-Steel
- S. UL 6A – Electrical Rigid Metallic Conduit-Aluminum and Stainless Steel
- T. UL 360 – Liquid-Tight Flexible Steel Conduit
- U. UL 514A – Metallic Outlet Boxes
- V. UL 514B – Conduit, Tubing, and Cable Fittings
- W. UL 514C – Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
- X. UL 651 – Schedule 40 and 80 Rigid PVC Conduit and Fittings
- Y. UL 797 – Electrical Metallic Tubing-Steel
- Z. UL 870 – Wireways, Auxillary Gutters, and Associated Fittings
- AA. UL 1242 – Electrical Intermediate Metal Conduit-Steel
- BB. UL 1660 – Liquid-Tight Flexible Nonmetallic Conduit
- CC. UL 2024 – Optical Fiber and Communication Cable Raceway

1.05 SUBMITTALS

A. Product Data:

1. Raceways
2. Fittings
3. Wireways
4. Wall ducts
5. Indoor service poles
6. Outlet boxes
7. Pull and junction boxes
8. Floor boxes
9. Tap boxes
10. Raceway seals

B. Manufacturer's Installation Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

C. Closeout Submittals:

1. Project Record Documents:
 - a. Record actual routing of raceways larger than 2".
 - b. Record actual location and mounting heights of wireways, wall ducts, indoor service poles, floor boxes, tap boxes, outlet, pull and junction boxes.
2. Operation and Maintenance Data:
 - a. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.

- b. Include spare parts data listing, source, and current prices of replacement parts and supplies.

1.06 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. Comply with NFPA 70.
 2. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.
- B. Certification:
 1. Installer of PVC-coated conduits and fitting shall be certified by a PVC conduit manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect from dirt, water, construction debris, and traffic.
- B. Protect PVC conduit from sunlight.
- C. Comply with manufacturer's written instructions.

1.08 WARRANTY

- A. Refer to Division 01 and Section 26 0000 – General Electrical Requirements for general warranty requirements.
- B. Manufacturer shall provide standard 1 yr written warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of final acceptance.

PART 2 - PRODUCTS

2.01 METAL WIREWAYS

- A. Wireways Covers: Screw-cover type
- B. Knockouts: Manufacturer's standard
- C. Finish: Manufacturer's standard enamel finish
- D. Manufacturers: Hoffman; Square D Co.; Approved equal

2.02 WALL DUCTS

- A. UL 870; aluminum suitable for installation of X-ray cables; flush covers and standard accessories; flush mounting; size: per manufacturer's/vendor's recommendations; manufacturer's standard gray finish.
- B. Manufacturers: Square D Co.; Approved equal

2.03 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, UL 514A; galvanized steel with stamped knockouts.
 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; 1/2" male fixture studs, where required.
 2. Concrete Ceiling Boxes: Concrete type

- B. **Cast-Metal Outlet Boxes:** NEMA FB 1, ferrous alloy, Type FD, with gasketed cover and threaded hubs
 - 1. For applications requiring more than 2 gang boxes, provide stainless steel custom fabricated welded boxes with threaded hubs and cover plate. For applications including terminations and splicing of power conductors, a standard UL Listed box shall be used inside of the custom fabricated box.]
- C. **Nonmetallic Outlet Boxes:** NEMA OS 2
- D. Gangable type boxes are not allowed.
- E. **Manufacturers:** O-Z/Gedney; Raco; Cooper Crouse-Hinds; Approved equal

2.04 OUTLET BOXES FOR COMMUNICATIONS

- A. **Minimum outlet box size:** 4-11/16" square by 2-1/8" deep minimum, with single-gang trim ring, unless otherwise noted on drawings.
 - 1. Total depth of the assembly including the trim ring shall not be less than 2-1/2".

2.05 PULL AND JUNCTION BOXES

- A. **Small Sheet Metal Pull and Junction Boxes:** NEMA OS 1; galvanized steel
- B. **Cast-Metal, Pull, and Junction Boxes:** NEMA FB 1; galvanized, cast iron with ground flange, gasketed cover and stainless steel cover screws
- C. **Minimum size:** 4" square by 2-1/8" deep for use with 1" conduit and smaller; 4-11/16" square by 2-1/8" deep for use with 1-1/4" conduit and larger
- D. **Sheet Metal Boxes Larger Than 12"** in any direction: Hinged cover or a chain installed between box and cover
- E. Field-fabricated boxes not allowed without prior approval of local authority having jurisdiction.
- F. **Manufacturers:** O-Z/Gedney; Raco; Cooper Crouse-Hinds; Approved equal

2.06 PULL AND JUNCTION BOXES FOR COMMUNICATIONS

- A. **Size:** Per TIA-569-B, unless otherwise noted on drawings.
- B. **Minimum pull box size:** 4-11/16" square by 2-1/8" deep, where pull box is used with raceway(s) smaller than 1-1/4" trade size, unless otherwise noted on drawings.
- C. **Minimum pull box size, where pull box is used with raceway(s) 1-1/4" trade size or larger:**
 - 1. For straight pull through: Length of at least 8 times trade-size diameter of largest raceway.
 - 2. For angle and U pulls:
 - a. Have distance between each raceway entry inside box and opposite wall of box of at least 8 times trade-size diameter of largest raceway, this distance being increased by sum of trade-size diameters of other raceways on same wall of box; and
 - b. Have distance between nearest edges of each raceway entry enclosing same conductor of at least:
 - 1) Six times trade-size diameter of raceway; or
 - 2) Six times trade-size diameter of larger raceway if raceways are of different sizes.
 - c. For raceway entering wall of pull box opposite to removable cover, have distance from wall to cover of not less than trade-size diameter of largest raceway plus 6 times diameter of largest conductor.

2.07 MULTISERVICE FLOOR BOXES

- A. On Grade: Cast iron or steel pour box, watertight design approved for use in on-grade and above-grade concrete floor applications, with four independent wiring compartments and capacity for up to four duplex receptacles and/or communication devices. The box: fully adjustable providing pre-pour and after-pour adjustment, tunnel compartment, and two receptacle brackets. Conduit knockouts per drawing requirements. Comply with UL 514A and UL 514C scrub water exclusion test for tile, terrazzo, carpet and wood floors.
- B. Covers: Activation Covers – Die-cast aluminum with textured aluminum finish, and black or brass powder-coated paint finishes as selected by the Architect. Cover: flanged or flangeless, as required, with options for tile or carpet inserts, blank covers, or covers with one or two 1" liquid tight conduit openings for furniture feed applications.
- C. Communication Modules Mounting Accessories: Complete line of faceplates and bezels provided by floor box manufacturer to facilitate mounting of fiber optic, coaxial, high-performance twisted-pair cabling, and communication devices. Cabling type and faceplate configurations per requirements in Section 27 1500 – Communications Horizontal Cabling. The box shall accommodate workstation connectivity outlets and modular inserts and other system devices.
- D. Manufacturers:
 - 1. Hubbell - HBLCFB Series
 - 2. Spider - AFB/CFB Series
 - 3. Legrand/Wiremold - Evolution Series

2.08 TV WALL BOXES

- A. Coordinate with Architectural drawings for TV mounting dimensions, mounting heights and details.
- B. Enclosure shall be provided with knock-outs to allow 1-gang steel work boxes to be mounted to the outside.
- C. Provide the following conduits:
 - 1. 3/4" conduit for power. Refer to plans for circuit information.
 - 2. (2) 1" conduits to ceiling space for Data.
 - 3. 1-1/2" conduit to ceiling space for AV. Coordinate with Architect and Owner.
 - 4. 1-1/2" conduit to conference room floor box. Where applicable.
- D. Parallel runs for power and Data or AV conduits shall not exceed 12 inches in length.
- E. Provide NEMA 5-20R duplex receptacle in 1-gang box.
- F. Provide 1-gang box for Data.
- G. Manufacturers: Chief; Wiremold; Approved equal.

2.09 RACEWAY PENETRATION SEALS

- A. Thruwall and Floor Seals.
- B. Manufacturers: New construction – OZ/Gedney FSK Series; existing construction – OZ/Gedney CSM Series; or equivalent by manufacturer listed in 2.1.F.

2.10 RACEWAY SEALING FITTINGS

- A. For one through four conductors: Manufacturers: OZ/Gedney CSB Series; Approved equal

- B. For greater than four conductors: Manufacturers: OZ/Gedney EYA Series with sealing compound; Approved equal
- C. Low-temperature or hazardous locations: Manufacturers: OZ/Gedney EYA Series with sealing compound; Approved equal

2.11 CABLE SUPPORTS

- A. Manufacturers: OZ/Gedney Type S; or equivalent by manufacturer listed in 2.1.F.

2.12 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends, with integral water stop.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052" or 0.138" thickness and of length to suit application.
- C. Integral Water Stop: Manufacturer: Thunderline Corporation; Approved equal
 - 1. High density polyethylene (HDPE). Type Century-Line engineered sleeve with end caps.
 - 2. Steel. Type WS engineered sleeve.

