



Date: February 18, 2025

Subject: Request for Quote (RFQ) – AFRH-G, Generator Replacement

Fiscal Service Procurement, on behalf of the Armed Forces Retirement Home (AFRH) of Gulfport, MS (AFRH-G), is hereby requesting a formal quote for Generator Replacement to include all management, supervision, personnel, services, materials, supplies, facilities, transportation, tools, and general and specialized equipment to replace the main building generators and equipment associated with the generators in accordance with the attached solicitation.

The Government intends to issue a firm fixed price contract for a period of performance to start as soon as possible. **This requirement is set aside to small businesses only.**

Offerors shall have an unexpired SAM.gov registration and Unique Entity Identifier (UEI) before contract award may be made.

The offeror shall adhere to the Quotation Instructions included within this solicitation.

Any questions regarding this solicitation shall be submitted in writing to purchasing@fiscal.treasury.gov and kaity.eaton@fiscal.treasury.gov by no later than **2:00pm ET on February 21, 2025** and must state “**20342325Q00014 – Questions/Generator, Attn: KE/PW**” in the subject line. Any questions submitted after this deadline will not be assured of an answer. Any questions and/or comments received are not considered proprietary and will not be protected by the Government.

PROPOSAL SUBMISSION:

Electronic quotations shall be submitted to purchasing@fiscal.treasury.gov and kaity.eaton@fiscal.treasury.gov no later than **10:00am ET on February 27, 2025** to be accepted, and must state “**20342325Q00014 – Questions/Generator, Attn: KE/PW**” in the subject line. Proposals received after this deadline are late and will not be considered. It is the responsibility of the Offeror to verify receipt of their proposal.

The Offeror assumes full responsibility for ensuring all electronic materials and attachments submitted are formatted in accordance with the Bureau of the Fiscal Service Security Requirements.

SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30				1. REQUISITION NUMBER	PAGE OF 1 59		
2. CONTRACT NO.		3. AWARD/ EFFECTIVE DATE	4. ORDER NUMBER	5. SOLICITATION NUMBER 20342325Q00014	6. SOLICITATION ISSUE DATE 02/18/2025		
7. FOR SOLICITATION INFORMATION CALL: ►		a. NAME KAITLYN EATON		b. TELEPHONE NUMBER (No collect calls)	8. OFFER DUE DATE/LOCAL TIME 02/27/2025 1000 ET		
9. ISSUED BY		CODE FSA-KEATON	10. THIS ACQUISITION IS <input checked="" type="checkbox"/> SMALL BUSINESS WOMEN-OWNED SMALL BUSINESS <input type="checkbox"/> HUBZONE SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOMEN-OWNED <input type="checkbox"/> SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS SMALL BUSINESS PROGRAM <input type="checkbox"/> 8(A) NAICS: 335312 SIZE STANDARD: 1,250				
Bureau of the Fiscal Service Division of Procurement Avery 5F 200 Third Street Attn: KAITLYN EATON Parkersburg WV 26101							
11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input checked="" type="checkbox"/> SEE SCHEDULE		12. DISCOUNT TERMS		13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	13b. RATING		
				14. METHOD OF SOLICITATION <input checked="" type="checkbox"/> RFQ <input type="checkbox"/> IFB <input type="checkbox"/> RFP			
15. DELIVER TO		CODE	16. ADMINISTERED BY Bureau of the Fiscal Service Division of Procurement Avery 5F 200 Third Street Parkersburg WV 26101				
CODE		FACILITY CODE	18a. PAYMENT WILL BE MADE BY CODE				
17a. CONTRACTOR/ OFFEROR							
TELEPHONE NO.		18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED <input type="checkbox"/> SEE ADDENDUM					
19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES			21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	The Bureau of the Fiscal Service, on behalf of the Armed Forces Retirement Home of Gulfport, MS (AFRH-G) is issuing the following solicitation for Generator Replacement Services as described in the Performance Work Statement (PWS) and attachments. This requirement is solicited as a 100% set-aside to Small Businesses. The Government anticipates award of a single (Use Reverse and/or Attach Additional Sheets as Necessary)						
25. ACCOUNTING AND APPROPRIATION DATA					26. TOTAL AWARD AMOUNT (For Govt. Use Only)		
<input checked="" type="checkbox"/> 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. <input type="checkbox"/> 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED.					<input checked="" type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED. <input type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED.		
<input type="checkbox"/> 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN _____ COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED.					<input type="checkbox"/> 29. AWARD OF CONTRACT: _____ OFFER DATED _____. YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:		
30a. SIGNATURE OF OFFEROR/CONTRACTOR					31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER) PCW		
30b. NAME AND TITLE OF SIGNER (Type or print)			30c. DATE SIGNED	31b. NAME OF CONTRACTING OFFICER (Type or print) PAUL C. WHITE		31c. DATE SIGNED	
AUTHORIZED FOR LOCAL REPRODUCTION PREVIOUS EDITION IS NOT USABLE					STANDARD FORM 1449 (REV. 2/2012) Prescribed by GSA - FAR (48 CFR) 53.212		

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
0001	Firm-Fixed Priced Contract with a period of performance to be determined prior to award. Generator Replacement Services Anticipated Award Type: Firm-fixed-price				

32a. QUANTITY IN COLUMN 21 HAS BEEN

RECEIVED INSPECTED ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED: _____

32b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE	32c. DATE	32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE
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32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE		32f. TELEPHONE NUMBER OF AUTHORIZED GOVERNMENT REPRESENTATIVE
		32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR	36. PAYMENT	37. CHECK NUMBER
			<input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL	

38. S/R ACCOUNT NUMBER	39. S/R VOUCHER NUMBER	40. PAID BY
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41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY (Print)	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER		41c. DATE	
		42b. RECEIVED AT (Location)	
		42c. DATE REC'D (YY/MM/DD)	42d. TOTAL CONTAINERS

CLAUSES, TERMS AND CONDITIONS

52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this address: <https://www.acquisition.gov/>

52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (NOV 2020)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

52.212-4 CONTRACT TERMS AND CONDITIONS -- COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (NOV 2023)

1052.212-4 CONTRACT TERMS AND CONDITIONS-COMMERCIAL ITEMS. (ALTERNATE II) (APR 2018) (DEVIATION 2016-00001)

(e) Definitions.

(2) As used in this clause, "Commercial supplier agreements" means terms and conditions customarily offered to the public by vendors of supplies or services that meet the definition of commercial item set forth in FAR 2.101 and intended to create a binding legal obligation on the end user. Commercial supplier agreements (CSA) are particularly common in information technology acquisitions, including acquisitions of commercial computer software and commercial technical data, but they may apply to any supply or service. The term applies—

- (i) Regardless of the format or style of the document. For example, a CSA may be styled as standard terms of sale or lease, Terms of Service (TOS), End User License Agreement (EULA), or another similar legal instrument or agreement, and may be presented as part of an offer or quotation responding to a solicitation.
- (ii) Regardless of the media or delivery mechanism used. For example, a CSA may be presented as one or more paper documents or may appear on a computer or other electronic device screen during a purchase, software installation, other product delivery, registration for a service, or another transaction.

(s) *Order of precedence.* Any inconsistencies in this solicitation or contract shall be resolved by giving precedence in the following order:

- (1) The schedule of supplies/services.
- (2) The Assignments, Disputes, Payments, Invoice, Other Compliances, Compliance with Laws Unique to Government Contracts, Unauthorized Obligations, and Commercial Supplier Agreements – Unenforceable Clauses paragraphs of this clause,
- (3) The clause at 52.212-5.
- (4) Addenda to this solicitation or contract, including any license agreements for computer software.
- (5) Solicitation provisions if this is a solicitation.

- (6) Other paragraphs of this clause.
- (7) The Standard Form 1449.
- (8) Other documents, exhibits, and attachments.
- (9) The specification.

(u) Unauthorized Obligations

- (1) Except as stated in paragraph (u)(2) of this clause, when any supply or service acquired under this contract is subject to any CSA, that includes any language, provision, or clause requiring the Government to indemnify the Contractor or any person or entity for damages, costs, fees, or any other loss or liability that would create an Anti-Deficiency Act violation (31 U.S.C. 1341), the following shall govern:
 - (i) Any such language, provision, or clause is unenforceable against the Government.
 - (ii) Neither the Government nor any Government authorized end user shall be deemed to have agreed to such clause by virtue of it appearing in the CSA. If the CSA is invoked through an "I agree" click box or other comparable mechanism (e.g., "click-wrap" or "browse-wrap" agreements), execution does not bind the Government or any Government authorized end user to such clause.
 - (iii) Any such language, provision, or clause is deemed to be stricken from the CSA.
- (2) Paragraph (u)(1) of this clause does not apply to indemnification by the Government that is expressly authorized by statute and specifically authorized under applicable agency regulations and procedures.

(w) Commercial supplier agreements –unenforceable clauses. When any supply or service acquired under this contract is subject to a CSA, the following language shall be deemed incorporated into the CSA. As used herein, "this agreement" means the CSA:

- (1) Notwithstanding any other provision of this agreement, when the end user is an agency or instrumentality of the Government, the following shall apply:
 - (i) *Applicability.* This agreement is a part of a contract between the commercial supplier and the Government for the acquisition of the supply or service that necessitates a license (including all contracts, task orders, and delivery orders under FAR part 12).
 - (ii) *End user.* This agreement shall bind the Government as end user but shall not operate to bind a Government employee or person acting on behalf of the Government in his or her personal capacity.
 - (iii) *Law and disputes.* This agreement is governed by Federal law.
 - (A) Any language purporting to subject the Government to the laws of a U.S. state, U.S. territory, district, or municipality, or a foreign nation, except where Federal law expressly provides for the application of such laws, is hereby deleted.
 - (B) Any language requiring dispute resolution in a specific forum or venue that is different from that prescribed by applicable Federal law is hereby deleted.
 - (C) Any language prescribing a different time period for bringing an action than that prescribed by applicable Federal law in relation to a dispute is hereby deleted.

- (iv) *Continued performance* The supplier or licensor shall not unilaterally revoke, terminate or suspend any rights granted to the Government except as allowed by this contract. If the supplier or licensor believes the Government to be in breach of the agreement, it shall pursue its rights under the Contract Disputes Act or other applicable Federal statute while continuing performance as set forth in paragraph (d) of this clause.
- (v) *Arbitration; equitable or injunctive relief.* In the event of a claim or dispute arising under or relating to this agreement, a binding arbitration shall not be used unless specifically authorized by agency guidance, and equitable or injunctive relief, including the award of attorney fees, costs or interest, may be awarded against the Government only when explicitly provided by statute (e.g., Prompt Payment Act or Equal Access to Justice Act).
- (vi) *Updating terms.*
 - (A) After award, the contractor may unilaterally revise terms if they are not material. A material change is defined as:
 - (1) Terms that change Government rights or obligations;
 - (2) Terms that increase Government prices;
 - (3) Terms that decrease overall level of service; or
 - (4) Terms that limit any other Government right addressed elsewhere in this contract.
 - (B) For revisions that will materially change the terms of the contract, the revised commercial supplier agreement must be incorporated into the contract using a bilateral modification.
 - (C) Any agreement terms or conditions unilaterally revised subsequent to award that are inconsistent with any material term or provision of this contract shall not be enforceable against the Government, and the Government shall not be deemed to have consented to them.
- (vii) *No automatic renewals.* If any license or service tied to periodic payment is provided under this agreement (e.g., annual software maintenance or annual lease term), such license or service shall not renew automatically upon expiration of its current term without prior express consent by an authorized Government representative.
- (viii) *Indemnification.* Any clause of this agreement requiring the commercial supplier or licensor to defend or indemnify the end user is hereby amended to provide that the U.S. Department of Justice has the sole right to represent the United States in any such action, in accordance with 28 U.S.C.516.
- (ix) *Audits.* Any clause of this agreement permitting the commercial supplier or licensor to audit the end user's compliance with this agreement is hereby amended as follows:
 - (A) Discrepancies found in an audit may result in a charge by the commercial supplier or licensor to the Government. Any resulting invoice must comply with the proper invoicing requirements specified in the underlying Government contract or order.
 - (B) This charge, if disputed by the Government, will be resolved through paragraph (d) of this clause; no payment obligation shall arise on the part of the Government until the conclusion of the dispute process.
 - (C) Any audit requested by the commercial supplier or licensor will be performed at the commercial supplier's or licensor's expense, without reimbursement by the Government and must be performed within the parameters of the Government's security procedures.
 - (D) The Contractor must notify the Contracting Officer of any audit request.

- (x) *Taxes or surcharges.* Any taxes or surcharges which the commercial supplier or licensor seeks to pass along to the Government as end user will be governed by the terms of the underlying Government contract and, in any event, must be submitted to the Contracting Officer for a determination of applicability prior to invoicing unless specifically agreed to otherwise in the underlying contract.
 - (xi) *Non-assignment.* This agreement may not be assigned, nor may any rights or obligations thereunder be delegated, without the Government's prior approval, except as expressly permitted under paragraph (b) of this clause.
 - (xii) *Confidential information.* If this agreement includes a confidentiality clause, such clause is hereby amended to state that neither the agreement nor the contract price, as applicable, shall be deemed "confidential information." Issues regarding release of "unit pricing" will be resolved consistent with the Freedom of Information Act. Notwithstanding anything in this agreement to the contrary, the Government may retain any confidential information as required by law, regulation or its internal document retention procedures for legal, regulatory or compliance purposes; provided, however, that all such retained confidential information will continue to be subject to the confidentiality obligations of this agreement.
- (2) If any language, provision, or clause of this agreement conflicts or is inconsistent with the preceding paragraph (w)(1) of this clause, the language, provisions, or clause of paragraph (w)(1) of this clause shall prevail to the extent of such inconsistency.

1052.201-70 CONTRACTING OFFICER'S REPRESENTATIVE (COR) APPOINTMENT AND AUTHORITY (APR 2015)

- (a) The COR(s) are named on the award form. Should a change to the COR(s) be necessary in the future, they will be named on the modification SF-30.
- (b) Performance of work under this contract is subject to the technical direction of the COR identified above, or a representative designated in writing. The term "technical direction" includes, without limitation, direction to the contractor that directs or redirects the labor effort, shifts the work between work areas or locations, and/or fills in details and otherwise serves to ensure that tasks outlined in the work statement are accomplished satisfactorily.
- (c) Technical direction must be within the scope of the contract specification(s)/work statement. The COR does not have authority to issue technical direction that:
 - (1) Constitutes a change of assignment or additional work outside the contract specification(s)/work statement;
 - (2) Constitutes a change as defined in the clause entitled "Changes";
 - (3) In any manner causes an increase or decrease in the contract price, or the time required for contract performance;
 - (4) Changes any of the terms, conditions, or specification(s)/work statement of the contract;
 - (5) Interferes with the contractor's right to perform under the terms and conditions of the contract; or
 - (6) Directs, supervises or otherwise controls the actions of the contractor's employees.
- (d) Technical direction may be oral or in writing. The COR must confirm oral direction in writing within five workdays, with a copy to the Contracting Officer.
- (e) The Contractor shall proceed promptly with performance resulting from the technical direction issued by the COR. If, in the opinion of the contractor, any direction of the COR or the designated representative falls within the limitations of (c) above, the contractor shall immediately notify the Contracting Officer no later than the beginning of the next Government workday.

- (f) Failure of the Contractor and the Contracting Officer to agree that technical direction is within the scope of the contract shall be subject to the terms of the clause entitled "Disputes."

52.204-9 PERSONAL IDENTITY VERIFICATION OF CONTRACTOR PERSONNEL (JAN 2011)

52.204-13 SYSTEM FOR AWARD MANAGEMENT MAINTENANCE. (OCT 2018)

1052.210-70 CONTRACTOR PUBLICITY (APR 2015)

The Contractor, or any entity or representative acting on behalf of the Contractor, shall not refer to the supplies or services furnished pursuant to the provisions of this contract in any news release or commercial advertising, or in connection with any news release or commercial advertising, without first obtaining explicit written consent to do so from the Contracting Officer. Should any reference to such supplies or services appear in any news release or commercial advertising issued by or on behalf of the Contractor without the required consent, the Government shall consider institution of all remedies available under applicable law, including 31 U.S.C. 333, and this contract. Further, any violation of this clause may be considered during the evaluation of past performance.

52.217-8 OPTION TO EXTEND SERVICES (NOV 1999)

The Government may require continued performance of any services within the limits and at the rates specified in the contract. These rates may be adjusted only as a result of revisions to prevailing labor rates provided by the Secretary of Labor. The option provision may be exercised more than once, but the total extension of performance hereunder shall not exceed 6 months. The Contracting Officer may exercise the option by written notice to the Contractor within 30 days of contract expiration.

1052.228-70 INSURANCE (APR 2015)

In accordance with FAR clause 52.228-5, entitled "Insurance—Work on a Government Installation" [or FAR clause 52.228-7 entitled, "*Insurance—Liability to Third Persons*"], insurance of the following kinds and minimum amounts shall be provided and maintained during the period of performance of this contract:

- (a) *Worker's compensation and employer's liability.* The Contractor shall, as a minimum, meet the requirements specified at FAR 28.307-2(a).
- (b) *General liability.* The Contractor shall, at a minimum, meet the requirements specified at FAR 28.307-2(b).
- (c) *Automobile liability.* The Contractor shall, at a minimum, meet the requirements specified at FAR 28.307-2(c).

52.232-18 AVAILABILITY OF FUNDS (APR 1984)

LAPSE FUNDING

In the event of a lapse funding resulting in a government shutdown, the status of Fiscal Year funding and any necessary action required of the Contractor will be made available at the following website: <https://www.fiscal.treasury.gov/doing-business-with-fiscal-service/>. It is the Contractor's responsibility to monitor this website for information regarding Fiscal Year funding.

1052.232-39 UNENFORCEABILITY OF UNAUTHORIZED OBLIGATIONS (January 2016)

- (a) *Definition.* As used in this clause-

"Commercial supplier agreements" means terms and conditions customarily offered to the public by vendors of supplies or services that meet the definition of commercial item set forth in FAR 2.101 and intended to create a binding legal obligation on the end user. Commercial supplier agreements (CSA) are particularly common in information technology acquisitions, including acquisitions of commercial computer software and commercial technical data, but they may apply to any supply or service. The term applies-

- (1) Regardless of the format or style of the document. For example, a CSA may be styled as standard terms of sale or lease, Terms of Service (TOS), End User License Agreement (EULA), or another similar legal instrument or agreement, and may be presented as part of an offer or quotation responding to a solicitation.
- (2) Regardless of the media or delivery mechanism used. For example, a CSA may be presented as one or more paper documents or may appear on a computer or other electronic device screen during a purchase, software installation, other product delivery, registration for a service, or another transaction.
- (b) Except as stated in paragraph (c) of this clause, when any supply or service acquired under this contract is subject to any CSA, that includes any language, provision, or clause requiring the Government to pay any future fees, penalties, interest, legal costs or to indemnify the Contractor or any person or entity for damages, costs, fees, or any other loss or liability that would create an Anti-Deficiency Act violation (31 U.S.C. 1341), the following shall govern:
 - (1) Any such language, provision, or clause is unenforceable against the Government.
 - (2) Neither the Government nor any Government authorized end user shall be deemed to have agreed to such clause by virtue of it appearing in the CSA. If the CSA is invoked through an "I agree" click box or other comparable mechanism (e.g., "click-wrap" or "browse-wrap" agreements), execution does not bind the Government or any Government authorized end user to such clause.
 - (3) Any such language, provision, or clause is deemed to be stricken from the CSA.
- (c) Paragraph (b) of this clause does not apply to indemnification or any other payment by the Government that is expressly authorized by statute and specifically authorized under applicable agency regulations and procedures.

1052.232-7003 ELECTRONIC SUBMISSION OF PAYMENT REQUESTS (APR 2015)

- (a) Definitions. As used in this clause—
 - (1) "Payment request" means a bill, voucher, invoice, or request for contract financing payment with associated supporting documentation. The payment request must comply with the requirements identified in FAR 32.905(b), "Content of Invoices" and the applicable Payment clause included in this contract.
 - (b) Except as provided in paragraph (c) of this clause, the Contractor shall submit payment requests electronically using the Invoice Processing Platform (IPP). Information regarding IPP, including IPP Customer Support is available at www.ipp.gov or any successor site.
 - (c) The Contractor may submit payment requests using other than IPP only when the Contracting Officer authorizes alternate procedures in writing in accordance with Treasury procedures.
 - (d) If alternate payment procedures are authorized, the Contractor shall include a copy of the Contracting Officer's written authorization with each payment request.

PAYMENT AND INVOICE QUESTIONS (IPP)

For payment and invoice questions, go to <https://arc.fiscal.treasury.gov/vendors-and-contractors/> or contact Accounts Payable at (304) 480-8000 option 7 or via email at AccountsPayable@fiscal.treasury.gov.

OVERPAYMENTS

In accordance with 52.212-4 section (i) 5 Overpayments: Accounts Receivable Conversion of Check Payments to electronic funds transfer (EFT): If the Contractor sends the Government a check to remedy duplicate contract financing or an overpayment by the government, it will be converted into an EFT. This means the Government will copy the check and use the account information on it to electronically debit the Contractor's account for the amount of the check. The debit from the Contractor's account will usually occur within 24 hours and will be shown on the regular account statement.

The Contractor will not receive the original check back. The Government shall destroy the Contractor's original check, but will keep a copy of it. If the EFT cannot be processed for technical reasons, the Contractor authorizes the Government to process the copy in place of the original check.

MARKING OF SHIPMENTS AND INVOICES

The Contractor shall ensure the contract number is clearly visible on all shipping/service documents, containers, and invoices.

PERFORMANCE EVALUATION

This award is subject to a performance evaluation via the Contractor Performance Assessment Reporting System (CPARS) at www.cpars.gov. Following the end of each 12-month performance period and at completion, a completed Government evaluation shall be forwarded to the Contractor. The Contractor may submit comments, if any, within the CPARS system during the time period specified in the evaluation transmittal. The Contractor's comments shall be considered in the final evaluation. Any disagreement between the parties regarding the evaluation shall be forwarded to the Contracting Officer. The final evaluation of the Contractor's performance is the decision of the Contracting Agency. In the event of a dispute the evaluation will be reviewed at least one level above the Contracting Officer. The final performance evaluation report will be saved in the Government's past performance database at <https://www.cpars.gov/>.

52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS -- COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (JAN 2025)

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial products and commercial services:

- (1) 52.203-19 Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (Jan 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).
- (2) 52.204-23 Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab Covered Entities (DEC 2023) (Section 1634 of Pub. L. 115-91)
- (3) 52.204-25 Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment. (Nov 2021) (Section 889(a)(1)(A) of Pub. L. 115-232).
- (4) 52.209-10 Prohibition on Contracting with Inverted Domestic Corporations (Nov 2015).
- (5) 52.232-40 Providing Accelerated Payments to Small Business Subcontractors (MAR 2023) (31 U.S.C. 3903 and 10 U.S.C. 3801).
- (6) 52.233-3 Protest After Award (Aug 1996) ([31 U.S.C. 3553](#)).

(7) 52.233-4 Applicable Law for Breach of Contract Claim (Oct 2004) (Public Laws 108-77 and 108-78 ([19 U.S.C. 3805 note](#))).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial products and commercial services:

- (1) 52.203-6 Restrictions on Subcontractor Sales to the Government (JUN 2020), with *Alternate I* (Nov 2021) ([41 U.S.C. 4704](#) and [10 U.S.C. 4655](#)).
- (2) 52.203-13 Contractor Code of Business Ethics and Conduct (Nov 2021) ([41 U.S.C. 3509](#)).
- (3) 52.203-15 Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (Jun 2010) (Section 1553 of Pub. L. 111-5). (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009.)
- (4) 52.203-17 52.203-17, Contractor Employee Whistleblower Rights (NOV 2023) (41 U.S.C. 4712); this clause does not apply to contracts of DoD, NASA, the Coast Guard, or applicable elements of the intelligence community--see FAR 3.900(a).
- (5) 52.204-10 Reporting Executive Compensation and First-Tier Subcontract Awards (JUN 2020) (Pub. L. 109-282) ([31 U.S.C. 6101 note](#)).
- (6) [Reserved]
- (7) 52.204-14 Service Contract Reporting Requirements (Oct 2016) (Pub. L. 111-117, section 743 of Div. C).
- (8) 52.204-15 Service Contract Reporting Requirements for Indefinite-Delivery Contracts (Oct 2016) (Pub. L. 111-117, section 743 of Div. C).
- (9) 52.204-27 Prohibition on a ByteDance Covered Application (JUN 2023) (Section 102 of Division R of Pub. L. 117-328).
- (10) 52.204-28 Federal Acquisition Supply Chain Security Act Orders--Federal Supply Schedules, Governmentwide Acquisition Contracts, and Multi-Agency Contracts. (DEC 2023) (Pub. L. 115-390, title II).
- (11)(i) 52.204-30 Federal Acquisition Supply Chain Security Act Orders--Prohibition. (DEC 2023) (Pub. L. 115-390, title II).
- (ii) Alternate I (DEC 2023) of 52.204-30.
- (12) 52.209-6 Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, Proposed for Debarment, or Voluntarily Excluded. (JAN 2025) ([31 U.S.C. 6101 note](#)).
- (13) 52.209-9 Updates of Publicly Available Information Regarding Responsibility Matters (Oct 2018) ([41 U.S.C. 2313](#)).
- (14) [Reserved]
- (15) 52.219-3 Notice of HUBZone Set-Aside or Sole-Source Award (Oct 2022) ([15 U.S.C. 657a](#)).
- (16) 52.219-4 Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Oct 2022) (if the offeror elects to waive the preference, it shall so indicate in its offer) ([15 U.S.C. 657a](#))
- (17) [Reserved]
- (18)(i) 52.219-6 Notice of Total Small Business Set-Aside (Nov 2020) ([15 U.S.C. 644](#)). (MAR 2020) of [52.219-6](#).
- (ii) Alternate I (MAR 2020) of [52.219-6](#).
- (19)(i) 52.219-7 Notice of Partial Small Business Set-Aside (Nov 2020) ([15 U.S.C. 644](#)). (MAR 2020) of [52.219-7](#).
- (ii) Alternate I (MAR 2020) of [52.219-7](#).
- (20) 52.219-8 Utilization of Small Business Concerns (JAN 2025) ([15 U.S.C. 637\(d\)\(2\)](#) and (3)).
- (21)(i) 52.219-9 Small Business Subcontracting Plan (JAN 2025) ([15 U.S.C. 637\(d\)\(4\)](#)). (Nov 2016) of [52.219-9](#).
- (ii) Alternate I (Nov 2016) of [52.219-9](#).
- (iii) Alternate II (NOV 2016) of [52.219-9](#).

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|-------------------------------------|---------|---------------|---|
| <input type="checkbox"/> | (iv) | Alternate III | (JAN 2025) of 52.219-9 . |
| <input type="checkbox"/> | (v) | Alternate IV | (JAN 2025) of 52.219-9 . |
| <input type="checkbox"/> | (22)(i) | 52.219-13 | Notice of Set-Aside of Orders (MAR 2020) (15 U.S.C. 644(r)). |
| <input type="checkbox"/> | (ii) | Alternate I | (MAR 2020) of 52.219-13 . |
| <input checked="" type="checkbox"/> | (23) | 52.219-14 | Limitations on Subcontracting (Oct 2022) (15 U.S.C. 637s). |
| <input type="checkbox"/> | (24) | 52.219-16 | Liquidated Damages—Subcontracting Plan (SEP 2021) (15 U.S.C. 637(d)(4)(F)(i)). |
| <input type="checkbox"/> | (25) | 52.219-27 | Notice of Set-Aside for, or Sole Source Award to, Service-Disabled Veteran-Owned Small Business (SDVOSB) Concerns Eligible Under the SDVOSB Program (FEB 2024) (15 U.S.C. 657f). |
| <input checked="" type="checkbox"/> | (26)(i) | 52.219-28 | Postaward Small Business Program Rerepresentation (JAN 2025) (15 U.S.C. 632(a)(2)). |
| <input type="checkbox"/> | (ii) | Alternate I | (MAR 2020) of 52.219-28 . |
| <input type="checkbox"/> | (27) | 52.219-29 | Notice of Set-Aside for, or Sole-Source Award to, Economically Disadvantaged Women-Owned Small Business Concerns (Oct 2022) (15 U.S.C. 637(m)). |
| <input type="checkbox"/> | (28) | 52.219-30 | Notice of Set-Aside for, or Sole-Source Award to, Women-Owned Small Business Concerns Eligible Under the Women-Owned Small Business Program (Oct 2022) (15 U.S.C. 637(m)). |
| <input type="checkbox"/> | (29) | 52.219-32 | Orders Issued Directly Under Small Business Reserves (MAR 2020) (15 U.S.C. 644(r)). |
| <input checked="" type="checkbox"/> | (30) | 52.219-33 | Nonmanufacturer Rule (SEP 2021) (15 U.S.C. 637(a)(17)). |
| <input checked="" type="checkbox"/> | (31) | 52.222-3 | Convict Labor (June 2003) (E.O. 11755). |
| <input checked="" type="checkbox"/> | (32) | 52.222-19 | Child Labor—Cooperation with Authorities and Remedies (JAN 2025) (E.O. 13126). |
| <input checked="" type="checkbox"/> | (33) | 52.222-21 | Prohibition of Segregated Facilities (Apr 2015). |
| <input checked="" type="checkbox"/> | (34)(i) | 52.222-26 | Equal Opportunity (Sept 2016) (E.O. 11246). |
| <input type="checkbox"/> | (ii) | Alternate I | (FEB 1999) of 52.222-26 . |
| <input checked="" type="checkbox"/> | (35)(i) | 52.222-35 | Equal Opportunity for Veterans (JUN 2020) (38 U.S.C. 4212). |
| <input type="checkbox"/> | (ii) | Alternate I | (JUL 2014) of 52.222-35 . |
| <input checked="" type="checkbox"/> | (36)(i) | 52.222-36 | Equal Opportunity for Workers with Disabilities (JUN 2020) (29 U.S.C. 793). |
| <input type="checkbox"/> | (ii) | Alternate I | (JUL 2014) of 52.222-36 . |
| <input checked="" type="checkbox"/> | (37) | 52.222-37 | Employment Reports on Veterans (JUN 2020) (38 U.S.C. 4212). |
| <input checked="" type="checkbox"/> | (38) | 52.222-40 | Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496). |
| <input checked="" type="checkbox"/> | (39)(i) | 52.222-50 | Combating Trafficking in Persons (Nov 2021) (22 U.S.C. chapter 78 and E.O. 13627). |
| <input type="checkbox"/> | (ii) | Alternate I | (MAR 2015) of 52.222-50 (22 U.S.C. chapter 78 and E.O. 13627). |
| <input checked="" type="checkbox"/> | (40) | 52.222-54 | Employment Eligibility Verification (JAN 2025) (Executive Order 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial products or commercial services as prescribed in FAR 22.1803 .) |
| <input type="checkbox"/> | (41)(i) | 52.223-9 | Estimate of Percentage of Recovered Material Content for EPA–Designated Items (May 2008) (42 U.S.C. 6962(c)(3)(A)(ii)). (Not applicable to the acquisition of commercially available off-the-shelf items.) |
| <input type="checkbox"/> | (ii) | Alternate I | Alternate I (MAY 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)). (Not applicable to the acquisition of commercially available off-the-shelf items.) |
| <input type="checkbox"/> | (42) | 52.223-11 | Ozone-Depleting Substances and High Global Warming Potential Hydrofluorocarbons (May 2024) (E.O. 13693). |

- (43) 52.223-12 Maintenance, Service, Repair, or Disposal of Refrigeration Equipment and Air Conditioners (MAY 2024) (E.O. 13693).
- (44) 52.223-20 Aerosols (MAY 2024) (E.O. 13693).
- (45) 52.223-21 Foams (May 2024) (E.O. 13693).
- (46) 52.223-23 Sustainable Products and Services (MAY 2024) (E.O. 14057, 7 U.S.C. 8102, 42 U.S.C. 6962, 42 U.S.C. 8259b, and 42 U.S.C. 76711).
- (47)(i) 52.224-3 Privacy Training (JAN 2017) (5 U.S.C. 552 a).
- (ii) Alternate I (JAN 2017) of [52.224-3](#).
- (48)(i) 52.225-1 Buy American-Supplies (Oct 2022) ([41 U.S.C. chapter 83](#)).
- (ii) Alternate I (Oct 2022) of [52.225-1](#).
- (49)(i) 52.225-3 Buy American—Free Trade Agreements—Israeli Trade Act (NOV 2023) ([19 U.S.C. 3301, 19 U.S.C. 2112, 19 U.S.C. 3805, 19 U.S.C. 4001](#), 19 U.S.C. chapter 29 (sections 4501-4732), Pub. L. 103-182, 108-77, 108-78, 108-286, 108-302, 109-53, 109-169, 109-283, 110-138, 112-41, 112-42, and 112-43).
- (ii) Alternate I [Reserved]
- (iii) Alternate II (JAN 2025) of 52.225-3.
- (iv) Alternate III (FEB 2024) of [52.225-3](#)
- (v) Alternate IV (Oct 2022) of [52.225-3](#).
- (50) 52.225-5 Trade Agreements (NOV 2023) ([19 U.S.C. 2501](#), et seq., [19 U.S.C. 3301](#) note).
- (51) 52.225-13 Restrictions on Certain Foreign Purchases (FEB 2021) (E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).
- (52) 52.225-26 Contractors Performing Private Security Functions Outside the United States (Oct 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; [10 U.S.C. Subtitle A, Part V, Subpart G Note](#)).
- (53) 52.226-4 Notice of Disaster or Emergency Area Set-Aside (Nov 2007) ([42 U.S.C. 5150](#)).
- (54) 52.226-5 Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov 2007) ([42 U.S.C. 5150](#)).
- (55) 52.226-8 Encouraging Contractor Policies to Ban Text Messaging While Driving (MAY 2024) (E.O. 13513).
- (56) 52.229-12 Tax on Certain Foreign Procurements (FEB 2021).
- (57) 52.232-29 Terms for Financing of Purchases of Commercial Products and Commercial Services (Nov 2021) ([41 U.S.C. 4505](#), 10 U.S.C. 3805).
- (58) 52.232-30 Installment Payments for Commercial Products and Commercial Services (Nov 2021) (41 U.S.C. 4505, 10 U.S.C. 3805).
- (59) 52.232-33 Payment by Electronic Funds Transfer-System for Award Management (Oct 2018) ([31 U.S.C. 3332](#)).
- (60) 52.232-34 Payment by Electronic Funds Transfer-Other than System for Award Management (Jul 2013) ([31 U.S.C. 3332](#)).
- (61) 52.232-36 Payment by Third Party (May 2014) ([31 U.S.C. 3332](#)).
- (62) 52.239-1 Privacy or Security Safeguards (AUG 1996) ([5 U.S.C. 552a](#)).
- (63) 52.240-1 Prohibition on Unmanned Aircraft Systems Manufactured or Assembled by American Security Drone Act—Covered Foreign Entities (Nov 2024) (Sections 1821-1826, Pub. L. 118-31, 41 U.S.C. 3901 note prec.).
- (64) 52.242-5 Payments to Small Business Subcontractors (JAN 2017) ([15 U.S.C. 637\(d\)\(13\)](#)).
- (65)(i) 52.247-64 Preference for Privately Owned U.S.-Flag Commercial Vessels (Nov 2021) ([46 U.S.C. 55305](#) and [10 U.S.C. 2631](#)).
- (ii) Alternate I (APR 2003) of [52.247-64](#).
- (iii) Alternate II (Nov 2021) of [52.247-64](#).

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial products and commercial services:

- (1) 52.222-41 Service Contract Labor Standards (AUG 2018) ([41 U.S.C. chapter 67](#)).
- (2) 52.222-42 Statement of Equivalent Rates for Federal Hires (MAY 2014) ([29 U.S.C. 206](#) and [41 U.S.C. chapter 67](#)).
- (3) 52.222-43 Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (Multiple Year and Option Contracts) (AUG 2018) ([29 U.S.C. 206](#) and [41 U.S.C. chapter 67](#)).
- (4) 52.222-44 Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (May 2014) ([29 U.S.C. 206](#) and [41 U.S.C. chapter 67](#)).
- (5) 52.222-51 E Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (May 2014) ([41 U.S.C. chapter 67](#)).
- (6) 52.222-53 Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services- Requirements (MAY 2014) ([41 U.S.C. chapter 67](#)).
- (7) 52.222-55 Minimum Wages for Contractor Workers Under Executive Order 14026 (JAN 2022).
- (8) 52.222-62 Paid Sick Leave Under Executive Order 13706 (JAN 2022) (E.O. 13706).
- (9) 52.226-6 Promoting Excess Food Donation to Nonprofit Organizations (Jun 2020) ([42 U.S.C. 179](#)).
- (10) 52.247-69 Reporting Requirement for U.S.-Flag Air Carriers Regarding Training to Prevent Human Trafficking (JAN 2025) (49 U.S.C. 40118(g)).

(d) *Comptroller General Examination of Record.* The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, as defined in FAR [2.101](#), on the date of award of this contract, and does not contain the clause at [52.215-2](#), Audit and Records-Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR subpart [4.7](#), Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e) (1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (e)(1), in a subcontract for commercial products or commercial services. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause-

- (i) [52.203-13](#), Contractor Code of Business Ethics and Conduct (Nov 2021) ([41 U.S.C. 3509](#)).
- (ii) [52.203-17](#) Contractor Employee Whistleblower Rights (NOV 2023) (41 U.S.C. 4712)
- (iii) [52.203-19](#), Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements (Jan 2017) (section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions)).
- (iv) [52.204-23](#), Prohibition on Contracting for Hardware, Software, and Services Developed or Provided by Kaspersky Lab Covered Entities (DEC 2023) (Section 1634 of Pub. L. 115-91).
- (v) [52.204-25](#), Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment. (Nov 2021) (Section 889(a)(1)(A) of Pub. L. 115-232).
- (vi) [52.204-27](#), Prohibition on a ByteDance Covered Application (Jun 2023) (Section 102 of Division R of Pub. L. 117-328).
- (vii) (A) 52.204-30, Federal Acquisition Supply Chain Security Act Orders--Prohibition. (DEC 2023) (Pub. L. 115-390, title II).
 - (B) Alternate I (DEC 2023) of 52.204-30.
- (viii) [52.219-8](#), Utilization of Small Business Concerns (JAN 2025) ([15 U.S.C. 637\(d\)\(2\)](#) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds the applicable threshold specified in FAR [19.702](#)(a) on the date of subcontract award, the subcontractor must include [52.219-8](#) in lower tier subcontracts that offer subcontracting opportunities.
- (ix) [52.222-21](#), Prohibition of Segregated Facilities (APR 2015).
- (x) [52.222-26](#), Equal Opportunity (SEP 2015) (E.O.11246).
- (xi) [52.222-35](#), Equal Opportunity for Veterans (JUN 2020) ([38 U.S.C. 4212](#)).
- (xii) [52.222-36](#), Equal Opportunity for Workers with Disabilities (JUN 2020) ([29 U.S.C. 793](#)).
- (xiii) [52.222-37](#), Employment Reports on Veterans (JUN 2020) ([38 U.S.C. 4212](#)).
- (xiv) [52.222-40](#), Notification of Employee Rights Under the National Labor Relations Act (DEC 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause [52.222-40](#).
- (xv) [52.222-41](#), Service Contract Labor Standards (AUG 2018) ([41 U.S.C. chapter 67](#)).
- (xvi) (A) [52.222-50](#), Combating Trafficking in Persons (Nov 2021) ([22 U.S.C. chapter 78](#) and E.O. 13627).
 - (B) Alternate I (MAR 2015) of [52.222-50](#) ([22 U.S.C. chapter 78](#) and E.O. 13627).
- (xvii) [52.222-51](#), Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (May 2014) ([41 U.S.C. chapter 67](#)).
- (xviii) [52.222-53](#), Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements (MAY 2014) ([41 U.S.C. chapter 67](#)).
- (xix) [52.222-54](#), Employment Eligibility Verification (JAN 2025) (E.O. 12989).
- (xx) [52.222-55](#), Minimum Wages for Contractor Workers Under Executive Order 14026 (JAN 2022).
- (xxi) [52.222-62](#), Paid Sick Leave Under Executive Order 13706 (JAN 2022) (E.O. 13706).
- (xxii) (A) [52.224-3](#), Privacy Training (Jan 2017) ([5 U.S.C. 552a](#)).
 - (B) Alternate I (JAN 2017) of [52.224-3](#).
- (xxiii) [52.225-26](#), Contractors Performing Private Security Functions Outside the United States (OCT 2016) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; 10 U.S.C. Subtitle A, Part V, Subpart G Note).
- (xxiv) [52.226-6](#), Promoting Excess Food Donation to Nonprofit Organizations (JUN 2020) ([42 U.S.C. 1792](#)). Flow down required in accordance with paragraph (e) of FAR clause [52.226-6](#).

- (xxv) 52.232-40, Providing Accelerated Payments to Small Business Subcontractors (MAR 2023) (31 U.S.C. 3903 and 10 U.S.C. 3801). Flow down required in accordance with paragraph (c) of 52.232-40
- (xxvi) 52.240-1 Prohibition on Unmanned Aircraft Systems Manufactured or Assembled by American Security Drone Act—Covered Foreign Entities (Nov 2024) (Sections 1821-1826, Pub. L. 118-31, 41 U.S.C. 3901 note prec.).
- (xxvii) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (Nov 2021) (46 U.S.C. 55305 and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.

(2) While not required, the Contractor may include in its subcontracts for commercial products and commercial services a minimal number of additional clauses necessary to satisfy its contractual obligations.

CONTRACT DOCUMENTS, EXHIBITS, AND ATTACHMENTS

Exhibit A: 100% Construction Set

Exhibit B: 100% Construction Structural Set

Exhibit C: Complete Specifications Set

Exhibit D: AFRH Directive 10-7A Facility Management Manual

Exhibit E: AFRH Directive 10-7A AFRH Facilities Management Program

**Gulfport Campus Generator Replacement
Performance Work Statement
Armed Forces Retirement Home (AFRH)**

1. Background. The United States Congress established the Armed Forces Retirement Home (AFRH) as a separate federal agency in 1991 when it enacted the Defense Authorization Act, Public Law 101-510. The Agency's source of income flows from the enlisted men and women of the Armed Forces of the United States through a small payroll deduction and forfeitures. In addition to the contributions from enlisted personnel, AFRH enjoys donations from generous individuals and the interest income from a trust fund established in 1855 for the Forefather to AFRH, the United States Soldiers Home. While the total number of residents varies from month-to-month, AFRH provides a home for approximately 600 former enlisted personnel in their retirement years at both the Gulfport (AFRH-G) and Washington (AFRH-W) campuses. This Home provides retired veterans with the common daily living needs such as: private rooms, bank, chapel, convenience store, mail room, laundry facilities, barber/beauty shop, dining facility, and a 24-hour security and staff presence. In addition to these common needs, AFRH offers social, recreational, and occupational activities for many interests. While residents live in this community, AFRH provides for their overall health care needs in a high-quality manner, including on site primary care, medical care, and a continuum of long-term care services as residents transition from independent living. Our residents found it to be an honor to serve our country. AFRH finds it to be an honor to serve them now.

2. Purpose. The Contractor shall provide all management, supervision, personnel, services, materials, supplies, facilities, transportation, tools, and general and specialized equipment to replace the main building generators and equipment associated with the generators on the AFRH-G Campus.

3. Scope. The Contractor shall provide and pay for all labor, material, tools, equipment, shop drawings, submittals, layout, unloading, scaffolding, ladders, hoisting, transportation, supervision, taxes, and any other items or services necessary for, and reasonably incidental to, the proper execution and completion of the work. This work shall be performed in accordance with the complete set of Construction Documents as outlined in the following documents and specifications:

Contract Set of Drawings:

Exhibit A: 100% Construction Set

Exhibit B: 100% Construction Structural Set

Contract Specifications:

Exhibit C: Complete Specifications Set

Other Documents:

Exhibit D: AFRH Directive 10-7A Facility Management Manual

Exhibit E: AFRH Directive 10-7A AFRH Facilities Management Program

It is the intention of the drawings and specifications in this scope to provide for a complete and workable electrical generator system; any miscellaneous equipment, supplies, materials and/or other items required for proper completion of the work shall be provided at no additional cost to AFRH beyond the firm fixed price proposed and accepted.

4. Specific Tasks. (*If Applicable*) The Contractor shall provide all labor, material, equipment, and services to fulfill all requirements stated herein this PWS.

4.1 Project Requirements

1. General Conditions

The Contract Documents are complementary- what is required by one is as binding as if required by all.

It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result shall be provided whether or not specifically called for, at no additional cost to AFRH.

Clarifications and interpretations of the Specifications or Work Scope described by Contract Documents shall only be issued by the AFRH Facility Manager.

a. Reference Standards

i. Standards, Specifications, Codes, Laws, and Regulations

Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of the Solicitation, except as may be otherwise specifically stated in the Contract Documents. Provided, however, that the Contractor shall comply with all subsequent amendments to applicable Laws or Regulations.

No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of the Contractor, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to AFRH, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

b. Reporting and Resolving Discrepancies

i. Reporting Discrepancies:

1. Contractor's Review of Contract Documents Before Starting Work:

Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify all figures therein and all field measurements. Contractor shall promptly give Notice to BFS and AFRH of any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from BFS before proceeding with any Work affected thereby by timely submitting a Request for Clarification. Contractor's strict compliance with this Paragraph is a condition precedent to the Contractor's right to make a Claim that arises from any claimed conflict, error, ambiguity, or discrepancy, or to seek any other remedy for the same that arises under the Contract Documents or any applicable Law or Regulation. If the Contractor fails to comply with this Paragraph, the Contractor shall be solely responsible for all costs and delays arising from or related to the conflict, error, ambiguity, or discrepancy at issue.

2. Contractor's Review of Contract Documents During Performance of Work:

If, during the performance of the Work, Contractor discovers any conflict, error, within the Contract Documents, or between the Contract Documents and

- (a) Any applicable Law or Regulation,
- (b) Any standard, specification, manual, or code, or
- (c) Any instruction of any Supplier, then

Contractor shall promptly provide Notice to AFRH and BFS in writing of the same. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by in the Contract Documents) until authorization or an modification or supplement to the Contract Documents has been issued by the Contracting Officer. Contractor's strict compliance with this Paragraph is a condition precedent to the Contractor's right to make a Claim that arises from any claimed conflict, error, ambiguity, or discrepancy described in this Paragraph, or to seek any other remedy for the same that arises under the Contract Documents or any applicable Law or Regulation. If the Contractor fails to comply with this Paragraph, the Contractor shall be solely responsible for all costs and delays arising from or related to the conflict, error, ambiguity, or discrepancy at issue.

3. Contractor's Failure to Discover:

If the Contractor fails to discover any such conflict, error, ambiguity, discrepancy, omission, or inconsistency which, in the exercise of reasonable care and diligence it should have discovered, the Contractor shall be solely responsible for all costs and delays arising from or related to the conflict, error, ambiguity, discrepancy, omission, or inconsistency at issue.

c. Resolving Discrepancies:

Except as may be otherwise specifically stated in the Contract Documents, the terms and conditions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

- i. The provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
- ii. The provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

In resolving inconsistencies or discrepancies among two or more sections of the Contract Documents, precedence shall be given in the following order:

1. Modifications to the Contract Documents
 2. The Contract Documents
 3. Changes in the Work Authorized by the Contracting Officer Representative
 4. Supplementary Work Description and Criteria
 5. General Work Description and Criteria Specifications
 6. Drawings
- iii. Authorized contract modifications in the Work shall take precedence over any terms and conditions of the Contract Documents addressed therein. Figure dimensions on Drawings shall take precedence over scale dimensions. When a portion of the Work is depicted on more than one Drawing, the Drawing having the greater detail shall have precedence.
 - iv. The Contractor agrees that, in the event of any ambiguity or conflict in the Contract Documents, the language in the Contract Documents shall not be construed against the AFRH.

v. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized by AFRH, by one or more of the following ways if no cost is associated:

- (a) AFRH's written approval of a Shop Drawing or Sample; or
- (b) AFRH's written interpretation or clarification.

No change in Contract Price or Period of Performance shall be permitted in connection with any of these methods of revision.

d. Reuse of Documents

i. Contractor and any Subcontractor or Supplier shall not:

- 1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 - 2. Reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of AFRH and Engineer and specific written verification or adaptation by BFS.
- ii. The prohibitions of this Contract Document will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.
 - iii. All portions of the Contract Documents are instruments of service for the Project. Any reuse of these materials by the Contractor or a Subcontractor without specific written authorization, verification, or adaptation by AFRH and BFS will be at the risk of the user and without liability or legal expense to BFS or AFRH. Such user shall hold BFS and AFRH harmless from any and all damages, including reasonable attorneys' fees, from any and all claims arising from any such reuse.

e. Electronic Data

- i. The data furnished by AFRH to Contractor, or by Contractor to AFRH, will be in either the form of printed copies (also known as hard copies) and/or in electronic media format. If there is a discrepancy between the electronic media format and the hard copies, the hard copies govern, except when the hardcopy is produced from the electronic media format it is being compared against, then the electronic media governs.
- ii. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within three (3) days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the three (3) day acceptance period will be corrected by the transferring party.
- iii. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

f. Availability of Lands; Subsurface and Physical Conditions; Hazardous/Environmental Conditions; Reference Points

i. Availability of Lands

1. AFRH shall furnish the Site. AFRH shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor shall comply in performing the Work.
2. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment, subject to the AFRH's prior written approval of the storage location.
3. Site Inspection: The Contractor is responsible for all conditions that exist at the Site. Contractor shall represent in its Offer that the Contractor has visited the Site and made a reasonable and thorough investigation of the Site.

ii. Differing Subsurface or Physical Conditions

If Contractor believes that any subsurface or physical condition that is uncovered or revealed could not have been discovered previously in the exercise of due diligence and site inspection, and either:

1. Is of such a nature as to require a change in the Contract Documents; or
2. Differs materially from that shown or indicated in the Contract Documents; or
3. Is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents:

Then Contractor shall, at the time the condition is uncovered or revealed, and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as defined by the Contract Documents), give notice to the Contracting Officer and AFRH. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid in cases of emergency) until receipt of written order to do so. If Contractor disturbs such condition or performs any Work in connection therewith before receiving a written order to do so, then Contractor waives any Claim arising from or related to such condition and shall be solely responsible for all costs and delays arising from or related to the same. Contractor's strict compliance with the Notice provision is a condition precedent to any Claim for adjustment of either the Contract Times or of the Contract Price due to such conditions.

If the Contractor failed to conduct the Site Inspection pursuant to paragraph (3) above, then the Contractor waives any Claim arising from or related to any subsurface or physical conditions that would be otherwise covered under this section, and the Contractor shall be solely responsible for all costs and delays arising from or related to the same.

iii. Underground Facilities

1. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data.
 - (a) Furnished to AFRH by the owners of such Underground Facilities, including AFRH, or others, and/or obtained by. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - (1) AFRH shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

- (2) The cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
- (i) Reviewing and checking all such information and data.
 - (ii) Locating all Underground Facilities shown or indicated in the Contract Documents.
 - (iii) Coordination of the Work with the owners of such Underground Facilities, including AFRH, during construction.
 - (iv) The safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.
2. Not Shown or Indicated: If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, Contractor shall, at the time the Underground Facility is uncovered or revealed, and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as defined in the contract documents), identify the owner of such Underground Facility and give Notice to that owner and to AFRH. If Contractor determines the presence of the Underground Facility will require a change to the Contract Documents, Contractor shall give Notice to the Contracting Officer and AFRH. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility. Contractor shall not further disturb the Underground Facility or perform any work in connection therewith until receipt of a written order to do so. If Contractor disturbs such condition or performs any work in connection therewith before receiving a written order to do so, then Contractor waives any Claim arising from or related to the Underground Facility and shall be solely responsible for all costs and delays arising from or related to the same. Contractor's strict compliance with the Notice requirements in this section is a condition precedent to the Contractor's right to make a Claim that arises from the Underground Facility at issue, or to seek any other remedy for the same that arises under the Contract Documents or any applicable Law or Regulation. If the Contractor fails to comply with this section, the Contractor shall be solely responsible for all costs and delays arising from or related to the Underground Facility at issue.
3. If the Contractor failed to conduct the Site Inspection pursuant the Contract Documents, then the Contractor waives any Claims arising from or related to the Underground Facilities, and the Contractor shall be solely responsible for all costs and delays arising from or related to the same.
- iv. Reference Points
- AFRH shall provide reference points for construction which in AFRH's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of AFRH. Contractor shall report to AFRH whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.
- v. Hazardous Environmental Condition and Historic Preservation at Site
1. Reports and Drawings:

The Supplementary Conditions identify those reports and drawings known to AFRH relating to Hazardous Environmental Conditions and Historic Elements that have been identified at the Site.

2. Limited Reliance by Contractor on Technical Data Authorized:

Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any Claim against, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- (a) The completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 - (b) Other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - (c) Any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.
3. If a Hazardous Environmental Condition or Historic Element is uncovered or revealed at or contiguous to the Site which was not shown or indicated Contractor shall immediately:
- (a) Secure or otherwise isolate such condition.
 - (b) Stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Contract Documents).
 - (c) Notify AFRH (and promptly thereafter confirm such Notice in writing).

AFRH shall determine the necessity for AFRH to retain a qualified expert to evaluate such condition or take corrective action, if any. AFRH shall take such actions as are necessary to permit AFRH to timely review and determine a proper course of action. During such time, Contractor shall be responsible for the safety and protection of such Hazardous Environmental Condition or Historic Element. Contractor shall not disturb the Hazardous Environmental Condition or Historic Element or perform any work in connection therewith (except as foreseen in cases of emergency) until receipt of written order to do so by AFRH. If Contractor disturbs such condition or performs any work in connection therewith before receiving a written order to do so, then Contractor waives any Claim arising from or related to the Hazardous Environmental Condition and shall be solely responsible for all costs and delays arising from or related to the same. Contractor's strict compliance with the Notice requirements in this Paragraph is a condition precedent to the Contractor's right to make a Claim from the Hazardous Environmental Condition or Historic Element at issue, or to seek any other remedy for the same that arises under the Contract Documents or any applicable Law or Regulation. If the Contractor fails to comply with this section, the Contractor shall be solely responsible for all costs and delays arising from or related to the Hazardous Environmental Condition or Historic Element at issue. Contractor shall be solely responsible for a Hazardous Environmental Condition created by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

The Contractor shall not be required to resume work in connection with such condition or in any affected area until after AFRH has delivered Notice to Contractor:

- (1) Specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or
- (2) Specifying any special conditions under which such Work may be resumed safely. Any adjustment in Contract Price or Period of Performance, or both, as a result of such work stoppage or such special conditions under which Work is agreed to be resumed by Contractor shall be included in a contract modification.

If after receipt of such Notice to resume work is given to the Contractor, and the Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then AFRH may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. Any adjustment in Contract Price or period of performance or both, as a result of deleting the portion of the Work that is in the area affected by such condition shall be included in a Contract Modification. AFRH may have such deleted portion of the Work performed by AFRH's own forces or others.

If Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately:

- (i) Secure or otherwise isolate such condition.
- (ii) Stop all Work in connection with such condition and in any area affected thereby (except in an emergency).
- (iii) Notify AFRH (and promptly thereafter confirm such Notice in writing).

Contractor shall develop a plan for removal or remediation of the Hazardous Environmental Condition in conformance with Laws and Regulations and submit same to AFRH for review and approval. By approving such plan, AFRH assumes no responsibility or liability for the sufficiency of the plan. Contractor shall be solely responsible to remove or remediate the Hazardous Environmental Condition promptly to allow Contractor to resume Work, and Contractor shall not be entitled to any changes to Contract Price and/or Contract Times in connection therewith.

To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless AFRH, and the officers, directors, members, partners, employees, agents, consultants, sub-consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this section shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

The provisions of this section do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

If the Contractor failed to conduct the Site Inspection pursuant to the preceding sections, then the Contractor waives any Claims arising from or related to Hazardous Environmental Conditions, and the Contractor shall be solely responsible for all costs and delays arising from or related to the same.

2. General Work Description and Criteria:

- a. Contractor shall utilize the applicable state, local, and county standards for erosion control.

- b. Temporary Utilities - All connections and extensions required to provide temporary utilities shall be made by the Contractor at the Contractor's expense and according to any law, regulation, code, or standards.
- c. Temporary Water – Contractor may connect to an existing AFRH water source for construction operations.
- d. Construction Facilities – Contractors may utilize mobile containers or offices. Office and storage spaces shall be maintained during progress of work and removed at completion of work. Size of field offices shall depend on contractor's needs. Install appropriate fire extinguisher. At completion of work, all temporary facilities shall be removed, and area restored to new condition.
- e. Sanitary Facilities – The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as will comply with laws and regulations. Temporary toilet facilities may consist of portable toilets. The number of toilets shall be based on OSHA regulations. Toilet facilities shall be kept supplied and clean and in sanitary condition until the completion of the work and then shall be removed from the site. Upon removal the site shall be properly cleaned and graded.
- f. Project Identification – Within 15 days after the commencement of work, provide one project identification sign at the limit of construction location. Maintain sign throughout the life of the project. On the sign, list two points of contact by name and telephone number.
- g. Product Requirements (Scope of Work) - All materials shall be installed in strict accordance with the manufacturer's written specifications or Material's Institute Standards. Where the manufacturer's recommended details are used, the manufacturer shall be responsible for the performance of their product. All Items not specifically mentioned that are required to make the work complete and operational shall be included.
- h. Installation and Storage - All materials, supplies, and equipment shall be installed per manufacturer's recommendations and per applicable codes and requirements. Material stored on site shall be protected from damage by moisture, wind, sun, abuse, or any other harmful effects.
- i. Product Substitution Procedures – Contractor to investigate proposed products and determine that they are equal or superior in all respects to products specified. Before utilizing substitution, Contractor shall obtain approval from AFRH, AFRH's Design Team (AE Works, LTD), and (if a cost change) BFS. Coordinate installation of accepted substitutions into the Work, making such changes as may be required for the Work to be complete in all respects.
- j. Government Furnished Products – Contractor is not responsible for products furnished by AFRH that are damaged prior to opening or receiving furnished products.
- k. Execution Requirements – The execution of all work shall be in strict accordance with these specifications and manufacturer's written specifications or Material's Institute Standards. Where the manufacturer's recommended details are used, the manufacturer shall be responsible for the performance of their product. All work not specifically mentioned that is required to make the work complete and operational shall be included.
 - i. Codes - Construction shall comply with all applicable International Code Council (ICC), federal, state, and local building codes. It is the responsibility of the Contractor to ensure compliance with said codes and modify the specifications as needed to comply with such codes.
 - ii. Measurements - The Contractor shall check and verify all dimensions and conditions before proceeding with construction. Do not scale drawings. Noted dimensions take precedence.
 - iii. Workmanship - Workmanship shall conform to the best and highest standards of quality in each trade and shall include all items of fabrication, construction, and installation. All work shall be completed by skilled tradesmen and mechanics. Installation of all equipment and materials shall be in strict accordance with

manufacturers' recommendations/instructions and applicable codes. Where required as outlined by law, work shall be performed by licensed individuals.

- I. Local Conditions – All AFRH Building Codes are defined in the AFRH Facilities Manual. Justifiable waivers can be granted by the AFRH Corporate Facilities Manager.
- m. Cleaning - Construction site to be in a clean and orderly condition throughout the construction process. At the conclusion of construction, the project shall be properly cleaned. This should include but not be limited to; cleaning the interior and exterior surfaces exposed to view, remove temporary labels, stains, and foreign substances, polish transparent and glossy surfaces, etc. Replace filters of operating equipment. Clean equipment and fixtures to a sanitary condition. Clean exterior such as debris from roof, gutters, landscape areas, driveways, and walks, etc. Remove all waste and surplus materials.
- n. Protecting Installed Construction – Contractor to protect all installed construction. If products or materials come with a protective coating, contractor shall maintain protective coating until construction is complete. Contractor shall replace any items that become defective or damaged.
- o. Formal designs are not required, but shop drawings from a qualified professional with the following elements are required for review and consent before pipe work begins.
 - i. Basic layout and route of conduit.
 - ii. Project specific sections and details.
 - iii. General Conditions.
 - iv. Any Notes and attachments to other work.
- p. After construction, As-built drawings of the shop drawings will be provided to AFRH in PDF format.

4.2 Schedule: The Contractor is to provide with the proposal a schedule for this project to accomplish the work most reasonably, efficiently, economically, and within the shortest number of calendar days possible. The schedule shall have a breakdown of the number of calendar days required to perform each element of work envisioned by the Contractor.

4.3 Submittals: The Contractor is to submit two (2) thumb drives of the Shop Drawings and the As-built drawings. One (1) shall be given to the COR (POC, see section 4.4), and the other shall be sent via trackable shipping/mail to:

Justin Seffens
 Lead Facilities Manager
 South Sherman- Office 210
 3700 North Capitol Street, N.W.
 Washington, DC 20011-8400
 Tele. (202) 541-7548

4.4 Point of Contact:

Armed Forces Retirement Home
 John Cage
 Contacting Officer's Representative (COR)
 Campus Operations
 Phone – provided upon contract award.

4.5 General Instructions to Contractor:

1. Conduct of Work: The Contractor shall maintain close liaison with the COR who will coordinate the work with AFRH. The Contractor shall:

- a. Execute the work diligently and aggressively, and promptly advise the COR of all significant developments.
 - b. Contact the COR prior to starting the field investigation who will coordinate all visits to the project site. Records of all visits to the installation shall be kept by the Contractor and copies shall be provided to the COR within seven (7) working days.
 - c. Prepare complete minutes of each meeting and significant telephone conversations with Government representatives and furnish a copy to the COR within seven working days of the conference. AFRH may revise all minutes of meeting and approve same before being utilized as decision documents.
 - d. Take appropriate measures to obtain clarification of design criteria requirements, to acquire all pertinent design information and to incorporate such information in the work being performed. These actions will be accomplished through the COR.
 - e. The Contractor shall not react to any instructions that will affect the scope, cost, or industry standards without first advising the COR. The Contractor will not perform any additional services without prior written authorization from the Contracting Officer.
2. Quality Assurance: The Contractor is responsible for the professional quality, technical accuracy and the coordination of all documents and other services, including the work of any of his Subcontractors/consultants. The Contractor is required to have a logical and functional quality control program to assure that errors and deficiencies are minimized. In the event damage to the AFRH results from negligent performance of any of the services furnished under this contract, the Contractor will be held liable for such damages. The AFRH's review in no way relieves the Contractor of their contractual responsibilities.
3. Progress Schedule: The Contractor is responsible for providing a project schedule with their proposal. The schedule is to indicate major milestones and the typical numbers of days for standard work associated with the performance of this project. Within seven days after the contract award, the Contractor shall perform a Site Inspection pursuant to the preceding paragraphs. Within 3 days of the site inspection, the Contractor will provide the COR with a revised schedule showing the major milestones for the performance of the project, including proposing submittal dates for these milestones. The schedule can be CPM and shall incorporate a time scale. The Contractor shall identify who will be responsible for the work and who will check it. Before any changes, the COR will be immediately notified, in writing, prior to such changes in key personnel, for approval. When changes in key personnel are made, the Contractor shall update the progress schedule and shall immediately deliver it to the COR.
4. Shop Drawings (if applicable): Shop Drawings shall be prepared on standard 30" x 42" sheet. Drawings must be easily readable at one-half size. A location and vicinity map shall be provided on the cover sheet.
5. Specifications (if required): Specifications shall be prepared in a way that is appropriate for this project and approved by AFRH. The final specifications shall include a prepared Submittal Register which shows items required shop drawings or any other types of submission by the contractor for AFRH review. The use of trade names and proprietary items in the specifications is strongly discouraged. If necessary, their use shall be brought to the attention of the COR early in the design development so that the necessary approvals can be obtained.

5. Unforeseen Condition(s). During the course of installation, if a related unforeseen condition(s) is encountered that prevents the Contractor from completing the work as proposed. Any additional work resulting or required from the aforementioned unforeseen condition(s) shall be submitted and pre-approved by COR and/or CO. The Contractor shall prepare a detailed estimate illustrating the work required. The COR and CO must approve this prior to performance. All proposed materials and/or labor associated with any unforeseen condition shall be determined fair and reasonable by the COR and/or CO prior to performance.

6. AFRH Business Hours. When the Contractor performs their responsibilities during AFRH's Business Hours, they shall arrange work so as not to cause interference with normal occurrence of Government

business. Though areas of AFRH are open 24 hours per day; 7 days per week, AFRH's Business Hours are 7:00am to 4:00 pm, Monday through Friday, excluding Federal holidays: New Years Day, Martin Luther King, Jr. Day, Presidents Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, Christmas Day and Inauguration Day (Washington, DC only).

6.1 Allowable Contractor Hours of Operation. The Contractor may perform work between the hours of 6:30 A.M. and 8:00 P.M. any day of the week unless otherwise directed by the COR.

7. Place of Performance. Work shall be performed on-site at the AFRH Campus in Gulfport, Mississippi.

8. Permits, Licenses, Records, and Reporting. The Contractor shall be responsible for submission of all required code compliant forms and shall obtain any applicable required permits and licenses for the performance of work. Upon submission of reports or the acquisition of permits or licenses, the Contractor shall provide one (1) copy to the Government for its records.

While AFRH Corporate Facility Manager is the Authority Having Jurisdiction on the federal campus, jurisdiction of environmental elements resides with the Environmental Protection Agency (EPA) who has delegated the DC Environmental Office as their representative. As such, the contractor is subject to the environmental regulations of Gulfport, Mississippi.

9. Contractor Regulatory Responsibility. The Contractor shall comply at all times with applicable laws, regulations, and codes issued by Federal, State, and local Municipality governing health, safety, environmental, and fire prevention in regard to their performance responsibilities. While performing duties, the Contractor shall abide by all industry standards and original equipment manufacturers' (OEM) specifications and recommendations.

10. Contractor-Furnished Equipment (CFE) and Vehicles. The Contractor shall furnish all equipment and materials including, but not limited to, motor vehicles, containers, and administrative equipment required to perform work required under this Contract. The Contractor shall repair and maintain all CF vehicles and equipment in a safe and serviceable condition suitable for their intended use. The Contractor shall not use any Government-owned tools, materials, or parts to maintain CF vehicles or equipment. CF vehicles or equipment not meeting applicable safety standards shall not be operated or stored on the AFRH facilities.

11. Contractor-Owned (CO) Vehicle Condition and Markings. All Contractor-owned vehicles shall be maintained in a neat, presentable, and operational condition. Contractor vehicles shall have clearly marked signs of sufficient size on both sides of the vehicle so as to be distinguishable from Government equipment. Markings shall include, but not be limited to, the Contractor's name, telephone number, and the vehicle identification number.

12. Contractor-Furnished Facilities (CFF). The Government will not provide facilities and the Contractor shall not place, construct, or otherwise provide additional buildings or facilities at the AFRH without prior written approval. The absence or non-availability of facilities shall not be cause for non-performance of this Contract.

13. Removal of Contractor Property. Within seven (7) calendar days after expiration or termination of this performance period, the Contractor shall remove of all Contractor-owned vehicles, equipment, tools, supplies, materials, and other items from the AFRH. The Government will not be responsible for any Contractor-owned property left after performance period expiration or termination. If the Contractor does not remove said property from the AFRH within the stated time, the Government will take possession of said property and dispose at the Contractor's expense or use for AFRH's needs.

14. Government Furnished Equipment (GFE). None

15. Government Personnel. The Contracting Officer (CO) has the overall responsibility for contract administration. The CO is the only Government representative authorized to amend, modify, or deviate from the contract. The Contracting Officer's Representative (COR) will be designated in writing at the time of award to assist the CO in the day-to-day on-site administration of this contract. The COR responsibilities include, but are not limited to determining the compliance and adequacy of performance by the Contractor, in accordance with the terms and conditions of this contract; requesting removal of unsuitable Contractor employees; approving schedule and Quality Control Plan changes; ordering re-performance of unacceptable work or performance by other means, etc.

16. Management. The Contractor shall manage the total work effort associated with the services required herein to ensure fully adequate and timely completion of these services, and permit tracking of work in progress. Such management includes, but is not limited to, planning, scheduling, cost accounting, report preparation, establishing and maintaining records, and quality control. The Contractor shall provide staff with the necessary management expertise to assure the performance of the required work.

Many of the services required by this contract include routine and scheduled weekend and holiday support and the Contractor shall ensure appropriate supervision and management consultation is available to respond to complaints or emergencies.

16.1 Key Personnel. Key personnel are defined as the Contract Manager and designated alternates. The Contractor shall provide a Contract Manager and perform continual management of the functional areas contained in this PWS. The Contract Manager shall conduct overall management coordination and shall be the central Point of Contact (POC) with the Government for performance of all work under the PWS. A Contractor employee shall be designated to act for the Contract Manager when work is being performed outside of duty hours or during the Contract Manager's absence.

The Contractor shall be required to provide the resume of key personnel at the time of award of contract for approval. At the Post Award conference, the Contractor shall submit to the COR, in writing, the name, title, office, home, and mobile telephone number of the Contract Manager.

16.1.1 Substitution of Key Personnel. Any changes to the working status of Key Personnel shall be submitted to the COR for approval within 14 working days prior to the change. In addition, the Contractor shall provide personnel with specific licenses and certifications as required in this Contract.

16.1.2 Supervision of Work. The Contractor Manager shall supervise work performed by Contractor personnel to ensure that all Contract requirements are met. The Contract Manager or designated alternate shall ensure that required supervision of Contractor personnel is provided whenever work is being performed.

16.2 Contractor Responsiveness. The Contractor shall ensure the COR has current emergency contact numbers for cases where services pertaining to execution of the PWS need to be addressed at other than normal Contract work hours. A personal answering machine and/or service is permitted at other than normal Contract workdays and work hours for receipt of COR emergency response work requirements, provided that the Contract Manager or designee responds to all calls within 8 hours after notification of the call by the answering machine and/or service. If that's after hours, then Contractor should respond at beginning of next business day. The Contract Manager and any individuals designated to act in that capacity shall have full authority to contractually bind the Contractor for prompt action on matters pertaining to execution of the PWS.

The Contract Manager or his designated representative shall be immediately available during all "Allowable Contractor Hours of Operation" (see Section 7.1).

17. Contractor Employees. All employees are to be responsible and of good character.

17.1 Employee Qualifications and Certifications. The Contractor shall ensure that only qualified personnel with required licenses or certifications perform work on the AFRH premises.

17.2 National Agency Check. All Contractor personnel are required to undergo background security investigations to ensure suitability for employment with a Federal entity. At a minimum, criminal background checks shall be conducted for Mississippi (MS) and any state where the prospective staff member has resided for the last seven years. For non-recurring or temporary services, the Contractor shall submit to the CO a letter for the CO's review to ensure whether a NAC is needed or not.

17.3 Employee Conduct. The Contractor shall be responsible for the performance and conduct of Contractor and Subcontractor personnel. Personnel employed by the Contractor in the performance of this PWS or any representative of the Contractor entering the installation shall abide by the security regulations and policy letters or directives of AFRH and shall comply with Executive Order 11222 (May 8, 1965) *Prescribing Standards of Ethical Conduct for Government Officers and Employees*.

No Contractor employee shall accept money or gifts from Residents. Contractor employees are prohibited from entering the occupied rooms of independent living residents without the prior approval of the COR. Any violation of the above will result in immediate removal of the employee by AFRH security.

Contractor employees shall not exhibit rude behavior toward civilians or other Contractor personnel. Loudness, vulgarity, rudeness, or other similar offensive conduct by an employee of the Contractor will be grounds for denying the employee further access to the installation.

The Contractor shall not employ for performance under this PWS any person whose employment would result in a conflict of interest with the Government's standards of conduct.

17.4 Personnel Appearance. Contractor employees shall be well-groomed, clean, neat in appearance, clothes properly fitted, uniform appearance with nametags, and appropriately dressed for the work to be done. Contractor employees shall not wear clothing with slogans, drawings, or language which could be construed as being lewd, obscene, profane, racially offensive, sexually suggestive, Anti-American, or which advocates the use of illegal drugs or other unlawful conduct.

17.5 Employee Roster. At the Contract start, the Contractor shall provide the COR with a roster that lists all employees (to include Subcontractor employees) requiring AFRH site access, their job titles, and CDL# for drivers. The Contractor shall update the roster as required, but not less than quarterly.

17.6 Smoking. Smoking is prohibited in all AFRH buildings and at least 25 feet from any occupied building on AFRH's campus. Contractor employees shall ensure that the smoking policy is observed in all areas of the AFRH.

17.7 Alcohol and Drug Use. The Contractor shall not allow any employee to perform work when the employee is under the influence of alcohol, illegal drugs or prescription drugs which can adversely affect the employee's ability to perform their duties in a safe manner. Employees found to be under the influence of alcohol or illegal drugs will be immediately removed from AFRH. The threshold for being under the influence of alcohol or illegal drugs is the same as that established by current laws for vehicle operation in the city of Gulfport, Mississippi. The Contractor is responsible for establishing the method(s) by which employees will be determined to be under the influence of alcohol or illegal drugs. The Government reserves the right to require any Contractor employee that is displaying errant or unexplained behavior to be removed from AFRH and immediately tested.

17.8 Termination of Employees. The Contractor shall ensure that employees who resign or are terminated from employment return identification badges to the Government immediately upon termination of employment with the Contractor.

18. Contractor Personnel Access. Contractor personnel shall be accompanied by COR or designee(s) while at AFRH or obtains written approval by the COR for unescorted access to the Contractors work areas but shall be subject to inspections by the Government as deemed necessary.

19. Contractor Personnel Removal. Government rules, regulations, laws, directives, and requirements that are issued during the Contract term relating to law and order and security shall be applicable to all employees or representatives who enter AFRH. Violation of such rules, regulations, laws, directives, or requirements shall be grounds for removal (permanently or temporarily as the Government determines) from the work site. Removal of employees does not relieve the Contractor from the responsibility for the work defined in this PWS.

The COR may require the Contractor to remove any employee performing requirements under this PWS for reason of misconduct or security risk posed. Contractor employees shall be subject to dismissal from the premises upon determination by the COR that such action is in the interest of the Government.

20. Replacement of Contractor Employee for Security Reasons. The Government retains the right to request removal of the Contractor's employees, regardless of prior clearance or Background Investigation (BI) adjudication status, whose actions clearly conflict with the interests of the Government. Upon the determination by the CO that a Contractor employee should be removed, the Contractor shall remove the Contractor's employee immediately after notification and shall provide replacement within five (5) working days.

21. AFRH Personnel and Other Contractors. Government employees or other Contractors may be performing services in areas associated with the requirements of this contract. Some examples may be Contractors performing specialized and one-time jobs. The Government will facilitate initial contact between Contractors or government employees performing duties associated with this contract. The Contractor shall provide all further required coordination with the Contractor.

21.1 Disputes with AFRH Personnel and/or Other Contractors. The Contractor shall notify the COR, in writing, of disputes in receiving support from, or providing support to other Contractors and/or government personnel within eight (8) working hours from the time the dispute occurs. If the Contractor is not able to resolve the dispute with the other Contractor and/or government personnel within a reasonable amount of time (a reasonable amount of time will be defined by the COR upon initial notification), the issue shall be forwarded to the COR for resolution. The COR shall provide written notice of dispute resolution(s) to the Contractor no later than five (5) workdays after the written notice for dispute resolution.

22. Pass and Identification Items. Pass and identification items are required for all Contractor personnel and non-Government owned vehicles entering AFRH. The Contractor pass and identification request shall be made to the COR on company letterhead and shall include: Contractor employee names, social security numbers, birth dates and work and home phone numbers.

23. Employee Badges/Parking. Contractor personnel shall visibly display Government furnished identification badges on their person in accordance with the AFRH procedures. All Contractor personnel shall comply with parking procedures published for the AFRH. Contractor employees shall return all AFRH issued identification badges and parking/vehicle IDs to the attending AFRH security officer stationed at the AFRH Security Gatehouse immediately upon exiting AFRH.

24. Safety. While performing the contract requirements, the Contractor shall ensure the protection of employees, health, and safety of AFRH residents, staff, and visitors while preventing damage to property, materials, supplies, equipment, and work interruptions. The Contractor shall:

- Comply with all OSHA and the AFRH Safety Regulations.
- Ensure that any additional safety measures will be incorporated when it is deemed necessary by the Contracting Officer (CO) or COR.
- Ensure resident safety and shall report safety concerns to the AFRH Safety Officer.

25. Motor Vehicle/Traffic Regulations. Contractor employees operating motor vehicles at AFRH shall possess a valid driver's license and insurance. Driver and vehicle permit, license, registration, and proof of insurance shall be maintained in the vehicle at all times and made available upon request. Contractor employees shall comply with local laws requiring seat belts be worn at all times. Contractor employees shall adhere to the posted speed limits. Speed limits on AFRH grounds are 15 mph unless otherwise posted. Only 5 mph is permitted when AFRH residents are present. Contractor personnel driving a motor vehicle on AFRH shall not use a cell phone unless the vehicle is safely parked, or the driver is using a hands-free device.

26. Data and Information. The Contractor shall respond to requests for any information from the COR and provide said information in a reasonable timeframe.

The Contractor shall obtain COR approval before releasing any stored, generated, or archived information related to this PWS to news agencies, the Contractor's corporate or other off-site offices, other government agencies, other Contractors, private parties, or any other entity other than the COR, the Chief of Campus Operations, or the AFRH Agency.

27. Non-Payment for Additional Work. Any additional services or a change to work specified which may be performed by the Contractor, either at its own volition or at the request of an individual other than a duly appointed CO, except as may be explicitly authorized in the contract, will be done at the financial risk of the Contractor. Only a duly appointed CO is authorized to bind the Government to a change in the specifications, terms, or conditions of this contract.

28. Indemnification. The Contractor shall indemnify and hold harmless the Government and its officers, agents, representatives, and employees from all claims, loss, damage, actions, causes of action, expense, and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person or property growing out of or attributable to any work performed under or related to the Contract, regardless of whether such claims, losses, damages, actions, expenses, and/or liability may be attributable to the fault, failure, or negligence of the Contractor.

29. Environmental Compliance. The Contractor shall comply with all AFRH, local, state, and federal environmental policies and mandates. Penalty charges resulting from Contractor's failure to comply with environmental policies and mandates will be borne by the Contractor only. The Contractor shall take any corrective actions as directed by such agencies with no additional cost to the Government.

30. Government Supervision of Contract Personnel. The Contractor shall be subject to inspections, audits, and work interruptions by AFRH personnel and personnel from other Government agencies. Such inspections, audits, and work interruptions are typical for government Contractors and may delay the work performed by the Contractor.

31. Quality Control. The Contractor and the Contractor personnel shall be responsible for quality control but shall be subject to government inspections and surveillance.

31.1 Inspections by the Government. The CO and COR will inspect for compliance with contract terms throughout the contract period. Evaluation will be based on the Contractor's compliance with the requirements set forth in the Performance Requirements Summary (PRS) Table below, and the Government will monitor the Contractor's performance under this Contract by performing checks of the Contractor's performance of PWS tasks. The Government will not only monitor "logistical tasks," but will also evaluate the Contractor's response and resolution to customer complaints. Typical procedures include random sampling, planned sampling, scheduled inspections, incidental inspections, and customer complaints.

31.2 Inspection Reports. The Government will record surveillance inspections. When the Contractor's performance is unsatisfactory, a Contract Discrepancy Report (CDR) will be issued. The Contractor shall reply in writing within five (5) workdays from the date of the CDR. The reply must give the reasons for the unsatisfactory performance, corrective action taken, and procedures to preclude recurrence.

31.3 Quality Assurance. The Government will periodically evaluate the Contractor's performance in accordance with the Quality Assurance Surveillance Plan (QASP). The purpose of the QASP is to ensure that all PWS requirements are complete and acceptable. The plan will ensure reliable continued service and preclude unnecessary complaints as a result of unacceptable performance. The Government's QASP includes the following elements:

- COR acceptance of performance objectives.
- Periodic surveillance of Contractors work.
- Performance meetings with the Contractor.

31.4 Participation in Government Quality Assurance. In addition to performing Contractor quality control, the Contractor shall participate in Government quality assurance programs as required by the CO.

31.5 Quality Control Plan (QCP). The Contractor shall establish and maintain a Quality Control Program (QCP) to ensure the work performed conforms to contract requirements and submit the QCP as part of their proposal package.

32. Performance Meetings. The Government and Contractor representatives shall meet as often as necessary to ensure satisfactory performance in accordance with the PWS.

33. Performance Requirements Summary (PRS). The Contractor service requirements are summarized into performance objectives that relate directly to contract success. The performance standards briefly describe the minimum acceptable levels of service for each objective. These standards are critical to successful contract completion.

34. Periodic Surveillance. This method employs a "spot check" style of evaluation and may be adjusted, based on quality trends. The PRS contains only those items considered most important for contract accomplishment. The Government retains the right to inspect all PWS requirements. The Contractor shall correct the unacceptable performance within 24 hours. If the Contractor does not correct the unacceptable performance within 24 hours, the COR will notify the CO who will take appropriate administrative action.

35. Performance Evaluation. Contract is subject to a performance evaluation to be placed in contract file upon performance completion.

Performance Requirements Summary (PRS) Table				
	PWS Task Requirement(s)	PWS Ref	Performance Standard	Method of Surveillance
PRS 1	All materials/products meet all established standards	Section 4	Performs task with 100% accuracy unless an exception was granted by the CO or COR.	Spot inspections performed throughout project.
PRS 2	All general work criteria met.	Section 4	Performs task with 100% accuracy unless an exception was granted by the CO or COR.	Spot inspections performed throughout project.
PRS 3	Equipment provided meets construction documents requirements	Section 4	Performs task with 100% accuracy unless an exception was granted by the CO or COR.	Spot inspections performed throughout project.
PRS 4	All installation requirements and construction requirements are met.	Section 4	Performs task with 100% accuracy unless an exception was granted by the CO or COR.	Spot inspections performed throughout project.

KEY PERSONNEL REPLACEMENT PROCESS

Key personnel may, with the consent of the contracting parties, be amended from time to time during the course of the contract to add or remove key personnel. A formal modification is only required when the key personnel are specifically named in the contract. This process only applies to the extent that the contract does not otherwise specify notice or personnel replacement obligations.

Government Request

The Government may require replacement of key personnel in the instance of non-performance, misconduct, or alleged misconduct whose continued use under a contract is contrary to the best interests of the Government. Circumstances that support a request for replacement include but are not limited to performance that is inconsistent with the contract performance work statement (PWS), terms and conditions, or violations of Federal laws, regulations, or agency conduct standards. The Contracting Officer's Representative (COR) will give written notice to the Contractor of the need for substitution, including the circumstances surrounding the request for replacement. In accordance with FAR Part 1.602-2(b), the Contracting Officer (CO) will ensure the Contractor receives impartial, fair, and equitable treatment; however, the CO is not required to investigate or validate allegations or wait until a final resolution of the circumstances surrounding the request for replacement before requiring substitution of key personnel.

Within twenty-four (24) hours of receiving notice, the Contractor shall respond to the Government's request to replace key personnel and provide key personnel replacement resume(s) to the COR(s). The resume(s) shall demonstrate that the qualifications of proposed replacement key personnel meet the qualifications stated in the PWS. The COR will notify the Contractor, in writing, within forty-eight (48) hours of receiving key personnel replacement resume(s) if the Contractor provided replacement personnel is acceptable. The Government reserves the right to disapprove the proposed substitute(s) and negotiate with the Contractor for other key personnel replacement(s). Any Contractor replacement of key personnel must be done in consultation with the COR. The process for replacing key personnel as described above does not suspend the Contractor's obligation to continue performance under the contract.

Contractor Request

If the Contractor must substitute key personnel, the Contractor shall provide written notice to the COR and the CO two (2) calendar weeks before the proposed replacement date, whenever possible. At a minimum, the Contractor shall provide the Government with notice forty-eight (48) hours before replacement. The only exception to the forty-eight (48) hour notice is death, incapacitation, abrupt termination, or resignation from employment of key personnel where the Contractor's notice was less than forty-eight (48) hours. If the deadline for providing notice falls on Friday after 5:00 pm, a weekend, or on a Federal Holiday, the Contractor shall provide notice the next business day if more than forty-eight (48) hours. The notice shall state the circumstances necessitating the proposed substitution of the key personnel and shall provide resume(s) of proposed replacement key personnel for review and consultation. The Contractor shall demonstrate that the qualifications of the proposed substitute(s) meet the qualifications stated in the PWS. The Government reserves the right to disapprove the proposed substitute(s) and negotiate with the Contractor for other key personnel replacement(s). Assignment of key personnel must be done in consultation with the COR.

SOLICITATION PROVISIONS

52.252-5 AUTHORIZED DEVIATIONS IN PROVISIONS (NOV 2020)

(a) The use in this solicitation of any Federal Acquisition Regulation (48 CFR Chapter 1) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the provision.

52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address: <https://www.acquisition.gov/>

52.204-7 SYSTEM FOR AWARD MANAGEMENT (NOV 2024)

52.204-22 ALTERNATIVE LINE ITEM PROPOSAL (JAN 2017)

52.204-24 REPRESENTATION REGARDING CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (NOV 2021)

The Offeror shall not complete the representation at paragraph (d)(1) of this provision if the Offeror has represented that it "does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument" in paragraph (c)(1) in the provision at 52.204-26, Covered Telecommunications Equipment or Services—Representation, or in paragraph (v)(2)(i) of the provision at 52.212-3, Offeror Representations and Certifications—Commercial Products or Commercial Services. The Offeror shall not complete the representation in paragraph (d)(2) of this provision if the Offeror has represented that it "does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services" in paragraph (c)(2) of the provision at 52.204-26, or in paragraph (v)(2)(ii) of the provision at 52.212-3.

(a) Definitions. As used in this provision—

Backhaul, covered telecommunications equipment or services, critical technology, interconnection arrangements, reasonable inquiry, roaming, and substantial or essential component have the meanings provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) Prohibition. (1) Section 889(a)(1)(A) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2019, from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. Nothing in the prohibition shall be construed to—

- (i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or
 - (ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.
- (2) Section 889(a)(1)(B) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232) prohibits the head of an executive agency on or after August 13, 2020, from entering into a contract or extending or renewing a contract with an entity that uses any equipment,

system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. This prohibition applies to the use of covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. Nothing in the prohibition shall be construed to—

- (i) Prohibit the head of an executive agency from procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or
- (ii) Cover telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (<https://www.sam.gov>) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(d) Representation. The Offeror represents that—

(1) It will, will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation. The Offeror shall provide the additional disclosure information required at paragraph (e)(1) of this section if the Offeror responds "will" in paragraph (d)(1) of this section; and

(2) After conducting a reasonable inquiry, for purposes of this representation, the Offeror represents that—

It does, does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services. The Offeror shall provide the additional disclosure information required at paragraph (e)(2) of this section if the Offeror responds "does" in paragraph (d)(2) of this section.

(e) Disclosures. (1) Disclosure for the representation in paragraph (d)(1) of this provision. If the Offeror has responded "will" in the representation in paragraph (d)(1) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the original equipment manufacturer (OEM) or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(ii) For covered services—

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the Product Service Code (PSC) of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(1) of this provision.

(2) Disclosure for the representation in paragraph (d)(2) of this provision. If the Offeror has responded "does" in the representation in paragraph (d)(2) of this provision, the Offeror shall provide the following information as part of the offer:

(i) For covered equipment—

(A) The entity that produced the covered telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known);

(B) A description of all covered telecommunications equipment offered (include brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); and

(C) Explanation of the proposed use of covered telecommunications equipment and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

(ii) For covered services—

(A) If the service is related to item maintenance: A description of all covered telecommunications services offered (include on the item being maintained: Brand; model number, such as OEM number, manufacturer part number, or wholesaler number; and item description, as applicable); or

(B) If not associated with maintenance, the PSC of the service being provided; and explanation of the proposed use of covered telecommunications services and any factors relevant to determining if such use would be permissible under the prohibition in paragraph (b)(2) of this provision.

52.204-26 COVERED TELECOMMUNICATIONS EQUIPMENT OR SERVICES-REPRESENTATION (OCT 2020)

(a) *Definitions.* As used in this provision, “covered telecommunications equipment or services and “reasonable inquiry” have the meaning provided in the clause [52.204-25](#), Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

(b) *Procedures.* The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (<https://www.sam.gov>) for entities excluded from receiving federal awards for “covered telecommunications equipment or services”.

(c)(1) *Representations.* The Offeror represents that it [] does, [] does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(2) After conducting a reasonable inquiry for purposes of this representation, the offeror represents that it [] does, [] does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

52.204-29 Federal Acquisition Supply Chain Security Act Orders—Representation and Disclosures (Dec 2023)

(a) *Definitions.* As used in this provision, *Covered article*, *FASCSA order*, *Intelligence community*, *National security system*, *Reasonable inquiry*, *Sensitive compartmented information*, *Sensitive compartmented information system*, and *Source* have the meaning provided in the clause [52.204-30](#), Federal Acquisition Supply Chain Security Act Orders—Prohibition.

(b) *Prohibition.* Contractors are prohibited from providing or using as part of the performance of the contract any covered article, or any products or services produced or provided by a source, if the prohibition is set out in an applicable Federal Acquisition Supply Chain Security Act (FASCSA) order, as described in paragraph (b)(1) of FAR [52.204-30](#), Federal Acquisition Supply Chain Security Act Orders—Prohibition.

(c) *Procedures.*

(1) The Offeror shall search for the phrase “FASCSA order” in the System for Award Management (SAM) (<https://www.sam.gov>) for any covered article, or any products or services produced or provided by a source, if there is an applicable FASCSA order described in paragraph (b)(1) of FAR [52.204-30](#), Federal Acquisition Supply Chain Security Act Orders—Prohibition.

(2) The Offeror shall review the solicitation for any FASCSA orders that are not in SAM, but are effective and do apply to the solicitation and resultant contract (see FAR [4.2303\(c\)\(2\)](#)).

(3) FASCSA orders issued after the date of solicitation do not apply unless added by an amendment to the solicitation.

(d) *Representation.* By submission of this offer, the offeror represents that it has conducted a reasonable inquiry, and that the offeror does not propose to provide or use in response to this solicitation any covered article, or any products or services produced or provided by a source, if the covered article or the source is prohibited by an applicable FASCSA order in effect on the date the solicitation was issued, except as waived by the solicitation, or as disclosed in paragraph (e).

(e) *Disclosures.* The purpose for this disclosure is so the Government may decide whether to issue a waiver. For any covered article, or any products or services produced or provided by a source, if the covered article or the source is subject to an applicable FASCSA order, and the Offeror is unable to represent compliance, then the Offeror shall provide the following information as part of the offer:

(1) Name of the product or service provided to the Government;

(2) Name of the covered article or source subject to a FASCSA order;

(3) If applicable, name of the vendor, including the Commercial and Government Entity code and unique entity identifier (if known), that supplied the covered article or the product or service to the Offeror;

(4) Brand;

(5) Model number (original equipment manufacturer number, manufacturer part number, or wholesaler number);

(6) Item description;

(7) Reason why the applicable covered article or the product or service is being provided or used;

(f) *Executive agency review of disclosures.* The contracting officer will review disclosures provided in paragraph (e) to determine if any waiver may be sought. A contracting officer may choose not to pursue a waiver for covered articles or sources otherwise subject to a FASCSA order and may instead make an award to an offeror that does not require a waiver.

52.209-2 PROHIBITION ON CONTRACTING WITH INVERTED DOMESTIC CORPORATIONS-- REPRESENTATION (NOV 2015)

(a) *Definitions.* “Inverted domestic corporation” and “subsidiary” have the meaning given in the clause of this contract entitled Prohibition on Contracting with Inverted Domestic Corporations (52.209-10).

(b) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-2(b) applies or the requirement is waived in accordance with the procedures at 9.108-4.

(c) *Representation.* The offeror represents that—

- (1) It is, is not an inverted domestic corporation; and
- (2) It is, is not a subsidiary of an inverted domestic corporation.

52.209-7 INFORMATION REGARDING RESPONSIBILITY MATTERS (OCT 2018)

(a) Definitions. As used in this provision—

Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative Proceedings, Civilian Board of Contract Appeals Proceedings, and Armed Services Board of Contract Appeals Proceedings). This includes administrative proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include agency actions such as contract audits, site visits, corrective plans, or inspection of deliverables.

Federal contracts and grants with total value greater than \$10,000,000 means—

(1) The total value of all current, active contracts and grants, including all priced options; and

(2) The total value of all current, active orders including all priced options under indefinite-delivery, indefinite-quantity, 8(a), or requirements contracts (including task and delivery and multiple-award Schedules).

Principal means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a division or business segment; and similar positions).

(b) The offeror has does not have current active Federal contracts and grants with total value greater than \$10,000,000.

(c) If the offeror checked "has" in paragraph (b) of this provision, the offeror represents, by submission of this offer, that the information it has entered in the Federal Awardee Performance and Integrity Information System (FAPIIS) is current, accurate, and complete as of the date of submission of this offer with regard to the following information:

(1) Whether the offeror, and/or any of its principals, has or has not, within the last five years, in connection with the award to or performance by the offeror of a Federal contract or grant, been the subject of a proceeding, at the Federal or State level that resulted in any of the following dispositions:

(i) In a criminal proceeding, a conviction.

(ii) In a civil proceeding, a finding of fault and liability that results in the payment of a monetary fine, penalty, reimbursement, restitution, or damages of \$5,000 or more.

(iii) In an administrative proceeding, a finding of fault and liability that results in—

(A) The payment of a monetary fine or penalty of \$5,000 or more; or

(B) The payment of a reimbursement, restitution, or damages in excess of \$100,000.

(iv) In a criminal, civil, or administrative proceeding, a disposition of the matter by consent or compromise with an acknowledgment of fault by the Contractor if the proceeding could have led to any of the outcomes specified in paragraphs (c)(1)(i), (c)(1)(ii), or (c)(1)(iii) of this provision.

(2) If the offeror has been involved in the last five years in any of the occurrences listed in (c)(1) of this provision, whether the offeror has provided the requested information with regard to each occurrence.

(d) The offeror shall post the information in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision in FAPIIS as required through maintaining an active registration in the System for Award Management, which can be accessed via <https://www.sam.gov> (see 52.204-7).

52.212-1 INSTRUCTIONS TO OFFERORS -- COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (SEP 2023)**NOTICE TO FIRMS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT**

In accordance with FAR 9.405, offers, quotes, proposals are not solicited from firms debarred, suspended, or proposed for debarment. Ineligible firms shall consider this an informational copy only.

PROPOSAL INSTRUCTIONS

The Offeror assumes full responsibility for ensuring all electronic materials and attachments submitted are formatted in accordance with the Bureau of the Fiscal Service Security Requirements. The following file extensions are not allowable and application materials/data submitted with these extensions cannot be considered:

.b64, .bat, .bpx .cab, .chm, .cmd, .com, .cpl, .dot, .dotx, .exe, .hqx, .hta, Media, .mhtml, mht,.mim, .mp3, .mp4, .one, .pif, .rar, .scr, .vbs, .uu, .uue, .vbs, .wsf, xxe,.wmv, html, mhtml, and .zip files

The Government does not allow 3rd party messaging systems/secure mail, other than when authorized by the Government. In those cases, the Government's 3rd party message system will be used when requested.

Microsoft Office non-macro enabled compatible documents and .PDF documents are acceptable. If the Offeror determines that other formats are necessary, it is the Offeror's responsibility to verify with Fiscal Service that those formats are acceptable. Proposal materials with unacceptable or unreadable formats may be found non-responsive.

In addition to the items specified in the solicitation provision above, the following information is necessary to enable proper evaluation:

Offerors shall, in relation to providing clear and sufficient information that their personnel meet the minimum qualifications stated in the PWS/SOW/SOO:

- NOT send by email a copy of an identification card with a photograph such as a driver's license, social security card, or passport, or prior government security clearance documents, etc., and
- NOT include their physical home and mailing address, social security number, etc. in their supporting resumes and education attainments.
 - 1) Redact or mark out with permanent black marker their physical or mailing address in their educational attainments, leaving the individual's name on the document(s).
- NOT include any information that can be used to distinguish or trace an individual's identity, either alone or when combined with other information that is linked or linkable to a specific individual that would be considered Personally Identifiable Information (PII).
 - 1) Examples are, but not limited to, education attainment documents that contain the individual's name and home address, financial transactions, medical history, and criminal or employment history and information; which can be used to distinguish or trace an individual's identity, such as their name, social security number, national ID number, date and place of birth, mother's maiden name, biometric records, photograph, physical home and/or email address, phone number, driver's license, etc., including any other personal information which is linked or linkable to an individual.

REQUIRED PROPOSAL DOCUMENTS

The prospective Offeror shall read and understand all parts of the PWS, instructions to offerors, and evaluation factors prior to responding or submitting a proposal. Submissions that do not follow instructions may be disqualified from further consideration.

The directions provided below assist in providing a fair and equitable and expeditious evaluation of the proposal. Failure to submit any of the requested information or follow any of the stated guidelines may result in the proposal being determined non-responsive. Non-responsive proposals will not be eligible for award.

The Offeror shall submit a complete proposal package in the following Volumes (I, II, III) as separate attachments with as little duplication of information as possible:

VOLUME I: Contractual Documents

VOLUME IIA: Technical Proposal

VOLUME IIB: Past Performance

VOLUME III: Price Proposal

Offerors submitting a proposal shall include the following:

VOLUME I: Contractual Documents

- Cover Page – Include the following information at minimum.
 - Company Name as it appears in the System for Award Management (SAM) and a list of any subcontractors that may be used under the contract (the prime Contractor must be actively registered in SAM at the time of award)
 - Company UEI Number
 - Company Point of Contact (POC) for this acquisition including name, title, phone number, and email.
- If the proposal involves a joint venture, "teaming arrangement", or significant subcontract effort, describe the legal and business arrangements involved.
- Describe any exceptions to the solicitation clauses or other conditions. This includes proposed language additions, deletions, or substitutions. Explain the reason(s) for the proposed exception and identify all existing solicitation language affected by the proposed change. If any such exceptions or conditions are offered, they must also be identified in a proposal cover or transmittal letter.
- Invoice Processing Platform (IPP) - Offerors shall confirm that they are capable of utilizing the IPP in accordance with the DTAR 1052.232-7003 Electronic Submission of Payment Requests (APR 2015).

VOLUME IIA: Technical Proposal

- **Generator Replacement Capabilities and Compatibility** – Description of the new equipment and how it will match the requirements in the construction documents attached to the PWS.
- **Technical Approach for Installation in a Timely Manner** – Provide Schedule that shows key steps and critical points
- **Quality Assurance** – Technical Description on the testing process and ensuring the installation meets all design requirements and specifications.

VOLUME IIB: Past Performance

The Offeror shall provide at least three (3) references and more specifically any Federal Government references for whom similar services were provided.

- (1) Federal Department or Agency Serviced
- (2) Year and Period of Performance Services were performed
- (3) Contract Number
- (4) Contracting Officer's Name, Telephone, and Email
- (5) Contract award amount
- (6) Final, or project final, contract price/cost
- (7) Brief Description of the Supplies & Services Provided
- (8) Description of contract performance to include a brief explanation of any problems or delays encountered (including how many times the Offeror has not been able to provide the required services requested and what methods or resources were put in place to meet the customers future needs) and any corrective actions taken in regard to either cost, schedule, or performance.

The Government may contact references provided via telephone to obtain additional information. The Government will evaluate the relevance and quality of the information provided by the reference.

If the Offeror has no previous contract history, then the Offeror may submit any other information supporting the quality, timeliness, and customer satisfaction with its contract performance, including a list of its major professional accomplishments and awards, and client references.

VOLUME III: Price Proposal

- (a) Price shall be shown in U.S. dollars with a maximum of two decimal points.
- (b) Include the following:

Per unit and extended pricing for each item.

52.212-2 EVALUATION -- COMMERCIAL PRODUCTS AND COMMERCIAL SERVICES (NOV 2021)

(a) The Government will award a contract resulting from this solicitation to the responsible offeror whose offer conforming to the solicitation will be most advantageous to the Government, price and other factors considered. It is the Government's decision and may award a contract at a higher price to a Contractor that has a superior technical proposal. The following factors shall be used to evaluate offers:

Volume IIA – Technical Proposal

- Description of the new equipment and how it will match the requirements in the construction documents attached to the PWS.
- Schedule shows key steps and critical points
- Technical Description on the testing process and ensuring the installation meets all design requirements and specifications.

Volume IIB – Past Performance

- The Offeror will be evaluated on performance under existing and prior contracts with similar Joint Commission and CARF accreditation. The Government will focus on information that demonstrates quality of performance, customer service, cost control, problem resolution, and the submission of timely reports relative to the size and complexity of the procurement under consideration as well as the relevance of the project.

Technical Proposal and Past Performance, when combined, are approximately equal to price.

(b) Options. The Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. The Government may determine that an offer is unacceptable if the option prices are significantly unbalanced. Evaluation of options shall not obligate the Government to exercise the option(s).

(c) A written notice of award or acceptance of an offer, mailed or otherwise furnished to the successful offeror within the time for acceptance specified in the offer, shall result in a binding contract without further action by either party. Before the offer's specified expiration time, the Government may accept an offer (or part of an offer), whether or not there are negotiations after its receipt, unless a written notice of withdrawal is received before award.

52.217-5 EVALUATION OF OPTIONS (JUL 1990)

52.219-1 Small Business Program Representations (FEB 2024).

(a) *Definitions.* As used in this provision—

Economically disadvantaged women-owned small business (EDWOSB) concern means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with [13 CFR part 127](#), and the concern is certified by SBA or an approved third-party certifier in accordance with [13 CFR 127.300](#). It automatically qualifies as a women-owned small business concern eligible under the WOSB Program.

Service-disabled veteran-owned small business (SDVOSB) concern means a small business concern—

(1) (i) Not less than 51 percent of which is owned and controlled by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran or;

(2) A small business concern eligible under the SDVOSB Program in accordance with 13 CFR part 128 (see subpart [19.14](#)).

(3) *Service-disabled veteran*, as used in this definition, means a veteran as defined in [38 U.S.C. 101\(2\)](#), with a disability that is service-connected, as defined in [38 U.S.C. 101\(16\)](#), with a disability that is service-connected, as defined in 38 U.S.C. 101(16), and who is registered in the Beneficiary Identification and Records Locator Subsystem, or successor system that is maintained by the Department of Veterans Affairs' Veterans Benefits Administration, as a service-disabled veteran.

Service-disabled veteran-owned small business (SDVOSB) concern eligible under the SDVOSB Program means an SDVOSB concern that—

(1) Effective January 1, 2024, is designated in the System for Award Management (SAM) as certified by the Small Business Administration (SBA) in accordance with 13 CFR 128.300; or

(2) Has represented that it is an SDVOSB concern in SAM and submitted a complete application for certification to SBA on or before December 31, 2023.

Service-disabled veteran-owned small business (SDVOSB) Program means a program that authorizes contracting officers to limit competition, including award on a sole-source basis, to SDVOSB concerns eligible under the SDVOSB Program.

Small business concern—

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in [13 CFR part 121](#) and the size standard in paragraph (b) of this provision.

(2) *Affiliates*, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

Small disadvantaged business concern, consistent with 13 CFR 124.1001, means a small business concern under the size standard applicable to the acquisition, that-

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by-

(i) One or more socially disadvantaged (as defined at 13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States, and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding the threshold at 13 CFR 124.104(c)(2) after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(2) The management and daily business operations of which are controlled (as defined at 13 CFR 124.106) by individuals who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

Veteran-owned small business concern means a small business concern-

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at [38 U.S.C.101\(2\)](#)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business concern means a small business concern-

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with [13 CFR part 127](#)) means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States, and the concern is certified by SBA or an approved third-party certifier in accordance with [13 CFR 127.300](#).

(b) (1) The North American Industry Classification System (NAICS) code for this acquisition is 335312.

(2) The small business size standard is 1,250 Employees.

(3) The small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce (*i.e.*, nonmanufacturer), is 500 employees, or 150 employees for information technology value-added resellers under NAICS code 541519, if the acquisition—

- (i) Is set aside for small business and has a value above the simplified acquisition threshold;
- (ii) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or
- (iii) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(c) *Representations.*

(1) The offeror represents as part of its offer that—

- (i) is, is not a small business concern; or
- (ii) It is, is not a small business joint venture that complies with the requirements of [13 CFR 121.103\(h\)](#) and [13 CFR 125.8\(a\)](#) and [\(b\)](#). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: ____.*]

(2) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents that it is, is not, a small disadvantaged business concern as defined in 13 CFR 124.1001.

(3) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents as part of its offer that it is, is not a women-owned small business concern.

(4) *Women-owned small business (WOSB) joint venture eligible under the WOSB Program.* The offeror represents as part of its offer that it is, is not a joint venture that complies with the requirements of [13 CFR 127.506\(a\)](#) through [\(c\)](#). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: ____.*]

(5) *Economically disadvantaged women-owned small business (EDWOSB) joint venture.* The offeror represents as part of its offer that it is, is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [*The offeror shall enter the name and unique entity identifier of each party to the joint venture: ____.*]

(6) *Veteran-owned small business concern.* [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.*] The offeror represents as part of its offer that it is, is not a veteran-owned small business concern.

(7) *SDVOSB concern.* [*Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(6) of this provision.*] The offeror represents as part of its offer that it is, is not an SDVOSB concern.

(8) SDVOSB joint venture eligible under the SDVOSB Program. [Complete only if the offeror represented itself as a SDVOSB concern in paragraph (c)(7) of this provision].
 The offeror represents as part of its offer that it is, is not a SDVOSB joint venture eligible under the SDVOSB Program that complies with the requirements of 13 CFR 128.402. [The offeror shall enter the name and unique entity identifier of each party to the joint venture: ___.]

(9) HUBZone small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents, as part of its offer, that—

- (i) It is, is not a HUBZone small business concern listed, on the date of this representation, as having been certified by SBA as a HUBZone small business concern in the Dynamic Small Business Search and SAM, and will attempt to maintain an employment rate of HUBZone residents of 35 percent of its employees during performance of a HUBZone contract (see [13 CFR 126.200\(e\)\(1\)](#)); and
- (ii) It is, is not a HUBZone joint venture that complies with the requirements of [13 CFR 126.616\(a\)](#) through [\(c\)](#). [The offeror shall enter the name and unique entity identifier of each party to the joint venture: ___.] Each HUBZone small business concern participating in the HUBZone joint venture shall provide representation of its HUBZone status.

(d) Notice. Under [15 U.S.C.645\(d\)](#), any person who misrepresents a firm's status as a business concern that is small, HUBZone small, small disadvantaged, service-disabled veteran-owned small, economically disadvantaged women-owned small, or women-owned small eligible under the WOSB Program in order to obtain a contract to be awarded under the preference programs established pursuant to section 8, 9, 15, 31, and 36 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall—

- (1) Be punished by imposition of fine, imprisonment, or both;
- (2) Be subject to administrative remedies, including suspension and debarment; and
- (3) Be ineligible for participation in programs conducted under the authority of the Act.

52.225-25 PROHIBITION ON CONTRACTING WITH ENTITIES ENGAGING IN CERTAIN ACTIVITIES OR TRANSACTIONS RELATING TO IRAN—REPRESENTATION AND CERTIFICATIONS (JUN 2020)

52.233-2 SERVICE OF PROTEST (SEP 2006)

(a) Protests, as defined in section 33.101 of the Federal Acquisition Regulation, that are filed directly with an agency, and copies of any protests that are filed with the General Accountability Office (GAO), shall be served on the Contracting Officer (addressed as follows) by obtaining written and dated acknowledgment of receipt from:

Ms. Keri Moore
 Procurement Compliance & Oversight Branch Manager
 U.S. Department of the Treasury, Bureau of the Fiscal Service
 Keri.Moore@fiscal.treasury.gov

(b) The copy of any protest shall be received in the office designated above within one day of filing a protest with the GAO.

52.212-3 Offeror Representations and Certifications - Commercial Products and Commercial Services (MAY 2024)

The Offeror shall complete only paragraph (b) of this provision if the Offeror has completed the annual representations and certification electronically in the System for Award Management (SAM) accessed through <https://www.sam.gov>. If the Offeror has not completed the annual representations and certifications electronically, the Offeror shall complete only paragraphs (c) through (v) of this provision.

(a) *Definitions*. As used in this provision -

Covered telecommunications equipment or services has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

Economically disadvantaged women-owned small business (EDWOSB) concern means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with [13 CFR part 127](#), and the concern is certified by SBA or an approved third-party certifier in accordance with [13 CFR 127.300](#). It automatically qualifies as a women-owned small business eligible under the WOSB Program.

Forced or indentured child labor means all work or service -

(1) Exacted from any person under the age of 18 under the menace of any penalty for its nonperformance and for which the worker does not offer himself voluntarily; or

(2) Performed by any person under the age of 18 pursuant to a contract the enforcement of which can be accomplished by process or penalties.

Highest-level owner means the entity that owns or controls an immediate owner of the offeror, or that owns or controls one or more entities that control an immediate owner of the offeror. No entity owns or exercises control of the highest level owner.

Immediate owner means an entity, other than the offeror, that has direct control of the offeror. Indicators of control include, but are not limited to, one or more of the following: Ownership or interlocking management, identity of interests among family members, shared facilities and equipment, and the common use of employees.

Inverted domestic corporation means a foreign incorporated entity that meets the definition of an inverted domestic corporation under [6 U.S.C. 395\(b\)](#), applied in accordance with the rules and definitions of [6 U.S.C. 395\(c\)](#).

Manufactured end product means any end product in product and service codes (PSCs) 1000-9999, except -

- (1) PSC 5510, Lumber and Related Basic Wood Materials;
- (2) Product or Service Group (PSG) 87, Agricultural Supplies;
- (3) PSG 88, Live Animals;
- (4) PSG 89, Subsistence;
- (5) PSC 9410, Crude Grades of Plant Materials;
- (6) PSC 9430, Miscellaneous Crude Animal Products, Inedible;
- (7) PSC 9440, Miscellaneous Crude Agricultural and Forestry Products;
- (8) PSC 9610, Ores;
- (9) PSC 9620, Minerals, Natural and Synthetic; and
- (10) PSC 9630, Additive Metal Materials.

Place of manufacture means the place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government. If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

Predecessor means an entity that is replaced by a successor and includes any predecessors of the predecessor.

Reasonable inquiry has the meaning provided in the clause 52.204-25, Prohibition on Contracting for Certain Telecommunications and Video Surveillance Services or Equipment.

Restricted business operations means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 ([Pub. L. 110-174](#)). Restricted business operations do not include business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate -

- (1) Are conducted under contract directly and exclusively with the regional government of

southern Sudan;

(2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;

(3) Consist of providing goods or services to marginalized populations of Sudan;

(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;

(5) Consist of providing goods or services that are used only to promote health or education; or

(6) Have been voluntarily suspended.

Sensitive technology -

(1) Means hardware, software, telecommunications equipment, or any other technology that is to be used specifically—

(i) To restrict the free flow of unbiased information in Iran; or

(ii) To disrupt, monitor, or otherwise restrict speech of the people of Iran; and

(2) Does not include information or informational materials the export of which the President does not have the authority to regulate or prohibit pursuant to section 203(b)(3) of the International Emergency Economic Powers Act ([50 U.S.C. 1702\(b\)\(3\)](#)).

Service-disabled veteran-owned small business (SDVOSB) concern means a small business concern—

(1) (i) Not less than 51 percent of which is owned and controlled by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran; or

(2) A small business concern eligible under the SDVOSB Program in accordance with 13 CFR part 128 (see subpart [19.14](#)).

(3) **Service-disabled veteran**, as used in this definition, means a veteran as defined in [38 U.S.C. 101](#)(2), with a disability that is service connected, as defined in [38 U.S.C. 101](#)(16), and who is registered in the Beneficiary Identification and Records Locator Subsystem, or successor system that is maintained by the Department of Veterans Affairs' Veterans Benefits Administration, as a service-disabled veteran.

Service-disabled veteran-owned small business (SDVOSB) concern eligible under the SDVOSB Program means an SDVOSB concern that—

(1) Effective January 1, 2024, is designated in the System for Award Management (SAM) as certified by the Small Business Administration (SBA) in accordance with 13 CFR 128.300; or

(2) Has represented that it is an SDVOSB concern in SAM and submitted a complete application for certification to SBA on or before December 31, 2023.

Service-disabled veteran-owned small business (SDVOSB) Program means a program that authorizes contracting officers to limit competition, including award on a sole-source basis, to SDVOSB concerns eligible under the SDVOSB Program.

Small business concern –

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in [13 CFR part 121](#) and size standards in this solicitation.

(2) **Affiliates**, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at [13 CFR 121.103](#).

Small disadvantaged business concern, consistent with [13 CFR 124.1001](#), means a small business concern under the size standard applicable to the acquisition, that –

(1) Is at least 51 percent unconditionally and directly owned (as defined at [13 CFR 124.105](#)) by –

(i) One or more socially disadvantaged (as defined at [13 CFR 124.103](#)) and economically disadvantaged (as defined at [13 CFR 124.104](#)) individuals who are citizens of the United

States; and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding the threshold at 13 CFR 124.104(c)(2) after taking into account the applicable exclusions set forth at [13 CFR 124.104\(c\)\(2\)](#); and

(2) The management and daily business operations of which are controlled (as defined at 13 CFR 124.106) by individuals, who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

Subsidiary means an entity in which more than 50 percent of the entity is owned -

- (1) Directly by a parent corporation; or
- (2) Through another subsidiary of a parent corporation.

Successor means an entity that has replaced a predecessor by acquiring the assets and carrying out the affairs of the predecessor under a new name (often through acquisition or merger). The term "successor" does not include new offices/divisions of the same company or a company that only changes its name. The extent of the responsibility of the successor for the liabilities of the predecessor may vary, depending on State law and specific circumstances.

Veteran-owned small business concern means a small business concern -

(1) Not less than 51 percent of which is owned and controlled by one or more veterans (as defined at [38 U.S.C. 101\(2\)](#)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned business concern means a concern which is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

Women-owned small business concern means a small business concern -

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with [13 CFR part 127](#)), means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States, and the concern is certified by SBA or an approved third-party certifier in accordance with [13 CFR 127.300](#).

(b)(1) *Annual Representations and Certifications.* Any changes provided by the Offeror in paragraph (b)(2) of this provision do not automatically change the representations and certifications in SAM.

(2) The offeror has completed the annual representations and certifications electronically in SAM accessed through <http://www.sam.gov>. After reviewing SAM information, the Offeror verifies by submission of this offer that the representations and certifications currently posted electronically at [FAR 52.212-3](#), Offeror Representations and Certifications - Commercial Products and Commercial Services, have been entered or updated in the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard(s) applicable to the NAICS code(s) referenced for this solicitation), at the time this offer is submitted and are incorporated in this offer by reference (see [FAR 4.1201](#)), except for paragraphs _____.
[Offeror to identify the applicable paragraphs at (c) through (v) of this provision that the offeror has completed for the purposes of this solicitation only, if any.]

These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted electronically on SAM.]

(c) Offerors must complete the following representations when the resulting contract is for supplies to be delivered or services to be performed in the United States or its outlying areas, or when the contracting officer has applied part 19 in accordance with [FAR 19.000\(b\)\(1\)\(ii\)](#). Check all that apply.

(1) *Small business concern.* The offeror represents as part of its offer that -

- (i) It is, is not a small business concern; or

(ii) It is, is not a small business joint venture that complies with the requirements of [13 CFR 121.103\(h\)](#) and [13 CFR 125.8\(a\)](#) and [\(b\)](#). [The offeror shall enter the name and unique entity identifier of each party to the joint venture: _____.]

(2) Veteran-owned small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents as part of its offer that it is, is not a veteran-owned small business concern.

(3) SDVOSB concern. [Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (c)(2) of this provision.] The offeror represents as part of its offer that -

(i) It is, is not a SDVOSB concern; or

(4) SDVOSB concern joint venture eligible under the SDVOSB Program. The offeror represents that it is, is not an SDVOSB joint venture eligible under the SDVOSB Program that complies with the requirements of 13 CFR 128.402. [Complete only if the offeror represented itself as an SDVOSB concern in paragraph (c)(3) of this provision.] [The offeror shall enter the name and unique entity identifier of each party to the joint venture: _____.]

(5) Small disadvantaged business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents that it is, is not a small disadvantaged business concern as defined in [13 CFR 124.1001](#).

(6) Women-owned small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents that it is, is not a women-owned small business concern.

(7) WOSB joint venture eligible under the WOSB Program. The offeror represents that it is, is not a joint venture that complies with the requirements of [13 CFR 127.506\(a\)](#) through [\(c\)](#). [The offeror shall enter the name and unique entity identifier of each party to the joint venture:]

(8) Economically disadvantaged women-owned small business (EDWOSB) joint venture. The offeror represents that it is, is not a joint venture that complies with the requirements of [13 CFR 127.506\(a\)](#) through [\(c\)](#). [The offeror shall enter the name and unique entity identifier of each party to the joint venture:]

Note to paragraphs (c)(9) and (10): Complete paragraphs (c)(9) and (10) only if this solicitation is expected to exceed the simplified acquisition threshold.

(9) Women-owned business concern (other than small business concern). [Complete only if the offeror is a women-owned business concern and did not represent itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents that it is, a women-owned business concern.

(10) Tie bid priority for labor surplus area concerns. If this is an invitation for bid, small business offerors may identify the labor surplus areas in which costs to be incurred on account of manufacturing or production (by offeror or first-tier subcontractors) amount to more than 50 percent of the contract price:

(11) HUBZone small business concern. [Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The offeror represents, as part of its offer, that -

(i) It is, is not a HUBZone small business concern listed, on the date of this representation, as having been certified by SBA as a HUBZone small business concern in the Dynamic Small Business Search and SAM, and will attempt to maintain an employment rate of HUBZone residents of 35 percent of its employees during performance of a HUBZone contract (see [13 CFR 126.200\(e\)\(1\)](#)); and

(ii) It is, is not a HUBZone joint venture that complies with the requirements of [13 CFR 126.616\(a\)](#) through [\(c\)](#). [The offeror shall enter the name and unique entity identifier of each party to the joint venture:] Each HUBZone small business concern participating in the HUBZone joint venture shall provide representation of its HUBZone status.

(d) Representations required to implement provisions of [Executive Order 11246](#) -

(1) Previous contracts and compliance. The offeror represents that - (i) It has, has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation; and

(ii) It has, has not filed all required compliance reports.

(2) Affirmative Action Compliance. The offeror represents that -

(i) It has developed and has on file, has not developed and does not have on file, at each establishment, affirmative action programs required by rules and regulations of the Secretary of Labor ([41 CFR parts 60-1](#) and [60-2](#)), or

(ii) It has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(e) *Certification Regarding Payments to Influence Federal Transactions* ([31 U.S.C. 1352](#)).

(Applies only if the contract is expected to exceed \$150,000.) By submission of its offer, the offeror certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with the award of any resultant contract. If any registrants under the Lobbying Disclosure Act of 1995 have made a lobbying contact on behalf of the offeror with respect to this contract, the offeror shall complete and submit, with its offer, OMB Standard Form LLL, Disclosure of Lobbying Activities, to provide the name of the registrants. The offeror need not report regularly employed officers or employees of the offeror to whom payments of reasonable compensation were made.

(f) *Buy American Certificate*. (Applies only if the clause at Federal Acquisition Regulation (FAR) 52.225-1, Buy American - Supplies, is included in this solicitation.)

(1)(i) The Offeror certifies that each end product, except those listed in paragraph (f)(2) of this provision, is a domestic end product and that each domestic end product listed in paragraph (f)(3) of this provision contains a critical component.

(ii) The Offeror shall list as foreign end products those end products manufactured in the United States that do not qualify as domestic end products. For those foreign end products that do not consist wholly or predominantly of iron or steel or a combination of both, the Offeror shall also indicate whether these foreign end products exceed 55 percent domestic content, except for those that are COTS items. If the percentage of the domestic content is unknown, select "no".

(iii) The Offeror shall separately list the line item numbers of domestic end products that contain a critical component (see [FAR 25.105](#)).

(iv) The terms "commercially available off-the-shelf (COTS) item," "critical component," "domestic end product," "end product," "foreign end product," and "United States" are defined in the clause of this solicitation entitled "Buy American-Supplies."

(2) Foreign End Products:

Line Item No.	Country of origin	Exceeds 55% domestic content (yes/no)

[List as necessary]

(3) Domestic end products containing a critical component:

Line Item No. _____

[List as necessary]

(4) The Government will evaluate offers in accordance with the policies and procedures of FAR part 25.

(g)(1) *Buy American - Free Trade Agreements - Israeli Trade Act Certificate*. (Applies only if the clause at [FAR 52.225-3](#), Buy American - Free Trade Agreements - Israeli Trade Act, is included in this solicitation.)

(i)(A) The Offeror certifies that each end product, except those listed in paragraph (g)(1)(ii) or (iii) of this provision, is a domestic end product and that each domestic end product listed in paragraph (g)(1)(iv) of this provision contains a critical component.

(B) The terms "Bahraini, Moroccan, Omani, Panamanian, or Peruvian end product," "commercially available off-the-shelf (COTS) item," "critical component," "domestic end

product," "end product," "foreign end product," "Free Trade Agreement country," "Free Trade Agreement country end product," "Israeli end product," and "United States" are defined in the clause of this solicitation entitled "Buy American - Free Trade Agreements - Israeli Trade Act."

(ii) The Offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahraini, Moroccan, Omani, Panamanian, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American - Free Trade Agreements - Israeli Trade Act."

Free Trade Agreement Country End Products (Other than Bahraini, Moroccan, Omani, Panamanian, or Peruvian End Products) or Israeli End Products:

Line item No. Country of origin

[List as necessary]

(iii) The Offeror shall list those supplies that are foreign end products (other than those listed in paragraph (g)(1)(ii) of this provision) as defined in the clause of this solicitation entitled "Buy American - Free Trade Agreements - Israeli Trade Act." The Offeror shall list as other foreign end products those end products manufactured in the United States that do not qualify as domestic end products. For those foreign end products that do not consist wholly or predominantly of iron or steel or a combination of both, the Offeror shall also indicate whether these foreign end products exceed 55 percent domestic content, except for those that are COTS items. If the percentage of the domestic content is unknown, select "no".

Other Foreign End Products:

Line Item No.	Country of origin	Exceeds 55% domestic content (yes/no)

[List as necessary]

(iv) The Offeror shall list the line-item numbers of domestic end products that contain a critical component (see [FAR 25.105](#)).

Line Item No. _____

[List as necessary]

(v) The Government will evaluate offers in accordance with the policies and procedures of FAR part 25.

(2) *Buy American - Free Trade Agreements - Israeli Trade Act Certificate, Alternate II.* If *Alternate II* to the clause at [FAR 52.225-3](#) is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Israeli end products as defined in the clause of this solicitation entitled "Buy American - Free Trade Agreements - Israeli Trade Act":

Israeli End Products:

Line item No.	Country of origin

[List as necessary]

(3) *Buy American - Free Trade Agreements - Israeli Trade Act Certificate, Alternate III.* If Alternate III to the clause at FAR 52.225-3 is included in this solicitation, substitute the following paragraph (g)(1)(ii) for paragraph (g)(1)(ii) of the basic provision:

(g)(1)(ii) The offeror certifies that the following supplies are Free Trade Agreement country end products (other than Bahraini, Korean, Moroccan, Omani, Panamanian, or Peruvian end products) or Israeli end products as defined in the clause of this solicitation entitled "Buy American - Free Trade Agreements - Israeli Trade Act":

Free Trade Agreement Country End Products (Other than Bahraini, Korean, Moroccan, Omani, Panamanian, or Peruvian End Products) or Israeli End Products:

Line item No.	Country of origin

[List as necessary]

(4) *Trade Agreements Certificate.* (Applies only if the clause at [FAR 52.225-5](#), Trade Agreements, is included in this solicitation.)

(i) The offeror certifies that each end product, except those listed in paragraph (g)(4)(ii) of this provision, is a U.S.-made or designated country end product, as defined in the clause of this solicitation entitled "Trade Agreements".

(ii) The offeror shall list as other end products those end products that are not U.S.-made or designated country end products.

Other End Products:

Line item No.	Country of origin

[List as necessary]

(iii) The Government will evaluate offers in accordance with the policies and procedures of FAR Part 25. For line items covered by the WTO GPA, the Government will evaluate offers of U.S.-made or designated country end products without regard to the restrictions of the Buy American statute. The Government will consider for award only offers of U.S.-made or designated country end products unless the Contracting Officer determines that there are no offers for such products or that the offers for such products are insufficient to fulfill the requirements of the solicitation.

(h) *Certification Regarding Responsibility Matters* ([Executive Order 12689](#)). (Applies only if the contract value is expected to exceed the simplified acquisition threshold.) The offeror certifies, to the best of its knowledge and belief, that the offeror and/or any of its principals -

(1) Are, are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(2) Have, have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: Commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or Commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property,

(3) Are, are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses enumerated in paragraph (h)(2) of this clause; and

(4) Have, have not, within a three-year period preceding this offer, been notified of

any delinquent Federal taxes in an amount that exceeds the threshold at 9.104-5(a)(2) for which the liability remains unsatisfied.

(i) Taxes are considered delinquent if both of the following criteria apply:

(A) *The tax liability is finally determined.* The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(B) *The taxpayer is delinquent in making payment.* A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(ii) *Examples.* (A) The taxpayer has received a statutory notice of deficiency, under [I.R.C. § 6212](#), which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(B) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under [I.R.C. § 6320](#) entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(C) The taxpayer has entered into an installment agreement pursuant to [I.R.C. § 6159](#). The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(D) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under [11 U.S.C. 362](#) (the Bankruptcy Code).

(i) *Certification Regarding Knowledge of Child Labor for Listed End Products (Executive Order 13126).* [The Contracting Officer must list in paragraph (i)(1) any end products being acquired under this solicitation that are included in the List of Products Requiring Contractor Certification as to Forced or Indentured Child Labor, unless excluded at [FAR 22.1503\(b\)](#).]

(1) *Listed end products.*

Listed end product	Listed countries of origin

(2) *Certification.* [If the Contracting Officer has identified end products and countries of origin in paragraph (i)(1) of this provision, then the offeror must certify to either (i)(2)(i) or (i)(2)(ii) by checking the appropriate block.]

□ (i) The offeror will not supply any end product listed in paragraph (i)(1) of this provision that was mined, produced, or manufactured in the corresponding country as listed for that product.

□ (ii) The offeror may supply an end product listed in paragraph (i)(1) of this provision that was mined, produced, or manufactured in the corresponding country as listed for that product. The offeror certifies that it has made a good faith effort to determine whether forced or indentured child labor was used to mine, produce, or manufacture any such end product furnished under this contract. On the basis of those efforts, the offeror certifies that it is not aware of any such use of child labor.

(j) *Place of manufacture.* (Does not apply unless the solicitation is predominantly for the acquisition of manufactured end products.) For statistical purposes only, the offeror shall indicate whether

the place of manufacture of the end products it expects to provide in response to this solicitation is predominantly -

(1) In the United States (Check this box if the total anticipated price of offered end products manufactured in the United States exceeds the total anticipated price of offered end products manufactured outside the United States); or

(2) Outside the United States.

(k) *Certificates regarding exemptions from the application of the Service Contract Labor Standards.* (Certification by the offeror as to its compliance with respect to the contract also constitutes its certification as to compliance by its subcontractor if it subcontracts out the exempt services.) [The contracting officer is to check a box to indicate if paragraph (k)(1) or (k)(2) applies.]

(1) Maintenance, calibration, or repair of certain equipment as described in [FAR 22.1003-4\(c\)\(1\)](#). The offeror does does not certify that -

(i) The items of equipment to be serviced under this contract are used regularly for other than Governmental purposes and are sold or traded by the offeror (or subcontractor in the case of an exempt subcontract) in substantial quantities to the general public in the course of normal business operations;

(ii) The services will be furnished at prices which are, or are based on, established catalog or market prices (see [FAR 22.1003-4\(c\)\(2\)\(ii\)](#)) for the maintenance, calibration, or repair of such equipment; and

(iii) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract will be the same as that used for these employees and equivalent employees servicing the same equipment of commercial customers.

(2) Certain services as described in [FAR 22.1003-4\(d\)\(1\)](#). The offeror does does not certify that -

(i) The services under the contract are offered and sold regularly to non-Governmental customers, and are provided by the offeror (or subcontractor in the case of an exempt subcontract) to the general public in substantial quantities in the course of normal business operations;

(ii) The contract services will be furnished at prices that are, or are based on, established catalog or market prices (see [FAR 22.1003-4\(d\)\(2\)\(iii\)](#));

(iii) Each service employee who will perform the services under the contract will spend only a small portion of his or her time (a monthly average of less than 20 percent of the available hours on an annualized basis, or less than 20 percent of available hours during the contract period if the contract period is less than a month) servicing the Government contract; and

(iv) The compensation (wage and fringe benefits) plan for all service employees performing work under the contract is the same as that used for these employees and equivalent employees servicing commercial customers.

(3) If paragraph (k)(1) or (k)(2) of this clause applies -

(i) If the offeror does not certify to the conditions in paragraph (k)(1) or (k)(2) and the Contracting Officer did not attach a Service Contract Labor Standards wage determination to the solicitation, the offeror shall notify the Contracting Officer as soon as possible; and

(ii) The Contracting Officer may not make an award to the offeror if the offeror fails to execute the certification in paragraph (k)(1) or (k)(2) of this clause or to contact the Contracting Officer as required in paragraph (k)(3)(i) of this clause.

(I) *Taxpayer Identification Number (TIN)* ([26 U.S.C. 6109](#), [31 U.S.C. 7701](#)). (Not applicable if the offeror is required to provide this information to SAM to be eligible for award.)

(1) All offerors must submit the information required in paragraphs (I)(3) through (I)(5) of this provision to comply with debt collection requirements of [31 U.S.C. 7701\(c\)](#) and [3325\(d\)](#), reporting requirements of [26 U.S.C. 6041](#), [6041A](#), and [6050M](#), and implementing regulations issued by the Internal Revenue Service (IRS).

(2) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government ([31 U.S.C. 7701\(c\)\(3\)](#)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(3) *Taxpayer Identification Number (TIN)*.

TIN: _____.

TIN has been applied for.

- TIN is not required because:
- Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;
- Offeror is an agency or instrumentality of a foreign government;
- Offeror is an agency or instrumentality of the Federal Government.

(4) *Type of organization.*

- Sole proprietorship;
- Partnership;
- Corporate entity (not tax-exempt);
- Corporate entity (tax-exempt);
- Government entity (Federal, State, or local);
- Foreign government;
- International organization per [26 CFR 1.6049-4](#);
- Other _____.

(5) *Common parent.*

- Offeror is not owned or controlled by a common parent;
- Name and TIN of common parent:

Name _____.

TIN _____.

(m) *Restricted business operations in Sudan.* By submission of its offer, the offeror certifies that the offeror does not conduct any restricted business operations in Sudan.

(n) *Prohibition on Contracting with Inverted Domestic Corporations.* (1) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-2(b) applies or the requirement is waived in accordance with the procedures at 9.108-4.

(2) *Representation.* The Offeror represents that -

- (i) It is, is not an inverted domestic corporation; and
- (ii) It is, is not a subsidiary of an inverted domestic corporation.

(o) *Prohibition on contracting with entities engaging in certain activities or transactions relating to Iran.* (1) The offeror shall email questions concerning sensitive technology to the Department of State at CISADA106@state.gov.

(2) *Representation and certifications.* Unless a waiver is granted or an exception applies as provided in paragraph (o)(3) of this provision, by submission of its offer, the offeror -

(i) Represents, to the best of its knowledge and belief, that the offeror does not export any sensitive technology to the government of Iran or any entities or individuals owned or controlled by, or acting on behalf of or at the direction of, the government of Iran;

(ii) Certifies that the offeror, or any person owned or controlled by the offeror, does not engage in any activities for which sanctions may be imposed under section 5 of the Iran Sanctions Act; and

(iii) Certifies that the offeror, and any person owned or controlled by the offeror, does not knowingly engage in any transaction that exceeds the threshold at FAR 25.703-2(a)(2) with Iran's Revolutionary Guard Corps or any of its officials, agents, or affiliates, the property and interests in property of which are blocked pursuant to the International Emergency Economic Powers Act ([50 U.S.C. 1701 et seq.](#)) (see OFAC's Specially Designated Nationals and Blocked Persons List at <https://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx>).

(3) The representation and certification requirements of paragraph (o)(2) of this provision do not apply if -

(i) This solicitation includes a trade agreements certification (e.g., [52.212-3\(g\)](#)) or a comparable agency provision); and

(ii) The offeror has certified that all the offered products to be supplied are designated country end products.

(p) *Ownership or Control of Offeror.* (Applies in all solicitations when there is a requirement to be registered in SAM or a requirement to have a unique entity identifier in the solicitation).

(1) The Offeror represents that it has or does not have an immediate owner. If the Offeror has more than one immediate owner (such as a joint venture), then the Offeror shall respond to

paragraph (2) and if applicable, paragraph (3) of this provision for each participant in the joint venture.

(2) If the Offeror indicates "has" in paragraph (p)(1) of this provision, enter the following information:

Immediate owner CAGE code: ____.

Immediate owner legal name: ____.

(Do not use a "doing business as" name)

Is the immediate owner owned or controlled by another entity: Yes or No.

(3) If the Offeror indicates "yes" in paragraph (p)(2) of this provision, indicating that the immediate owner is owned or controlled by another entity, then enter the following information:

Highest-level owner CAGE code: ____.

Highest-level owner legal name: ____.

(Do not use a "doing business as" name)

(q) *Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law.* (1) As required by sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 ([Pub. L. 113-235](#)), and similar provisions, if contained in subsequent appropriations acts, The Government will not enter into a contract with any corporation that -

(i) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(ii) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(2) The Offeror represents that -

(i) It is [] is not [] a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and

(ii) It is [] is not [] a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(r) *Predecessor of Offeror.* (Applies in all solicitations that include the provision at 52.204-16, Commercial and Government Entity Code Reporting.)

(1) The Offeror represents that it is or is not a successor to a predecessor that held a Federal contract or grant within the last three years.

(2) If the Offeror has indicated "is" in paragraph (r)(1) of this provision, enter the following information for all predecessors that held a Federal contract or grant within the last three years (if more than one predecessor, list in reverse chronological order):

Predecessor CAGE code: ____ (or mark "Unknown").

Predecessor legal name: ____.

(Do not use a "doing business as" name).

(s) [Reserved]

(t) *Public Disclosure of Greenhouse Gas Emissions and Reduction Goals.* Applies in all solicitations that require offerors to register in SAM (12.301(d)(1)).

(1) This representation shall be completed if the Offeror received \$7.5 million or more in contract awards in the prior Federal fiscal year. The representation is optional if the Offeror received less than \$7.5 million in Federal contract awards in the prior Federal fiscal year.

(2) *Representation.* [Offeror to check applicable block(s) in paragraph (t)(2)(i) and (ii)]. (i) The Offeror (itself or through its immediate owner or highest-level owner) [] does, [] does not publicly disclose greenhouse gas emissions, i.e., makes available on a publicly accessible Web site the results of a greenhouse gas inventory, performed in accordance with an accounting standard with publicly available and consistently applied criteria, such as the Greenhouse Gas Protocol Corporate Standard.

(ii) The Offeror (itself or through its immediate owner or highest-level owner) [] does, [] does not publicly disclose a quantitative greenhouse gas emissions reduction goal, i.e., make

available on a publicly accessible Web site a target to reduce absolute emissions or emissions intensity by a specific quantity or percentage.

(iii) A publicly accessible Web site includes the Offeror's own Web site or a recognized, third-party greenhouse gas emissions reporting program.

(3) If the Offeror checked "does" in paragraphs (t)(2)(i) or (t)(2)(ii) of this provision, respectively, the Offeror shall provide the publicly accessible Web site(s) where greenhouse gas emissions and/or reduction goals are reported.

(u)(1) In accordance with section 743 of Division E, Title VII, of the Consolidated and Further Continuing Appropriations Act, 2015 ([Pub. L. 113-235](#)) and its successor provisions in subsequent appropriations acts (and as extended in continuing resolutions), Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with an entity that requires employees or subcontractors of such entity seeking to report waste, fraud, or abuse to sign internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting such waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(2) The prohibition in paragraph (u)(1) of this provision does not contravene requirements applicable to Standard Form 312 (Classified Information Nondisclosure Agreement), Form 4414 (Sensitive Compartmented Information Nondisclosure Agreement), or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

(3) *Representation.* By submission of its offer, the Offeror represents that it will not require its employees or subcontractors to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting such employees or subcontractors from lawfully reporting waste, fraud, or abuse related to the performance of a Government contract to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information (e.g., agency Office of the Inspector General).

(v) *Covered Telecommunications Equipment or Services - Representation.* Section 889(a)(1)(A) and section 889 (a)(1)(B) of [Public Law 115-232](#).

(1) The Offeror shall review the list of excluded parties in the System for Award Management (SAM) (<https://www.sam.gov>) for entities excluded from receiving federal awards for "covered telecommunications equipment or services".

(2) The Offeror represents that -

(i) It [] does, [] does not provide covered telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument.

(ii) After conducting a reasonable inquiry for purposes of this representation, that it

[] does, [] does not use covered telecommunications equipment or services, or any equipment, system, or service that uses covered telecommunications equipment or services.

(End of provision)

Alternate I (Feb 2024). As prescribed in 12.301(b)(2), add the following paragraph (c)(12) to the basic provision:

(12) (Complete if the offeror has represented itself as disadvantaged in paragraph (c)(5) of this provision.)
— Black American.

— Hispanic American.

— Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

— Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, Republic of Palau, Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

— Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

— Individual/concern, other than one of the preceding.