2.13 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Coordinate with Architect/Engineer size and location of required built-in openings in building structure, including those sleeved, formed or core drilled.
- B. Coordinate with Architect/Engineer cutting, removing, or piercing general or mechanical insulation, fire-rated walls, ceilings or steelwork.
- C. Verify with Architect/Engineer all surface raceway installations except in mechanical, electrical, and communications rooms.
- D. Coordinate with Architect/Engineer exact locations of floor boxes, where shown on drawings, prior to rough-in.
- E. Coordinate routing of through-roof conduits.
- F. Coordinate sleeve selection and application with selection and application of firestopping specified in Section 26 0593 – Electrical Systems Firestopping.
- G. Verify that exterior wall or wet location boxes are gasketed type cast boxes with matching cover.
- H. Verify with manufacturer that "touch-up" paint kit and PVC-coating kit are available for use.

3.02 EXAMINATION

- A. Examine surfaces to receive raceways and boxes for compliance with installation tolerances and other conditions affecting performance of raceway's installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.03 INSTALLATION

A. Raceways:

1. Comply with ANSI/NECA 1 and NFPA 70 for installation requirements applicable to products specified in Part 2 except where requirements on drawings or in this Section are stricter.
2. Arrange raceways to maintain headroom and present neat appearance.
3. Raceway routing is shown in approximate locations, unless dimensioned. Route to complete raceway installation before starting conductor installation.
4. Keep raceways at least 12" away from parallel runs of fuels, steam, hot-water pipes or ductwork. Install horizontal raceway runs above water and steam piping. Install raceways level and square and at proper elevations: 6'-6" minimum headroom, except in exit pathways 7'-0" minimum headroom. Do not block access to junction boxes, mechanical equipment or prevent removal of ceiling panels, etc.
5. Run raceways concealed in construction to avoid adverse conditions such as heat and moisture, to permit drainage, and to avoid materials and equipment of other trades, except where noted otherwise.
6. Avoid exposed raceway runs. Run raceways exposed where impractical or impossible to conceal or where specific approval is obtained. Run exposed raceways grouped and parallel or perpendicular to construction. Do not route exposed raceways over boilers or other high-temperature machinery or in contact with such equipment. Offset exposed raceways at boxes.
7. Route raceways installed above accessible ceilings parallel or perpendicular to construction.
8. Do not install raceways in structural or topping floor slabs, except where noted on the plans. Install raceway in structural or topping floor slabs, where noted on plans, as follows:
 - a. Center raceways in structural slabs clear of reinforcing steel, except where crossing same, and spaced on centers equal or exceeding 3 times the raceway diameter. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement. Space raceways laterally to prevent voids in concrete.
 - b. Outside diameter of raceway shall not exceed 1/3 the structural slab thickness.
 - c. Obtain approval from Engineer for each run of raceway 1" or larger.
 - d. Do not install raceways in topping slabs of 2" or less.
 - e. Locate raceways to avoid conflict with equipment, door bucks, partitions and other equipment bolted to floor.
 - f. Arrange stub-ups so curved portions of bends are not visible above finished slab. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; use flexible metal conduit 6" above the floor. Install threaded plugs flush with floor for future equipment connections.
 - g. Change from nonmetallic raceway to RMC or IMC before rising above floor.
9. Cut raceways square using saw or pipe cutter.
10. Use hydraulic one-shot raceway bender or factory elbows for bends in raceway larger than 2", unless sweep elbows required. Bend raceways according to manufacturer's recommendations. Do not use torches or open flame to aid in bend of PVC conduit.
11. Use raceway fittings compatible with raceways and suitable for use and environment.
12. Provide bushings on all raceways 1-1/2" and larger.
13. Raceways minimum sizes:
 - a. Minimum raceway size 3/4", except as noted on drawings.

- b. Minimum home run size: 3/4", except as noted on drawings.
 - c. Minimum size for flexible metal conduit is 1/2" except 3/8" for luminaires.
 - d. Minimum size for liquidtight flexible metal conduit is 1/2"
14. Install empty raceways 2-1/2" and larger with 10 ga galvanized fishwire; install 200 lb nylon pull cord in raceways smaller than 2-1/2"; leave at least 12" of slack at each end of pull wire. Cap raceways at both ends.
15. Feed devices on same wall vertically from above or junction box in suspended ceiling.
- a. Do not install horizontal bends in conduit around corners.
 - b. Feed devices in exterior or load-bearing walls by horizontal conduit runs.
 - c. Where horizontal conduit runs are required or allowed, install conduits from device to device on same wall.
16. Raceways Supports:
- a. Independently support or attach raceway system to structural parts of construction. Suspended ceiling systems shall not be considered as structural parts of construction for raceway support. Do not attach raceways to piping system.
 - b. Raceway supports for horizontal or vertical single runs:
 - 1) Hot dipped galvanized heavy-duty sheet steel straps, mineralac clamps or steel slotted support channel system with appropriate components.
 - 2) Spring steel type pressure clamps for raceways 3/4" and smaller.
 - c. Raceway supports for horizontal and vertical multiple runs:
 - 1) Trapeze-type supports fabricated with steel slotted channel systems with appropriate components.
 - 2) Support horizontal runs with appropriately sized rods.
 - 3) Anchor vertical runs to structure.
 - 4) Spring-steel type pressure clamps for raceways 3/4" and smaller.
 - d. Vertical raceway runs 1-1/4" and larger passing through floors: Support at each floor with pipe riser clamps.
 - e. Do not support raceways with wire, perforated pipe straps or plastic tie-wrap. Remove wires used for temporary support.
 - f. Secure raceways in metal stud walls to prevent rattling.
 - g. Arrange raceway supports to prevent misalignment during wiring installation.
 - h. Do not fasten raceways to corrugated metal roof deck.
 - i. For fasteners and supports, including steel slotted support systems, support devices, support spacing, support of conductors in vertical raceways, and hanger rod size, refer to Section 26 0529 – Hangers and Supports for Electrical Systems and NFPA 70.
17. Identify raceways per requirements in Section 26 0553 – Electrical Systems Identification.
18. Ground raceways per requirements in Section 26 0526 – Grounding and Bonding for Electrical Systems.
19. Flexible Conduit Connections: Use maximum of 72" of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for motors.
- a. Use LFMC in damp or wet locations subject to severe physical damage.
 - b. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
20. Install PVC-coated raceways in areas with corrosive atmosphere or as noted on plans.
21. Use tools approved for use with PVC coated conduits and fittings.
22. Install stainless steel raceway clamps, mounting hardware, supports, hangers, etc., when located in "wet" or "wash-down" areas.
23. Communications Raceways:
- a. Minimum communications raceway size: 1", unless otherwise noted on drawings.

- b. Install one raceway from each communications outlet box. Horizontal raceway runs between wall outlet boxes are not allowed.
 - c. Terminate raceway above closest accessible ceiling space.
 - d. Install insulated bushings on end of each raceway.
 - e. Use UL listed metallic grounding clamps, when terminating raceway on cable tray.
 - f. Install flush two-gang box with single-gang trim ring for each communications outlet or as noted on drawings.
 - g. Install with no more than 180 degrees of bends between pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
 - h. Conduit bend radii (minimum) shall be:
 - 1) Six (6) times internal conduit diameter for conduit 2" or less internal diameter.
 - 2) Ten (10) times internal conduit diameter for conduit greater than 2" internal diameter.
 - i. Conduit bends shall be smooth, even, and free of kinks or other discontinuities that may have detrimental effects on pulling tension or cable integrity during or after installation.
 - j. Do not install 90-degree condulets. Install continuous radius sweeps of 45° minimum for 90-degree bends.
 - k. Do not install continuous sections longer than 100 ft.
 - l. Reference Legend for nurse call outlet box sizes.
 - m. Install nylon pull cord in empty raceways. Leave at least 12" of slack at each end of pull wire. Cap raceways at both ends.
24. Optical fiber Communications Cable Raceway (Innerduct):
- a. Minimum innerduct size: 1", unless otherwise noted on drawings.
 - b. Extend innerduct to termination and/or storage enclosure.
 - c. Install couplings designed for innerduct size and type where innerduct enters termination and/or storage enclosure.
 - d. Splice innerduct segments using couplings designed for that purpose, where not installed in a continuous length.
 - e. Install 200 lb nylon pull cord in empty innerduct. Leave at least 12" of slack at each end of pull wire. Cap innerduct at both ends.
 - f. Label innerduct at 20' foot intervals with tags indicating cable types and quantities contained therein.
25. Power and low-voltage raceways: Minimum 12" separation when run parallel, cross perpendicular.

B. Boxes:

- 1. Install boxes to accommodate device indicated by symbol, in conformance with code requirements, number and size of conductors and splices and consistent with type of construction.
- 2. Install the appropriate cover on surface-mounted boxes:
 - a. Raised device covers on 4" square and 4-11/16" boxes and handy box covers on handy boxes, etc.
 - b. Device covers that are square drawn or square cut on boxes in block.
 - c. Tile covers on boxes in tile.
 - d. Round drawn device covers on boxes in lath and plaster walls or dry wall only.
 - e. Set front edge of device boxes flush with finished wall surfaces except on walls of non-combustible materials where boxes may have maximum set back of 1/4". Secure flush-mounted box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- 3. Set outlet boxes parallel to construction and independently attached to same.

4. Do not install back-to-back and through-the-wall boxes. Install with minimum 6" horizontal separation between closest edges of the boxes. Install with minimum 24" separation in acoustic-rated walls and fire-rated walls.
 5. Install multi-ganged boxes where 2 or more devices are in same location, unless otherwise noted.
 6. **Box Support:**
 - a. Mount boxes straight.
 - b. Install horizontal bracing at top or bottom of box for 3 or more gang device boxes in stud walls.
 - c. Install stud support one side, with short piece of stud, for up to 2 gang device boxes.
 - d. Do not support boxes with tie-wire.
 - e. For one and two gang box support, manufactured bracket supports shall be accepted alternate.
 - f. Support boxes independently of raceways.
 - g. Install adjustable steel channel fasteners for hung ceiling outlet box.
 - h. Install stamped steel bridges to fasten flush-mounted outlet box between studs.
 - i. Do not install boxes to ceiling support wires or piping systems.
 7. Install partitions in multi-ganged boxes where different types of devices are installed, or devices installed operate at different voltages.
 8. Mount boxes in block walls at block joint nearest to indicated height.
 9. **Recessed Boxes in Masonry Walls:** Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall.
 10. When boxes are installed in fire-resistive walls and partitions, provide 24" horizontal separation between boxes on opposite sides of a wall. In addition, limit penetrations to 16 sq in per penetration and not to exceed a total of 100 sq in per 100 sq ft of wall area. Apply fire stop putty pads acceptable to the fire marshal.
 11. **Pull and junction boxes:** Install as shown, or as necessary to facilitate pulling of wire and to limit number of bends within code requirements. Install above accessible ceilings and in unfinished areas.
 12. Install boxes to be permanently accessible.
 13. Do not intermix conductors from more than one system in same junction box or pull box, unless shown or specifically authorized otherwise.
 14. Adjust box location up to 10' prior to rough-in to accommodate intended purpose.
 15. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726 – Wiring Devices.
 16. **Inaccessible Ceiling Areas:** Install outlet and junction boxes no more than 6" from ceiling access panel or from removable recessed luminaire.
 17. The drawings do not necessarily show every outlet, pull or junction box required. Add all required boxes as necessary.
- C. Outlet Boxes for Communications:**
1. Install communications outlet boxes for each communications outlet, or as noted on drawings.
 2. Coordinate with other trades to maintain 8" clear space (minimum, measured from box centerline) on all sides of wall-mounted telephone outlet box.
- D. Pull and Junction Boxes for Communications:**
1. **Position Communications Pull and Junction Boxes:**
 - a. In any section of conduit longer than 100 ft
 - b. Where there are bends totaling more than 180 degrees between pull points or pull boxes

- c. Wherever there is a reverse bend in run
 2. Do not use pull boxes in place of bends on straight section of raceway, unless otherwise shown on drawings.
- E. Expansion Fittings:
1. Use couplings and flexible connection made up of 24" length of flexible metal conduit, where EMT runs across expansion joints in ceiling spaces.
- F. Raceway Penetration Seals:
1. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
 2. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Maintenance of Joint Protection" for materials and installation.
 3. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Section 26 0593 – Electrical Systems Firestopping.
 4. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
 5. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1" annual clear space between pipe and sleeve for installing mechanical sleeve seals.
 6. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1" annual clear space between raceway and sleeve for installing mechanical sleeve seals.
 7. Sleeve-Seal Installation: Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 8. Provide chrome- or nickel-plated escutcheons where raceways pass through walls, floors or ceilings and are exposed in finished areas. Size escutcheons to fit raceways for finished appearance. Finished areas shall not include mechanical/electrical rooms, janitor's closets, storage rooms, etc., unless suspended ceilings are specified.
 9. Remove temporary sleeves, if used for form wall openings, prior to installation of permanent materials.
- G. Raceway Sealing Fittings:
1. Install listed watertight seals to prevent the passage of moisture and water vapor through raceway, where raceway passes from interior to exterior of the building, where raceway passes between areas of different temperatures such as into or out of cold rooms or freezers, where raceway enters room which at any time is subject to low or high temperatures and where raceway enters a room which at any time is subject to internal air pressures above or below normal.
 2. Install watertight seals in interior of all raceways passing through building roof, ground floor slab (when the raceway does not extend beyond building footprint), or through outside walls of building above or below grade. Seal on the end inside building, using raceway sealing fittings manufactured for the purpose. Locate fittings at suitable accessible locations. For concealed raceways install each fitting in flush steel box with blank coverplate to match finish of adjacent plates or surfaces.
 3. Seal raceways entering or passing through "hazardous (classified) areas" as defined in NFPA 70.

H. Raceway and Outlet Boxes Sealing in Bio-sensitive Areas:

1. Where outlet boxes and raceways are recessed mounted, seal box to adjacent wall, ceiling, or floor surface with silicone caulk.
 2. Where outlet boxes and raceways are surface mounted:
 - a. Seal box to adjacent wall, ceiling, or floor surface with continuous bead of silicone caulk.
 - b. Seal both sides of surface-mounted raceway to adjacent surfaces with silicone caulk. Where raceways are threaded rigid steel on minimum 3/4" standoffs, sealing of raceway sides is not required.
 3. Install gasketed device cover plates with additional continuous bead of silicone caulk between device plate and adjacent wall, ceiling, or floor surface.
 4. After wiring is installed, surround wiring with 1" barrier of silicone caulk around conductors within device box hub.
 5. Silicone Caulk: Resistant to microbiological growth.
 6. No escutcheons are allowed where raceways pass through walls, floors or ceilings and are exposed in finished areas. Cut and patch holes to within 1/4" of raceway and seal opening with sprayable vinyl, flexible PVC coating equal to Cocoon material.
- I. Sleeve Installation for Electrical Penetrations:
1. Coordinate sleeve selection and application with selection and application of firestopping specified in Section 26 0593 – Electrical Systems Firestopping.
 2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
 3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 4. Rectangular Sleeve Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50" and no side greater than 16", thickness shall be 0.052".
 - b. For sleeve cross-section rectangle perimeter equal to, or greater than, 50" and 1 or more sides equal to, or greater than, 16", thickness shall be 0.138".
 5. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies, unless openings compatible with firestop system used are fabricated during construction of floor or wall.
 6. Cut sleeves to length for mounting flush with both surfaces of walls.
 7. Extend sleeves installed in floors 2" above finished floor level.
 8. Size pipe sleeves to provide 1/4" annular clear space between sleeve and raceway, unless sleeve seal is to be installed.

3.04 APPLICATION

- A. Raceway uses permitted and not permitted per NFPA 70 requirements and as described below.
- B. Rigid Metal Conduit (RMC) permitted to be installed as follows:
 1. Installations below grade and in or under concrete slabs
 2. All locations except corrosive atmospheres
 3. Hazardous locations
 4. Locations requiring mechanical protection
- C. PVC Coated Conduit permitted to be installed as follows:
 1. In corrosive atmospheres or as noted on plans
 2. In exterior environments needing additional protection
 3. Use PVC coated elbows
- D. Electrical Metallic Tubing (EMT) permitted to be installed as follows:
 1. Interior partitions

2. Above suspended ceilings
 3. In concrete slabs
 4. 1.8 m(6 ft) AFF in exposed areas of mechanical equipment rooms
 5. Sizes 2" and smaller except as approved
- E. Flexible Metal Conduit (FMC) permitted to be installed as follows:
1. Use flexible metal conduit 2 ft to 4 ft in length for final connections for:
 - a. Vibrating equipment (including transformers and hydraulic, pneumatic, electric solenoid, or motor-driven equipment) in dry locations.
 - b. Final connections to recessed luminaires in lengths not to exceed 6 ft.
 2. No flexible metal conduit length restriction when using "Manufactured Wiring Systems."
- F. Liquid Tight Flexible Metal Conduit (LFMC) permitted to be installed as follows:
1. Use liquid tight flexible conduit, 2 ft to 4 ft in length, for final connections to:
 - a. Vibrating equipment (including transformers and hydraulic, pneumatic, electric solenoid, or motor-driven equipment) in wet locations.
 - b. Instruments and control devices
- G. Rigid Nonmetallic Conduit (RNC) permitted to be installed as follows:
1. Direct burial, concrete encased
 2. Direct burial, in sand fill on bottom and top
 3. Corrosive atmospheres
 4. Use steel elbow in concrete encased runs
- H. One-half inch raceway permitted:
1. Between controller and its control or pilot device
 2. Between lighting switch and nearest outlet for luminaire
 3. Control wiring where mounted on equipment where conduit must follow contour of equipment
 4. Protective and signal systems where noted
 5. Where shown on plans

3.05 RACEWAY WIRING METHODS

- A. Underground More than 5 ft outside Foundation Wall: Install thickwall nonmetallic conduit; install cast metal boxes or nonmetallic handholes.
- B. Underground Within 5 ft from Foundation Wall: Install rigid steel conduit; install cast metal or nonmetallic boxes.
- C. In or Under Slab on Grade: Install thickwall nonmetallic conduit; install cast or nonmetallic metal boxes.
- D. Outdoor Locations, Above Grade: Install rigid steel conduit; install cast metal or nonmetallic outlet, pull, and junction boxes.
- E. In Slab Above Grade: Install rigid steel conduit; install cast boxes.
- F. Wet and Damp Locations: Install rigid (steel) (aluminum) conduit or thickwall nonmetallic conduit; install cast metal or nonmetallic outlet, junction, and pull boxes. Install flush mounting outlet boxes in finished areas.
- G. Concealed Dry Locations: Install electrical metallic tubing; install sheet metal boxes; install flush mounting outlet boxes in finished areas; install hinged enclosure for large pull boxes.