ARMED FORCES RETIREMENT HOME, GULFPORT CAMPUS

CONSTRUCTION BID DOCUMENTS

GENERATOR REPLACEMENT

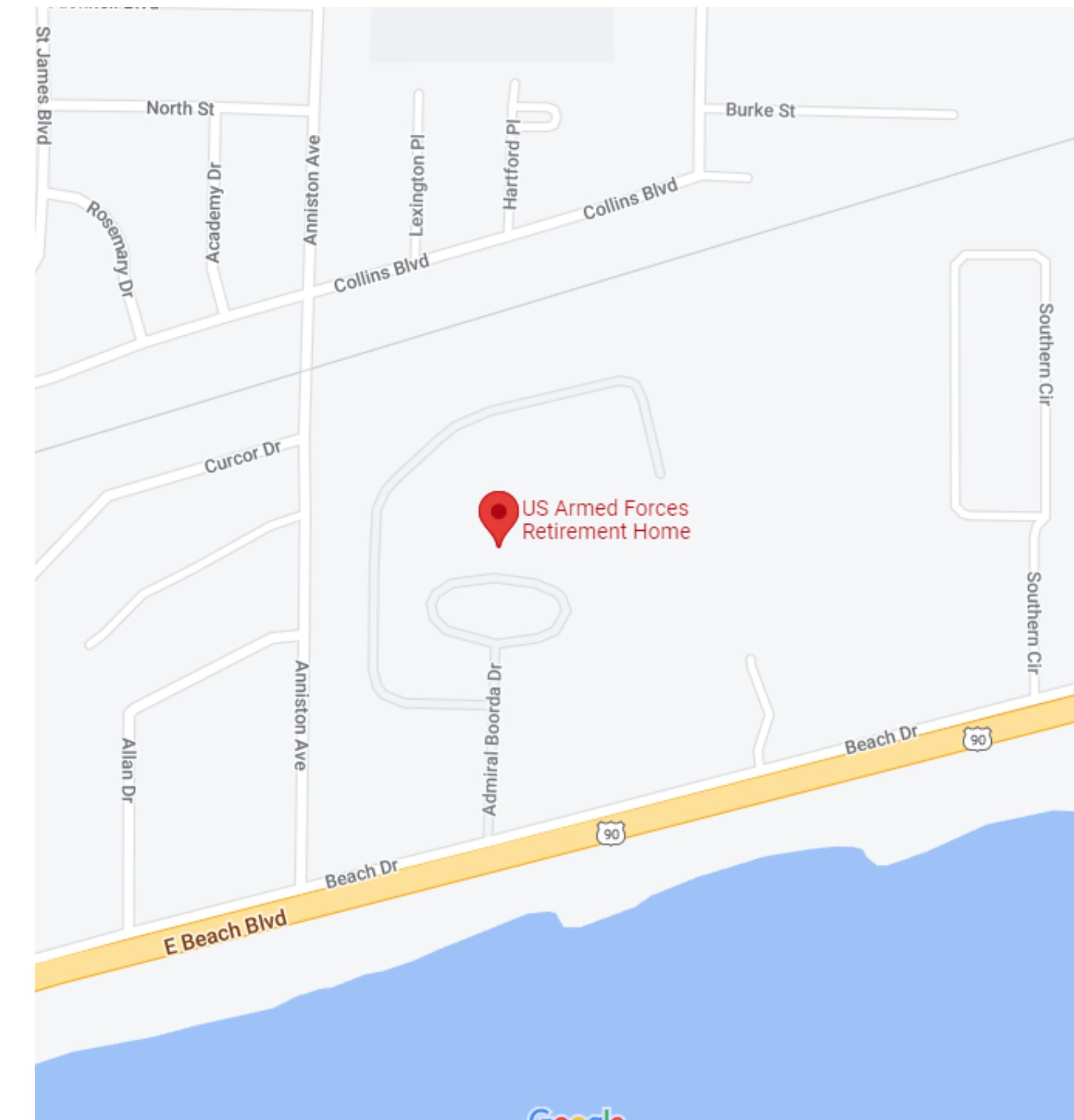
AFRH Project Numbers: AFRCRO-FAC-22-0033, AFRCRO-FAC-24-005

SHEET INDEX

- G001 - COVER SHEET
- S001 - STRUCTURAL SPECIFICATIONS
- S101 - FOUNDATION PLAN
- S201 - DETAILS
- A101 - PLATFORM FENCING PLAN AND ELEVATIONS
- P101 - PLUMBING PLANS
- E001 - ELECTRICAL SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
- E101 - ELECTRICAL PLAN - LOWER LEVEL OF PLATFORM
- E102 - ELECTRICAL PLANS
- E103 - ELECTRICAL WORK - MECHANICAL 1032
- E201 - PARTIAL EXISTING ELECTRICAL ONE-LINE DIAGRAM
- E202 - PARTIAL NEW ELECTRICAL ONE-LINE DIAGRAM
- E301 - ELECTRICAL DETAILS

Exhibit A

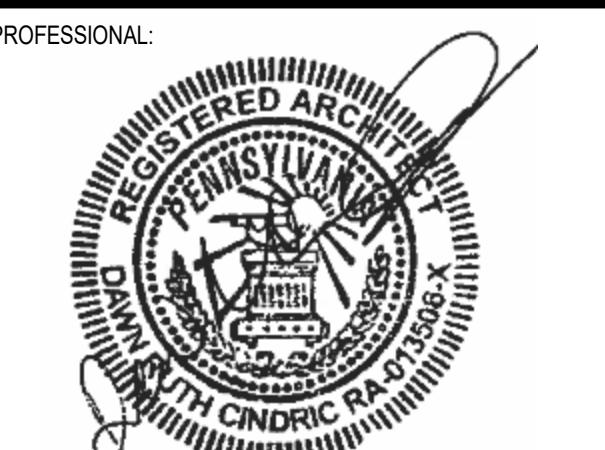
LOCATION MAP



THIS SQUARE APPEARS 1/2"x1/2" ON FULL SIZE SHEETS

SUBMISSION:
CONSTRUCTION BID
DOCUMENTS

NO DATE REVISION



PROJECT NAME:
AFRH GULFPORT
GENERATOR
REPLACEMENT

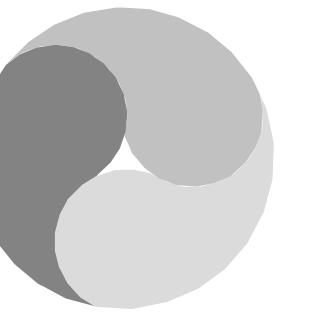
1800 Beach Dr, Gulfport, MS 39507

DRAWING TITLE:
COVER SHEET

DRAWN BY: SB
CHECKED BY: FS
PROJ. NO.: AFRH-016
DATE: 08.30.24
DRAWING NO.

G001

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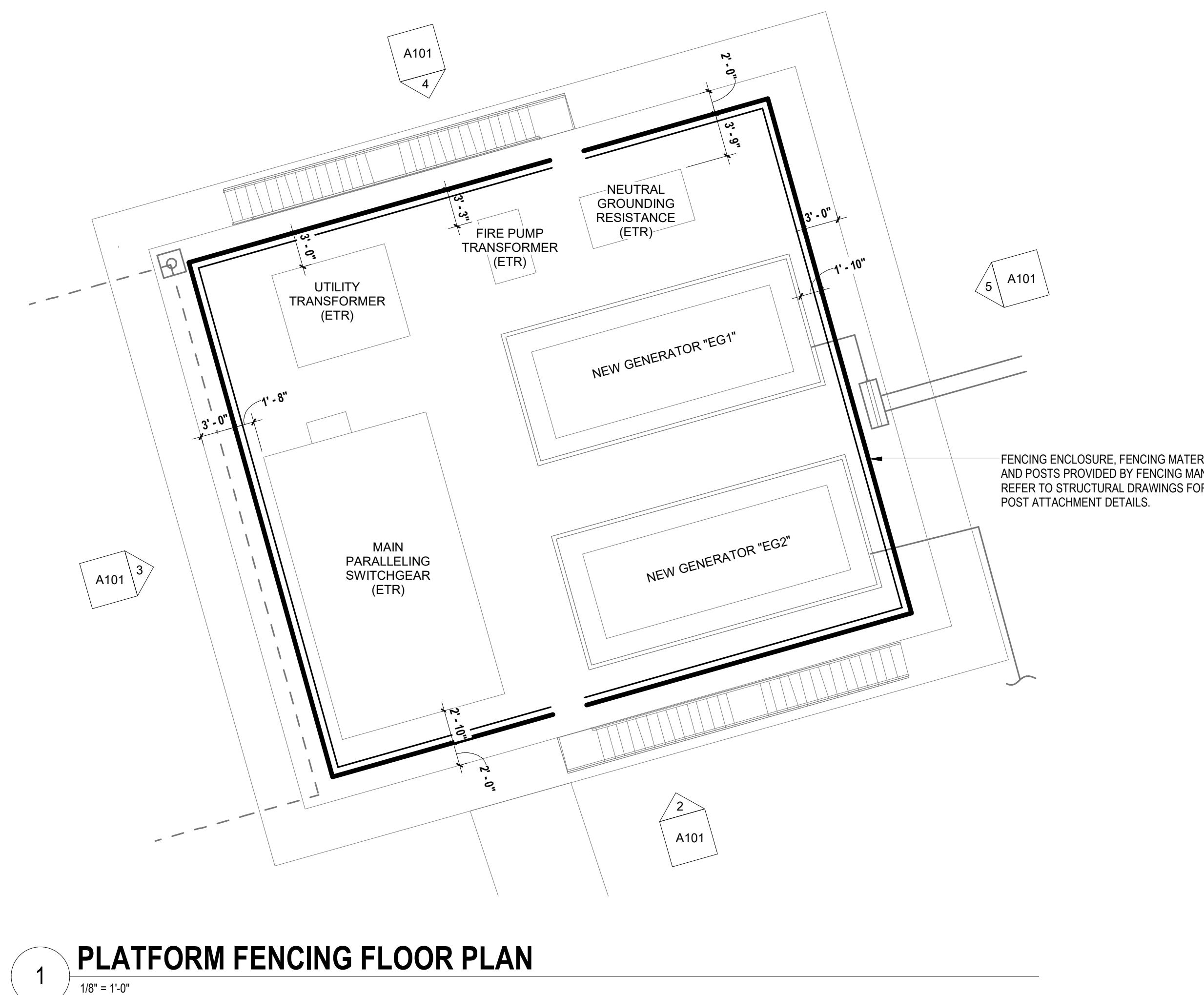


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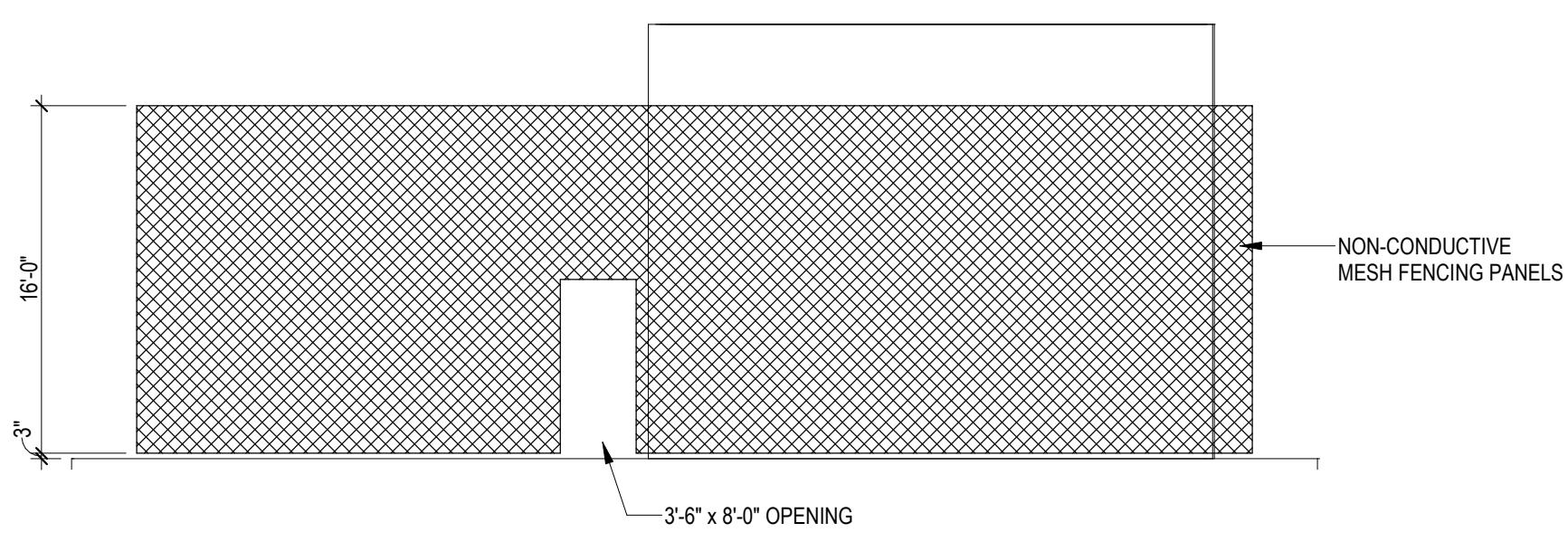
1655 FORT MYER DRIVE
SUITE 830
ARLINGTON, VA 22209
PH: 412.287.7333
www.aeworks.com

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ARMED FORCES
RETIREMENT HOME
GULFPORT, MS**

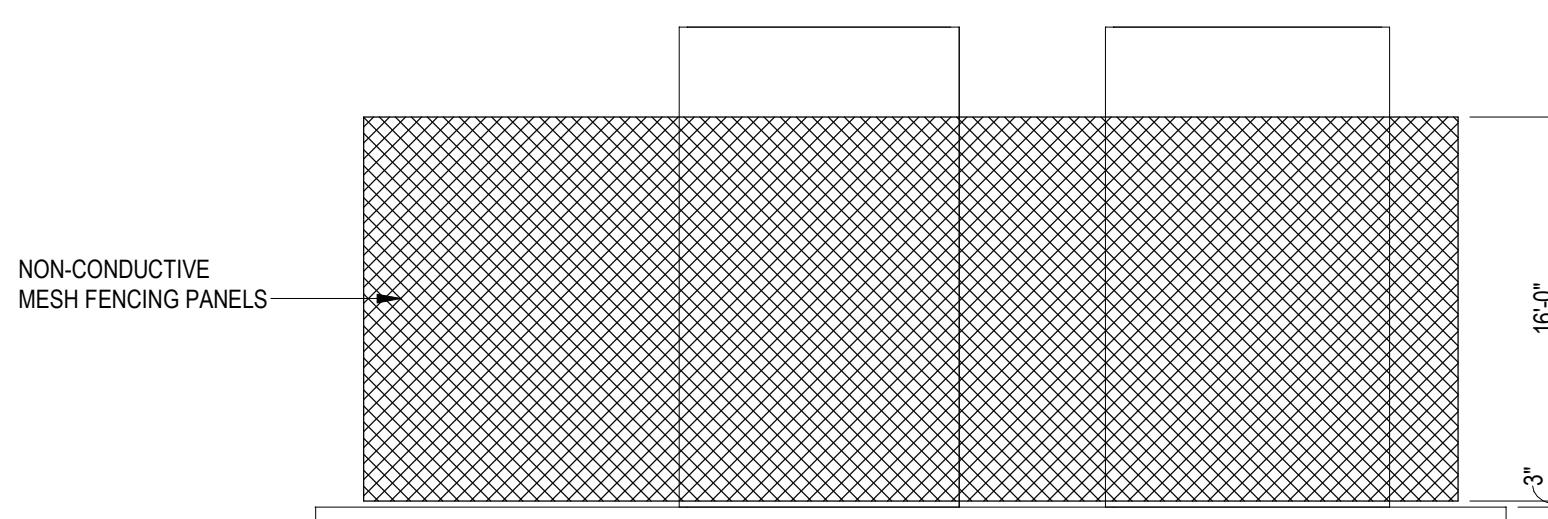
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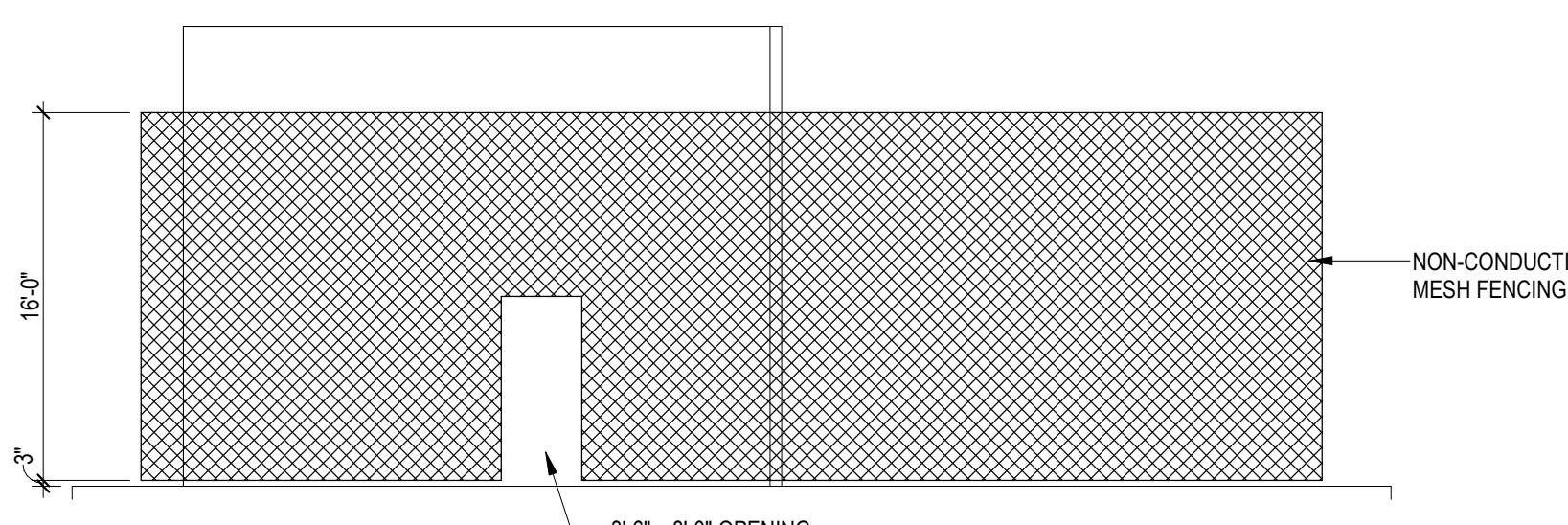
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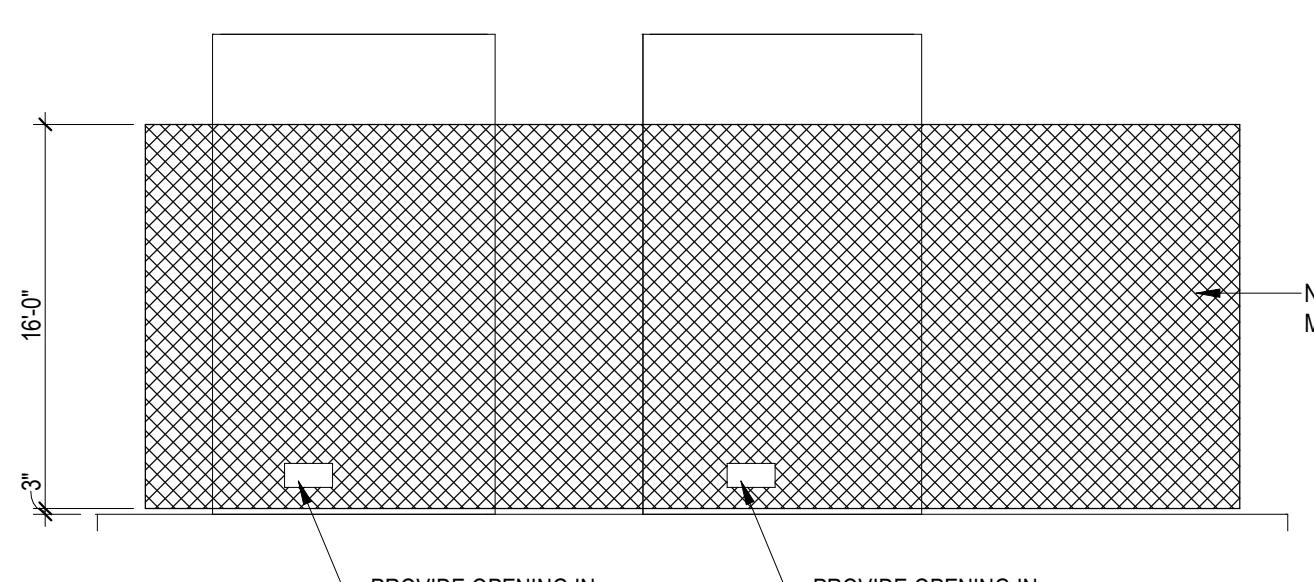
FENCING ELEVATION



FENCING ELEVATION



FENCING ELEVATION



FENCING ELEVATION

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CONSTRUCTION BID DOCUMENTS

NO	DATE	REVISION
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PROJECT NAME:
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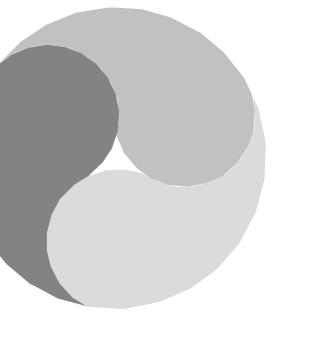
1800 Beach Dr, Gulfport, MS 39507

DRAWING TITLE:

PLATFORM FENCING PLAN AND ELEVATIONS

DRAWN BY: SB
CHECKED BY: FS
PROJ. NO: AFRH-016
DATE: 08.30.24
DRAWING NO:

A101

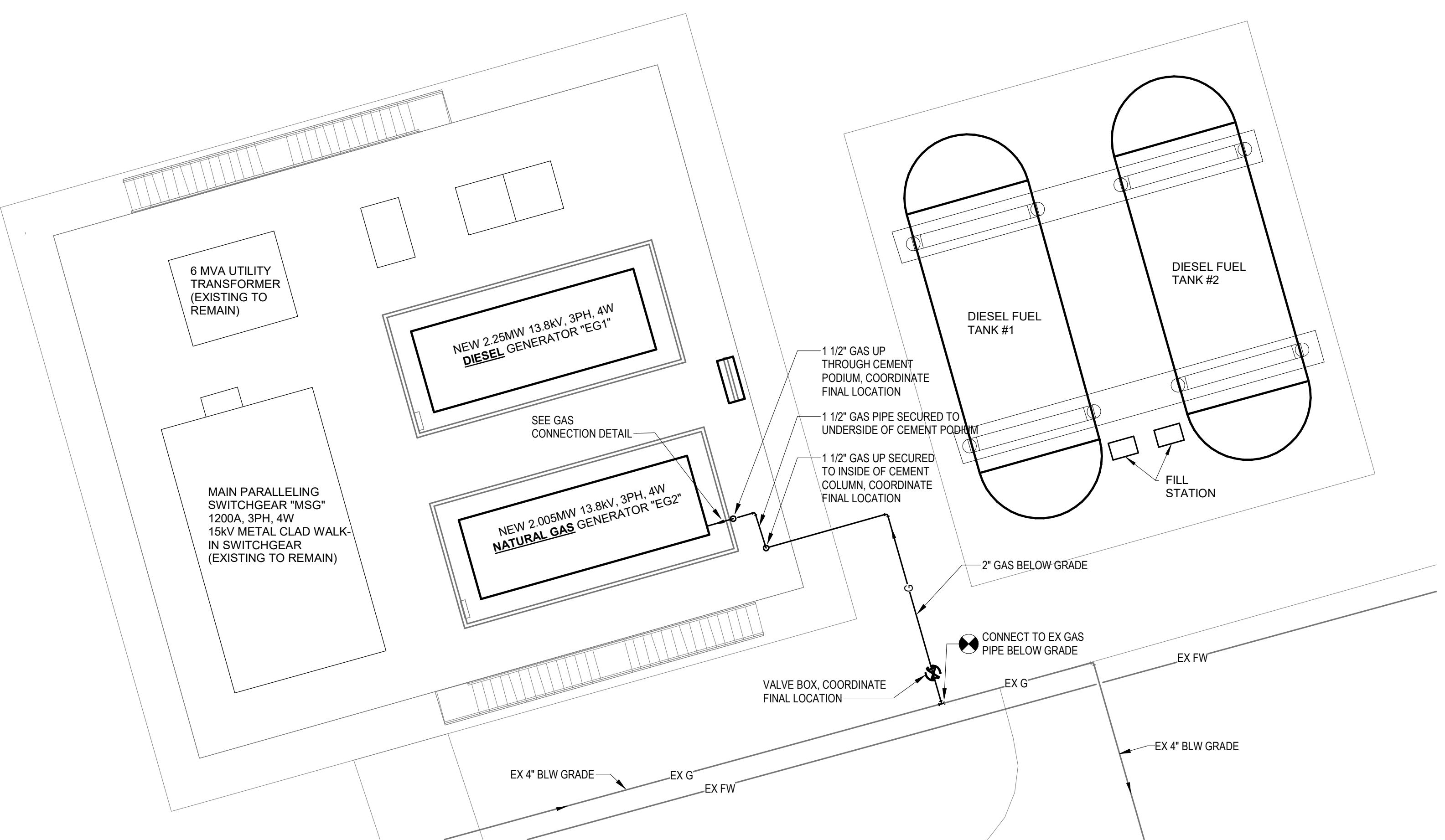


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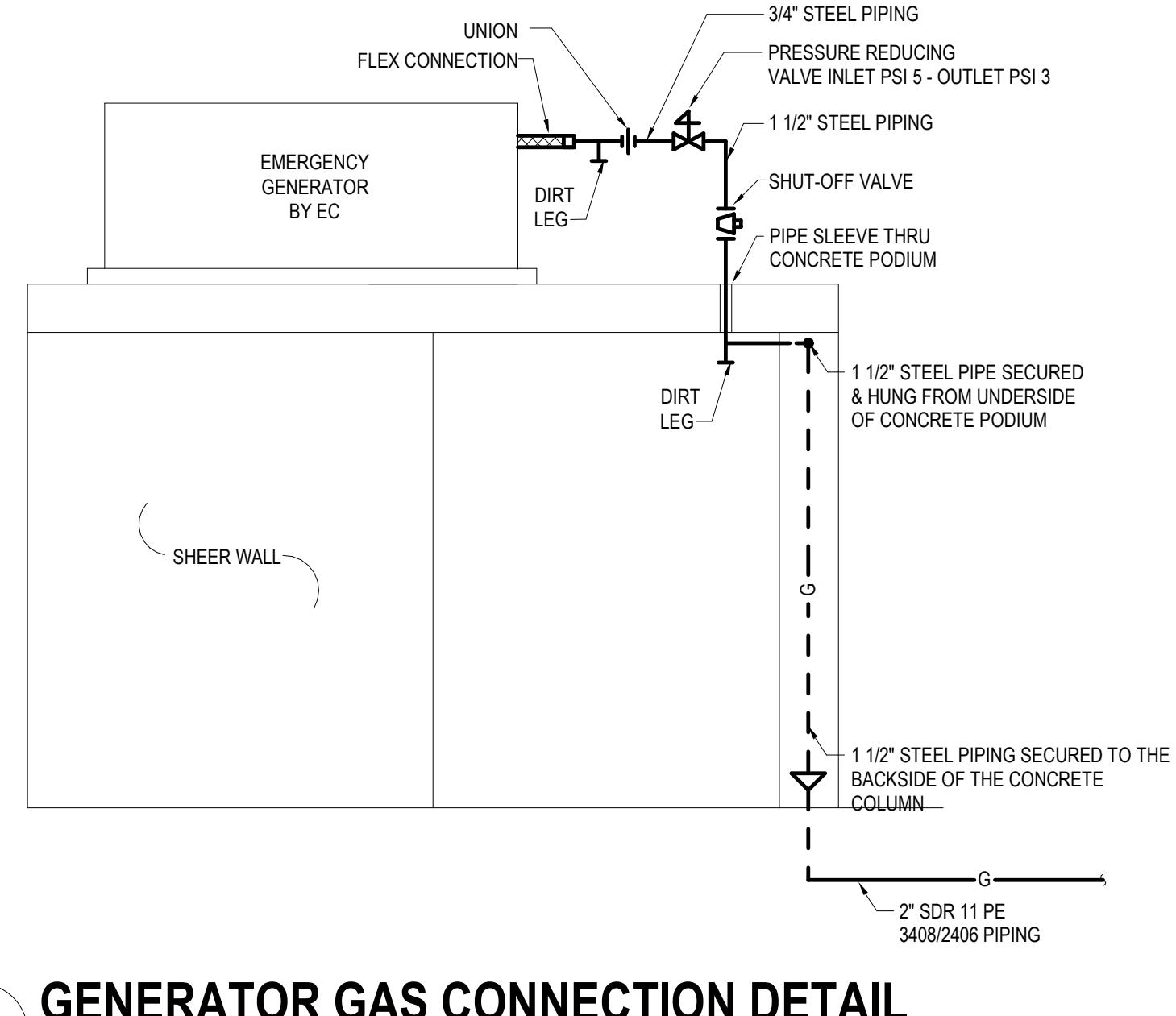
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1 PLUMBING NEW WORK PLAN
NTS



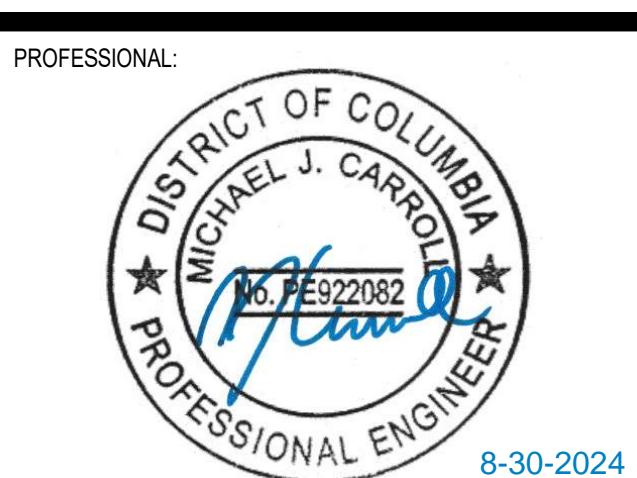
3 GENERATOR GAS CONNECTION DETAIL



2 PLUMBING OVERALL SITE PLAN
NTS

SUBMISSION:
CONSTRUCTION BID
DOCUMENTS

NO	DATE	REVISION



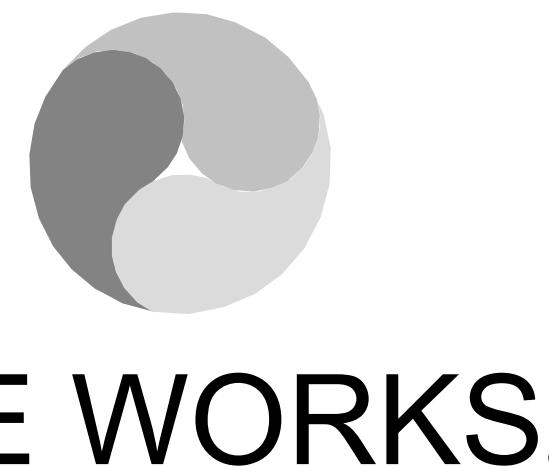
PROJECT NAME:
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REPLACEMENT

1800 Beach Dr, Gulfport, MS 39507

DRAWING TITLE:
PLUMBING PLANS

DRAWN BY: ELP
CHECKED BY: RB
PROJ. NO.: AFRH-016
DATE: 08.30.24
DRAWING NO.: 101

P101



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ELECTRICAL DEMOLITION GENERAL NOTES

- CONTRACTOR SHALL PROVIDE A MINIMUM TWO WEEKS WRITTEN NOTICE PRIOR TO ANY SHUT DOWN. NOTICE IS TO INCLUDE BUT IS NOT LIMITED TO THE LOCATION, PANELS AND DURATION OF SHUT DOWN.
- OWNER SHALL HAVE RIGHT OF FIRST REFUSAL TO ANY EQUIPMENT, DEVICES, ETC. DEMOLISHED FROM RENOVATION AREA PRIOR TO DISPOSAL.
- MANTAIN CONTINUITY OF SERVICE TO AREAS OUTSIDE THE PROJECT BOUNDARY. PATCH AND REPAIR ALL CIRCUITS CUT OFF DURING DEMOLITION BY WIRING METHODS COMPATIBLE WITH THE EXISTING INSTALLATION.
- THE ELECTRICAL CONTRACTOR SHALL REVIEW THE DRAWINGS OF ALL OTHER TRADES IN THIS CONTRACT. THE REMOVAL OF ELECTRICAL SERVICE TO ALL EQUIPMENT IDENTIFIED ON OTHER TRADE DRAWINGS IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
- EXERCISE EXTREME CAUTION WHEN REMOVING/RELOCATING WIRING AND EQUIPMENT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT OTHER WIRING DEVICES, EQUIPMENT AND LIGHT FIXTURES THAT MAY BE CONNECTED TO THE SAME CIRCUIT REMAIN OPERATIONAL AND ACTIVE.

ELECTRICAL DRAWING INDEX

Sheet Number	Sheet Name
E001	ELECTRICAL SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
E101	ELECTRICAL PLAN - LOWER LEVEL OF PLATFORM
E102	ELECTRICAL PLANS
E103	ELECTRICAL WORK - MECHANICAL 103
E201	PARTIAL EXISTING ELECTRICAL ONE-LINE DIAGRAM
E202	PARTIAL NEW ELECTRICAL ONE-LINE DIAGRAM
E301	ELECTRICAL DETAILS

ELECTRICAL SYMBOLS LEGEND

	BRANCH CIRCUITS TO DEVICES OR EQUIPMENT - SHORT TICKS INDICATE HOTS - LONG TICK INDICATES NEUTRAL - NO TICK MARKS INDICATES ONE HOT AND ONE NEUTRAL INCLUDE A GROUND CONDUCTOR IN ALL CONDUITS AND RACEWAYS PER NEC REQUIREMENTS. GROUND CONDUCTORS ARE NOT INDICATED WITH TICK MARKS. REFER TO PANEL SCHEDULES FOR WIRE AND CONDUIT SIZES AND QUANTITIES.		HOME RUN TO INDICATED PANEL AND CIRCUIT NUMBER(S) - SHORT TICKS INDICATE HOTS - LONG TICK INDICATES NEUTRAL - NO TICK MARKS INDICATES ONE HOT AND ONE NEUTRAL INCLUDE A GROUND CONDUCTOR IN ALL CONDUITS AND RACEWAYS PER NEC REQUIREMENTS. GROUND CONDUCTORS ARE NOT INDICATED WITH TICK MARKS. REFER TO PANEL SCHEDULES FOR WIRE AND CONDUIT SIZES AND QUANTITIES.		DASHED GREY LINES AROUND EQUIPMENT INDICATE NEC REQUIRED CLEARANCES
	SOLID HATCHING OVER LIGHTING FIXTURES INDICATES FIXTURE SHALL BE POWERED VIA LIFE SAFETY CIRCUIT AND RELAYED VIA UL924 LISTED DEVICE FOR FULL BRIGHTNESS DURING FIRE ALARM OR NORMAL POWER LOSS.		DASHED SYMBOLS INDICATE ELEMENT TO BE DEMOLISHED		EXIT SIGN, WALL MOUNTED CHEVRONS AS INDICATED ON DRAWINGS
	REFER TO LIGHTING FIXTURE SCHEDULE FOR ASSOCIATED SYMBOL FOR EACH FIXTURE TYPE.		GREY SYMBOLS INDICATE ELEMENT EXISTING TO REMAIN		EXIT SIGN, CEILING MOUNTED FACES, CHEVRONS, AND ORIENTATION AS INDICATED ON DRAWINGS
	REFER TO PANEL SCHEDULES FOR ADDITIONAL INFORMATION		JUNCTION BOX		PULL BOX DIMENSIONS AS INDICATED ON DRAWINGS
	3P-30A-FN SAFETY DISCONNECT SWITCH (NON-FUSED) NUMBER OF POLES, FRAME SIZE AND FUSE SIZE AS INDICATED		3P-30A-F00 SAFETY DISCONNECT SWITCH (FUSED) NUMBER OF POLES, FRAME SIZE, AND FUSE SIZE AS INDICATED	\$	SINGLE POLE SWITCH
	1-PHASE MOTOR EQUIPMENT TAG AS INDICATED		3-PHASE MOTOR EQUIPMENT TAG AS INDICATED	\$3	3-WAY SWITCH
	DUPLEX WALL RECEPTACLE NEMA 5-20R UNLESS NOTED OTHERWISE		QUADRUPLEX WALL RECEPTACLE NEMA 5-20R UNLESS NOTED OTHERWISE	\$4	4-WAY SWITCH

ELECTRICAL ABBREVIATIONS LIST

1P	1 POLE (2P, 3P, 4P, ETC.)	DISC	DISCONNECT	JBX	JUNCTION BOX	PWR	POWER
A	AMPERES	DIST	DISTRIBUTION	KV	KILOVOLT	QTY.	QUANTITY
AC	ABOVE COUNTER, AIR CONDITIONER	DIN	DOWN	KVA	KILOVOLT-AMPERE	RCPT	RECEPTACLE
ACLG	AUTOMATIC DOOR OPENER	DONS	DIVISION OF OCCUPATIONAL HEALTH AND	KVAR	KILOVOLT-AMPERE REACTIVE	REQD	REQUIRED
ADO	A.F.P.	DPR	DRUG	KWH	KILOWATT-HOUR	RSC	ROOF-LEVEL CONDUIT
A.F.F.	ABOVE FINISHED FLOOR	DPSM	SAFETY	DOC	LOCATE, LOCATION	RTU	ROOF-TOP UNIT
A.F.G.	ABOVE FINISHED GRADE	DPSM	MANAGEMENT	LT	LIGHT	SC	SURFACE CONDUIT
AFI	ARC FAULT CIRCUIT INTERRUPTER	DRS	DIVISION OF RADIATION SAFETY	LTG	LIGHTING	SEC	SECONDARY
AHU	AIR HANDLING UNIT	DS	SAFETY DISCONNECT SWITCH	LTING	LIGHTING	SHT	SHUTTER
ALT	ALUMINUM	DT	DATA TRANSFER	LV	LOW VOLTAGE	SIM	SIMILAR
ALT	ALTERNATE	DTR	DIVISION OF TECHNICAL RESOURCES	MAX	MAXIMUM	SIN	SOLID NEUTRAL
AMP	AMPERES	DWG, DWGS	DRAWING, DRAWINGS()	MAG S	MAGNETIC STARTER	SPEC	SPECIFICATION
AMPL	AMPLIFIER	EC	ELECTRICAL CONTRACTOR	MIC	MOMENTARY CONTACT	SPKR	SPAKER
ANNUN	ANNUNCIATOR	ELEC	ELECTRICAL	MIC	MOTOR CONTROL ACTUATOR	SPK	SPKERS
APPROX	APPROXIMATELY	ELEV	ELEVATOR	MCB	MAIN CIRCUIT BREAKER	SR	SURFACE RACEWAY
AQ-STAT	AQUASTAT	EM	EMERGENCY	MCC	MOTOR CONTROL CENTER	SS	STAINLESS STEEL
ARCH	ARCHITECT, ARCHITECTURAL	EMS	ENERGY MANAGEMENT SYSTEM	MDC	MAIN DISTRIBUTION CENTER	SSW	SELECTOR SWITCH
AS	AMP	EMC	EMI	MDP	MULTI-DIMENSIONAL PANEL	STD	STATIONARY PUSHBUTTONS
AT	AMP TRIP	EP	EMERGENCY METALLIC TUBING	MFR	MANUFACTURER	STA	STATION
ATS	AUTOMATIC TRANSFER SWITCH	EQUIP	EQUIPMENT	MFS	MAIN FUSED DISCONNECT SWITCH	STD	STANDARD
AUTO	AUTOMATIC	EWC	ELECTRIC WATER COOLER	MH	MANHOLE	SURF	SURFACE MOUNTED
AUX	AUXILIARY	EXIST	EXISTING	MIC	MICROPHONE	SW	SWITCH
AVG	AUDIO-VISUAL	EXP	EXPLOSION PROOF	MIS	MISCELLANEOUS	SWB	SURFACE BOARD
BATT	BATTERY	FA	FIRE ALARM	MLO	MAIN LUSS ONLY	SYM	SYMMETRICAL
BD	BOARD	FABP	FIRE ALARM DOORSTATION POWER	MMS	MAIN MOTOR STARTER	SYS	SYSTEM
BLDG	BUILDING	FACNET	FACILITIES NETWORK SYSTEM	MSP	MOTOR STARTER PANELBOARD	TEL	TELEPHONE
BMS	BUILDING MANAGEMENT SYSTEM	FACNET	FACILITIES NETWORK SYSTEM	MSB	MAIN SWITCHBOARD	T-STAT	THERMOSTAT
C	CONDUT, CENTER LINE	FACP	FIRE ALARM CONTROL PANEL	MOUNT	MOUNT	TAMPER	TAMPER RESISTANT
CAB	CABINET	FCL	FAN CONDUIT UNIT	MTS	MANUAL TRANSFER SWITCH	TR	TEMPERATURE
CAT	CAT LOG	FTXT	FEATURE	MTR	MOTOR, MOTORIZED	TT-C	TELEVISION TERMINAL CABINET
CATV	CABLE TELEVISION	FLS	FLOOR	MTR	MOTOR, MOTORIZED	TV	TELEVISION
CB	CIRCUIT BREAKER	FLUOR	FLUORESCENT	MTR	MOTOR, MOTORIZED	TVTC	TELEVISION TERMINAL CABINET
CCOM	CLINICAL CENTER OFFICE OF FACILITY	FT	FEET	N.C.	NORMALLY CLOSED	TYP.	TYPICAL
CCTV	CLOSE-CIRCUIT TELEVISION	FSS	FUSED SAFETY SWITCH	NEC	NATIONAL ELECTRICAL CODE	UC	UNDER COUNTER
CIT	CENTER FOR INFORMATION TECHNOLOGY	GAS	GAUGE	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION	UEB	UNDER-GROUND ELECTRICAL
CKT	CIRCUIT	GAL	GALLON	NFSS	NON-FUSED SAFETY SWITCH	UG	UNDERGROUND
CLG	CEILING	GALV	GALVANIZED	NIC	NOT IN CONTRACT	UH	UNIT HEATER
COMB	COMBINATION	GC	GENERAL CONTRACTOR	NHH	NATIONAL INSTITUTES OF HEALTH	U.O.	UNLESS NOTED OTHERWISE
CONN	CONNECTION	GEN	GENERATOR	NL	NIGHT LIGHT	UT	UNDERGROUND TELEPHONE
CONST	CONSTRUCTION	GFCI, GFI	GROUND FAULT CIRCUIT INTERRUPTER	NO.	NORMALLY OPEN	UT	UTILITY
CONT	CONTINUOUS OR CONTINUOUS	GFP	GROUND FAULT PROTECTOR	NPF	NORMAL POWER FACTOR	UV	UNIT VENTILATOR OR ULTRAVIOLET
CONTR	CONTRACTOR	GRS	GALVANIZED RIGID STEEL (CONDUIT)	OH	OVERHEAD	V	VOLUME
CONV	CONVECTOR	GYB	GYPSUM BOARD	OHPE	OFFICE OF HOSPITAL PHYSICAL ENVIRONMENT	VA	VOLT-AMPERE(S)
CP	CIRCULATING PUMP	HOA	HAND-OFF-AUTOMATIC	OI	OVERLOADS	VDT	VIDEO DISPLAY TERMINAL
CRT	CATHODE-RAY TUBE	HORIZ	HORIZONTAL	P	PLATE	VERT	VERTICAL
CRT	CURRENT TRANSFORMER	HP	HIGH POWER	PA	PUBLIC ADDRESS	VFD	VARIABLE FREQUENCY DRIVE
CTR	CENTER	HPP	HIGH POWER FACTOR	PB	PULL BOX, PUSH BUTTON	VOL	VOLUME
CU	COPPER	HT	HEIGHT	PE	PNEUMATIC ELECTRIC	W	WATT(S)
DCP	DOOR & WATER CIRCULATING PUMP	HTG	HEATING	PEDESTAL	POWER FACTOR	WAO	WORK-AREA OUTLET
DDCM	DIVISION OF DESIGN AND CONSTRUCTION	HTR	HEATER	PH	PHASE	WH	WIRE GUARD
DEPT	DEPARTMENT	HVAC	HEATING, VENTILATING, AND AIR	PIV	POST INDICATING VALVE	WIO	WATER HEATER
DET	DETAIL	HVAC	CONDITIONING	PNL	PANEL	WP	WITHOUT
DEP	DIVISION OF ENVIRONMENTAL PROTECTION	HWP	HIGH WATER PUMP	PO	PROJECT OFFICER	XFM	WEATHERPROOF
DFOM	DIVISION OF FACILITIES OPERATIONS AND MAINTENANCE	IC	INTERRUPTING CAPACITY	PP	POWER POLE	XFR	TRANSFORMER
DFM	DIVISION OF THE FIRE MARSHAL	IG	ISOLATED GROUND	PR	PAIR	@	AT
DFP	DIVISION OF FACILITIES PLANNING	IMC	INTERMEDIATE METAL CONDUIT	PRI	PRIMARY	FEET	FEET
DFS	DIVISION OF FACILITIES STEWARDSHIP	INC	INCANDESCENT	PROJ	PROJECTION	#	INCHES
DIA	DIAMETER	IR	INFRARED	PW	POWER ROOF VENTILATOR	Ø, ⌀	NUMBER
		IW	INTERLOCK WITH	PT	POTENTIAL TRANSFORMER	PHASE	PHASE
				PVC	POLYVINYL CHLORIDE (CONDUIT)		

CONSTRUCTION BID DOCUMENTS

NO DATE REVISION

PROFESSIONAL:

SARA ROSE LAPANO
Lic. No. 040205983
8-30-2024

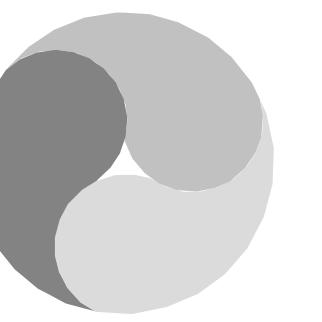
PROJECT NAME:
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GENERATOR
REPLACEMENT

1800 Beach Dr, Gulfport, MS 39507

DRAWING BY: BK
CHECKED BY: SL
PROJ. NO.: AFRH-016
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POWER PLAN KEYNOTES



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SARA ROSE LAPPA
Lic. No. 0402059835
8-30-2024
PROFESSIONAL ENGINEERS

PROJECT NAME:
AFRH GULFPORT GENERATOR REPLACEMENT

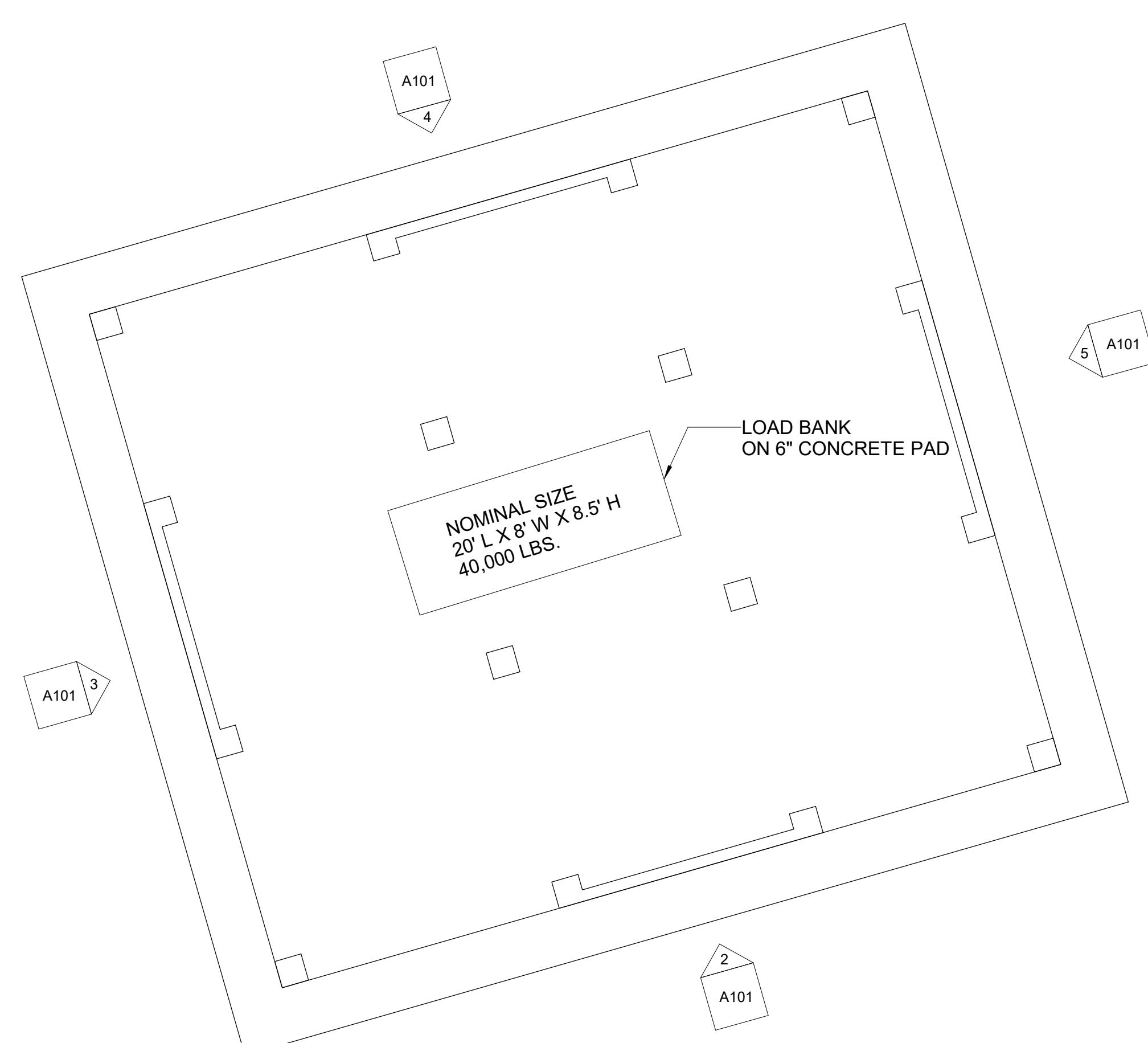
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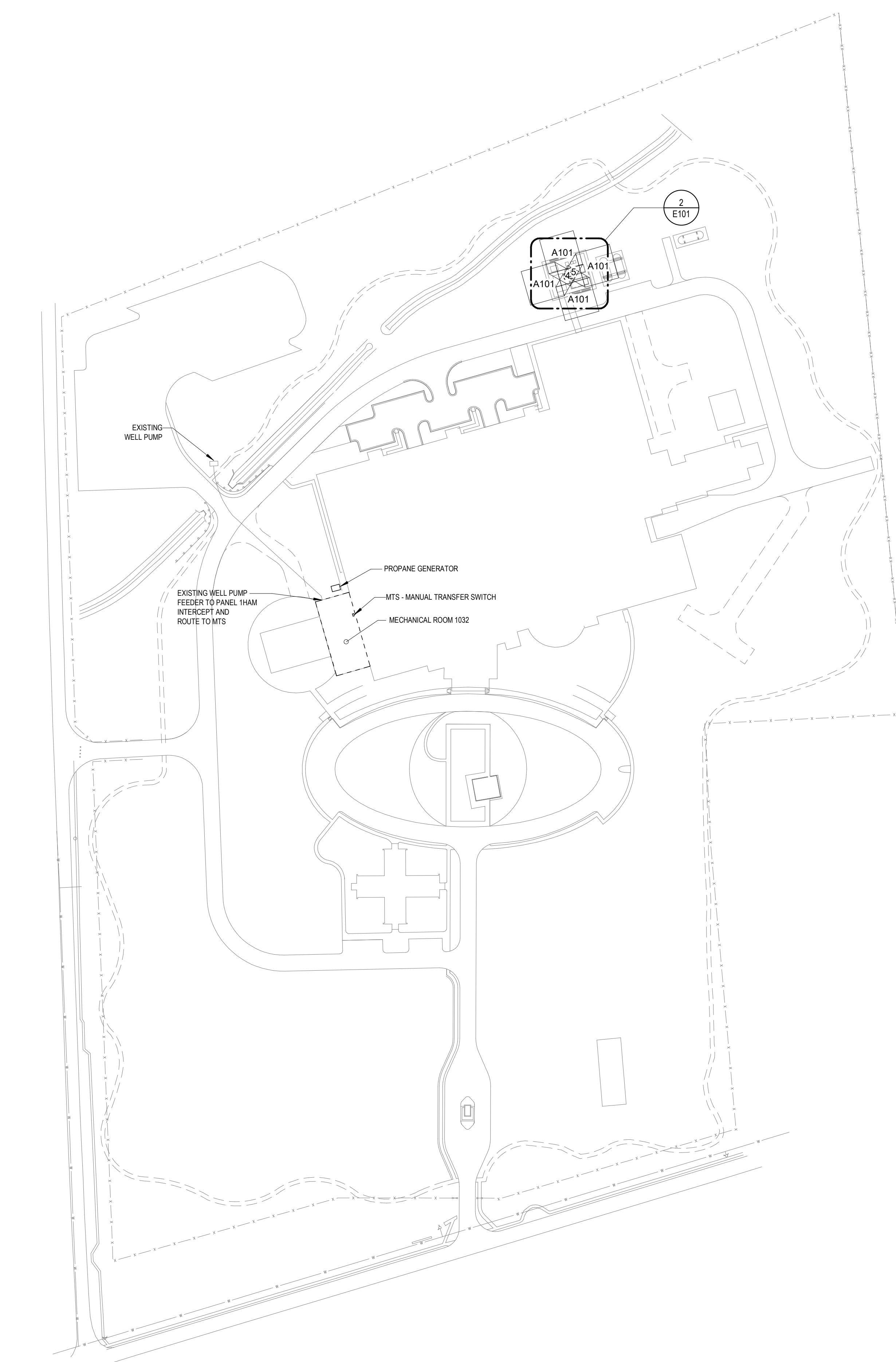
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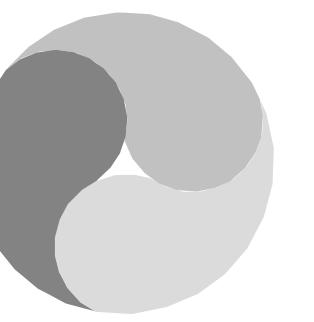
2 ELECTRICAL NEW WORK PLAN - LOWER LEVEL



1 OVERALL SITE PLAN - LOWER LEVEL

N

E101



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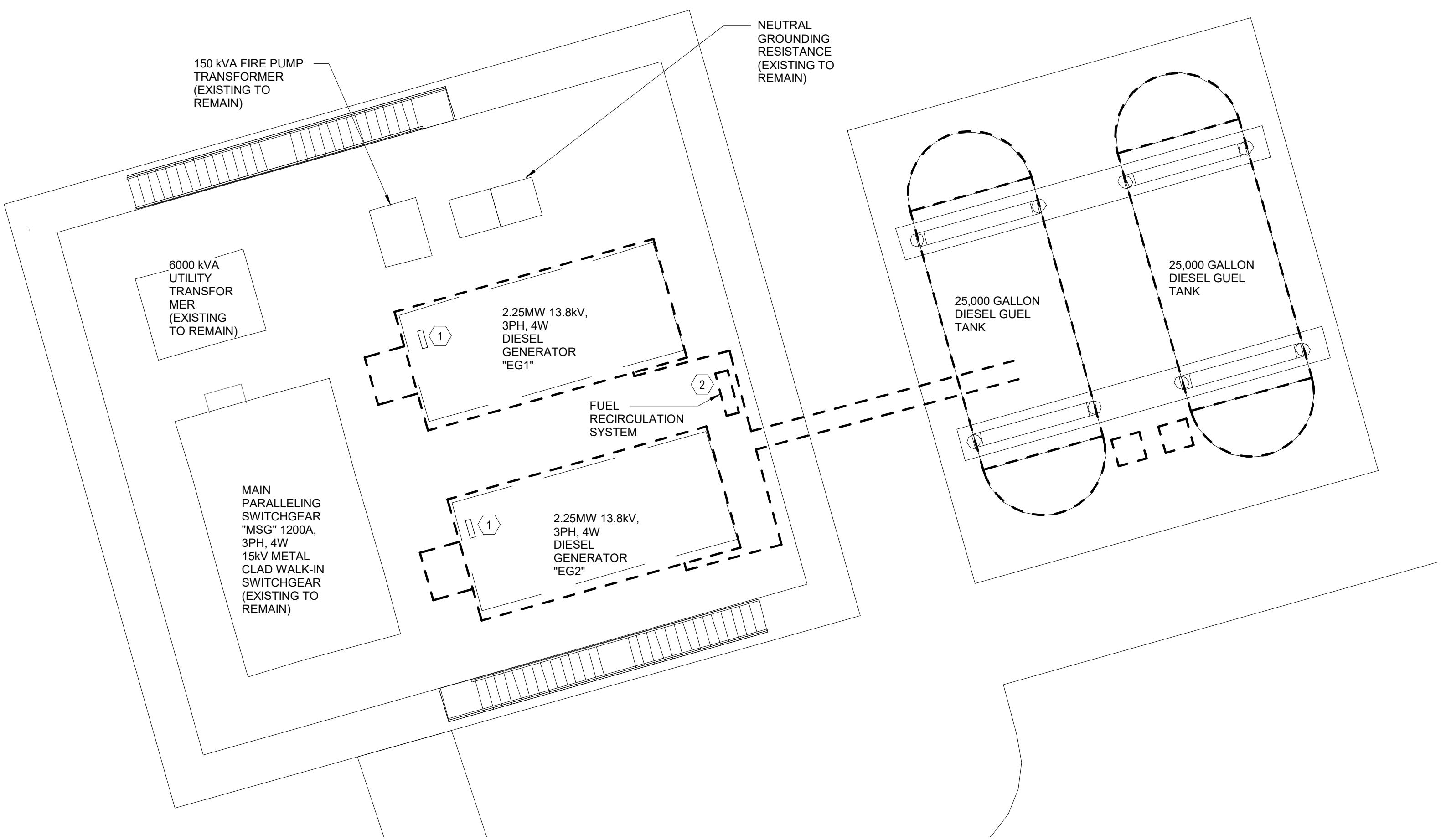
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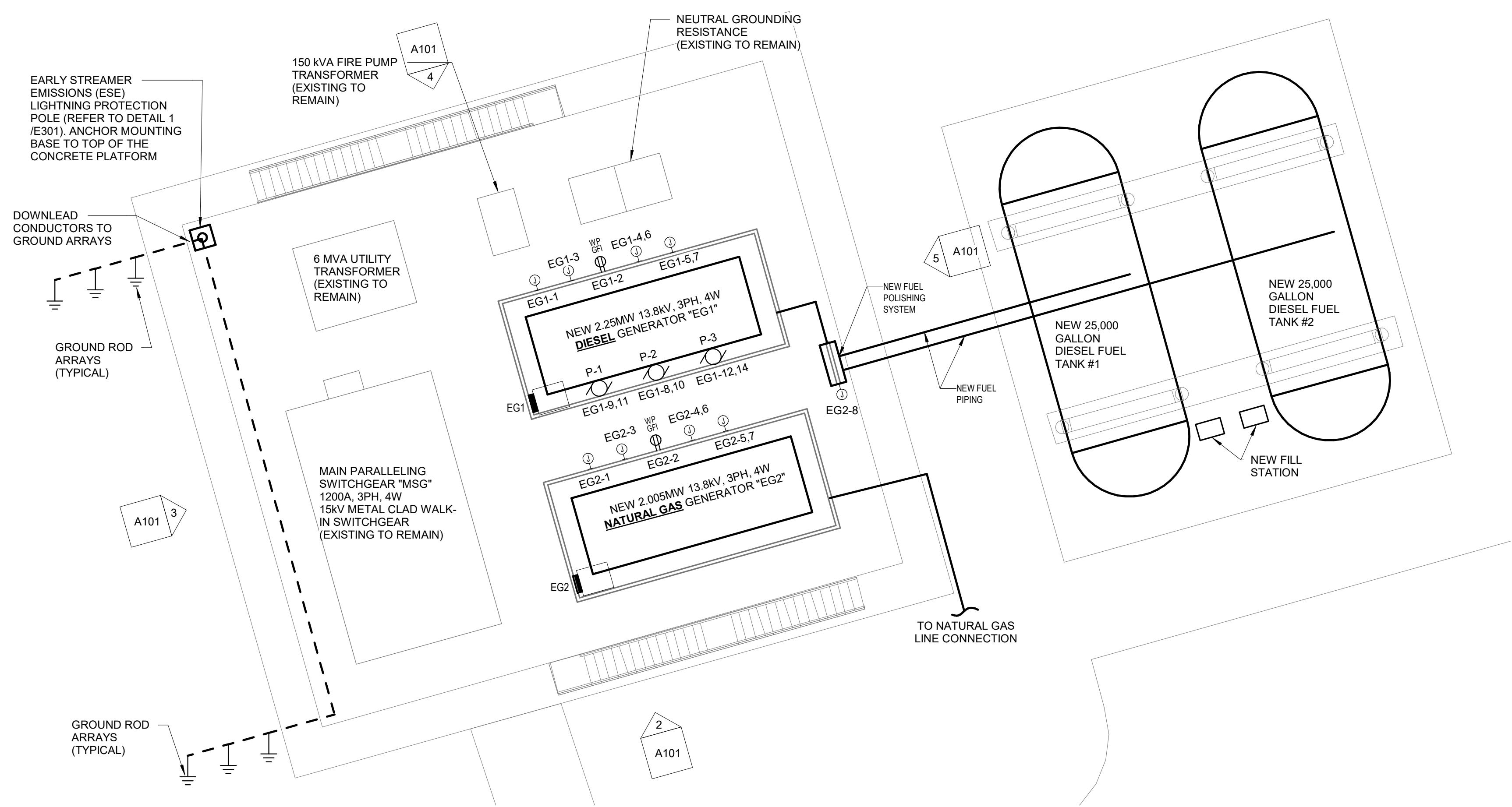
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POWER PLAN KEYNOTES



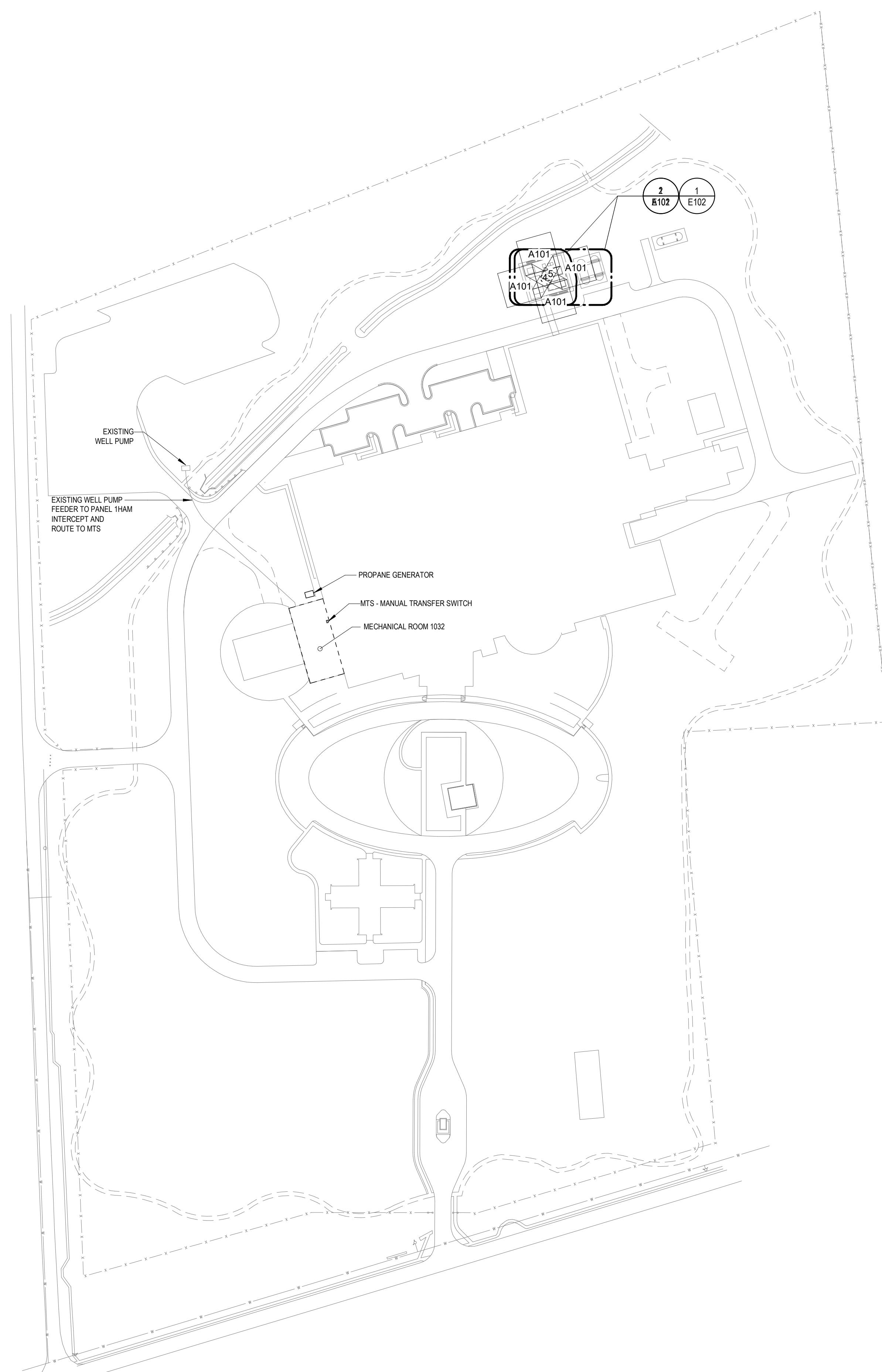
ELECTRICAL DEMOLITION PLAN



ELECTRICAL NEW WORK PLAN

ELECTRICAL DEMOLITION KEYNOTES

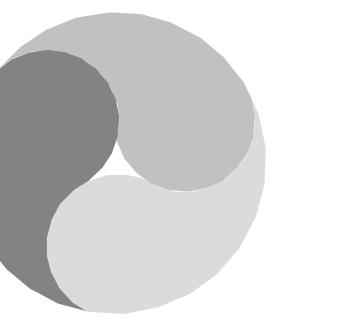
- 1 DISCONNECT FEEDER TO LOAD CENTER INSIDE GENERATOR ENCLOSURE.
 - 2 DISCONNECT POWER FROM EXISTING FUEL RECIRCULATING SYSTEM.



OVERALL SITE PLAN - LEVEL 1

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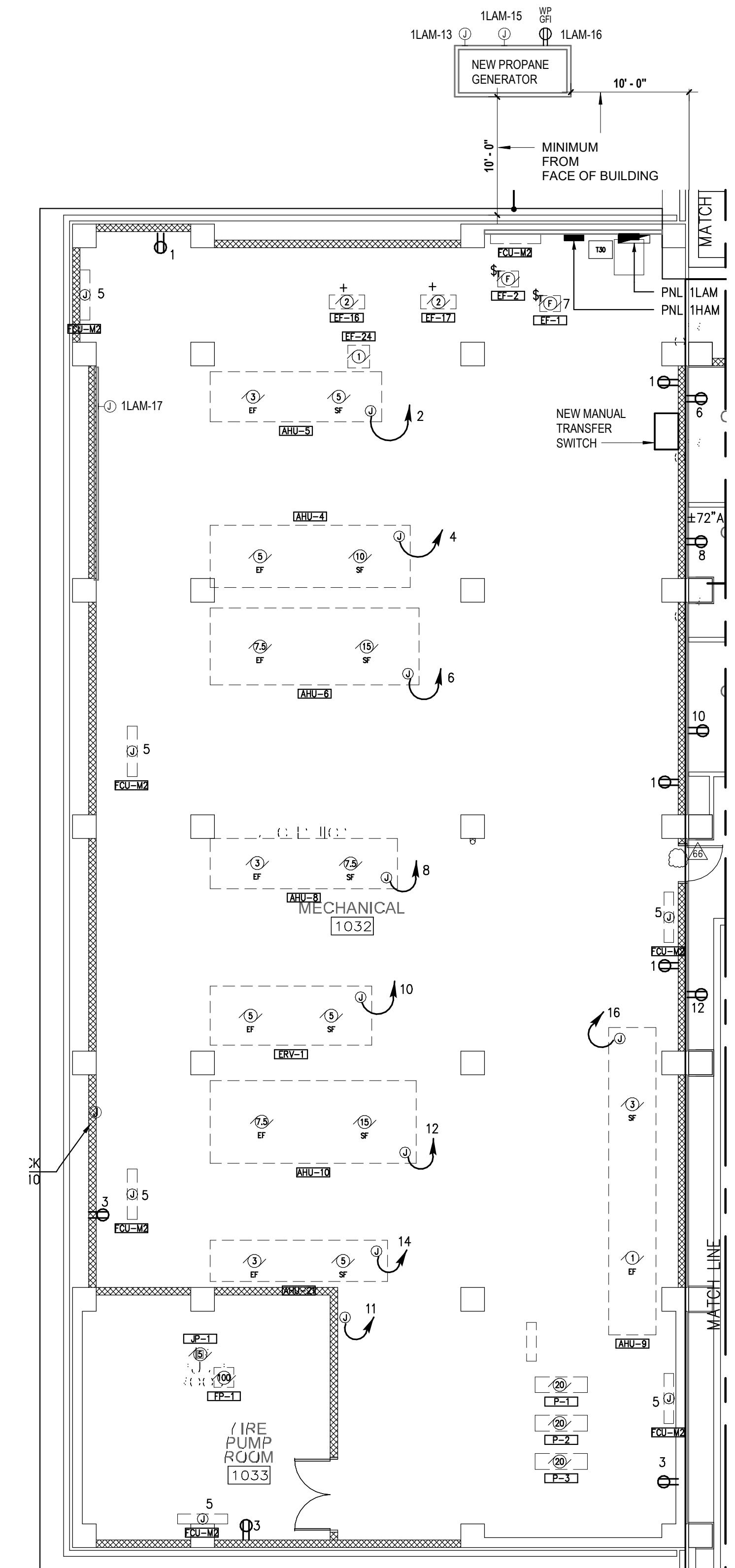
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DRAWING TITLE:
ELECTRICAL WORK -
MECHANICAL 1032

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DATE: 08.30.24
DRAWING NO.