- H. Exposed Dry Locations: Install rigid steel conduit; install sheet metal boxes; install flush mounting outlet boxes in finished areas; install hinged enclosure for large pull boxes.
- I. Exposed Subject to Damage: Install rigid steel conduit.

3.06 FIELD QUALITY CONTROL

- A. Inspect raceway, boxes, indoor service poles, and wireways for physical damage, proper alignment, supports and seismic restraints, where applicable.
- B. Replace any damaged component of the raceway system or install new raceway system.
- C. Inspect components, wiring, connections and grounding.

3.07 REPAINTING

- A. Repair damage to galvanized finishes with manufacturer-supplied zinc-rich paint kit. Leave remaining paint with Owner.
- B. Repair damage to PVC or paint finishes with manufacturer-supplied touch-up coating. Leave remaining coating with Owner.
- C. Wireways, indoor service poles: Remove paint splatters and other marks from surface; touch-up chips, scratches, or marred finishes to match original finish using manufacturer-supplied paint kit. Leave remaining paint with Owner.

3.08 ADJUSTING

- A. Adjust flush-mounted boxes pre-pour and after-pour to be flush with finished materials.
- B. Install knockout closures in unused openings in boxes.
- C. Align adjacent wall-mounted outlet boxes for switches and similar devices.
- D. Adjust outlet boxes to allow luminaires to be positioned as indicated on drawings.

3.09 CLEANING

- A. Clean interior and exterior of boxes, wireways, and indoor poles to remove dust, debris and other material.

END OF SECTION

SECTION 26 0543

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems
- B. Section 26 0533 - Raceway and Boxes for Electrical Systems
- C. Section 26 0543.13 - Excavation and Backfill
- D. Section 26 0553 - Electrical Systems Identification

1.02 DESCRIPTION

- A. Section includes conduits, ducts, and duct accessories for direct buried for underground distribution for electrical power and communications.
- B. The terms duct and duct bank, as used in this Section, are defined as follows:
 - 1. Duct: A single underground conduit, encased in concrete or direct buried.
 - 2. Duct Bank: Two or more ducts run together.

1.03 REFERENCE STANDARDS

- A. ANSI C2 – National Electrical Safety Code
- B. ANSI C80.1 – Rigid Steel Conduit-Zinc Coated (GRC)
- C. ASTM F512 – Specification for Smooth-Wall Poly (Vinyl Chloride) (PVC) Conduits and Fittings for Underground Installation
- D. ETL PVC-001 – PVC Coated Conduit
- E. NEMA RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- F. NEMA TC2 – Electrical Polyvinylchloride (PVC) Conduit
- G. NEMA TC3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing
- H. NEMA TC6&8 – PVC Plastic Utilities Duct for Underground Installation
- I. NEMA TC9 – Fittings for PVC Plastic Utility Duct for Underground Installation
- J. NFPA 70 – National Electrical Code
- K. UL 651 – Schedule 40 and 80 Rigid PVC Conduit
- L. UL 651A – Type EB and A Rigid PVC Conduit and HDPE Conduit
- M. UL E53373 – Underground Fiber Reinforced Epoxy Conduit (FRE)
- N. ULG – Electrical Rigid Metallic Conduit-Steel

1.04 SUBMITTALS

- A. Product data for the following:**
 - 1. Duct bank materials, including spacers and miscellaneous components
 - 2. Ducts and conduits and their accessories, including elbows, end bells, bushings, seals, bends, fittings, plugs, pull tape, and solvent cement
 - 3. Warning tape
 - 4. Warning plank
- B. Manufacturer's Installation Instructions:**
 - 1. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Closeout Submittals:**
 - 1. Project Record Documents:
 - a. Record actual routing of conduits and duct banks.
 - 2. Operation and Maintenance Data:
 - a. Include manufacturer's recommended operating instructions, maintenance procedures and intervals, and preventive maintenance instructions.
 - b. Include spare parts data listing, source, and current prices of replacement parts and supplies.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:**
 - 1. Comply with NFPA 70
 - 2. Comply with ANSI C2
 - 3. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.
- B. Certification:**
 - 1. Installer of PVC coated conduits and fitting shall be certified by a PVC conduit manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect from dirt, water, construction debris, and traffic.**
- B. Deliver ducts to project site with end capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.**

1.07 WARRANTY

- A. Refer to Division 01 and Section 26 0000 – General Electrical Requirements for general warranty requirements.**
- B. Manufacturer shall provide standard 1 yr written warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of final acceptance.**

PART 2 - PRODUCTS

2.01 CONDUITS

- A. **Rigid Nonmetallic Conduit (RNC):** NEMA TC 2 Schedule 40 PVC, UL 651, with matching fittings by same manufacturer, complying with NEMA TC 3 and UL 651, listed for underground use, direct buried.
- B. **Size:**
 - 1. As Indicated on drawings.

2.02 DUCT ACCESSORIES

- A. **Duct Spacers:**
 - 1. Rigid PVC interlocking spacers.
 - 2. Factory-fabricated, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling. Horizontal and vertical locking separation of 3" between ducts as shown on drawings.
- B. **Elbows:** Material to match conduit; minimum bend radius of 36".
- C. **Bell Ends:** Manufactured bell ends of appropriate sizes at each end of conduit; pre-manufactured system for PVC with conduit seals, provisions for roughing into the concrete pour and waste stops, when entering a new building or a new manhole.
- D. **Bushings:** Groundable steel bushings of appropriate sizes on all metal conduits where bell ends are not used; pre-manufactured system for PVC with conduit seals, provisions for roughing into concrete pour and waste stops, when entering a new or existing building or a new or existing handhole or pull box.
- E. **Seals:** Mechanical interlocking assembly seal of modular synthetic rubber links properly sized to fit the pipe and tightened in place, in accordance with manufacturer's instructions, when entering an handhole or pull box below grade and concrete shall be core drilled for the appropriate size conduit and seal.
- F. **Plugs:** Closure plugs or caps of same material as conduit at ends of unused sections.
- G. **Pull Tape:** Nylon pull tape with measurement markings in uniform lengths in each empty duct.
- H. **Grounding:**
 - 1. Steel grounding bushings, where bell ends are not used.
 - 2. Bonding fitting with bonding strap on steel conduit with end bells.
- I. **Warning Tape:** Underground line warning tape specified in Section 26 0553 - Electrical Systems Identification.
- J. **Solvent Cement:** Recommended by conduit manufacturer.
- K. **Multicell Raceway Systems:** An outer shell with pre-lubricated inner ducts preinstalled. A typical assembly: 4" shell with 4 cells of 1-1/2" inner ducts. The outer shell: Available in bullet-resistant fiberglass, galvanized steel, and electrical metallic tubing; manufactured for direct burial and concrete encasement installation methods.
- L. **PVC and High Density Polyethylene (HDPE) Bundles:** For installation in large-bore steel casings. The bundles: Assembled with bore spacers to keep conduits aligned within the casing.
- M. **Preassembled Multiduct Kits:** Communication ducts, assembled with duct spacers, ready to lay in trenches for direct burial or encasement. A typical preassembled kit: Four 1-1/2" ducts in 20 ft lengths.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Coordinate layout and installation of ducts with final arrangement of other utilities, site grading, and surface features as determined in the field.
- B. Coordinate elevations of ducts and duct bank entrances into pull boxes or pad-mounted transformer with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Architect. For manholes and handholes construction, refer to Section 26 0543.19 – Manholes and Hardware.
- C. Adjust the depth of electrical utilities to avoid existing utilities with no change to contract price.
- D. Utility Coordination: When duct lines are being constructed for use by a utility serving the project, consult with them for duct size and quantity, minimum bending radii, maximum distance between pulling points, grounding details, termination arrangement, and other criteria.
- E. Duct Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
 - 1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
 - 2. Drawings shall be signed and sealed by a qualified professional engineer.

3.02 EXISTING UTILITIES

- A. The existing utilities shown on contract drawings have been plotted from available records. No guarantee is made as to accuracy of locations indicated and is shown for the benefit of Contractor.
- B. Contact all serving utility companies and have them locate their lines prior to commencing work. Telephone "Call Before You Dig" at 1-800-424-5555, 48 hours prior to commencing work. Coordinate with Owner all existing utility lines prior to commencing work.
- C. Protect shown, visible and located utilities from damage. Promptly repair all active shown, visible and located utilities damaged by construction. This repair shall be made solely at the expense of the Contractor.
- D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

3.03 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Architect and Owner no fewer than 2 days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Architect's or Owner's written permission.