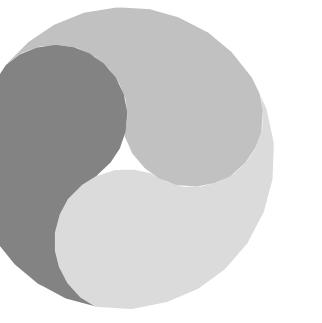
E103

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1 ELECTRICAL WORK - MECHANICAL 1032

1/8" = 1'-0"



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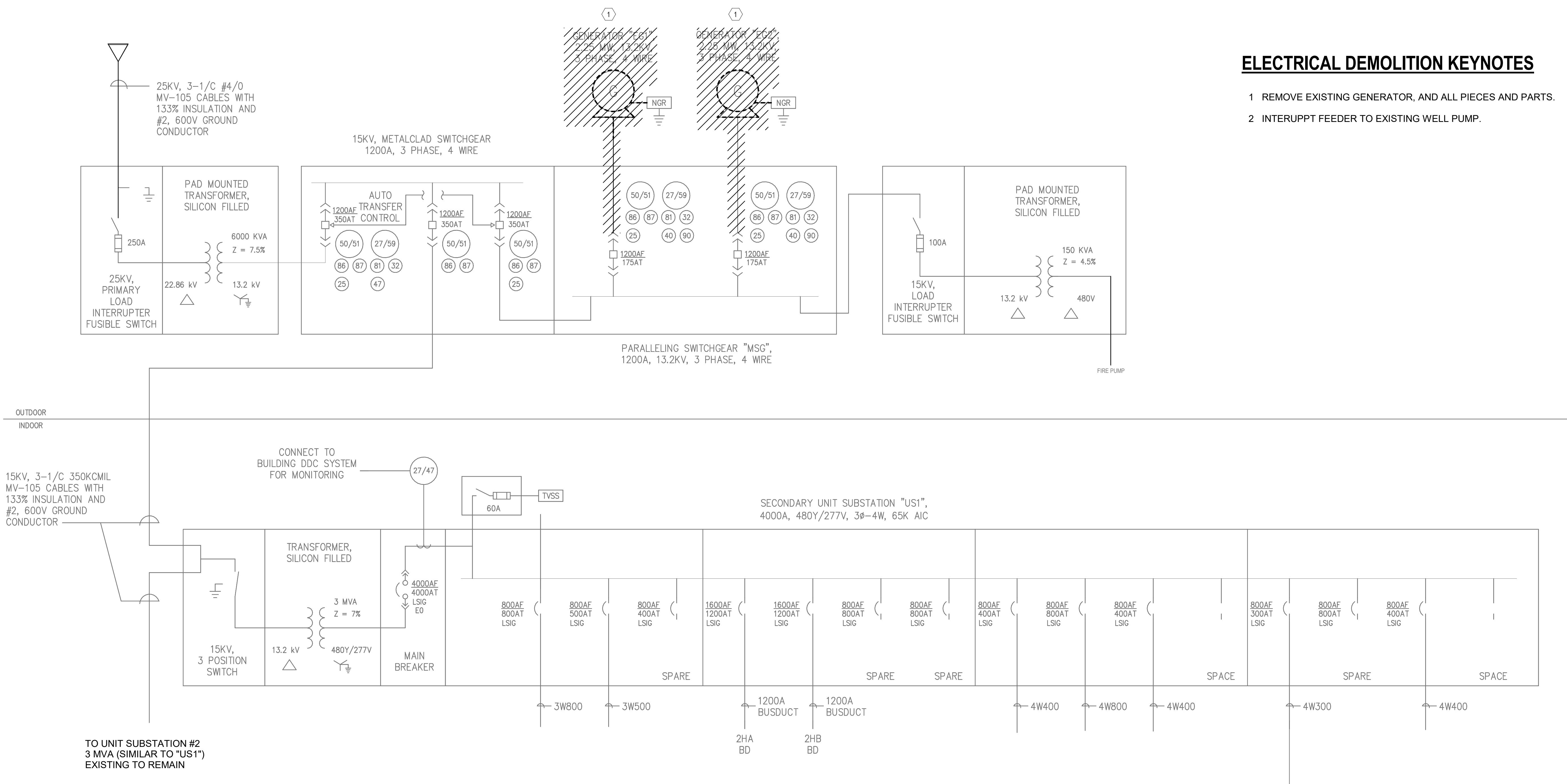
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ELECTRICAL DEMOLITION KEYNOTES

- 1 REMOVE EXISTING GENERATOR, AND ALL PIECES AND PARTS.
 - 2 INTERRUPT FEEDER TO EXISTING WELL PUMP.



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COMMONWEALTH OF VIRGINIA

SARA ROSE LAPPANO

Lic. No. 0402059835

8-30-2024

ENGINEER

PROJECT NAME:
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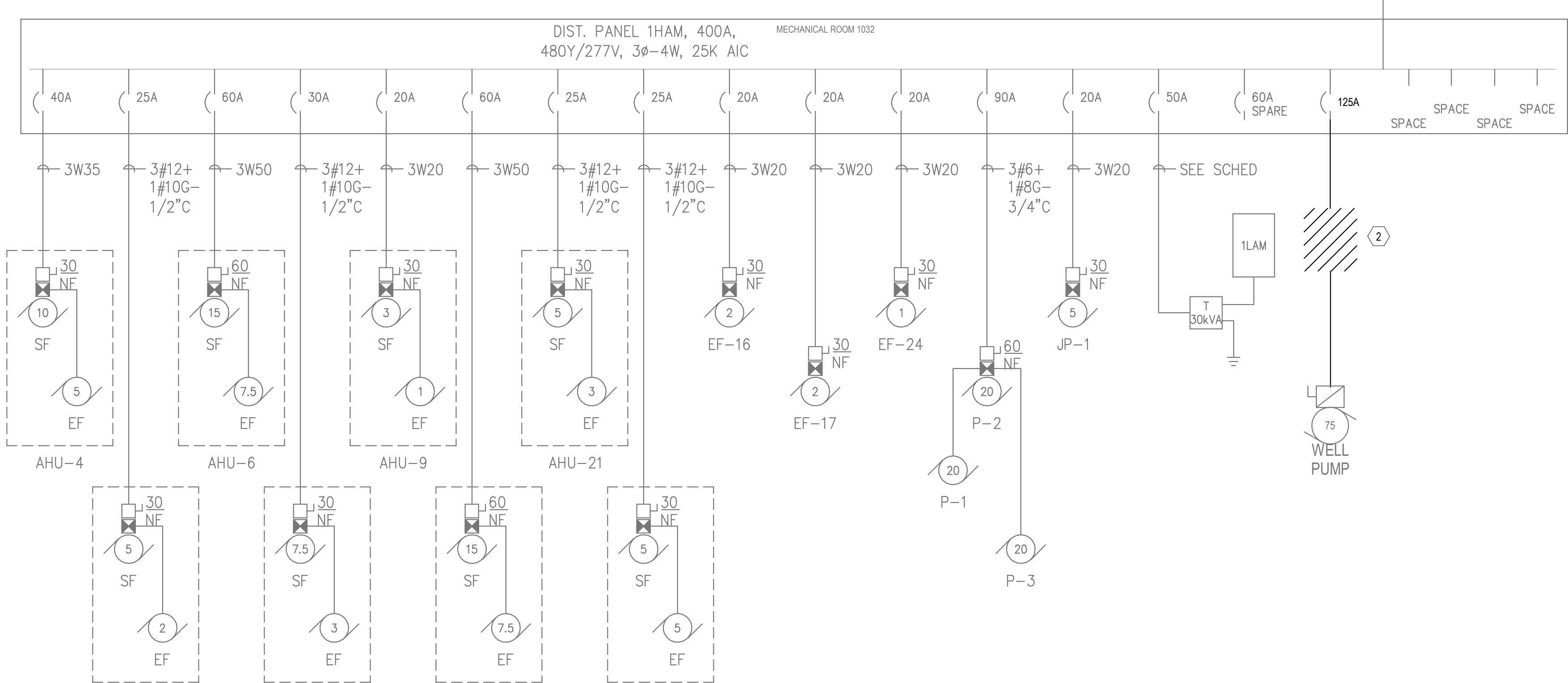
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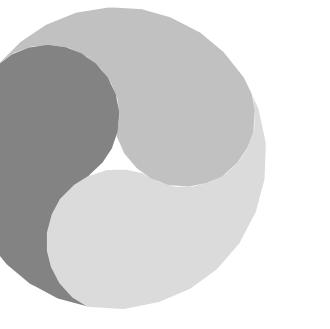
PARTIAL EXISTING ELECTRICAL ONE-LINE DIAGRAM

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PARTIAL EXISTING ELECTRICAL ONE-LINE DIAGRAM

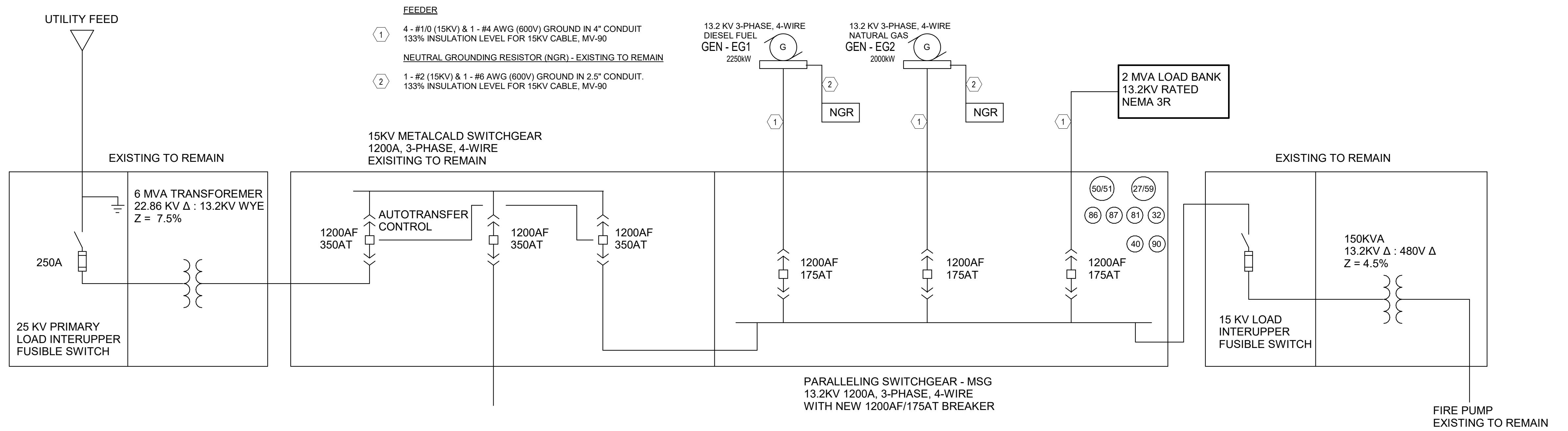


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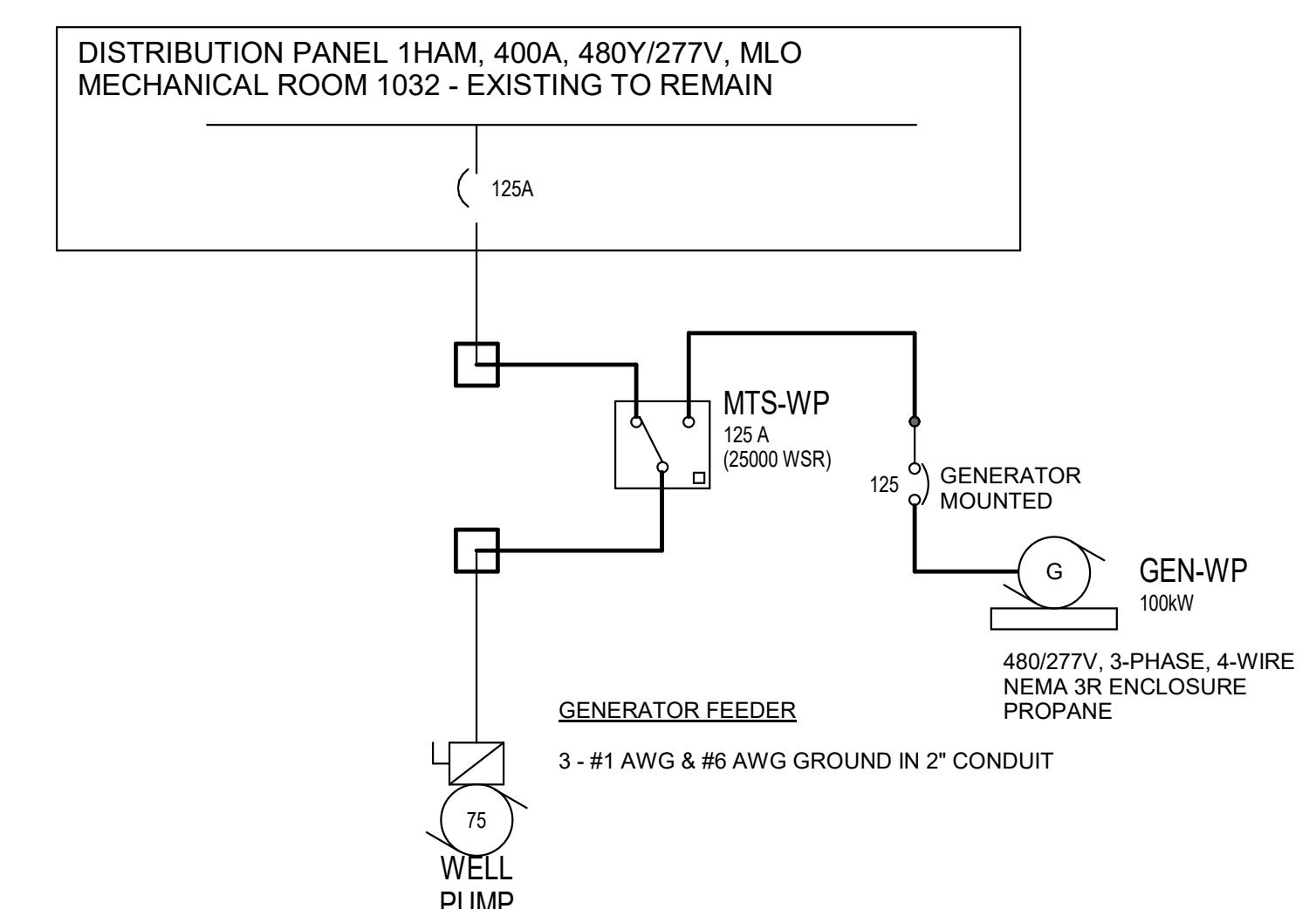
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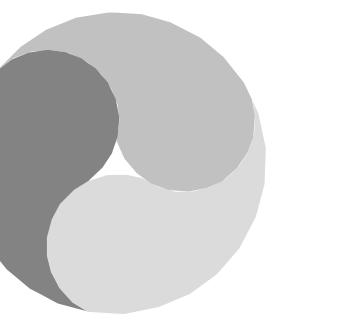
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ELECTRICAL ONE-LINE
DIAGRAM**

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1 PARTIAL NEW ELECTRICAL ONE-LINE DIAGRAM
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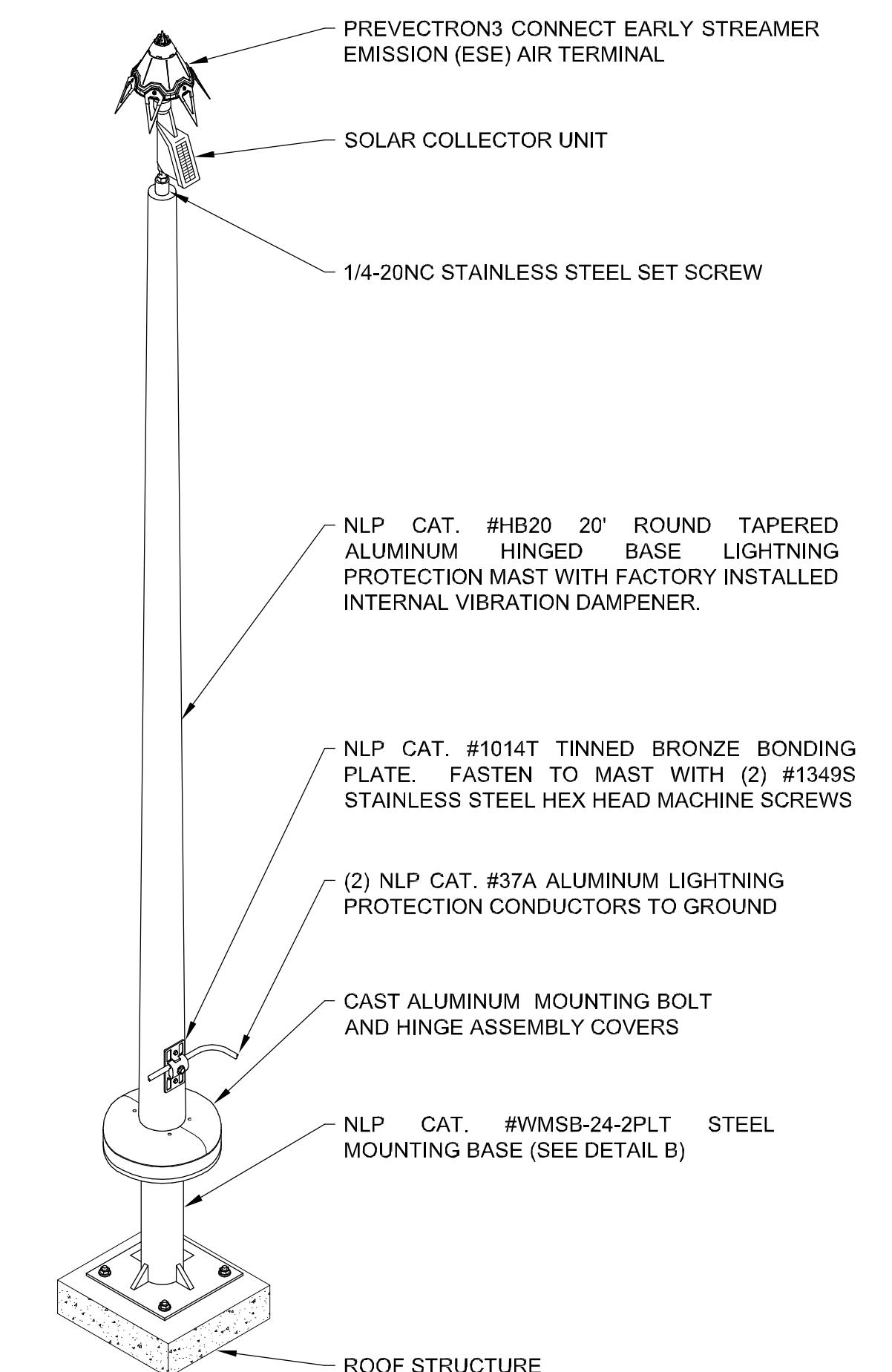
CONNECT TO EXISTING FEEDER MADE AVAILABLE BY DEMOLITION
3 - #3 AWG & #8 AWG G IN 1.25" CONDUIT.

PANEL EG1						
RATINGS: 120/240 MAIN TYPE: MLO		LOCATION: FED FROM: MOUNTING: SURFACE				
CKT NO	CIRCUIT DESCRIPTION	BREAKER P	LOAD KVA A	BREAKER P	LOAD KVA B	CIRCUIT CKT NO
1	BATTERY CHARGER	20.0 A	1.00 0.00	20.0 A	1 NEMA 5-20R GFI	2
3	LIGHTING	20.0 A	1.00 0.00	20.0 A	2 JACKET WATER HEATER	4
5	SPACE HEATER	25.0 A	2.00 0.00	20.0 A	2 PUMP NO. 1	6
7			2.00 0.50	20.0 A	2 PUMP NO. 1	8
9	PUMP NO. 2	20.0 A	0.50 0.50	20.0 A	2 PUMP NO. 3	10
11			0.50 0.50	20.0 A	2 PUMP NO. 3	12
13	SPACE	1	— 0.50	—	1 SPACE	14
15	SPACE	1	— —	—	1 SPACE	16
17	SPACE	1	— —	—	1 SPACE	18
			4.5 4.5			
			:CONNECTED LOAD/PHASE (KVA)			
			37.5 37.5			
			30.0 :TOTAL CONNECTED LOAD (A)			
			37.5 :TOTAL CONNECTED LOAD (A)			
			100.0% :TOTAL DEMAND FACTOR			
			9.0 :TOTAL DEMAND LOAD (KVA)			
			37.5 :TOTAL DEMAND LOAD (A)			

CONNECT TO EXISTING FEEDER MADE AVAILABLE BY DEMOLITION
3 - #3 AWG & #8 AWG G IN 1.25" CONDUIT.

PANEL EG2						
RATINGS: 120/240 MAIN TYPE: MLO		LOCATION: FED FROM: MOUNTING: SURFACE				
CKT NO	CIRCUIT DESCRIPTION	BREAKER P	LOAD KVA A	BREAKER P	LOAD KVA B	CIRCUIT CKT NO
1	BATTERY CHARGER	20.0 A	1.00 0.18	20.0 A	1 NEMA 5-20R GFI	2
3	LIGHTING	20.0 A	1.00 0.00	20.0 A	2 JACKET WATER HEATER	4
5	SPACE HEATER	30.0 A	2.00 1.00	20.0 A	1 FUEL POLISHING SYSTEM	6
7			2.00 1.00	20.0 A	1 FUEL POLISHING SYSTEM	8
9	SPARE	20.0 A	0.00 0.00	20.0 A	1 SPARE	10
11	SPARE	20.0 A	0.00 0.00	20.0 A	1 SPARE	12
13	SPACE	1	— 0.00	20.0 A	1 SPARE	14
15	SPACE	1	— —	20.0 A	1 SPARE	16
17	SPACE	1	— —	—	1 SPACE	18
			4.2 5.0			
			:CONNECTED LOAD/PHASE (KVA)			
			34.8 41.7			
			52.0 :TOTAL CONNECTED LOAD (A)			
			38.3 :TOTAL CONNECTED LOAD (A)			
			100.0% :TOTAL DEMAND FACTOR			
			9.2 :TOTAL DEMAND LOAD (KVA)			
			38.3 :TOTAL DEMAND LOAD (A)			

EXISTING PANEL 1LAM						
RATINGS: 208Y/120 MAIN TYPE: MCB MCB RATING: 100.0 A		LOCATION: FED FROM: MOUNTING: SURFACE				
CKT NO	CIRCUIT DESCRIPTION	BREAKER P	LOAD KVA A	BREAKER P	LOAD KVA B	CIRCUIT CKT NO
1	EXISTING RECEPTACLES	20.0 A	0.54 1.00	20.0 A	1 EXISTING JUNCTION BOX	2
3	EXISTING RECEPTACLES	20.0 A	0.54 1.00	20.0 A	1 EXISTING JUNCTION BOX	4
5	EXISTING FAN COIL UNIT	20.0 A	0.58 1.00	20.0 A	1 EXISTING JUNCTION BOX	6
7	EXISTING FAN SCHEDULE	20.0 A	0.66 1.00	20.0 A	1 EXISTING JUNCTION BOX	8
9	EXISTING FAN SCHEDULE	20.0 A	0.83 1.00	20.0 A	1 EXISTING JUNCTION BOX	10
11	EXISTING JUNCTION BOX	20.0 A	1.00 1.00	20.0 A	1 EXISTING JUNCTION BOX	12
13	GENERATOR BATTERY CHARGER	20.0 A	1.00 1.00	20.0 A	1 EXISTING JUNCTION BOX	14
15	GENERATOR BLOCK HEATER	20.0 A	1.00 0.18	20.0 A	1 RECEPTACLE AT GENERATOR	16
17						18
19						20
21						22
23						24
25						26
27						28
29						30
31						32
33						34
35						36
37						38
39						40
41						42
			5.2 4.6			43
			44.6 39.2			44
			29.8 36.8			45
			13.3 :CONNECTED LOAD/PHASE (A)			
			37.0 :TOTAL CONNECTED LOAD (A)			
			100.0% :TOTAL DEMAND FACTOR			
			13.3 :TOTAL DEMAND LOAD (A)			
			37.0 :TOTAL DEMAND LOAD (A)			



THIS SQUARE APPEARS 1/2x1/2" ON FULL SIZE SHEETS
SUBMISSION: CONSTRUCTION BID DOCUMENTS

NO	DATE	REVISION

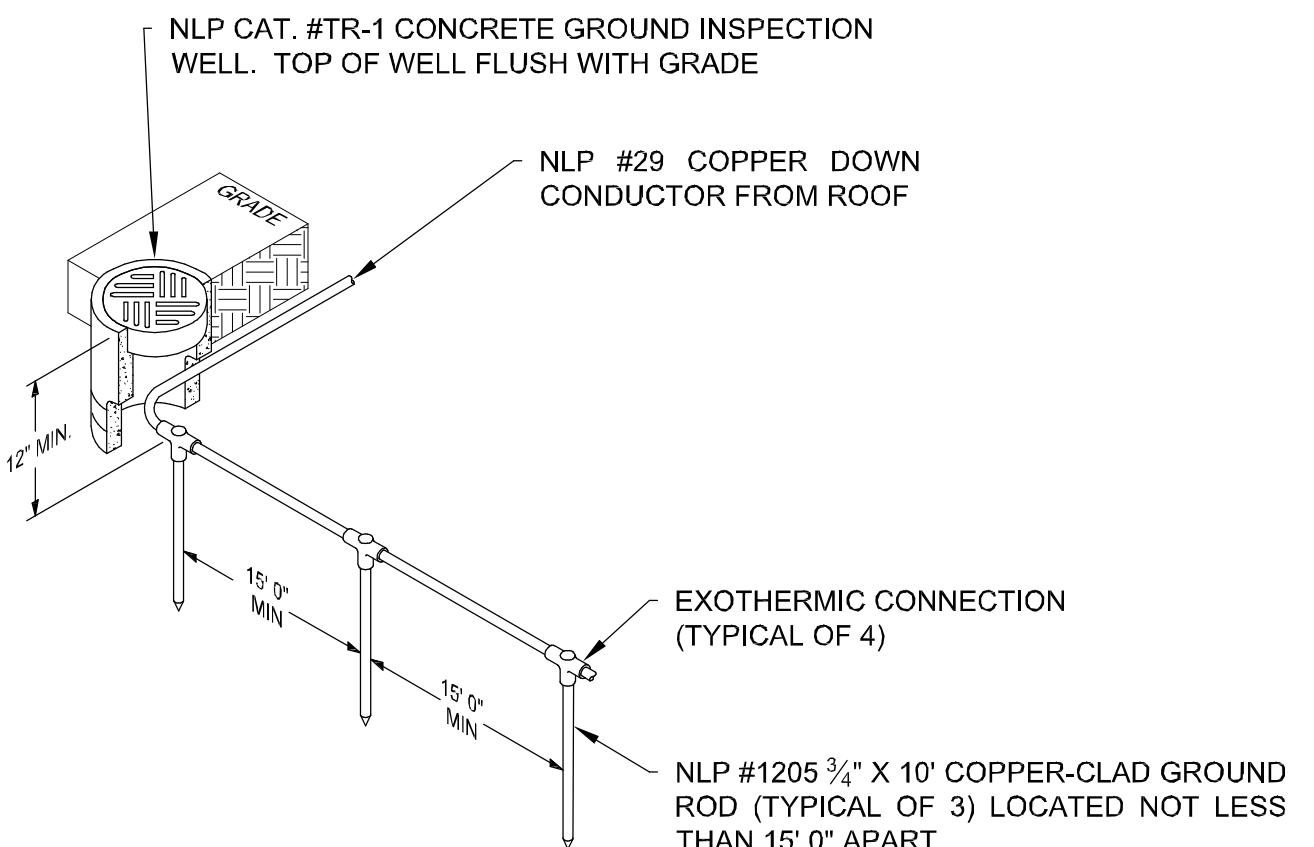
PROFESSIONAL:
SARA ROSE LAPPANO
Lic. No. 0402059835
8-30-2024

PROJECT NAME:
**AFRH GULFPORT
GENERATOR
REPLACEMENT**

1800 Beach Dr, Gulfport, MS 39507

DRAWING TITLE:
ELECTRICAL DETAILS

DRAWN BY: BK
CHECKED BY: MM
PROJ. NO.: AFRH-016
DATE: 08.30.24
DRAWING NO.: E301
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DOWNLOAD TO GROUND

C
NOT TO SCALE



MAST BASE DETAIL

B
NOT TO SCALE



HINGED BASE LIGHTNING PROTECTION MAST

A
NOT TO SCALE



STRUCTURAL SPECIFICATIONS

MISCELLANEOUS

- THE STRUCTURAL SYSTEM IS UNSTABLE UNTIL ALL CONNECTIONS HAVE BEEN MADE AND ALL CONCRETE HAS REACHED ITS MINIMUM DESIGN STRENGTH, AS SHOWN IN THE STRUCTURAL DOCUMENTS.

2. CONTRACTOR IS RESPONSIBLE FOR MEANS AND METHODS OF CONSTRUCTION TO ENSURE THE SAFETY OF THE BUILDING UNTIL STRUCTURAL SYSTEM IS COMPLETED. THIS INCLUDES, BUT IS NOT LIMITED TO, THE ADDITION OF WHATEVER TEMPORARY BRACING, SHORING, GUY OR TIE-DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER COMPLETION OF THE PROJECT.

3. CONTRACTOR TO SUPPORT, BRACE AND SECURE EXISTING STRUCTURE AS REQUIRED. CONTRACTOR IS SOLELY RESPONSIBLE FOR THE SAFETY OF THE BUILDING DURING CONSTRUCTION.

4. APPLICABLE BUILDING CODE: 2021 INTERNATIONAL BUILDING CODE.

5. GRAVITY DESIGN LOADS:

AREA	SUPERIMPOSED LIVE LOAD	TOTAL DEAD LOAD
GENERATOR PLATFORM	40 PSF + EQUIPMENT	SW + 5 PSF

6. SEISMIC DESIGN CRITERIA:
RISK CATEGORY = III
SEISMIC IMPORTANCE FACTOR ξ = 1.00
 S_s = 0.12
 S_d = 0.066
SITE CLASS = D
 S_{ds} = 0.11
 S_{d1} = 0.094

DESIGN CATEGORY = B
BASIC SEISMIC FORCE RESISTING SYSTEMS:
A) ORDINARY REINFORCED CONCRETE SHEAR WALLS (R=4)
SEISMIC SHEAR (EQUIVALENT LATERAL FORCE PROCEDURE) = 20 KIPS
SEISMIC RESPONSE COEFFICIENT, C_S = .028

7. SNOW DESIGN CRITERIA:
GROUND SNOW LOAD = 8 PSF
SNOW EXPOSURE FACTOR, C_x = 1.0
SNOW IMPORTANCE FACTOR, I_s = 1.0
THERMAL FACTOR, C_t = 1.0
SLOPE FACTOR, C_S = 1.0

8. WIND DESIGN CRITERIA:
ULTIMATE WIND SPEED: V_{ult} = 167 MPH (3 SECOND GUST)
EQUIVALENT NOMINAL BASIC WIND SPEED V_{asd} = 130 MPH (3 SECOND GUST)

TORNADO SPEED, V_t = 50 MPH
RISK CATEGORY = III
TORNADO EFFECTIVE PLAN AREA, A_e = 35,000 SF
EXPOSURE CATEGORY = C
ENCLOSED BUILDING INTERNAL PRESSURE COEFFICIENT, C_{cp} = +/-0.18
ENCLOSED BUILDING TORNADO INTERNAL PRESSURE COEFFICIENT, $C_{cp,t}$ = +.55/-1.18
WIND BORNE DEBRIS REGION
GENERATOR DESIGN:
PRESSURE= 65 PSF
DIESEL TANKS DESIGN:
PRESSURE= 84 PSF
FENCING DESIGN:
PRESSURE= +83/-108 PSF

9. RAIN DESIGN CRITERIA:
DESIGN STORM RETURN PERIOD = 200 YRS
RAINFALL INTENSITY = 10.3 IN/HR

10. ALL MATERIALS AND WORKSHIPS SHALL BE IN ACCORDANCE WITH THE REFERENCED BUILDING CODE.

11. COORDINATE ALL DIMENSIONS AND ELEVATIONS WITH THE ARCHITECTURAL DRAWINGS. DO NOT SCALE DRAWINGS.

12. CONTACT ENGINEER WITH ANY QUESTIONS OR DISCREPANCIES FOUND ON DRAWINGS.

13. SECTIONS AND DETAILS ARE REFERENCED IN TYPICAL LOCATIONS BUT ALSO APPLY TO ALL OTHER SIMILAR CONDITIONS.

14. CONTRACTOR TO VERIFY ALL EXISTING DIMENSIONS, ELEVATIONS, AND CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.

15. SUBMIT SHOP DRAWINGS AS REQUIRED HEREIN. ALLOW FOR TWO WEEKS REVIEW TIME AFTER RECEIPT OF SUBMISSIONS BY THIS FIRM. ALL SUBMITTALS SHALL BE CHECKED AND SIGNED BY THE GENERAL CONTRACTOR AND SIGNED/SEALED BY THE DELEGATED ENGINEER, WHERE SPECIFIED HEREIN.

16. CONTRACTOR SHALL NOT BE RELIEVED FROM RESPONSIBILITY FOR ERRORS OR OMISSIONS IN SHOP DRAWINGS OR MIX DESIGNS BY THE ENGINEER'S REVIEW THEREOF.

17. ANY CHANGES TO THE STRUCTURE SHALL HAVE BEEN REVIEWED AND APPROVED IN WRITING BY THE ENGINEER PRIOR TO COMMENCING WORK ON ITEMS AFFECTED.

18. CONTRACTOR SHALL NOTIFY THIS OFFICE WHEN THE STRUCTURAL SYSTEM IS SUBSTANTIALLY COMPLETED.

HAND RAILS

1. AN ENGINEER REGISTERED IN THE STATE OF MISSISSIPPI SHALL DESIGN RAILING SYSTEM AND CONNECTION OF IT TO THIS STRUCTURE.

2. SUBMIT SHOP DRAWINGS BEARING THE EMBOSSED SEAL AND THE SIGNATURE OF THE ENGINEER FOR REVIEW PRIOR TO FABRICATION.

3. THE CONFIGURATION OF THE RAILING SYSTEM SHALL BE AS SHOWN ON THE ARCHITECTURAL DRAWINGS.

4. RAILING SYSTEM AND CONNECTIONS SHALL BE DESIGNED FOR APPLICABLE LOADS AS INDICATED ON THE PLANS AND IN THE BUILDING CODE. THE LOADS SHALL BE CLEARLY INDICATED ON SHOP DRAWINGS.

5. SHOP DRAWINGS SHALL SHOW AND SPECIFY CONNECTIONS UTILIZED WITHIN THE RAILING SYSTEM AS WELL AS CONNECTIONS TO AND LOADS IMPOSED UPON THE STRUCTURAL SYSTEM SHOWN ON THESE PLANS.

DELEGATED ENGINEER

1. WHERE NOTED HEREIN, A LICENSED PROFESSIONAL (DELEGATED) ENGINEER SHALL BE RETAINED TO DESIGN THE PRODUCT OR ASSEMBLY.

2. THE DELEGATED ENGINEER SHALL BE EXPERIENCED IN THE DESIGN OF THE REFERENCED PRODUCT OR ASSEMBLY.

3. THE DELEGATED ENGINEER MUST BE PROVIDED WITH A COPY OF THESE DRAWINGS AND SPECIFICATIONS.

4. IT IS THE DELEGATED ENGINEER'S RESPONSIBILITY TO REVIEW THE ENGINEER OF RECORD'S WRITTEN ENGINEERING REQUIREMENTS AND AUTHORIZATION FOR

THE DELEGATED ENGINEERING DOCUMENT TO DETERMINE THE APPROPRIATE SCOPE OF ENGINEERING.

- THE DELEGATED ENGINEERING DOCUMENT SHALL COMPLY WITH THE WRITTEN ENGINEERING REQUIREMENTS RECEIVED FROM THE ENGINEER OF RECORD. THEY SHALL INCLUDE THE PROJECT IDENTIFICATION AND THE CRITERIA USED AS A BASIS FOR ITS PREPARATION. A DELEGATED ENGINEER DETERMINES THESE ARE DETAIL FEATURES OR UNPREDICTED PROJECT LIMITS WHICH CONFLICT WITH THE WRITTEN ENGINEERING REQUIREMENTS PROVIDED BY THE ENGINEER OF RECORD, THE DELEGATED ENGINEER SHALL TIMELY CONTACT THE ENGINEER OF RECORD FOR RESOLUTION OF CONFLICTS.
- THE DELEGATED ENGINEER SHALL FORWARD THE DELEGATED ENGINEERING DOCUMENT TO THE ENGINEER OF RECORD FOR REVIEW. ALL FINAL DELEGATED ENGINEERING DOCUMENTS REQUIRE THE IMPRESSED SEAL AND SIGNATURE OF THE DELEGATED ENGINEER AND INCLUDE:

 - A) DRAWINGS INTRODUCING ENGINEERING INPUT SUCH AS DEFINING THE CONFIGURATION OR STRUCTURAL CAPACITY OF STRUCTURAL COMPONENTS AND/OR THEIR ASSEMBLY INTO STRUCTURAL SYSTEMS.
 - B) CALCULATIONS.

EXISTING BUILDINGS

INFORMATION ON THE EXISTING BUILDING, SHOWN ON THESE PLANS, IS OBTAINED FROM EXISTING BUILDING PLANS BY SFCS ARCHITECTS, DATED JUNE 5TH, 2009. EXISTING INFORMATION DOES NOT NECESSARILY REFLECT AS-BUILT CONDITIONS. THE CONTRACTOR SHALL VERIFY ALL INFORMATION SHOWN ON THESE PLANS AND NOTIFY THE ENGINEER OF ANY VARIATION.

GEOTECHNICAL INVESTIGATION

- A SUBSURFACE INVESTIGATION SHALL BE COMPLETED AT THE SITE BY A LICENSED GEOTECHNICAL ENGINEER PRIOR TO BEGINNING EARTHWORK OPERATIONS.
- THE GEOTECHNICAL ENGINEER SHALL DETERMINE THE METHOD OF TESTING (BORINGS, PROBES, HAND AUGERS, ETC.)
- A SIGNED/SEALED SOILS REPORT SHALL BE SUBMITTED TO THE A/E, WHICH SHALL INCLUDE SITE PREPARATION PROCEDURE, FOUNDATION DESIGN RECOMMENDATIONS, AND CONSTRUCTION TESTING REQUIREMENTS.
- SINCE FOUNDATION DESIGN INFORMATION WAS NOT AVAILABLE AT THE TIME THESE FOUNDATIONS WERE PREPARED, THE FOLLOWING ASSUMPTIONS WERE MADE:
 - A) MAXIMUM BEARING PRESSURE = 2000 PSF
 - B) MAXIMUM SETTLEMENT = 3/4"
 - C) MAXIMUM DIFFERENTIAL SETTLEMENT = 1/2"
- THE FOUNDATION DESIGN IS SUBJECT TO CHANGE PENDING THE RESULTS OF THE GEOTECHNICAL INVESTIGATION AND PENNONI'S REVIEW OF THE SOILS REPORT.

CAST IN PLACE CONCRETE

- ALL CAST-IN-PLACE CONCRETE WORK INCLUDES REINFORCING STEEL AND RELATED WORK, INCLUDING FORMWORK, SETTING ANCHOR BOLTS, PLATES, FRAMES, DOWELS FOR MASONRY OR OTHER ITEMS EMBEDDED IN CONCRETE.
- APPLICABLE STANDARDS

ACI NUMBER	TITLE
117	STANDARD SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION
226	GROUND GRANULATED BLAST-FURNACE SLAG
301	STANDARD SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS
302	GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION
304	GUIDE FOR MEASURING, MIXING, TRANSPORTING AND PLACING CONCRETE
304.2R	PLACING CONCRETE BY PUMPING METHODS.
305R	HOT WEATHER CONCRETING
306R	COLD WEATHER CONCRETING
308	STANDARD PRACTICE FOR CURING CONCRETE
309R	GUIDE FOR CONSOLIDATION OF CONCRETE
315	MANUAL OF STANDARD PRACTICE FOR DETAILING CONCRETE STRUCTURES
318	BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
347	RECOMMENDED PRACTICE FOR CONCRETE FORMWORK CRSI NUMBER/TITLE
63	RECOMMENDED PRACTICE FOR PLACING REINFORCING BARS
- THE GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE CONSTRUCTION OF FORMWORK, SHORING AND RE-SHORING IN ACCORDANCE WITH ACI 347.
 - A) FORM AND SHORING DESIGN BY A P.E. REGISTERED IN THE STATE OF MISSISSIPPI.
- SUBMIT FORM WORK AND SHORING DRAWINGS TO LOCAL BUILDING DEPARTMENT WHEN REQUIRED BY FLORIDA THRESHOLD LAW.
- CONSTRUCTION JOINTS NOT SHOWN ON THE DRAWINGS MUST BE MADE AND LOCATED TO LEAST IMPAIR THE STRENGTH OF THE STRUCTURE.
 - A) NO HORIZONTAL CONSTRUCTION JOINTS WILL BE PERMITTED IN BEAMS, GIRDERS AND SLABS.
 - B) LOCATION OF ANY CONSTRUCTION JOINT NOT SHOWN IS SUBJECT TO REVIEW AND ACCEPTANCE BY ENGINEER.
- INTERNAL VIBRATION, PROPERLY APPLIED IS THE REQUIRED METHOD OF CONSOLIDATING PLASTIC CONCRETE.
- PROVIDE 3/4" CHAMFER ON ALL EXPOSED CORNERS OF COLUMNS, BEAMS AND WALLS UNLESS OTHERWISE NOTED ON ARCHITECTURAL DRAWINGS.
- CONTRACTOR SHALL VERIFY LOCATIONS OF ALL OPENINGS, SLEEVES, AND SLAB RECESSES AS REQUIRED BY OTHER TRADES BEFORE CONCRETE IS PLACED. NO SLEEVES, OPENINGS, OR INSERT MAY BE PLACED IN BEAMS, JOISTS, OR COLUMN UNLESS APPROVED BY THE ENGINEER.
- CONTRACTOR SHALL VERIFY EMBEDDED ITEMS INCLUDING, BUT NOT LIMITED TO, ANCHOR BOLTS, BOLT CLUSTERS, WELD PLATES, ETC., BEFORE PLACING CONCRETE. NOTIFY ENGINEER OF ANY CONFLICTS WITH REBAR.
- ALL EXPOSED CONCRETE SURFACES TO BE IN ACCORDANCE WITH ACI 301 SECTION 5.3.3.(C), INCLUDING SURFACE TOLERANCE CLASS A AS SPECIFIED IN ACI 117.U.N.O.
- SEE ARCHITECTURAL DRAWINGS FOR REQUIRED CONCRETE FINISHES.
- SLOPE WALKWAYS TO DRAIN AWAY FROM THE STRUCTURE.
- TESTING
 - A) A QUALIFIED TESTING LAB SHALL BE RETAINED TO PERFORM QUALITY CONTROL WORK AND ON-SITE TESTING.
 - B) SLUMP TEST - ASTM 143
 - C) MOLD AND CURE TEST CYLINDERS (ASTM C-31) AND TEST CYLINDERS FOR STRENGTH (ASTM C39). TAKE ONE TEST - THREE CYLINDERS FOR EACH DAYS POUR OF 100 CUBIC YARDS, OR FRACTION THEREOF. TEST ONE CYLINDER AT 7 DAYS, TWO AT 28 DAYS. TEST CYLINDER SAMPLES SHALL BE TAKEN AT THE POINT OF DISCHARGE WHEN USING A PUMP.
 - D) ONE COPY OF ALL TEST REPORTS SHALL BE SENT DIRECTLY TO THE OWNER, ENGINEER, ARCHITECT AND GENERAL CONTRACTOR.

- PROVIDE THE FOLLOWING MINIMUM CONCRETE STRENGTHS AT 28 DAYS:
 - A) FOOTINGS, SLAB-ON-GRADE-----3000 PSI
 - B) FORMED COLUMNS, WALLS, BEAMS & SLABS-----4000 PSI
- CONCRETE MUST BE BATCHED, MIXED AND TRANSPORTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR READY-MIXED CONCRETE ASTM C94.
- REQUIRED SLUMP = 4 PLUS OR MINUS ONE INCH.
- CONCRETE MUST BE PLACED WITHIN 90 MINUTES OF BATCH TIME. WHEN AIR TEMPERATURE IS BETWEEN 85 AND 90 DEGREES F, REDUCE MIXING AND DELIVERY TIME TO 75 MINUTES. WHEN AIR TEMPERATURE IS HIGHER THAN 90 DEGREES F, REDUCE MIXING AND DELIVERY TIME TO 60 MINUTES.
- FOLLOWING THE PLACING OF THE CONCRETE BY THE USE OF A WATER SPRAY, WATER SATURATED FABRIC, MOISTURE RETAINING MEMBRANE OR LIQUID CURING COMPOUND.
- CURE SLABS-ON-GRADE FOR THE FIRST 72 HOURS BY THE USE OF:
 - A) FOG SPRAYING
 - B) PONDING
 - C) SPRINKLING
 - D) CONTINUOUSLY WET ABSORPTIVE MATS OR FABRIC
 - E) CONTINUE CURING BY USE OF MOISTURE RETAINING COVER UNTIL CONCRETE HAS OBTAINED ITS SPECIFIED 28 DAY COMPRESSIVE STRENGTH.
 - F) OR LIQUID CURING COMPOUND AFTER FINISHING PROCESS IS COMPLETED.
 - G) CONCRETE WET CURE TIME TO BE 7 DAYS MINIMUM AT 50 DEGREES MINIMUM TEMPERATURE.
- FASTENERS AND MATERIALS USED FOR WELDING OR OTHERWISE SECURING COMPONENTS TO ONE ANOTHER SHALL BE OF DOMESTIC (USA MADE) MANUFACTURE. SIMILARLY, ALL MATERIALS USED IN THE MANUFACTURING PROCESS SHALL BE FROM A DOMESTIC SOURCE.
- SHOP AND FIELD WELDS SHALL BE DONE BY AWS CERTIFIED WELDERS. PROVIDE CURRENT CERTIFICATES UPON REQUEST.
- NO SPLICES SHALL BE PERMITTED IN ANY STRUCTURAL STEEL MEMBER UNLESS SHOWN ON APPROVED SHOP DRAWINGS.
- STEEL STAIRS AND/OR LADDERS SHALL BE DESIGNED FOR 100 PSF LIVE LOAD BY A LICENSED DELEGATED ENGINEER, WHO SHALL SUBMIT SIGNED AND SEALED SHOP DRAWINGS. SHOP DRAWINGS SHALL SPECIFY ALL DESIGN LOADS.
- SUBMITTALS: CONTRACTOR SHALL SUBMIT DETAILED SHOP DRAWINGS SHOWING ALL STRUCTURAL STEEL LAYOUTS AND DETAILS, SIZES OF MEMBERS, TYPE OF STEEL, CONNECTION DETAILS, WELDS, BOLTS, ETC., AS REQUIRED TO FABRICATE AND ERECT ALL STRUCTURAL STEEL FRAMING. ALL CONNECTIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE DESIGNED BY THE DETAILER AND SUBMITTED ON SHOP DRAWINGS, SIGNED AND SEALED BY A REGISTERED FLORIDA DELEGATED ENGINEER.
- NON-SHRINK GROUT SHALL BE NONMETALLIC, SHRINKAGE-RESISTANT, PREMIXED, NON-CORROSIVE, NON-STAINING PRODUCT CONTAINING SELECTED SILICA SANDS, PORTLAND CEMENT, SHRINKAGE COMPENSATING AGENTS, PLASTICIZING AND WATER-REDUCING AGENTS, COMPLYING WITH CRD-C621, CORPS OF ENGINEERS.
- IF NOT SPECIFIED ON THE DRAWINGS, THE THROAT SIZE OF ANY FILLET WELD SHALL BE EQUAL TO 1/16" LESS THAN THE THINNEST CONNECTION COMPONENT.
- NO FIELD WELDING OF GALVANIZED MEMBERS IS PERMITTED.
- ERCTION
 - A) BEFORE ERECTION, THE CONTRACTOR IS TO REMOVE ALL MUD, DIRT OR OTHER FOREIGN MATTER, WHICH ACCUMULATES DURING HANDLING AND STORAGE.
 - B) DRIFTING TO ENLARGE UNFAIR HOLES WILL NOT BE PERMITTED. DRILL SUCH HOLES TO ACCOMMODATE THE NEXT LARGER SIZE FASTENER, WHERE POSSIBLE.
 - C) AFTER ERECTION, CLEAN FIELD WELDS, BOLTED CONNECTIONS, AND ABRASIVE AREAS WHERE SHOP COAT HAS BEEN DAMAGED. SPOT AND PRIME AREAS USING SAME MATERIAL AS SHOP COAT.
 - D) SET ALL MEMBERS SO THAT, IN THEIR FINAL LOCATION, LEVEL, PLUMBNESS AND ALIGNMENT ARE WITHIN THE TOLERANCES PRESCRIBED BY AISC CODE.
- DRILL-IN BOLTS, SCREWS AND DOWELS
 - A) ADHESIVE DOWELING RODS/BOLTS SHALL BE CARBON STEEL THREADED ROD CONFORMING TO ISO 898-5.8 WITH A MINIMUM TENSILE STRENGTH OF 72.5 KSI (500MPA) AND A MINIMUM YIELD OF 58 KSI (400MPA). THREAD RODS WITH NUTS AND WASHERS INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
 - B) DRILLING CONNECTIONS THROUGH COLUMN WEBBS OR AT BEAMS THAT FRAME OVER THE TOPS OF COLUMNS MUST BE DESIGNED TO HAVE AT LEAST ONE INSTALLED BOLT REMAIN IN PLACE TO SUPPORT THE FIRST BEAM WHILE THE SECOND BEAM IS BEING ERECTED. ALTERNATIVELY, THE FABRICATOR MUST SUPPLY A SEAT OR EQUIVALENT DEVICE WITH A MEANS OF POSITIVE ATTACHMENT TO SUPPORT THE FIRST BEAM WHILE THE SECOND BEAM IS BEING ERECTED.
 - C) EXPANSION BOLTS SHALL BE HIHLI KB TZ (ESR 1917) OR EQUAL. BOLT SHALL MEET DUCTILITY REQUIREMENTS OF ACI 318 SECTION D1.
 - D) MASONRY SCREWS SHALL BE 1/4" DIAMETER WITH 1-5/8" MINIMUM EMBEDMENT INSTALLED IN DRILLED HOLES USING AN APPROPRIATE BIT DIAMETER.
 - E) DOUBLE CONNECTIONS THROUGH COLUMN WEBBS OR AT BEAMS THAT FRAME OVER THE TOPS OF COLUMNS MUST BE DESIGNED TO HAVE AT LEAST ONE INSTALLED BOLT REMAIN IN PLACE TO SUPPORT THE FIRST BEAM WHILE THE SECOND BEAM IS BEING ERECTED. ALTERNATIVELY, THE FABRICATOR MUST SUPPLY A SEAT OR EQUIVALENT DEVICE WITH A MEANS OF POSITIVE ATTACHMENT TO SUPPORT THE FIRST BEAM WHILE THE SECOND BEAM IS BEING ERECTED.
 - F) SCREWS SHALL HAVE A BODY MADE OF CARBON STEEL AND SHALL BE HEAT TREATED AND SHALL HAVE 80M ZINC COATING IN ACCORDANCE WITH EN ISO 4042. PROVIDE HILTI EZ (ESR 3027) SCREWS BY HILTI OR EQUAL.
 - G) HEAVY-DUTY CONCRETE AND MASONRY SCREWS SHALL BE TESTED AND APPROVED TO MEET THE MINIMUM REQUIREMENTS OF ACI 355.2. HILTI KWICK HUS EZ (ESR-3027) FOR CONCRETE, ESR-3056 FOR GROUT FILLED MASONRY. HEAVY DUTY SCREWS BY HILTI OR EQUAL.
 - H) THE CONTRACTOR SHALL ARRANGE FOR AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ON SITE INSTALLATION TRAINING FOR ALL OF THE ANCHORING PRODUCTS SPECIFIED. PENNONI TO RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S PERSONNEL WHO ARE TO INSTALL ANCHORS ARE TRAINED PRIOR TO THE COMMENCEMENT OF INSTALLATION.
- STRUCTURAL STEEL
 - A) STRUCTURAL STEEL SHALL CONFORM TO THE AISI "SPECIFICATION FOR BUILDINGS", LATEST EDITION.
 - B) WELDED CONNECTIONS SHALL CONFORM TO THE LATEST REVISED CODE OF THE AMERICAN WELDING SOCIETY, AWS D1.1. ALL WELDING SHALL BE PERFORMED USING E70XX, LOW HYDROGEN ELECTRODES. ELECTRODES ARE TO BE PROTECTED FROM MOISTURE.
 - C) STEEL BEAMS SHALL BE FABRICATED WITH THE NATURAL CAMBER (WITHIN THE MILL TOLERANCE) LOCATED ABOVE THE HORIZONTAL CENTERLINE BETWEEN THE END CONNECTIONS.
 - D) VERIFY THE EXACT SIZE AND LOCATION OF ALL OPENINGS FOR MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR PRIOR TO FABRICATION OF MATERIALS.
 - E) SHOP PRIME STEEL SURFACES EXCEPT THE FOLLOWING:
 - A) SURFACES EMBEDDED IN CONCRETE OR MORTAR. EXTEND PRIMING OF PARTIALLY EMBEDDED MEMBERS TO A DEPTH OF 2 INCHES.
 - B) SURFACES TO BE FIELD WELDED.
 - C) SURFACES TO BE HIGH-STRENGTH BOLTED WITH SLIP-CRITICAL CONNECTIONS.
 - D) SURFACES TO RECEIVE SPRAYED FIRE-RESISTIVE MATERIALS.
 - E) GALVANIZED SURFACES.
 - F) SURFACE PREPARATION: CLEAN SURFACES TO BE PAINTED. REMOVE LOOSE RUST AND MILLSCALE AND SPATTER, SLUG, OR FLUX DEPOSITS. PREPARE SURFACES ACCORDING TO THE FOLLOWING SPECIFICATIONS AND STANDARDS.
 - G) PRIMING: IMMEDIATELY AFTER SURFACE PREPARATION, APPLY PRIMER ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND AT RATE RECOMMENDED BY SSPC TO PROVIDE A DRY FILM THICKNESS OF NOT LESS THAN 1.5 MILS. USE PRIMING METHODS THAT RESULT IN FULL COVERAGE OF JOINTS, CORNERS, EDGES, AND EXPOSED SURFACES.
 - A) STRIPE PAINT CORNERS, CREVICES, BOLTS, WELDS, AND SHARP EDGES.
 - B) APPLY TWO COATS OF SHOP PAINT TO INACCESSIBLE SURFACES AFTER ASSEMBLY OR ERECTION. CHANGE COLOR OF SECOND COAT TO DISTINGUISH IT FROM FIRST.
 - H) PRIME AND PAINT ALL FIELD WELDS AFTER INSPECTION.
 - I) A QUALIFIED TESTING LABORATORY SHALL BE RETAINED TO PERFORM THE FOLLOWING TESTS.
 - A) VISUALLY INSPECT ALL STEEL MEMBERS AND CONNECTIONS.
 - J) ONE COPY OF ALL TEST REPORTS SHALL BE SENT DIRECTLY TO OWNER, ARCHITECT, STRUCTURAL ENGINEER, AND GENERAL CONTRACTOR.
 - K) STEEL SHALL CONFORM TO:
 - WIDE FLANGE (WF/WI)-----ASTM A992 (50 KSI)
 - SHAPES (S, L, C, MC)-----ASTM A36
 - HOLLOW STRUCTURAL SECTIONS (HSS)-----ASTM A500 GRADE C (RECTANGULAR 50 KSI; ROUND 46 KSI)
 - FRAMING BOLTS-----ASTM A325N OR A490N

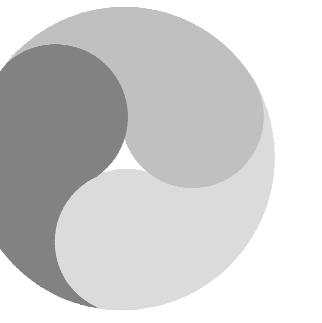
SHEAR STUDS-----ASTM A108
WELDING ELECTRODES-----E70XX

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Jeffrey J. Salemi, P.E.
Florida P.E. #44131
PENNONI Project No. AEWLA2209



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THIS SQUARE APPEARS 1/2" X 1/2" ON FULL SIZE SHEETS
SUBMISSION:
CONSTRUCTION BID DOCUMENTS

NO DATE REVISION

PROFESSIONAL:

Jeffrey J. Salemi
No. 44131
State of Florida
Professional Engineer
This item has been digitally signed and sealed by Jeffrey J. Salemi on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

PROJECT NAME:
**AFRH GULFPORT
GENERATOR
REPLACEMENT**

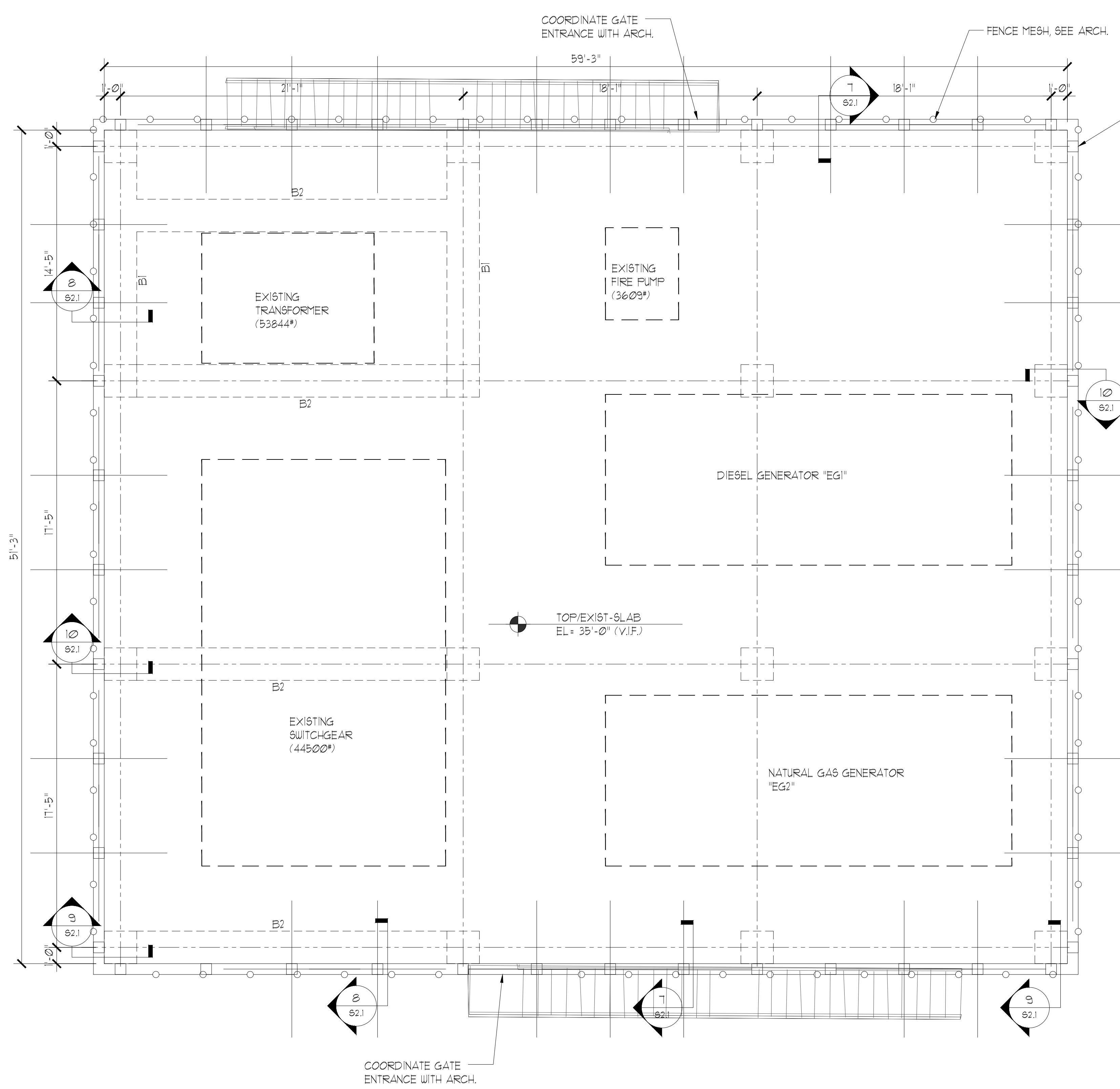
1800 Beach Dr, Gulfport, MS 39507

DRAWING TITLE:
**TANK FOUNDATION
PLAN & GENERATOR
PLATFORM FRAMING
PLAN**

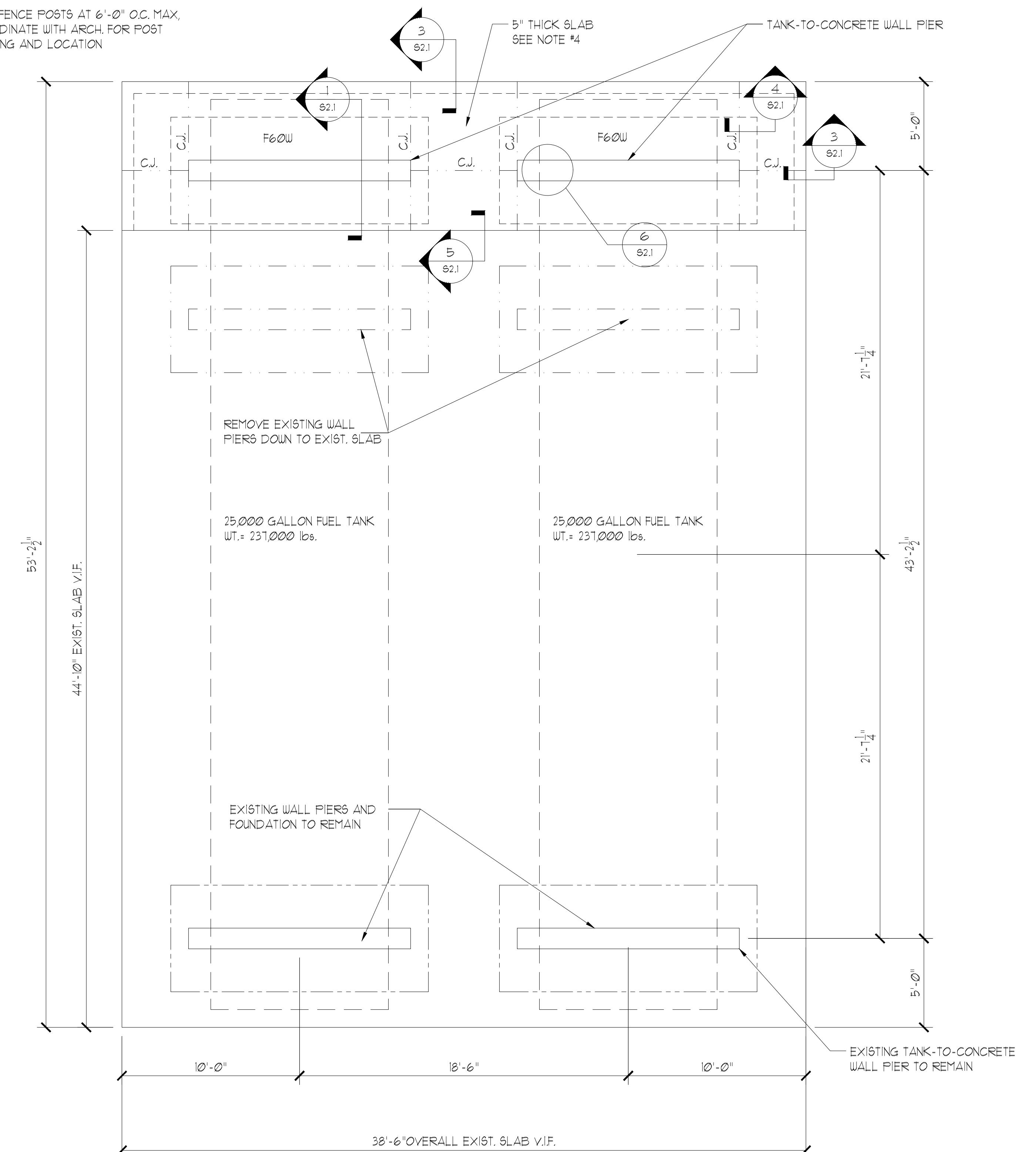
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PROJ. NO.: AFRH-016
DATE: 08.30.24
DRAWING NO.:

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**GENERATOR PLATFORM
FRAMING PLAN**



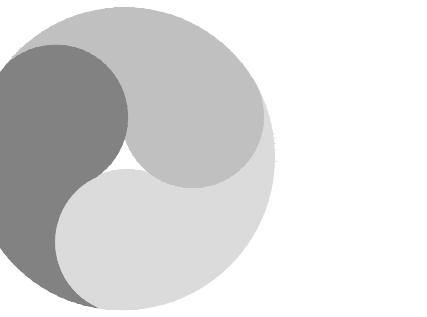
**FUEL STORAGE TANK
FOUNDATION PLAN**

FOOTING SCHEDULE						
MARK	SIZE	DEPTH	REINF. EA. WAY	REMARKS	DWL/A.B. EMBEDMENT	
F60W	6'-0"	1'-8"	(1) #6 CONT. T#B (1) #12 TRANSV. T#B	WALL FTG.	1'-5"	

FOUNDATION PLAN NOTES:
 1. TOP FOOTING EL. = 17'-0"
 TOP OF EXIST. SLAB-ON-GRADE EL. = 19'-0".
 2. CENTER ALL FOOTINGS ON CENTERLINE OF WALL PIERS, UNO.
 3. COORDINATE ALL EXISTING AND UNDERGROUND UTILITIES WITH CIVIL AND MEP DRAWINGS.
 4. SLAB-ON-GRADE TO BE 5" THICK CONCRETE WITH #6x6 W2.1xW2.1 WELDED WIRE FABRIC ON GRANULAR BASE.
 5. SEE 6201 FOR SLAB-ON-GRADE TYPICAL DETAILS.
 6. SEE ARCH/CIVIL DRAWINGS FOR LOCATION ON SITE.

NOTE:
FIELD VERIFY EXISTING CONDITIONS PRIOR TO FABRICATION AND CONSTRUCTION.

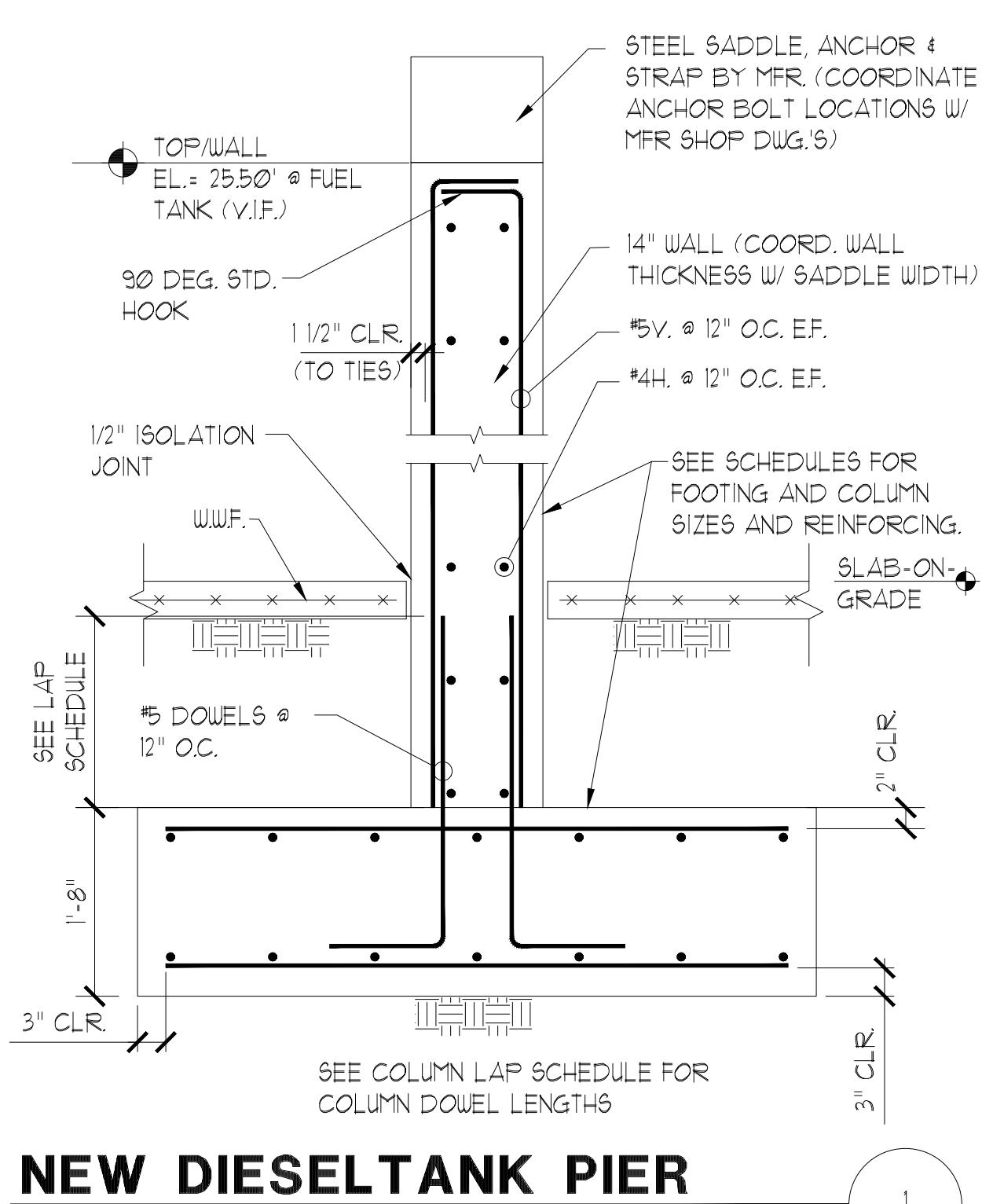
THIS DRAWING IS NOT FOR CONSTRUCTION. IT HAS BEEN ISSUED FOR GOVERNMENTAL REVIEW AND/OR PRELIMINARY PRICING ONLY.