3.04 DUCT INSTALLATION

- A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.

- B. **Curves and Bends:** Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends, both horizontally and vertically, at other locations, unless otherwise indicated. All 90-degree sweeps with radius 10 ft or less shall be rigid steel conduit.
- C. **Joints:** Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane. Do not use conduit that requires the use of couplings for straight runs. Use acceptable PVC terminal adapters when joining PVC conduit to metallic fittings or rigid metal conduit.
- D. **Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes:** Use end bells, spaced approximately 10" o.c. for 5" ducts, and vary proportionately for other duct sizes.
 - 1. Begin change from regular spacing to end-bell spacing 10 ft from the end bell without reducing duct line slope and without forming a trap in the line.
 - 2. **Direct Buried Duct Banks:** Install an expansion and deflection fitting in each conduit in area of disturbed earth adjacent to manhole or handhole.
 - 3. **Concrete Enclosed Duct Banks:** Install watertight expansion fitting in each conduit, with internal bonding jumper to allow for 3/4" movement in any direction.
 - 4. Grout end bells into structure walls from both sides to provide watertight entrances.
- E. **Building Wall Penetrations:** Make a transition from underground duct to rigid steel conduit at least 5 ft outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 26 0533 - Raceway and Boxes for Electrical Systems.
- F. **Expansion Fittings:** Provide suitable expansion fittings or other suitable means to compensate for expansion and contraction for raceways crossing expansion joints in structures or concrete slabs between two adjacent structures and between a duct bank and structure. Provide for the high rate of thermal expansion and contraction of PVC conduit by providing PVC expansion joints as recommended by manufacturer and as required. Refer to structural drawings for location of expansion joints in structures.
- G. **Sealing:** Provide temporary closure at termination of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand minimum of 15 psig hydrostatic pressure. Provide watertight entrance sealing device where an underground conduit enters a structure through a concrete roof or membrane waterproofed wall or floor.
- H. **Fire Stops:** Provide fire stop openings around electrical penetrations to maintain fire-resistance rating, where underground raceways penetrate fire-rated walls or floors.
- I. **Pulling Cord:** Install 100 lbf test nylon cord in ducts, including spares. Identify with tags at each end and at any intermediate pull point the origin and destination of each spare duct. Provide a removable permanent cap over each end of each spare duct.
- J. **Direct Buried Duct Banks:**
 - 1. Support ducts on duct spacers coordinated with duct size, duct spacing, and outdoor temperature.
 - 2. Space spacers close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 ft of duct. Secure spacers to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6" between tiers.
 - 3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Section 26 0543.13 - Excavation and Backfill.
 - 4. Install backfill as specified in Section 26 0543.13 - Excavation and Backfill.

5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand place backfill to 4" over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Section 26 0543.13 - Excavation and Backfill.
6. Install ducts with a minimum of 3" between ducts for like services and 6" between power and signal ducts.
7. Depth: Install top of duct bank at least 36" below finished grade, unless otherwise indicated.
8. Set elevation of bottom of duct bank below the frost line.
9. Warning Plank: Bury warning plank approximately 12" above direct buried ducts and duct banks, placing them 24" o.c. Align plank along the width and along the centerline of duct bank. Provide an additional plank for each 12" increment of duct bank width over a nominal 18". Space additional planks 12" apart, horizontally.

K. Stub-Ups:

1. Use manufactured PVC duct elbows for stub-ups at poles and equipment and at building entrances through floor, unless otherwise indicated. Extend concrete encasement throughout length of the elbow. Concrete encasement applies to concreted encased ducts.
2. Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase couplings with 3" of concrete. Concrete encasement applies to concrete encased ducts.
 - b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete pads, extend steel conduit horizontally a minimum of 5 ft from edge of equipment pad or foundation. Encase in concrete for concrete encased ducts. Install insulated grounding bushings on terminations at equipment.

L. Arrangement and Routing:

1. Arrange multiple duct runs substantially in accordance with details shown on drawings. Locate underground ducts where indicated on drawings and grade to the elevations shown on civil drawings.
2. Make minor changes in location or cross-section as necessary to avoid obstructions or conflicts. Where duct runs cannot be installed substantially as shown because of conditions not discoverable prior to digging of trenches, refer the condition to the Architect for written instructions before further work is done.
3. Maintain a 12" minimum vertical separation between ducts and other systems at crossings where other utility piping systems are encountered or being installed along a raceway route. Maintain a 12" minimum separation between ducts and other systems in parallel runs. Do not place ducts over valves or couplings in other piping systems. Refer conflicts with these requirements to the Architect for written instructions before further work is done.
4. Provide markers at grade to indicate direction of underground conduits provided under this contract. Provide markers consisting of double-ended arrows, straight for straight runs and bent at locations where runs change direction. Provide markers at all bends and at intervals not exceeding 100 ft in straight runs. Use markers made of sheet bronze not less than 1/4" thick embedded in and secured to the top of concrete posts. Use markers not less than 10" long and 3/4" wide and marked ELECTRIC CABLES in letters 1/4" high incised into the bronze to a depth of 3/32".
5. Enter manholes and structures with ducts at right angles.

M. PVC Coated Conduits: Use tools approved for use with PVC coated conduits and fittings.

3.05 UNDERGROUND DUCT APPLICATION

- A. Ducts for Electrical Feeders 600V and Less: RNC, Schedule 40 PVC, in direct buried duct bank, unless otherwise indicated.
- B. Ducts for Electrical Branch Circuits: RNC, Schedule 40 PVC, in direct buried duct bank, unless otherwise indicated.
- C. Underground Ducts for Telephone, Communications, or Data Utility Service Cables: Schedule 40 PVC installed in direct buried duct bank, unless otherwise indicated.
- D. Underground Ducts Crossing Driveways or Roadways: RNC, Schedule 40 PVC, encased in reinforced concrete.

3.06 EARTHWORK

- A. Excavation and Backfill: Comply with Section 26 0543.13 - Excavation and Backfill, do not use heavy-duty, hydraulic-operated compaction equipment.

3.07 CONCRETE

- A. Concrete: 3000 psi, 28-day strength, complying with Division 03 – Concrete, where concrete encased.

3.08 GROUNDING

- A. Ground underground ducts according to Section 26 0526 - Grounding and Bonding for Electrical Systems.

3.09 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts.
 - 2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80% fill of duct. If obstructions are indicated, remove obstructions and retest.
- B. Preparation for pulling in conductors:
 - 1. Do not install crushed or deformed raceways. Avoid traps in raceways where possible. Take care to prevent the lodging of plaster, concrete, dirt, or trash in raceways, boxes, fittings, and equipment during the course of construction. Make raceways entirely free of obstructions or replace them. Ream all raceways, remove burrs, and clean raceway interior before introducing conductors or pull wires.
 - 2. Immediately after installation, plug or cap all raceway ends with watertight and dust-tight seals until the time for pulling in conductors.
- C. Do not backfill underground direct buried and concrete encased ducts until the Architect has inspected them. Notify Architect 24 h in advance of duct concrete pour, or backfill of direct buried ducts.

3.10 CLEANING

- A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

END OF SECTION

SECTION 26 0543.13

EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0543 - Underground Ducts and Raceways for Electrical Systems

1.02 DESCRIPTION

- A. Section lists methods and materials for trench excavation and backfill for electrical and communications conduits in duct banks. Refer to Section 26 0543 – Underground Ducts and Raceways for Electrical Systems.

1.03 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
- B. Excavation: Removal of material encountered above sub-grade elevations and to lines and dimensions indicated.
- C. Duct: A single underground conduit encased in concrete or direct buried.
- D. Duct Bank: Two or more ducts run together.
- E. Fill: Soil materials used to raise existing grades.
- F. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- G. Utilities: On-site underground ducts and duct banks as well as underground services within buildings.

1.04 SUBMITTALS

- A. Submit list of materials to be used for backfill.

1.05 QUALITY ASSURANCE

- A. Pre-excavation Conference: Conduct conference at project site to comply with requirements in Division 01 Section "Project Coordination."

PART 2 - PRODUCTS

2.01 FILL MATERIAL

- A. Type 1 Fill:
 - 1. Material from excavation separated from materials, which do not compact by tamping and rolling. No stones larger than 3" and no building, organic, or corrosive or frozen materials and no lumps larger than 6".
- B. Type 2 Fill:
 - 1. Sand or gravel materials with none larger than 2" and of that portion passing the #4 sieve less the 5% to pass #200 sieve.

- C. Type 3 Fill:
 - 1. Gravel of rounded to sub-angular shape, screened, which will pass 3/4" sieve and retained on #4 sieve.
- D. Type 4 Fill:
 - 1. Pit run rock or gravel with maximum stone size of 1".
- E. Type 5 Fill:
 - 1. Pea gravel, screened, which will pass 3/8" sieve and retained on #4 sieve.

2.02 CRUSHED ROCK

- A. Crushed Rock: 1-1/4" minus, unless smaller is required for bedding material.

2.03 SAND

- A. Sand: Clean and washed building sand.

2.04 TOPSOIL

- A. Topsoil: Equal in quality to that removed.

2.05 SOD

- A. New Sod: Mature, densely rooted grass free of weeds and objectionable grasses.

2.06 PLANTS

- A. Plants: Obtained from a commercial nursery and be similar to those replaced.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Establish grade lines and locations of roadways and sidewalks, grade beams, and pill caps. Provide necessary stakes and batter boards.
- B. Verify elevations of existing utilities prior to excavation for new ducts.
- C. Verify locations of handholes and pull boxes with civil drawings
- D. Coordinate excavation and backfill with Section 31 2000 – Earth Moving.

3.02 EXCAVATION

- A. Provide excavation for underground work, including ducts, handholes, pull boxes, and equipment pads, unless otherwise shown or specified. Lay duct in open trench, except when Architect gives written permission for tunneling.
- B. Excavate trench to 24" wider than duct or duct bank dimensions and minimum of 3" below bottom of duct.
- C. Include clearing, tree removal, grubbing, pavement removal, substructure removal such as walls, footings, and piers, and all incidental work such as tunneling, sheet piling, shoring, underpinning, pumping, bailing, and transportation. Coordinate excavation extending beyond construction limits with Construction Manager and Owner.
- D. Do not provide blasting on this project without written permission of Architect and Owner.

- E. Over excavate 3" and fill with 3" of sand, where trench bottom is rock, or rocky, or contains debris larger than 1", or material with sharp edges.
- F. Perform all crossings of concrete or asphalt after surface material has been saw cut to required width and removed.
- G. Conform to utility company requirements for excavation and vault installation in addition to contract document requirements where excavations are for installing utility company's ducts and vaults.

3.03 ROCK EXCAVATION

- A. Use mechanical methods to remove rock in trenches for underground ducts.
- B. Refer to Geotechnical Report available from Architect/Engineer for data on rock.
- C. Include rock excavation in the Bid, unless otherwise indicated.

3.04 INSTALLATION

- A. Keep underground ducts to proper line and grade and sealed to prevent entrance of animals or foreign matter.
- B. Provide bracing and sheet piling as necessary to support trenches. Comply with Local Regulations, applicable provisions of OSHA Regulations on trenching, or with provisions of "Manual of Accident Prevention in Construction" published by Associated General Contractors of America.
- C. Do not lay duct in water.
- D. Keep trench free from water until duct joint material has hardened and concrete encasement is in place.
- E. Do not increase the contract cost due to presence of ground water in soil or necessity of sheet piling or bracing trenches. Adjust contract cost when sheet piling is left in place, on written order of Owner.
- F. Do not remove sheet piling until trench is substantially backfilled. Cut off sheet piling left in place not less than 2 ft below new, finished grade.
- G. Place underground ducts on 3" compacted bedding of sand. Shape bedding for clearance for joints and fittings, tamped in place and graded evenly to ensure uniform bearing for the full length of duct. Do not support duct by blocking, planking or mounding of bedding material.
- H. Install lines passing under foundations with minimum of 3" clearance to concrete and ensure there is no disturbance of bearing soil.

3.05 BACKFILL

- A. Backfill around ducts by hand to depth of 12" above top of duct with Type 3 or 5 fill in 6" layers. Compact backfill thoroughly with compactor of suitable weight or with approved mechanical tamper. Do not use flooding or jetting with water.
- B. Place backfill from 12" above duct to elevation of subgrade in layers not exceeding 8" in depth with Type 3, 4 or 5 fill.
- C. Backfill from 12" above duct to sub-grade with Type 2, 3, or 4 fill, when excavating through areas which are to become walks, roads, driveways or parking areas of concrete, bituminous or exposed gravel surfacing or such areas are existing to remain. Backfill in 12" layers and compact with mechanical means to density 95% modified proctor.

- D. Conform excavation, duct laying, backfilling, grading and surfacing, as herein specified, when excavation occurs on public property or areas beyond the property line. Comply with additional requirements for public utility or other authorities. Check with each utility and incorporate cost of any additional requirements in base bid.
- E. Backfill around vaults and handholes to be free of debris larger than 1-3/4" in all directions to 1 ft from vault.
- F. Provide 6" of pea gravel or sand bedding for vaults and handholes larger than 3'-0" x 3'-0". For handholes smaller than 3'-0" x 3'-0", provide 3" pea gravel or sand.
- G. Other backfill shall be free of debris larger than 6" in diameter.
- H. Place backfill material so as to obtain a minimum degree of compaction of 95% of maximum density at optimum moisture content. Moisten backfill material as required to obtain proper compaction.
- I. Broken pavement, concrete, sod, roots, and debris shall not be used for backfill.

3.06 DEWATERING

- A. Provide, operate, and maintain all pumps or other dewatering equipment required for control of water in trenches and excavations for electrical and communications site work during the entire construction period.

3.07 SHORING

- A. Provide as required by trenching and excavating to secure site work. Comply with applicable safety regulations.

3.08 FINISHING

- A. On completion of trenching and backfilling operations, restore grades to original elevation or to new sub-grade elevation.
- B. Replace surfaces to existing conditions when trenching is through existing areas or beyond construction limits.
- C. Use 6" of topsoil and sod to match existing elevations in landscaped areas or as otherwise approved by Landscape Architect.

3.09 SURFACE FINISHING

- A. Refinish every disturbed surface to its original condition.
- B. Replace planted materials not surviving 90 days after contract acceptance at Contractor's own expense.
- C. Return after 1 year and re-fill, compact and refinish settled areas to grade.

3.10 CARE OF PLANTS AND TREES

- A. Remove and safely store plants and trees with trunks smaller than 6" diameter prior to commencing site work. Avoid trees larger than 6" diameter when so indicated on drawings. Replace plants and trees upon completion of site work.

END OF SECTION

SECTION 26 0553

ELECTRICAL SYSTEMS IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0519 – Low-Voltage Electrical Power Conductors and Cables
- B. Section 26 0533 – Raceways and Boxes for Electrical Systems
- C. Section 26 0543 – Underground Ducts and Raceways for Electrical Systems
- D. Section 26 3623 – Transfer Switches

1.02 REFERENCE

- A. Work under this Section is subject to requirements of Contract Documents including General Conditions, Supplementary Conditions, and sections under Division 01 - General Requirements.

1.03 DESCRIPTION

- A. Section includes the following:
 - 1. Identification for raceway and metal-clad cable
 - 2. Identification for conductors and communication and control cable
 - 3. Underground-line warning tape
 - 4. Warning labels and signs
 - 5. Instruction signs and posted drawings
 - 6. Equipment identification nameplates
 - 7. Wiring devices identification
 - 8. Miscellaneous identification products
- B. Refer to the respective Division 26 Sections, and Sections in other Divisions that specify electrical components, for additional electrical identification requirements.

1.04 REFERENCE STANDARDS

- A. ANSI A13.1 – Scheme for the Identification of Piping Systems
- B. ANSI C2 – National Electrical Safety Code
- C. ANSI Z535.4 – National Standards for Product Safety Signs and Labels
- D. 29 CFR – Labor, Part 1910 – Occupational Safety and Health Standards, Section 1910.145 – Specifications for Accident Prevention Signs and Tags
- E. NFPA 70 – National Electrical Code

1.05 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Nameplate Schedule: Prior to making nameplates, submit a complete schedule to Architect for approval indicating nameplate size, lettering size, color and actual nameplate information.

- C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.06 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.145.

1.07 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Manufacturers: Brady USA, Ideal, Marking Services, Inc. (MSI), Seton, or approved equal.
- C. Color for Printed Legend:
 - 1. Power Circuits: Black letters on an orange field.
 - 2. Legend: Indicate system or service and voltage, if applicable.
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action when placed in position.
- F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2" long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action when placed in position.
- G. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2" wide; compounded for outdoor use.

2.02 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend.
- B. Manufacturers: Brady USA, Ideal, Marking Services, Inc. (MRI), Seton, or approved equal.

- C. **Color-Coding Conductor Tape:** Colored, self-adhesive vinyl tape not less than 3 mils thick by 1" to 2" wide.
- D. **Marker Tapes:** Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- E. **Aluminum Wraparound Marker Labels:** Cut from 0.014" thick aluminum sheet, with stamped, embossed, or scribed legend, and fitted with tabs and matching slots for permanently securing around wire or cable jacket or around groups of conductors.
- F. **Metal Tags:** Brass or aluminum, 2" x 2" x 0.05", with stamped legend, punched for use with self-locking nylon tie fastener.
- G. **Write-On Tags:** Polyester tag, 0.010" thick, with corrosion-resistant grommet and polyester or nylon tie for attachment to conductor or cable.
 - 1. **Marker for Tags:** Permanent, waterproof, black ink marker recommended by tag manufacturer.
- H. **Plasticized Card-Stock Tags:** Vinyl cloth with preprinted and field-printed legends. Orange background, unless otherwise indicated, with eyelet for fastener.