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PH: 412.287.7333
www.aeworks.com

CLIENT:
ARMED FORCES
RETIREMENT HOME
GULFPORT, MS

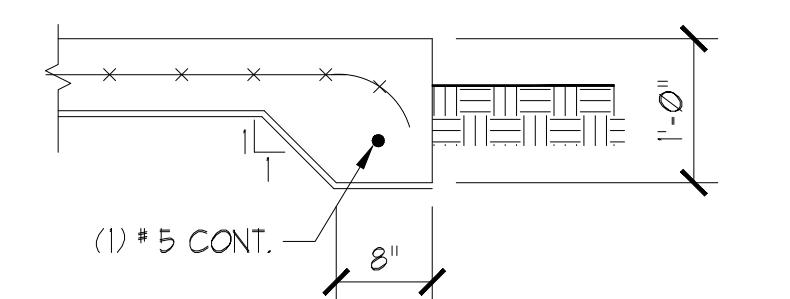
1800 Beach Dr, Gulfport, MS 39507



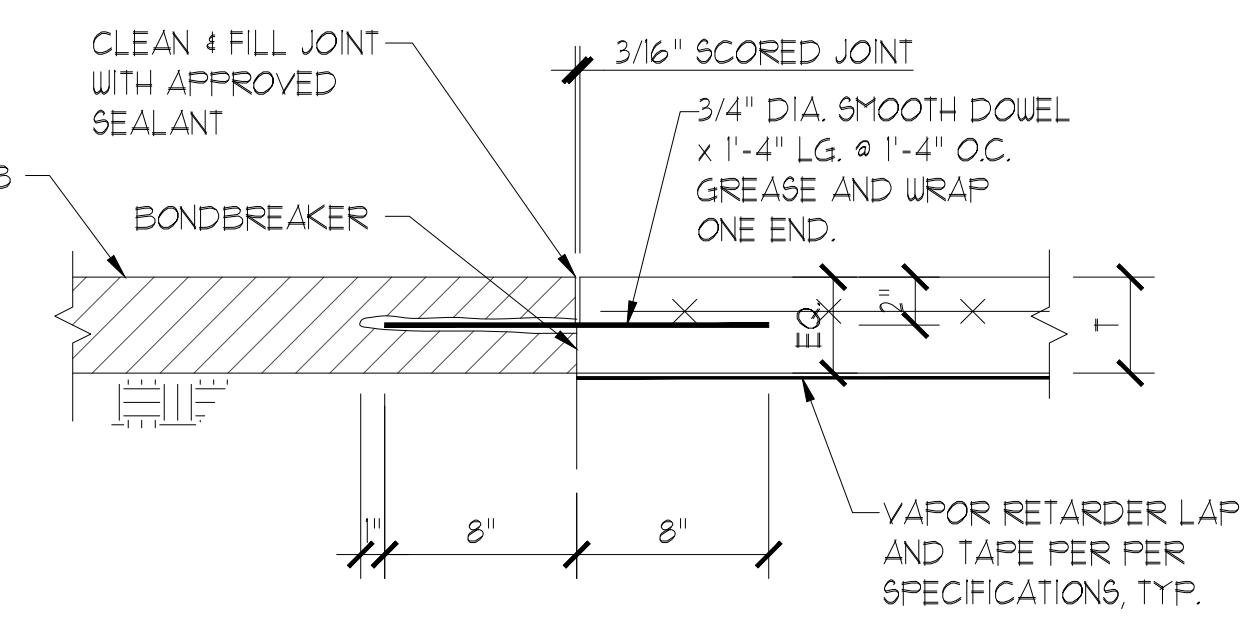
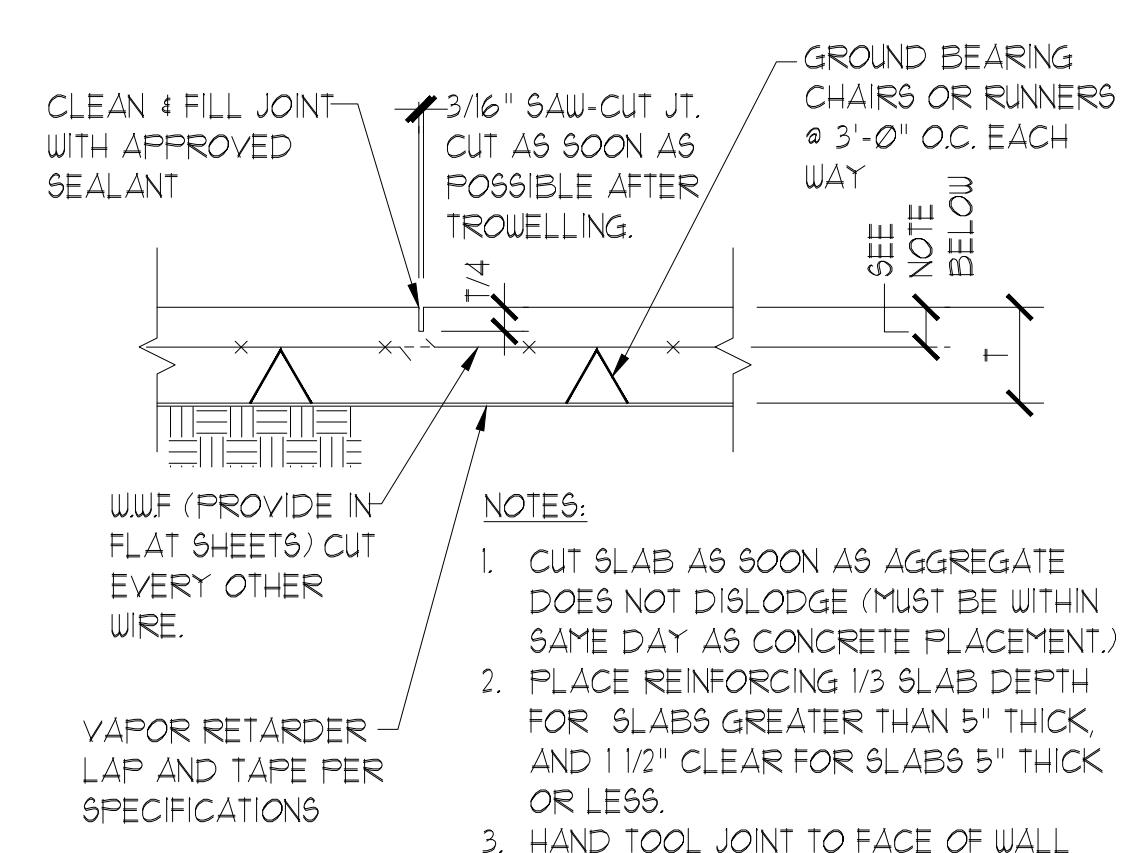
VERTICAL REINFORCEMENT BAR LAP SCHEDULE					
BAR SIZE	COMPRESSION LAP	CLASS "B" TENSION LAP			NOTES:
		3,000 PSI	4,000 PSI	5,000 PSI	
#4	15"	29"	25"	23"	
#5	25"	36"	31"	28"	
#6	30"	43"	37"	33"	
#7	35"	63"	54"	49"	
#8	40"	72"	62"	55"	
#9	44"	81"	70"	63"	
#10	50"	91"	79"	70"	

NOTES:
1. BASED ON NORMAL WEIGHT CONCRETE & GRADE 60 REINFORCING BARS.

VERTICAL REINFORCEMENT BAR LAP SCHEDULE - CONCRETE



THICKENED SLAB EDGE



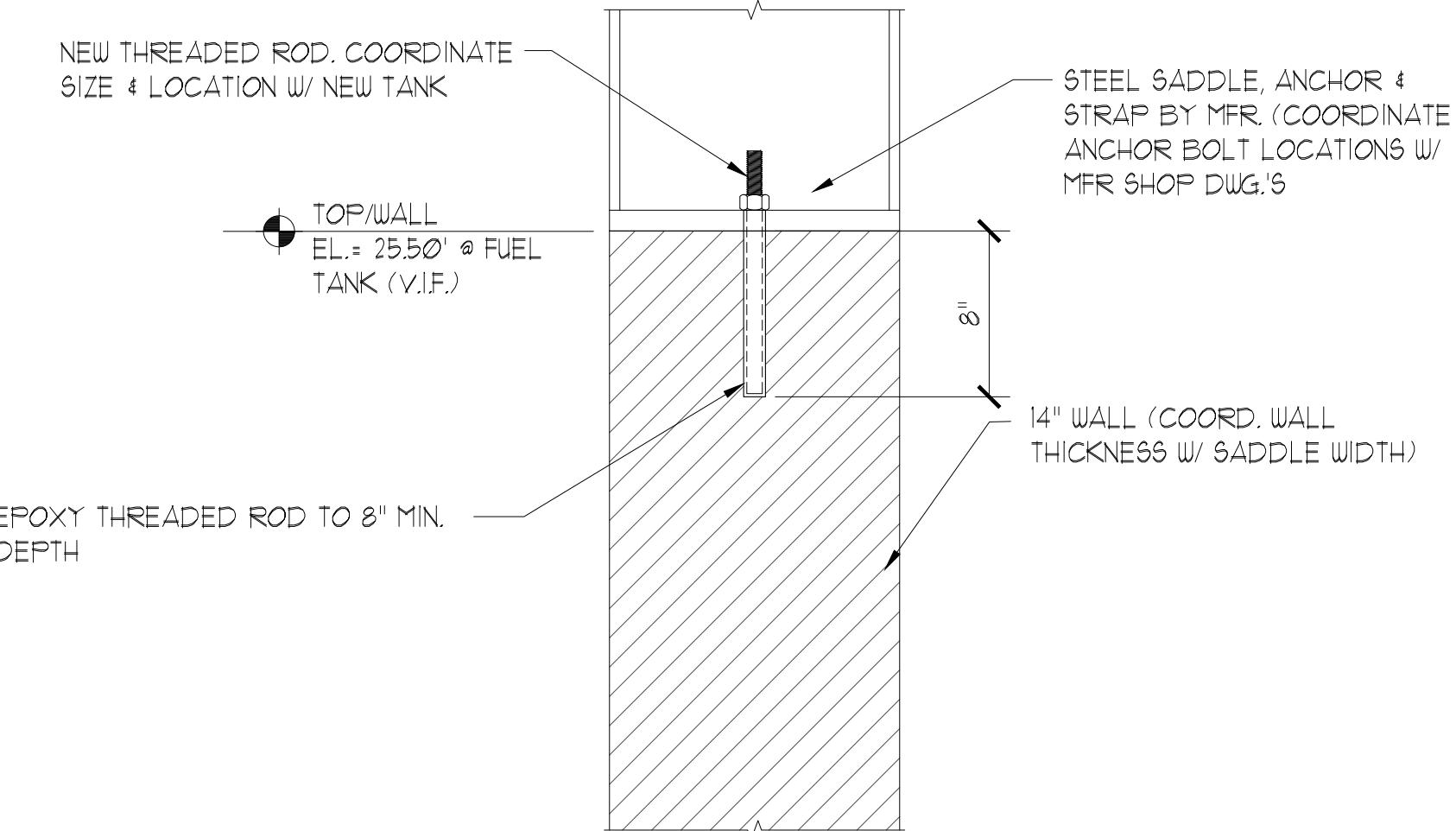
NOTES:
1. TO BE USED AT CONTRACTOR'S OPTION AT ANY CONTROL JOINT LOCATION.
2. POUR SLABS IN ALTERNATING LONG STRIPS. DO NOT POUR IN A CHECKER BOARD PATTERN.

CONTRACTION JOINT W/ WWF

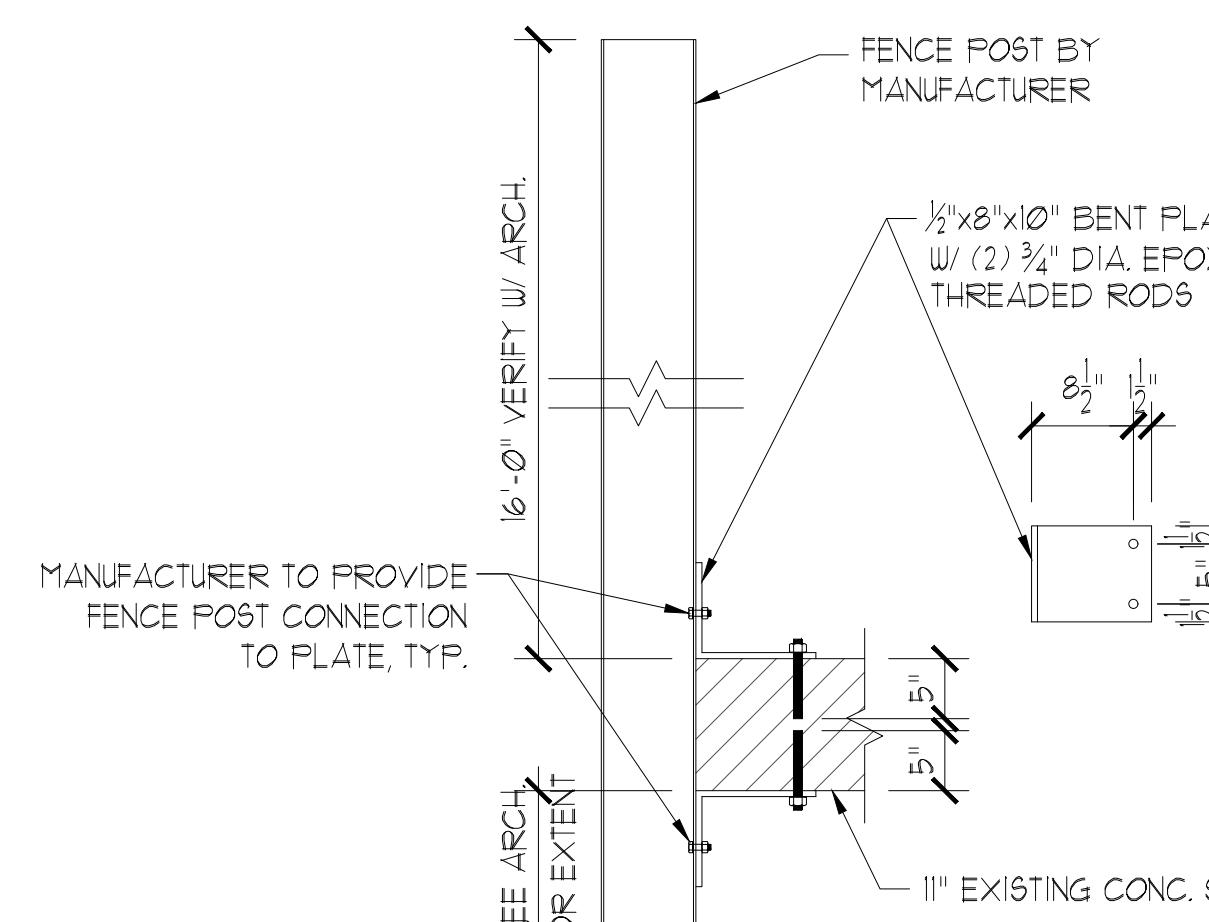
SCALE: 1/2" = 1'-0"

CONSTRUCTION JOINT

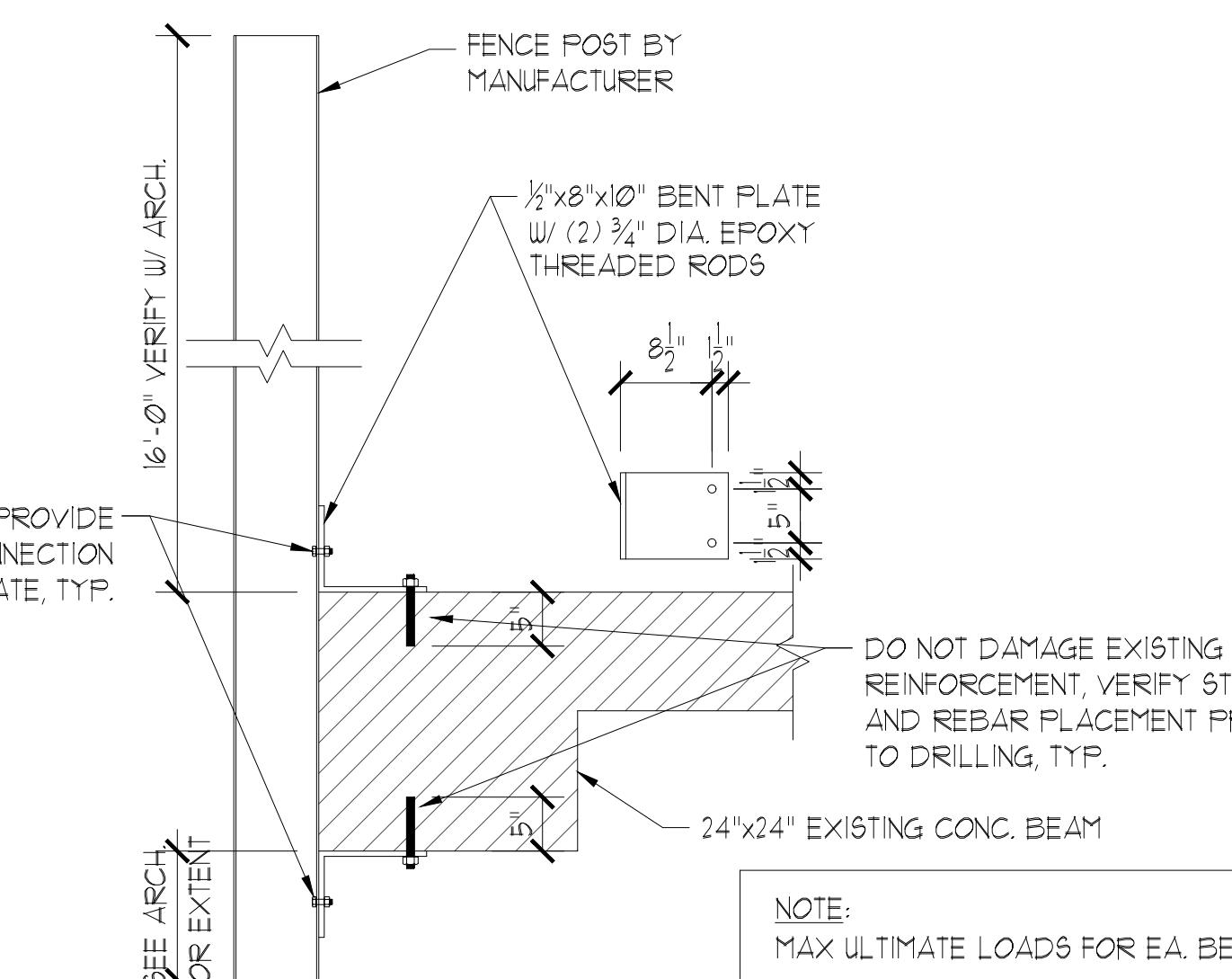
SCALE: 1/2" = 1'-0"



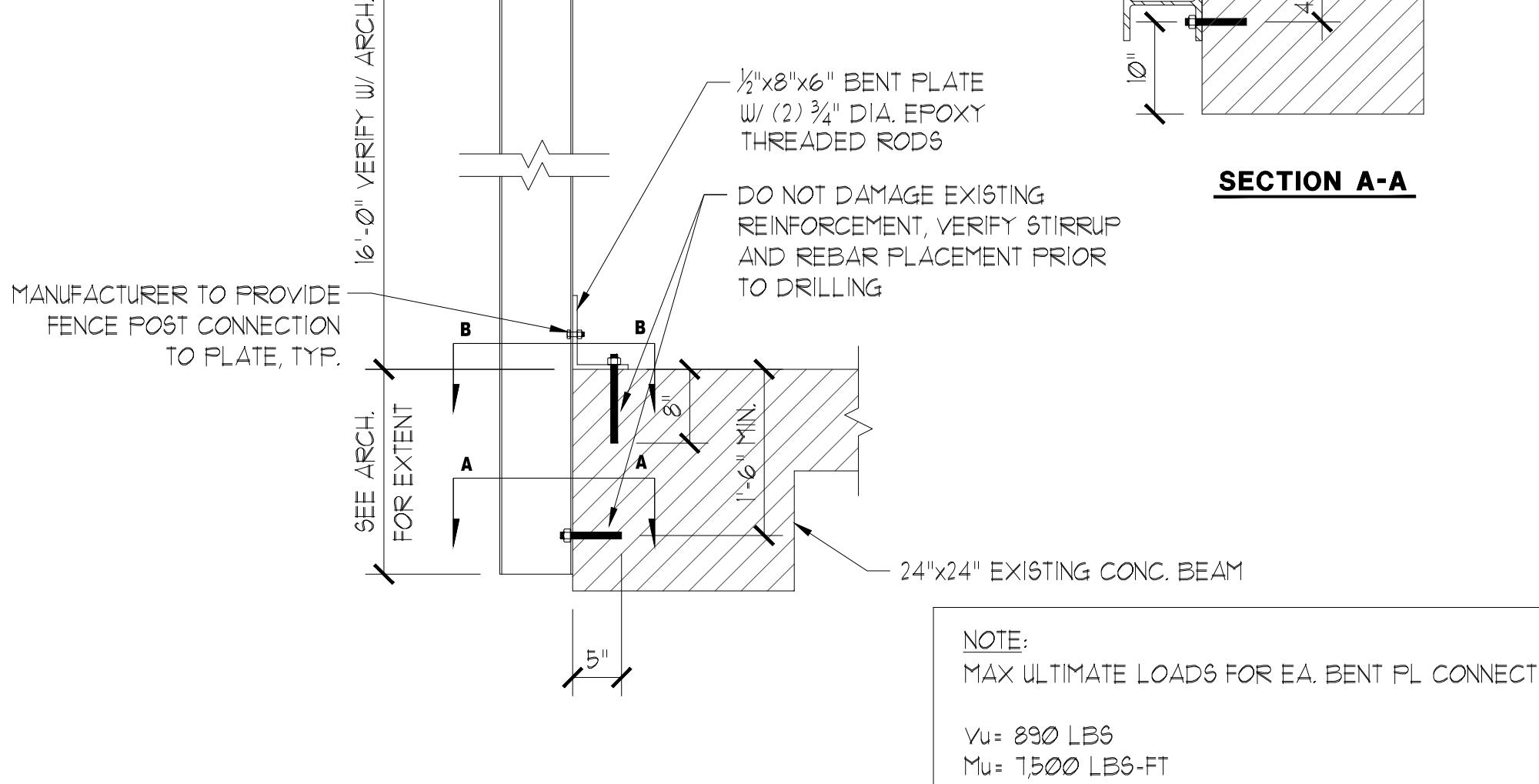
EXISTING DIESEL TANK PIER



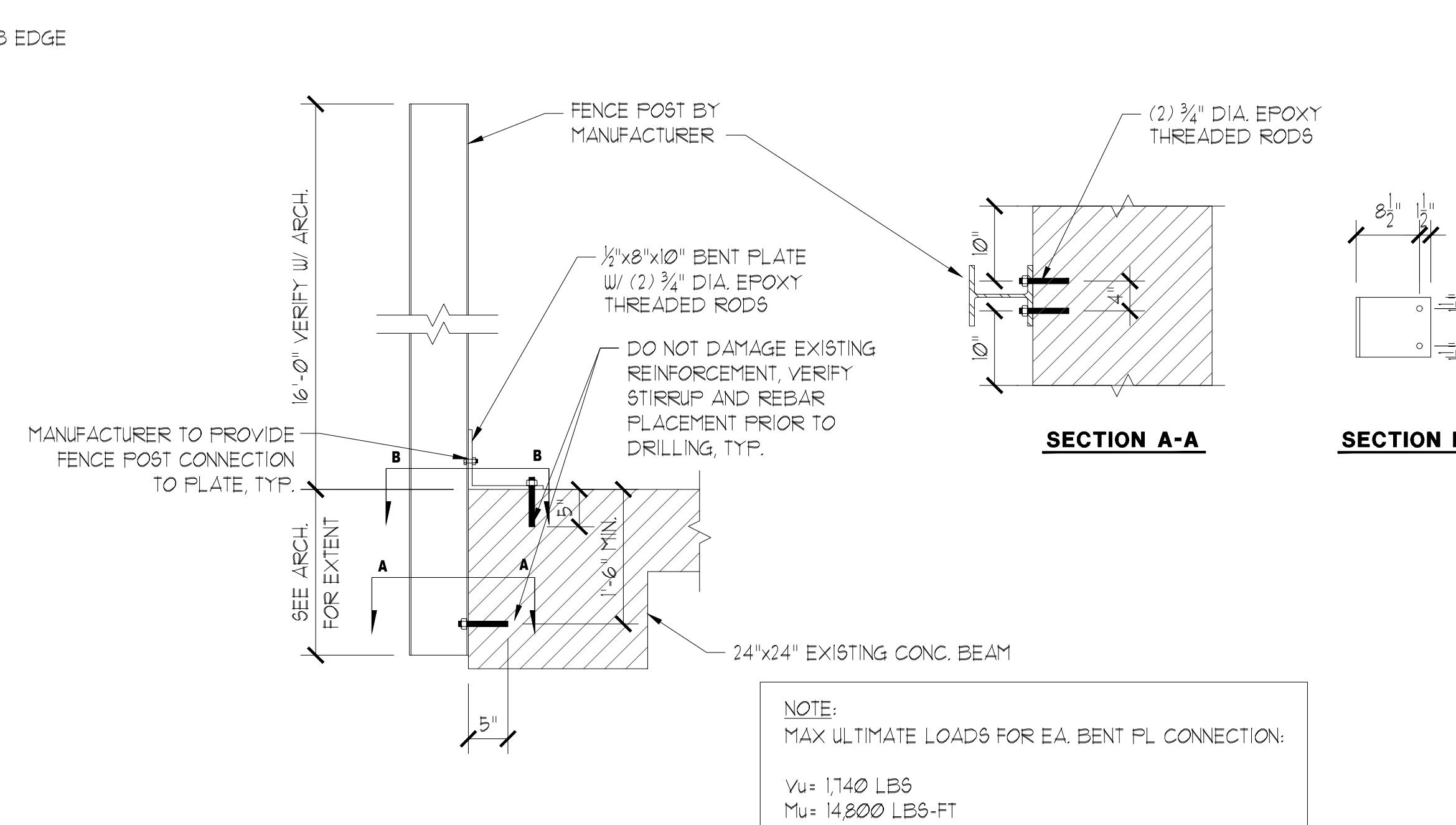
POST AT SLAB EDGE DETAIL



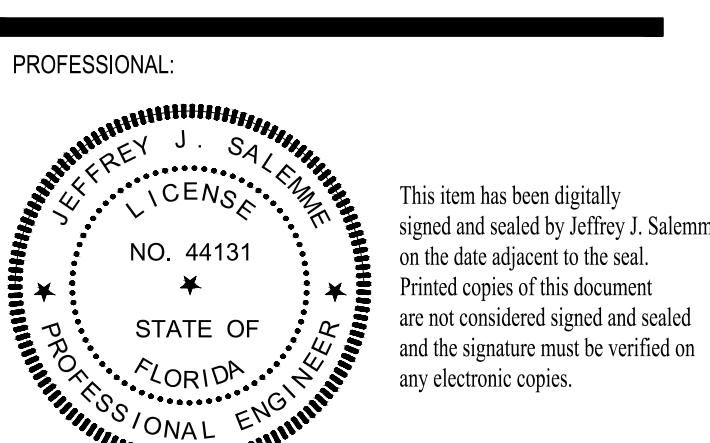
POST AT BEAM DETAIL



FENCE POST AT CORNER CONC. COLUMN



FENCE POST AT EDGE CONC. COLUMN



PROJECT NAME:
AFRH GULFPORT
GENERATOR
REPLACEMENT

1800 Beach Dr, Gulfport, MS 39507

DRAWING TITLE:
DETAILS

DRAWN BY: GAP
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S201

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Exhibit C



**Armed Forces Retirement Home
Gulfport Generators Replacement
BFS ORDER NO.: 20342322F00023h
REQ. #: AFRCRO-FAC-22-0033**

Gulfport, MS

CONSTRUCTION BID DOCUMENTS

August 30, 2024

AEW# AFRH-016

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DIVISION 02 – EXISTING CONDITIONS – to be issued by AFRH with solicitation.

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26 05 00	Common Work Results for Electrical Systems
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SECTION 221123 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Joining materials.
4. Manual gas shutoff valves.
5. Pressure regulators.
6. Dielectric fittings.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Piping specialties.
2. Corrugated, stainless steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.
5. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Shop Drawing Scale: 1/8"/Ft.
2. Detail mounting, supports, and valve arrangements for pressure regulator assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

B. Certificates:

1. Welding certificates.

C. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Steel Support Welding: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. Pipe Welding: Qualify procedures and operators in accordance with the ASME Boiler and Pressure Vessel Code.

1.6 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide purging and startup of natural-gas supply in accordance with requirements indicated:
 1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of natural-gas service.
 2. Do not proceed with interruption of natural-gas service without Construction Manager's and Owner's written permission.

1.7 COORDINATION

- A. Coordinate requirements for piping identification for natural-gas piping.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 54 and the International Fuel Gas Code.
- B. Minimum Operating-Pressure Ratings:
 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
 2. Service Regulators: 5 psig minimum unless otherwise indicated.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Seismic Performance: Natural-gas piping system is to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7. See Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

1. The term "withstand" means "the piping system will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the piping system will be fully operational after the seismic event."
2. Component Importance Factor: 1.5.

2.2 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 2. Wrought-Steel Welding Fittings: ASTM A234/A234M for butt welding and socket welding.
 3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
 4. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
- B. Corrugated, Stainless Steel Tubing: Comply with ANSI/IAS LC 1/CSA 6.26.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. FlashShield Products; Gastite, a division of Titeflex Corp.
 - b. TracPipe CounterStrike; Omega Flex, Inc.
 - c. Tru-Flex Metal Hose Corp.
 - d. Ward Manufacturing LLC.
 2. Tubing: ASTM A240/A240M, corrugated, Series 300 stainless steel.
 3. Coating: PE with flame retardant.
 - a. Surface-Burning Characteristics: As determined by testing identical products in accordance with ASTM E84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 50 or less.
 4. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
 5. Striker Plates: Steel, designed to protect tubing from penetrations.
 6. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections are to comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
 7. Operating-Pressure Rating: 5 psig.
- C. PE Pipe: ASTM D2513, SDR 11.
 1. PE Fittings: ASTM D2683, socket-fusion type or ASTM D3261, butt-fusion type with dimensions matching PE pipe.

2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D2513, SDR 11; and steel pipe complying with ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.
 - a. Underground Portion: PE pipe complying with ASTM D2513, SDR 11 inlet.
 - b. Casing: Steel pipe complying with ASTM A53/A53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering. Vent casing aboveground.
 - c. Aboveground Portion: PE transition fitting.
 - d. Outlet is threaded or flanged or suitable for welded connection.
 - e. Tracer wire connection.
 - f. UV shield.
 - g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
4. Transition Service-Line Risers: Factory fabricated and leak tested.
 - a. Underground Portion: PE pipe complying with ASTM D2513, SDR 11 inlet connected to steel pipe complying with ASTM A53/A53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
 - b. Outlet is threaded or flanged or suitable for welded connection.
 - c. Bridging sleeve over mechanical coupling.
 - d. Factory-connected anode.
 - e. Tracer wire connection.
 - f. UV shield.
 - g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

2.3 PIPING SPECIALTIES

- A. Quick-Disconnect Devices: Comply with ANSI Z21.41.
 1. Copper-alloy convenience outlet and matching plug connector.
 2. Seals: Nitrile.
 3. Hand operated with automatic shutoff when disconnected.
 4. For indoor or outdoor applications.
 5. Adjustable, retractable restraining cable.
- B. Y-Pattern Strainers:
 1. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
 2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
 3. Strainer Screen: 40-mesh startup strainer, and perforated stainless steel basket with 50 percent free area.
 4. CWP Rating: 125 psig.

2.4 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.
- B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

- C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.5 MANUAL GAS SHUTOFF VALVES

- A. See "Underground, Manual Gas Shutoff Valve Schedule" and "Aboveground, Manual Gas Shutoff Valve Schedule" articles for where each valve type is applied in various services.
- B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
1. CWP Rating: 125 psig.
 2. Threaded Ends: Comply with ASME B1.20.1.
 3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 4. Tamperproof Feature: Locking feature for valves indicated in "Underground, Manual Gas Shutoff Valve Schedule" and "Aboveground, Manual Gas Shutoff Valve Schedule" articles.
 5. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
 6. Service Mark: Valves NPS 1-1/4 to NPS 2 having initials "WOG" permanently marked on valve body.
- C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.
1. CWP Rating: 125 psig.
 2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
 3. Tamperproof Feature: Locking feature for valves indicated in "Underground, Manual Gas Shutoff Valve Schedule" and "Aboveground, Manual Gas Shutoff Valve Schedule" articles.
 4. Service Mark: Initials "WOG" permanently marked on valve body.
- D. Bronze Plug Valves: MSS SP-78.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. [A.Y. McDonald Mfg. Co.](#)
 - b. [Lee Brass Company.](#)
 2. Body: Bronze, complying with ASTM B584.
 3. Plug: Bronze.
 4. Ends: Threaded, socket, or flanged as indicated in "Underground, Manual Gas Shutoff Valve Schedule" and "Aboveground, Manual Gas Shutoff Valve Schedule" articles.
 5. Operator: Square head or lug type with tamperproof feature where indicated.
 6. Pressure Class: 125 psig.
 7. Listing: Valves NPS 1 and smaller are to be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- E. PE Ball Valves: Comply with ASME B16.40.
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. [Kerotest Manufacturing Corp.](#)
 - b. [Perfection Corporation.](#)
 - c. [R.W. Lyall; brand of Hubbell Utility Solutions; Hubbell Incorporated.](#)

2. Body: PE.
3. Ball: PE.
4. Stem: Acetal.
5. Seats and Seals: Nitrile.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: 80 psig.
8. Operating Temperature: Minus 20 to plus 140 deg F.
9. Operator: Nut or flat head for key operation.
10. Include plastic valve extension.
11. Include tamperproof locking feature for valves where indicated on Drawings.

F. Valve Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kerotest Manufacturing Corp.
 - b. Perfection Corporation.
 - c. R.W. Lyall; brand of Hubbell Utility Solutions; Hubbell Incorporated.
2. Cast-iron, two-section box.
3. Top section with cover with "GAS" lettering.
4. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
5. Adjustable cast-iron extensions of length required for depth of bury.
6. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Actaris: a brand of ITT Controls.
 - b. American Meter Company.
 - c. Dormont; A Watts Water Technologies Company.
 - d. Fischer; Emerson Electric Co., Automation Solutions.
2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.

4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: NBR; resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: UV-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to regulator.
9. Pressure regulator is to maintain discharge pressure setting downstream and is to not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 5 psig.

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. [GF Piping Systems: Georg Fischer LLC](#).
- b. [Jomar Valve](#).
- c. [WATTS: A Watts Water Technologies Company](#).
- d. [Wilkins](#).
- e. Zurn Industries, LLC.

2. Description:

- a. Standard: ASSE 1079.
- b. Pressure Rating: 125 psig minimum at 180 deg F.
- c. End Connections: Solder-joint copper alloy and threaded ferrous.

2.8 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description and rated pressure of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.
- B. Label and identify gas piping and pressure outside a multitenant building by tenant.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Close equipment shutoff valves before turning off natural gas to premises or piping section.
- B. Inspect natural-gas piping in accordance with NFPA 54 and the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.
- C. Comply with NFPA 54 and the International Fuel Gas Code requirements for preventing accidental ignition.

3.2 INSTALLATION OF OUTDOOR PIPING

- A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.
 - 1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.
- C. Install underground, PE, natural-gas piping in accordance with ASTM D2774.
- D. Steel Piping with Protective Coating:
 - 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 - 3. Replace pipe having damaged PE coating with new pipe.
- E. Install fittings for changes in direction and branch connections.
- F. Install pressure gauge upstream and downstream from each service regulator.

3.3 INSTALLATION OF VALVES

- A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless steel tubing, aluminum, or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install anode for metallic valves in underground PE piping.

3.4 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 2. Cut threads full and clean using sharp dies.
 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints:
 1. Construct joints in accordance with AWS D10.12/D10.12M, using qualified processes and welding operators.
 2. Bevel plain ends of steel pipe.
 3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
- E. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join in accordance with ASTM D2657.
 1. Plain-End Pipe and Fittings: Use butt fusion.
 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers for steel piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- B. Install hangers for corrugated stainless steel tubing, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- C. Support horizontal piping within 12 inches of each fitting.
- D. Support vertical runs of steel piping to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- E. Support vertical runs of corrugated stainless steel tubing to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 PIPING CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install natural-gas piping electrically continuous, and bonded to gas-appliance equipment grounding conductor of the circuit powering the appliance in accordance with NFPA 70.
- C. Where installing piping adjacent to appliances, allow space for service and maintenance of appliances.
- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

3.7 LABELING AND IDENTIFICATION

- A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.
- B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.8 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Test, inspect, and purge natural gas in accordance with NFPA 54 and the International Fuel Gas Code and authorities having jurisdiction.
 - 2. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- B. Prepare test and inspection reports.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.10 OUTDOOR PIPING SCHEDULE

- A. Underground natural-gas piping is to be the following:
 - 1. PE pipe and fittings joined by heat fusion; service-line risers with tracer wire terminated in an accessible location.
- B. Aboveground natural-gas piping is to be one of the following:
 - 1. Steel pipe with malleable-iron fittings and threaded joints.
 - 2. Steel pipe with wrought-steel fittings and welded joints.

3.11 UNDERGROUND, MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping utility's gas mains and listed by an NRTL.
- B. Underground:
 - 1. PE valves.
 - 2. NPS 2 and Smaller: Bronze plug valves.

3.12 ABOVEGROUND, MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves for pipe sizes NPS 2 and smaller at service meter are to be the following:
 - 1. Bronze plug valve.
- B. Distribution piping valves for pipe sizes NPS 2 and smaller are to be the following:
 - 1. Bronze plug valve.
- C. Valves in branch piping for single appliance are to be the following:
 - 1. Bronze plug valve.

END OF SECTION 231123

SECTION 26 01 00 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract apply to this and the other sections of Division 26, 27, and 28.
- B. This section is a Division 26 Common Work Results for Electrical section and is a part of each Division 26, 27, and 28 Sections.
- C. Requirements of the following Division 26 Sections apply to this section:
 - 1. Quality Requirements
 - 2. Common Work Results for Electrical.

1.2 SUMMARY:

- A. This Section includes general administrative and procedural requirements for electrical installations.
 - 1. Pre-Construction Meeting.
 - 2. Abbreviations and Definitions.
 - 3. Permits, Codes, and Inspections.
 - 4. Utilities.
 - 5. Visiting Premises.
 - 6. Submittals.
 - 7. Project Drawings and Specifications.
 - 8. Cooperation and Coordination with Other Trades.
 - 9. Space Priority.
 - 10. Product Listing.
 - 11. Nameplate Data.
 - 12. Record Documents.
 - 13. Maintenance Manuals.
 - 14. Warranty.
 - 15. Performance of Equipment.
 - 16. Delivery, Storage and Handling.
 - 17. Rough-ins.
 - 18. Electrical Installations.
 - 19. Cutting and Patching.
 - 20. Cleaning.
 - 21. Testing.
 - 22. Instructions to the Owner.

1.3 ABBREVIATIONS AND DEFINITIONS

- A. General: Utilize the following abbreviations and definitions for discernment within the Drawings and Specifications.
 - ANSI American National Standards Institute.
 - ASA American Standards Association.

ASTM	American Society of Testing Materials.
E.C.	Electrical Contractor.
EIA	Electronic Industries Association.
ETL	Electrical Testing Laboratories, Inc.
G.C.	General Contractor.
HVAC	Heating, Ventilating, Air Conditioning Contractor.
ICEA	International Cable Engineers Association.
IEEE	Institute of Electrical and Electronics Engineers.
IES	Illuminating Engineering Society.
NEC	National Electrical Code.
NEMA	National Electrical Manufacturers Association.
NFPA	National Fire Protection Association.
O.E.M.	Original Equipment Manufacturer.
OSHA	Occupational Safety and Health Admin.
P.C.	Plumbing Contractor.
UL	Underwriter's Laboratories, Inc.

1.4 DEFINITIONS

- A. PROVIDE means to furnish, place, erect, connect, test and turn over to Owner, complete and ready for the regular operation, the particular work referred to. INSTALL means to join, unite, fasten, link, attach, set up or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular work referred to.
- B. FURNISH means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application for the particular work referred to.
- C. WIRING means the inclusion of all raceways, fittings, conductors, connectors, tape, junction and outlet boxes, connections, splices, and all other items necessary and/or required in connection with such work.
- D. CONDUIT means the inclusion of all fittings, hangers, supports, sleeves, etc.
- E. AS DIRECTED means as directed by the Engineer.
- F. CONCEALED means embedded in masonry or other construction, installed behind wall furring or within double partitions or installed within hung ceilings.
- G. ACCEPTED means as accepted by the Engineer.
- H. APPROVED means as approved by the Engineer.
- I. EQUAL means equivalent as approved by the Engineer.
- J. CONTRACTOR as stated herein shall mean Electrical Contractor.

1.5 PERMITS, CODE, AND INSPECTIONS

- A. General: Contractor shall obtain and pay for all permits and inspections required by laws, ordinances, rules, and regulations having jurisdiction for work included under this Contract and shall submit approval certificates to the Engineer.
- B. Codes: The electrical installation shall comply fully with all local, county, and state laws, ordinances and regulations applicable to electrical installations.
- C. The Electrical installation shall be in compliance with the requirements of the latest applicable versions:
 - 1. Occupational Safety and Health Act (OSHA).
 - 2. Institution of Electrical and Electronic Engineers (IEEE).
 - 3. National Electric Code (NEC).
 - 4. National Electrical Safety Code (NESC).
 - 5. National Board of Fire Underwriter's (NBFI).
 - 6. Authority having Jurisdiction.
 - 7. Underwriter's Laboratories, Inc. (UL).
 - 8. National Electrical Manufacturer's Association (NEMA).
 - 9. National Electrical Contractors Association (NECA).
 - 10. National Safety Code.
 - 11. Legislative Act 235 (1965) - Handicapped.
 - 12. Legislative Act 287 (1974) - Excavation.
 - 13. International Building Code (IBC).
 - 14. Americans with Disabilities Act (ADA).
 - 15. All local codes and ordinances in effect and having jurisdiction.
 - 16. All requirements of electric, telephone, and CATV utility companies.
 - 17. All approved published instructions set forth by equipment manufacturers.
- D. Submit certificates issued by approved authorized agencies to indicate conformance of all work with the above requirements, as well as any additional certificates as may be required for the performance of this contract work.
- E. Should any change in Drawings or Specifications be required to comply with governmental regulations, the Contractor shall notify Engineer prior to execution of the work. The work shall be carried out according to the requirements of such code in accordance with the instruction of the Engineer and at no additional cost to the Owner.

1.6 VISITING PREMISES

- A. General: The Bidder shall visit the project site before submitting their bid, in order to familiarize themselves with existing conditions that may affect their work. It is the Contractor's responsibility to analyze existing conditions. Sufficient allowances shall be provided in the Contractor's bid to cover work, due to existing conditions, that will be required to complete this contract work.
- B. By submission of a bid, the Contractor is attesting that responsible personnel did in fact visit the site during the bidding period and verified all existing pertinent conditions.
- C. Contractor shall verify all measurements and dimensions at the site prior to submitting a bid.

1.7 PROJECT DRAWINGS AND SPECIFICATIONS

- A. Contractor shall carefully examine the Drawings and Specifications of all trades and report all discrepancies to the Construction Manager in writing to obtain corrective action. The Construction Manager shall obtain and distribute corrective action from the Engineer. No departures from the Contract Documents will be made without prior written approval from the Engineer via the Construction Manager.
- B. Questions or disputes regarding the intent or meaning of Contract Documents shall be resolved by the interpretation of the Engineer. The Engineer's interpretation is final and binding.
- C. The Drawings and Specifications are not intended to define all details, finish materials, and special construction that may be required or necessary. The Contractor shall provide all installations complete and adequate as implied by the project documents.
- D. Drawings are diagrammatic only and do not show exact routes and locations of equipment and associated wiring. The Contractor shall verify the work of all other trades and shall arrange their work to avoid conflicts. In the event of a conflict, the Contractor shall obtain corrective action from the Engineer via the Construction Manager.
- E. All work shall be considered new, unless noted otherwise.

1.8 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. This Electrical Contractor must cooperate completely and coordinate work with the Contractors of other trades providing equipment under this division and other divisions of the specifications.
- B. Coordinate the location of each and every electrical panel, pullbox, transfer switch, ect. with the Engineer before rough-in. The above required floor plans shall be reviewed and approved by the Owner and Engineer and shall be signed by both the Owner and the Engineer.
- C. Individual trade interference drawings may be used as shop drawings and/or as record drawings at the completion of the project.

1.9 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the contract documents to ascertain these requirements.
- B. Carefully check space requirements with the existing conditions and the physical confines of the area to ensure that all material can be installed in the spaces allotted there to including finished suspended ceilings. Make modifications there to as required.
- C. Transmit to other trades all information required for work to be provided under their respective sections in ample time for installation.
- D. Where work interconnects with work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.

- E. Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate, project and schedule work with the Engineer in accordance with the construction sequence.
- F. The locations of panels and other equipment indicated on the Drawings are approximately correct, but they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed.
- G. Exercise particular caution with reference to the location of panels and have precise and definite locations approved by the Engineer before proceeding with the installation.
- H. The Drawings show only the general run of raceways and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the Engineer and receive his approval before such alterations are made. All such modifications shall be made without additional cost to the owner.
- I. Obtain from the Engineer in the field the location of such devices or equipment not definitely located on the Drawings.
- J. Circuit "tags" in the form of arrows are used where shown to indicate the home runs of raceways to electrical distribution points. These tags show the circuits in each home run and the panel designation. Show the actual circuit numbers on the finished record tracing and on panel directory card. Where circuiting is not indicated, Electrical Contractor must provide required circuiting in accordance with the loading indicated on the drawings and/or as directed.
- K. The Drawings generally do not indicate the exact number wires in each conduit for the branch circuit wiring of fixtures, and outlets, or the actual circuiting. Provide the correct wire size and quantity as required by the indicated circuiting and/or circuit numbers indicated and control wiring diagrams, if any, specified voltage drop or maximum distance limitations, and the applicable requirements of the NEC.
- L. Adjust location of conduits, panels, equipment, pull boxes, fixtures, etc. to accommodate the work to prevent interferences, both anticipated and encountered. Determine the exact route and location of each raceway prior to installation.
- M. Contractor shall furnish services of an experienced Superintendent, who shall be in constant charge of all work, and who shall coordinate his work with the work of other trades. No work shall be installed before coordinating with other trades.

1.10 NAMEPLATE DATA

- A. Provide permanent operational data nameplate on each item of power operated equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplate in an accessible location.

1.11 OMISSIONS FROM THE DRAWINGS

- A. Should a Bidder find discrepancies in or omissions from the drawings or specifications or be in doubt as to their meaning, they shall notify the Construction Manager in writing before submitting their proposal. The Construction Manager will in turn obtain clarifications from the

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Design Professional and send written instructions to all Bidders. If the Contractor fails to comply with this requirement, they shall accept the Design Professional's interpretation as to the intended meaning of the drawings and specifications.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Major items of equipment shall have manufacturer's name, address, and catalog number on a plate securely attached in a convenient place. All equipment or apparatus of any one (1) system must be the product of one (1) manufacturer or approved equivalent products of a number of manufacturer's that are suitable for use in a unified system.
- B. All materials and equipment for which Underwriter's Laboratories have established standards shall bear a UL label of approval.
- C. In all cases where a device, function or item of equipment is herein referred to in the singular, such reference shall apply to as many such items as are required to complete the installation.
- D. All listed materials and equipment shown on drawings and/or specified herein, are indicative of complete and whole units and shall be furnished as such.
- E. Comply with manufacturer's printed instructions and recommendations as minimum criteria for the installation of equipment.
- F. All materials and equipment provided under this Contract shall be completely satisfactory and acceptable in operation, performance and capacity. No approval, either verbal or written, of any drawing, descriptive data or samples of such materials, equipment and/or appurtenances, shall relieve this Contractor of his responsibility to turn over all items in perfect working order at completion of the work.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for distinct identification; adequately packaged and protected to prevent damage during shipment, storage and handling.
- B. Store equipment and materials at the site unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

3.2 ROUGH-IN

- A. Obtain written approval of locations of all electrical devices from the Engineer prior to rough-in. The Engineer reserves the right to move any or all electrical devices prior to rough-in, at no additional cost.
- B. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- C. Refer to equipment specifications for rough-in requirements.
- D. Contractor shall obtain detailed and specific information regarding location of all equipment. Final locations may differ from those indicated on drawings. Work improperly placed because of Contractor's failure to obtain this information shall be relocated and reinstalled as directed, without additional costs to the Contract.
- E. The design shall be subject to such revisions as may be necessary to overcome building obstructions. No charges shall be made in location of equipment without prior written approval.
- F. Rough-ins for devices in concrete block walls shall be installed level and plumb. Devices adjacent to each other shall be installed at the same elevation. Saw cut openings to the size required, such that oversized cover plates are not required.

3.3 INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
 1. Coordinate electrical systems, equipment, and materials installation with other building components.
 2. Verify all dimensions by field measurements.
 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
 8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components.
 9. Coordinate the cutting and patching of building components to accommodate installation of electrical equipment and materials.
 10. Coordinate the installation of electrical materials and equipment above existing ceilings with suspension system, existing mechanical equipment and systems, and existing structural components.
 11. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations.

12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.4 EQUIPMENT ACCESSORIES

- A. Provide supports, hangers and auxiliary structural members required for support of the work.
- B. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls and floors and elsewhere as will be required for the proper protection of each raceway and passing through building surfaces.

3.5 CUTTING AND PATCHING

- A. General: Perform cutting and patching associated with all Division 26 work:
 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover Work to provide for installation of ill-timed Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in existing structures.
 - f. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.
 2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
 3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
 6. Arrange and pay for repairs required to restore other work, because of damage caused by electrical installations.
 7. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective or non-conforming installations.
 8. Patch all finished surfaces and building components using new materials specified for the original installation and experienced Installers. For Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.6 CLEANING

- A. Contractor is responsible for returning work areas to owner in a safe and clean condition.

3.7 DEBRIS

- A. Debris resulting from work under this Contract, shall all be removed promptly from the premises by this Contractor.
- B. Remove all dead wire and associated raceway resulting from work under this contract.

3.8 TESTING

- A. Contractor, at his own expense, shall make any tests directed by an inspection authority or by the Engineer and shall provide all equipment, instruments and materials to make such tests.
- B. All overload devices, including equipment furnished under other contracts, shall be set and adjusted to suit load conditions.
- C. Unless otherwise approved, all connections shall be made and all components shall be in place, complete and operational, at time of final inspection and tests.
- D. Time of such tests, the manner in which they are made and the results of the tests, shall be subject to approval.
- E. Upon completion of work, all component parts, both singularly and as a whole, shall be set, calibrated, adjusted and left in satisfactory operating condition to suit load conditions, by means of instruments furnished by the Contractor.
- F. Complete testing of equipment and systems shall be provided throughout this project.
- G. Industry standards shall apply except as otherwise specified.
- H. Provide all labor, premium labor and materials required by shop and field testing as specified in the Contract Documents and as required by the authorities having jurisdiction.
- I. Notify the Engineer fourteen (14) days prior to the testing dates. Upon completion of a test, a statement of certification shall be forwarded to the Engineer for their approval.
- J. Conduct tests at a time agreeable to the Engineer. Provide premium labor as necessary.
- K. Products which are found defective or do not pass such tests shall be removed and replaced at the Contractor's expense. Tests shall be repeated.

3.9 FIRE STOPS

- A. Openings for electrical equipment penetrating a fire rated floor, wall or ceiling, shall be resealed as required by Code. Install fire rated sealant equal to or greater than the fire rating of the penetrated surface.

3.10 WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, they shall restore the waterproof integrity of that surface at their own expense and as directed by the Engineer.
- C. Contractor shall advise the Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the drawings. Such work shall be performed in such a manner as to maintain any warranties in place.

3.11 CONSTRUCTION PROGRESS AND NOTIFICATION

- A. The Contractor shall notify, in writing, the Owner and the Engineer of construction progress. At a minimum, the Contractor shall notify at the 50% rough in of conduit, prior to enclosing or burying, and at "punch list" time lines.

- B. END OF SECTION 26 01 00

SECTION 26 02 00 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

- A. Section Includes:
 - 1. Contractors Guarantee.
 - 2. Materials, Workmanship, and Methods.
 - 3. Control of Installation.

1.2 CONTRACTORS GUARANTEE:

- A. The Electrical Contractor shall guarantee for a period of one (1) year from the date of acceptance of the job that all equipment, material, and labor furnished by them are free from defects. Any defects in material and workmanship shall be corrected by the Electrical Contractor without further expense to the Owner. All items specified to have a longer warranty shall be guaranteed for that longer period. Controls shall have a minimum of two (2) year guarantee on parts and labor.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step-in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 MATERIALS, WORKMANSHIP, AND METHOD

- A. All materials and equipment shall be new, of highest quality, and shall conform in all respects to these specifications. All work shall be performed in keeping with the highest standards of workmanship and quality. All mechanical equipment shall be installed in accordance with the manufacturer's installation instructions which shall be available at the job site. All mechanical equipment shall bear the label of an approved agency.
- B. The means, methods, techniques, sequences and procedures, and job site safety shall be the sole responsibility of the contractor.

3.3 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.
- C. END OF SECTION 26 02 00

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. This section is a Division 26 Common Work Results for Electrical Section and is a part of each Division 26, 27, and 28 sections.
- B. The Division 26 contractor shall be responsible for all work listed on the drawings and in the specification section for Division 26, 27, and 28.
- C. Coordinate work of Division 26, 27, and 28 with the work of Divisions 21, 22 and 23.
- D. Drawings, General Provisions, Special Provisions and Division 1 Specification Sections, apply to all Division 26, 27, and 28 Sections.

1.2 SUMMARY

- A. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:
 1. Sleeves and Penetrations.
 2. Fire Stopping
 3. Locations
 4. Outages and Disruptions
 5. Temporary
 6. Painting
 7. Vibration Isolation

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for the following products:
 1. Joint sealers
 2. Firestop materials
- C. Shop drawings detailing fabrication and installation for metal fabrications and wood supports, and anchorage for electrical materials and equipment.

1.4 QUALITY ASSURANCE

- A. All products, materials and processes shall comply with the Design and Construction Standards of the owner. Where a conflict arises between these specifications and / or the project drawings and the Design and Construction Standards of the owner, the Design and Construction Standards shall be followed.

- B. Installer Qualifications: Engage an experienced installer for the installation and application joint sealers, access panels, and doors.
- C. Qualify welding processes and welding operators in accordance with AWS D1.1, "Structural Welding Code - Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- D. Fire-resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating shown.
 - 1. Provide UL Label on each fire-rated access door.
- E. ASTM E-814 or UL 1479 for firestop system assemblies that provide a fire rating equal to that of construction being penetrated.
- F. ANSI Compliance: Comply with requirements of ANSI Standard A13.1, "Scheme for the identification of Piping Systems," for type and size of lettering for cable labels.
- G. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.
- C. Deliver firestop materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand type, and UL label. Store materials under cover and protect from weather and damage. Comply with recommended procedure, precautions and remedies described in material data sheets.

1.6 SEQUENCE AND SCHEDULING

- A. Coordinate electrical equipment installation with other building components.
- B. Arrange for chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- D. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

- E. Coordinate connection of electrical services with equipment provided under other sections of the specifications.
- F. Coordinate requirements for access panels and doors where items requiring access are concealed behind finished surfaces.
- G. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.
- H. Coordinate delivery of firestop materials with scheduled installation date to allow minimum storage at job site
- I. Coordinate the shut-off and disconnection of electrical service with the Owner.
- J. Notify the Owner at least fourteen (14) days prior to commencing demolition operations.
- K. Perform demolition in phases as indicated. Coordinate electrical equipment installation with other building components.

PART 2 - PRODUCTS

2.1 MISCELLANEOUS METALS

- A. Steel plates, shapes, bars, and bar grating: ASTM A-36.
- B. Cold-formed Steel Tubing: ASTM A-500
- C. Hot-rolled Steel Tubing: ASTM A-501.
- D. Steel Pipe: ASTM A-53, Schedule 40, welded.
- E. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout, recommended for interior and exterior applications.
- F. Fasteners: Zinc-coated, type, grade, and class as required.

2.2 JOINT SEALERS

- A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
- B. Colors: As selected by the Engineer from manufacturer's standard colors.
- C. Elastomeric Joint Sealers: Provide the following types:
 1. One part, mildew-resistant, silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and non-porous joint substrates; formulated with fungicide; intended for sealing interior joints with non-porous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

2.3 FIRE STOPPING

- A. Use only that manufacturer listed in UL Fire Resistance Directory for the UL system involved.
- B. All firestopping materials used on this project shall be the products of one manufacturer. Each trade shall use products of the same manufacturer.
- C. Standards: The firestop systems and products shall have been tested in accordance with the procedures of U.L. 1479 (ASTM E814-81) and material shall be UL classified as Fill, Void or Cavity Materials for use in Through-Penetration Firestops. The firestop system shall comply with NEC Paragraph 300-21. All work shall comply with NFPA 101-Life Safety Code, latest edition adopted.

PART 3 - EXECUTION

3.1 GENERAL

- A. All construction under this contract shall be completed in a neat and craftsman-like manner. Work that, in the judgement of the Engineer, is not satisfactorily installed shall be removed and replaced to the Engineer satisfaction, at the Contractor's expense.
- B. Housekeeping: Throughout construction, all work areas and storage areas shall be kept clean. The Contractor shall keep all items clean of dirt, rust, dust and fingermarks.

3.2 SLEEVES AND PENETRATIONS

- A. Contractor shall provide sleeves where raceways pass through walls, partitions, floors, and ceilings.
- B. Sleeves in bearing and/or masonry walls and/or partitions shall be of galvanized rigid steel conduit finished with smooth edges. For other than masonry or bearing walls/partitions, sleeves shall be EMT conduit.
- C. Sleeves in masonry ceilings and floors shall be galvanized rigid steel conduit finished with smooth edges. For other than masonry ceilings and floors, sleeves shall be EMT conduit. All sleeves shall be properly installed and cemented in place.
- D. Floor sleeves shall extend 1" above finished floor, unless otherwise noted. Space between floor sleeves and piping or raceway shall be caulked with UL listed fire resistive and waterproof caulking compound as approved.
- E. Where piping or raceways pass through waterproofed floors or walls, design of sleeves shall be such that waterproofing can be flashed into and around the sleeves.
- F. Where items provided under this Contract pass through roofs this Contractor shall coordinate the installation with the Roofing Contractor and shall provide an approved penetration. The Electrical Contractor shall make provisions not to void the roof bond.
- G. Sleeves through exterior walls below grade shall be fitted with seals which be ratcheted tight via bolts.

- H. Where sleeves pass through walls from the interior to the exterior, conduits shall be sealed on the inside with an UL approved sealant

3.3 FIRESTOPPING

- A. Where conduits, conduit sleeves, wireways and other electrical raceways or cables pass through fire partitions, fire walls, fire floors, or smoke walls, the Electrical Contractor shall provide a fire or smoke stopping that provides an effective barrier against the spread of fire, smoke or gases.
- B. Installation of Fire-Stopping Materials: Install materials to fill openings around electrical services penetrating floors and walls and provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Install materials in accordance with printed instructions of the UL Fire Resistance Directory and per manufacturer's published instructions.
- C. All cables that are installed in conduit sleeves or in wireways through fire or smoke floors or partitions shall be provided with an equally rated re-enterable U.L. listed fire and smoke rated silicone RTV foam in the opening.
- D. Examine fire/smoke-stopped areas to ensure proper installation before concealing or enclosing areas.
- E. Keep areas of work accessible until inspection by applicable code authorities.

3.4 LOCATIONS

- A. Obtain written approval of locations of all electrical devices from the Engineer prior to rough-in. The Engineer reserves the right to move any or all electrical devices prior to rough-in, at no additional cost.
- B. Contractor shall obtain detailed and specific information regarding location of all equipment. Final locations may differ from those indicated on Drawings. Work improperly placed because of Contractor's failure to obtain this information shall be relocated and reinstalled as directed, without additional costs to the Contract.
- C. The design shall be subject to such revisions as may be necessary to overcome building obstructions. No changes shall be made in location of equipment without prior written approval.

3.5 PAINTING

- A. Factory-painted equipment cabinets and trim shall not be field-painted except for touching up scratches or damage where necessary to achieve like-new finish. Touching up shall be done after equipment is in its final location.

3.6 VIBRATION ISOLATION

- A. Isolation mounting shall be provided for all moving equipment where the energy of the vibration is of sufficient magnitude to produce perceptible vibration or structure transmitted noise in occupied areas. Isolation equipment shall be selected, installed and adjusted in accordance with manufacturer's recommendations.

- B. All equipment and material shall be installed to operate without objectionable noise or vibration as determined by Engineer and Owner. Should such objectionable noise or vibration be produced and transmitted to occupied portions of the building by apparatus, piping or other parts of this work, any necessary changes as approved shall be made by the Contractor.
- C. All conduit terminations to noise or vibration producing equipment (i.e. motors, transformers) shall be made with a short section of liquid-tight flexible metal conduit.

3.7 OUTAGES AND DISRUPTIONS

- A. Continuity of operation of all essential HVAC, plumbing and electrical items, including water, gas, electrical service, lighting, outlets, power and controls for heating and cooling equipment, auxiliary systems, fire alarm, emergency lighting and power, program, sound, alarms and telephones shall be provided as required for occupancy of the premises during the construction period.
- B. The schedule and timing of any interruption of electrical service or disruption of occupied areas that may affect use of the premises by the Owner shall be coordinated with the Construction Manager. Temporary or interim use feeders and facilities shall be provided by the Contractor, as approved and/or directed, to minimize the duration and extent of outages or interruptions.
- C. In areas where the construction work will interfere unduly with use of the premises, the Construction manager may direct that construction work be performed during time periods other than indicated above or on Saturdays, Sundays, or Holidays. Judgment as to whether such undue interference may exist shall rest solely with the Construction Manager. Also, the Construction Manager may require that temporary or interim use feeders and facilities shall be provided by the Contractor as approved and/or directed, to minimize the duration and extent of outages or interruptions.
- D. Preparatory work shall be performed as completely as possible in each instance prior to scheduled service outages.
- E. Contractor shall be responsible for all premium time/overtime required to perform outages and cutovers of services. Coordinate with the Construction Manager.
- F. Contractor shall be responsible for any and all premium time/overtime required to complete the work in the various areas within the allotted time, as well as any premium/overtime required to install work through unaffected or remote areas from the work as necessary to maintain continuity of services and occupancy of the existing buildings, as required. Coordinate with the Construction Manager.
- G. END OF SECTION 26 05 00

SECTION 26 05 13
MEDIUM-VOLTAGE CABLES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the furnishing, installation, and connection of medium-voltage cables, indicated as cable or cables in this section, and medium-voltage cable splices and terminations.

1.2 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.
- B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.
- C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for medium-voltage cables.

1.3 QUALITY ASSURANCE

- A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 FACTORY TESTS

- A. Factory Tests shall be required.
- B. Factory Tests shall be in accordance with Paragraph, MANUFACTURED PRODUCTS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirement:
 1. A representative sample of Medium-voltage cables from each lot shall be factory tested per NEMA WC 74 to ensure that there are no electrical defects in that specific lot of cable.

1.5 SUBMITTALS

- A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
 1. Shop Drawings:
 - a. Submit sufficient information to demonstrate compliance with drawings and specifications.
 - b. Submit the following data for approval:
 - 1) Complete electrical ratings.
 - 2) Installation instructions.
 - 2.3. Certifications:
 - a. Factory Test Reports: Submit certified factory production test reports for approval.

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- b. Field Test Reports: Submit field test reports for approval.
- c. Compatibility: Submit a certificate from the cable manufacturer that the splices and terminations are approved for use with the cable.
- d. Two weeks prior to final inspection, submit the following.
 - 1) Certification by the manufacturer that the cables, splices, and terminations conform to the requirements of the drawings and specifications.
 - 2) Certification by the Contractor that the cables, splices, and terminations have been properly installed and tested.
 - 3) Certification by the Contractor that each splice and each termination were completely installed in a single continuous work period by a single qualified worker without any overnight interruption.
- 4. Qualified Worker Approval:
 - a. Qualified workers who install cables, splices, and terminations shall have a minimum of five years of experience splicing and terminating cables, including experience with the materials in the approved splices and terminations. Qualified workers who perform cable testing shall have a minimum of five year of experience performing electrical testing of medium-voltage cables, including the ability to understand, interpret test results and develop test report.
 - b. Furnish satisfactory proof of such experience for each qualified worker who splices or terminates the cables.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
- B. American Society for Testing and Materials (ASTM):
 - B3-13.....Standard Specification for Soft or Annealed Copper Wire
- C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 48-09Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV
 - 386-06Separable Insulated Connector Systems for Power Distribution Systems above 600 V
 - 400-12Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems

- 400.2-13Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF)
- 404-12Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500,000 V
- D. National Electrical Manufacturers Association (NEMA):
- WC 71-14Non-Shielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electric Energy
- WC 74-125-46 KV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy
- E. National Fire Protection Association (NFPA):
- 70-17National Electrical Code (NEC)
- F. Underwriters Laboratories (UL):
- 1072-06Medium-Voltage Power Cables

1.7 SHIPMENT AND STORAGE

- A. Cable shall be shipped on reels such that it is protected against physical, mechanical and environmental damage. Each end of each length of cable shall be hermetically sealed with manufacturer's end caps and securely attached to the reel.
- B. Cable stored and/or cut on site shall have the ends turned down, and sealed with cable manufacturer's standard cable end seals, or field-installed heat-shrink cable end seals.

PART 2 - PRODUCTS

2.1 CABLE

- A. Cable shall be in accordance with ASTM, IEEE, NEC, NEMA and UL, and as shown on the drawings.
- B. Single conductor stranded copper conforming to ASTM B3.
- C. Voltage Rating:
 1. 15,000 V cable shall be used on 13,200 V distribution systems.
- D. Insulation:
 1. Insulation level shall be 133%.
 2. Types of insulation:
 - a. Cable type abbreviation, EPR: Ethylene propylene rubber insulation shall be thermosetting, light and heat stabilized.
 - b. Cable type abbreviation, XLP, XLPE, or TR-XLPE: cross-linked polyethylene insulation shall be thermosetting, light and heat stabilized, and chemically cross-linked.
- E. Insulation shield shall be semi-conducting. Conductor shield shall be semi-conducting.

- F. Insulation shall be wrapped with copper shielding tape, helically-applied over semi-conducting insulation shield.
- G. Heavy duty, overall protective polyvinyl chloride jacket shall enclose every cable. The manufacturer's name, cable type and size, and other pertinent information shall be marked or molded clearly on the overall protective jacket.
- H. Cable temperature ratings for continuous operation, emergency overload operation, and short circuit operation shall be not less than the NEC, NEMA WC 71, or NEMA WC 74 standard for the respective cable.

2.2 SPLICES AND TERMINATIONS

- A. Materials shall be compatible with the cables being spliced and terminated, and shall be suitable for the prevailing environmental conditions.
- B. In locations where moisture might be present, the splices shall be watertight. In manholes and pullboxes, the splices shall be submersible.
- C. Splices:
 - 1. Shall comply with IEEE 404. Include all components required for complete splice, with detailed instructions.
- D. Terminations:
 - 1. Shall comply with IEEE 48. Include shield ground strap for shielded cable terminations.
 - 2. Dead-break terminations for indoor and outdoor use: 600 A deadbreak premolded rubber elbow connectors with bushing inserts, suitable for submersible applications. Separable connectors shall comply with the requirements of IEEE 386, and shall be interchangeable between suppliers. Allow sufficient slack in medium-voltage cable, ground, and drain wires to permit elbow connectors to be moved to their respective parking stands.//
 - 3. Ground metallic cable shields with a device designed for that purpose, consisting of a solderless connector enclosed in watertight rubber housing covering the entire assembly.
 - 4. Provide insulated cable supports to relieve any strain imposed by cable weight or movement.
Ground cable supports to the grounding system.

2.3 FIREPROOFING TAPE

- A. Fireproofing tape shall be flexible, non-corrosive, self-extinguishing, arcproof, and fireproof intumescent elastomer. Securing tape shall be glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (0.75 inch) wide.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

- B. Cable shall be installed in conduit above grade and duct bank below grade.
- C. All cables of a feeder shall be pulled simultaneously.
- D. Conductors of different systems (e.g., 120V and 15kV) shall not be installed in the same raceway.
- E. Splice the cables only in manholes and pull boxes.
- F. Ground shields in accordance with Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- G. Cable maximum pull length, maximum pulling tension, and minimum bend radius shall conform with the recommendations of the manufacturer.
- H. Use suitable lubricating compounds on the cables to prevent pulling damage. Provide compounds that are not injurious to the cable jacket and do not harden or become adhesive.
- I. Seal the cable ends prior to pulling, to prevent the entry of moisture or lubricant.

3.3 PULLING CABLES IN DUCTS

- A. Cables shall be pulled into ducts with equipment designed for this purpose, including power-driven winches, cable-feeding flexible tube guides, cable grips, pulling eyes, and lubricants. A sufficient number of qualified workers and equipment shall be employed to ensure the careful and proper installation of the cable.
- B. Cable reels shall be set up at the side of the opening and above the duct or hatch level, allowing cables to enter through the opening without reverse bending. Flexible tube guides shall be installed through the opening in a manner that will prevent cables from rubbing on the edges of any structural member.
- C. Cable shall be unreeled from the top of the reel. Pay-out shall be carefully controlled. Cables to be pulled shall be attached through a swivel to the main pulling wire by means of a suitable cable grip and pulling eye.
- D. Woven-wire cable grips shall be used to grip the cable end when pulling small cables and short straight lengths of heavier cables.
- E. Pulling eyes shall be attached to the cable conductors to prevent damage to the cable structure.
- F. Cables shall be liberally coated with a suitable lubricant as they enter the tube guide or duct. Rollers, sheaves, or tube guides around which the cable is pulled shall conform to the minimum bending radius of the cable.
- G. Cables shall be pulled into ducts at a reasonable speed. Cable pulling using a vehicle shall not be permitted. Pulling operations shall be stopped immediately at any indication of binding or obstruction, and shall not be resumed until the potential for damage to the cable is corrected. Sufficient slack shall be provided for free movement of cable due to expansion or contraction.
- H. Splices in manholes shall be firmly supported on cable racks. Cable ends shall overlap at the ends of a section to provide sufficient undamaged cable for splicing.

- I. Cables cut in the field shall have the cut ends immediately sealed to prevent entrance of moisture.

3.4 SPLICES AND TERMINATIONS

- A. Install the materials as recommended by the manufacturer, including precautions pertaining to air temperature and humidity during installation.
- B. Installation shall be executed by qualified person trained to perform medium-voltage equipment installations. Tools shall be as recommended or provided by the manufacturer. Installation shall comply with manufacturer's instructions.
- C. Splices in manholes shall be located midway between cable racks on walls of manholes, and supported with cable arms at approximately the same elevation as the enclosing duct.
- D. Where the Government determines that unsatisfactory splices and terminations have been installed, the Contractor shall replace the unsatisfactory splices and terminations with approved material at no additional cost to the Government.

3.5 FIREPROOFING

- A. Cover all cable segments exposed in manholes and pullboxes with fireproofing tape.
- B. Apply the tape in a single layer, wrapped in a half-lap manner, or as recommended by the manufacturer. Extend the tape not less than 25 mm (1 inch) into each duct.
- C. At each end of a taped cable section, secure the fireproof tape in place with glass cloth tape.

3.6 CIRCUIT IDENTIFICATION OF FEEDERS

- A. In each pull box, install permanent identification tags on each circuit's cables to clearly designate the circuit identification and voltage. The tags shall be the embossed brass type, 40 mm (1.5 inches) in diameter and 40 mils thick. Attach tags with plastic ties. Position the tags so they will be easy to read after the fireproofing tape is installed.

3.7 ACCEPTANCE CHECKS AND TESTS

- A. General:
 1. Perform tests in accordance with the latest IEEE 400 and 400.2, manufacturer's recommendations, and as specified in this specification.
 2. Contractor shall make arrangements to have tests witnessed by the Engineer. Contractor shall proceed with tests only after obtaining approval from the Engineer.
- B. Visual Inspection: Perform visual inspection prior to electrical tests.
 1. Inspect exposed sections of cables for physical damage.
 2. Inspect shield grounding, cable supports, splices, and terminations.
 3. Verify that visible cable bends meet manufacturer's minimum bending radius requirement.
 4. Verify installation of fireproofing tape and identification tags.
 5. At the time of final acceptance, Contractor shall provide the Engineer visual field inspection notes, findings, and photographs detailing accessible inspection locations.

C. Electrical Tests - New Cables: Perform preparation and tests in order shown below:

1. Preparation Prior to Testing: Splices and terminations applied to new cables shall be completed prior to testing. For renovation installation, ends of new cables intended to be spliced to existing service-aged cables shall be prepared (cut back) to allow testing without flashover or tracking. Cables shall not be connected to other equipment while under test.
2. Perform Insulation-Resistance Test. Test all cables with respect to ground and adjacent cables. All adjacent cables shall be grounded during testing.
 - a. Apply test voltage for a period sufficient to stabilize output voltage and insulation resistance measurement.
 - b. Test data shall include megohm, applied test voltage, and leakage current readings.
 - c. Further testing shall not continue unless the insulation resistance test results meet or exceed the values listed below. Test voltages and minimum acceptable resistance values shall be:

<u>Voltage Class</u>	<u>Test Voltage</u>	<u>Min. Insulation Resistance</u>
15kV	5,000 VDC	20,000 megohms

3. Perform Tan Delta test. Review test readings with the //Resident Engineer// //COR// prior to proceeding with the Very Low Frequency (VLF) Withstand test
4. Perform Very Low Frequency (VLF) Withstand test. Utilize test voltages in accordance with IEEE 400.2.

D. Electrical Tests - Service-Aged Cables: Tests shall be performed for serviced-age cables before inter-connecting to new cables. Perform tests in order shown below:

1. Preparation Prior to Testing: Splices and terminations applied to cables shall be completed prior to testing. Ends of cables intended to be spliced to existing service-aged cables shall be prepared (cut back) to allow testing without flashover or tracking. Cables shall not be connected to other equipment while under test.
2. Perform Insulation-Resistance Test. Test all cables with respect to ground and adjacent cables. All adjacent cables shall be grounded during testing.
 - a. Apply test voltage for a period sufficient to stabilize output voltage and insulation resistance measurement.
 - b. Test data shall include megohm, applied test voltage, and leakage current readings.
 - c. Further testing shall not continue unless the insulation resistance test results meet or exceed the values listed below. Test voltages and minimum acceptable resistance values shall be:

<u>Voltage Class</u>	<u>Test Voltage</u>	<u>Min. Insulation Resistance</u>
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15kV 5,000 VDC 20,000 megohms

3. Perform Tan Delta test. Review test readings with the Engineer prior to proceeding with the VLF Withstand test.
4. Perform VLF Withstand test. Utilize test voltages in accordance with IEEE 400.2.
- E. Electrical Tests – Inter-connected New Cables and Service-Aged Cables: After successful Tan Delta and VLF Withstand testing of new cables and service-aged cables, perform final splicing inter-connecting between new and service-aged cables. Once new and service-aged cables are completely inter-connected, conduct Tan Delta and VLF Withstand tests for the entire inter-connected cable. Utilize maintenance test voltage for VLF Withstand testing.
- F. Field Test Report: Submit a field test report to the Engineer that includes the following information:
 1. Project Name, Location, Test Date.
 2. Name of Technician and Company performing the test.
 3. Ambient temperature and humidity at time of test.
 4. Name, Model Number and Description of Test Equipment used.
 5. Circuit identification, cable length, cable type and size, insulation type, cable manufacturer, service age (if any), voltage rating, description of splices or terminations.
 6. Visual field inspection notes, findings, and photographs.
 7. Insulation Resistance Test results:
 - a. Test voltage.
 - b. Measurement in Megohms.
 - c. Leakage current.
 8. Tan Delta results:
 - a. Test voltage.
 - b. Waveform (sinusoidal or cosine-rectangular).
 - c. Mean Tan Delta at V_0 .
 - d. Stability measured by Standard Deviation at V_0 .
 - e. Differential Tan Delta.
 - f. IEEE Condition Assessment Rating.
 9. VLF Withstand results:
 - 1) Test voltage.
 - 2) Waveform (sinusoidal or cosine-rectangular).
 - 3) Pass/Fail Rating.
 10. Conclusions. If any deficiency is discovered based on test results, provide recommendations for corrective action.

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G. Final Acceptance: Final acceptance shall depend upon the satisfactory performance of the cables under test. No cable shall be put into service until all tests are successfully passed, and field test reports have been approved by the Engineer.

END OF SECTION 26 05 13

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Copper building wire.
 - 2. Metal-clad cable, Type MC.
 - 3. Connectors and splices.
 - 4.
- B. Related Requirements:
 - 1. Section 260513 "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 601 to 35 000 V.
 - 2. Section 26 05 23 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Encore Wire Corporation.
 - 2. Okonite Company (The).
 - 3. Southwire Company.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

- D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- E. Conductor Insulation:
 - 1. Type RHH and Type RHW-2: Comply with UL 44.
 - 2. Type USE-2 and Type SE: Comply with UL 854.
 - 3. Type THHN and Type THWN-2: Comply with UL 83.
 - 4. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 - 5. Type UF: Comply with UL 83 and UL 493.
 - 6. Type XHHW-2: Comply with UL 44.

2.2 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Encore Wire Corporation.
 - 2. Okonite Company (The).
 - 3. Southwire Company.
- C. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Comply with UL 1569.
 - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Circuits:
 - 1. Single circuit and multicircuit with color-coded conductors.
 - 2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
- E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.
- F. Ground Conductor: Insulated.
- G. Conductor Insulation:
 - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
 - 2. Type XHHW-2: Comply with UL 44.
- H. Armor: Steel, interlocked.
- I. Jacket: PVC applied over armor.

2.3 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

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- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems; Atkore International.
 - 2. Hubbell Incorporated, Power Systems.
 - 3. O-Z/Gedney; Emerson Electric Co., Automation Solutions, Appleton Group.
- C. Jacketed Cable Connectors: For steel jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: One or Two hole with standard or long barrels as required.
 - 3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders:
 - 1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits:
 - 1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION, GENERAL

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. 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.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. 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.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inch of slack.
- D. Comply with requirements in Section 28 46 21.11 "Addressable Fire-Alarm Systems" for connecting, terminating, and identifying wires and cables.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 2. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements:
 - a. Service entrance disconnect switches
 - b. Automatic Transfer switch
 - c. Main Switchgear
 3. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - 1) A low-resistance ohmmeter.
 - 2) Calibrated torque wrench.
 - 3) Thermographic survey.
 - c. Inspect compression-applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.
 - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
 - g. Continuity test on each conductor and cable.
 - h. Uniform resistance of parallel conductors.
 4. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
 - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
 5. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:
1. Procedures used.
 2. Results that comply with requirements.
 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

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END OF SECTION 26 05 19

SECTION 26 05 23 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Backboards.
 - 2. Category 6 balanced twisted pair cable.
 - 3. Balanced twisted pair cable hardware.
 - 4. RS-485 cable.
 - 5. Control cable.
 - 6. Control-circuit conductors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.
- B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Flame Travel and Smoke Density in Plenums: As determined by testing identical products according to NFPA 262, by a qualified testing agency. Identify products for installation in plenums with appropriate markings of applicable testing agency.
 - 1. Flame Travel Distance: 60 inch or less.
 - 2. Peak Optical Smoke Density: 0.5 or less.
 - 3. Average Optical Smoke Density: 0.15 or less.
- C. Flame Travel and Smoke Density for Riser Cables in Non-Plenum Building Spaces: As determined by testing identical products according to UL 1666.
- D. Flame Travel and Smoke Density for Cables in Non-Riser Applications and Non-Plenum Building Spaces: As determined by testing identical products according to UL 1685.

2.2 BACKBOARDS

- A. Description: Plywood, fire-retardant treated, 3/4 by 48 by 96 inch. Comply with requirements for plywood backing panels in Section 06 10 53 "Miscellaneous Rough Carpentry."
- B. Painting: Paint plywood on all sides and edges with eggshell latex paint. Comply with requirements in Section 09 91 23 "Interior Painting."

2.3 CATEGORY 6a BALANCED TWISTED PAIR CABLE

- A. Description: Four-pair, balanced-twisted pair cable, with internal spline, certified to meet transmission characteristics of Category 6 cable..
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. AMP NETCONNECT; a TE Connectivity Ltd. company.
 2. Belden.
 3. Berk-Tek Leviton; a Nexans/Leviton alliance.
- C. Standard: Comply with TIA-568-C.2 for Category 6 cables.
- D. Conductors: 100 ohm, No. 23 AWG solid copper.
- E. Shielding/Screening: Unshielded twisted pairs (UTP).
- F. Cable Rating: Plenum.
- G. Jacket: White, Gray, Blue, or Yellow thermoplastic. Coordinate with the facility standard colors per system.

2.4 BALANCED TWISTED PAIR CABLE HARDWARE

- A. Description: Hardware designed to connect, splice, and terminate balanced twisted pair copper communications cable.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. AMP NETCONNECT; a TE Connectivity Ltd. company.
 2. Belden.
 3. Berk-Tek Leviton; a Nexans/Leviton alliance.
- C. General Requirements for Balanced Twisted Pair Cable Hardware:
 1. Comply with the performance requirements of Category 6a.
 2. Comply with TIA-568-C.2, IDC type, with modules designed for punch-down caps or tools.
 3. Cables must be terminated with connecting hardware of same category or higher.
- D. Source Limitations: Obtain balanced twisted pair cable hardware from single source from single manufacturer.
- E. Connecting Blocks: 110-style IDC for Category 6a. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.

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- F. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
 - 1. Number of Terminals per Field: One for each conductor in assigned cables.
- G. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
 - 1. Features:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. Replaceable connectors.
 - d. 24 or 48 ports.
 - 2. Construction: 16-gauge steel and mountable on 19 inch equipment racks.
 - 3. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- H. Patch Cords: Factory-made, four-pair cables in 36 inchlengths; terminated with an eight-position modular plug at each end.
 - 1. Patch cords must have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords must have latch guards to protect against snagging.
 - 2. Patch cords must have color-coded boots for circuit identification.
- I. Plugs and Plug Assemblies:
 - 1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair 100 ohm unshielded or shielded balanced twisted pair cable.
 - 2. Comply with IEC 60603-7-1, IEC 60603-7-2, IEC 60603-7-3, IEC 60603-7-4, and IEC 60603-7.5.
 - 3. Marked to indicate transmission performance.
- J. Jacks and Jack Assemblies:
 - 1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair 100 ohm unshielded or shielded balanced twisted pair cable.
 - 2. Designed to snap-in to a patch panel or faceplate.
 - 3. Standards:
 - a. Category 6a, unshielded balanced twisted pair cable must comply with IEC 60603-7-41.
 - 4. Marked to indicate transmission performance.
- K. Faceplate:
 - 1. Four port, vertical single-gang faceplates designed to mount to double-gang wall boxes.
 - 2. Metal Faceplate: Stainless steel, complying with requirements in Section 26 27 26 "Wiring Devices."
 - 3. For use with snap-in jacks accommodating any combination of balanced twisted pair, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
- L. Legend:
 - 1. Machine printed, in the field, using adhesive-tape label.
 - 2. Snap-in, clear-label covers and machine-printed paper inserts.

2.5 RS-485 CABLE

- A. Standard Cable: NFPA 70, Type CMG.
 - 1. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with UL 1685.

- B. Plenum-Rated Cable: NFPA 70, Type CMP.
 - 1. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - 2. Fluorinated ethylene propylene insulation.
 - 3. Unshielded.
 - 4. Fluorinated ethylene propylene jacket.
 - 5. Flame Resistance: NFPA 262.

2.6 CONTROL CABLE

- A. Paired Cable: NFPA 70, Type CMG.
 - 1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with UL 1685.

- B. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1. Multi-pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - 2. PVC insulation.
 - 3. Unshielded.
 - 4. PVC jacket.
 - 5. Flame Resistance: Comply with NFPA 262.

2.7 CONTROL-CIRCUIT CONDUCTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AMP NETCONNECT; a TE Connectivity Ltd. company.
 - 2. Belden.
 - 3. Berk-Tek Leviton; a Nexans/Leviton alliance.

- B. Class 1 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway Type THW, complying with UL 83 in raceway Type XHHW-2, complying with UL 44 in raceway.

- C. Class 2 Control Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway Type XHHW-2, complying with UL 44 in raceway.

- D. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type THHN/THWN-2, complying with UL 83 in raceway Type XHHW-2, complying with UL 44 in raceway.

- E. Class 2 Control Circuits and Class 3 Remote-Control and Signal Circuits That Supply Critical Circuits: Circuit Integrity (CI) cable.

1. Smoke control signaling and control circuits.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test twisted pair cables according to TIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Test cables on receipt at Project site.
 1. Test each pair of twisted pair cable for open and short circuits.

3.2 INSTALLATION OF RACEWAYS AND BOXES

- A. Comply with requirements in Section 26 05 33 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
 1. Outlet boxes must be no smaller than 2 inch wide, 3 inch high, and 2-1/2 inch deep.
 2. Outlet boxes for cables must be no smaller than 4 inch square by 2-1/8 inch deep with extension ring sized to bring edge of ring to within 1/8 inch of the finished wall surface.
 3. Flexible metal conduit must not be used.
- B. Comply with TIA-569-D for pull-box sizing and length of conduit and number of bends between pull points.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.
- D. Raceway Installation in Equipment Rooms:
 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
 2. Install cable trays to route cables if conduits cannot be located in these positions.
 3. Secure conduits to backboard if entering the room from overhead.
 4. Extend conduits 3 inch above finished floor.
 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- E. Backboards: Install backboards with 96 inch dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.
- F. All wiring to be installed in full conduit.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568-C Series of standards.
 - 2. Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems."
 - 3. Terminate all conductors; cable must not contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 - 4. Cables may not be spliced and must be continuous from terminal to terminal. Do not splice cable between termination, tap, or junction points.
 - 5. Cables serving a common system may be grouped in a common raceway. Install network cabling and control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
 - 6. Secure and support cables at intervals not exceeding 30 inch and not more than 6 inch from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
 - 8. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
 - 9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Do not use heat lamps for heating.
 - 10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Monitor cable pull tensions.
 - 11. Support: Do not allow cables to lie on removable ceiling tiles.
 - 12. Secure: Fasten securely in place with hardware specifically designed and installed so as to not damage cables.
 - 13. Provide strain relief.
 - 14. Keep runs short. Allow extra length for connecting to terminals. Do not bend cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
 - 15. Ground wire must be copper, and grounding methods must comply with IEEE C2. Demonstrate ground resistance.
- C. Balanced Twisted Pair Cable Installation:
 - 1. Comply with TIA-568-C.2.
 - 2. Install termination hardware as specified in Section 27 15 13 "Communications Copper Horizontal Cabling" unless otherwise indicated.
 - 3. Do not untwist balanced twisted pair cables more than 1/2 inch at the point of termination to maintain cable geometry.
- D. Installation of Control-Circuit Conductors:
 - 1. Install wiring in raceways.
 - 2. Use insulated spade lugs for wire and cable connection to screw terminals.
 - 3. Comply with requirements specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- E. Open-Cable Installation:
 - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - 2. Suspend copper cable not in a wireway or pathway a minimum of 8 inch above ceilings by cable supports not more than 30 inch apart.

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3. Cable must not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.
- F. Separation from EMI Sources:
 1. Comply with BICSI TDMM and TIA-569-D recommendations for separating unshielded copper voice and data communications cable from potential EMI sources including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment must be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 5 inch.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 12 inch.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 24 inch.
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment must be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: A minimum of 2-1/2 inch.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 6 inch.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 12 inch.
 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures must be as follows:
 - a. Electrical Equipment or Circuit Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment or Circuit Rating between 2 and 5 kVA: A minimum of 3 inch.
 - c. Electrical Equipment or Circuit Rating More Than 5 kVA: A minimum of 6 inch.
 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inch.
 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inch.

3.4 REMOVAL OF CONDUCTORS AND CABLES

- A. Remove abandoned conductors and cables. Abandoned conductors and cables are those installed that are not terminated at equipment and are not identified with a tag for future use.

3.5 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:
 1. Class 1 remote-control and signal circuits; No 14 AWG.
 2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
 3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.

3.6 FIRESTOPPING

- A. Comply with requirements in Section 07 84 13 "Penetration Firestopping."
- B. Comply with TIA-569-D, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping" Chapter.

3.7 GROUNDING

- A. For data communication wiring, comply with TIA-607-B and with BICSI TDMM, "Bonding and Grounding (Earthing)" Chapter.
- B. For control-voltage wiring and cabling, comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
- B. Identify data and communications system components, wiring, and cabling according to TIA-606-B; label printers must use label stocks, laminating adhesives, and inks complying with UL 969.
- C. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire must have a unique tag.

3.9 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments and inspect cabling connections to confirm compliance with TIA-568-C.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test cabling for direct-current loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination, but not after cross-connection.
 - a. Test instruments must meet or exceed applicable requirements in TIA-568-C.2. Perform tests with a tester that complies with performance requirements in its "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in its "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide or transfer the data from the instrument to the computer, save as text files, print, and submit.
- C. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 26 05 23

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes grounding and bonding systems and equipment.
- B. Section includes grounding and bonding systems and equipment, plus the following special applications:
 1. Underground distribution grounding.
 2. Ground bonding common with lightning protection system.
 3. Foundation steel electrodes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
 1. Test wells.
 2. Ground rods.
 3. Ground rings.
 4. Grounding arrangements and connections for separately derived systems.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
 1. In addition to items specified in Section 01 33 04 "Operation and Maintenance Manuals" include the following:
 - a. Plans showing as-built, dimensioned locations of system described in "Field Quality Control" Article, including the following:
 - 1) Test wells.
 - 2) Ground rods.
 - 3) Ground rings.

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- b.
 - 4) Grounding arrangements and connections for separately derived systems.
 - Instructions for periodic testing and inspection of grounding features at test wells ground rings grounding connections for separately derived systems based on NFPA 70B.
 - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - 2) Include recommended testing intervals.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Burndy; Hubbell Incorporated, Construction and Energy.
 - 2. ERICO; nVent.
 - 3. Harger Lightning & Grounding.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B3.
 - 2. Stranded Conductors: ASTM B8.
 - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 thick by 4 inches in cross section and a minimum of 2-feet wide, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Conduit Hubs: Mechanical type, terminal with threaded hub.
- G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- H. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- I. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- J. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- K. Straps: Solid copper, copper lugs. Rated for 600 A.
- L. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.
- M. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- N. Water Pipe Clamps:
 - 1. Mechanical type, two pieces with zinc-plated bolts.
 - a. Material: Die-cast zinc alloy.
 - b. Listed for direct burial.
 - 2. U-bolt type with malleable-iron clamp and copper ground connector rated for direct burial.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.
- B. Ground Plates: 1/4 inch thick, hot-dip galvanized.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install barecopper conductor, No. 3/0 AWG minimum.
 1. Bury at least 30 inches below grade.
 2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
- C. Grounding Conductors: Green-colored insulation with continuous yellow stripe.
- D. Isolated Grounding Conductors: Green-colored insulation with more than one 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.
- E. Grounding Bus: Install in electrical equipment rooms, data rooms, in rooms housing service equipment, and elsewhere as indicated.
 1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- F. 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.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper

conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

- C. **Grounding Connections to Manhole Components:** Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.

3.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- 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.
- C. **Isolated Equipment Enclosure Circuits:** For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

3.6 INSTALLATION

- A. **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.
- B. **Ground Bonding Common with Lightning Protection System:** Comply with NFPA 780 and UL 96 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.
- C. **Ground Rods:** Drive rods until tops are 2 inches 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. Use exothermic welds for all below-grade connections.
 3. For grounding electrode system, install at least three 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.

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- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 26 05 43 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.
 - 1. 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.
- E. 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 bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- F. 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; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by 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.
 - 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.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.
- I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
 - 1. Install tinned-copper conductor not less than No. 3/0 AWG for ground ring and for taps to building steel.
 - 2. Bury ground ring not less than 24 inches from building's foundation.
- J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.
- K. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections with the assistance of a factory-authorized service representative.
- B. Tests and Inspections:
 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. 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.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
 5. Substations and Pad-Mounted Equipment: 5 ohms.
 6. Manhole Grounds: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Steel slotted support systems.
 2. Conduit and cable support devices.
 3. Support for conductors in vertical conduit.
 4. Structural steel for fabricated supports and restraints.
 5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
 6. Fabricated metal equipment support assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Sockets.
 - e. Eye nuts.
 - f. Fasteners.
 - g. Anchors.
 - h. Saddles.
 - i. Brackets.
 2. Include rated capacities and furnished specialties and accessories.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. For fabrication and installation details for electrical hangers and support systems.
1. Hangers. Include product data for components.
 2. Slotted support systems.
 3. Equipment supports.
 4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
- C. Delegated-Design Submittal: For hangers and supports for electrical systems.
1. Include design calculations and details of hangers.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Structural members to which hangers and supports will be attached.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 45 00 "Quality Requirements," to design hanger and support system.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame Rating: Class 1.
 2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; Atkore International.
 - b. B-line; Eaton, Electrical Sector.
 - c. Unistrut; Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Galvanized steel.
 4. Channel Width: Selected for applicable load criteria.
 5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

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- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA 1.
 2. NECA 101
 3. NECA 102.
 4. NECA 105.
 5. NECA 111.
- B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 3/8 inch in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT IMC and RMC may be supported by openings through structure members, according to NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.

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- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. General contractor to provide per Division 03 30 00 "Cast-In-Place Concrete" requirements. Electrical contractor to coordinate approved equipment footprint and weight.
- B. Anchor equipment to concrete base as follows:
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Section 09 91 13 "Exterior Painting" Section 09 91 23 "Interior Painting" and Section 09 91 13 "Exterior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 1. Metal conduits and fittings.
 2. Nonmetallic conduits and fittings.
 3. Metal wireways and auxiliary gutters.
 4. Surface raceways.
 5. Boxes, enclosures, and cabinets.
 6. Handholes and boxes for exterior underground cabling.
- B. Related Requirements:
 1. Section 07 84 13 "Penetration Firestopping" for firestopping at conduit and box entrances.

1.3 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel conduit.
- C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 1. Structural members in paths of conduit groups with common supports.
 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Qualification Data: For professional engineer.

- C. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; Atkore International.
 - b. Southwire Company.
 - c. Wheatland Tube; Zekelman Industries.
 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. GRC: Comply with ANSI C80.1 and UL 6.
 4. IMC: Comply with ANSI C80.6 and UL 1242.
 5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: 0.040 inch, minimum.
 6. EMT: Comply with ANSI C80.3 and UL 797.
 7. FMC: Comply with UL 1; zinc-coated steel.
 8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; Atkore International.
 - b. Southwire Company.
 - c. Wheatland Tube; Zekelman Industries.
 2. Comply with NEMA FB 1 and UL 514B.
 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
 5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
 6. Fittings for EMT:
 - a. Material: Steel or die cast.
 - b. Type: compression.
 7. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 8. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. B-line; Eaton, Electrical Sector.
 2. Hoffman; nVent.

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3. Wiegmann; Hubbell Incorporated, Commercial, and Industrial.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12, as applicable, unless otherwise indicated, and sized according to NFPA 70.
 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Crouse-Hinds; Eaton, Electrical Sector.
 2. Hoffman; nVent.
 3. Wiremold; Legrand North America, LLC.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4 inches by 2-1/8 inches by 2-1/8 inches deep.
- J. Gangable boxes are allowed.
- K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12, as applicable, with continuous-hinge cover with flush latch unless otherwise indicated.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Fiberglass.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. Cabinets:

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1. NEMA 250, Type 1, Type 3R, or Type 12, as applicable, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armorcast Products Company.
 - b. Oldcastle Infrastructure Inc.; CRH Americas.
 - c. Quazite; Hubbell Incorporated, Power Systems.
 2. Standard: Comply with SCTE 77.
 3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 6. Cover Legend: Molded lettering indicating the system inside. .
 7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.5 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 1. Tests of materials shall be performed by an independent testing agency.
 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC RNC, Type EPC-40-PVC.
 - 2. Concealed Conduit, Aboveground: GRC RNC, Type EPC-40-PVC.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried concrete encased.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R or Type 4X SS as indicated on plans.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: GRC.
 - 2. Exposed, Not Subject to Severe Physical Damage: GRC.
 - 3. Exposed and Subject to Severe Physical Damage: GRC.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT or ENT .
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: GRC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 - 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
 - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz.
- F. Do not install aluminum conduits, boxes, or fittings.
- G. Install surface raceways only where indicated on Drawings.
- H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.

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- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from RNC, Type EPC-40-PVC, to PVC coated rigid steel conduit before rising above floor and up to a minimum of 3" above finished floor.
- M. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- N. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- O. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

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- Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- S. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- U. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Conduit extending from interior to exterior of building.
 - 4. Conduit extending into pressurized duct and equipment.
 - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - 6. Where otherwise required by NFPA 70.
- X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- Y. Expansion-Joint Fittings:
 - 1. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet. RMC conduits shall also be provided with bonding jumpers at expansion fittings.
 - 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 - 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.

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4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- Z. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- AA. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- BB. 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. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- CC. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- DD. Locate boxes so that cover or plate will not span different building finishes.
- EE. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- GG. Set metal floor boxes level and flush with finished floor surface.
- HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 21 00 "Earthwork, Excavation, Trenching and Backfilling" for pipe less than 6 inches in nominal diameter.
 2. Install backfill as specified in Section 31 21 00 "Earthwork, Excavation, Trenching and Backfilling."
 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 31 21 00 "Earthwork, Excavation, Trenching and Backfilling."
 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

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5. Install manufactured PVC coated 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 coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install handholes with bottom below frost line, Insert depth of frost line below grade at Project site below grade.
- E. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- F. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install Osleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

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3.7 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Round sleeves.
 - 2. Rectangular sleeves.
 - 3. Sleeve seal systems.
 - 4. Grout.
 - 5. Pourable sealants.
 - 6. Foam sealants.
- B. Related Requirements:
 - 1. 26 00 10 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
 - 2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
 - 3. Section 07 84 13 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.
- C. This section is applicable to all Division 27 and 28 sections.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ROUND SLEEVES

- A. Wall Sleeves, Steel:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, LLC.
 - b. CCI Piping Systems.
 - c. Flexicraft Industries.
 - 2. Description: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends and integral waterstop.
- B. Wall Sleeves, Cast Iron:

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1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. American Ductile Iron Pipe.
 - b. Flexicraft Industries.
 - c. McWane Ductile.
 2. Description: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop.
- C. Pipe Sleeves, PVC:
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. CCI Piping Systems.
 - b. GPT; an EnPro Industries company.
 - c. Metraflex Company (The).
 2. Description: ASTM D1785, Schedule 40.
- D. Molded Sleeves, PVC:
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. ABB, Electrification Products Division.
 - b. Arlington Industries, Inc.
 - c. Reliance Worldwide Corporation.
 2. Description: With nailing flange for attaching to wooden forms.
- E. Molded Sleeves, PE or PP:
1. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - a. Crete-Sleeve.
 2. Description: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sheet Metal Sleeves, Galvanized Steel, Round:
1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Benefast.
 - b. Specified Technologies, Inc.
 2. Description: Galvanized-steel sheet; thickness not less than 0.0239 inch; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

2.2 RECTANGULAR SLEEVES

- A. Sheet Metal Sleeves, Galvanized Steel, Rectangular:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Abesco Fire LLC.
 - b. Specified Technologies, Inc.
 - c. Wiremold; Legrand North America, LLC.
 2. Description:
 - a. Material: Galvanized sheet steel.
 - b. Minimum Metal Thickness:
 - 1) For sleeve cross-section rectangle perimeter less than 50 inch and with no side larger than 16 inch, thickness must be 0.052 inch.
 - 2) For sleeve cross-section rectangle perimeter not less than 50 inch or with one or more sides larger than 16 inch, thickness must be 0.138 inch.

2.3 SLEEVE SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. **Basis of Design: OZ Gedney type CSM seals.**
 2. Advance Products & Systems, Inc.
 3. CALPICO, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable or between raceway and cable.
1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 2. Pressure Plates: Carbon steel.
 3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 GROUT

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. W.R. Meadows, Inc.
- B. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
1. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
 2. Design Mix: 5000 psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

2.5 POURABLE SEALANTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carlisle SynTec Incorporated.
 - 2. GAF.
 - 3. Johns Manville; a Berkshire Hathaway company.
- B. Description: Single-component, neutral-curing elastomeric sealants of grade indicated below.
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

2.6 FOAM SEALANTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dow Chemical Company (The).
 - 2. Innovative Chemical Products (Building Solutions Group).
- B. Description: Multicomponent, liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam. Foam expansion must not damage cables or crack penetrated structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Sleeves for Conduits Penetrating Above-Grade, Non-Fire-Rated, Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall or floor so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - b. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 07 92 00 "Joint Sealants."
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4 inch annular clear space between sleeve and raceway or cable, unless sleeve seal system is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inch above finished floor level. Install sleeves during erection of floors.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Wall Assemblies:

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1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for wall assemblies.
- C. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seal systems. Size sleeves to allow for 1 inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.2 INSTALLATION OF RECTANGULAR SLEEVES AND SLEEVE SEALS

- A. Install sleeves in existing walls without compromising structural integrity of walls. Do not cut structural elements without reinforcing the wall to maintain the designed weight bearing and wall stiffness.
- B. Install conduits and cable with no crossings within the sleeve.
- C. Fill opening around conduits and cables with expanding foam without leaving voids.
- D. Provide metal sheet covering at both wall surfaces and finish to match surrounding surfaces. Metal sheet must be same material as sleeve.

3.3 INSTALLATION OF SLEEVE SEAL SYSTEMS

- A. Install sleeve seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

END OF SECTION 26 05 44

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Labels.
2. Bands and tubes.
3. Tapes and stencils.
4. Tags.
5. Signs.
6. Cable ties.
7. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E and Section 26 05 73.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. 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 field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Colors for 240-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - 4. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - 5. Color for Neutral: White or gray.
 - 6. Color for Equipment Grounds: Bare copper, Green, or Green with a yellow stripe.
 - 7. Colors for Isolated Grounds: Green with two or more yellow stripes.
- C. Raceways and Cables Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."
- D. Warning Label Colors:

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1. Identify system voltage with black letters on an orange background.
- E. Warning labels and signs 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."
- F. Equipment Identification Labels:
 1. Black letters on a white field.

2.3 LABELS

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
- B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.
- C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
 1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
 2. Marker for Labels:
 - a. Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - b. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- D. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil- thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
 1. Minimum Nominal Size:
 - a. 1-1/2 by 6 inches for raceway and conductors.
 - b. 3-1/2 by 5 inches for equipment.
 - c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

- A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

2.5 TAPES AND STENCILS

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
- C. Tape and Stencil: 4-inch- wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.
- D. Floor Marking Tape: 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.
- E. Underground-Line Warning Tape:
 - 1. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 - 2. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
- F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.6 TAGS

- A. Tags for conduits and tags for cables are to be rectangle, single hole PVC based machine printed as manufactured by Uticom Systems Inc., or similar manufacturer, with the conduit number or cable number printed in black and the background in the following colors:
 - a. > 5KV conduit - Orange.
 - b. <600V (power) conduit - Red.
 - c. Control conduit (120V or 24V) - Purple.
 - d. Instrumentation conduit (4-20ma) - Blue.
 - e. Data and Communication conduit - Yellow.
 - f. Intrinsically safe conduit- Light Blue.
- B. Handwritten tags of any type are not permitted.
- C. For panel labels and other equipment labels list the equipment name , the voltage and where it is fed from.

2.7 SIGNS

- A. Baked-Enamel Signs:
 - 1. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. 1/4-inch grommets in corners for mounting.
 - 3. Nominal Size: 7 by 10 inches.
- B. Metal-Backed Butyrate Signs:
 - 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
 - 2. 1/4-inch grommets in corners for mounting.
 - 3. Nominal Size: 10 by 14 inches.
- C. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Engraved legend.
 - 2. Thickness:
 - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
 - b. For signs larger than 20 sq. in., 1/8 inch thick.
 - c. Engraved legend with black letters on white face.
 - d. Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting.
 - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 Deg F according to ASTM D638: 7000 psi.

3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. 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

3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
 1. Secure tight to surface of conductor, cable, or raceway.

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- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "POWER."
 - 3. "UPS."
- M. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
- O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Labels:
 - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text are required, use labels 2 inches high.
- Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
 - 1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

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- V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- W. Underground Line Warning Tape:
 - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
 - 2. Limit use of underground-line warning tape to direct-buried cables.
 - 3. Install underground-line warning tape for direct-buried cables and cables in raceways.
- X. Metal Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using UV-stabilized cable ties.
- Y. Nonmetallic Preprinted Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using UV-stabilized cable ties.
- Z. Write-on Tags:
 - 1. Place in a location with high visibility and accessibility.
 - 2. Secure using UV-stabilized cable ties.
- AA. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on minimum 1-1/2-inch- high sign; where two lines of text are required, use signs minimum 2 inches high.
- BB. Metal-Backed Butyrate Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.
- CC. Laminated Acrylic or Melamine Plastic Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high sign; where two lines of text are required, use labels 2 inches high.
- DD. Cable Ties: General purpose, for attaching tags, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch- high, black letters on 20-inch centers.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, and at 30-foot maximum intervals.
- D. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Machine printed PVC slip-on sleeve type.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- E. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive vinyl tape applied in bands.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "POWER."
 - 3. "UPS."
- G. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use Machine printed PVC slip-on sleeve type to identify the phase.
 - 1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- H. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.
- I. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use Machine printed PVC slip-on sleeve type with the conductor or cable designation, origin, and destination.
- J. Control-Circuit Conductor Termination Identification: For identification at terminations, provide Machine printed PVC slip-on sleeve type with the conductor designation.

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- K. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- L. Auxiliary Electrical Systems Conductor Identification: Machine printed PVC slip-on sleeve type that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- M. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- N. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within 12 inches 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.
- O. Workspace Indication: Apply floor marking tape or tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- P. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- Q. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting:] Baked-enamel warning signs.
 - 1. Apply to exterior of door, cover, or other access.
 - 2. For 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.
- R. Arc Flash Warning Labeling: Self-adhesive labels.
- S. Operating Instruction Signs: Baked-enamel warning signs.
- T. Emergency Operating Instruction Signs: Baked-enamel warning signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- U. Equipment Identification Labels:
 - 1. Indoor Equipment: Baked-enamel signs.
 - 2. Outdoor Equipment: Laminated acrylic or melamine sign.
 - 3. Equipment to Be Labeled:

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- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Switchgear.
- e. Switchboards.
- f. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- g. Substations.
- h. Emergency system boxes and enclosures.
- i. Motor-control centers.
- j. Enclosed switches.
- k. Enclosed circuit breakers.
- l. Enclosed controllers.
- m. Variable-speed controllers.
- n. Push-button stations.
- o. Power-transfer equipment.
- p. Contactors.
- q. Remote-controlled switches, dimmer modules, and control devices.
- r. Battery-inverter units.
- s. Battery racks.
- t. Power-generating units.
- u. Monitoring and control equipment.
- v. UPS equipment.

**V. Labels using adhesive or self-adhesive wrap around type are not acceptable.
Handwritten labels are not acceptable.**

END OF SECTION 26 05 53

SECTION 26 05 73.13 - SHORT-CIRCUIT STUDIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.3 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled. Existing to remain items shall remain functional throughout the construction period.
- B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.
- C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.
- E. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.
- G. SCCR: Short-circuit current rating.
- H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- I. Single-Line Diagram: See "One-Line Diagram."

1.4 ACTION SUBMITTALS

- A. Product Data:
 1. For computer software program to be used for studies.
 2. Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.

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- a. Short-circuit study input data, including completed computer program input data sheets.
- b. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
 - 1) Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
 - 2) Revised one-line diagram, reflecting field investigation results and results of short-circuit study.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 1. For Power Systems Analysis Software Developer.
 2. For Power System Analysis Specialist.
 3. For Field Adjusting Agency.
- B. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
 1. For overcurrent protective devices to include in emergency, operation, and maintenance manuals.
 2. The following are from the Short-Circuit Study Report:
 - a. Final one-line diagram.
 - b. Final Short-Circuit Study Report.
 - c. Short-circuit study data files.
 - d. Power system data.

1.7 QUALITY ASSURANCE

- A. Study shall be performed using commercially developed and distributed software designed specifically for power system analysis.
- B. Software algorithms shall comply with requirements of standards and guides specified in this Section.
- C. Manual calculations are unacceptable.
 1. Power System Analysis Software Qualifications: Computer program shall be designed to perform short-circuit studies or have a function, component, or add-on module designed to perform short-circuit studies.
 2. Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- D. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

- E. Short-Circuit Study Certification: Short-Circuit Study Report shall be signed and sealed by Power Systems Analysis Specialist.
- F. Field Adjusting Agency Qualifications:
 - 1. Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
 - 2. A member company of NETA.
 - 3. Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE DEVELOPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. SKM
- B. Comply with IEEE 399 and IEEE 551.
 - 1. Analytical features of power systems analysis software program shall have capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram of modeled power system, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Conductor types, sizes, and lengths.
 - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center, and panelboard designations and ratings.
 - 6. Derating factors and environmental conditions.
 - 7. Any revisions to electrical equipment required by the study.
- D. Comments and recommendations for system improvements or revisions in a written document, separate from one-line diagram.
- E. Protective Device Evaluation:
 - 1. Evaluate equipment and protective devices and compare to available short-circuit currents. Verify that equipment withstand ratings exceed available short-circuit current at equipment installation locations.
 - 2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
 - 3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
 - 4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in standards to 1/2-cycle symmetrical fault current.

5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
- F. Short-Circuit Study Input Data:
1. One-line diagram of system being studied.
 2. Power sources available.
 3. Manufacturer, model, and interrupting rating of protective devices.
 4. Conductors.
 5. Transformer data.
- G. Short-Circuit Study Output Reports:
1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. Equivalent impedance.
 2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. Calculated asymmetrical fault currents:
 - 1) Based on fault-point X/R ratio.
 - 2) Based on calculated symmetrical value multiplied by 1.6.
 - 3) Based on calculated symmetrical value multiplied by 2.7.
 3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.
 - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

PART 3 - EXECUTION

3.1 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the study.
 1. Verify completeness of data supplied on one-line diagram. Call any discrepancies to Architect's attention.
 2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
 3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. Qualifications of technicians and engineers shall be as defined by NFPA 70E.
- B. Gather and tabulate the required input data to support the short-circuit study. Comply with requirements in Section 01 78 39 "Contract Closeout and Execution Requirements" for recording

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circuit protective device characteristics. Record data on a Record Document copy of one-line diagram. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:

1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Power sources and ties.
4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
7. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
8. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
9. Motor horsepower and NEMA MG 1 code letter designation.
10. Conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
11. Derating factors.

3.2 SHORT-CIRCUIT STUDY

- A. Perform study following the general study procedures contained in IEEE 399.
- B. Calculate short-circuit currents according to IEEE 551.
- C. Base study on device characteristics supplied by device manufacturer.
- D. Extent of electrical power system to be studied is indicated on Drawings.
- E. Begin short-circuit current analysis at the service, extending down to system overcurrent protective devices as follows:
 1. To the 480/277-volt side of the unit substations. US1 and US2.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. Include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for the fault-current dc decrement to address asymmetrical requirements of interrupting equipment.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and a single line-to-ground fault at each equipment indicated on one-line diagram.
 1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- I. Include in the report identification of any protective device applied outside its capacity.

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END OF SECTION 26 05 73.13

SECTION 26 05 73.16 - COORDINATION STUDIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.
 - 1. Study results shall be used to determine coordination of series-rated devices.

1.3 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled. Existing to remain items shall remain functional throughout the construction period.
- B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.
- C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.
- E. Power System Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion of the circuit from the system.
- G. SCCR: Short-circuit current rating.
- H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- I. Single-Line Diagram: See "One-Line Diagram."

1.4 ACTION SUBMITTALS

- A. Product Data:

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1. For computer software program to be used for studies.
2. Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
 - a. Coordination-study input data, including completed computer program input data sheets.
 - b. Study and equipment evaluation reports.
3. Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.
 - a. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 1. For Power System Analysis Software Developer.
 2. For Power Systems Analysis Specialist.
 3. For Field Adjusting Agency.
- B. Product Certificates: For overcurrent protective device coordination study software, certifying compliance with IEEE 399.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For overcurrent protective devices to include in emergency, operation, and maintenance manuals.
 1. The following are from the Coordination Study Report:
 - a. Final one-line diagram.
 - b. Final protective device coordination study.
 - c. Coordination study data files.
 - d. List of all protective device settings.
 - e. Time-current coordination curves.
 - f. Power system data.

1.7 QUALITY ASSURANCE

- A. Studies shall be performed using commercially developed and distributed software designed specifically for power system analysis.
- B. Software algorithms shall comply with requirements of standards and guides specified in this Section.
- C. Manual calculations are unacceptable.
- D. Power System Analysis Software Qualifications:
 1. Computer program shall be designed to perform coordination studies or have a function, component, or add-on module designed to perform coordination studies.

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2. Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- E. Power Systems Analysis Specialist Qualifications: Professional engineer licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- F. Field Adjusting Agency Qualifications:
 1. Employer of a NETA ETT-Certified Technician Level III responsible for all field adjusting of the Work.
 2. A member company of NETA.
 3. Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 POWER SYSTEM ANALYSIS SOFTWARE DEVELOPERS

- A. Comply with IEEE 242 and IEEE 399.
- B. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- C. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.
 1. Optional Features:
 - a. Arcing faults.
 - b. Simultaneous faults.
 - c. Explicit negative sequence.
 - d. Mutual coupling in zero sequence.

2.2 COORDINATION STUDY REPORT CONTENTS

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram of modeled power system, showing the following:
 1. Protective device designations and ampere ratings.
 2. Conductor types, sizes, and lengths.
 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 4. Motor and generator designations and kVA ratings.
 5. Switchgear, switchboard, motor-control center, and panelboard designations.
 6. Any revisions to electrical equipment required by the study.
 7. Study Input Data: As described in "Power System Data" Article.

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- a. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."
- D. Protective Device Coordination Study:
 - 1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
 - a. Phase and Ground Relays:
 - 1) Device tag.
 - 2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
 - 3) Recommendations on improved relaying systems, if applicable.
 - b. Circuit Breakers:
 - 1) Adjustable pickups and time delays (long time, short time, and ground).
 - 2) Adjustable time-current characteristic.
 - 3) Adjustable instantaneous pickup.
 - 4) Recommendations on improved trip systems, if applicable.
 - c. Fuses: Show current rating, voltage, and class.
- E. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
 - 1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
 - 2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
 - 3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
 - 4. Plot the following listed characteristic curves, as applicable:
 - a. Power utility's overcurrent protective device.
 - b. Medium-voltage equipment overcurrent relays.
 - c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 - d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
 - e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
 - f. Cables and conductors damage curves.
 - g. Ground-fault protective devices.
 - h. Motor-starting characteristics and motor damage points.
 - i. Generator short-circuit decrement curve and generator damage point.
 - j. The largest feeder circuit breaker in each motor-control center and panelboard.
 - 5. Maintain selectivity for tripping currents caused by overloads.
 - 6. Maintain maximum achievable selectivity for tripping currents caused by overloads on series-rated devices.
 - 7. Provide adequate time margins between device characteristics such that selective operation is achieved.
 - 8. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance of the Work. Devices to be coordinated are indicated on Drawings.
 - 1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the overcurrent protective device study.
 - 1. Verify completeness of data supplied in one-line diagram on Drawings. Call any discrepancies to Architect's attention.
 - 2. For equipment included as Work of this Project, use characteristics submitted under provisions of action submittals and information submittals for this Project.
 - 3. For equipment that is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. Qualifications of technicians and engineers shall be as defined by NFPA 70E.
- B. Gather and tabulate all required input data to support the coordination study. List below is a guide. Comply with recommendations in IEEE 551 for the amount of detail required to be acquired in the field. Field data gathering shall be under direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:
 - 1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 - 2. Electrical power utility impedance at the service.
 - 3. Power sources and ties.
 - 4. Short-circuit current at each system bus (three phase and line to ground).
 - 5. Full-load current of all loads.
 - 6. Voltage level at each bus.
 - 7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
 - 8. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
 - 9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
 - 10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
 - 11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
 - 12. Maximum demands from service meters.
 - 13. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
 - 14. Motor horsepower and NEMA MG 1 code letter designation.
 - 15. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).

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16. Medium-voltage cable sizes, lengths, conductor material, cable construction, metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).
17. Data sheets to supplement electrical distribution system one-line diagram, cross-referenced with tag numbers on diagram, showing the following:
 - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
 - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
 - d. Generator thermal-damage curve.
 - e. Ratings, types, and settings of utility company's overcurrent protective devices.
 - f. Special overcurrent protective device settings or types stipulated by utility company.
 - g. Time-current-characteristic curves of devices indicated to be coordinated.
 - h. Manufacturer, frame size, interrupting rating in amperes root mean square (rms) symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
 - j. Switchgear, switchboards, motor-control centers, and panelboards ampacity, and SCCR in amperes rms symmetrical.
 - k. Identify series-rated interrupting devices for a condition where the available fault current is greater than the interrupting rating of downstream equipment. Obtain device data details to allow verification that series application of these devices complies with NFPA 70 and UL 489 requirements.

3.3 COORDINATION STUDY

- A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- B. Comply with IEEE 399 for general study procedures.
- C. Base study on device characteristics supplied by device manufacturer.
- D. Extent of electrical power system to be studied is indicated on Drawings.
- E. Begin analysis at the service, extending down to system overcurrent protective devices as follows:
 1. To the low side of the transformer in the unit substation. US1 and US2.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. Transformer Primary Overcurrent Protective Devices:
 1. Device shall not operate in response to the following:
 - a. Inrush current when first energized.
 - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
 - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
 2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.

- H. Motor Protection:
 - 1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
 - 2. Select protection for motors served at voltages more than 600 V according to IEEE 620.
- I. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.
- J. Generator Protection: Select protection according to manufacturer's written instructions and to IEEE 242.
- K. Include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and apply to low- and medium-voltage, three-phase ac systems. Also account for fault-current dc decrement, to address asymmetrical requirements of interrupting equipment.
- L. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and a single line-to-ground fault at each equipment indicated on one-line diagram.
 - 1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- M. Protective Device Evaluation:
 - 1. Evaluate equipment and protective devices and compare to short-circuit ratings.
 - 2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
 - 3. Any application of series-rated devices shall be recertified, complying with requirements in NFPA 70.
 - 4. Include in the report identification of any protective device applied outside its capacity.

3.4 LOAD-FLOW AND VOLTAGE-DROP STUDY

- A. Perform a load-flow and voltage-drop study to determine the steady-state loading profile of the system. Analyze power system performance two times as follows:
 - 1. Determine load flow and voltage drop based on full-load currents obtained in "Power System Data" Article.
 - 2. Determine load flow and voltage drop based on 80 percent of the design capacity of load buses.
 - 3. Prepare load-flow and voltage-drop analysis and report to show power system components that are overloaded, or might become overloaded; show bus voltages that are less than as prescribed by NFPA 70.

3.5 MOTOR-STARTING STUDY

- A. Perform a motor-starting study to analyze the transient effect of system's voltage profile during motor starting. Calculate significant motor-starting voltage profiles and analyze the effects of motor starting on the power system stability.
- B. Prepare the motor-starting study report, noting light flicker for limits proposed by IEEE 141 and voltage sags so as not to affect operation of other utilization equipment on system supplying the motor.

3.6 FIELD ADJUSTING

- A. Adjust relay and protective device settings according to recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of equipment manufacturer under the "Startup and Acceptance Testing" contract portion.
- B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.
- C. Testing and adjusting shall be by a full-time employee of the Field Adjusting Agency, who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification.
 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.

3.7 DEMONSTRATION

- A. Refer to Section 01 71 16 "Manufacturer Acceptance of Conditions" for requirements of training and demonstrations. Engage Power Systems Analysis Specialist to train Owner's maintenance personnel in the following:
 1. Acquaint personnel in fundamentals of operating the power system in normal and emergency modes.
 2. Hand-out and explain the coordination study objectives, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting time-current coordination curves.
 3. For Owner's maintenance staff certified as NETA ETT-Certified Technicians Level III or NICET Electrical Power Testing Level III Technicians, teach how to adjust, operate, and maintain overcurrent protective device settings.

END OF SECTION 26 05 73.16

SECTION 26 05 73.19 - ARC-FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.3 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- B. Field Adjusting Agency: An independent electrical testing agency with full-time employees and the capability to adjust devices and conduct testing indicated and that is a member company of NETA.
- C. One-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- D. Power System Analysis Software Developer: An entity that commercially develops, maintains, and distributes computer software used for power system studies.
- E. Power Systems Analysis Specialist: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located.
- F. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.
- G. SCCR: Short-circuit current rating.
- H. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.
- I. Single-Line Diagram: See "One-Line Diagram."

1.4 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.

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- B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form:
 1. Arc-flash study input data, including completed computer program input data sheets.
 2. Arc-flash study report; signed, dated, and sealed by Power Systems Analysis Specialist.
 3. Submit study report for action prior to receiving final approval of distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that selection of devices and associated characteristics is satisfactory.
- C. Arc-flash warning labels shall be submitted for approval prior to installation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 1. For Power Systems Analysis Software Developer.
 2. For Power System Analysis Specialist.
 3. For Field Adjusting Agency.
- B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
 1. Provide maintenance procedures in equipment manuals according to requirements in NFPA 70E.

1.7 QUALITY ASSURANCE

- A. Study shall be performed using commercially developed and distributed software designed specifically for power system analysis.
- B. Software algorithms shall comply with requirements of standards and guides specified in this Section.
- C. Manual calculations are unacceptable.
- D. Power System Analysis Software Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 1. Computer program shall be designed to perform arc-flash analysis or have a function, component, or add-on module designed to perform arc-flash analysis.
 2. Computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- E. Power Systems Analysis Specialist Qualifications: Professional engineer in charge of performing the arc-flash study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.

- F. Arc-Flash Study Certification: Arc-Flash Study Report shall be signed and sealed by Power Systems Analysis Specialist.
- G. Field Adjusting Agency Qualifications:
 - 1. Employer of a NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification responsible for all field adjusting of the Work.
 - 2. A member company of NETA.
 - 3. Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Comply with IEEE 1584 and NFPA 70E.
- B. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary of study findings.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of results.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Conductor types, sizes, and lengths.
 - 3. Transformer kilovolt ampere (kVA) and voltage ratings, including derating factors and environmental conditions.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center, panelboard designations, and ratings.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output Data: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."
- F. Protective Device Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 05 73.16 "Coordination Studies."
- G. Arc-Flash Study Output Reports:
 - 1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each equipment location included in the report:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.

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- f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.
- H. Incident Energy and Flash Protection Boundary Calculations:
- 1. Arcing fault magnitude.
 - 2. Protective device clearing time.
 - 3. Duration of arc.
 - 4. Arc-flash boundary.
 - 5. Restricted approach boundary.
 - 6. Limited approach boundary.
 - 7. Working distance.
 - 8. Incident energy.
 - 9. Hazard risk category.
 - 10. Recommendations for arc-flash energy reduction.
- I. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of computer printout.

2.3 ARC-FLASH WARNING LABELS

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems" for self-adhesive equipment labels. Produce a 3.5-by-5-inch self-adhesive equipment label for each work location included in the analysis.
- B. Label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
 - 1. Location designation.
 - 2. Nominal voltage.
 - 3. Protection boundaries.
 - a. Arc-flash boundary.
 - b. Restricted approach boundary.
 - c. Limited approach boundary.
 - 4. Arc flash PPE category.
 - 5. Required minimum arc rating of PPE in Cal/cm squared.
 - 6. Available incident energy.
 - 7. Working distance.
 - 8. Engineering report number, revision number, and issue date.
- C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- B. Preparatory Studies: Perform the Short-Circuit and Protective Device Coordination studies prior to starting the Arc-Flash Hazard Analysis.
 - 1. Short-Circuit Study Output: As specified in "Short-Circuit Study Output Reports" Paragraph in "Short-Circuit Study Report Contents" Article in Section 26 05 73.13 "Short-Circuit Studies."
 - 2. Coordination Study Report Contents: As specified in "Coordination Study Report Contents" Article in Section 26 05 73.16 "Coordination Studies."
- C. Calculate maximum and minimum contributions of fault-current size.
 - 1. Maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
 - 2. Calculate arc-flash energy at 85 percent of maximum short-circuit current according to IEEE 1584 recommendations.
 - 3. Calculate arc-flash energy at 38 percent of maximum short-circuit current according to NFPA 70E recommendations.
 - 4. Calculate arc-flash energy with the utility contribution at a minimum and assume no motor contribution.
- D. Calculate the arc-flash protection boundary and incident energy at locations in electrical distribution system where personnel could perform work on energized parts.
- E. Include medium- and low-voltage equipment locations, except equipment rated 240 V ac or less fed from transformers less than 125 kVA.
- F. Calculate the limited, restricted, and prohibited approach boundaries for each location.
- G. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators shall be decremented as follows:
 - 1. Fault contribution from induction motors shall not be considered beyond three to five cycles.
 - 2. Fault contribution from synchronous motors and generators shall be decayed to match the actual decrement of each as closely as possible (for example, contributions from permanent magnet generators will typically decay from 10 per unit to three per unit after 10 cycles).
- H. Arc-flash energy shall generally be reported for the maximum of line or load side of a circuit breaker. However, arc-flash computation shall be performed and reported for both line and load side of a circuit breaker as follows:
 - 1. When the circuit breaker is in a separate enclosure.
 - 2. When the line terminals of the circuit breaker are separate from the work location.
- I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.

3.3 POWER SYSTEM DATA

- A. Obtain all data necessary for conduct of the arc-flash hazard analysis.

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1. Verify completeness of data supplied on one-line diagram on Drawings. Call discrepancies to Architect's attention.
 2. For new equipment, use characteristics from approved submittals under provisions of action submittals and information submittals for this Project.
 3. For existing equipment, whether or not relocated, obtain required electrical distribution system data by field investigation and surveys conducted by qualified technicians and engineers.
- B. Electrical Survey Data: Gather and tabulate the following input data to support study. Comply with recommendations in IEEE 1584 and NFPA 70E as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study, and shall be by the engineer or its representative who holds NETA ETT-Certified Technician Level III or NICET Electrical Power Testing Level III certification. Data include, but are not limited to, the following:
1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Obtain electrical power utility impedance or available short circuit current at the service.
 3. Power sources and ties.
 4. Short-circuit current at each system bus (three phase and line to ground).
 5. Full-load current of all loads.
 6. Voltage level at each bus.
 7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
 8. For reactors, provide manufacturer and model designation, voltage rating and impedance.
 9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
 10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
 11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
 12. Busway manufacturer and model designation, current rating, impedance, lengths, size, and conductor material.
 13. Motor horsepower and NEMA MG 1 code letter designation.
 14. Low-voltage conductor sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
 15. Medium-voltage conductor sizes, lengths, conductor material, conductor construction and metallic shield performance parameters, and conduit material (magnetic or nonmagnetic).

3.4 LABELING

- A. Apply one arc-flash label on the front cover of each section of the equipment for each equipment included in the study. Base arc-flash label data on highest values calculated at each location.
- B. Each piece of equipment listed below shall have an arc-flash label applied to it:
1. Motor-control center.
 2. Low-voltage switchboard.
 3. Switchgear.
 4. Medium-voltage switch.
 5. Medium voltage transformers
 6. Low voltage transformers.
 7. Panelboard and safety switch over 250 V.

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8. Applicable panelboard and safety switch under 250 V.
 9. Control panel.
- C. Note on record Drawings the location of equipment where the personnel could be exposed to arc-flash hazard during their work.
1. Indicate arc-flash energy.
 2. Indicate protection level required.

3.5 APPLICATION OF WARNING LABELS

- A. Install arc-flash warning labels under the direct supervision and control of Power System Analysis Specialist.

3.6 DEMONSTRATION

- A. Refer to Section 01 71 16 "Manufacturer Acceptance of Conditions" for requirements of training and demonstrations. Engage Power Systems Analysis Specialist to train Owner's maintenance personnel in potential arc-flash hazards associated with working on energized equipment and the significance of arc-flash warning labels.

END OF SECTION 26 05 73.19

SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes Cx process requirements for the following electrical components, systems, assemblies, and equipment:
- Lightning protection systems.
 - Grounding systems.
 - Grounding systems.
 - Generators.
- B. Related Requirements:
- Section 01 91 13 "General Commissioning Requirements" for general Cx process requirements and CxA responsibilities.

1.3 DEFINITIONS

- A. BoD: Basis-of-Design Document, as defined in Section 01 91 13 "General Commissioning Requirements."
- B. Cx: Commissioning, as defined in Section 01 91 13 "General Commissioning Requirements."
- C. CxA: Commissioning Authority, as defined in Section 01 91 13 "General Commissioning Requirements."
- D. Essential Power Systems: A power system that a facility transitions to in the absence of Normal power. This power includes all systems classified as "standby" or "emergency," including "legally required."
- E. Low Voltage: 600 V and below.
- F. Medium Voltage: 601 V and above.
- G. Normal Power Systems: A power system that provides primary power to a facility.
- H. OPR: Owner's Project Requirements, as defined in Section 01 91 13 "General Commissioning Requirements."
- I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For electrical testing technician.
- B. Construction Checklists: Draft construction checklists will be created by CxA for Contractor review.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For electrical systems and components to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Testing Technician Qualifications: Technicians to perform electrical Construction Checklist verification tests, Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
 1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate's degree in electrical systems, or similar field. Degree may be offset by three years' experience as an apprentice or a journey-level electrician. Generally, required knowledge includes electrical and HVAC concepts, building operations, and application and use of tools and instrumentation to measure performance of electrical equipment, assemblies, and systems.
 2. Minimum three years' experience installing, servicing, and operating systems manufactured by approved manufacturer.
- B. Testing Equipment and Instrumentation Quality and Calibration: For test equipment and instrumentation required to perform electrical Cx work, perform the following:
 1. Submit test equipment and instrumentation list. For each equipment or instrument, identify the following:
 - a. Equipment/instrument identification number.
 - b. Planned Cx application or use.
 - c. Manufacturer, make, model, and serial number.
 - d. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.
 2. Test equipment and instrumentation shall meet the following criteria:
 - a. Capable of testing and measuring performance within the specified acceptance criteria.
 - b. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
 - c. Be maintained in good repair and operating condition throughout duration of use on Project.
 - d. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.
- C. Proprietary Test Instrumentation and Tools:
 1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:
 - a. Submit proprietary instrumentation and tools list. For each instrument or tool, identify the following:
 - 1) Instrument or tool identification number.

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- 2) Equipment schedule designation of equipment for which the instrument or tool is required.
 - 3) Manufacturer, make, model, and serial number.
 - 4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.
- b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
 - c. Electrical proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION CHECKLISTS

- A. Prepare detailed construction checklists for electrical systems, subsystems, equipment, and components. Complete and submit construction checklists.

3.2 CONSTRUCTION CHECKLIST REVIEW

- A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.
- B. Return draft Construction Checklist review comments within 10 days of receipt.
- C. When review comments have been resolved, CxA will provide final construction checklists, marked "Approved for Use, (date)."
- D. Use only construction checklists, marked "Approved for Use, (date)."

3.3 GENERAL TESTING REQUIREMENTS

- A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved Shop Drawings and submittals.
- B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.
- C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

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- E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.
- F. Construction Checklists: Prepare and submit detailed construction checklists for electrical systems, subsystems, equipment, and components.
 - 1. Contributors to development of construction checklists shall include, but are not limited to, the following:
 - a. Electrical systems and equipment installers.
 - b. Electrical instrumentation and controls installers.
- G. Perform tests using design conditions, whenever possible.
 - 1. Simulated conditions may, with approval of Owner's representative, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
 - 2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
 - 3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.
- H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to Owner's representative. After deficiencies are resolved, reschedule tests.
- I. If seasonal testing is specified, complete appropriate initial performance tests and documentation and schedule seasonal tests.
- J. Coordinate schedule with, and perform Cx activities at the direction of the CxA.
- K. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Sections specifying electrical systems and equipment.
- L. Provide technicians, instrumentation, tools, and equipment to complete and document the following:
 - 1. Performance tests.
 - 2. Demonstration of a sample of performance tests.
 - 3. Cx tests.
 - 4. Cx test demonstrations.

3.4 Cx TESTS FOR ELECTRICAL SYSTEMS

- A. Verification of Normal Power System Operation:
 - 1. Prerequisites: Acceptance of results for construction checklists for Division 26 electrical components associated with Normal power system.
 - 2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
 - 3. Test Purpose: Verify operation of Normal power system.
 - 4. Test Conditions: Energize components of Normal power system, one at a time.
 - 5. Acceptance Criteria: Proper operation of Normal power system over a 24-hour period.
- B. Verification of Essential Power System Operation:
 - 1. Prerequisites:

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- a. Acceptance of results for construction checklists for Division 26 electrical components associated with Essential power system.
 - b. Completion of "Verification of Normal Power System Operation" tests.
 - 2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
 - 3. Test Purpose: Verify operation of Essential power system.
 - 4. Test Conditions:
 - a. Energize components of Normal power system.
 - b. Simulate a failure of Normal power system.
 - 5. Acceptance Criteria: Transfer of power from Normal to Essential power system within OPR.
- C. Test Purpose: Verify operation of control and monitoring systems for Normal and Essential power systems.
- D. Test Conditions:
- 1. Energize components of Normal power system.
 - 2. Test operation of equipment.
- E. Acceptance Criteria: Operation of equipment according to OPR.

END OF SECTION 26 08 00

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Panelboards.

1.2 DEFINITIONS

- A. MCCB: Molded-case circuit breaker.
- B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Include dimensioned plans, elevations, sections, and details.
 - 2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.

1.4 FIELD CONDITIONS

- A. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 - 1. Ambient temperatures within limits specified.
 - 2. Altitude not exceeding 1000 feet.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
 - 1. Panelboard Warranty Period: 24 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA PB 1.
- D. Comply with NFPA 70.
- E. Enclosures: Surface-mounted, dead-front cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Other Wet or Damp Indoor Locations: NEMA 250
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions. Trims shall cover all live parts and shall have no exposed hardware.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
- F. Incoming Mains Location: Bottom.
- G. Phase, Neutral, and Ground Buses: Hard drawn copper, 98 percent conductivity.
- H. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
- I. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
- J. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- K. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include label or manual with size and type of allowable upstream and branch devices listed and labeled by an NRTL for series-connected short-circuit rating.
- L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.3 POWER PANELBOARDS

- A. Panelboards: NEMA PB 1.
- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- C. Mains: Lugs only.
- D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: bolt-on circuit breakers.

2.4 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Directory card inside panelboard door.

2.5 ACCESSORY COMPONENTS AND FEATURES

- A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install panelboards and accessories according to NEMA PB 1.1.
- C. Mount panelboard cabinet plumb and rigid without distortion of box.
- D. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- E. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
- F. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- G. Install filler plates in unused spaces.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
 1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

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END OF SECTION 262416

PANELBOARDS
26 24 16-5

SECTION 26 32 13.13 - DIESEL-ENGINE-DRIVEN GENERATOR SETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes packaged engine generators used to supply non-emergency power, with the following features:
 1. Diesel engine.
 2. Diesel fuel-oil system.
 3. Control and monitoring.
 4. Generator overcurrent and fault protection.
 5. Generator, exciter, and voltage regulator.
 6. Vibration isolation devices.
- B. Related Requirements:
 1. Section 26 36 00 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 1. Include plans and elevations for engine generator and other components specified. Indicate access requirements affected by height of subbase fuel tank.
 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Identify fluid drain ports and clearance requirements for proper fluid drain.
 4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
 6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for engine generators and functional relationship between all electrical components.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for engine generator, accessories, and components, from manufacturer.
- B. Source quality-control reports.

- C. Field quality-control reports.
- D. Warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers must have been in business no less than 10 years.
- B. Source Limitations: Obtain packaged engine generators and auxiliary components through one source from a single manufacturer. This includes both gaseous and diesel generators.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Engine generator housing, engine generator, batteries, battery racks, silencers, sound attenuating equipment, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Component Importance Factor: 1.5.
- B. B11 Compliance: Comply with B11.19.

- C. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.
 - 3. Comply with NFPA 99.
 - 4. Comply with NFPA 110 requirements for Level [1] [2] EPSS.
- D. UL Compliance: Comply with UL 2200.
- E. Engine Exhaust Emissions: Comply with EPA Tier 4 requirements and applicable state and local government requirements.
- F. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- G. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature 5 to 104 deg F.
 - 2. Relative Humidity: Zero to 95 percent.
 - 3. Altitude: Sea level to 1000 feet.
- H. Unusual Service Conditions: Engine generator equipment and installation are required to operate under the following conditions:
 - 1. High salt-dust content in the air due to sea-spray evaporation .

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Power Rating: Standby.
- D. Overload Capacity: 110 percent of service load for 1 hour in 12 consecutive hours.
- E. EPSS Class: Engine generator shall be classified as a Class 96 according to NFPA 110.
- F. Power Factor: 0.8, lagging.
- G. Frequency: 60 Hz.
- H. Voltage: as depicted on contract drawings
- I. Phase: as depicted on contract drawings.
- J. Induction Method: Turbocharged.