2.03 UNDERGROUND-LINE WARNING TAPE

- A. **Manufacturers:** Ideal, Marking Services, Inc. (MRI), Seton, or approved equal.
- B. **Description:** Permanent, bright-colored, continuous-printed, polyethylene tape.
 - 1. Not less than 6" wide by 4 mils thick.
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip.
 - 4. Printed legend shall indicate type of underground line.
 - 5. Red tape for electrical and orange tape for communications installations.

2.04 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. **Self-Adhesive Warning Labels:** Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.
- C. **Self-Adhesive Arc Flash Warning Labels:** Industrial grade, made of durable polyester with overlamine to withstand harsh environments (UV rays, scratches and most chemicals).
 - 1. **Manufacturer:** Seton or approved equal
- D. **Engraved Plastic Signs:** Engraving stock, melamine plastic laminate, minimum 1/16" thick for signs up to 20 sq in and 1/8" thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
- E. **Baked-Enamel Warning Signs for Interior Use:** Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4" grommets in corners for mounting. Nominal size, 7" x 10".
- F. **Metal-Backed, Butyrate Warning Signs for Exterior Use:** Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396" galvanized-steel backing; and with colors, legend, and size required for application. 1/4" grommets in corners for mounting. Nominal size, 10" x 14".

- G. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING – OSHA REGULATION – AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 3. Arc Flash Labels: Per ANSI Z535.4, the signal word WARNING appearing in black letters on an orange background, with second line below (Arc Flash and Shock Hazard) in black letters on white background and third line below (Appropriate PPE Required) in black letters on white background. Include the following information on the label:
 - a. Equipment name
 - b. Available bolted current
 - c. Flash protection boundary distance
 - d. Incident energy level at 18" expressed in cal/cm²
 - e. Personnel protective equipment (PPE) class
 - f. Voltage shock hazard
 - g. Limited shock approach boundary
 - h. Restricted shock approach boundary
 - i. Prohibited shock approach boundary

2.05 INSTRUCTION SIGNS AND POSTED DRAWINGS

- A. Instruction Signs: Engraved, laminated acrylic or melamine plastic, minimum 1/16" thick for signs up to 20 sq in and 1/8" thick for larger sizes.
1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Mounting Frames: Extruded aluminum, 4-point screw mount with 1/8" clear plexiglass cover.
- B. Posted Drawings: Print electrical riser diagrams on 20 lb bond paper. (Blueprint paper is not acceptable.) Reduce drawings to approximately 1/2 size using Xerox reduction process. Contact Engineer to obtain updated original plans for printing.

2.06 EQUIPMENT IDENTIFICATION NAMEPLATES

- A. Engraved, Three-layer, Laminated Acrylic or Melamine Nameplate: Punched or drilled for screw mounting. White letters on a black background, except emergency power equipment nameplates are to have white letters on a red background. Minimum letter height shall be 3/8" unless noted otherwise.
- B. Stenciled Legend: In non-fading, waterproof, black ink or oil-based, alkyd enamel paint. Minimum letter height shall be 1".

2.07 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, type 6/6 nylon cable ties.
1. Minimum Width: 3/16"
 2. Tensile Strength: 50 lb minimum
 3. Temperature Range: -40°F to 185°F
 4. Color: Black, except where used for color-coding
- B. Paint: Paint materials and application requirements are specified in Division 09 – Finishes painting Sections.
- C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Raceway and Ductbanks More Than 600 V Concealed within Buildings:** 4" wide black stripes on 10" centers over orange background that extends full length of raceway or duct and is 12" wide. Stencil legend "DANGER CONCEALED HIGH-VOLTAGE WIRING" with 3" high black letters on 20" centers. Stop stripes at legends. Apply to the following finished surfaces:
1. Floor surface directly above conduits running beneath and within 12" of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A:** Identify with orange snap-around labels.
1. Identify 4" round, 4" square and 4-11/16" junction boxes concealed above ceiling or exposed with neat lettering on cover with permanent black marking pen. Identify source, circuit number, phase, and control circuit number.
- C. Accessible Raceways and Cables of Auxiliary Electrical Systems:** Identify the following systems with color-coded, snap-around, color-coding bands:
1. Fire Alarm System (including covers of pull and junction boxes): Red
 2. Fire-Suppression Supervisory and Control System: Red and yellow
 3. Combined Fire Alarm and Security System: Red and blue
 4. Security System: Blue and yellow
 5. Mechanical and Electrical Supervisory System: Green and blue
 6. Telecommunication System: Green and yellow
- D. Power-Circuit Conductor Identification:** For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors or other appropriate number or letter to expedite future tracing and troubleshooting. For single conductor cables, identify phase in addition to the above. Phase identification shall be consistent throughout the system.
- E. Branch-Circuit Conductor Identification:** Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.
- F. Conductors to Be Extended in the Future and Spare Conductors:** Attach marker tape to conductors and list source and circuit number.
- G. Auxiliary Electrical Systems Conductor Identification:** Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with project drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
- H. Locations of Underground Lines:** Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Install underground-line warning tape for both direct-buried cables and cables in raceway.

- I. **Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access to equipment.**
 - 1. **Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:**
 - a. **Power transfer switches**
 - b. **Controls with external control power connections**
 - 2. **Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.**
 - 3. **Arc Flash Warning Labels: install per NFPA.70 for each switchgear, switchboard, panelboard, motor control center, industrial control panel (every enclosure that may contain energized conductors or components). Locate labels so they are visible to the personnel before examination, adjustment, servicing, or maintenance of the equipment.**
 - 4. **Available Fault Current Labels: install per NFPA 70 for each piece of service entrance equipment. Locate labels so they are visible to the personnel before examination, adjustment, servicing or maintenance of the equipment.**
- J. **Warning Labels for UPS equipment rooms: Comply with International Fire Code (IFC) and apply baked-enamel warning signs. Identify word 'DANGER' with white letters on red background. Identify other explanatory text describing the danger condition with black text on white background. Apply to exterior of UPS equipment room door.**
- K. **Instruction Signs and Posted Drawings:**
 - 1. **Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend printed in all capital letters of 12 pt size minimum where instructions are needed for system or equipment operation.**
 - 2. **Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8" high letters for emergency instructions at equipment used for power transfer.**
- L. **Emergency Electrical System Junction and Pull Boxes:**
 - 1. **Identify with spray-painted covers as follows:**
 - a. **480/277 V circuits: Red/Brown**
 - b. **120/208 V circuits: Red/White**
- M. **Equipment Identification Nameplates: On each unit of equipment, install unique designation nameplate that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply nameplates to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.**
 - 1. **Nameplate Instructions:**
 - a. **Indoor Equipment: Engraved, laminated acrylic or melamine nameplate. Unless otherwise indicated, provide a single line of text with 1/2" high letters (1/4" where space is limited) on 1-1/2" high nameplate; where 2 lines of text are required, use nameplates sized 2" high.**
 - b. **Outdoor Equipment: Engraved, laminated acrylic or melamine nameplates sized similar to indoor equipment nameplates.**
 - c. **Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.**
 - 2. **Install nameplates for equipment including, but not limited to, the following:**
 - a. **Panelboards, electrical cabinets, and enclosures**

- b. Access doors and panels for concealed electrical items
 - c. Electrical distribution panelboards including each feeder device within the equipment enclosures.
 - d. Transformers
 - e. Emergency system boxes and enclosures
 - f. Disconnect switches
 - g. Enclosed circuit breakers
 - h. Motor controllers
 - i. Pushbutton stations
 - j. Power transfer equipment
 - k. Contactors
 - l. Remote-controlled switches, dimmer modules, and control devices
 - m. Battery inverter units
 - n. Battery racks
 - o. Voice and data cable terminal equipment
 - p. Intercommunication and call system master and staff stations
 - q. Television/audio components, racks, and controls
 - r. Fire alarm control panel and annunciators
 - s. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks
 - t. Monitoring and control equipment
 - u. Uninterruptible power supply equipment
 - v. Terminals, racks, and patch panels for voice and data communication and for signal and control functions
 - w. Non-concealed junction box covers of auxiliary electrical systems
3. Provide the following information on each nameplate:
- a. Equipment name/tag:
 - 1) Matching the designation from the contract documents, or identifying the load controlled or function of the equipment where no specific tag is shown on the contract documents.
 - 2) For disconnect switches, use the prefix "SW-" followed by the name of the equipment served, example: "SW-PMP-201."
 - b. Equipment operating voltage, phase, wiring configuration, and ampacity:
 - 1) Example: "208V/3PH/4W/225A"
 - c. Source of power supply, including circuit number:
 - 1) Example: "FED FROM LP-2/45"
- N. For panelboards, provide a nameplate identifying the color code of wiring within the panel, including the following information:
- 1. Heading "PANEL VOLTAGE CONDUCTOR COLOR CODING"
 - 2. PHASE A: COLOR OF INSTALLED CONDUCTORS
 - 3. PHASE B: COLOR OF INSTALLED CONDUCTORS
 - 4. PHASE C: COLOR OF INSTALLED CONDUCTORS
 - 5. NEUTRAL: COLOR OF INSTALLED CONDUCTORS
 - 6. GROUND: GREEN
- O. For service entrance equipment, provide a nameplate identifying the maximum available fault current and "as of" effective date.
- 1. Example: "MAXIMUM AVAILABLE FAULT CURRENT 33,500A AS OF 2017/06/15."