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- K. Governor: Adjustable isochronous, with speed sensing.
- L. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.
- M. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
 - 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- N. Engine Generator Performance:
 - 1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
 - 2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
 - 3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
 - 4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 - 5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
 - 6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
 - 7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
 - 8. Start Time:
 - a. Comply with NFPA 110, Type 10 system requirements.
 - b. 10seconds.

2.4 DIESEL ENGINE

- A. Fuel: ASTM D975, diesel fuel oil, Grade 2-D S15.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid-mounted.

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1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499 and with NFPA 110 requirements for Level 1 equipment for heater capacity].
- E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.
1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, UV-, and abrasion-resistant fabric.
 - a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
1. Minimum sound attenuation of 25 dB at 500 Hz.
 2. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall be **78** dBA or less.
 - 3.
- G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- H. Starting System: 24-V electric, with negative ground.
1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 3. Cranking Cycle: As required by NFPA 110 for system level specified.

4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 DIESEL FUEL-OIL SYSTEM

- A. Comply with NFPA 37.
- B. Piping: Fuel-oil piping shall be Schedule 40 black steel, complying with requirements in Section 23 11 13 "Facility Fuel-Oil Piping." Cast iron, aluminum, copper, and galvanized steel shall not be used in the fuel-oil system.
- C. Main Fuel Pump: Mounted on engine to provide primary fuel flow under starting and load conditions.

- D. Fuel Filtering: Remove water and contaminants larger than 1 micron.
- E. Relief-Bypass Valve: Automatically regulates pressure in fuel line and returns excess fuel to source.
- F. Subbase tank: Comply with UL 142, factory-fabricated fuel tank assembly, with integral, float-controlled transfer pump and the following features:
 - 1. Containment: Integral rupture basin with a capacity of 150 percent of nominal capacity of day tank.
 - a. Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak.
 - 2. Tank Capacity: As recommended by engine manufacturer for an uninterrupted period of 4 hours' operation at 100 percent of rated power output of engine-generator system without being refilled.
 - 3. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.
 - 4. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level.

2.6 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- C. Provide minimum run time control set for 30 minutes with override only by operation of a remote emergency-stop switch.
- D. Comply with UL 508A.
- E. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.
- F. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common wall-mounted control and monitoring panel. Panel shall be powered from the engine generator battery.

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G. Control and Monitoring Panel:

1. Digital engine generator controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
2. Analog control panel with dedicated gages and indicator lights for the instruments and alarms indicated below.
3. Instruments: Located on the control and monitoring panel and viewable during operation.
 - a. Engine lubricating-oil pressure gage.
 - b. Engine-coolant temperature gage.
 - c. DC voltmeter (alternator battery charging).
 - d. Running-time meter.
 - e. AC voltmeter, for each phase.
 - f. AC ammeter, for each phase.
 - g. AC frequency meter.
 - h. Generator-voltage adjusting rheostat.
4. Controls and Protective Devices: Controls, shutdown devices, and common alarm indication, including the following:
 - a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Control switch not in automatic position alarm.
 - d. Overcrank alarm.
 - e. Overcrank shutdown device.
 - f. Low-water temperature alarm.
 - g. High engine temperature prealarm.
 - h. High engine temperature.
 - i. High engine temperature shutdown device.
 - j. Overspeed alarm.
 - k. Overspeed shutdown device.
 - l. Low fuel main tank.
 - 1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for duration required **for the indicated EPSS class**.
 - m. Coolant low-level alarm.
 - n. Coolant low-level shutdown device.
 - o. Coolant high-temperature prealarm.
 - p. Coolant high-temperature alarm.
 - q. Coolant low-temperature alarm.
 - r. Coolant high-temperature shutdown device.
 - s. EPS load indicator.
 - t. Battery high-voltage alarm.
 - u. Low cranking voltage alarm.

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- v. Battery-charger malfunction alarm.
 - w. Battery low-voltage alarm.
 - x. Lamp test.
 - y. Contacts for local and remote common alarm.
 - z. Low-starting air pressure alarm.
 - aa. Low-starting hydraulic pressure alarm.
 - bb. Remote manual stop shutdown device.
 - cc. Air shutdown damper alarm when used.
 - dd. Air shutdown damper shutdown device when used.
 - ee. Generator overcurrent-protective-device not-closed alarm.
 - ff. Hours of operation.
 - gg. Engine generator metering, including voltage, current, hertz, kilowatt, kilovolt ampere, and power factor.
- H. Common Remote Panel with Common Audible Alarm: Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.
- I. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.
- 1. Overcrank alarm.
 - 2. Low water-temperature alarm.
 - 3. High engine temperature prealarm.
 - 4. High engine temperature alarm.
 - 5. Low lube oil pressure alarm.
 - 6. Overspeed alarm.
 - 7. Low fuel main tank alarm.
 - 8. Low coolant level alarm.
 - 9. Low cranking voltage alarm.
 - 10. Contacts for local and remote common alarm.
 - 11. Audible-alarm silencing switch.
 - 12. Air shutdown damper when used.
 - 13. Run-Off-Auto switch.
 - 14. Control switch not in automatic position alarm.
 - 15. Fuel tank derangement alarm.
 - 16. Fuel tank high-level shutdown of fuel supply alarm.
 - 17. Lamp test.
 - 18. Low-cranking voltage alarm.
 - 19. Generator overcurrent-protective-device not-closed alarm.
- J. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator unless otherwise indicated.

- K. Remote Emergency-Stop Switch: Flush; wall mounted unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other engine generator protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:
1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other engine generator malfunction alarms. Contacts shall be available for load shed functions.
 2. Under single- or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
- B. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground fault.
1. Indicate ground fault with other engine generator alarm indications.
 2. Trip generator protective device on ground fault.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide six or 12-lead alternator.
- E. Range: Provide limited range of output voltage by adjusting the excitation level.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- G. Enclosure: Driproof.
- H. Instrument Transformers: Mounted within generator enclosure.

- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.
 - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 - 2. Maintain voltage within 15 percent on one step, full load.
 - 3. Provide anti-hunt provision to stabilize voltage.
 - 4. Maintain frequency within 10 percent and stabilize at rated frequency within 5 seconds.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- L. Subtransient Reactance: 12 percent, maximum.

2.9 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - 1. Material: Bridge-bearing neoprene, complying with AASHTO M 251 separated by steel shims.
 - 2. Shore A Scale Durometer Rating: 40.
 - 3. Number of Layers: Two.
 - 4. Minimum Deflection: 1 inch
- B. Comply with requirements in Section 23 21 16 "Hydronic Piping Specialties" for vibration isolation and flexible connector materials for steel piping.
- C. Comply with requirements in Section 23 31 13 "Metal Ducts" for vibration isolation and flexible connector materials for exhaust shroud and ductwork.
- D. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.10 OUTDOOR ENGINE GENERATOR ENCLOSURE

- A. Description:
 - 1. Vandal-resistant, sound-attenuating, weatherproof steel housing; wind resistant up to 150 MPH. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
 - a. Coordinate subparagraph below with Drawings showing features, construction details, and equipment arrangement.

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2. Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure; erected on concrete foundation.
- B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 150 mph
- C. Seismic Design: Comply with seismic requirements in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Hinged Doors: With padlocking provisions.
- E. Space Heater: Thermostatically controlled and sized to prevent condensation.
- F. Lighting: Provide weather-resistant LED 30 fc average maintained.
- G. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- H. Muffler Location: Within enclosure.
- I. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.
 1. Louvers: Fixed-engine, cooling-air inlet and discharge. Stormproof and drainable louvers prevent entry of rain and snow.
 2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
 3. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.
- J. Interior Lights with Switch: Factory-wired, vapor-proof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
 1. AC lighting system and connection point for operation when remote source is available.
 2. DC lighting system for operation when remote source and generator are both unavailable.
- K. Convenience Outlets: Factory-wired, GFCI. Arrange for external electrical connection.
- L. Rated for UL2200
- M. Secondary louver on radiator end of enclosure to divert water away from inside the enclosure. This louver diverts water down to the platform.

2.11 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 1. Tests: Comply with IEEE 115 and with NFPA 110, Level 1 Energy Converters.

PART 3 - EXECUTION

3.1 INSTALLATION

- 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 Owner no fewer than 15 calendar days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.
- B. Comply with NECA 1 and NECA 404.
- C. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.
- D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- E. Exhaust System: Install Schedule 40 black steel piping with welded joints and connect to engine muffler. Piping shall be same diameter as muffler outlet.
 - 1. Piping materials and installation requirements are specified in Section 23 21 13 "Hydronic Piping."
 - 2. Install flexible connectors and steel piping materials according to requirements in Section 23 21 16 "Hydronic Piping Specialties."
 - 3. Insulate muffler/silencer and exhaust system components according to requirements in Section 23 07 19 "HVAC Piping Insulation."
- F. Drain Piping: Install condensate drain piping to muffler drain outlet with a shutoff valve, stainless-steel flexible connector, and Schedule 40 black steel pipe with welded joints.
 - 1. Piping materials and installation requirements are specified in Section 23 21 13 "Hydronic Piping."
 - 2. Drain piping valves, connectors, and installation requirements are specified in Section 23 21 16 "Hydronic Piping Specialties."
- G. Fuel Piping:
 - 1. Diesel storage tanks, tank accessories, piping, valves, and specialties for fuel systems are specified in Section 23 11 13 "Facility Fuel-Oil Piping."
 - 2. Copper and galvanized steel shall not be used in the fuel-oil piping system.
- H. Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow space for service and maintenance.
- C. Connect cooling-system water piping to engine generator and heat exchanger with flexible connectors.
- D. Connect engine exhaust pipe to engine with flexible connector.
- E. Connect fuel piping to engines with a gate valve and union and flexible connector.
- F. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- G. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- H. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.3 IDENTIFICATION

- A. Identify system components according to Section 23 05 53 "Identification for HVAC Piping and Equipment" and Section 26 05 53 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections with the assistance of a factory-authorized service representative.
- E. Tests and Inspections:
 1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection:
 - 1) Compare equipment nameplate data with Drawings and the Specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify that the unit is clean.

- b. Electrical and Mechanical Tests:
- 1) Perform insulation-resistance tests according to IEEE 43.
 - a) Machines Larger Than 200 hp: Test duration shall be 10 minutes. Calculate polarization index.
 - b) Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.
 - 2) Test protective relay devices.
 - 3) Verify phase rotation, phasing, and synchronized operation as required by the application.
 - 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
 - 5) Perform vibration test for each main bearing cap.
 - 6) Verify correct functioning of the governor and regulator.
2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
 4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 6. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding 40-inch wg. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 7. Exhaust Emissions Test: Comply with applicable government test criteria.
 8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 9. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
 10. Noise Level Tests: Measure A-weighted level of noise emanating from engine generator locations on the property line , and compare measured levels with required values.
- F. Coordinate tests with tests for transfer switches and run them concurrently.

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- G. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- H. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
- I. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
- J. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- K. Remove and replace malfunctioning units and retest as specified above.
- L. Retest: Correct deficiencies identified by tests and observations, and retest until specified requirements are met.
- M. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 26 32 13.13

SECTION 26 32 13.16 - GAS-ENGINE-DRIVEN GENERATOR SETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes packaged engine generators for non-emergency use with the following features:
 - 1. Natural gas engine.
 - 2. Gaseous fuel system.
 - 3. Control and monitoring.
 - 4. Generator overcurrent and fault protection.
 - 5. Generator, exciter, and voltage regulator.
 - 6. Vibration isolation devices.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans and elevations for engine generator and other components specified.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Identify fluid drain ports and clearance requirements for proper fluid drain.
 - 4. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 5. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include base weights.
 - 6. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: Certificates, for engine generator, accessories, and components, from manufacturer.
- B. Source quality-control reports.
- C. Field quality-control reports.
- D. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers must have been in business no less than 10 years.
- B. Source Limitations: Obtain packaged engine generators and auxiliary components through one source from a single manufacturer. This includes both gaseous and diesel generators.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Engine generator housing, engine generator, batteries, battery racks, silencers, sound attenuating equipment, accessories, and components shall withstand the effects of earthquake motions determined according to ASCE/SEI 7
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Component Importance Factor: 1.5.
- B. B11 Compliance: Comply with B11.19.
- C. NFPA Compliance:
 - 1. Comply with NFPA 37.
 - 2. Comply with NFPA 70.
 - 3. Comply with NFPA 99.
 - 4. Comply with NFPA 110 requirements for Level [1] [2] EPSS.
- D. UL Compliance: Comply with UL 2200.
- E. Engine Exhaust Emissions: Comply with EPA Tier 4 requirements and applicable state and local government requirements.

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- F. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.
- G. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Ambient Temperature 5 to 104 deg F.
 - 2. Relative Humidity: Zero to 95 percent.
 - 3. Altitude: Sea level to 1000 feet.
- H. Unusual Service Conditions: Engine generator equipment and installation are required to operate under the following conditions:
 - 1. High salt-dust content in the air due to sea-spray evaporation .

2.3 ENGINE GENERATOR ASSEMBLY DESCRIPTION

- A. Factory-assembled and -tested, water-cooled engine, with brushless generator and accessories.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C. Power Rating: Standby.
- D. Overload Capacity: 110 percent of service load for 1 hour in 12 consecutive hours.
- E. EPSS Class: Engine generator shall be classified as a Class 96 according to NFPA 110.
- F. Power Factor: **0.8**, lagging.
- G. Frequency: 60 Hz.
- H. Voltage: as depicted on contract drawings
- I. Phase: as depicted on contract drawings.
- J. Induction Method: Turbocharged.
- K. Governor: Adjustable isochronous, with speed sensing.
- L. Mounting Frame: Structural steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.
 - 1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.

M. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries.
2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

N. Engine Generator Performance:

1. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
3. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
6. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
7. Sustained Short-Circuit Current: For a three-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
8. Start Time:
 - a. Comply with NFPA 110, Type 10 system requirements.
 - b. 10 seconds.

2.4 GAS ENGINE

- A. Fuel: Natural gas.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: Engine or skid-mounted.
 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Jacket Coolant Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with UL 499 and with NFPA 110 requirements for Level 1 equipment for heater capacity.

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- E. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine-driven coolant pump.
 - 1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 - 2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 - 3. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 - 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 - 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
 - a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- F. Muffler/Silencer: Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - 1. Minimum sound attenuation of 25 dB at 500 Hz.
 - 2. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall be **78** dBA or less.
- G. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- H. Starting System: 24-V electric, with negative ground.
 - 1. Components: Sized so they are not damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Performance Requirements" Article.
 - 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 - 3. Cranking Cycle: As required by NFPA 110 for system level specified.
 - 4. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least three times without recharging.
 - 5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
 - 6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.
 - 7. Battery Stand: Factory-fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.
 - 8. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.

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9. Battery Charger: Current-limiting, automatic-equalizing, and float-charging type designed for lead-acid batteries. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.5 GASEOUS FUEL SYSTEM

- A. Natural Gas Piping: Comply with requirements in Section 23 11 23 "Facility Natural Gas Piping."
- B. LP Gas Piping: Comply with requirements in Section 23 11 26 "Facility Liquefied-Petroleum Gas Piping."
- C. Gas Train: Comply with NFPA 37.
- D. Engine Fuel System:
- E. Natural Gas, Vapor-Withdrawal System:
 1. Carburetor.
 2. Secondary Gas Regulators: One for each fuel type, with atmospheric vents piped to building exterior.
 3. Fuel-Shutoff Solenoid Valves: NRTL-listed, normally closed, safety shutoff valves; one for each fuel source.
 4. Fuel Filters: One for each fuel type.
 5. Manual Fuel Shutoff Valves: One for each fuel type.
 6. Flexible Fuel Connectors: Minimum one for each fuel connection.
 7. LP gas flow adjusting valve.
 8. Fuel change gas pressure switch.

2.6 CONTROL AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates generator-set shutdown. When engine generator is running, specified system or

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- equipment failures or derangements automatically shut down engine generator and initiate alarms.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates generator-set shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.
- C. Provide minimum run time control set for 30 minutes with override only by operation of a remote emergency-stop switch.
- D. Comply with UL 508A.
- E. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from generator-set vibration. Panel shall be powered from the engine generator battery.
- F. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common wall-mounted control and monitoring panel. Panel shall be powered from the engine generator battery.
- G. Control and Monitoring Panel:
1. Digital controller with integrated LCD, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.
 2. Analog control panel with dedicated gages and indicator lights for the instruments and alarms indicated below.
 3. Instruments: Located on the control and monitoring panel and viewable during operation.
 - a. Engine lubricating-oil pressure gage.
 - b. Engine-coolant temperature gage.
 - c. DC voltmeter (alternator battery charging).
 - d. Running-time meter.
 - e. AC voltmeter, [for each phase] [connected to a phase selector switch].
 - f. AC ammeter, [for each phase] [connected to a phase selector switch].
 - g. AC frequency meter.
 - h. Generator-voltage adjusting rheostat.
 4. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication, including the following:
 - a. Cranking control equipment.
 - b. Run-Off-Auto switch.
 - c. Control switch not in automatic position alarm.
 - d. Overcrank alarm.
 - e. Overcrank shutdown device.
 - f. Low water temperature alarm.
 - g. High engine temperature prealarm.
 - h. High engine temperature.
 - i. High engine temperature shutdown device.
 - j. Overspeed alarm.
 - k. Overspeed shutdown device.
 - l. Low fuel main tank.

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- 1) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for the duration required for the indicated EPSS class.
 - m. Coolant low-level alarm.
 - n. Coolant low-level shutdown device.
 - o. Coolant high-temperature prealarm.
 - p. Coolant high-temperature alarm.
 - q. Coolant low-temperature alarm.
 - r. Coolant high-temperature shutdown device.
 - s. EPS supplying load indicator.
 - t. Battery high-voltage alarm.
 - u. Low cranking voltage alarm.
 - v. Battery-charger malfunction alarm.
 - w. Battery low-voltage alarm.
 - x. Lamp test.
 - y. Contacts for local and remote common alarm.
 - z. Low-starting air pressure alarm.
 - aa. Low-starting hydraulic pressure alarm.
 - bb. Remote manual stop shutdown device.
 - cc. Air shutdown damper alarm when used.
 - dd. Air shutdown damper shutdown device when used.
 - ee. Hours of operation.
 - ff. Engine generator metering, including voltage, current, Hz, kW, kVA, and power factor.
 - gg. Generator overcurrent protective device not closed alarm.
- H. Common Remote Panel with Common Audible Alarm: Include necessary contacts and terminals in control and monitoring panel. Remote panel shall be powered from the engine generator battery.
- I. Remote Alarm Annunciator: An LED indicator light labeled with proper alarm conditions shall identify each alarm event, and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.
1. Overcrank alarm.
 2. Coolant low-temperature alarm.
 3. High engine temperature prealarm.
 4. High engine temperature alarm.
 5. Low lube oil pressure alarm.
 6. Overspeed alarm.
 7. Low fuel main tank alarm.
 8. Low coolant level alarm.
 9. Low cranking voltage alarm.
 10. Contacts for local and remote common alarm.
 11. Audible-alarm silencing switch.
 12. Air shutdown damper when used.
 13. Run-Off-Auto switch.
 14. Control switch not in automatic position alarm.
 15. Fuel tank derangement alarm.
 16. Fuel tank high-level shutdown of fuel supply alarm.
 17. Lamp test.
 18. Low cranking voltage alarm.
 19. Generator overcurrent protective device not closed.

- J. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.
- K. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

2.7 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:
 1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms. Contacts shall be available for load shed functions.
 2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 3. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.
 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
- B. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground fault.
 1. Indicate ground fault with other engine generator alarm indications.
 2. Trip generator protective device on ground fault.

2.8 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide 12 lead alternator.
- E. Range: Provide limited range of output voltage by adjusting the excitation level.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- G. Enclosure: Driproof.
- H. Instrument Transformers: Mounted within generator enclosure.

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- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.
 - 1. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.
 - 2. Maintain voltage within 15 percent on one step, full load.
 - 3. Provide anti-hunt provision to stabilize voltage.
 - 4. Maintain frequency within **10** percent and stabilize at rated frequency within 5 seconds.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- L. Subtransient Reactance: **12**percent, maximum.

2.9 VIBRATION ISOLATION DEVICES

- A. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - 1. Material: Bridge-bearing neoprene, complying with AASHTO M 251 separated by steel shims.
 - 2. Shore "A" Scale Durometer Rating: 40
 - 3. Number of Layers: Two.
 - 4. Minimum Deflection: 1 inch.
- B. Comply with requirements in Section 23 21 16 "Hydronic Piping Specialties" for vibration isolation and flexible connector materials for steel piping.
- C. Comply with requirements in Section 23 31 13 "Metal Ducts" for vibration isolation and flexible connector materials for exhaust shroud and ductwork.
- D. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

2.10 OUTDOOR ENGINE GENERATOR ENCLOSURE

- A. Description:
 - 1. Vandal-resistant, sound-attenuating, weatherproof steel housing; wind resistant up to 150. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
 - a. Coordinate subparagraph below with Drawings showing features, construction details, and equipment arrangement.
 - 2. Prefabricated or pre-engineered, galvanized-steel-clad, integral structural-steel-framed, walk-in enclosure; erected on concrete foundation.
- B. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to 150 mph

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- C. Seismic Design: Comply with seismic requirements in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Hinged Doors: With padlocking provisions.
- E. Space Heater: Thermostatically controlled and sized to prevent condensation.
- F. Lighting: Provide weather-resistant LED 30 fc average maintained.
- G. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.
- H. Muffler Location: Within enclosure.
- I. Engine-Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.
 - 1. Louvers: Fixed-engine, cooling-air inlet and discharge. Stormproof and drainable louvers prevent entry of rain and snow.
 - 2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
 - 3. Ventilation: Provide temperature-controlled exhaust fan interlocked to prevent operation when engine is running.
- J. Interior Lights with Switch: Factory-wired, vapor-proof luminaires within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
 - 1. AC lighting system and connection point for operation when remote source is available.
 - 2. DC lighting system for operation when remote source and generator are both unavailable.
- K. Convenience Outlets: Factory-wired, GFCI. Arrange for external electrical connection.
- L. Rated for UL2200
- M. Secondary louver on radiator end of enclosure to divert water away from inside the enclosure. This louver diverts water down to the platform.

2.11 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - 1. Tests: Comply with IEEE 115[and with NFPA 110, Level 1 Energy Converters].

PART 3 - EXECUTION

3.1 INSTALLATION

- 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 Owner no fewer than 15 calendar days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.
- B. Comply with NECA 1 and NECA 404.
- C. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.
 - 1. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
 - 2. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch.. Secure engine generator to anchor bolts installed in concrete bases. Concrete base construction is specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."
- D. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- E. Exhaust System: Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet.
 - 1. Install flexible connectors and steel piping materials according to requirements in Section 23 21 16 "Hydronic Piping Specialties."
 - 2. Insulate muffler/silencer and exhaust system components according to requirements in Section 23 07 19 "HVAC Piping Insulation."
- F. Drain Piping: Install condensate drain piping to muffler drain outlet with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe, the full size of the drain connection, with welded joints.
- G. Gaseous Fuel Piping:
 - 1. Natural gas piping, valves, and specialties for gas distribution are specified in Section 23 11 23 "Facility Natural Gas Piping."
- H. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.
- B. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.

- C. Connect cooling-system water piping to engine generator and heat exchanger with flexible connectors.
- D. Connect engine exhaust pipe to engine with flexible connector.
- E. Gaseous Fuel Connections:
 - 1. Connect fuel piping to engines with a gate valve and union and flexible connector.
 - 2. Install manual shutoff valve in a remote location to isolate gaseous fuel supply to the generator.
 - 3. Vent gas pressure regulators outside building a minimum of 60 inches from building openings.
- F. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- G. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.
- H. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

3.3 IDENTIFICATION

- A. Identify system components according to Section 23 05 53 "Identification for HVAC Piping and Equipment" and Section 26 05 53 "Identification for Electrical Systems."
- B. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections[with the assistance of a factory-authorized service representative.
- D. Tests and Inspections:
 - 1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in the first two subparagraphs below as specified in the NETA ATS. Certify compliance with test parameters.
 - a. Visual and Mechanical Inspection
 - 1) Compare equipment nameplate data with drawings and specifications.
 - 2) Inspect physical and mechanical condition.
 - 3) Inspect anchorage, alignment, and grounding.
 - 4) Verify the unit is clean.
 - b. Electrical and Mechanical Tests
 - 1) Perform insulation-resistance tests in accordance with IEEE 43.

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- a) Machines larger than 200 hp. Test duration shall be 10 minutes. Calculate polarization index.
- b) Machines 200 hp or less. Test duration shall be one minute. Calculate the dielectric-absorption ratio.
- 2) Test protective relay devices.
- 3) Verify phase rotation, phasing, and synchronized operation as required by the application.
- 4) Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.
- 5) Perform vibration test for each main bearing cap.
- 6) Verify correct functioning of the governor and regulator.
- 2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here, including, but not limited to, single-step full-load pickup test.
- 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
- 4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
- 5. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.
- 6. Exhaust Emissions Test: Comply with applicable government test criteria.
- 7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
- 8. Harmonic-Content Tests: Measure harmonic content of output voltage at 25 percent and 100 percent of rated linear load. Verify that harmonic content is within specified limits.
- 9. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four < on the property lineand compare measured levels with required values.
- E. Coordinate tests with tests for transfer switches and run them concurrently.
- F. Test instruments shall have been calibrated within the past 12 months, traceable to NIST Calibration Services, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- G. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.
- H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.
- I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- J. Remove and replace malfunctioning units and **retest** as specified above.

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- K. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- L. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 26 32 13.16

SECTION 26 36 00 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 1. Nonautomatic transfer switches (Manual Transfer Switch).
 2. Transfer switch accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
 2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.
- B. Shop Drawings:
 1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
 2. Include material lists for each switch specified.
 3. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
 4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciations, and control panels.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer-authorized service representative.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
 1. In addition to items specified in Section 01 33 04 "Operation and Maintenance Manual," include the following:
 - a. Features and operating sequences, both automatic and manual.

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- b. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 - 1. Member company of NETA.
 - a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.7 FIELD 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:
 - 1. Notify Owner no fewer than 15 calendar days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NEMA ICS 1.
- C. Comply with NFPA 110.
- D. Comply with UL 1008 unless requirements of these Specifications are stricter.
- E. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- F. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 - 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
 - 2. Short-time withstand capability for three cycles.

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- G. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- H. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- I. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.
- J. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- K. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable with printed markers at terminations. Color-coding and wire and cable markers are specified in Section 26 05 53 "Identification for Electrical Systems."
 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
 4. Accessible via front access.
- L. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 NONAUTOMATIC TRANSFER SWITCHES (MANUAL TRANSFER SWITCH)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ASCO by Schneider Electric
 2. Eaton.
 3. Kohler
- B. Electrically Operated: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.
- C. Double-Throw Switching Arrangement: Incapable of pauses or intermediate position stops during switching sequence.
- D. Pilot Lights: Indicate source to which load is connected.
- E. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and alternative-source sensing circuits.
 1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 2. Emergency Power Supervision: Red light with nameplate engraved "Alternative Source Available."

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- F. Unassigned Auxiliary Contacts: Switch shall have one set of normally closed contacts for each switch position, rated 10 A at 240-V ac.
- G. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - 1. Switch Action: Double throw; mechanically held in both directions.
 - 2. Contacts: Silver composition or silver alloy for load-current switching.
 - 3. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 4. Material: Hard-drawn copper, 98 percent conductivity.
 - 5. Main and Neutral Lugs: Compression type.
 - 6. Ground Lugs and Bus-Configured Terminators: Compression type.
 - 7. Ground bar.
 - 8. Connectors shall be marked for conductor size and type according to UL 1008.

2.3 SOURCE QUALITY CONTROL

- A. Prepare test and inspection reports.
 - 1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:
 - a. Overvoltage.
 - b. Undervoltage.
 - c. Loss of supply voltage.
 - d. Reduction of supply voltage.
 - e. Alternative supply voltage or frequency is at minimum acceptable values.
 - f. Temperature rise.
 - g. Dielectric voltage-withstand; before and after short-circuit test.
 - h. Overload.
 - i. Contact opening.
 - j. Endurance.
 - k. Short circuit.
 - l. Short-time current capability.
 - m. Receptacle withstand capability.
 - n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wall-hung Switch
 - 1. Provide workspace and clearances required by NFPA 70.
- B. Announcer and Control Panel Mounting: Flush in wall unless otherwise indicated.
- C. Identify components according to Section 26 05 53 "Identification for Electrical Systems."
- D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.
- E. Comply with NECA 1.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to motor controls, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.
 - 1. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- F. Connect twisted pair cable according to Section 26 05 23 "Control-Voltage Electrical Power Cables."
- G. Route and brace conductors according to manufacturer's written instructions[.] and Section 26 05 29 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.
- H. Final connections to equipment shall be made with liquid-tight, flexible metallic conduit no more than 18 inches in length.

3.3 FIELD QUALITY CONTROL

- A. Administrant for Tests and Inspections:
 - 1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
- B. Tests and Inspections:
 - 1. After installing equipment, test for compliance with requirements according to NETA ATS.
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with Drawings and Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and required clearances.
 - d. Verify that the unit is clean.
 - e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
 - f. Verify that manual transfer warnings are attached and visible.
 - g. Verify tightness of all control connections.
 - h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:
 - 1) Use of low-resistance ohmmeter.

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- 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.
 - i. Perform manual transfer operation.
 - j. Verify positive mechanical interlocking between normal and alternate sources.
 - k. Perform visual and mechanical inspection of surge arresters.
 - l. Inspect control power transformers.
 - 1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
 - 2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
 - 3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.
3. Electrical Tests:
 - a. Perform insulation-resistance tests on all control wiring with respect to ground.
 - b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
 - c. Verify settings and operation of control devices.
 - d. Calibrate and set all relays and timers.
 - e. Verify phase rotation, phasing, and synchronized operation.
 - f. Perform automatic transfer tests.
 - g. Verify correct operation and timing of the following functions:
 - 1) Normal source voltage-sensing and frequency-sensing relays.
 - 2) Engine start sequence.
 - 3) Time delay on transfer.
 - 4) Alternative source voltage-sensing and frequency-sensing relays.
 - 5) Automatic transfer operation.
 - 6) Interlocks and limit switch function.
 - 7) Time delay and retransfer on normal power restoration.
 - 8) Engine cool-down and shutdown feature.
4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

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- C. Coordinate tests with tests of generator and run them concurrently.
- D. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- E. Transfer switches will be considered defective if they do not pass tests and inspections.
- F. Remove and replace malfunctioning units and retest as specified above.
- G. Prepare test and inspection reports.
- H. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
 - 1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
 - 3. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

END OF SECTION 26 36 00

SECTION 26 40 40 MEDIUM VOLTAGE LOAD BANK

PART 1 - GENERAL

A medium voltage, transformer type, air-cooled, automatic resistive load bank is required for permanent, on-site installation as a component of a standby/emergency power engine generator system. The load bank is to be used for periodic, scheduled, supervised maintenance exercise and testing of the standby/emergency power source. The load bank shall be operated in local control.

PART 2 – PRODUCTS

2.1 RATINGS

- A. The load capacity, power factor and voltage is as noted on the contract drawings.
- B. The load bank step resolution is 25% or 50 kw, whichever is less.
- C. The load bank is rated to operate in ambient temperatures from 0 degrees F to 120 degrees F.
- D. The load bank is to have a continuous duty cycle.
- E. The load enclosure is rated NEMA 3R.

2.3 DESIGN

- A. The load bank shall be a completely self-contained, freestanding unit which includes all resistive load elements, load control devices, load element branch circuit fuse protection, main load bus and terminals, cooling system, controller and malfunction detection system and type enclosure.
- B. The medium voltage load bank shall be a single, unitized, skidded unit within which the following principle elements are installed and connected:
 - C. Main input fusible disconnect switch
 - D. Power isolation transformer
 - E. Low voltage main power fusible disconnect switch
- F. Low voltage load module, including load elements and control. The load bank shall only require connection of medium voltage power source, connection of external service power and connection of remote control panel.
- G. The load bank enclosure shall be of double wall construction for cool exterior and thermal isolation of the load elements.
- H. Cooling airflow through the enclosure shall be vertical with cold air intake at the bottom and hot air exhaust out the top. Intake and exhaust openings shall be screened.

- I. All interior spaces of the enclosure shall be accessible by hinged, lockable doors. Bolt-on panels shall not be acceptable.
- J. The enclosure shall be painted with an industrial enamel using a UL listed material and process.
- K. The enclosure shall include forklift channels and lifting eyes.

2.4 POWER ISOLATION TRANSFORMER

- A. The medium-voltage load bank shall be equipped with an isolation type, power transformer to step down the applied voltage to the load bank voltage of 480V AC, 3-phase.
- B. Transformer shall be dry type, aluminum wound, VPI-epoxy coated with the following specification:
 - 1. Continuous KVA capacity shall be 110% that of load bank
 - 2. Primary shall be 3-wire, delta connected, 60kV BIL
 - 3. Secondary shall be 4-wire, wye connected with grounded neutral, 10kV BIL
 - 4. 220°C insulation
 - 5. 150°C rise
- C. Transformer shall be equipped with a 15.0 kV rated, air type, load break fusible disconnect switch with external manual/lockable operator.
- D. Transformer secondary shall connect to a full rated, 600V, load break, fusible disconnect switch equipped with class-L time delay fuses. Switch shall have externally operable and lockable handle mechanism.
- E. Transformer shall be enclosed within an environmentally controlled enclosure installed upon the load bank skid adjacent to the low voltage load module. The enclosure shall have hinge open and lockable access doors. The transformer/enclosure shall be forced air ventilated via the load bank main cooling fan. The enclosure shall be equipped with anti-condensation interior space heaters under control of a humidistat and powered from a service external to the load bank.
- F. The transformer/enclosure shall be arranged for either top or bottom conduit/cable entry.
- G. The low voltage secondary of the transformer shall supplied with cable connection of the load side of the low voltage fusible disconnect switch to the low voltage load bank distribution bus bars.

2.5 LOAD ELEMENTS

- A. Resistive Load elements: Open, helically wound chromium alloy electrical resistance wire derated to operate at 60% of the maximum continuous temperature rating of wire. Element wire to be mechanically supported over entire length in such a way that should a wire break, the broken wire segments will not short to adjacent conductors or to ground.
- B. Load elements are to be individually serviceable and replaceable in the field without major disassembly of the load bank. An acceptable design to satisfy this requirement is the installation of the load elements in slide-out, removable trays in such a way that any element is easily accessed without disturbing any other elements.

- C. All materials used in the mounting and installation of the load elements shall be suitable for the temperatures encountered, both in normal operation and under fault conditions.
- D. Materials in direct contact with the element wire shall be ceramic. These ceramics shall be installed upon and reinforced and supported by stainless steel structures.
- E. Other materials which structurally support the load elements and/or form the hot air duct within which the elements are mounted shall be steel, stainless steel or aluminum.
- F. Plastics and glass reinforced plastic materials and flammable materials are not acceptable materials of construction for installation, support and mounting of load elements or in the construction of the load bank hot air duct.
- G. Load element short circuit protection: The resistive load shall be fused in branch circuits of not more than 50 KW each.
- H. Load circuit fuses shall be 200,000 A.I.C current limiting type, extremely fast acting 600V rated.
- I. Load control: One magnetic contactor per each fused branch circuit.
- J. Load bank power wiring: 150°C insulated.
- K. Main terminals: Cooper, 1000A per square inch
- L. Cooling system: Forced air cooled by motor drive propeller fan. Motors shall be (TEFC or ODP), 1800 RPM maximum and controlled by a circuit breaker combination motor starter.
- M. Cooling fan and control power shall be derived internally from the main load bus. The cooling fan shall operate at AC line voltage. Load control circuits and fan motor control shall operate at 120V, via control power isolation transformers. Control circuit fuses shall be 100,000 A.I.C. current limiting type, 600V rated.
- N. Malfunction detection system consisting of sensors within the load bank, load bank enable/disable permissive circuit, and alarms. Malfunction detection sensors to include: cooling air intake temperature switch set at 120°F, adjustable exhaust air temperature switch set at not more than 75°F above the maximum rated temperature rise and an air pressure switch to sense for loss of cooling airflow.

2.6 LOCAL CONTROL PANEL

- A. The local panel shall have the following features:
 - 1. Power supply for load bank control circuits.
 - 2. Malfunction detection/auto disconnect system.
 - 3. Cooling fan automatic start-stop control.
 - 4. Remote load dump circuit to allow use of remote dry contacts (close to run) to trip load bank off line.
 - 5. Input/output devices and control circuits for operation of load bank from remote control panel and automatic controller.
 - 6. Auxiliary dry contacts to indicate "normal operation"/"system failure"
- B. SWITCHES
 - 1. Off-Manual-Auto-Remote mode switch
 - 2. Manual Run-Stop pushbuttons

3. Bypass switch to override remote load dump
4. Master load switch
5. Load step switches

C. Status annunciation with the following indicators:

1. Power connected
2. Local-manual run
3. Local-auto run
4. Remote mode
5. Load dump
6. Load dump bypass
7. Normal operation
8. Cooling failure
9. Master load on
10. Load step on (one for each load step)
11. Press-to-test pushbutton for indicators

- D. The load bank is to be equipped with an automatic controller, which will be activated when the load bank mode selector switch is placed in the "automatic" position.
- E. In the automatic mode the load bank is to be on line and continuously operative whenever the generator runs. The load bank shall provide a component of the total generator load and shall be automatically variable in response to dynamic total load demands upon the generator.
- F. PLC controller senses generator load and automatically adds/subtracts load bank steps to maintain total generator load at a desired level. Controller sense amperes. Adjustable level and delay.

2.7 PC SOFTWARE

A. The PC software will have the following features:

1. Enhance Load Control with transient speed information data acquisition and reporting.
2. Customizable front-panel window layouts.
3. Supply test properties including ratings, alternator, engine customer and additional notes for template configuration.
4. Result data can be printed or exported to PDF, XLS formats.
5. Certification to ISO8528.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with load bank manufacturers' written installation instructions.
- B. Coordinate size and location of concrete bases for load bank. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete. Concrete base to be 5" high and extend 4" beyond footprint of equipment in all directions.
- C. Install packaged engine generator with restrained spring isolators having a minimum deflection of 1 inch. Secure load to anchor bolts installed in concrete bases. Concrete base construction is specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."
- D. Install load bank to provide access, without removing connections or accessories, for periodic maintenance.
- E. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- F. Connect wiring according to Section 26 05 13 "Medium Voltage Cable."

3.2 IDENTIFICATION

- A. Identify system components according to Section 26 05 53 "Identification for Electrical Systems."

3.3 WARRANTY

- A. The load bank shall be supplied with a two-year manufacturer's warranty, which covers all materials and service labor. The manufacturer shall demonstrate the availability of factory service technicians in support of the load bank.

3.4 MANUFACTURER QUALIFICATIONS

- A. Qualifications of load bank manufacturer
- B. The load bank shall be a product of a firm regularly engaged in the design and manufacture of generator load banks.
- C. The load bank manufacturer shall demonstrate at least five years experience with at least twenty-five successful installations of load banks similar or equal to the load bank specified herein.

3.5 START UP SERVICE

- A. The load bank manufacturer is to provide one day start-up service of the load bank, on site, after the load bank has been installed and connected.

END OF SECTION 26 40 00

SECTION 26 41 19 - LIGHTNING PROTECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes **Early Streamer Emission (ESE)** Air Terminal lightning protection system for the following:
 - 1. An outdoor utility equipment structure (elevated structure).
- B. Work included
 - 1. Provide all labor, material, equipment, and services to perform operations required for the complete installation and related work as specified.
 - 2. Any such work included in any other section of these specifications that is not specifically described therein shall comply with the requirements of this section.
 - 3. The following items of work are specifically included in, but not limited to the generality implied by these specifications:
 - a. ESE lightning protection air terminal
 - b. Complete mast, base, and supports.
 - c. Down conductors
 - d. Grounding terminations
- C. Related Work
 - 1. Nationally Recognized Testing Laboratory (NRTL) Inspection of Completed System
 - a. The completed lightning protection system shall be inspected to the Installation Requirements for ESE Lightning Protection Systems US 17-102.
 - b. Submit an NRTL inspection report for the completed project.
 - 2. IEEE Fall of potential method for ground resistance testing

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Submit shop drawings showing location of ESE air terminal(s), conductors, bonding connections, and grounding equipment. Shop drawings shall include sizes for conductors, ground electrodes, and connection/termination details.
- C. Submit Risk Assessment Per NF C 17-102 annex A; or UTE 17-108; or equivalent risk assessment yielding a protection level
- D. Submit detailed product data sheets showing application, dimensions, and material of each component utilized in the lightning protection system installation.
- E. Submit proof of installer's approval or certification by the ESE system manufacturer.
- F. Submit EPA data per AASHTO code for the lightning protection mast(s) to be used on this project.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Lightning protection system Shop Drawings, drawn to scale, coordinated with each other, using input from installers of the items involved:
- B. Qualification Data: For Installer.
- C. Product certificates.
- D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Completion Certificate

1.5 PROJECT RECORD DOCUMENTS

- A. Submit project record documents under other provisions.
- B. Accurately record actual locations of air terminals, bonding/grounding equipment, and conductors.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. **BASIS OF DESIGN:** Prevectron3 by National Lightning Protection (NLP), 13550 Smith Rd, Ste 150, Aurora, CO 80011, 1-800-628-2816, fax: 303 295-1623, www.NationalLightning.com

B. SUBSTITUTIONS

1. Submit written requests for substitution made a minimum of ten (10) days prior to bid date for consideration.
 - a. Risk assessment for facility per UTE C 17-108.
 - b. Effective Projected Area (EPA) calculations for proposed mast to be utilized as specified in section II part C of this specification.
 - c. Submit copy of manufacturer's system warranty.
 - d. Submit a list of twenty (20) verifiable installations utilizing the ESE terminal with names, addresses, and phone numbers of the completed installations.

2.2 PERFORMANCE REQUIREMENTS

- A. Lightning Protection Components, Devices, and Accessories: Listed and labeled by a qualified testing agency as complying with UL-96 and marked for intended location and application.

2.3 MATERIALS

A. ESE Air Terminal

1. Complete ESE air terminal assembly
 - a. Air terminal shall be certified to NF C 17-102
 - b. Threaded base for connection to mast.
 - c. Continuous nickel-plated copper central air terminal
 - d. 316 grade stainless steel housing.
 - e. The air terminal shall release stored energy based upon rapid variation of ambient field strength in phase with the approaching downward leader.
 - f. Test the air terminal per appendix C of NFC 17-102, and witnessed by a Nationally Recognized Testing Laboratory.
 - g. Air terminal shall have a standard deviation value 40% lower than the requirement in NF C 17-102 section C.3.5.2.5.
 - h. Air terminal shall utilize independent synchronized modules including one module for neutralization of space charge at the tip of the air terminal prior to triggering the upward streamer. Modules shall be replaceable.
2. Air terminals that utilize an internal spark gap or pulsed release based upon hold voltage are not acceptable.
3. Air terminals that utilize a central rod that is isolated from ground are not acceptable.
4. Air terminals that utilized radioactive ionization sources are not acceptable.
5. Air terminals that are listed under the UL category OVTZ are not acceptable.
6. Plate indicating name, phone number, NRTL file number of the ESE air terminal manufacturer.
7. Minimum of five (5) year full replacement warranty.

B. Conductors

1. Copper conductors shall be 37 strand copper wire with a minimum net weight of 410 lbs. per 1,000 ft. (187.97kg per 304.8m). Substitute aluminum conductors, when necessary, to avoid dissimilar metals.
2. The structural steel may be utilized as the main down conductor.
 - a. Structural steel shall be electrically continuous or made so.
 - b. Perimeter columns shall be grounded or at intervals not exceeding an average of 60 feet (18.2 M) on center.
3. All conductors shall be securely fastened to the structure at every 36" (914.4mm) on center utilizing fasteners with corrosion resistance equal to that of the conductor.
4. All metal objects of induction situated within 15' 0" (4.5 M) of a lightning protection conductor or bonded metal body shall be interconnected to the lightning protection system.
 - a. Grounded metal bodies shall be interconnected to the lightning protection system via a main size conductor.
 - b. Ungrounded metal bodies shall be interconnected to the lightning protection system via a secondary conductor no smaller than #6 AWG (13.3 mm²) copper.
5. No copper materials shall be installed upon a dissimilar metal. Aluminum or tin coated copper shall be installed where these conditions exist.

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6. Tin or lead coated copper and bronze equipment shall be utilized where corrosive atmospheres are present.
7. Lightning protection conductors shall maintain a downward or horizontal path to ground avoiding U and V pockets with the following exception:
 - a. A conductor may rise no more than 3" for every 12" of run.
8. No bend of conductor shall form a final included angle of less than 90 degrees nor shall have a radius of less than 8 inches Exceptions are thru roof and thru wall connections.
9. Provide each ESE air terminal with two (2) paths to ground from the base plate of the mast, except an elevated mast that may have a single conductor run for a maximum of 16 feet (4.8 meters) before two (2) down conductors are implemented.
10. Install down conductors as widely separated as possible.

C. Lightning Protection Mast

1. Aluminum, steel, or galvanized steel masts
 - a. Height as required by application.
 - b. Threaded connection for acceptance of ESE air terminal.
 - c. Bonding plate for cable connection.
 - d. Design mast as required by wind and safety factors inherent to the geographic location of the installation.
2. Anchor base, direct burial, & side mounted masts shall be designed and manufactured to the AASHTO code. Effective Projected Area (EPA) data based upon the AASHTO code shall be included with the project submittals.
3. As indicated on lightning protection drawing(s)
4. Certified or accepted by the ESE system manufacturer.

D. Grounding System

1. The ground system shall have no more than 10 ohms of resistance
 - a. Measure resistance using the IEEE fall of potential method.
 - b. Measure resistance at each down conductor.
 - c. Make resistance measurements in dry weather, not earlier than 48 hours after precipitation.
 - d. Document resistance measurements and testing method.
2. Acceptable Ground terminations
 - a. Ground rods: 3/4"x 10' copper-clad (3 per down lead)
 - b. OR Electrolytic ground electrodes (1 per down lead) or in combination with ground rods, and plates to achieve the 10-ohm resistance requirement.
 - c. Ground loop conductors shall be a minimum of 2/0 AWG stranded bare copper. Each down conductor shall terminate at a ground rod. Connect the ground rod to the ground loop.
3. Provide Burndy HYGROUND fittings or exothermic connections for all ground connections.
4. Make connections to ground rods, ground plates, electrolytic ground electrodes, or ground loop conductors at a point not less than 24 inches away from foundation walls and 18 inches below grade,
5. Space ground terminations as evenly as possible around the building perimeter.
6. Bond all grounded systems together via main size conductor to achieve equal potential of all grounded systems. Make all such connections by exothermic welding where possible.

E. Connector, Fasteners, and Hardware

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1. Provide all connectors, fittings, fasteners, clamps, guards, lugs, exothermic connections, as required to install all parts of the lightning protection system. Fabricate all equipment from copper, bronze, and/or aluminum material for the use intended.
2. Make all connections between dissimilar metals with tinned copper or tinned bronze equipment and treated with Penetrox A.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that all surfaces are ready to receive work.
- B. Verify and compare dimensions and measurements shown on shop drawings with field conditions.
- C. Verify that all systems that may influence the lightning protection system design are included or referenced on the shop drawings.

3.2 INSTALLATION - GENERAL

- A. Install ESE lightning protection system in accordance with the manufacturer's installation instructions.
- B. Installation shall be accomplished in a neat and orderly manner by an installer approved or certified by the ESE system manufacturer.
- C. Conceal all work inside the building.
- D. Seal all wall, roof, and other penetrations as required and performed by the appropriate trade.
- E. Coordinate all structural applications with the project structural engineer and all other applicable trades.
- F. Protect elements under other sections from damage or disfiguration during work under this section.
- G. Install all adhesive lightning protection components with an adhesive approved by the roof manufacturer.
- H. Properly guard and protect all work installed in accessible areas from damage.
- I. Install all material in a manner to protect against electrolytic couple in the presence of moisture.

3.3 FIELD QUALITY CONTROL

- A. Perform Field inspections and provide documentations by factory authorized inspector.
 1. For inspection of down conductors prior to being covered by interior, exterior, or other installations.
 2. For inspection of lightning protection system grounds prior to burial.
 3. Provide NRTL inspection report for completed lightning protection system.

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END OF SECTION 26 41 19

SECTION 323000 - NON-CONDUCTIVE FENCING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. SCOPE OF WORK

Supply and install all materials and accoutrements required for the new construction of an electrically non-conductive custom design fence system from the outside.

1.2 SYSTEM DESCRIPTION

- A. The high security fence shall consist of non-conductive/low radar-reflectivity fence panels of a specified height, and non-conductive/low radar-reflectivity fence posts.
- B. The supply of mesh fabric, framework and accoutrements for the attachment of mesh to framework shall be supplied by one source to ensure the quality and required level of security.

1.3 DESIGN CRITERIA

A. Establish the barrier function.

1. New fence construction
2. Non-conductive panels
3. Anti-Cut panels
4. Non-conductive panels

B. Delegated Design of Non-Conductive Fence System: Structural posts, load calculations, and spacing shall designed by the Contractor's Professional Engineer.

C. Structural Engineer to design base plates and anchors to deck.

1.4 QUALIFICATIONS

A. Manufacturer shall have a minimum of ten (10) years' experience in manufacture of non-conductive fencing.

1.5 STORAGE AND HANDLING

A. Materials shall be stored in a clean dry location with proper ventilation to avoid damage from moisture. Materials shall be protected against damage from weather, vandalism, and theft. Any freight damage must be noted on bill of lading at time of receipt.

1.6 REFERENCES

A. Manufacturer's Certified Test Reports attesting the level of non-conductivity.

1.7 SUBMITTAL

A. Review Submittals:

The manufacturers' submittal information shall include Fencing literature, drawings and samples as required prior to ordering. Prior to ordering, certified test results shall be submitted providing the documented ability of the fence system to prevent the transmission of electricity through the system for electric utility applications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: AMICO Security, ANC Safeguard 2100, ANC Non-Conductive Perimeter System, and the non-conductive fence panels shall conform to the ANC SAFEGUARD or approved equal.
- B. The complete fence system shall be procured from a single source.

2.2 MATERIALS

The materials and accoutrements for this fencing system are unique. All design, construction, and components shall be approved by the owner to meet the desired level of non-conductivity and electromagnetic wave transparency.

A. Mesh Selection

Non-conductive mesh used shall meet the following:

1. Width of panel – 12ft (3,658mm)
2. Height of panel – 3ft (914mm) and 4ft (1,219mm)
3. Mesh diamond opening – 1.75in (44.5mm) x 1.75in (44.5mm) nominal, 68% open area
4. Mesh Thickness – 1.0in (25.4mm) nominal
5. Weight – 2.36 lbs/sf² (11.52 kg/m²)
6. Standard Color – Dark Gray

B. Non Conductive Framework

1. 100 percent non-conductive construction shall only incorporate non-conductive materials for posts and supports members as required. Color shall be dark gray.
2. Posts shall be supplied by manufacturer.
3. Gate posts shall be 6-inches x 6-inches x 3/8-inch H-Posts. Gates with an opening less than 12-feet.

C. Fittings

Security Wedge Plugs shall be used to secure the mesh panels to the selected framework. Fittings shall be made in accordance with the strength standards as designed. Security and sized to the specific framework.

D. Finish

1. Fence Panels - The standard color is dark gray.

PART 3 - INSTALLATION

3.1 PREPARATION

- A. Coordinate post setting, and guidelines for installation of materials with other trades.
- B. Installation and lay-out of the job shall be approved by the general contractor prior to installation.

3.2 INSTALLATION

- A. Field Measurements
- B. Install in accordance with manufacturer's drawings and direction.
- C. Fit materials together to form tight joints except as necessary for expansion and change in grade.
- D. Perform cutting, drilling, and fitting required for installation.
- E. The fence must be installed using manufacturers panels and fittings.
- F. Follow the cutting, sealing and safety information as recommended by the manufacturer.
- G. Posts shall be plumb, spaced and installed as noted on drawings.

3.3 FABRIC

- A. Fabric shall be installed so that the bottom of panels is no more than 2-in above grade. Top of panels shall be level and conforming to grade.

3.4 CLEANING

- A. The contractor shall be responsible to clean up the jobsite of any unused materials and trash.
- B. Post hole excavations shall be scattered uniformly away from posts.

END OF SECTION 32 30 00

**ARMED FORCES
RETIREMENT HOME
FACILITIES
MANAGEMENT
MANUAL**

March 2020

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INTRODUCTION

This Manual should be read in conjunction with the basic Directive – AFRH Agency Directive 10-7 dated March 20, 2020 (or most current version).

The AFRH Facilities Management Program Manual contains policy and guidance on the many facets of AFRH facilities management. Contents of the Manual include an extensive list of references which contain specific guidance and information on individual facilities management subject areas. As additional reference materials are added, the AFRH Corporate Facilities Manager (CFM) will issue additional/updated guidance via AFRH Notices, or revisions to the Manual.

Definitions pertaining to facilities management are contained throughout the AFRH Facilities Management Program Manual. To facilitate ease of reading, definitions for specific subject areas are collocated with specific subject matter areas.

Any questions regarding the contents of this Manual should be addressed to the AFRH CFM.

- 1. Resource List**
 - a. Relevant Property Management Regulations or Executive Orders (Newly Enacted Laws or Revisions shall supersede listed versions below.)
 - i. ADA Regulations; 28 CFR Part 35 & 36
 - ii. AFRH's Compliance with the National Environmental Policy Act; 38 C.F.R.- Chapter 2
 - iii. Department of Transportation Traffic Regulations 23 C.F.R. Part 655, Subpart F
 - iv. Executive Order 12411, Government Work Space Management Reforms
 - v. Executive Order 12893, Principles of Infrastructure Investments
 - vi. Executive Order 12902, Energy Efficiency and Water Conservation at Federal Facilities
 - vii. Executive Order 13221, Energy Efficient Standby Power Devices
 - viii. Executive Order 13287, Preserve America
 - ix. Executive Order 13327, Federal Real Property Asset Management
 - x. Executive Order 13423, Strengthening, Federal Environmental, Energy, and Transportation Management
 - xi. Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance
 - xii. Executive Order 13653, Preparing the United States for the Impacts of Climate Change
 - xiii. Federal Energy Management and Planning Programs; 10 CFR part 436
 - xiv. Federal Management Regulations (FMR); 41 C.F.R.- Chapter 101-102

- xv. Federal Preservation Officer; 36 C.F.R- Chapter I- Part 60- Section 60.3
- xvi. Occupational Safety and Health Administration (OSHA)Regulations; 29 C.F.R.- Chapter 1900-1999
- xvii. Public Health: Quality of Life: Environment; 42 C.F.R- Part 483- Subpart B- Section 483.15(h)
- xviii. Public Health: Physical Environment; 42 C.F.R.- Part 483- Subpart I- Section 483.470
- xix. Protection of Historic Properties; 36 C.F.R.- Part 800

- b. Adopted Codes (Newest Editions shall supersede listed versions below.)

- xx. 2018 International Building Code (IBC)
- xxi. 2018 International Residential Code (IRC)
- xxii. 2018 International Mechanical Code (IMC)
- xxiii. 2018 International Plumbing Code (IPC)
- xxiv. 2018 International Fire Code (IFC)
- xxv. 2018 International Fuel Gas Code (IFGC)
- xxvi. 2018 International Energy Conservation Code (IECC)
- xxvii. 2018 International Existing Building Code (IEBC)
- xxviii. 2018 International Wildland Urban Interface Code (IWUIC)
- xxix. 2018 International Performance Code for Buildings and Facilities (ICCPC)
- xxx. 2018 International Property Maintenance Code (IPMC)
- xxxi. Commission on Accreditation of Rehabilitation Facilities, CARF International Certification Standards
- xxxii. NFPA 1 Fire Code
- xxxiii. NFPA 2 Hydrogen Technologies Code
- xxxiv. NFPA 30 Flammable and Combustible Liquids Code
- xxxv. NFPA 30A Code for Motor Fuel Dispensing Facilities and Repair Garages
- xxxvi. NFPA 30B Code for the Manufacture and Storage of Aerosol Products
- xxxvii. NFPA 42 Code for the Storage of Pyroxylin Plastic
- xxxviii. NFPA 52 Vehicular Gaseous Fuel Systems Code
- xxxix. NFPA 54 National Fuel Gas Code
- xl. NFPA 55 Compressed Gases and Cryogenic Fluids Code
- xli. NFPA 57 Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code
- xlii. NFPA 58 Liquefied Petroleum Gas Code
- xliii. NFPA 59 Utility LP-Gas Plant Code
- xliv. NFPA 70 National Electrical Code®
- xlv. NFPA 70A National Electrical Code® Requirements for One- and Two-Family Dwellings
- xlvi. NFPA 72 National Fire Alarm and Signaling Code

- xlvii. NFPA 85 Boiler and Combustion Systems Hazards Code
- xlviii. NFPA 99 Health Care Facilities Code
- xlix. NFPA 101 Life Safety Code®
 - i. NFPA 101B Code for Means of Egress for Buildings and Structures
 - ii. NFPA 400 Hazardous Materials Code
 - iii. NFPA 430 Code for the Storage of Liquid and Solid Oxidizers
 - iv. NFPA 432 Code for the Storage of Organic Peroxide Formulations
 - v. NFPA 434 Code for the Storage of Pesticides
 - vi. NFPA 490 Code for the Storage of Ammonium Nitrate
 - vii. NFPA 495 Explosive Materials Code
 - viii. NFPA 900 Building Energy Code
 - ix. NFPA 909 Code for the Protection of Cultural Resource Properties - Museums, Libraries, and Places of Worship
 - x. NFPA 914 Code for Fire Protection of Historic Structures
 - xi. NFPA 1127 Code for High Power Rocketry
 - xii. NFPA 1730 Standard on Organization and Deployment of Fire Prevention Inspection and Code Enforcement, Plan Review, Investigation, and Public Education Operations to the Public
 - xiii. NFPA 5000 Building Construction and Safety Code®
 - xiv. The Joint Commission Accreditation and Certification Standards

c. Adopted Standards (Newest version applies and enforced)

- i. American Concrete Institute
- ii. American Forest and Paper Association
- iii. Asphalt Institute
- iv. American Industrial Hygiene Association
- v. American Institute of Electrical Engineers
- vi. American Institute of Mining and Metallurgical Engineers
- vii. American Institute of Timber Construction
- viii. American Lumber Standards Committee
- ix. American National Standards Institute
- x. American Plywood Association
- xi. Asphalt Roofing Manufacturers Association
- xii. American Society of Civil Engineers
- xiii. American Society of Heating, Refrigerating, and Air Conditioning Engineers and the Illuminating Engineering Society of North America in ASHRAE/IES Standard 90A-1980
- xiv. American Society of Mechanical Engineers
- xv. American Society of Plumbing Engineers
- xvi. American Society of Sanitary Engineering
- xvii. American Society of Testing and Materials
- xviii. Architectural Woodwork Institute
- xix. American Wood-Preservers Bureau

- xx. American Wood-Preservers Institute
- xxi. Brick Association of North Carolina
- xxii. Brick Institute of America
- xxiii. Carpet and Rug Institute
- xxiv. Ceramic Tile Institute of America
- xxv. Concrete Reinforcing Steel Institute (CRSI)
- xxvi. Facing Tile Institute
- xxvii. Gypsum Association
- xxviii. Indiana Limestone Institute of America
- xxix. Marble Institute of America
- xxx. Masonry Institute of America
- xxxi. National Air Durct Cleaning Association (NADCA)
- xxxii. National Asphalt Pavement Association
- xxxiii. National Building Granite Quarries Association
- xxxiv. National Concrete Masonry Association
- xxxv. NFPA 3 Recommended Practice on Commissioning and Integrated Testing of Fire Protection and Life Safety Systems
- xxxvi. NFPA 4 Standard for Integrated Fire Protection and Life Safety System Testing
- xxxvii. NFPA 10 Standard for Portable Fire Extinguishers
- xxxviii. NFPA 11 Standard for Low-, Medium-, and High-Expansion Foam
- xxxix. NFPA 11A Standard for Medium- and High-Expansion Foam Systems
 - xl. NFPA 11C Standard for Mobile Foam Apparatus
 - xli. NFPA 12 Standard on Carbon Dioxide Extinguishing Systems
 - xlii. NFPA 12A Standard on Halon 1301 Fire Extinguishing Systems
 - xliii. NFPA 13 Standard for the Installation of Sprinkler Systems
 - xliv. NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes
 - xlv. NFPA 13E Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems
 - xlii. NFPA 13R Standard for the Installation of Sprinkler Systems in
 - xlvii. Low-Rise Residential Occupancies
 - xlviii. NFPA 14 Standard for the Installation of Standpipe and Hose Systems
 - xlix. NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection
- 1. NFPA 16 Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems

- li. NFPA 17 Standard for Dry Chemical Extinguishing Systems
- lii. NFPA 17A Standard for Wet Chemical Extinguishing Systems
- liii. NFPA 18 Standard on Wetting Agents
- liv. NFPA 18A Standard on Water Additives for Fire Control and Vapor Mitigation
- lv. NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
- lvi. NFPA 22 Standard for Water Tanks for Private Fire Protection
- lvii. NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- lviii. NFPA 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- lix. NFPA 31 Standard for the Installation of Oil-Burning Equipment
- lx. NFPA 33 Standard for Spray Application Using Flammable or Combustible Materials
- lxi. NFPA 34 Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids
- lxii. NFPA 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
- lxiii. NFPA 40 Standard for the Storage and Handling of Cellulose Nitrate Film
- lxiv. NFPA 45 Standard on Fire Protection for Laboratories Using Chemicals
- lxv. NFPA 46 Recommended Safe Practice for Storage of Forest Products
- lxvi. NFPA 50 Standard for Bulk Oxygen Systems at Consumer Sites
- lxvii. NFPA 50A Standard for Gaseous Hydrogen Systems at Consumer Sites
- lxviii. NFPA 50B Standard for Liquefied Hydrogen Systems at Consumer Sites
- lxix. NFPA 51 Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes
- lxx. NFPA 51A Standard for Acetylene Cylinder Charging Plants
- lxxi. NFPA 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
- lxxii. NFPA 53 Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres

- lxxiii. NFPA 56 Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems
- lxxiv. NFPA 59A Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)
- lxxv. NFPA 67 Guide on Explosion Protection for Gaseous Mixtures in Pipe Systems
- lxxvi. NFPA 68 Standard on Explosion Protection by Deflagration Venting
- lxxvii. NFPA 69 Standard on Explosion Prevention Systems
- lxxviii. NFPA 70B Recommended Practice for Electrical Equipment Maintenance
- lxxix. NFPA 70E Standard for Electrical Safety in the Workplace®
- lxxx. NFPA 73 Standard for Electrical Inspections for Existing Dwellings
- lxxxi. NFPA 75 Standard for the Fire Protection of Information Technology Equipment
- lxxxii. NFPA 76 Standard for the Fire Protection of Telecommunications Facilities
- lxxxiii. NFPA 77 Recommended Practice on Static Electricity
- lxxxiv. NFPA 79 Electrical Standard for Industrial Machinery
- lxxxv. NFPA 80 Standard for Fire Doors and Other Opening Protectives
- lxxxvi. NFPA 80A Recommended Practice for Protection of Buildings from Exterior Fire Exposures
- lxxxvii. NFPA 82 Standard on Incinerators and Waste and Linen Handling Systems and Equipment
- lxxxviii. NFPA 86 Standard for Ovens and Furnaces
- lxxxix. NFPA 87 Recommended Practice for Fluid Heaters
 - xc. NFPA 88A Standard for Parking Structures
 - xcii. NFPA 88B Standard for Repair Garages
- xcii. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems
- xciii. NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems
- xciv. NFPA 91 Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids
- xcv. NFPA 92 Standard for Smoke Control Systems
- xcvi. NFPA 92A Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences
- xcvii. NFPA 92B Standard for Smoke Management Systems in Malls, Atria, and Large Spaces
- xcviii. NFPA 96 Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

- xcix. NFPA 97 Standard Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances
- c. NFPA 99B Standard for Hypobaric Facilities
- ci. NFPA 101A Guide on Alternative Approaches to Life Safety
- cii. NFPA 102 Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures
- ciii. NFPA 105 Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives
- civ. NFPA 110 Standard for Emergency and Standby Power Systems
- cv. NFPA 111 Standard on Stored Electrical Energy Emergency and Standby Power Systems
- cvi. NFPA 140 Standard on Motion Picture and Television Production Studio Soundstages, Approved Production Facilities, and Production Locations
- cvii. NFPA 160 Standard for the Use of Flame Effects Before an Audience
- cviii. NFPA 170 Standard for Fire Safety and Emergency Symbols
- cix. NFPA 203 Guide on Roof Coverings and Roof Deck Constructions
- cx. NFPA 204 Standard for Smoke and Heat Venting
- cxi. NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
- cxii. NFPA 214 Standard on Water-Cooling Towers
- cxiii. NFPA 220 Standard on Types of Building Construction
- cxiv. NFPA 221 Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls
- cxv. NFPA 225 Model Manufactured Home Installation Standard
- cxvi. NFPA 230 Standard for the Fire Protection of Storage
- cxvii. NFPA 231 Standard for General Storage
- cxviii. NFPA 231C Standard for Rack Storage of Materials
- cxix. NFPA 231D Standard for Storage of Rubber Tires
- cxx. NFPA 231F Standard for the Storage of Roll Paper
- cxxi. NFPA 232 Standard for the Protection of Records
- cxxii. NFPA 232A Guide for Fire Protection for Archives and Records Centers
- cxxiii. NFPA 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
- cxxiv. NFPA 251 Standard Methods of Tests of Fire Resistance of Building Construction and Materials
- cxxv. NFPA 252 Standard Methods of Fire Tests of Door Assemblies

- cxxvi. NFPA 253 Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
- cxxvii. NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials
- cxxviii. NFPA 256 Standard Methods of Fire Tests of Roof Coverings
- cxxix. NFPA 257 Standard on Fire Test for Window and Glass Block Assemblies
- cxxx. NFPA 258 Recommended Practice for Determining Smoke Generation of Solid Materials
- cxxxi. NFPA 259 Standard Test Method for Potential Heat of Building Materials
- cxxxii. NFPA 260 Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture
- cxxxiii. NFPA 261 Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes
- cxxxiv. NFPA 262 Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
- cxxxv. NFPA 265 Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls
- cxxxvi. NFPA 266 Standard Method of Test for Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source
- cxxxvii. NFPA 267 Standard Method of Test for Fire Characteristics of Mattresses and Bedding Assemblies Exposed to Flaming Ignition Source
- cxxxviii. NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
- cxxxix. NFPA 269 Standard Test Method for Developing Toxic Potency Data for Use in Fire Hazard Modeling
- cxl. NFPA 270 Standard Test Method for Measurement of Smoke Obscuration Using a Conical Radiant Source in a Single Closed Chamber
- cxli. NFPA 271 Standard Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
- cxlii. NFPA 272 Standard Method of Test for Heat and Visible Smoke Release Rates for Upholstered Furniture Components or Composites and Mattresses Using an Oxygen Consumption Calorimeter
- cxliii. NFPA 274 Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation

- cxliv. NFPA 275 Standard Method of Fire Tests for the Evaluation of Thermal Barriers
- cxlv. NFPA 276 Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components
- cxlvi. NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
- cxlvii. NFPA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
- cxlviii. NFPA 287 Standard Test Methods for Measurement of Flammability of Materials in Cleanrooms Using a Fire Propagation Apparatus (FPA)
- cix. NFPA 288 Standard Methods of Fire Tests of Horizontal Fire Door Assemblies Installed in Horizontal Fire Resistance-Rated Assemblies
- cl. NFPA 289 Standard Method of Fire Test for Individual Fuel Packages
- cli. NFPA 290 Standard for Fire Testing of Passive Protection Materials for Use on LP-Gas Containers
- cli. NFPA 291 Recommended Practice for Fire Flow Testing and Marking of Hydrants
- cli. NFPA 295 Standard for Wildfire Control
- cliv. NFPA 297 Guide on Principles and Practices for Communications Systems
- clv. NFPA 298 Standard on Foam Chemicals for Wildland Fire Control
- clvi. NFPA 299 Standard for Protection of Life and Property from Wildfire
- clvii. NFPA 302 Fire Protection Standard for Pleasure and Commercial Motor Craft
- clviii. NFPA 303 Fire Protection Standard for Marinas and Boatyards
- clix. NFPA 307 Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves
- clx. NFPA 318 Standard for the Protection of Semiconductor Fabrication Facilities
- clxi. NFPA 326 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair
- clxii. NFPA 328 Recommended Practice for the Control of Flammable and Combustible Liquids and Gases in Manholes, Sewers, and Similar Underground Structures
- clxiii. NFPA 329 Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases

- clxiv. NFPA 350 Guide for Safe Confined Space Entry and Work
- clxv. NFPA 385 Standard for Tank Vehicles for Flammable and Combustible Liquids
- clxvi. NFPA 386 Standard for Portable Shipping Tanks for Flammable and Combustible Liquids
- clxvii. NFPA 395 Standard for the Storage of Flammable and Combustible Liquids at Farms and Isolated Sites
- clxviii. NFPA 402 Guide for Aircraft Rescue and Fire-Fighting Operations
- clxix. NFPA 422 Guide for Aircraft Accident/Incident Response Assessment
- clxx. NFPA 450 Guide for Emergency Medical Services and Systems
- clxxi. NFPA 471 Recommended Practice for Responding to Hazardous Materials Incidents
- clxxii. NFPA 472 Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents
- clxxiii. NFPA 473 Standard for Competencies for EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents
- clxxiv. NFPA 475 Recommended Practice for Responding to Hazardous Materials Incidents/Weapons of Mass Destruction
- clxxv. NFPA 480 Standard for the Storage, Handling, and Processing of Magnesium Solids and Powders
- clxxvi. NFPA 481 Standard for the Production, Processing, Handling, and Storage of Titanium
- clxxvii. NFPA 482 Standard for the Production, Processing, Handling, and Storage of Zirconium
- clxxviii. NFPA 484 Standard for Combustible Metals
- clxxix. NFPA 485 Standard for the Storage, Handling, Processing, and Use of Lithium Metal
- clxxx. NFPA 496 Standard for Purged and Pressurized Enclosures for Electrical Equipment
- clxxxi. NFPA 497 Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- clxxxii. NFPA 498 Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives
- clxxxiii. NFPA 499 Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- clxxxiv. NFPA 501 Standard on Manufactured Housing
- clxxxv. NFPA 501A Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities

- clxxxvi. NFPA 502 Standard for Road Tunnels, Bridges, and Other Limited Access Highways
- clxxxvii. NFPA 513 Standard for Motor Freight Terminals
- clxxxviii. NFPA 520 Standard on Subterranean Spaces
- clxxxix. NFPA 550 Guide to the Fire Safety Concepts Tree
- cxc. NFPA 551 Guide for the Evaluation of Fire Risk Assessments
- cxi. NFPA 555 Guide on Methods for Evaluating Potential for Room Flashover
- cxcii. NFPA 556 Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles
- cxciii. NFPA 557 Standard for Determination of Fire Loads for Use in Structural Fire Protection Design
- cxciv. NFPA 560 Standard for the Storage, Handling, and Use of Ethylene Oxide for Sterilization and Fumigation
- cxcv. NFPA 601 Standard for Security Services in Fire Loss Prevention
- cxcvi. NFPA 650 Standard for Pneumatic Conveying Systems for Handling Combustible Particulate Solids
- cxcvii. NFPA 651 Standard for the Machining and Finishing of Aluminum and the Production and Handling of Aluminum Powders
- cxcviii. NFPA 652 Standard on Combustible Dusts
- cxcix. NFPA 654 Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
- cc. NFPA 655 Standard for Prevention of Sulfur Fires and Explosions
- cci. NFPA 664 Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
- ccii. NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
- cciii. NFPA 703 Standard for Fire Retardant—Treated Wood and Fire-Retardant Coatings for Building Materials
- cciv. NFPA 704 Standard System for the Identification of the Hazards of Materials for Emergency Response
- ccv. NFPA 705 Recommended Practice for a Field Flame Test for Textiles and Films
- ccvi. NFPA 720 Standard for the Installation of Carbon Monoxide(CO) Detection and Warning Equipment
- ccvii. NFPA 730 Guide for Premises Security
- ccviii. NFPA 731 Standard for the Installation of Electronic Premises Security Systems
- ccix. NFPA 750 Standard on Water Mist Fire Protection Systems
- ccx. NFPA 780 Standard for the Installation of Lightning Protection Systems

- ccxi. NFPA 790 Standard for Competency of Third-Party Field Evaluation Bodies
- ccxii. NFPA 791 Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation
- ccxiii. NFPA 801 Standard for Fire Protection for Facilities Handling Radioactive Materials
- ccxiv. NFPA 820 Standard for Fire Protection in Wastewater Treatment and Collection Facilities
- ccxv. NFPA 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- ccxvi. NFPA 851 Recommended Practice for Fire Protection for Hydroelectric Generating Plants
- ccxvii. NFPA 853 Standard for the Installation of Stationary Fuel Cell Power Systems
- ccxviii. NFPA 901 Standard Classifications for Incident Reporting and Fire Protection Data
- ccxix. NFPA 902 Fire Reporting Field Incident Guide
- ccxx. NFPA 903 Fire Reporting Property Survey Guide
- ccxxi. NFPA 904 Incident Follow-up Report Guide
- ccxxii. NFPA 906 Guide for Fire Incident Field Notes
- ccxxiii. NFPA 921 Guide for Fire and Explosion Investigations
- ccxxiv. NFPA 950 Standard for Data Development and Exchange for the Fire Service
- ccxxv. NFPA 951 Guide to Building and Utilizing Digital Information
- ccxxvi. NFPA 1126 Standard for the Use of Pyrotechnics Before a Proximate Audience
- ccxxvii. PYR 1128 Standard Method of Fire Test for Flame Breaks
- ccxxviii. PYR 1129 Standard Method of Fire Test for Covered Fuse on Consumer Fireworks
- ccxxix. NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas
- ccxxx. NFPA 1142 Standard on Water Supplies for Suburban and Rural Fire Fighting
- ccxxxii. NFPA 1143 Standard for Wildland Fire Management
- ccxxxii. NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire
- ccxxxiii. NFPA 1145 Guide for the Use of Class A Foams in Manual Structural Fire Fighting
- ccxxxiv. NFPA 1150 Standard on Foam Chemicals for Fires in Class A Fuels
- ccxxxv. NFPA 1192 Standard on Recreational Vehicles
- ccxxxvi. NFPA 1194 Standard for Recreational Vehicle Parks and Campgrounds

- ccxxxvii. NFPA 1201 Standard for Providing Emergency Services to the Public
- ccxxxviii. NFPA 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems
- ccxxxix. NFPA 1231 Standard on Water Supplies for Suburban and Rural Fire Fighting
- ccxl. NFPA 1250 Recommended Practice in Fire and Emergency Service Organization Risk Management
- ccxli. NFPA 1401 Recommended Practice for Fire Service Training Reports and Records
- ccxlii. NFPA 1584 Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises
- ccxlii. NFPA 1600 Standard on Disaster/Emergency Management and Business Continuity Programs
- ccxliv. NFPA 1620 Standard for Pre-Incident Planning
- ccxlv. NFPA 1802 Standard on Two-Way, Portable (Hand-held) Land Mobile Radios for Use by Emergency Services Personnel
- ccxlii. NFPA 1851 Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
- ccxlii. NFPA 1852 Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA)
- ccxlviii. NFPA 1952 Standard on Surface Water Operations Protective Clothing and Equipment
- ccxlix. NFPA 1953 Standard on Protective Ensembles for Contaminated Water Diving
- ccl. NFPA 1961 Standard on Fire Hose
- ccli. NFPA 1962 Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances
- ccli. NFPA 1963 Standard for Fire Hose Connections
- ccli. NFPA 1964 Standard for Spray Nozzles
- ccli. NFPA 1965 Standard for Fire Hose Appliances
- cclv. NFPA 1971 Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting
- cclvi. NFPA 1982 Standard on Personal Alert Safety Systems (PASS)
- cclvii. NFPA 1991 Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies
- cclviii. NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems
- cclix. NFPA 2010 Standard for Fixed Aerosol Fire-Extinguishing Systems
- cclx. NFPA 8501 Standard for Single Burner Boiler Operation

- cclxi. NFPA 8502 Standard for the Prevention of Furnace Explosions/Implosions in Multiple Burner Boilers
- cclxii. NFPA 8503 Standard for Pulverized Fuel Systems
- cclxiii. NFPA 8504 Standard on Atmospheric Fluidized-Bed Boiler Operation
- cclxiv. NFPA 8505 Standard for Stoker Operation
- cclxv. NFPA 8506 Standard on Heat Recovery Steam Generator Systems
- cclxvi. National Roofing Contractors Association
- cclxvii. National Terrazzo and Mosaic Association
- cclxviii. National Wood Window and Door Association
- cclxix. Portland Cement Association
- cclxx. Tile Council of America
- cclxxi. Underwriters Laboratories
- cclxxii. West Coast Lumber Inspection Bureau
- cclxxiii. Wood work Institute of California
- cclxxiv. Western Wood Products Association

- 2. Local Compliance:** In addition to the Standards, Codes, and Regulations listed above, the AFRH will adhere to the general building codes and safety ordinances for fire and traffic enforced by the local authorities for which a facility is located, unless an exception is granted by the AFRH Corporate Facilities Manager (CFM) after guidance is provided by the AFRH Chief Operating Officer (COO).
- 3. Continuous Operations:** AFRH facilities shall provide for onsite personnel 24 hour per day/7 days per week required to provide the basic living and/or emergency requirements of facility Residents and/or tenants.
- 4. Office Business Hours:** Administrative and business office hours for general services provided by AFRH shall be open between 8:00 A.M. and 4:00 P.M., except between the hours of 12:00 P.M. and 1:00 P.M. for lunch, Monday through Friday except on Federal holidays
- 5. Quiet Hours:** Individuals may not make unreasonably loud noise between 9:30 P.M. and 6:30 A.M., which is likely to annoy or disturb one or more other persons in their residences ("Unreasonable" shall be defined as in the judgment of the Administrator what is fair, appropriate, and/or sensible, but in any case, the noise level at the point of occurrence in or around a dormitory or tenant area including a Resident's room or tenant's house may not exceed 85 dB (Decibels) during quiet hours.

Note: The Administrator may designate “unreasonable” determinations to any campus staff personnel that they see fit for the duty)

6. Access to Secure Areas:

All mechanical/electrical rooms, building storage closets/areas, personal offices, and roof tops shall be considered “secure areas.” Only authorized personnel are allowed to access secure areas. (Authorized personnel are defined as those who have been assigned keys, granted security card access, or given special permission by the Key Control Officer of the facility the CFM, the COO, or their designees.) Secure areas are to be kept locked and closed at all times, unless the secure door is within the visual field of an authorized person who monitors and ensures that unauthorized individuals do not enter.

7. Interior Facility Air Conditioned Temperature:

All air conditioned common areas, areas that are not assigned to a single individual for personal use, shall be between 74 and 76 degrees Fahrenheit at all times. Personnel in individual areas are allowed to vary the temperature in their area between 68 and 80 degrees Fahrenheit if the area possesses the mechanical ability to do so without disrupting other areas or utilizing an excess amount of energy. (“Excess” shall be defined as in the judgment of the FM what is appropriate and/or sensible.) If the temperature in an air conditioned area achieves 86 degrees Fahrenheit or decreases below 55 degrees Fahrenheit through mechanical failure, the Administrator is to consult with the COO if alternatives for the working or living conditions in those areas should be pursued.

8. Facility Hot Water Standard Temperature:

Except in Memory Support and Long Term Care areas, all hot water point-of-use locations shall have a temperature no less than 120 degrees Fahrenheit and no greater than 124 degrees. The hot water point-of-use locations in Memory Support and Long Term Care shall range between 110 and 114 degrees Fahrenheit.

9. Facility Illumination Levels:

The following illumination standard shall be the minimum levels allowed in any interior or garage areas of an AFRH facility unless an exception is granted by the FM after adequate justification as determined by the CFM is provided:

- a. 50 foot-candles at work station surfaces, measured at a height of 30 inches above floor level, during working hours (for visually difficult or critical tasks, additional lighting may be authorized by the CFM);

- b. 30 foot-candles in work areas, common areas, and Resident rooms during working hours, measured at 30 inches above floor level;
- c. 10 foot-candles, but not less than 1 foot-candle, in non-work areas, during working hours (normally this will require levels of 5 foot-candles at elevator boarding areas, minimum of 1 foot-candle at the middle of corridors and stairwells as measured at the walking surface, 1 foot-candle at the middle of corridors and stairwells as measured at the walking surface, and 10 foot-candles in storage areas); and
- d. Any level as determined by the Safety or Security Officer as approved by the Administrator and CFM essential for safety and security purposes, including exit signs and exterior lights.

10. Energy and Water Conservation:

It is every Government employee's duty and responsibility to conserve energy and water. Not only does it reduce AFRH cost, but it saves resources for the future generation. Every employee is required and every Resident is encouraged to:

- a. Turn off lights and equipment when not needed;
- b. Not block or impede ventilation;
- c. Set heating temperatures in non-occupied areas no higher than 55 degrees Fahrenheit during non-working hours for Winter months and no lower than 85 degrees Fahrenheit during non-working hours for Summer months except as necessary to return space temperatures to a suitable level for the beginning of working hours;
- d. Keep windows and other building accesses closed during the heating and cooling seasons;
- e. Turn off water fixtures when not in direct use. Do not leave fixtures running unattended; and
- f. Ensure that irrigation is performed ONLY on an as needed bases. Irrigation systems should not run when it is raining or when the water table is high.

Only electronic products that are Electronic Product Environmental Assessment Tool (EPEAT)-registered products

or ENERGY STAR® rated may be purchased by Federal employees for the facility. Residents moving into the facility may only bring electronic products that meet the ENERGY STAR® rating criteria. It shall be the responsibility of the facility Administrators that the facility staff ensure compliancy with this requirement.

Purchasing sustainable products and services identified by EPA programs including: WaterSense certified products and services (water efficient products) shall be the preferred practice when these types of products or services are available. When EPA program products are available, the facilities must provide justification and request approval from the CFM to purchase substitutes.

Facilities are to ensure that their Leadership in Energy and Environmental Design (LEED) buildings meet the Federal

Guiding Principles (FGP) for sustainability. The documentation for the FGP are to be kept up-to-date.

Facilities shall improve sustainability in every aspect of the facility by developing and implementing innovated methods to conserve energy or water, maintaining LEED status, and implementing the agency's Strategic Sustainability Plan and Climate Adaptation Plan.

Data Input

Monthly, facilities are to submit each month's electrical, water, natural gas, and any other energy or water data into an energy profile manager as determined by the Agency's CFM.

When called upon by the CFM, facilities are to provide all sustainability data that may be required to complete any reports that shall be submitted for review by the public or other agencies.

11. Recycling:

Facilities shall make every effort to recycle as much generated waste as possible. At the minimum, at least fifty (50) percent of all generated waste shall be diverted from landfills.

12. Environmental Responsibilities:

Environmental Products:

Products that do not damage the environment, otherwise known as "Green" products or environmentally friendly

products, shall be used when possible or feasible. In the following services, Green Products are to be utilized.

- a. Cleaning services;
- b. Green meeting and conference services; and
- c. Construction (products and materials, such as paint with no or low volatile organic content (VOCs), or native landscaping plants).

Pest Control

With certain exceptions, a pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant, or desiccant, or any nitrogen stabilizer.

- a. Properly follow pesticide labeling instructions
- b. Use any pesticide under an experimental use permit consistent with the provisions of the permit
- c. Ensure that applicators are properly trained and, wherever required, necessary or possible, certified to use pesticides
- d. Applicators use appropriate personal protective equipment
- e. Properly manage any pesticide storage facilities
 - o Storage areas shall be secure
 - o Containers shall be sealed
 - o Enclosed storage areas are vented
- f. Dispose of pesticide residues and waste in accordance with required and recommended procedures
- g. Maintain records of applications of restricted use pesticides, except when applied by a certified applicator who is a private contractor.

Asbestos

The Facility's Campus Operations staff must ensure the following actions are adhere to by contractors or lessees in relation to asbestos in buildings:

- a. When asbestos is observed, suspected, or possible, Campus Operations personnel shall have the area or building inspected and assessed for the presence and condition of

asbestos-containing materials. Space to be leased must be free of all asbestos containing materials, except undamaged asbestos flooring in the space or undamaged boiler or pipe insulation outside the space, in which case an asbestos management program conforming to U.S. Environmental Protection Agency (EPA) guidance must be implemented.

- b. Manage in-place asbestos that is in good condition and not likely to be disturbed.
- c. Abate damaged asbestos and asbestos likely to be disturbed. Campus Operation personnel shall perform a pre-alteration asbestos assessment for activities that may disturb asbestos.
- d. Do not use asbestos in new construction, renovation/modernization or repair of owned or leased space.
- e. Communicate all written and oral asbestos information about the leased space to tenants.

Radon

When Radon is suspected, or possible, Campus Operations personnel shall have the area or building inspected and tested for the presence of Radon. If the test results provide a positive results, Campus Operations personnel shall ensure the following actions are adhere to by contractors or lessees in relation to the abatement of radon in spaces when radon levels exceed current EPA standards:

- a. Abate the Radon per Environmental Protection Agency (EPA) standards with a professional contractor
- b. Retest abated areas and make lessors retest, as required, abated areas to adhere to EPA standards.

Indoor Air Quality

Facility Campus Operations personnel shall assess indoor air quality of buildings as part of their safety and environmental facility assessments. Campus Operation personnel must respond to tenant complaints on air quality and take appropriate corrective action where air quality does not meet applicable standards.

Lead

Facility Campus Operations personnel shall ensure the following actions are adhere to by contractors or lessees in relation to lead in buildings:

- a. Test space for lead-based paint in renovation projects that require sanding, welding or scraping painted surfaces.
- b. Do not remove lead based paint from surfaces in good condition.
- c. Test all painted surfaces for lead in proposed or existing schools or child care centers.
- d. Abate lead-based paint found in accordance with U.S. Department of Housing and Urban Development (HUD) Lead-Based Paint Guidelines or encapsulate per EPA Regulations if the lead paint is not in good condition or in a school or child care center.
- e. Test potable water for lead in all drinking water outlets.
- f. Take corrective action when lead levels exceed the HUD Guidelines.

Hazardous Materials and Wastes

The Facility Campus Operations personnel shall ensure the following actions are adhere to by contractors or lessees in relation to the monitoring of hazardous materials and wastes:

- a. Monitor the transport, use, and disposition of hazardous materials and waste in buildings to provide for compliance with General Services Administration (GSA), Occupational Safety and Health Administration (OSHA), Department of Transportation, EPA, and applicable State and local requirements. In addition, tenants of leased AFRH real property must comply with these requirements.
- b. In leased space, include in all agreements with the lessor requirements that hazardous materials stored in leased space are kept and maintained according to applicable Federal, State, and local environmental regulations.

Underground Storage Tanks (UST)

The facility's Campus Operations personnel have the following responsibilities concerning the management of underground storage tanks in real property:

- a. Register, manage, and close underground storage tanks, including heating oil and fuel oil tanks, in accordance with GSA, EPA, and applicable State and local requirements.
- b. Require any party responsible for tanks on AFRH real property that own or that they use but do not own to follow these requirements and to be responsible for the cost of compliance.

Seismic Safety

Facilities must follow the standards issued by the Interagency Committee on Seismic Safety in Construction (ICSSC) as the minimum level acceptable for assessing the seismic safety of their owned and leased buildings and in mitigating unacceptable seismic risks in those buildings.

13. Historic Preservation:

Each facility Administrator is responsible for securing and protecting the historic resources on their facility. No alteration, modification, repair, replacement, etc. is to be made to any historic resources without following the Program Agreements (PA) or Master Plans that may be applicable or without the expressed written permission of the FM, if a procedure is not described in their PA or a product is not approved in their Master Plan. In all cases where a historic resource may be impacted in any way including but not limited to, visual, physical, environmental, etc. by a facility undertaking or activity, the facilities shall consult with the AFRH Cultural Resource Manager to determine if an adverse effect applies. If so, the facility must consult the CFM for guidance and approval before taking any further action.

14. Snow and Ice Removal:

Facilities are to ensure that plans or contracts are in place that allow emergency vehicles and daily essential AFRH personnel have complete access to the resident-occupied buildings at all times during a snow or ice event.

AFRH facilities are to make plans for the possibility that public roads and transportation shall be unusable or unavailable during a snow or ice event. If there is a strong possibility, as determined by the Administrator, that daily essential AFRH

personnel may not be able to access the facility due to local government's inability to clear paths of travel and/or provide standard public transportation, the facilities are to implement their plans to provide for temporary lodging and/or other measures to ensure essential support for Residents.

15. Grounds Maintenance:

The Facility's Chief, Campus Operations shall do all that is necessary within their authority to keep the grounds landscape healthy, clean, safe and attractive. Such activities include, but are not limited to, planning and carrying out annual plantings, periodic weeding, fertilizing, shrub tree pruning, topiary, lighting, fencing, runoff drainage, irrigation, and other jobs for protecting and improving the topsoil, plants, lawn, and lawn care accessories. Priority in care shall be given to the facility's entrance and entry way. The Facility's Chief, Campus Operations is to develop grounds maintenance plans with the contractor's assistance that indicate the areas of high visibility that will receive the most attention during the Spring and Summer months.

16. Facility Maintenance

Preventative Maintenance

Preventative Maintenance (PM) shall be performed on all facility-occupied buildings and all equipment per all applicable laws, regulations, codes, standards, and Original Equipment Manufacturer requirements and/or recommendations. No deviation shall be allowed without the express written permission of the CFM.

Service Request Work

Service Request Work, also known as Work Orders, shall be performed upon request on all occupied and unoccupied buildings per all applicable laws, regulations, codes, standards, and the Original Equipment Manufacturer requirements and/or recommendations (if applicable) if the Service Request Work is reasonable, feasible, and/or economical as determined by the Facility's Chief, Campus Operations. Service Request Work shall consist of all items specifically described here in, as well as any activity such as, but not limited to: testing, measuring, replacing, adjusting, installing, inspecting, servicing, rebuilding, reclamation, classifying as to serviceability, and/or repairing of any structural, mechanical, electrical, or plumbing component of a building, structure, utility system, ground facility, edifice, and/or any other real property of the AFRH for

the purpose of retaining and/or restoring that component in or to a specified state in which the component can perform its required functions or in such condition that it may be continuously used at its original or designed capacity and efficiency for its intended purpose. Service Request Work shall also include, but not limited to: the installation, removal, mounting, or dismounting of personal items, decorative components, or other items consisting of (but not limited to): pictures, shelves, banners, dispensers, or any other miscellaneous object to or from any building, structure, utility system, ground facility, edifice, or any other real property of the AFRH. Service Request Work shall be carried to completion including operational checks and cleanup of the job site. No deviation of Service Request Work as described above shall be allowed without the express written permission of the CFM.

Facilities shall have adequate procedures in place to receive and respond to service requests during normal business hours and for receiving and responding to emergency and urgent service requests 24 hours per day, seven days a week, including weekends and holidays

Facilities shall complete all Service Requests within four (4) business days of receipt of Service Request, or inform the requestor why such repair cannot be completed in such a time frame.

Emergency Service Request

An emergency condition is one that: threatens life or injury, causes severe property damage, or major disruption to AFRH operations. Examples are: utility system outages, overflowing drains, broken water pipes, electrical defects which may cause fire or shock, accidents, fire, gas leaks, refrigeration outage, alarm activation, alarm outages, etc. Facilities shall have procedures in place to receive emergency service requests – 24 hours per day/7 days per week.

Facilities shall respond immediately to Emergency Service Requests and must have personnel or contractors on the job site and working within fifteen (15) minutes after receipt of an emergency service request during normal business hours and within one (1) hour after normal business hours.

Work must continue until the emergency is arrested.

Urgent Service Request

An Urgent Service Request shall consist of providing services or correcting failures which do not immediately threaten personnel, property, or AFRH mission but which would soon inconvenience and/or affect personnel health or wellbeing, lead to property damage, or lead to disruptions in operational missions. Facilities shall have procedures in place to receive emergency service requests - 24 hours per day and 7 days per week.

Facilities shall have personnel or contractors on the job site and working within one (1) hour after receipt of an Urgent Service Request received during normal business hours and within two (2) hours for urgent requests received after normal business hours.

Work must continue until the urgent nature is arrested.

Routine Service Request

Routine Service Requests or other service requests normally received during normal business hours, and may be completed at any hour that Campus Operations personnel deem appropriate in relation to the policies and the needs.

Resident Room Turnovers

The Facility's Chief, Campus Operations shall perform refurbishment, repair, and cleaning of resident rooms in preparation for resident living for new residents once the current resident has moved out. Campus Operation personnel shall inspect, assess required work; and perform the repair, replacement (including any missing government furniture required per any law, regulation, AFRH Directive, or Campus SOP), and cleaning requirements once the assessment is complete. The Chief, Resident Services or his/her designee shall make a single list of all issues for Campus Operations personnel to resolve. After the items on the list are resolved, the Resident Services Chief shall be the custodian of the room until a Resident fills it. All additional repair issues shall be submitted as individual service request per procedures.

Reports

a. Facility Chief, Campus Operations is to provide schedule of PMs to be performed that year during the first week of the Government Fiscal Year to the FM. Each month after that, Chief of Campus Operations is to provide to the FM a monthly report on all preventative maintenance performed for the previous months, a justification for why any PMs were not performed, when the PMs are rescheduled if applicable, any issues discovered during the PM, and the plan to resolve the issue.

b. Refrigerant Reports detailing the loss of refrigerant for cooling or other types of systems shall be reported annual in December to the CFM for the last Government Fiscal Year. (Note: If a leak over 100 lbs. occurs, it is to be reported immediately and guidance is to be requested as to necessary actions that must be taken.)

c. Hazardous Waste Report detailing the collection of or disposal of Hazardous Wastes per CFM guidance shall be reported in the month that it occurs. (Note: if a hazardous waste spill or accident occurs it is to be reported immediately and guidance is to be requested as to necessary actions that must be taken.)

d. A monthly Service Request Tracking Report shall be provided to the FM that contains the following information

(1) The number of Service Requests received for the month.

(2) The number of service request completed for the month.

(3) The number of service request canceled for the month.

(4) The number of service request extended for the month.

(5) The total of service request still on hold.

(6) The number of emergency requests for the month.

(7) The number of urgent requests for the month.

- (8) The number of routine requests for the month.
- (9) The total number of requests of each service request classification that were not completed by its deadline and became delinquent.
- (10) The total number of service requests by each trade (ex: electrical, plumbing, HVAC, carpentry, etc.)
- (11) All requests on hold, with extensions, and delinquent.
 - e. After the average exterior temperature is above 50 degrees Fahrenheit, the Chief of Campus Operations shall provide a monthly Chiller Maintenance and Inspection Report containing the following until the average exterior temperature drops below the 50 degree mark again:
 - (1) Chilled water temperature (incoming)
 - (2) Chilled water temperature (outgoing)
 - (3) Condenser water temperature (incoming)
 - (4) Condenser water temperature (outgoing)
 - (5) Evaporator pressure
 - (6) Motor Loads
 - (7) Compressor oil level
 - (8) Oil pressure
 - (9) Oil temperature
 - (10) Details of work performed, observations, and recommendations
 - (11) A chemical water treatment analysis of the cooling towers' water and glycol from each Chiller system.
- f. After the average exterior temperature goes below 70 degrees Fahrenheit, the Chief of Campus Operations shall provide a monthly Boiler Maintenance and Inspection Report

containing the following until the average exterior temperature goes above the 70 degree mark again:

- (1) High pressure boiler protection
- (2) Low water level protection
- (3) High water level protection
- (4) High flue gas temperature warning
- (5) Flame failure protection
- (6) Trial For Ignition (TFI) Failure
- (7) Fire eye or Flame Rod test

g. For each elevator, an Elevator Report shall be created that lists all of the prior month's service request concerning elevators, and the duration each system was inoperable

h. As requested by the CFM, the Chief, Campus Operations shall provide or create any report or document as described or needed by the FM.

The Chief, Campus Operations shall establish and maintain a records keeping system of the reports that shall facilitate the FM's periodic review of service requests, preventive maintenance, and additional work. The Chief, Campus Operations shall maintain records in a consistent, business-like and orderly fashion. All records shall contain sufficient supporting documentation, if applicable, to provide a complete audit trail.

The Chief, Campus Operations shall ensure that generated technical records, reports, files, and other documentation are made available to the CFM and other authorized Government representatives. The Chief, Campus Operations shall obtain CFM approval before releasing any stored, generated, or archived information related to their campus or other AFRH activities to other government bodies, other Federal agencies, contractors, private parties, or news agencies.

Inspections

Periodically, the FM shall conduct inspections of the facility and/or the facility records. Facilities are to assist the CFM in any way possible to help ensure the CFM is able to conduct a thorough and complete inspection.

17. Building Drawings:

Current drawings that address all features of the facility, especially the fire protection, shall be maintained at all times by the facilities.

18. Utility System Management Plan:

Each facility must develop a Utility System Management Plan (USMP) in coordination with and approval of the CFM. The USMP shall be designed to promote a safe, controlled, comfortable environment for residents, patients, visitors and staff by assessing and minimizing risks of utility system failures. The Plan shall ensure operational reliability and supports the Agency's mission in providing excellent services and quality care to our Residents.

19. Interim Life Safety Plan;

Definitions
Interim Life Safety Measures (ILSM) are a series of administrative actions required to be taken to temporarily compensate for the hazards posed by current NFPA 101 Life Safety Code (LSC) deficiencies or construction activities.

Requirement

It is AFRH's policy to ensure a high level of safety during all construction activities.

Facilities shall create standard operating procedures in coordination with and approval of the FM to provide a level of building life safety that would meet all expected requirements during construction activities and continue to provide the necessary measures when there is a Life Safety Code (LSC) deficiency or until completion of all construction activities.

Implementation of ILSM is required in or adjacent to all construction areas and throughout buildings with existing LSC deficiencies. ILSM apply to all Residents and personnel, including construction workers. In addition, ILSMs must be implemented upon project development and be continuously enforced through project completion.

ILSM shall provide a level of life safety comparable to that of the already existing facilities Life Safety measures. Each ILSM action must be documented through written procedures. Except as stated below, frequencies for inspection, testing, training, and monitoring and evaluation shall be established by the facilities.

Facilities shall have written ILSM procedures that cover situations when Life Safety Code deficiencies cannot be immediately corrected or during periods of construction. The procedures shall include criteria for evaluating when and to what extent the facility follows special measures to compensate for increased life safety risk. When the facility identifies Life Safety Code deficiencies that cannot be immediately corrected or during periods of construction, the facilities shall implement the ILSM in their Interim Life Safety Plan, which shall consist of at least the following actions:

- a. Notify the fire department (or other emergency response group) and initiate an internal fire watch when a fire alarm or sprinkler system is out of service more than 4 hours in a 24-hour period in an occupied building. Notification and fire watch times are documented.
- b. Posts signage identifying the location of alternate exits to everyone affected.
 - a. Inspect exits in affected areas on a daily basis. The need for these inspections shall be based on criteria in the Facility's interim life safety measure established in their SOPs.
 - b. Provide temporary but equivalent fire alarm and detection systems for use when a fire system is impaired. The need for these equivalent systems shall be based on criteria in the organizations interim life safety measure (ILSM) established in their SOPs.
 - c. Provide additional fire-fighting equipment.
 - d. Use temporary construction partitions that are smoke-tight, or made of noncombustible material or made of limited-combustible material that will not contribute to the development or spread of fire.
 - e. Increase surveillance of buildings, grounds, and

equipment, giving special attention to construction areas and storage, excavation, and field offices.

- f. Enforce storage, housekeeping, and debris-removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level.
- g. Provide additional training to those who work in the facility on the use of fire-fighting equipment.
- h. Conduct one additional fire drill per shift per quarter.
- i. Inspect and test temporary systems monthly. The completion date of the tests shall be documented.
- j. Facilities shall conduct education to promote awareness of building deficiencies, construction hazards, and temporary measure implemented to maintain fire safety.
- k. Facilities shall train those who work in the facilities to compensate for impaired structural or compartmental fire safety feature.
- l. Facilities shall strongly enforce the prohibiting of smoking in accordance with the "No Smoking Directive."

20. Change Analysis:

Change Analysis shall be conducted anytime something new is brought into the workplace, whether it be a piece of equipment, different materials, a new process, an entirely new building, new personnel, etc. to plan for any new hazards that may unintentionally be introduced. Before implementing a change for a facility, the change shall be analyzed thoroughly beforehand. The Change Analysis will help in heading off a problem before it develops. At the minimum, Change Analysis shall be conducted and documented when the following occur.

- a. Building or leasing a new facility.
- b. Installing new equipment.
- c. Using new materials.
- d. Starting up new processes.
- e. Altering or modifying an existing facility.

f. Staffing changes occur.

21. Facility Alterations/

All alterations/modifications to any aspect of a facility shall be reviewed and approved by the CFM before work is contracted or implemented. Administrators, or their designees, shall ensure that all alteration/modification projects are submitted on a Facility Change Request Form (FCR) to the CFM along with a Change Analysis in a timely manner that provides the CFM with sufficient time to review all request. (*The FCR Form is attached to this manual.*) Any alteration/modification projects requiring permits as determined by the CFM may be issued a permit by the CFM after all applicable documents, information, and/or data as determined by the CFM is submitted for review by the Administrator or their designee. Inspections as determined by the CFM shall be conducted by either the CFM or a CFM's representative who may be a certified or professional third party individual or entity. No individual unless wearing the appropriate personal protection per OSHA regulations shall be allowed to utilize, occupy, or enter into the area of work for an alteration/modification construction project until a "Certificate of Occupancy" letter is provided by the CFM declaring that the project has passed all required building code inspections and the area is safe for the general public.

22. Personal Appliances Usage:

Portable Heaters, Fans, and other Such Devices

All portable heaters, fans, air conditioners, and other such Devices, which are plugged into the facilities electric network or are operated on a consumed fuel are prohibited from operating in Government-controlled facilities unless authorized by the CFM as a temporary measure. Regulations do not allow for permanent or long term usage.

Common Spaces and Work Areas

Refrigerators, microwaves, blenders, coffee machines, and other such personal appliances are prohibited from being operated or used at work stations, work areas, or common areas. Such devices may only be utilized in designated break rooms, kitchens, cafeteria, canteen, or bar area. The Administrator may make temporary exceptions for special events such as parties or large conferences or meetings.

Televisions may only be used in common areas unless otherwise authorized by the Administrator, CFM, or COO.

Radios may be utilized by staff at their personal work station if the Supervisor approves and it does not disturb any other individual in the general area. In any case, the noise level may not exceed 40 dB (the hum of a standard residential refrigerator).

Residents may utilize in their personal room “Energy Star” rated or “EPEAT” registered refrigerators, microwaves, and coffee machines if the device is NOT plugged into a power extension cord or power strip (the only exception is computer peripheral accessories), and no more than two devices are plugged into the same outlet at the same time. Residents may also operate televisions, radios, stereos, computers, printers, and computer peripheral accessories if such devices are NOT plugged into a power extension cord. These devices may utilize one power strip, but at no time may more than one power strip be plugged into the same outlet or plugged into another power strip. No other personal appliance may be operated or utilized in a resident room unless the device is required by the maintenance contractor to perform a repair.

23. Furniture:

All furniture utilized or stored on the facility must meet NFPA requirements for fire resistance for the type of area where the furniture is utilized or stored.

Resident Room Furniture:

All Resident rooms shall include certain furniture provided by AFRH. The standard furniture shall include the furnishings listed for each Campus in the Resident Guide Directive. An additional chair may be provided to a Resident, if the Administrator determines that the Resident is financially unable to provide their own chair or chairs. The design, style, color, etc. of the furniture items shall be at the discretion of the Administrator, but any choice must be consistent with current furnishings in the room or in the area or in the building unless a waiver is provided by the CFM.

Common Area Furniture:

All furniture and their arrangement in common areas shall be consistent with the intent of the designation of the area. Alterations or replacement furniture shall be at the discretion of

the Administrator, but any choice in design, style, color, etc. must be consistent with current furnishings in the area or in the building unless a waiver is provided by the CFM.

All missing or damaged furniture shall be replaced, repaired, or discarded per the Administrators or their designee's determination. (Any controlled furniture as defined in section 24 "Tracking Personal Property" must be discarded per section 26 "Excess Personal Property".)

24. Tracking Personal Property:

Definitions

Accountable Personal Property includes expendable personal property whose expected useful life is two years or longer and whose acquisition value, as determined by the Agency, warrants tracking in the Agency's property records, including capitalized and sensitive personal property.

Accountability means the ability to account for personal property by providing a complete audit trail for property transactions from receipt to final disposition.

Control means the ongoing function of maintaining physical oversight and surveillance of personal property throughout its complete life-cycle using various property management tools and techniques taking into account the environment in which the property is located and its vulnerability to theft, waste, fraud, or abuse.

Controlled Property includes the following categories which comprises all accountable personal property:

- a. Sensitive Property (as listed in the Enclosure to this Directive).
- b. Property valued over \$1,000 that is not: perishable, expendable due to normal daily operations, a building material, or an item that is incapable of being removed without destruction.
- c. Property loaned to or from another Federal Agency.
- d. Gifts of property received by the Government from non-government sources.

e. Weapons - all types including, but not limited to, air, spring, powder, or other propulsions system.

f. Hazardous personal property including materials and devices.

g. Unclaimed Deceased Resident Property.

h. Unclaimed Deceased Military Personnel Property transferred to AFRH per U.S.C. Title 10

Hazardous personal property means property that is deemed a hazardous material, chemical substance or mixture, or hazardous waste under the Hazardous Materials Transportation Act (HMTA) (49 U.S.C. 5101), the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901–6981), or the Toxic Substances Control Act (TSCA) (15 U.S.C. 2601–2609).

Inventory includes a formal listing of all accountable property items assigned to the Agency, along with a formal process to verify the condition, location, and quantity of such items. This term may also be used as a verb to indicate the actions leading to the development of a listing. In this sense, an inventory must be conducted using an actual physical count, electronic means, and/or statistical methods.

Non-Controlled Property is property in which due to its inherent nature or value, the value/benefit of the property to the Government is so low that tracking would be cost prohibitive making the property's control unwarranted. The following criteria make tracking a property unwarranted:

a. Property that has an acquisition cost of less than \$1,000 (excluding items which have been designated as sensitive items),

b. Perishable,

c. Expendable through normal daily use,

d. Building material, and

e. Immovable without being destroyed

Sensitive Property includes all items, regardless of value, that require special control and accountability due to unusual rates

of loss, theft, misuse, or due to security or export control considerations, or due to legal requirements to maintain and track the property.

Tracking of Government Property

AFRH's inventory tracking process only applies to controlled property as defined in this Directive/Manual.

Administrators are to develop standard operating procedures (SOPs) per the General Accountability Office's (GAO) Executive Guide- "Best Practices in Achieving Consistent, Accurate Physical Counts of Inventory and Related Property" to track controlled personal property, but at a minimum, Administrators shall implement the following.

Each Administrator shall assign Accountability Officers (AOs) over all the different areas at each of their respective facilities. The AO shall be accountable for all controlled property in their assigned area. The AO shall assign specific controlled property to specific Property Custodians (PCs). The PC shall be accountable and control the controlled property assigned to them.

Note #1: The Agency's Executive Support Services Officer (ESSO) shall be the AO for areas occupied by the COO and Corporate Resource Office (CRO) staff. Each COO and CRO staff member shall be the PC for the controlled property in the offices they occupy and oversee.

The AOs shall utilize unique property control numbers (PCN) to account for each controlled property item in their assigned area. The PCN shall be entered and monitored in a Property Management System (PMS) to track and control these items. The PCN shall be linked to data in the PMS that contains information on the controlled property item such as the item's name, purchase price, manufacturer's information, item location and condition, assigned AO and PC, and which category of controlled property the item conforms to. This information in the PMS shall serve as the basis for performing semi-annual physical inventory procedures.

Twice per calendar year, but not within 180 days of each other, the Administrators shall conduct a general inventory check of all controlled personal property at their facility. Administrators may utilize any method or inventory technique that will work

best with their campus, but AOs and PCs may not perform inventories on property assigned to them.

Any discrepancies between the physical inventory and any and all information (especially, condition and location) in the PMS must be reported and justified to the CFM. If as determined by the CFM adequate justification is not provided to account for the controlled property, the CFM shall submit the report to the AFRH Inspector General (IG) and COO for action.

Note #2: Twice per calendar year, but not within 180 days of each other, the ASSS under the supervision of the IG and CFM shall conduct a general inventory check of all controlled property in areas occupied by the COO and CRO staff. The inventory results are submitted to the COO for review and/or action if applicable.

25. Receiving Personal Property:

The Administrators are to create and establish SOPs to perform the following. When personal property that meets the criteria established for controlled property is acquired by the facility an AO and PC is to be assigned to the property, the property shall be assigned a PNC, and the PNC is to be entered into the PMS with the item's name, purchase price, manufacturer's information, item location and condition, and assigned AO and PC.

Note: When personal property that meets the criteria established for controlled property is acquired for areas occupied or utilized by COO or CRO staff, the ESSO as the AO shall assign a PNC to the property, and the PNC is to be entered into the PMS with the item's name, purchase price, manufacturer's information, item location and condition, and assigned AO and PC who shall be the COO or CRO staff member that occupies or oversees the area. All acquisitions of property by the ASSS for the COO and CRO staff are to be overseen by the CFM. The records of the acquisitions are to be reviewed by the IG once per year for discrepancies.

26. Excess Personal Property:

Definitions

Excess personal property means any personal property that is no longer required for AFRH needs, as determined by the COO

or designee or unclaimed property no longer required to be tracked by law.

Acquiring Excess Personal Property

Since using excess personal property from other Federal Agencies generally only cost AFRH shipping and transportation, employees should use excess personal property from other Federal Agencies to the maximum extent practicable, which will maximize the return on AFRH dollars spent and minimize expenditures for new procurement. Before purchasing new property, access GSAXcess for any available excess personal property that may be suitable for your needs. You must use excess personal property unless it would cause serious hardship, be impractical, or impair your operations. (Impractical examples include if significant reimbursement for shipping or other cost outweighs current property value or new property values, if items do not match current area style, type, or size needed, etc.)

To process a transfer of excess property between AFRH and any other Federal Agencies contact the CFM for guidance and current Federal procedures.

Disposal of Excess Personal Property

Property becomes excess as a result of its unusable or unsafe condition or it is no longer needed. Annual utilization reviews and annual Administrator Walk-through inspections shall be performed at the end of the government fiscal year to identify inactive or underutilized property. Property that is inactive or underutilized as a result of repair or replacement needs shall be repaired or replaced if the cost for said repairs or replacements are within the funding of the current campus budget. If funding is not available in the current budget, the repairs or replacements shall be budgeted in a future budget and carried out when funding becomes available.

Non-Controlled Property with a value under \$10 that is inactive or underutilized due to lack of need may be destroyed or as excess property by the end user as they determine if their supervisor approves

Note: Excess property may not be taken for reuse outside of the facility by any personnel on the facility)

Controlled of any value and non-controlled property with a value of \$100 or more that is inactive or underutilized due to lack of need shall be documented by the PC (for controlled property) or the end user (for non-controlled property) as inactive or underutilized, and reviewed and approved for disposal by the AO of that area. The documentation along with justification as to why the property is no longer needed shall be submitted to the CFM to be declared excess personal property.

If the property is usable, the CFM will send out a notice to all managers indicating that the property will be declared excess within 30 days unless someone declares a need and claims the property for use. Once the CFM declares the property excess, the property shall become surplus, and the CFM shall provide guidance and current Federal procedures for to the AO for shipping the items to a Government Sale Center per FMR requirements.

If the property is not usable, the CFM will declare the property excess and instruct the AO on the appropriate method for destruction.

**27. Tracking
Government
Real Property:**

AFRH Real Property is maintained on the United States Army Real Property Inventory Roll. Annually, when the Annual Real Property Inventory Report is submitted to the

General Service Administration (GSA), AFRH shall submit all changes in real property status to the United States Army Corps of Engineers (USACE) to update the AFRH real property on the Army inventory rolls.

**28. Acquiring
Government
Real Property:**

Only as authorized by law shall AFRH acquire real property. If the law does not specify the acquisition method or process. AFRH shall adhere to the acquisition requirements and process of the FMR. When real property is acquired, the legal description along with a copy of the deed shall be forwarded to the USACE within 30 days of the purchase in order to add the property to AFRH Real Property Inventory.

**29. Excess
Government
Real Property:**

Only through an act of law or through the determination of the COO that a piece of real property is excess because it is no longer needed by AFRH shall AFRH declare that the piece of property is excess. In such a case, AFRH shall report the property as excess to GSA per FMR requirements and the USACE in order to remove the property from the AFRH Real Property Inventory of the Army inventory rolls. The COO

shall determine which Disposal Agency, as defined by the FMR, to utilize to dispose of the excess real property. Once the COO has determined the Disposal Agency, the FM shall work with that agency to provide all documentation, information, and data in order for the Disposal Agency to transfer or sale the real property per FMR requirements in a timely manner.

30. Lost, Stolen, or Damaged AFRH Property:

Definitions

Gross negligence is an act or omission of the individual(s) which constitutes misconduct, willful negligence, or a wanton and reckless disregard for the Government property.

Simple negligence is the failure or omission to observe, for the protection of Government interests, that degree of care, precaution and vigilance which the circumstances justly demand, whereby the Government suffers through loss, damage, destruction, or theft of Government property

Willful misconduct is any intentional wrongful or unlawful act or omission relating to Government property.

Action Procedures for lost, stolen, or damaged property

If AFRH property that is on the AFRH Property Inventory List or if a report is made that AFRH property valued at or over \$250 is lost, stolen, or damaged, then, the Administrator shall have procedures in place to initiate and conduct an inquiry to determine what happened; how it happened; where it happened; who was involved; when it happened and any evidence of negligence, willful misconduct or deliberate unauthorized use or disposition of the property.

If gross negligence, willful misconduct, or unauthorized use or disposition of the property is determined, the Administrator shall refer the matter to the COO. The COO shall determine whether administrative and/or legal actions should be taken against the responsible party and the amount of the full financial liability of the responsible party. (The full financial liability includes, but is not limited to, legal fees, administrative cost, loss of operational services, market value of property, and procurement cost.)

If simple negligence is determined in the lost, stolen, or damaged property, the responsible party shall be liable for the

full reimburse of the financial amount to replace or repair the property.

Federal employees are required to exercise the proper care to safeguard Government property. Failure to exercise minimum safeguards by a federal employee, which resulted in the loss, stolen or damaged property, may result in the employee being held financially liable for the loss, damage, destruction, or theft of Government property as well as receiving administrative disciplinary action(s). The COO shall determine if the employee's negligence to safeguard the Government property was a significant cause of the lost, stolen, or damaged property, and whether the employee is to be held financially liable and/or administratively disciplined.

31. Unclaimed Personal Property:

Personal property of Deceased Individuals

- Unclaimed personal property of deceased Residents shall be controlled and inventoried for three years.
- Unclaimed personal property of deceased military personnel transferred to AFRH under USC. Title 10 - Residents shall be controlled and inventoried the property for two years.
- Unclaimed personal property of deceased employees, visitors, or guest shall be controlled and inventoried per the federal regulations or local jurisdictions regulations that may be applicable.

Each type of unclaimed personal property shall be kept in a secure area with extreme limited access to limit the possibility of loss. No other items may be stored in the secure area. The Administrator is the Accountability Officer, as defined in section 24 "Tracking Personal Property", for the unclaimed personal property and may not delegate this duty.

After the required period to control and inventory the unclaimed personal property of the deceased individual, the property shall be considered a gift to the government. The facility may take possession and utilize the gifted property like all other government property. Because the property is a gift, it must be tracked like all gifted property to the Government. The Administrator may declare the property excess and dispose of the excess property as described in section 29 "Excess Personal Property".

Personal Property Abandoned or Lost and Unclaimed

Facilities shall either retain or dispose of unclaimed lost or abandoned personal property based on the need of the facility determined by the Administrator and the personal property requirements in this manual and the following paragraphs.

If the facility does not need the property, and the unclaimed property is definitely valued at less than \$500, the unclaimed property may be immediately abandoned or destroyed.

(Unclaimed personal property may be abandoned or destroyed without public notice when the estimated resale value of the property is less than \$500 in accordance with the provisions in FMR §102-36.330.). If the Administrator or their designee decides to abandon or destroy the unclaimed lost or abandoned personal property valued at less than \$500, title to the property immediately vests in the Government, and the federal facility is not required to hold the unclaimed property for 30 days in these circumstances. (In summary, this paragraph is referring to junk or trash found on the facility)

Facilities must hold unclaimed personal property lost or abandoned, which they wish to retain or that is valued at \$500 or more, for 30 calendar days from the date it was found.

Unless the previous owner files a claim, title to the property vests in the Government after 30 days per FMR §102-41.120.

If the facility does not need the property, and the unclaimed property is possibly valued at \$500 or more, the Administrator or their designee shall follow the procedures set forth in section 26 “Excess Personal Property”

For unclaimed personal property retained that is not cash, the unclaimed personal property becomes controlled property per section 24 “Tracking Personal Property” for 3 years. Tracking records must be maintained for official use by the facility for 3 years after title vests in the Government to permit identification of the property should the former owner file a claim for the property.

For unclaimed personal property that is cash or funds received from disposal of such property, the cash shall be deposited in the AFRH Trust Fund to cover any valid claim filed within this

3-year period. Records of the deposits must be maintained for 3 years by the facility and the CFOs office to verify any claim.

If a claim is filed after 30 days, and the property was sold, reimbursement of the property to the former owner must not exceed any proceeds from the disposal of such property, less the costs of the Government's care and handling of the property. If the property was abandoned or destroyed in accordance with FMR §102-41.125, or otherwise used or transferred, reimbursement of the property to the former owner must not exceed the estimated resale value of the property at the time of the vesting of the property with the Government, less costs incident to the care and handling of the property, as determined by the CFM through the General Services Administration, Office of Travel, Transportation, and Asset Management (MT), Washington DC per FMR §102-41.135.

32. Government-owned Vehicles (Includes all devices utilized to transport people or goods over land; examples golf cart, ATV, etc.):

AFRH shall procure trucks and cars through the GSA Fleet Vehicle program. Only hybrid or electric vehicles are to be procured through the GSA Fleet Vehicle program if a hybrid or electric vehicle is available or will be available within the next 120 days of the need for a new or replacement vehicle.

Before the Administrators may lease or purchase any vehicle, they must obtain the approval of such purchase in writing from the COO.

All operators will follow all applicable speed limits, AFRH safety guidance, and local traffic laws. Users are to follow local city and/or state traffic regulations in regards to their driving conduct.

Administrators shall establish SOPs that govern the appropriate users and usage of vehicles. At no time, shall vehicles other than street legal cars and trucks be utilized off of the Campus.

33. Driving AFRH Government-owned Vehicles:

All drivers of Government-owned vehicles are required to take the GSA sponsored National Safety Council's Online Defensive Driving Course. In addition, before driving a government-owned vehicle, employees are to ensure that the GSA Accident Reporting Kit (Form 1627) is in the glove compartment

34. Traffic Rules and Related Signage:

Administrators are to develop traffic rules and related signage for their facility that promote a safe environment for vehicle users and pedestrians. All traffic rules and related signage

developed for any AFRH facility shall conform to the Manual on Uniform Traffic Control Devices published by the Department of Transportation.

35. Parking Priorities:

Facilities must reserve official parking spaces, in the following order of priority per FMR §102-74.285 & §102-74.305 as applicable for a building:

- a. Official postal vehicles at buildings containing the U.S. Postal Service's mailing operations.
- b. Government-owned and leased vehicle.
- c. Parking for disabled of residents, patrons, and visitors drivers.
- d. Service vehicles, and vehicles of residents (except RVs), patrons, and visitors.
- e. Severely disabled employees ("disabled employee" means an employee who has a severe, permanent impairment that for all practical purposes precludes the use of public transportation, or an employee who is unable to operate a car as a result of permanent impairment who is driven to work by another. Priority shall require certification by the Agency's Medical Director).
- f. Executive personnel.
- g. Vanpool/carpool vehicles.
- h. Electric or Hybrid vehicles.
- i. Other privately owned vehicles of employees, on a space-available basis.
- j. Recreational Vehicles of Residents

**36. Home-to-Work
or Mass Transit-
to-Work
Transportation:**

No home-to-work or mass transit-to-work transportation shall be provided by AFRH, unless the COO determines the transportation meets the criteria set down in FMR 102-5.50.

37. Safety Processes:

Campus Operations personnel and all contractors who work for

AFRH or on AFRH property while doing maintenance or construction work are to adhere to all OSHA regulations dictated in OSHA Construction Industry Regulations (section 1926). Facilities may expand their safety requirements only after having their new safety requirements approved by the CFM.

38. Posting/Installing Signage, Notifications, Bulletins, and Flyers:

Signage, Notifications, Bulletins, and Flyers shall be posted/installed per the regulations stipulated in the most current DOT and/or ADA requirements in designated areas only as stipulated by the Administrator or their designee.

39. Flag Flying:

To create uniformity with most other federal agencies, AFRH campuses shall comply with the following flag policy standards established by General Service Administration.

1. Flag Disposal. The method of disposing of the Flag shall conform to the provisions set forth at 4 U.S.C. § 8(k).
2. Flag Size. The Flag dimensions authorized for executive agencies shall conform to the provisions of Executive Order 10834 (August 21, 1959), which is set forth at 4 U.S.C. § 1 note.. 9. Flying the Flag.
3. The Flag shall be flown:
 - a. Between sunrise and sunset 7 days per week. The times for raising and lowering the Flag are based on agency work schedules and availability of staffing to raise and lower the Flag;
 - b. If Flag is properly illuminated during hours of darkness, the Flag may be displayed 24 hours a day.
 - c. The Flag is not to be flown, for safety reasons, during high winds, severe storms or icy conditions.
4. The following is the recognized days for displaying the POW/MIA Flag. At a minimum, Campus shall display the POW/MIA Flay on these days.:
 - a. Armed Forces Day: Third Saturday in May
 - b. Memorial Day: Last Monday in May
 - c. Flag Day: June 14
 - d. Independence Day: July 4
 - e. National POW/MIA Recognition Day: TBD
 - f. Veterans Day: November 11

5. Time Frames for Half-Staffing the Flag. Provided below are the time frames for flying the Flag at half-staff upon the death of the following officials (as enumerated in 4 U.S.C. § 7, as amended).
 - a. PRESIDENT OF THE UNITED STATES: Period - 30 days from the day of death.
 - b. FORMER PRESIDENT OF THE UNITED STATES: Period - 30 days from the day of death.
 - c. VICE PRESIDENT OF THE UNITED STATES: Period - 10 days from the day of death.
 - d. FORMER VICE PRESIDENT OF THE UNITED STATES: Period - From the day of death until interment.
 - e. THE CHIEF JUSTICE OF THE SUPREME COURT: Period - 10 days from the day of death.
 - f. RETIRED CHIEF JUSTICE OF THE SUPREME COURT: Period - 10 days from the day of death.
 - g. ASSOCIATE JUSTICE OF THE SUPREME COURT: Period - From the day of death until interment.
 - h. SPEAKER OF THE HOUSE OF REPRESENTATIVES: Period - 10 days from the day of death.
 - i. MEMBER OF THE CABINET: Period - From the day of death until interment.
 - j. PRESIDENT PRO TEMPORE OF THE SENATE: Period - From the day of death until interment.
 - k. MAJORITY LEADER OF THE HOUSE OF REPRESENTATIVES: Period - From the day of death until interment.
 - l. MINORITY LEADER OF THE HOUSE OF REPRESENTATIVES: Period - From the day of death until interment.
 - m. U.S. SENATOR, U.S. REPRESENTATIVE, TERRITORIAL DELEGATE, OR RESIDENT COMMISSIONER FROM PUERTO RICO: Period - On the day of death and on the following day.
 - n. GOVERNOR OF STATE, TERRITORY OR POSSESSION: Period - From the day of death until interment.

- o. OTHER OFFICIALS, FORMER OFFICIALS OR FOREIGN DIGNITARIES: Period - As directed by the President.
- p. FEDERAL OFFICIALS: Period - On the day of death and on the following day (if requested). Location - The building where the official performed his or her duty and those buildings that are occupied by the official's department or agency in the same geographic area.
- q. STATE OFFICIALS (OTHER THAN THE GOVERNOR) AND OFFICIALS OF THE DISTRICT OF COLUMBIA: Period - On the day of death and on the following day. Location - At locations as requested throughout the State or in the District of Columbia.
- r. CITY OFFICIAL: Period - On the day of death and on the following day. Location - At locations as requested in the City where the official performed his or her duty
- s. MEMBER OF THE ARMED FORCES FROM ANY STATE, TERRITORY, POSSESSION, OR THE DISTRICT OF COLUMBIA WHO DIES WHILE SERVING ON ACTIVE DUTY: Period - As directed by proclamation or other order from the Governor of a State or the Mayor of the District of Columbia, pursuant to Public Law 110-41, the "Army Specialist Joseph P. Micks Federal Flag Code Amendment Act of 2007." Location - Throughout the State or the District of Columbia covered by the proclamation
- t. PROMINENT CITIZENS (NOT ENUMERATED IN STATUTE): Period – As directed by the President
- u. HISTORICAL EVENTS: Period – As directed by the President

Attachment

SENSITIVE PROPERTY

1. Computers, all microcomputers and personal computers, including desktop systems, work stations, laptops, notebooks, mainframes, minicomputers, handheld computers (palms), and other portables
2. External Computer Peripherals, including:
 - a. Printers.
 - b. Disk Drives, (Fixed and Removable Media).
 - c. Tape Drives.
 - d. CD and DVD Drives.
 - e. Scanners.
 - f. Monitors.
 - g. Terminals.
3. Cameras, all types.
4. Recorders and players, including, but not limited to, digital, laser, cassette, and reel-to-reel.
5. Radios.
6. Receivers.
7. Transceivers.
8. Televisions.

Facility Change Request Form (FCR)

Armed Forces Retirement Home

DIRECTIONS:

- Complete Sections A for all requests.
- Complete Sections B and C for renovation of space.
- Complete Sections D for a request for new space and Sections B and C if renovation is also needed.
- Complete Section E for change of function of space only.

Forward by e-mail or fax this completed form with the appropriate information to the Chief of Campus Operations.

A. CONTACT INFORMATION:		
Requesting Department/ Resident:		Date of Request
Contact Name:	Contact Phone:	Contact Email:
B. REQUEST FOR RENOVATION OF SPACE:		
Why is the renovation needed? Describe renovation needed in detail. What are the implications or impacts if the renovation is not approved? (Write on back if more space is required)		
Provide location (i.e. building name and room number(s); site area in reference to building; etc). Attach concept drawings/floor plans. Contact Campus Operations for pdf plans. It is not necessary to provide detailed plans because AFRH will determine feasibility, code issues, and engage architectural services where needed. (Write on back if more space is required)		
Address special requirements such as plumbing, electrical, etc. It is not necessary to provide detailed engineering of your project because AFRH will determine availability of supporting infrastructure, code issues, and engage engineering services where needed. (Write on back if more space is required)		
Space will be used for: A Resident <input type="checkbox"/> Resident Group <input type="checkbox"/> Resident Community <input type="checkbox"/> - An AFRH Staff Member <input type="checkbox"/> AFRH Staff <input type="checkbox"/> All Groups <input type="checkbox"/> Other <input type="checkbox"/>		
Will you need additional/new furnishings? Yes <input type="checkbox"/> No <input type="checkbox"/>		

If yes, itemize the furniture that will be needed: Provide catalog sheets or cut sheets if available. (Write on back if more space is required)

When does the work need to be completed?

Complete Section C regarding funding. Complete Section E if room function will be changing.

C. FUNDING INFORMATION:

What is the source of funds for the renovation? Self Campus Operations Corporate Project Grant RFAB

How much is available to commit to the project?

D. REQUEST FOR NEW SPACE:

Why is new space needed? What are the impacts or implications if allocation of new space is not granted? Provide building name, room number(s). (Write on back if more space is required)

Provide location (i.e. building name and room number(s); site area in reference to building; etc). Attach concept drawings/floor plans. Contact Campus Operations for pdf plans. It is not necessary to provide detailed plans because AFRH will determine feasibility, code issues, and engage architectural services where needed. (Write on back if more space is required)

Address special requirements such as plumbing, electrical, etc. It is not necessary to provide detailed engineering of your project because AFRH will determine availability of supporting infrastructure, code issues, and engage engineering services where needed. (Write on back if more space is required)

Space will be used for: : A Resident Resident Group Resident Community
- An AFRH Staff Member AFRH Staff All Groups

Have you identified a suitable location for this new space that may be available? Yes No

If space is currently occupied by another department, have you contacted current holder of the space provided? Yes No Do they support the concept?
Yes No

When is space needed?

Will the current space be vacated: Yes No If yes, explain the plans for the vacated space: (Write on back if more space is required)

IF RENOVATION OF THE SPACE IS NEEDED, PLEASE COMPLETE SECTIONS B AND C ABOVE. COMPLETE SECTION E IF ROOM FUNCTION WILL BE CHANGING.

E. REQUEST TO CHANGE FUNCTION OF SPACE: if more than one room is involved, attach additional page(s)

Location: _____
Room # (If Applicable) _____

Current Space Use _____

Requested Space Use Change _____

Justification for change: (Write on back if more space is required)

F. (OFFICE USE ONLY) REQUEST REVIEW & APPROVAL SIGNATURES

1. Chief of Campus Operations Review: _____ Date: _____

Circle One: (**No Issues Anticipated – Not Recommended**)

Comments (Required if Not Recommended):

2. Administrator Approval:		Date:
Circle One: (Approval - Rejected)		
Comments (Required if Rejected):		
3. Corporate Facility Manager Approval (if applicable):		Date:
Circle One: (Approval - Rejected)		
Comments (Required if Rejected):		
4. Chief Operating Officer Approval (if applicable):		Date:
Circle One: (Approval - Rejected)		
Comments (Required if Rejected):		
G. (OFFICE USE ONLY) BUDGET APPROVAL		
Facilities Planning, Design, and Construction budget estimate:		
<input type="checkbox"/> New Funding <input type="checkbox"/> Funding Reallocation <input type="checkbox"/> If reallocated, from which budget line/contract in which department?		
Approved CIP Budget (if applicable): <input type="checkbox"/>		
Campus Administrator Funding Reallocation Approval (if applicable):		Date:
Chief Financial Officer New Funding Approval (if applicable):		Date:
Circle One: (Approval - Rejected)		
Comments (Required if Rejected):		

Exhibit E



ARMED FORCES RETIREMENT HOME

AGENCY DIRECTIVE 10-7A

FACILITIES

5 MARCH 2020

AFRH FACILITIES MANAGEMENT PROGRAM

AUTHORITY: USC Title 16, Title 24, Title 29, Title 41, and Title 42.

- 1. PURPOSE:** To establish standards, guidance, requirements, and assign responsibilities for the Armed Forces Retirement Home (AFRH) Facilities Management Program.
- 2. CANCELLATION:** AFRH Agency Directive 10-7, dated November 5, 2014 and AFRH Agency Directive 10-4, dated December 4, 2014.
- 3. APPLICABILITY:** All individuals that enter or utilize any facility or property owned, operated, or leased by AFRH. This Directive should be read in conjunction with the enclosed AFRH Facilities Management Program Manual dated March 5, 2020, included herewith.
- 4. BACKGROUND:** The AFRH owns over 300 acres of land and several buildings that total approximately two million square feet of space that includes numerous pieces of equipment and furniture. Government agencies are required to protect and safeguard the properties put in their trust; as well as preserve, or even enhance, the value of said property. With that in mind, this Directive has been developed to document the standards, guidance, requirements, and responsibilities for the management of AFRH facilities and property.
- 5. POLICY:** In order to provide comprehensive standards, guidelines, and requirements for the appropriate management of AFRH facilities and property, both real and personal, that covers as many scenarios as possible including, but not limited to: construction, maintenance, transportation, property inventorying, property disposal, safety, security, historic preservation, energy conservation, water conservation, and a host of other areas required to operate and run an efficient organization that protects the public health, safety, welfare, and interest in or around AFRH property, the AFRH will utilize other established current codes, standards, and Government regulations. The list of resources that contain the codes, standards, or regulations that AFRH shall adhere to are provided in the AFRH Facilities Management Program Manual. The Manual is provided as an enclosure to this Directive.
AFRH addendums to the listed codes, standards, and/or deviations from applicable regulations that have gone through the appropriate Federal approval process shall be attached to this Directive or issued as Notices during the interim between revisions of this Directive.

If any standard, code, or regulation resource listed in the AFRH Facilities Management Program Manual conflicts with the other, the more stringent or restrictive criteria or requirement applies, unless the AFRH Chief Operating Officer (COO) deems a regulation supersedes a code and/or standard or the Agency's Corporate Facility Manager (CFM) deems a code supersedes a standard.

6. DEFINITIONS: Definitions pertaining to the AFRH Facilities Management Program are contained in the enclosed Facilities Management Manual.

7. RESPONSIBILITIES:

a. Chief Operating Officer (COO):

- (1) Ensures written policy is established regarding the Agency's Facility Management and usage. Periodically reviews subject policy and makes necessary changes.
- (2) Issues written Facilities Management Program policy and ensures regulations and laws are implemented. Determines the best use of AFRH property within the bounds of the United States law; ensures preservation, utilization or actions with AFRH property complies with all applicable regulations, and makes certain that users utilize AFRH property for its intended use and in the best interest of the AFRH mission.

b. Corporate Facility Manager (CFM):

- (1) Determines methodologies, approaches or alternatives used to achieve program or project objectives on/or with AFRH property defined by the COO which are confined by the standards, codes, and Federal Regulations for a Federal facility.
- (2) Makes interpretations related to facility codes and standards when the meaning is called into question. Performs inspections or have inspections performed by qualified entities to ensure that activities related to property management conform to the requirements listed in this Directive.
- (3) Executes policy development, policy analysis and implementation for the facility operations and preservation.
- (4) Implements and executes the responsibilities of the following Federal positions:

(a) Authority having jurisdiction (AHJ) "also known as the Building Code authority"- refers to the AFRH authority to which engineering documents are submitted for building permits or other approvals related to standards, codes, and property management regulations; strives to preserve the quality and value of AFRH property by ensuring that maintenance and construction standards are uniformly and equitably enforced, ensures that all properties are maintained and occupied for use in a safe and efficient manner, and ensure any and all repairs, construction, renovations, modifications, and/or alterations are installed per the standards, codes, regulations as stated in this Directive and in conformance with the best interest of the facility and its operation.

(b) Federal Preservation Officer (FPO) - the official designated by the Head of the Federal Agency responsible for coordinating that agency's activities under the National Historic Preservation Act of 1966, as amended, and Executive Order 11593 including nominating properties under that agency's ownership or control to the National Register.

(c) Senior Real Property Officer (SRPO) - responsible for monitoring the Agency's real property assets so that its assets are managed in a manner that is consistent with, and supportive of, the goals and objectives set forth in the agency's overall strategic plan and consistent with the real property asset management principles developed by the Federal Real Property Council.

(d) Senior Sustainability Officer (SSO) - shall perform the functions of the senior agency official designated by the Head of each Agency pursuant to section 3(d)(i) of Executive Order 13423 and shall be responsible for:

(1) Preparing the targets for Agency-wide reductions and the inventory of greenhouse gas emissions required under subsections 2(a), (b), and (c) of Executive Order 13514;

(2) Annually, preparing and submitting to the CEQ Chair and the Director, Office of Management and Budget (OMB) for their review and approval, a multi-year Strategic Sustainability Performance Plan (Sustainability Plan or Plan) as described in section 8 of Executive Order 13514;

(3) Preparing and implementing the approved Plan in coordination with appropriate offices and organizations within the Agency including the COO, General Counsel, Chief Information Officer, Chief Financial Officer, and in coordination with other Agency plans, policies, and activities;

(4) Monitoring the Agency's performance and progress in implementing the Plan, and reporting the performance and progress to the White House Council on Environmental Quality (CEQ) Chair and the Director, OMB, on such schedule and in such format as the Chair and the Director may require; and

(5) Reporting annually to the Head of the Agency on the adequacy and effectiveness of the Agency's Plan,

(e) Master Planner – shall be the point of contact for information on: AFRH National Environmental Policy Act (NEPA) documents; NEPA oversight activities; and review of other agencies' Environmental Impact Statements (EISs) and NEPA documents; responsible for classifying proposed actions and undertaking the level of analysis, consultation, and review appropriate to each; as well as implementing a Capital Improvement Plan.

(f) Lease Manager - oversees completion of all necessary paperwork in relation to all leased documents; work to ensure maximum occupancy of rentable space; coordinate promotions to increase number of tenants in rentable space; and manage tenant needs and repair issues.

c. Administrators:

(1) Ensures appropriate SOPs are created at their facility to manage, operate, and maintain the campus facilities per the resources listed in this Directive and the associates AFRH Addendum to those standards, codes, and regulations.

(2) Ensure implementation and necessary monitoring of all applicable standards in the facility manual, federal regulations, and United States laws at their facility.

(3) Ensure that the CFM reviews all facility alterations or modifications before implementation.

(4) Ensure any interpretations of Code or Standards by the CFM are enforced, and any interpretation of regulation or law by the COO are enforced.

(5) Ensure that the Campus Chiefs have all relevant and required signage posted in their respective areas.

(6) Ensure applicable Standard Operating Procedures (SOPs) are developed in each functional area concerning the day-to-day operation and use, and maintenance of the campus facility under their control.

(7) Provide facility-level oversight and guidance regarding the operation and use of their facility.

(8) Ensures cooperation and coordination between all participants responsible for the administration of any and all facility management standards, codes, regulations, and laws.

d. Campus Operations Chiefs: Review all resources listed in this Directive and the enclosed Manual. Implement all Facilities Management Directive requirements which are applicable in the areas and/or subject matters under their management, supervision, jurisdiction, or control.

e. Campus Operations Staff: Follow any Agency process for reviewing and approving all modifications and/or alterations to facilities.

8. PROCEDURES: Facility Management shall be conducted using the procedures and standards outlined in the attached Manual.

9. ACTION:

- a. AFRH follows the Facilities Manual within accordance of all applicable Federal regulations, guidance, and/or law.
- b. Each AFRH Administrator shall develop and issue any SOPs the Administrator deems necessary for implementing this Directive or the Facilities Manual attached within 120 days from the date of this Directive.



JAMES M. BRANHAM
Chief Operating Officer

Distribution:

All AFRH Employees (electronic copy)

Attachment:

AFRH Facilities Manual