- P. **Access Panel Identification:** Furnish typewritten charts with identification and location of access panels serving equipment and incorporate in O&M Manuals.

3.02 INSTALLATION

- A. **Verify Identity of each item before installing identification products.**
- B. **Location:** Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. **Apply identification devices to surfaces that require finish after completing finish work.**
- D. **Self-Adhesive Identification Products:** Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. **Install non-adhesive signs and plastic nameplates parallel to equipment lines; attach with screws and auxiliary hardware appropriate to the location and substrate. Secure to inside surface of door or panelboard that is recessed in finished locations.**
- F. **Posted Drawings and Operating Instructions:** Mount drawings and operating procedures on the wall immediately adjacent to the piece of equipment for which the instructions apply. If sufficient wall space is available, mount directly to one of the sheet metal panels of the equipment.
- G. **Warning Signs:** Install warning signs where there is hazardous exposure or danger associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with ANSI A13.1 standard color and design.
1. **Operational Tags:** Where needed for proper and adequate information on operation and maintenance of electrical systems, provide tags of plasticized card stock, either preprinted or hand printed to convey the message; example: "DO NOT OPEN THIS SWITCH WHEN BREAKER IS CLOSED."
- H. **System Identification Color Banding for Raceways and Cables:** Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
- I. **Color-Coding for Phase and Voltage Level Identification, 600 V or Less:** Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
1. Color shall be factory applied, or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
 2. **Colors for 208/120 V Circuits:**
 - a. Phase A (left bus in panelboard): Black
 - b. Phase B (center bus in panelboard): Red
 - c. Phase C (right bus in panelboard): Blue
 - d. Neutral: White
 - e. Equipment Ground: Green
 3. **Colors for 480/277 V Circuits:**
 - a. Phase A (left bus in panelboard): Brown
 - b. Phase B (center bus in panelboard): Orange
 - c. Phase C (right bus in panelboard): Yellow
 - d. Neutral: Gray
 - e. Equipment Ground: Green

4. Where dedicated neutrals are required or are shown on the drawings, neutral insulation color shall be either white or gray with colored tracer to match color of phase conductor to which neutral is dedicated.
 5. Field-applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6" from terminal points and in boxes where splices or taps are made. Apply last two runs of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- J. Aluminum Wraparound Marker Nameplates and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- K. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6" to 8" below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16" overall.
- L. Painted Identification: Prepare surface and apply paint according to Division 09 – Finishes painting Sections.

END OF SECTION

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SECTION 26 3623

TRANSFER SWITCHES

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 26 0000 – General Electrical Requirements

1.02 REFERENCE

- A. Work under this section is subject to requirements of Contract Documents including General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements.

1.03 DESCRIPTION OF SYSTEM

- A. Provide automatic service entrance rated transfer switch, 1200A, 3 phase, 60 Hz, 4 pole, in NEMA 3R enclosure with solid neutral for voltage and current as indicated on drawings.
- B. Provide unit mounted, service entrance capable Surge Protective Device (SPD) device in compliance with UL 1449 4th. Edition.

1.04 REFERENCE STANDARDS

- A. ICS 10 Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment
- B. UL 869A - Reference Standard for Service Equipment
- C. UL1008 7th Edition Automatic Transfer Switches

1.05 SUBMITTALS

- A. Submit shop Drawings for equipment provided under this Section.

1.06 QUALITY ASSURANCE

- A. Obtain transfer switches from one source and by single manufacturer.
- B. Regulatory Requirements:
 - 1. Comply with NFPA 70 for components and installation.
 - 2. Furnish products listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified and indicated.
- C. Factory Test
 - 1. Test system in accordance at the factory in accordance with Section 26 0812 - Power Distribution Acceptance Tests and Demonstration of Transfer Functions.
 - 2. Provide factory test report.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, fumes, water, corrosive substances, construction debris, and traffic. Provide temporary heaters in switchgear as required to prevent condensation.

- B. Deliver in shipping splits of length that can be moved in delivery path, individually wrapped for protection, and mounted on shipping skids. Mark crates, boxes, and cartons clearly to identify equipment. Show crate, box, or carton identification number on shipping invoices.
- C. Use factory-installed lifting provisions. Handle carefully to avoid damage to internal components, enclosure, and finish.

1.08 WARRANTY

- A. Refer to Division 01 and Section 26 0000 – General Electrical Requirements for general warranty requirements.
- B. Manufacturer shall provide standard 1 yr warranty against defects in materials and workmanship for products specified in this Section. Warranty period shall begin on date of final acceptance.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Acceptable Manufacturers: ASCO by Schneider Electric, Russelectric, or Kohler.

2.02 TRANSFER SWITCH

- A. Transfer switch:
 - 1. Mechanically held, electrically operated type
 - 2. Interlocked to ensure only 2 possible positions, normal and emergency.
 - 3. Rated for continuous duty in unventilated sheet metal enclosure
 - 4. Suitable for all classes of loads at maximum rated voltages
 - 5. Withstand rating that meets or exceeds withstand rating of transfer switch feeder breakers.
 - 6. Shall be open transition type.
 - 7. Internal heater element for humidity control.
- B. Provide main contacts with silver alloy wiping action type protected by arcing contacts.
- C. Provide switch components accessible from front of enclosure.
- D. Provide 3 cycle short circuit rating to guarantee contact opening and no damage when transfer switch is served by molded case circuit breakers.
- E. Provide 10 cycle short circuit rating to guarantee contact opening and no damage when transfer switch is served by power circuit breakers.
- F. Provide switch with the following items:
 - 1. Adjustable 1 to 3 second time delay to override momentary voltage dips and outages.
 - 2. Time delay on transfer to emergency. Adjustable from 1 to 300 seconds (factory set at 3 seconds).
 - 3. Time delay on retransfer to normal. Adjustable from 2 seconds to 30 minutes.
 - 4. Full phase protection consisting of 2 phase relays and one close differential relay. Phase relays shall be set to 70% drop out, 90% pick up, and differential relays set for 92 to 95% pick-up and 83 to 85% drop-out.
 - 5. Pushbutton reset to normal.
 - 6. Pushbutton to bypass time delay on retransfer to normal.
 - 7. Pilot light to indicate normal position.
 - 8. Pilot light to indicate emergency position.

9. Auxiliary contact to close when normal power falls.
 10. Auxiliary contact to open when normal power falls.
 11. Auxiliary contact on same shaft as main contacts (closed on normal).
 12. Auxiliary contact on same shaft as main contacts (closed on emergency).
 13. Four position selector switch to provide "Test," "Auto," "OFF", and "Engine Start."
 14. Contacts to start engine-generator when normal power falls.
 15. Time delay engine start, adjustable from 0 to 5 seconds.
 16. Adjustable time delay on retransfer to normal source with 5 minute unloaded running time of standby plant:
 - a. Minimum delay 2 minutes
 - b. Maximum delay 25 minutes
 - c. Built in circuitry to nullify time delay if emergency source fails and power is available at normal source.
 17. Relay to prevent transfer to emergency until voltage and frequency of generating plant have reached 90% of rated value.
 18. Provide bi-direction in-phase monitor or dual motor operator with programmed neutral to allow voltage decay in motor and transformer circuits.
- G. Bypass/Isolation switch:
1. Dual-source enclosed.
 2. Isolate transfer switch and de-energize for maintenance, testing or repair.
 3. Dual-source operation - bypass either to normal or emergency source directly to load at discretion of operator.
 4. Break-before-make operation of contacts.
 5. Operation - fully mechanical, designed to provide quick-make-quick-break of contacts and only allow switch to be fully closed or fully open with no mid position possible.
 6. Operation - possible regardless of the position or condition of the transfer switch.

2.03 SERVICE ENTRANCE

- A. UL 869A and UL1008 7th edition
- B. Listed as suitable for use as service entrance equipment where applicable and must include connection for bonding and grounding of neutral conductor.
- C. Barriers shall be placed such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations.
- D. Utility side main circuit breaker of same make and specifications per drawings.

2.04 INSTALLATION

- A. Install equipment in accordance with manufacturer's recommendations.
- B. Provide equipment protection during and subsequent to installation.
- C. Connect transfer switches that are part of fire pump controllers.

2.05 OPERATION

- A. Parallel "start engine-generator" contacts of transfer switches, such that failure of normal source at any switch shall start engine.

- B. Transfer of one switch from normal to emergency shall not preclude any other switch from transferring.
- C. Engine generator cool down cycle shall not start until all transfer switches have timed out back to normal source.

2.06 ACCEPTANCE TESTING

- A. Testing by Electrical Contractor
- B. Adjust or replace equipment as needed to comply with manufacturer's specifications and resubmit corrected test reports.

END OF SECTION